

Route 1A-Vinnin Square  
Priority Corridor Study  
in Marblehead, Salem,  
and Swampscott



# Route 1A-Vinnin Square Priority Corridor Study

Marblehead, Salem, and Swampscott

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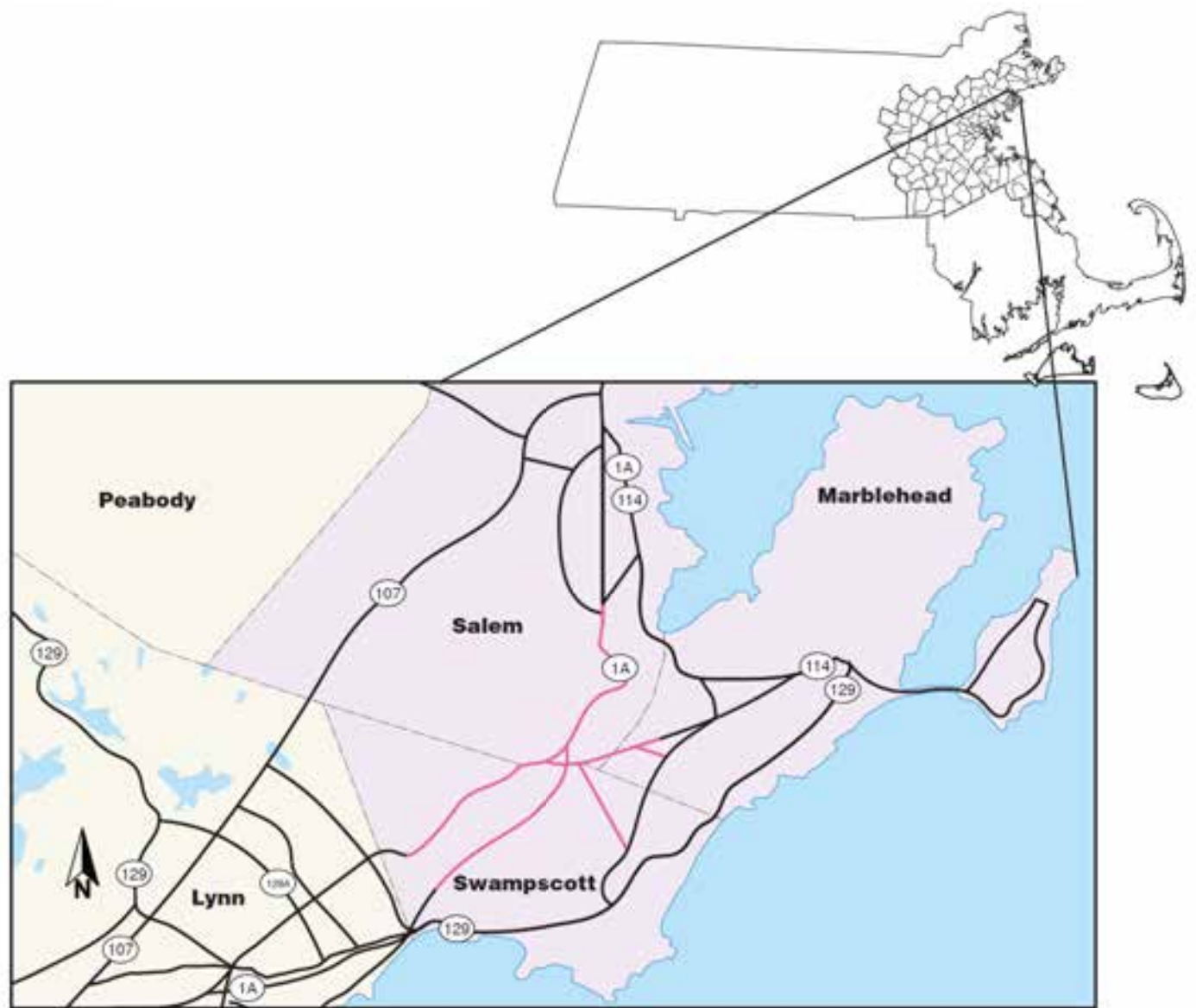
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## ABSTRACT

The Boston Region Metropolitan Planning Organization (MPO) selected Route 1A, and other roadways in and surrounding the Vinnin Square area in the Town of Swampscott, City of Salem, and Town of Marblehead, as the subject of a corridor study in federal fiscal year (FFY) 2016. The *Route 1A-Vinnin Square Priority Corridor Study* focuses on one of the locations identified in a regional needs assessment—conducted as part of the MPO’s Long-Range Transportation Plan, *Charting Progress to 2040*—used to guide investment decisions regarding transportation infrastructure improvements in the Boston region. The MPO prioritized this location for study after considering a number of factors: the need to address poor safety conditions and traffic congestion; the desire to enhance multimodal transportation; the need to maintain regional travel capacity; the interest in ensuring that, over time, corridor studies are funded in all subregions of the MPO’s planning area; and the potential for recommendations from the study to be implemented.

Vinnin Square is a large commercial district and residential area of multi-family homes located primarily in Swampscott and including a section of Salem. Traffic from Vinnin Square directly impacts Marblehead. Commercial and residential development has significantly increased in the past decade, and will possibly continue to expand into Marblehead. As a result, there are a growing number of pedestrians and bicyclists in Vinnin Square; however, the current roadway configurations there inhibit walking and bicycling, and traffic safety, congestion, and mobility have become challenging issues.

The MPO staff, working with the study’s advisory task force, developed improvements that would transform Route 1A and the ancillary streets around it into pedestrian- and bicyclist-friendly roadways, as well as a transportation corridor that serves all modes of transportation and maintains regional travel capacity. This study provides the City of Salem, the Towns of Marblehead and Swampscott, the Massachusetts Department of Transportation (MassDOT), and other stakeholders an opportunity to review, at a conceptual level, what would be required to address the deficiencies of Route 1A and the ancillary streets, before committing design and engineering funds to a roadway improvement project.

This report summarizes the analyses and recommendations from the study. The first sections describe the existing conditions in the study area and the problems that were identified. The following sections provide an assessment of the safety and operational problems, and discuss the potential improvements. The report also includes technical appendices, which cite the methods used and data applied in the study, including detailed reports about intersection capacity

analyses. If implemented, the report's recommendations would result in an improved roadway corridor where it is safe to walk or bicycle to the shops and businesses in Vinnin Square, recreational areas, and workplaces, and where traffic operates efficiently.

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# Chapter 1—Introduction

## 1.1 ORIGIN OF STUDY

During the past five years, the Boston Region Metropolitan Planning Organization (MPO) has conducted five studies of priority corridors identified through the Needs Assessment of the Long-Range Transportation Plan (LRTP), and municipalities have been receptive to them.<sup>1</sup> The studies provide cities and towns with the opportunity to review what is needed to improve a specific arterial segment, starting at the conceptual level, before committing design and engineering funds to a project. After reviewing the options, if a city or town initiates a project that qualifies for state and federal funds, the study's documentation may be useful to both the Massachusetts Department of Transportation (MassDOT) and the project proponent. The information provided in the study's report is useful for completing MassDOT Highway Division's project initiation forms, identifying problems along the corridor, justifying the need for improvements and for funding resources, and providing improvement concepts to advance into preliminary design and engineering.

The existing needs for all transportation modes in the MPO region were identified as part of the Needs Assessment of the LRTP, which guides the process of deciding which projects to fund in future Transportation Improvement Programs (TIPs). Current mobility needs in the MPO region, listed in the current LRTP, are as follows:

- Maintaining and modernizing roadways with high levels of congestion and safety problems
- Increasing the quantity and quality of walking and bicycling facilities
- Improving the efficiency of transit service and adherence to schedules

Based on previous and ongoing transportation-planning work—including the MPO's Congestion Management Process (CMP) and MPO planning studies—MPO staff identified several priority arterial roadway segments that require maintenance, modernization, and safety and mobility improvements, and listed them in the LRTP. To address the problems that exist in some of these arterial segments, a study was included in the federal fiscal year (FFY) 2016 Unified Planning Work Program (UPWP).<sup>2</sup> Through this study, MPO staff recommend

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<sup>1</sup> Boston Region Metropolitan Planning Organization, *Charting Progress to 2040: The New Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization*, endorsed by the Boston Region MPO on July 30, 2015.

<sup>2</sup> Boston Region Metropolitan Planning Organization, *Unified Planning Work Program, Federal Fiscal Year 2016*, endorsed by the Boston Region Metropolitan Planning Organization on July 30, 2015.

conceptual improvements for one or more corridors, or several small sections within a corridor, which were identified in the CMP and LRTP Needs Assessment process. MPO staff select locations for study—considering municipal, subregional, and other public feedback—and collect data, conduct technical analysis, and recommend improvements. Recommendations from the study are sent to implementing agencies, which may choose to fund improvements through various federal, state, and local sources, separately or in combination.

By focusing on arterial segments rather than intersections, planners can evaluate multimodal transportation needs comprehensively with the goal of creating “complete streets.” A holistic approach to analyzing problems and forming recommendations ensures that the needs of all roadway users—including pedestrians, bicyclists, motorists, and transit riders—are considered. Ultimately, this will result in roadways where it is safe to cross the street and walk or cycle to shops, schools, train stations, and recreational facilities, and where buses can run on time. Typically, the recommended improvements are within a roadway’s right-of-way and they take into account the needs of abutters and roadway users, and the interests and support of stakeholders.

# Chapter 2—Background and Objectives

## 2.1 SELECTION PROCESS

Following a selection process based on safety conditions,<sup>3</sup> congested conditions,<sup>4</sup> multimodal significance,<sup>5</sup> regional significance,<sup>6</sup> regional equity,<sup>7</sup> and implementation potential,<sup>8</sup> the *Route 1A-Vinnin Square Priority Corridor Study* in the City of Salem and Towns of Marblehead and Swampscott was selected and approved for study on April 2, 2015, by the MPO. The study location was selected from a list of 54 arterial segments in 39 municipalities in the MPO region.<sup>9</sup> A copy of the technical memorandum about the selection process is included in Appendix A. MassDOT Highway Division District 4, MassDOT Office of Transportation Planning, the City of Salem, and the Towns of Marblehead and Swampscott supported the study of the Vinnin Square area. They participated by collecting data needed for the analyses, reviewing documentation on existing conditions, identifying problems, and developing improvements to mitigate the problems.

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<sup>3</sup> Safety Conditions: The location has a higher-than-average crash rate for its functional class; contains a crash cluster that makes it eligible for Highway Safety Improvement Program (HSIP) funding; contains a crash location on MassDOT Highway Division's Top High Crash Locations Report; or has a significant number of pedestrian and bicycle crashes (two or more per mile).

<sup>4</sup> Congested Conditions: The travel time index is at least 1.3.

<sup>5</sup> Multimodal Significance: The roadway carries one or more bus routes or is adjacent to a transit stop or station; the roadway supports bicycle or pedestrian activities or there is a project planned that will support these activities; there is a need to accommodate pedestrians and bicyclists and improve transit on the roadway; or there is a significant amount of truck traffic on the roadway serving regional commerce.

<sup>6</sup> Regional Significance: The roadway is on the National Highway System; carries a significant portion of regional traffic (Average Daily Traffic of 20,000 vehicles or more); lies within 0.5 miles of environmental-justice transportation analysis areas or zones; or is essential for the region's economic, cultural, or recreational development.

<sup>7</sup> Regional Equity: To ensure that, over time, all subregions in the MPO's planning area receive UPWP planning studies, during each funding cycle MPO staff select no more than one location per subregion for potential study, and choose a location in a different subregion from the location studied in the preceding cycle.

<sup>8</sup> Implementation Potential: The study location is proposed by the jurisdictional agency or agencies for the roadway; proposed or prioritized by a subregional group; or identified as a priority for improvement by other stakeholders.

<sup>9</sup> Technical Memorandum, dated April 2, 2015, to the Boston Region Metropolitan Planning Organization, Federal Fiscal Year (FFY) 2016 Priority Corridors for Long-Range Transportation Plan (LRTP) Needs Assessment: Selection of Study Locations.

## 2.2 STUDY LOCATION

Figure 1 shows a regional map with the arterial roadway segments in the study area indicated in red (all figures are included at the end of the report). Vinnin Square is a large commercial district—made up of three large shopping areas with large chain stores, restaurants, and medical and office complexes—and residential area with numerous multi-family developments located primarily in Swampscott and a section of Salem. Traffic from Vinnin Square directly impacts Marblehead.

Vinnin Square is largely served by Route 1A (Paradise Road in Swampscott and Loring Avenue in Salem) and ancillary streets, including Essex Street, Tedesco Street, and Vinnin Street. All of the streets have two-lanes and widen at the major signalized intersections to include turn lanes. Over the past two decades, Vinnin Square has seen a high concentration of commercial and multi-family development. Swampscott, most noticeably, has seen a marked increase in development activity, which the town has encouraged in order to improve the viability of this commercial district. As a result, there is a growing number of pedestrians and bicyclists in Vinnin Square, and traffic safety, congestion, and mobility have become challenging issues. In addition, substantially more people from the neighboring residential areas on Route 1A, Loring Avenue, Essex Street, and Tedesco Street are walking, bicycling, and riding buses, and conditions for these users are expected to worsen in the future because of increasing congestion and lack of pedestrian and bicycle amenities.

## 2.3 STUDY VISION AND GOALS

The City of Salem and the Towns of Marblehead and Swampscott are envisioning a safe transportation network that would transform Vinnin Square into a vibrant area linking all three communities and that would balance the needs of motorists with the needs of pedestrians and bicyclists by increasing the quantity and quality of infrastructure for walking, biking, and bus transit.<sup>10</sup>

The goal is to improve the existing transportation system and make it more efficient by reducing congestion, increasing safety for motorists, pedestrians, and bicyclists; improving connectivity by closing gaps in the sidewalk network; providing continuous and usable shoulders or bike lanes; and connecting people to places to support economic activities and livable communities. Towards that end, the objectives of this study were as follows:

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<sup>10</sup> The Healthy Transportation Compact is a key requirement of the landmark transportation reform legislation, signed into law in June 2009, that aims to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment, and create stronger communities.



- Document existing problems.
- Examine traffic flow and capacity.
- Analyze safety for pedestrians, bicyclists, motorists, and bus riders.
- Determine pedestrian, bicyclists, motorists, and bus riders' needs.
- Develop multimodal transportation improvements.

## 2.4 PUBLIC PARTICIPATION

An advisory task force—composed of representatives from the City of Salem, Towns of Swampscott and Marblehead, MassDOT, and interest groups—was established to participate in this study. MPO staff met with the task force twice. In the first meeting they discussed the work scope and existing problems, such as lack of accommodation for bicyclists, long crosswalks, lack of pedestrian refuge areas, and high speeds of vehicles. In the second meeting, MPO staff presented the existing conditions, analyses, proposed improvements, and obtained comments. This report reflects the task force's feedback. Appendix A includes a list of task force members and their comments.

# Chapter 3—Characteristics of the Corridor

## 3.1 ROADWAYS

The roadways which were the focus of this study are shown in Figure 2 and listed below:

- Route 1A (Paradise Road) in Swampscott
- Route 1A (Loring Avenue) in Salem
- Essex Street and Loring Avenue in Salem and Swampscott
- Vinnin Street in Swampscott
- Tedesco Street in Marblehead
- Salem Street in Swampscott

Figure 3 shows the roadway jurisdiction, which identifies the authority and obligation of agencies to administer, control, construct, maintain, and operate a highway subject to the provisions of the Commonwealth of Massachusetts. When an agency has jurisdiction of a street or highway, that agency is responsible for the upkeep of that highway, including reconstruction, signing, and maintenance. All of these responsibilities remain with the agency until the jurisdiction is transferred to another authority.

Figure 4 shows the functional class of the roadways in and around the study area. The functional class identifies a roadway according to the character of traffic service that it is intended to provide and the degree of access to the roadway (access control). There are three roadway functional classifications: arterial, collector, and local roads. Arterial roadways provide the highest level of service for the longest uninterrupted distance, with some degree of access control. Collector streets provide a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials. Local roads primarily provide direct access to abutting land parcels, such as residential areas.

### 3.1.1 Route 1A

The 2.5 mile section of Route 1A (Paradise Road and Loring Avenue) in the study area is a two-lane undivided roadway with turn lanes at designated locations (mostly at signalized intersections). The roadway is directionally designated as a north-south principal arterial roadway under the jurisdiction of MassDOT. It connects Salem and several communities to the north—Danvers, Peabody, and Wenham—as well as Swampscott and several cities to the south—Lynn, Revere, Boston, Chelsea, and Everett. In addition, Route 1A provides access to Marblehead to the east via Tedesco Street. Route 1A is part of the National Highway System (NHS) program; as such, projects to improve

Route 1A are eligible for federal funds. Route 1A serves regional and local traffic, the right-of-way varies between 50 and 60 feet wide in the study area, and the posted speed limit varies from 30 to 35 miles per hour (mph) in both directions.<sup>11</sup>The land uses adjacent to the roadway are mixed—commercial, residential, and recreational.

### 3.1.2 Essex Street and Loring Avenue

The segment of Essex Street and Loring Avenue in the study area is approximately 0.75 miles long. The two roadways create a continuous artery, and thus are both directionally designated as north-south arterial roadways under the jurisdictions of the City of Salem (for Loring Avenue) and Town of Swampscott (for Essex Street). Both are two-lane undivided roadways with turn lanes at the signalized intersections. They connect to Vinnin Square and serve regional and local traffic. Both roadways are classified as minor arterials and they are not part of the NHS program. The right-of-way varies between 46 and 55 feet wide, and the posted speed limit is 30 mph in both directions. The land uses adjacent to the roadway are mixed—commercial, residential, and cemetery.

### 3.1.3 Tedesco Street and Vinnin Street

The segment of Tedesco Street and Vinnin Street in the study area is approximately 0.8 miles long. The two roadways create a continuous artery, and thus are both directionally designated as east-west arterial roadways under the jurisdictions of the Town of Marblehead (for Tedesco Street) and Town of Salem (for Vinnin Street). Both are two-lane undivided roadways with turn lanes at the signalized intersections. Both roadways, east of Route 1A, are classified as principal arterials on the NHS program, thus projects to improve them are eligible for federal funds. The right-of-way varies between 40 and 48 feet wide, and the posted speed limit is 35 mph in both directions. The land uses adjacent to both streets are mixed— residential, recreational, and commercial.

### 3.1.4 Salem Street

The approximately 0.3 mile section of Salem Street in the study area is a two-lane undivided roadway. The roadway is directionally designated as a north-south minor arterial roadway under the jurisdiction of the Town of Swampscott. Salem Street provides access to Vinnin Square and it connects via Vinnin Street and Sunbeam Lane. The roadway is classified as a minor arterial and it is not on the NHS program. The right-of-way is about 50 feet wide and the posted speed limit is 30 mph in both directions. The land uses adjacent to the roadway are mixed—commercial, recreational, and residential.

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<sup>11</sup> Right-of-way is defined as the land or interest therein, acquired for or devoted to a highway.

## 3.2 MAJOR INTERSECTIONS

Several minor arterials, collector streets, business driveways intersect Route 1A, Essex Street, and Tedesco Street to form signalized intersections. These intersections, shown in Figure 5, are described below. The intersections are listed from south to north.

### 3.2.1 Route 1A and Ellis Road Intersection

Ellis Road is a city-owned local street in Swampscott that intersects Route 1A to form a four-leg signalized intersection. MassDOT has jurisdiction over this intersection and is responsible for implementing improvements to the intersection. Each of the approaches to the intersection has one travel lane. The intersection is equipped with an Eagle DP 300 signal controller and has a semi-actuated traffic-control system with functioning push-button pedestrian signals. The signal equipment lacks an Opticom system for emergency preemption. The traffic signal heads are mounted on a mixture of mast-arm and post mounts. There are crosswalks on all legs of the intersection; however, the curb ramps do not meet MassDOT or American with Disabilities Act (ADA) standards as they lack detectable warning plates. A bus stop is located on each side of Route 1A south of the intersection. The land uses adjacent to the intersection are primarily residential, although, the Clarke Elementary School is located in the northwest corner of the intersection.

### 3.2.2 Route 1A and Vinnin Liquor Driveway Intersection

The driveway to Vinnin Liquors and Whole Foods is privately owned. It intersects Route 1A to form a three-leg signalized intersection. MassDOT, which has jurisdiction over this intersection, is responsible for implementing improvements to it. Each of the Route 1A approaches has one through travel lane in each direction and an exclusive left-turn lane on the southbound approach. The Vinnin Liquor and Whole Foods driveway has two travel lanes on its approach: one for left turns and one for right turns. The intersection is equipped with a Peek 3000E signal controller and has a fully actuated and coordinated traffic control system with functioning push-button pedestrian signals and an Opticom system for emergency preemption. The signal heads are mounted on a mixture of mast-arm and post mounts. There are crosswalks with curb ramps, but they do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Route 1A, but there are no bus stop signs, shelters, or benches. The intersection curb radii are adequate for trucks and buses servicing commercial and retail businesses in the area. The land uses adjacent to the intersection are mixed—commercial and residential.

### 3.2.3 Route 1A and Swampscott Mall and Vinnin Square Plaza Driveways Intersection

The driveways to Swampscott Mall and Vinnin Square Plaza are privately owned. They intersect Route 1A to form a four-leg signalized intersection. MassDOT has jurisdiction over this intersection. It is one of the critical intersections in the corridor as there are high traffic volumes on both Route 1A and the driveways. Near the intersection, Route 1A has two lanes on the northbound approach (an exclusive left-turn lane and through/right-turn lanes) and three lanes on the southbound approach (an exclusive left-turn lane, through lane, and exclusive right-turn lane). The Swampscott Mall driveway has three travel lanes on the approach (an exclusive left-turn lane, through lane, and exclusive right-turn lane), while the Vinnin Square Plaza driveway has two travel lanes (an exclusive left-turn lane and through/right-turn lanes). The intersection is equipped with a Peek 3000E signal controller and has a fully actuated and coordinated traffic signal system with an Opticom system for emergency preemption. The signal heads are mounted on a mixture of mast-arm and post mounts. There are functioning push-button pedestrian signals only for crossing Route 1A. There are no crosswalks or push-button pedestrian signals for crossing either of the mall driveways. The curb ramps do not meet MassDOT's standards because they lack detectable warning plates. A bus stop is located on each side of Route 1A, but neither has a shelter. The intersection curb radii are adequate for trucks and buses servicing commercial and retail businesses in the area. The land use in the vicinity is commercial.

### 3.2.4 Essex Street and Swampscott Mall Driveway Intersection

Essex Street and the Swampscott Mall driveway intersect to form a three-leg signalized intersection. The Town of Swampscott has jurisdiction over this intersection. Each of the Essex Street approaches has two travel lanes: on the southbound approach (an exclusive left-turn lane and a through lane) and on the northbound approach (an exclusive right-turn lane and a through lane). The mall driveway has two travel lanes at the approach: one for left turns and one for right turns. The intersection is equipped with a Peek 3000E signal controller and has a fully actuated traffic signal system with functioning pedestrian signals. The signal heads are mounted on a mixture of mast-arm and post mounts. There are crosswalks with curb ramps, but the ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Essex Street, but neither has a shelter. The intersection curb radii are adequate for trucks and buses. The land uses near the intersection are mixed—commercial and industrial.

### 3.2.5 Route 1A and Vinnin Street Intersection

Vinnin Street is a city-owned minor collector in Salem that intersects Route 1A to form a four-leg signalized intersection. MassDOT has jurisdiction over this intersection. Each of the Route 1A approaches has two travel lanes (a shared through/left-turn lane and a shared through/right-turn lane). Vinnin Street has two travel lanes on the eastbound approach (an exclusive left-turn lane and a through/right-turn lane) and three lanes on the westbound approach (an exclusive left-turn lane, through lane, and exclusive right-turn lane). The intersection is equipped with a Peek 3000E signal controller and has a fully actuated and coordinated traffic control system with functioning push-button pedestrian signals. An Opticom system for emergency preemption has been installed. The signal heads are mounted on mast-arm mounts. There are crosswalks with curb ramps, but they do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Route 1A, but neither has a shelter with a bench. The intersection curb radii are adequate for trucks and buses servicing commercial business activities. The land uses in the area are commercial—mostly retail services.

### 3.2.6 Vinnin Street and Loring Avenue Intersection

Vinnin Street intersects Loring Avenue, a city-owned street, to form a four leg signalized intersection. The City of Salem has jurisdiction over the roadways and the intersection. Loring Avenue's southbound approach has two travel lanes (an exclusive left-turn lane and through/right-turn lane) and three travel lanes on the northbound approach (an exclusive left-turn lane, through lane, and exclusive right-turn lane). Vinnin Street has two lanes on the westbound approach (an exclusive left-turn lane and through/right-turn lane) and one lane on the eastbound approach for all traffic movements. The intersection is equipped with a Peek 3000E signal controller and has a fully actuated and coordinated traffic signal system with functioning push-button pedestrian signals. The signal equipment has an Opticom system for emergency preemption. The signal heads for the traffic movements are mounted on mast-arm mounts. There are crosswalks with curb ramps, but the curb ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Loring Avenue, but neither has a bus shelter. The intersection curb radii are adequate for trucks and buses. The land uses in the area are mixed commercial and residential.

### 3.2.7 Route 1A (Paradise Road) and Route 1A (Loring Avenue) Intersection

Route 1A's local name changes at the Salem-Swampscott line from Loring Avenue on the Salem side to Paradise Road on the Swampscott side. Loring

Avenue intersects Route 1A to form a three-leg signalized intersection. MassDOT has jurisdiction over this intersection. Each of the approaches at the intersection has two travel lanes: the northbound approach has an exclusive left-turn lane and through lane; the southbound approach has a through lane and exclusive right-turn lane; and the eastbound approach has an exclusive left-turn lane and exclusive right-turn lane. The intersection is equipped with a Peek 3000E signal controller and has a fully actuated and coordinated traffic signal system with functioning push-button pedestrian signals. The signal heads are mounted on a mixture of mast-arm and post mounts and the equipment includes an Opticom system for emergency preemption. There are crosswalks with curb ramps at all corners of the intersection, but the curb ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Route 1A north of the intersection, but neither has a bus shelter. The intersection curb radii are adequate for trucks and buses. The land uses near the intersection are commercial and residential.

### **3.2.8 Vinnin Street and Salem Street Intersection**

Salem Street is a city-owned minor arterial in Salem that intersects Vinnin Street to form a three-leg signalized intersection. The City of Salem has jurisdiction over this intersection. Each approach of Vinnin Street has two lanes: the eastbound approach has an exclusive right-turn lane and through lane, and the westbound approach has a shared through/left-turn lane and through lane. Salem Street's northbound approach has two lanes, an exclusive left-turn lane and exclusive right-turn lane. The intersection is equipped with a Peek 3000E signal controller and has a fully actuated traffic signal system with functioning pedestrian signals and an Opticom system for emergency preemption. The signal heads are a mixture of mast-arm and post mounts. There are crosswalks with curb ramps, but the curb ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Salem Street. The intersection curb radii are adequate for trucks and buses. The land uses near the intersection are commercial and recreational.

### **3.2.9 Tedesco Street and Leggs Hill Road Intersection**

Leggs Hill Road is a town-owned collector street in Marblehead that intersects Tedesco Street to form a three-leg unsignalized intersection. The Town of Marblehead has jurisdiction over this intersection. All of the Tedesco Street approaches and Leggs Hill Road's southbound approach have one lane for all traffic movements. Tedesco Street is the major street at the intersection and its traffic is not controlled. Leggs Hill Road is the minor street and its traffic is controlled by a stop sign. The Town of Marblehead recently installed a crosswalk on Tedesco Street that is equipped with a rectangular rapid flash beacon, but Leggs Hill Road still lacks a crosswalk. There are curb ramps at the intersection,

but they do not meet MassDOT's standards since they do not have detectable warning plates. The land use near the intersection is residential.

### 3.2.10 Route 1A and Leggs Hill Road Intersection

Leggs Hill Road is a city-owned collector road in Salem that intersects Route 1A to form a three-leg unsignalized intersection. MassDOT has jurisdiction over this intersection. The intersection is located in a sharp horizontal curve that limits sight lines and distances for drivers on Route 1A. At the intersection, each approach of Route 1A has two lanes: the northbound approach has a through lane and right-turn lane, and the southbound approach has a through lane and left-turn lane. Leggs Hill Road westbound has one lane on its approach serving all traffic movements. Route 1A is the major street at the intersection and its traffic is not controlled. Leggs Hill Road is the minor street and its traffic is controlled by a stop sign. There is a sidewalk on the east side of Route 1A, but none on the west side. The sidewalk has curb ramps at Leggs Hill Road, but the curb ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. The crosswalk on Route 1A is located south of the intersection because of a horizontal curve that limits sight distance on Route 1A. There is no crosswalk on Leggs Hill Road connecting the sidewalks. A bus stop is located on each side of Route 1A. The intersection curb radii are adequate for trucks and buses. The land uses near the intersection are recreational and educational.

### 3.2.11 Route 1A and Harrison Road Intersection

Harrison Road is a city-owned road in Salem that intersects Route 1A to form a three-leg signalized intersection. MassDOT has jurisdiction over this intersection. The Route 1A approaches at the intersection have two lanes: the northbound approach has an exclusive left-turn lane and through/right-turn lane, and the southbound approach has an exclusive right-turn lane and through lane. Harrison Road's eastbound approach has one lane serving all traffic movements. The intersection is equipped with a TCT LMD 9200 signal controller and has a fully actuated and uncoordinated traffic signal system with functioning pedestrian signals, and an Opticom system for emergency preemption. The signal heads are mounted on mast-arm mounts. There are sidewalks on both sides of Route 1A and Harrison Road and crosswalks with curb ramps for crossing both streets, but the curb ramps do not meet MassDOT or ADA standards because they lack detect warning plates. A bus stop is located on each side of Route 1A south of the intersection; despite the large number of bus boardings and alightings at these stops, there are no shelters. The intersection curb radii are adequate for trucks and buses. The land uses near the intersection are residential and educational; Harrison Road provides access to the Salem State University South



Campus, which in the future will become the new site for the Horace Mann Laboratory School.

### **3.2.12 Route 1A and Pickman Road Intersection**

Pickman Road is a city-owned street that intersects Route 1A to form a three-leg signalized intersection. MassDOT has jurisdiction over this intersection. The Route 1A approaches have one lane serving all traffic movements at each approach. Pickman Road's eastbound approach has one lane serving all traffic movements. The intersection is equipped with an EPAC 300 signal controller and has a semi-actuated, uncoordinated traffic signal system with functioning pedestrian signals. The signal heads are mounted on both mast-arm and post mounts. The signal system has no Opticom system for emergency preemption. There are sidewalks on both sides of Route 1A and Pickman Road and crosswalks with curb ramps for crossing both streets, but the curb ramps do not meet MassDOT or ADA standards because they lack detectable warning plates. A bus stop is located on each side of Route 1A at the intersection. The intersection curb radii are adequate for trucks and buses. The land use near the intersection is primarily residential.

## **3.3 LAND USE AND DEVELOPMENT**

The map in Figure 6 shows the general land-use designation for the area surrounding the roadways that are the focus of this study. The land uses include, but are not limited to, residential, commercial, educational, park and recreation, and cemetery. Based on discussions with representatives from Marblehead, Salem, and Swampscott, the following are the recent and planned developments in the area that impact the area's traffic flow.

### **3.3.1 Potential Redevelopment of Existing and Vacant Parcels**

The City of Salem and the Towns of Marblehead and Swampscott expect redevelopment of some of the existing land parcels in the vicinity of Vinnin Square. Over the past decade, Vinnin Square has seen a high concentration of commercial and multi-family home development. Most notably, Swampscott has seen a marked increase in development activity, which the town has encouraged in order to improve the viability of this commercial district. In addition, the vacant parcel of land adjoining the Tedesco Country Club, which is part of an overlay district in both Marblehead and Salem, is zoned to allow for high-density residential development of 30 units per acre. Redevelopment of existing and vacant parcels is expected to continue at Vinnin Square into the future.

### **3.3.2 Salem School Swap**

Salem State University and the City of Salem have plans to move the

Horace Mann Laboratory School, which is currently located off of Route 1A (Loring Avenue) at the North Campus, to the South Campus off Harrison Road. According to the Salem News, Sasaki Associates, a planning firm based in Watertown, has been hired by the University to help put together plans for the University's North Campus.<sup>12</sup> Moving the Horace Mann Laboratory School to the South Campus would impact traffic on Route 1A, as access to Harrison Road is only available via Route 1A. The move would require that a comprehensive Safe Routes to School (SRTS) study be undertaken to identify appropriate routes to the new school, the needs of pedestrians and bicyclists, and safety improvements that would encourage students and parents to walk and bike to school. As Route 1A is the primary roadway connecting to Harrison Avenue, this section of Route 1A would need improvements to accommodate school buses and the additional traffic to the site during school openings and closings. Safety for pedestrians and bicyclists when crossing Route 1A is a priority and should be evaluated in light of the school swap. This study looked at improvements on Route 1A that would benefit or facilitate the school swap, but a comprehensive SRTS study is needed to address impacts on other streets.

### **3.4 PLANNED PROJECTS AND STUDIES**

Figure 7 shows the planned projects and previous studies that addressed the study area or its surroundings. The improvements developed in this study considered and incorporated recommendations from the previous studies.

#### **3.4.1 Canal Street Rail Trail Construction (Phase 2)**

The Canal Street Rail Trail project will construct 0.6 miles of shared-use, off-road path to close the gap between the Marblehead Rail Trail and the shared-use path that extends from Canal Street to Mill Street in Salem. The new trail will be 10 feet wide with two-foot shoulders. The project includes the relocation of a railroad spur. Funding for the project is programmed in the Boston Region MPO's FFY 2019 TIP. As of March 16, 2016, the project was at the 25 percent design stage.<sup>13</sup>

#### **3.4.2 Reconstruction on Canal Street, from Washington Street and Mill Street to Loring Avenue and Jefferson Avenue**

The improvements to Canal Street include reconstruction of the roadway pavement, curbing, and sidewalks. Wheelchair ramps and pedestrian crossings will be added where appropriate to improve pedestrian safety. Additional

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<sup>12</sup> [http://www.salemnews.com/...s/salem-state-unveils-early-vision-for-school-campus-swap/article\\_9e2cd695-1683-5215-8d77-8d3cde7d9cb8.html](http://www.salemnews.com/...s/salem-state-unveils-early-vision-for-school-campus-swap/article_9e2cd695-1683-5215-8d77-8d3cde7d9cb8.html)[11/6/2016 12:36:54 PM]

<sup>13</sup> MassDOT Highway Division, Project Information Database, based on data queried on November 7, 2016. <http://www.massdot.state.ma.us/highway/ProjectInfo.aspx>

improvements, such as tree plantings and ornamental lighting, and curb extensions will be incorporated. Pavement markings will be painted to define the parking areas and provide defined shoulder areas for use by bicyclists. Drainage improvements will be constructed, the roadway crown will be adjusted to provide a consistent cross slope, and locations that have settled will be repaired. Driveway access issues will be more clearly defined so that ways to improve safety for vehicles entering and exiting local businesses can be identified. Traffic signals at Mill Street and Washington Street and at Loring Avenue and Jefferson Avenue will be updated. This project was under construction as of October 15, 2016.<sup>14</sup>

### 3.4.3 Road Safety Audit, Route 1A (Loring Avenue), Salem

In collaboration with the City of Salem, the Salem State University Police Department, and MassDOT, a road safety audit (RSA) was conducted along the segment of Route 1A between Intervale Road and Harrison Road in Salem.<sup>15</sup> The RSA was conducted in response to concerns from the city and the university regarding safety along this section of roadway. Thirty-three crashes occurred on the roadway segment in the span of approximately three and a half years, including a fatal crash in June 2013 in which a pedestrian died. The crash rate for the segment is about 2.0 crashes per million vehicles entering, which is below the state average for principal arterials. The purpose of this RSA was to identify both short- and long-term safety improvements that could be made to increase safety along the corridor. Potential short-term, low-cost improvements could be considered by the responsible agency for immediate implementation, as appropriate. The *Route 1A-Vinnin Square Priority Corridor Study* considered the recommendations of the RSA in developing proposed improvements for that section of Route 1A.

### 3.4.4 Road Safety Audit, 450 Paradise Road (Route 1A) at Swampscott Mall in Swampscott

MassDOT identified the segment of Route 1A (Paradise Road) at the Swampscott Mall as a high crash cluster location for vehicles, based on 2010-12 crash data. Because it is a high-crash location, MassDOT required a RSA to be conducted.<sup>16</sup> Recommendations from the RSA are expected to be incorporated into MassDOT project number 607761, which primarily consists of improvements to Route 1A at the intersection of Swampscott Mall and Vinnin Square Plaza. The

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<sup>14</sup> Ibid

<sup>15</sup> Road Safety Audit, Loring Avenue, Salem, prepared for Massachusetts Department of Transportation, November 2013.

<sup>16</sup> Road Safety Audit, 450 Paradise Road (Route 1A) at Swampscott Mall in Swampscott, Massachusetts, Prepared for Massachusetts Department of Transportation, August 27, 2015.

*Route 1A-Vinnin Square Priority Corridor Study* considered the recommendations of the RSA in developing proposed improvements for that section of Route 1A.

### 3.4.5 Traffic Impact Study, Assisted-Living Residential Development

The purpose of this traffic impact study is to evaluate existing and projected traffic, operational, and safety conditions in the vicinity of the proposed assisted-living residential development located at 224 Salem Street in Swampscott, and identify measures to mitigate potential project-related traffic impacts on the surrounding roadways, if necessary. McMahon Associates reviewed the existing traffic operations and potential traffic impacts from the new facility and, based on the analysis, determined that the projected traffic increases associated with both the background traffic growth (traffic volumes projected for the area) and the traffic generated by the new assisted-living facility could be accommodated on the roadways in the area. In addition, the study determined that with the proposed facility in place, safe and efficient access will be provided to the site.<sup>17</sup>

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<sup>17</sup> Assisted Living Residential Development, Traffic Impact Study, Swampscott, Massachusetts, January 2015.

# Chapter 4—Existing Transportation

## 4.1 DATA COLLECTION

MassDOT Highway Division's Traffic Data Collection Section performed turning movement counts (TMCs) at the intersections in the study area in April 2016, while schools were in session. The counts were conducted during the weekday AM peak travel period (7:00 AM–9:00 AM), the weekday PM peak travel period (4:00 PM–6:00 PM), and the Saturday midday travel period (12:00 AM–2:00 PM). Heavy vehicles such as school buses, transit buses, and trucks were counted separately. Pedestrian and bicycle counts were conducted simultaneously with the TMCs.

In addition, the Traffic Data Collection Section conducted automatic traffic recorder (ATR) counts at five locations on Route 1A, Essex Street, Tedesco Street, and Salem Street. The ATR counts are continuous 48-hour traffic counts used to determine the average weekday traffic (AWDT) on a roadway. The Traffic Data Collection Section also collected spot-speed data at the same five locations. Similar to the ATR counts, the spot-speed data are continuous 48-hour records. The TMC, AWDT, and spot-speed data are included in Appendix B.

## 4.2 DAILY TRAFFIC VOLUMES

Figure 8 shows the AWDT at the five locations. The AWDT value ranges are as follows:

- 19,000 to 20,000 vehicles per day on Route 1A
- 18,000 to 19,000 vehicles per day on Essex Street and Loring Avenue
- 15,000 to 16,000 vehicles per day on Tedesco Street
- 6,000 to 7,000 vehicles per day on Salem Street

Figure 9 shows the daily distribution of the hourly traffic volumes at the five locations. The daily distributions show peak-period volumes in the range of 800 to 1,000 vehicles per hour (vph) in both directions of Route 1A. Outside of the AM and PM peak periods, the traffic volumes in each direction of Route 1A are in the range of 400 to 600 vph. The estimated capacity of a two-lane roadway is about 800 to 1000 vph per direction, and the capacity of a four-lane roadway is about 1,600 to 1,800 vph per direction. Therefore a two-way, two-lane roadway should be adequate for traffic on Route 1A and the ancillary streets, except at the signalized intersections where turn lanes are justified.

### 4.3 TURNING MOVEMENT VOLUMES

Figure 10 shows the turning movement volumes at the major intersections during the weekday AM peak hour (7:30–8:30 AM), weekday PM peak (4:45 PM–5:45 PM), and Saturday PM peak (12:00–1:00 PM). Based on the turning movement volumes, MPO staff determined the following:

- The traffic in the corridor consists of pass-through commuter traffic and traffic going to shopping, school, and recreational destinations in the study area.
- The peak flow direction is southbound during the AM peak period and northbound during the PM peak period.
- The following are the critical intersections controlling traffic flow in the corridor:
  - Route 1A at the driveway to Vinnin Liquor and Whole Foods
  - Route 1A at the driveway to Swampscott Mall
  - Route 1A at Vinnin Street
  - Route 1A at Loring Avenue

### 4.4 PEDESTRIAN TRAFFIC VOLUMES

Table 1 presents the number of pedestrians observed at the major intersections in the study area during the two-hour weekday AM peak period and the two-hour weekday PM peak period on Tuesday, April 12, 2016, and the two-hour Saturday PM peak period on April 9, 2016. These volumes may be low because of the colder than usual weather in April and the high traffic volume during peak periods. Nonetheless, significant pedestrian activity was observed in the corridor as people walked to access residential and recreation areas, schools, and commercial services.

**TABLE 1**  
**Pedestrian and Bicycle Volumes**

Intersection	Pedestrians	Bicyclists
Route 1A at Ellis Road	98	7
Route 1A at Vinnin Liquor Driveway	42	4
Route 1A at Swampscott Mall	58	3
Route 1A at Vinnin Street	42	2
Route 1A at Loring Avenue	18	7
Route 1A at Leggs Hill Road	11	7
Route 1A at Harrison Road	32	11
Route 1A at Pickman Road	24	0
Essex Street and Swampscott Mall Driveway	30	8
Loring Avenue at Vinnin Street	21	4
Vinnin Street at Salem Street	8	5
Tedesco Street at Leggs Hill Road	9	4

Source: Central Transportation Planning Staff.

#### 4.5 BICYCLE TRAFFIC VOLUMES

Table 1 presents the number of bicyclists observed at the major intersections in the study area during the two-hour weekday AM peak period and the two-hour weekday PM peak period on Tuesday, April 12, 2016, and the two-hour Saturday PM peak period on April 9, 2016. These volumes may be low because of the colder than usual weather in April, high traffic volume during peak periods, and the lack of amenities that provide safety and comfort for bicyclists, such as functioning shoulders or bike lanes. Despite these adverse conditions, the counts indicate that bicyclists are using the area roadways.

#### 4.6 HEAVY VEHICLES VOLUMES

The percentage of heavy vehicles (light-goods vehicles, buses, single-unit trucks, and semi-trucks) observed at the intersections ranges between 2.0 and 5.0 percent of the total traffic on a weekday and between 1.0 and 3.0 percent on a Saturday. These rates are not considered particularly high for peak-period traffic conditions. The percentages of heavy vehicles are included in the TMC in Appendix B.

#### 4.7 SPOT SPEEDS

Figure 11 shows the results of the spot-speed data collected on the roadways in the study area. Spot speeds are vehicle speeds observed at a specific location. The data gathered in spot-speed studies are useful for making decisions about safety applications, such as setting speed limits, evaluating speed problems, and assessing speed as a contributing factor in crashes. The average spot speeds observed in the corridor range between 25 and 32 mph, close to the 30 mph posted speed limit, except for the segment of Route 1A in the vicinity of Leggs Hill Road in Salem, where the average spot speed was 36 mph. In addition, 85 percent of the drivers were travelling at 37 mph or slower, except for the segment of Route 1A in the vicinity of Leggs Hill Road, where the drivers travelled at 42 mph. The spot-speed data indicated that about 62 percent of the drivers travel between 29 and 39 mph, which is known as the 10-mph-pace speed. The data and analysis shows that the observed speeds on the Route 1A segment in the vicinity of Leggs Hill Road are considerably higher than the posted speed limit.

#### 4.8 SIGNAL TIMING AND LAYOUT INFORMATION

MassDOT provided the MPO staff with the existing signal timings, as-built traffic signal plans, and signal-phase sequences of the signalized intersections (included in Appendix C). MPO staff used Google Maps and field visits to identify recent modifications to the intersection layouts and signal plans. The information was used to analyze existing traffic operations conditions.

## 4.9 BUS SERVICE

There are several public transportation services operating in the study area, including bus and commuter rail services. These are displayed in Figure 12, a transit service map. The MBTA operates four bus routes in the study area:

- Route 441: Marblehead – Haymarket (Boston) or Wonderland Station (Revere) via Paradise Road
- Route 448: Marblehead – Downtown Crossing (Boston)
- Route 455: Salem Depot – Wonderland (Revere) via Central Square (Lynn)
- Route 459: Salem Depot – Downtown Crossing via Logan Airport (Boston) and Central Square (Lynn)

These services connect the communities in the study area to Central Square Station in Lynn on the Newburyport Commuter Rail Line; Wonderland Station on the Blue Line in Revere; Logan Airport in East Boston; and downtown Boston, including South Station. Routes 441 and 448 operate Monday through Friday every 15 minutes from 5:13 AM to 12:28 AM, and Saturday and Sunday every 30 minutes from 6:06 AM to 12:39 AM. Routes 455 and 459 operate Monday through Friday every 20 minutes from 5:10 AM to 12:30 AM, and Saturday and Sunday every 30 minutes from 6:05 AM to 11:35 PM. The schedules of the four bus routes are included in Appendix D.

Figure 13 shows the bus stop locations and number of riders (boarding and alighting) at the heavily used stops. Only one stop in the entire study area had a bus shelter (Essex Street at Carol Way). The lack of bus shelters creates inconveniences for passengers, especially during inclement weather.

Table 2 shows the results of the evaluation of bus routes as measured against the MBTA's service standards for span of service (hours during which the service operates), frequency of service, vehicle loading (passenger crowding based on the number of passengers to seats), schedule adherence, daily ridership, and average number of passengers per trip. These standards establish acceptable levels of service required to meet the MBTA's service objectives for accessibility, reliability, safety and comfort, and cost effectiveness of service. The evaluation was based on the MBTA's 2010 service delivery policy standards and the spring 2011 schedule.

The performance evaluation showed that MBTA bus Routes 441, 455, and 459 all had high levels of ridership, but all failed the frequency of service and vehicle loading standards; additional resources would be required to bring those routes up to the standard. Bus Route 448 had low ridership and failed the span of service standard.



**TABLE 2**  
**Bus Service Evaluation, 2010–11**

Route	Route Description	Span of Service	Frequency of Service	Vehicle Loading	Schedule Adherence	Daily Ridership	Average Number of Passengers per Trip
441	Marblehead – Haymarket (Boston) or Wonderland Station (Revere) via Paradise Road	Pass	Fail	Fail	49.0%	1,442	37
448	Marblehead – Downtown Crossing (Boston)	Fail	Pass	Pass	49.0%	162	32
455	Salem Depot – Wonderland (Revere) via Central Square (Lynn)	Pass	Fail	Fail	42.0%	1,797	42
459	Salem Depot – Downtown Crossing via Logan Airport (Boston) and Central Square (Lynn)	Pass	Fail	Fail	37.0%	1,085	43

Notes: The performance standards listed in this chart are defined in the MBTA's 2010 Service Delivery Policy.

The evaluation was based on the MBTA's spring 2011 schedule.

"Pass" means the bus service meets the performance standards established for that service standard. "Fail" means the bus service does not meet the performance standards established for that service objective.

"Span" is based on the 2010 service delivery policy standard for the route type and spring 2011 schedule; the goal is local routes weekday span from 7:00 AM to 6:30 PM; correcting this failure would always require additional resources.

"Frequency" is based on 2010 service delivery policy standard for the route type and spring 2011 schedule; the goal is local routes AM and PM peak, 30-minute headway; correcting this failure would always require additional resources.

"Loading" is based on the 2010 service delivery policy and same ridership data used above; the standard is less than 140 percent of seated load averaged over 30-minute period during peak periods and less than 100 percent of seated load averaged over 60-minute period during off-peak periods; correcting this failure would always require additional resources.

"Schedule Adherence" is based on the 2010 service delivery policy (the definition of this service objective varies by frequency of service and time point crossings for start/mid/endpoints of the bus route); percentage shown is the proportion of all time point crossings during fall 2010, which were on time; the goal is 75 percent on time. Correcting this failure would NOT always require additional resources.

Source: Massachusetts Bay Transportation Authority.

## 4.10 COMMUTER RAIL SERVICE

The MBTA's Newburyport/Rockport Commuter Rail Line has stations in Swampscott and Salem. Many of the commuter rail riders from the communities in the study area access the commuter rail stations via Route 1A or Essex Street and Loring Avenue. The MBTA operates a full schedule Monday through Friday from 4:55 AM to 12:00 AM and an abbreviated service on Saturday and Sunday from 7:00 AM to 11:11 PM. (The full train schedules are included in Appendix D.) Peak-period frequency for both the inbound and outbound trains is approximately 40 minutes. The typical weekday boarding (inbound trains) at the Salem Station and Swampscott Station are 2,122 and 884 passengers, respectively.

At Salem Station, the MBTA provides 329 parking spaces; 67 percent of the spaces are utilized on an average day. The City of Salem offers another 120 parking spaces near the station; 88 percent are utilized on an average day. At Swampscott Station the MBTA provides 125 spaces; 90 percent are utilized on an average day. In addition, the Town of Swampscott provides 18 spaces; 100 percent are utilized on an average day. The parking rate is \$4.00 daily at both Salem Station and Swampscott Station.

# Chapter 5—Existing Conditions Analyses

## 5.1 SAFETY ANALYSIS

MPO staff used crash data from MassDOT's Registry of Motor Vehicles database and from municipal police departments for the time period from January 2011 through December 2014 to evaluate safety for motorists, pedestrians, and bicyclists in the study area. The following sections describe the analyses and results of this safety assessment.

### 5.1.1 Crash Summary

Figure 14 shows the motor-vehicle crash clusters in the study area, and Figure 15 shows the pedestrian- and bicycle-crash clusters. Table 3 presents the crash summaries and crash rates for each cluster. The summary indicates the severity of the crashes; manner of collision; road-surface, ambient-light, and weather conditions at the time of the crashes; number of bicyclists and pedestrians involved; and time of occurrence. The crash data for each individual crash in each cluster is included in Appendix E.

**TABLE 3**  
**2011–14 Crash Summary and Crash Rates**

<b>Crash Variable</b>	<b>Cluster 1</b>	<b>Cluster 2</b>	<b>Cluster 3</b>	<b>Cluster 4</b>	<b>Cluster 5</b>	<b>Cluster 6</b>	<b>Cluster 7</b>
<b><i>Crash Severity</i></b>	--	--	--	--	--	--	--
Fatal injury	0	0	0	0	1	1	0
Non-fatal injury	26	7	24	3	7	17	33
Property damage only	35	14	47	12	17	48	11
Unknown/not reported	12	0	3	2	0	2	7
<b><i>Manner of Collision</i></b>	--	--	--	--	--	--	--
Rear-end	32	11	15	5	13	42	13
Angle	24	0	38	5	5	13	25
Single vehicle crash	7	4	5	6	5	7	4
Sideswipe, same direction	5	2	6	0	1	3	3
Head-on	3	2	8	1	0	0	1
Sideswipe, opposite direction	2	0	2	0	1	2	1
Not reported/unknown	0	0	0	0	0	2	4
<b><i>Road Surface Conditions</i></b>	--	--	--	--	--	--	--
Dry	59	13	50	15	21	46	36
Wet	13	5	21	2	5	22	11
Sand, dirt, gravel, and water	0	0	0	0	0	0	0
Snow/ice	0	0	3	0	0	0	1
Not reported/unknown	1	3	0	0	0	0	3
<b><i>Ambient Light Conditions</i></b>	--	--	--	--	--	--	--
Daylight	62	15	53	9	22	49	34
Dark, lighted roadway	10	3	15	8	1	16	9
Dark, unlighted roadway	0	1	1	0	1	0	1
Dawn	0	0	2	0	1	0	1
Dusk	0	0	3	0	0	3	4

Crash Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Not reported/unknown	1	2	0	0	0	0	2
<b>Weather Conditions</b>	--	--	--	--	--	--	--
Clear	43	12	46	15	19	46	33
Cloudy	17	5	6	1	3	6	8
Rain	10	2	19	1	3	13	7
Snow/ice/freezing rain	0	0	3	0	0	2	1
Not reported/unknown	0	2	0	0	0	0	2
<b>Bicyclists and Pedestrians Involved</b>	--	--	--	--	--	--	--
Bicyclist	0	0	1	2	1	0	0
Pedestrian	1	2	1	0	1	2	2
<b>Time Period</b>	--	--	--	--	--	--	--
Peak period	15	3	18	6	2	20	10
Off-peak period	58	18	56	11	23	48	41
<b>Total crashes</b>	<b>73</b>	<b>21</b>	<b>74</b>	<b>17</b>	<b>25</b>	<b>68</b>	<b>51</b>
<b>Four-year average (rounded) Segment crash rate</b>	<b>7.33</b>	<b>2.55</b>	<b>4.33</b>	<b>3.38</b>	<b>2.57</b>	<b>6.13</b>	<b>2.11</b>
<b>Average statewide crash rate for roadway segment (based on functional classification of roadway)</b>	<b>3.49</b>	<b>3.65*</b>	<b>3.49</b>	<b>3.49</b>	<b>3.49</b>	<b>3.49</b>	<b>3.49</b>

Note: The AM peak period is 7:00 AM–9:00 AM; the PM peak period is 4:00 PM–6:00 PM.

Cluster 2 is on a minor arterial.

Shading denotes segment crash rate higher than the statewide average.

Source: Central Transportation Planning Staff.

According to the analysis results presented in Table 3, the predominant crash types were rear-end, angle, and single-vehicle crashes. Together, those types of crashes constituted between 75 percent and 85 percent of the crashes in the corridor. Some of the crashes occurred because of motorists failing to yield right-of-way, following too close, and being inattentive or distracted. However, lack of turn lanes contributed to the high number of turn-related crashes on Route 1A at the Swampscott Mall area and Vinnin Square, as seen in Clusters 1 and 3. High vehicular speeds, a sharp horizontal curve, limited sight distance, and inadequate signage also contributed to the crashes in Cluster 5. Also, recurring traffic queues contributed to the high number of rear-end collisions in Clusters 1, 6, and 7. Eleven pedestrian and bicycle crashes occurred at midblock locations or at intersections.

The crash rates for the roadway segments within the crash clusters (segment crash rates) ranged between 2.11 and 7.33 crashes per million vehicles-miles traveled (MVMT). The most recent 2016 statewide average crash rate for an urban principal arterial was 3.49 crashes per MVMT and 3.65 for a minor

arterial.<sup>18</sup> Crash Clusters 1, 3, and 6 had segment crash rates that exceeded the statewide average for a principal arterial. The segment crash rate for Cluster 2 was below the state average for minor arterials. The segment crash rates for Clusters 4, 5, and 7 were below the state average for a principal arterial.

### 5.1.2 Collision Diagrams

Figures 16-21 show the collision diagrams for crashes within each crash cluster. MPO staff used available police crash reports to prepare the collision diagrams; however staff were not able to obtain police crash reports for every crash. Therefore, the figures only show those crashes for which a police-drawn sketch of the crash scene was available. Collision diagrams are useful for examining patterns and developing safety strategies. The numbers in the collision diagram uniquely identify each crash and may be used to cross-reference the crash records. The collision diagrams, along with the crash records, are included in Appendix E.

## 5.2 TRAFFIC OPERATIONS ANALYSES

Staff conducted traffic operations analyses consistent with the Highway Capacity Manual (HCM) methodologies.<sup>19</sup> HCM methodology is used to assess traffic conditions at signalized and unsignalized intersections and rate the level-of-service (LOS) from A to F. LOS A represents the best operating conditions (little to no delay), while LOS F represents the worst operating conditions (long delay). LOS E represents operating conditions at capacity (the limit of acceptable delay). Table 4 presents the control delays (standards for comparison) associated with each LOS for signalized and unsignalized intersections.

**TABLE 4**  
**Intersection Levels-of-Service Criteria, 2010**

<b>Level of Service</b>	<b>Signalized Intersection Control Delay (seconds per vehicle)</b>	<b>Unsignalized Intersection Control Delay (seconds per vehicle)</b>
A	<10	<10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	> 80	> 50

Source: Highway Capacity Manual 2010.

<sup>18</sup> Published by MassDOT, based on crash information queried on January 8, 2016. Massachusetts Department of Transportation website, crash rates, <http://www.massdot.state.ma.us/highway/Departments/TrafficandSafetyEngineering/CrashData/CrashRates.aspx>

<sup>19</sup> Highway Capacity Manual 2010, Transportation Research Board of the National Academies, Washington, DC, December 2010.

Using the traffic and signal data collected, MPO staff built traffic analysis networks for the weekday AM and PM peak hours and the Saturday PM peak hours. Synchro traffic simulation software was used to assess the capacity and quality of traffic flow.<sup>20</sup> Figures 22-24 show the results of the existing conditions analyses in terms of LOS and delays for the weekday AM, weekday PM, and Saturday PM peak hours, respectively. The existing conditions LOS analysis worksheets are included in Appendix F.

With the exception of the intersection of Route 1A (Paradise Road) and Vinnin Street, none of the intersections in the corridor appeared to be failing. In general, traffic congestion in the study area was restricted to peak travel periods—because of the high volume of commuter and shopping trips—and confined to the following locations:

- Route 1A at Swampscott Mall
- Vinnin Square (Route 1A, Loring Avenue, and Vinnin Street)
- Leggs Hill Road at Tedesco Street

The high weekday PM peak period delay on Route 1A at Pickman Road is the result of traffic congestion and queues created at the intersection of Route 1A and Canal Street and Jefferson Avenue. At the time this report was published, this intersection was under construction and the proposed improvements were expected to reduce congestion and queues.

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<sup>20</sup> Trafficware Inc., Synchro Studio 9.1, Synchro plus SimTraffic, Build 909, Revision 20, Sugar Land, Texas.

# Chapter 6—Problems and Issues

## 6.1 OVERVIEW

As Vinnin Square developed commercially and residentially in recent years, traffic volumes and the number of pedestrians and bicyclists in the area increased. As a result, traffic safety, congestion, and mobility have become challenging issues. In addition, there is a growing need to improve mobility for residents of the neighborhoods adjacent to Vinnin Square, and to provide connections to enable them to access Vinnin Square and other destinations, such as recreational areas and schools.

Because the study area is large and specific segments of the area's roadways have unique problems, MPO staff divided the roadways in the study area into segments based on roadway character, land use, crash experience, and jurisdiction and ownership. The resulting roadway segments from south to north are as follows:

1. Route 1A from Ellis Street to Longwood Drive
2. Route 1A at Swampscott Mall
3. Essex Street and Loring Avenue, south of Vinnin Square
4. Vinnin Square
5. Tedesco Street, from Vinnin Square to Leggs Hill Road
6. Route 1A from Vinnin Square to Leggs Hill Road
7. Route 1A from Leggs Hill Road to Sumner Road

For each of the six roadway segments, MPO staff identified the problems and developed recommendations for addressing them. A summary of the problems identified on each segment are presented in Figure 25. They were identified through analyses of traffic and safety data, field reconnaissance, and discussions with the advisory task force. They include, but are not limited to, pedestrian and bicyclist issues, traffic safety and operations problems, and access management and control issues. Figures 26-31 show photographs of some of the problems identified on the roadway segments.

## 6.2 PEDESTRIAN AND BICYCLIST PROBLEMS

Figures 26, 29, and 30 show some of the challenges facing pedestrians and bicyclists in the study area. The following are some of the reasons why the roadways are considered unfriendly for pedestrians and bicyclists:

- Wide roadways create inequity by placing too much emphasis on vehicular use and by encouraging higher vehicle speeds, which puts pedestrians and bicyclists at risk.

- A lack of shoulders or bike lanes makes the roadways uncomfortable for bicyclists.
- Sidewalks are too close to the travel lanes, which creates an uncomfortable environment for pedestrians.
- A lack of crosswalks at some major intersections and side streets makes crossing challenging for pedestrians and puts them at risk.
- Obstructions in crosswalks, non-ADA compliant curb ramps, broken sidewalks, and sidewalk connectivity problems (gaps) create an unfriendly environment for pedestrians, especially for people with disabilities.
- A lack of bus shelters at heavily used stops creates problems for riders, especially during inclement weather.

### **6.3 TRAFFIC SAFETY AND OPERATIONS PROBLEMS**

Figures 28 and 31 show some of the traffic congestion and operations problems facing motorists. They include the following:

- High vehicular speeds at the sharp horizontal curve on Route 1A at Leggs Hill Road results in many crashes.
- Outdated signal-timing plans need to be updated to make the flow of traffic efficient through the study area.
- High volumes of traffic on Route 1A and Vinnin Street creates congestion at Vinnin Square and the Swampscott Mall area.
- Lack of turn lanes and traffic queues cause a high number of crashes on Route 1A at the Swampscott Mall, Vinnin Square, and Route 1A between Harrison Road and Sumner Road.

### **6.4 ACCESS CONTROL AND MANAGEMENT PROBLEMS**

Developing Vinnin Square and the Swampscott Mall into a vibrant destination with direct linkage to surrounding neighborhoods would require roadway, streetscape, and landscape improvements to accommodate all road users.

Presently, the numerous driveways along the corridor contribute to many crashes in the square, and a lack of trees and greenery makes an unwelcoming environment for pedestrians and bicyclists.



# Chapter 7—Improvements

## 7.1 TIME FRAME

MPO staff worked with the study’s advisory task force to develop short-term, medium-term, and long-term strategies for addressing the pedestrian and bicyclist issues, traffic safety and operations problems, and access management issues identified in the corridor. The time frame categorized as “short-term” is typically less than five years. Short-term improvements are relatively uncomplicated and inexpensive to implement, and require minimal design efforts. Often maintenance or special funds are used to pay for these improvements. Typical examples of short-term improvements are pavement striping and sign installations. The time frame categorized as “medium-term” is typically between five and 10 years. Medium-term improvements are more complicated than their short-term counterparts and require more funding resources and design and engineering efforts. Examples of medium-term improvements are adding turn lanes at intersections, adding sidewalks, and signal retiming and coordination projects. Long-term improvements are complicated and the time frame for implementation is typically 10 or more years. They require more design and engineering efforts, environmental permitting, and large funding resources. Typical examples of long-term improvements are adding lanes and roadway reconstruction.

## 7.2 FUTURE TRAFFIC CONDITIONS

Planners typically use a planning model to systematically forecast future traffic volumes based on changes in the transportation network or land use. For this study, staff used the Boston Region MPO’s regional travel demand model set, which was recently adopted for the development of the LRTP. This model’s socioeconomic components are derived from forecasts produced by the Metropolitan Area Planning Council (MAPC). The model is calibrated at a regional level for 164 cities and towns, which includes the 101 cities and towns in the MPO’s planning region. Using this model, staff projected that traffic on Route 1A, Essex Street, and Tedesco Street would grow by five percent between now and 2040. To test the impact the proposed improvements would have on future traffic conditions, staff increased the existing peak-hour turning movement volumes by five percent to develop 2040 projections.

## 7.3 CONCEPTS FOR IMPROVEMENTS

Most of the concepts for improvements that MPO staff developed would be carried out within the existing roadway’s right-of-way—they require no land takings and take into account the needs of abutters and roadway users. The majority of the improvements could be completed in the short-term or medium-

term to make the study area's roadways safer and more attractive to pedestrians and bicyclists, while serving the needs of commuters and supporting economic activities and livable communities. A few of the proposed improvements would involve construction outside of the roadway's right-of-way. The following sections describe the proposed improvements on each roadway segment, their traffic operations and safety performances, advantages and disadvantages, and cost estimates.

## **7.4 ROUTE 1A FROM ELLIS STREET TO LONGWOOD DRIVE**

### **7.4.1 Roadway Setting**

Figure 32 shows the improvements developed for the segment of Route 1A between Ellis Street and Longwood Drive. The proposed improvements would reconfigure the roadway to accommodate bicyclists and make it safer for both pedestrians and bicyclists. The roadway would be reconfigured to include two 11-foot travel lanes, bike lanes, and sidewalks on both sides of the roadway. Additional improvements include reconstruction of the curb ramps to MassDOT's standards. The proposed roadway would have high visibility crosswalks across all town-owned streets that intersect Route 1A. It is expected that the renovations would make it easier and safer to walk and bike, and fulfill the vision of connecting the neighborhoods to Vinnin Square. The bike lanes would provide greater protection and higher visibility for both bicyclists and motorists, improving safety for all road users.

### **7.4.2 Operational Features**

In addition to the renovations discussed above, providing the following features would modernize the roadway and make it safer and more efficient for all users:

- Street lighting to improve visibility at night
- Additional signs and pavement markings to designate the bike lanes
- Additional speed limit signs to alert drivers of reduced speed zones

### **7.4.3 Advantages**

- Requires no land takings
- Makes Route 1A safer and more pedestrian- and bicyclist-friendly
- Transforms Route 1A into a neighborhood facility that supports livable communities and vibrant economic activities
- Reduces crashes in this segment, especially pedestrian- and bicyclist-related collisions and rear-end collisions
- Roadway functions well and would not cause delays to motorists
- Maintains traffic flow and promotes multimodal transportation

- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and bike lanes would attract more people who would walk and bike
- Bike lanes appeal to people of various ages and bicycling ability; as such, adding bike lanes could increase bicycling volumes by as much as 10 to 20 percent<sup>21, 22</sup>

#### 7.4.4 Disadvantages

There are no disadvantages associated with the proposed improvements except for impacts on traffic flow during construction that would affect commuters and business activities.

#### 7.4.5 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate that the proposed improvements would cost between \$2 million and \$3 million. This estimate includes drainage improvements, sidewalks and ADA-compliant ramp construction, landscape and streetscape renovation, paving and markings, signing, and street lighting.

### 7.5 ROUTE 1A AT SWAMPSCOTT MALL

#### 7.5.1 Roadway Setting

Four alternatives were developed for the segment of Route 1A from Longwood Drive to Vinnin Street.

##### *Alternative 1*

Figure 33 shows the proposed improvements in Alternative 1, which would renovate and reconfigure the roadway to make it safer for pedestrians and bicyclists. Alternative 1 would construct a two-way left-turn lane on the segment of Route 1A between the Swampscott Mall driveway and Vinnin Street to make traffic flow safely and more efficiently. The proposed roadway would have two 11-foot travel lanes, an 11-foot two-way left-turn lane, bike lanes, sidewalks on both sides of the roadway, and curb ramps reconstructed to MassDOT's standards. The proposed roadway would have high visibility crosswalks at the signalized intersections and across all town-owned streets and major driveways that intersect Route 1A. MPO staff recommend the installation of bus shelters at

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<sup>21</sup> New York City Department of Transportation, *Prospect Park West: Bicycle Path and Traffic Calming Update*, [http://www.nyc.gov/html/dot/downloads/pdf/2012\\_ppw\\_trb2012.pdf](http://www.nyc.gov/html/dot/downloads/pdf/2012_ppw_trb2012.pdf)

<sup>22</sup> J. Parks, P. Ryus., A. Tanaka, C. Monsere, M. McNeil, J. Dill, and W. Schultheiss, District Department of Transportation Bicycle Facility Evaluation, Project No. 11404, (2012), <http://ddot.dc.gov/node/477212>

the heavily used MBTA bus stops on Route 1A at the Swampscott Mall intersection. The Town of Swampscott has expressed strong support for this alternative.

### *Alternative 2*

Figure 34 shows the improvements proposed in Alternative 2. This alternative has all of the improvements proposed in Alternative 1, except that the two-way left-turn lane would be replaced with a median and an exclusive left-turn lane at the Summit Estates.

### *Alternative 3*

Figure 35 shows the proposed improvements in Alternative 3, which would renovate and reconfigure Route 1A to increase capacity and make traffic flow efficiently. Alternative 3 would convert Route 1A into a four-lane roadway by adding a travel lane in each direction beginning at the site of Vinnin Liquor and Whole Foods and ending at Vinnin Street. The proposed roadway would have high visibility crosswalks at the signalized intersections and across all town-owned streets and major driveways that intersect Route 1A. In addition, MPO staff recommend the installation of bus shelters on Route 1A at the heavily used MBTA bus stops at the Swampscott Mall.

### *Alternative 4*

Alternative 4, shown in Figure 36, has all of the improvements proposed in Alternative 3, in addition to a median and an exclusive left-turn lane at the Summit Estates on the segment between the driveway to Swampscott Mall and Vinnin Street. The median would provide a pedestrian refuge area and make it safer and easier for pedestrians to cross Route 1A.

## 7.5.2 Operational Features

In addition to the proposed improvements outlined above, providing the following features would increase safety and modernize Route 1A to serve all users efficiently:

- New timing and coordination plans for traffic signals
- Accessible pedestrian signals at the signalized intersections
- Countdown timers for pedestrian crossings at the signalized intersections
- Detection for bicycles at the signalized intersections
- Street lighting to improve visibility at night
- Speed limit signs
- Signs and pavement markings to designate the bike lanes

### 7.5.3 Level of Service

The expected performance of the intersections, after implementation of the proposed improvements, is shown in Figures 37-42. Estimates of LOS and delay are provided for the weekday AM and PM and Saturday PM peak hours.

For each of the alternatives, the signalized intersections on Route 1A at Swampscott Mall would operate satisfactorily during the peak hours. The LOS analysis worksheets are included in Appendix F.

### 7.5.4 Advantages

#### *Alternatives 1 and 2*

- Transforms Route 1A into a safer and more pedestrian- and bicyclist-friendly transportation corridor
- Transforms Route 1A into a neighborhood amenity that supports livable communities and vibrant economic activities
- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and bike lanes would attract more people who would walk and bike, and better support the mixed land uses at Vinnin Square
- Roadway functions well and would not cause delays to motorists; traffic flow would be maintained while promoting multimodal transportation
- Reduces the high number of crashes that occur in the segment, especially left-turn-related crashes and angle and rear-end collisions
- Maximizes access to business driveways
- Requires minimal land takings

#### *Alternatives 3 and 4*

- Roadway functions well and would not cause delays to motorists; traffic flow would be maintained while serving multimodal transportation
- Reduces the high number of crashes that occur in the segment, especially left-turn-related crashes and angle and rear-end collisions
- Maximizes access to business driveways

### 7.5.5 Disadvantages

#### *Alternatives 1 and 2*

Construction and traffic management issues associated with Alternatives 2, 3, and 4 would impact traffic flow and business activities.

#### *Alternatives 3 and 4*

- Not bicyclist-friendly and does not support livable communities
- Requires significant land takings along Route 1A to accommodate the lane additions, as they would not fit into the existing right-of-way

- Costs considerably more to build compared to Alternatives 1 and 2, because of the relocation of utilities and land takings
- Construction and traffic management rerouting would impact traffic flow and business activities more than in Alternatives 1 and 2

### 7.5.6 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate that Alternatives 1 and 2 would each cost between \$4 million and \$6 million, and that Alternatives 3 and 4 would each cost between \$7 million and \$10 million.

The estimates exclude the cost of land takings required for the improvements. The estimates include the costs of drainage improvements, paving and markings, signing, accommodation and relocation of utilities, sidewalks and ADA-compliant ramp construction, streetscape amenities, traffic signals and equipment upgrades, and street lighting.

## 7.6 ESSEX STREET AND LORING AVENUE SOUTH OF VINNIN SQUARE

### 7.6.1 Roadway Setting

Figure 43 shows the improvements developed for Essex Street and Loring Avenue south of Vinnin Square. The proposed improvements would renovate and reconfigure the roadway to make travel safer and easier for pedestrians and bicyclists. The proposed roadway would include two 11-foot travel lanes, and bike lanes and sidewalks on both sides of the roadway. Sidewalks and curb ramps would be renovated to meet MassDOT's standards. In addition, MPO staff recommend installing bus shelters on Essex Street at the heavily used MBTA bus stops located at the Swampscott Mall driveway and on Loring Avenue at Carol Way. The proposed roadway would have high visibility crosswalks across all town-owned streets and major driveways that intersect Essex Street and Loring Avenue. The redesigned roadway would fulfill the vision of connecting the neighborhoods to services at Vinnin Square and the Swampscott Mall.

### 7.6.2 Operational Features

In addition to the proposed renovation efforts discussed above, providing the following features would modernize the roadway to increase safety and make Essex Street and Loring Avenue south of Vinnin Square efficient for all users:

- New timing plans for the traffic signal at Essex Street and the Swampscott Mall driveway
- Detection for bicycles at the signalized intersections
- Signs and pavement markings to designate the bike lanes
- Street lighting

- Speed limit signs

### 7.6.3 Level of Service

The expected performance of the signalized intersections, after implementation of the proposed improvements, is shown in Figures 37-39. Estimates of LOS and delay are provided for the weekday AM and PM and Saturday PM peak hours. The signalized intersection would operate satisfactorily during the peak hours.

### 7.6.4 Advantages

- Requires no land takings
- Renovates Essex Street and Loring Avenue to be a more pedestrian- and bicyclist-friendly
- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and bike lanes would attract more people who would walk and bike
- Roadway functions well and would not cause delays to motorists; traffic flow would be maintained while serving multimodal transportation
- Reduces crashes in the roadway segment, especially left-turn-related crashes and angle and rear-end collisions
- Provides a bus shelter on Essex Street at the Swampscott Mall driveway, which would make taking the bus more comfortable and attractive to residents

### 7.6.5 Disadvantages

There are no disadvantages associated with the proposed improvements except that construction and traffic management issues associated with improvements to Essex Street and Loring Avenue would impact traffic flow and business activities.

### 7.6.6 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate the improvements to cost between \$2 million and \$3 million. This estimate includes the cost of drainage improvements, sidewalks and ADA-compliant ramp construction, landscape and streetscape renovation, paving and markings, signing, signal retiming, and street lighting.

## 7.7 VINNIN SQUARE

Two alternatives were developed for improving traffic safety and accommodating pedestrians and bicyclists at Vinnin Square.

### 7.7.1 Roadway Setting

#### *Alternative 1*

Figure 44 shows the proposed improvements in Alternative 1. All of the improvements are kept within the existing right-of-way to avoid land takings at Vinnin Square. The proposed improvements would mark the travel lanes on Route 1A and Loring Avenue for shared-use with bicyclists and renovate the sidewalks and curb ramps on this section of Route 1A to meet MassDOT's standards. Additional improvements would provide a welcoming environment for pedestrians at Vinnin Square by upgrading the streetscape, landscaping with greenery, and calming traffic. MPO staff recommend the installation of bus shelters on Loring Avenue for the heavily used MBTA bus stops located near the Vinnin Street intersection. In addition, MPO staff advise the City of Salem to work with the business owners in Vinnin Square on consolidating driveways on Route 1A to reduce turn related-crashes and provide a welcoming environment for pedestrians and bicyclists. In addition, MPO staff recommend installing high visibility crosswalks at the signalized intersections and across all city- or town-owned streets and major driveways that intersect Route 1A or Loring Avenue.

#### *Alternative 2*

Figure 45 shows the proposed improvements in Alternative 2. They are similar to those in Alternative 1, except that the shared-use lanes are replaced with bike lanes on Route 1A. Alternative 2 would allow and provide continuous and connected bike lanes on Route 1A from Swampscott to Salem, a distance of approximately three miles.

### 7.7.2 Operational Features

In addition to the proposed improvements, providing the following features would increase safety and modernize the roadways at Vinnin Square to serve all users safely and efficiently:

- New timing and coordination plans for traffic signals
- Accessible pedestrian signals at the signalized intersections
- Countdown timers to assist pedestrians at the signalized intersections
- Detection for bicycles at the signalized intersections
- Signs and pavement markings to designate the shared-use lane or bike lanes
- Street lighting
- Speed limit signs

### 7.7.3 Level of Service

The expected performance of the intersections, after implementation of the proposed improvements, is shown in Figures 37-39. Estimates of LOS and delay



are provided for the weekday AM and PM and Saturday PM peak hours for both Alternatives 1 and 2. Either alternative would allow the signalized intersections on Route 1A, Loring Avenue, and Vinnin Street to operate satisfactorily during the peak hours.

#### 7.7.4 Advantages

##### *Alternative 1*

- Requires no land-takings
- Roadway functions well and would not cause significant delays to motorists
- Provides a welcoming environment for pedestrians
- Provides bus shelters at Vinnin Square, which would make taking the bus more comfortable and attractive to residents
- Defines driveway access issues more clearly so that safety for vehicles entering and exiting local businesses can be improved and a pleasant sidewalk experience can be provided for pedestrians

##### *Alternative 2*

Alternative 2 has all of the benefits of Alternative 1 in addition to the following:

- Provides continuous and connected bike lanes on Route 1A and makes the roadway more pedestrian- and bicyclist-friendly
- Remakes Vinnin Square and Route 1A into a neighborhood amenity that supports livable communities and vibrant economic activities
- Consistent with MassDOT's Healthy Transportation Compact; the pedestrian amenities and bike lanes would attract more people who would walk and bike to Vinnin Square, thereby better supporting the mixed land uses at the square

#### 7.7.5 Disadvantages

##### *Alternative 1*

- Creates a gap in the bike network on Route 1A
- Does not provide safe accommodation for bicyclists, thus would not well support the mixed land uses at Vinnin Square

##### *Alternative 2*

- Requires land takings for adding bike lanes
- Construction and traffic management issues associated with the improvements would impact traffic flow and affect commuters and business activities

### 7.7.6 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate that Alternative 1 would cost between \$1 million and \$2 million, and Alternative 2 would cost between \$3 million and \$4 million.

The estimates exclude the cost of land takings required for the improvements. The estimates include the cost of drainage improvements, accommodation and relocation of utilities, construction of sidewalks and ADA-compliant curb ramps, streetscape and landscape renovations, paving and markings, upgrades to traffic signals and equipment, new signal-timing plans, and street lighting.

## 7.8 TEDESCO STREET FROM VINNIN SQUARE TO LEGGS HILL ROAD

### 7.8.1 Roadway Setting

Figure 46 shows the improvements developed for Tedesco Street. The proposed improvements would reconfigure the roadway to make it safer for pedestrians and bicyclists. The proposed roadway consists of two 11-foot travel lanes with five-foot shoulders, and sidewalks on both sides of Tedesco Street. Additional improvements include the renovation of sidewalks and curb ramps to meet MassDOT's standards. Construction of a new sidewalk on the north side of Tedesco Street, from West Street to Vinnin Square, will help to close the gap in the sidewalk network. MPO staff also recommend the installation of rectangular rapid flash beacons for the midblock crosswalk on Tedesco Street at the Tedesco Country Club House. Other minor adjustments include the installation of bulb outs on Brookhouse Drive to allow vehicles to approach Tedesco Street at a more perpendicular angle, shorten the crosswalk distance, and reduce the speed of right-turning vehicles onto Tedesco Street. MPO staff recommend high visibility crosswalks across all town-owned streets and major driveways that intersect Tedesco Street.

### 7.8.2 Traffic Signal Warrant Analysis

Traffic control signals are valuable devices for controlling vehicular and pedestrian traffic. They assign the right-of-way to various traffic movements and thereby strongly influence traffic flow. Traffic control signals that are properly designed, located, operated, and maintained will provide orderly movement of traffic, and reduce congestion and the frequency and severity of certain types of crashes, especially right-angle collisions. Traffic control signals are not solutions to all traffic problems at intersections. Poorly designed and maintained, ineffectively placed, improperly operated, or unjustified traffic control signals can result in excessive delays, a significant increase in crashes (especially the rear-

end type), and diversion of traffic to less adequate routes, as road users attempt to avoid the traffic control signals.

Investigating the need for a traffic control signal at an unsignalized intersection involves analyzing factors related to the existing traffic operations and safety conditions at the intersection, as well as the potential to improve these conditions. Such an investigation is called a traffic signal warrant analysis. The *Manual on Uniform Traffic and Control Devices* (MUTCD) lists nine traffic signal warrants that justify installing a traffic signal.<sup>23</sup>

Using the methodology outlined in the 2009 edition of the MUTCD, staff performed detailed traffic signal warrant analyses to determine whether the installation of a traffic control signal at the intersection of Tedesco Street and Leggs Hill Road is justified and if signalizing the intersection would improve safety and traffic operations.

Table 5 presents the results of the traffic signal warrant analyses; detailed traffic signal warrant analysis worksheets are included in Appendix F. Existing conditions at the intersection of Tedesco Street and Leggs Hill Road satisfy three of the warrants. However, the intersection has a low crash rate, and traffic delays on Leggs Hill Road occur only during the two-hour AM and two-hour PM peak travel periods. In addition, a peak-hour intersection capacity analysis also indicated that a traffic signal at the intersection would create traffic queues on Tedesco Street that would extend beyond West Street and block traffic entering or exiting Brookhouse Drive. Based on the results of the signal warrant and intersection capacity analyses, MPO staff does not recommend installing a traffic signal at Tedesco Street and Leggs Hill Road at this time.

**TABLE 5**  
**Traffic Signal Warrant Analysis**  
**Tedesco Street and Leggs Hill Road Intersection**

<b>Warrant</b>	<b>Results</b>
Warrant 1, Eight-Hour Vehicular Volume	Satisfied
Warrant 2, Four-Hour Vehicular Volume	Satisfied
Warrant 3, Peak Hour	Satisfied
Warrant 4, Pedestrian Volume	Not satisfied
Warrant 5, School Crossing	Not satisfied
Warrant 6, Coordinated Signal System	Not satisfied
Warrant 7, Crash Experience	Not satisfied
Warrant 8, Roadway Network	Not satisfied
Warrant 9, Intersection Near a Grade Crossing	Not satisfied

Source: Central Transportation Planning Staff.

<sup>23</sup> The MUTCD lists nine traffic signal warrants that justify installing a traffic signal. The warrants are listed in Table 5.

### 7.8.3 Operational Features

In addition to the proposed improvements discussed above, providing the following features would modernize the roadway to increase safety and make Tedesco Street efficient for all users:

- Street lighting
- Signs and pavement markings to define shoulder areas for use by bicyclists
- Speed limit signs

### 7.8.4 Level of Service

The expected performance of the intersection of Tedesco Street and Leggs Hill Road, after implementation of the proposed improvements, is shown in Figures 37-39. Estimates of LOS and delay are provided for the weekday AM and PM peak hours and Saturday PM peak hour. The signalized intersection would operate satisfactorily during the peak hours but traffic on Leggs Hill Road would face longer delays.

### 7.8.5 Advantages

- Renovates Tedesco Street to make the roadway more pedestrian- and bicyclist-friendly
- Renovates Tedesco Street to make it safer for all users
- Closes the gap in the sidewalk network on Tedesco Street
- Requires no land takings
- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and shoulders would attract more people who would walk and bike
- Roadway functions well, and would not cause delays to motorists
- Maintains traffic flow and promotes multimodal transportation

### 7.8.6 Disadvantages

There are no disadvantages associated with the proposed improvements, except that construction and traffic management would have an impact on traffic flow and affect commuters and business activities.

### 7.8.7 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimates that the improvements will cost between \$1 million and \$2 million. This estimate includes drainage improvements, construction of sidewalks and ADA-compliant curb ramps, streetscape renovation, paving and markings, and street lighting.

## 7.9 ROUTE 1A FROM VINNIN SQUARE TO LEGGS HILL ROAD

### 7.9.1 Roadway Setting

Figure 47 shows the improvements proposed for the segment of Route 1A from Vinnin Square to Leggs Hill Road. The improvements were developed taking into consideration the recommendations of a RSA conducted in collaboration with the City of Salem, the Salem State University Police Department, and MassDOT. Presently, the roadway segment is striped to include two 11-foot travel lanes and 6-to-8-foot shoulders and sidewalks on both sides from Maple Avenue to Riverview Street. The proposed improvements would reconfigure the roadway by converting the existing shoulders into bike lanes, thereby increasing safety for bicyclists. MPO staff also recommend the construction of new sidewalks and curb ramps on the west side of Loring Avenue from Riverview Street to Harrison Road to close the gap in the sidewalk network. Closing the gap in the sidewalk network on Route 1A would benefit the impending school swap that will move the Horace Mann Laboratory School to the Salem State University South Campus. In addition, MPO staff recommend installing a midblock crosswalk with pedestrian signals and advance-pedestrian-warning signs on Route 1A between Riverview Street and Leggs Hill Road. The midblock crosswalk should be located where it will be visible to approaching drivers; adequate sight distance must be considered. Other recommendations include the installation of high visibility crosswalks across all town-owned streets and major driveways that intersect Route 1A, and curve-warning signs and street lighting on the sharp horizontal curve in the vicinity of Leggs Hill Road.

### 7.9.2 Operational Features

In addition to the renovations discussed above, providing the following features would modernize Route 1A, increase safety, and make the roadway more efficient for all users:

- Signs and pavement markings to designate the bike lanes
- Speed limit signs

### 7.9.3 Advantages

- Renovates Route 1A into a more pedestrian- and bicyclist-friendly roadway
- Renovates Route 1A to better serve students of Horace Mann Laboratory School at the future location of the school on Harrison Road off of Route 1A
- Closes the gap in the sidewalk network on Route 1A
- Improves safety for all road users

- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and bike lanes would attract more people who would walk and bike
- Roadway functions well and traffic flow would be maintained while promoting multimodal transportation
- Fulfills the vision of connecting the neighborhoods to places such schools, recreational areas, and the Salem Bike Trail
- Requires no land takings

#### 7.9.4 Disadvantages

There are no disadvantages associated with the proposed improvements.

#### 7.9.5 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate the improvements to cost between \$1million and \$2 million. This estimate includes drainage improvements, construction of sidewalks and ADA-compliant curb ramps, streetscape renovation, paving, and street lighting.

### 7.10 ROUTE 1A FROM LEGGS HILL ROAD TO SUMNER ROAD

#### 7.10.1 Roadway Setting

Figure 48 shows the improvements proposed for the segment of Route 1A from Leggs Hill Road to Sumner Road. The proposed improvements include the recommendations from the RSA conducted in collaboration with the City of Salem, Salem State University Police Department, and MassDOT. The proposed improvements reconfigure the roadway by converting the existing 6-to-8 foot shoulders into bike lanes to increase safety for bicyclists and by revamping the sidewalks and curb ramps to bring them to MassDOT's standards. The improvements include retiming the traffic signals at Harrison Road and Pickman Roads, adding countdown timers and accessible pedestrian signals to increase safety for pedestrians, and installing of high visibility crosswalks across all town-owned streets and major driveways that intersect Route 1A. Additional improvements include the installation of pedestrian- and school-warning signs to alert drivers of pedestrians in crosswalks, and the installation of bus shelters at the stops on Route 1A between Harrison Road and Lincoln Road. These improvements are expected to benefit the impending school swap that will move the Horace Mann Laboratory School to the Salem State University South Campus.

Finally, MPO staff recommend that the City of Salem work with MassDOT, MassRIDES, and Walk Boston to conduct a comprehensive Safe Routes to

School study, before the school swap occurs, to identify appropriate safe routes to the new school, pedestrian and bicyclists' needs, and safety improvements that would encourage students to walk and bike to the relocated school.

### 7.10.2 Operational Features

In addition to the renovation efforts discussed above, providing the following features would modernize Route 1A, increase safety, and make the roadway more efficient for all users:

- Street lighting
- Signs and pavement markings to designate the bike lanes
- Speed limit signs

### 7.10.3 Level of Service

The expected performance of the Route 1A intersection at Harrison Road and Pickman Road, after implementation of the proposed improvements, is shown in Figures 37-39. Estimates of LOS and delay are provided for the weekday AM and PM and Saturday PM peak hours. Analyses show that the two signalized intersections would operate satisfactorily during the peak hours.

### 7.10.4 Advantages

- Renovates Route 1A into a more pedestrian- and bicyclist-friendly roadway
- Renovates Route 1A to better serve students of the Horace Mann Laboratory School at the future location of the school on Harrison Road off of Route 1A
- Improves safety for all road users
- Consistent with MassDOT's Healthy Transportation Compact; the sidewalks and bike lanes would attract more people who would walk and bike
- Roadway functions well, and traffic flow would be maintained while promoting multimodal transportation
- Enhances safety for people who would walk or bike to school or work, or for recreation
- The bike lanes would provide better protection and visibility for bicyclists
- Fulfills the vision of connecting the neighborhoods to schools, recreational areas, and the Salem Bike Trail
- Requires no land takings

### 7.10.5 Disadvantages

There are no disadvantages associated with the proposed improvements.

### 7.10.6 Cost

Based on the costs of similar reconstruction projects recorded in MassDOT's project information database, MPO staff estimate the project to cost between \$2 million and \$3 million. This estimate includes drainage improvements, construction of sidewalks and ADA-compliant curb ramps, streetscape renovation, paving and markings, signing, and street lighting.

## 7.11 EXAMPLES OF MODEL ROADWAYS AND FEATURES

The improvements proposed in this study would increase safety, balance the needs of all transportation users, expand mobility, improve public health, support economic activities, reduce emissions for a cleaner environment, and create stronger communities. Figure 49 shows examples of accessible curb ramps that comply with MassDOT's standards and high visibility crosswalks that increase safety for pedestrians. Figure 50 shows examples of sidewalk designs that provide welcoming sidewalk experiences and median cuts that offer pedestrians refuge areas. Figure 51 shows examples of MBTA bus shelters proposed for the heavily used MBTA bus stops and examples of pedestrian signals that can be used to increase safety for pedestrians at midblock crosswalks on high-traffic-volume roadways. Finally, Figure 52 shows photographs of other roadways in the Boston region that received the type of treatments described in this report; they include Route 109 in Westwood, Route 135 in Natick, and Route 109 in Medway.



# Chapter 8—Conclusion and Next Steps

## 8.1 CONCLUSIONS

The above analyses and evaluations indicate that Route 1A and the ancillary streets surrounding it in Marblehead, Salem, and Swampscott need renovations to improve safety and mobility for motorists, pedestrians, and bicyclists. This study identified the transportation issues related to safety, operations, and mobility, and proposed solutions to address needs in those areas. This study aligns with the Boston Region MPO's goals of modernizing roadways to reduce congestion, increasing safety on the region's highway system, expanding the quantity and quality of walking and bicycling infrastructure, and making transit service more efficient and modern. The proposed improvements offered in this report, if implemented, would increase traffic safety, make traffic operations more efficient, and modernize the roadway to accommodate all users.

### 8.1.1 Problems

There are several reasons why pedestrians and bicyclists find navigating the roadways in the study area challenging and why the roadways are considered unfriendly for those users: wide roadways create inequity by placing too much emphasis on vehicular use and by encouraging higher vehicle speeds; a lack of shoulders or bike lanes makes the roadways uncomfortable for bicyclists; and sidewalks are too close to the travel lanes, which causes discomfort for pedestrians. Furthermore, obstructions in crosswalks, curb ramps that are not ADA compliant, broken sidewalks, and sidewalk connectivity problems (gaps) create an unfriendly environment for pedestrians, especially for people with disabilities. Also, a lack of bus shelters at the heavily used stops creates problems for bus riders, especially during inclement weather.

Among the traffic operations problems facing motorists are high vehicular speeds at the sharp horizontal curve on Route 1A at Leggs Hill Road in Salem, where many crashes have occurred. Also, outdated signal-timing plans make the flow of traffic inefficient through the Vinnin Square District. Additionally, high volumes of traffic and a lack of left-turn lanes on Route 1A causes a high number of crashes, traffic queues, and congestion near Swampscott Mall, in Vinnin Square, and on Route 1A between Harrison Road and Sumner Road.

### 8.1.2 Solutions

MPO staff, working with the study's advisory task force, developed recommendations for improvements that could transform the study area into a pedestrian- and bicyclist-friendly transportation corridor that serves all modes of transportation and maintains regional travel capacity. MPO staff evaluated

different roadway cross sections to determine how best to accommodate all road users safely and fulfill the vision of connecting the neighborhoods to the Vinnin Square District, educational institutions, and recreational areas, thereby fostering cohesive land uses, connecting people and their destinations, and promoting economic activity. This study provides the City of Salem, Towns of Marblehead and Swampscott, MassDOT, and other stakeholders with an assessment of the transportation needs at Vinnin Square and the adjoining neighborhoods in light of past, recent, and future developments, and allows them to start planning projects to implement the recommended improvements. When selecting preferred improvements to advance through the planning process, planners should consider the advantages and disadvantages of each alternative, cost, effectiveness, and impacts on their goals and objectives.

### 8.1.3 Project Implementation

Because there are multiple jurisdictions in the study area, successful implementation of the proposed improvements would require cooperation between MassDOT Highway Division and the municipalities to ensure that signal equipment can communicate and share data; sidewalks, shoulders, and bike lanes are continuous and connected; and MassDOT's standards guide the design of roadway elements such as curb ramps, bike lanes, sidewalks. It is important for stakeholders to examine the design concepts with all road users in mind.

MassDOT owns Route 1A and would be responsible for any renovations to the following sections of Route 1A:

- **Route 1A from Ellis Street to Longwood Drive in Swampscott**  
The proposed improvements on this segment are estimated to cost between \$2 million and \$3 million. This estimate includes sidewalk renovation, installation of ADA-compliant curb ramps, the addition of new bike lanes, and pavement resurfacing and marking, as well as signage, street lighting, and drainage improvements. The Town of Swampscott has expressed support for the improvements.
- **Route 1A from Longwood Drive to Vinnin Street in Swampscott**  
Four alternatives were developed for this segment. The Town of Swampscott has expressed strong support for Alternative 1— a two-lane, two-way roadway with a two-way left-turn lane, and bike lanes and sidewalks on both sides. Additional recommendations include improvements and upgrades to the streetscape, bus shelters, traffic signals and equipment, signage, and drainage. Alternative 1 is estimated to cost between \$4 million and \$6 million.

- **Route 1A from Vinnin Square to Sumner Road**

The proposed improvements would reconfigure the roadway by converting the existing shoulders into bike lanes, renovating existing sidewalks and curb ramps, and constructing new sidewalks and crosswalks to close the gap in the sidewalk network. Additional improvements include traffic signal equipment upgrades; safety improvements to support the impending school swap that will move the Horace Mann Laboratory School to the Salem State University South Campus; the addition of bus shelters at the heavily used MBTA bus stops; and signing, drainage, and streetscape improvements. MPO staff estimate the improvements to cost between \$2 million and \$4 million.

The City of Salem and the Towns of Marblehead and Swampscott own the arterials and the local collectors that connect to Route 1A. These municipalities would be responsible for any renovation to the roadways under their jurisdiction:

- **Essex Street and Loring Avenue South of Vinnin Square**

The Town of Swampscott has jurisdiction of Essex Street and the City of Salem has jurisdiction of Loring Avenue. The proposed improvements would reconfigure the roadway to make it safer and easier for pedestrians and bicyclists to traverse. The reconfigured roadway would include two 11-foot travel lanes and bike lanes and sidewalks on both sides of the roadway. Additional improvements include the installation of a bus shelter at the stop located near the Swampscott Mall entrance on Essex Street. MPO staff estimate the improvements to cost between \$2 million and \$3 million.

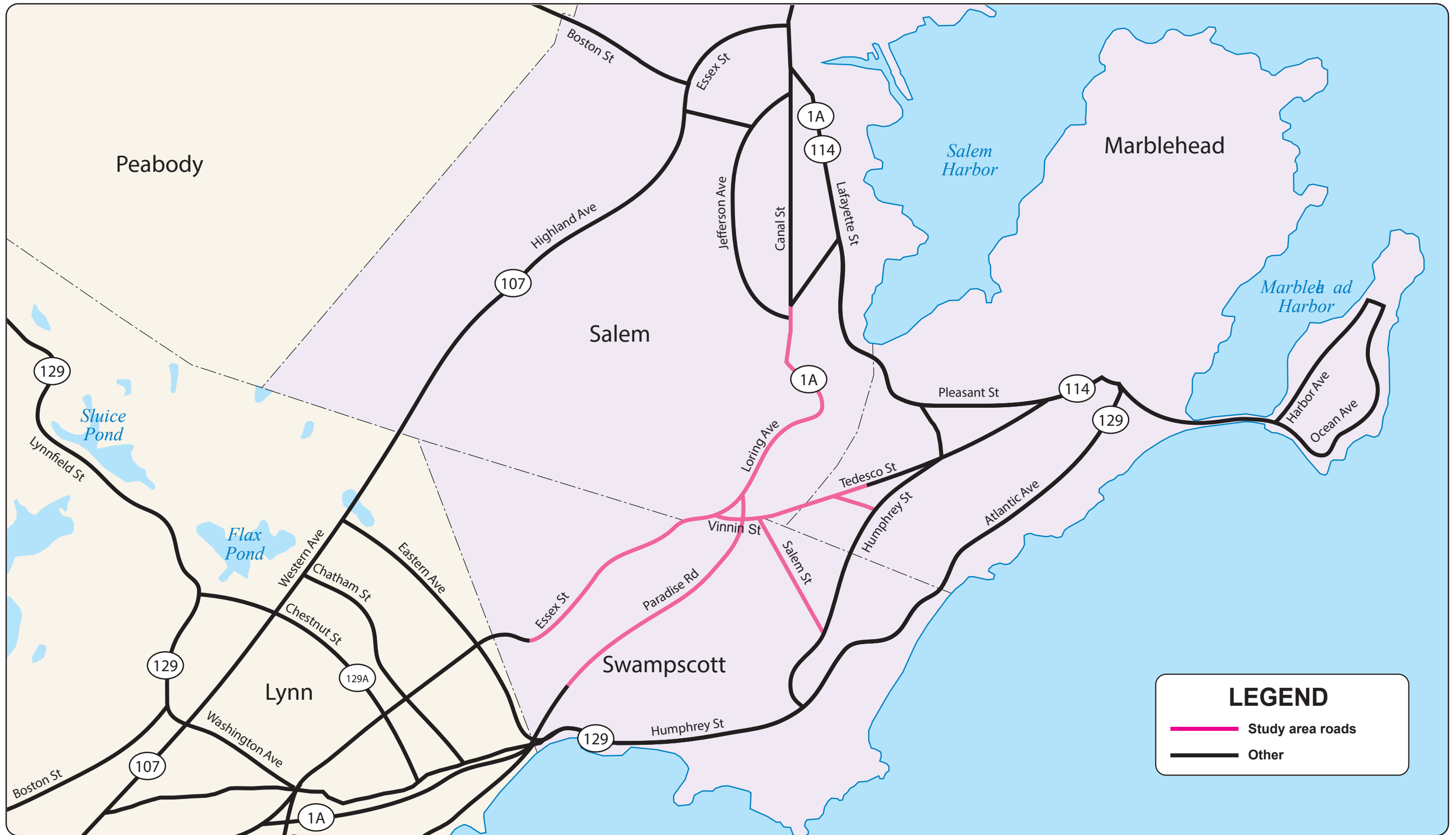
- **Tedesco Street from Vinnin Square to Leggs Hill Road**

The Town of Marblehead has jurisdiction over Tedesco Street. The proposed improvements would convert the roadway into a two-way, two-lane facility with sidewalks and shoulders on both sides of the street. Other improvements would close the gap in the sidewalk network, renovate curb ramps to MassDOT's standards, and install the following: rectangular rapid flash beacons in the midblock crosswalks; minor adjustments (bulb outs) on the Brookhouse Drive approach, which would shorten the crosswalk distance and reduce the vehicle speeds; and high visibility crosswalks. MPO staff estimate the improvements to cost between \$1 million and \$2 million.

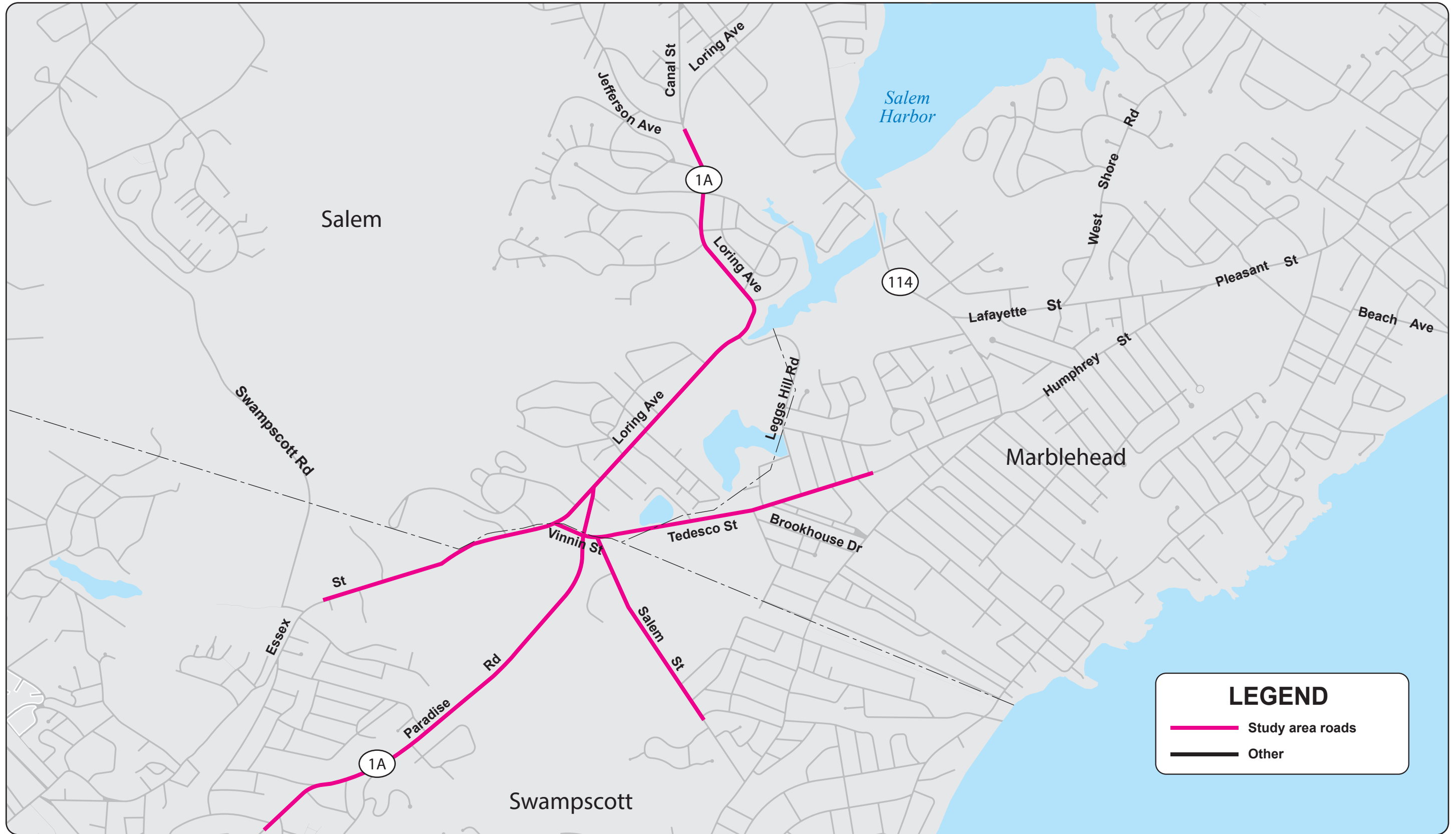
#### 8.1.4 Project Development

Transportation decision making is complex and is influenced by factors such as financial limitations and agencies' programmatic commitments. Project development is the process that takes transportation improvements from concept to construction. This process will depend upon cooperation between MassDOT, Marblehead, Salem, Swampscott, and the MPO. This planning study and the two RSAs provide the necessary information for the project proponents to initiate the project notification and review process. After completing the initial steps, the proponents can start preliminary design and engineering and place the project on the TIP. An overview of the project development process is included in Appendix G.

SA/sa



**Figure 1**  
**Regional Map of Study Area and Nearby Roadways**



**LEGEND**

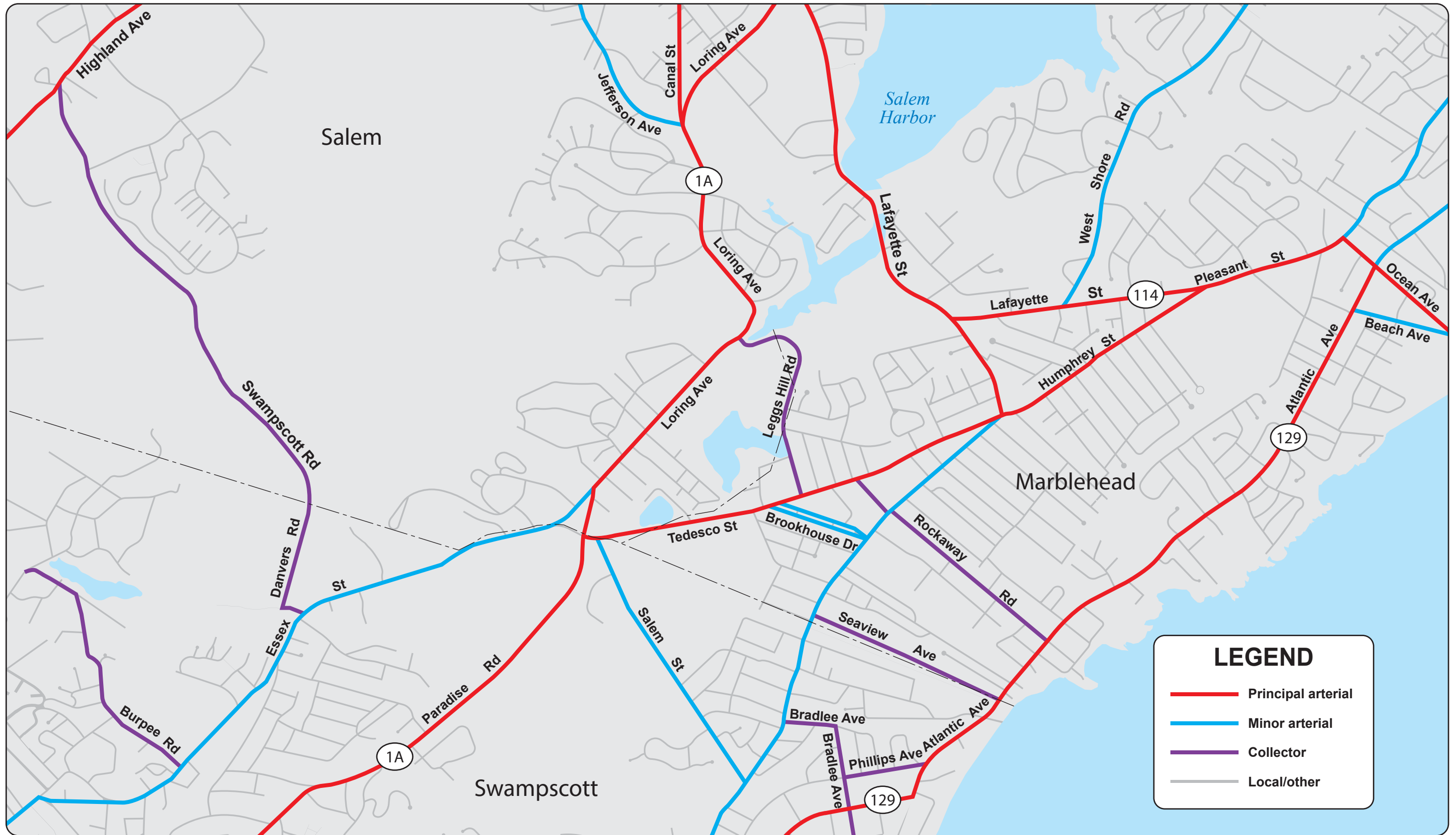
- Study area roads
- Other



**Figure 2**  
**Study Area Map**



**Figure 3**  
**Roadway Jurisdiction Map**



**LEGEND**

- Principal arterial
- Minor arterial
- Collector
- Local/other

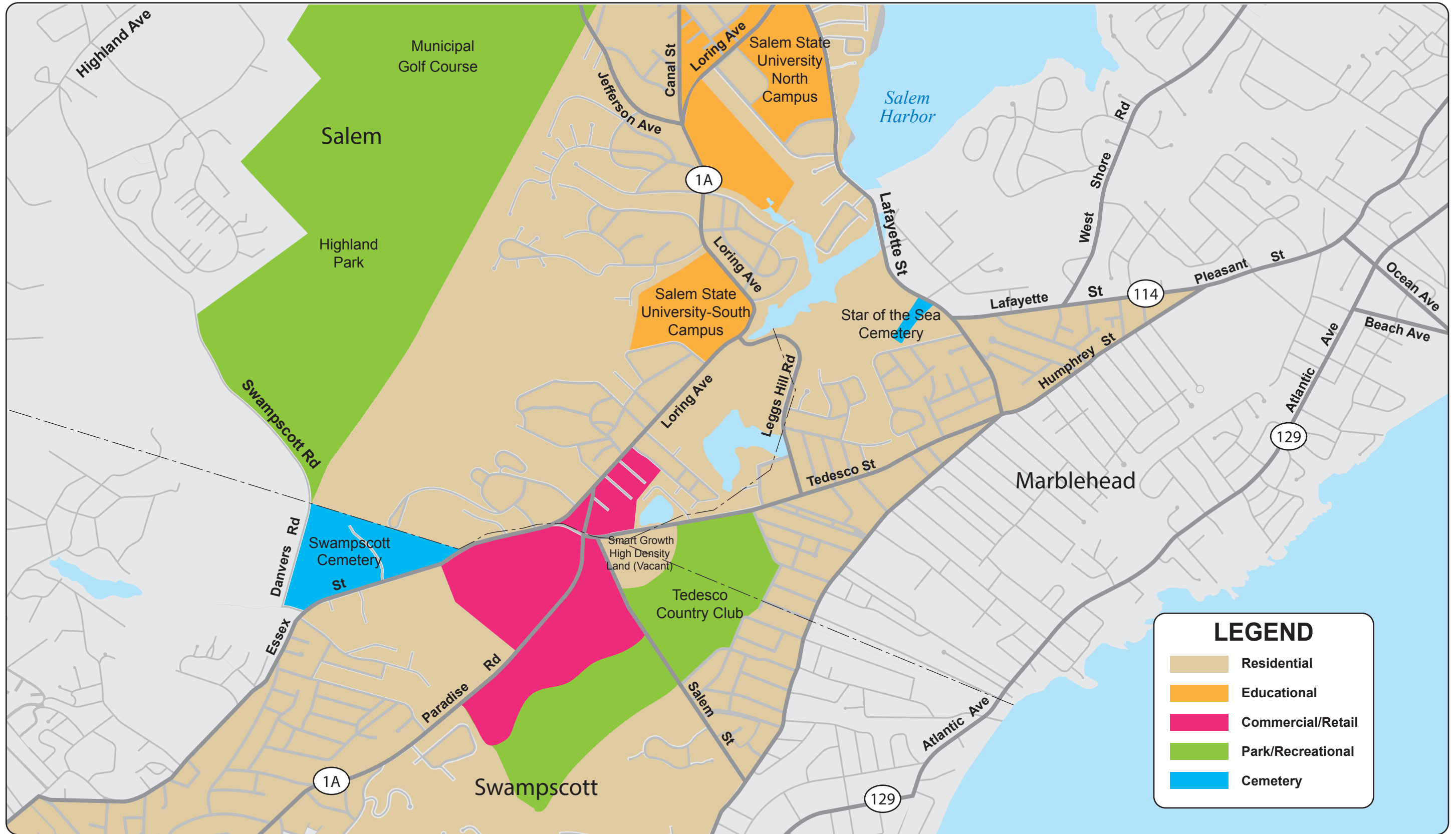


**Figure 4**  
**Roadway Functional Class Map**

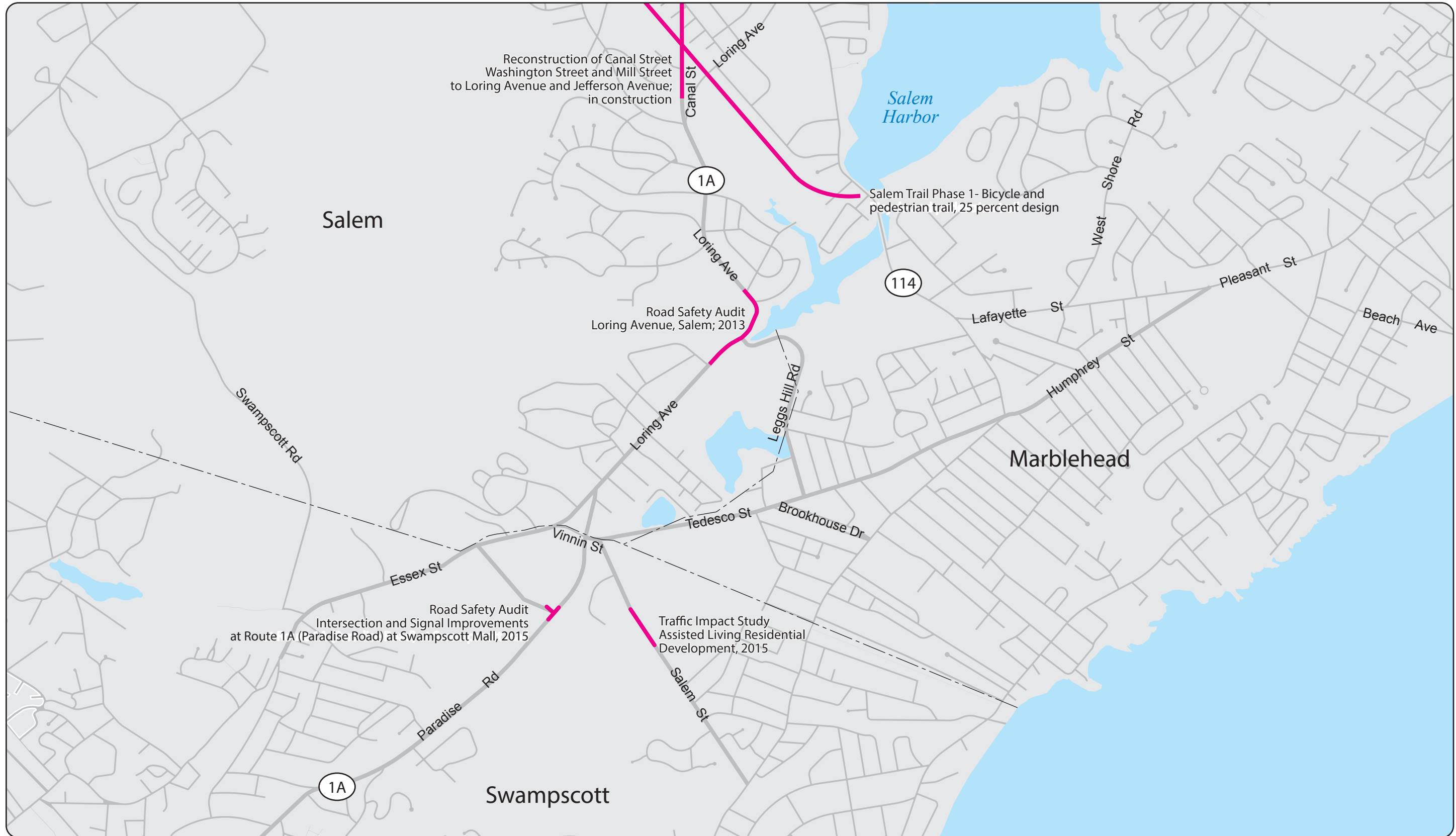




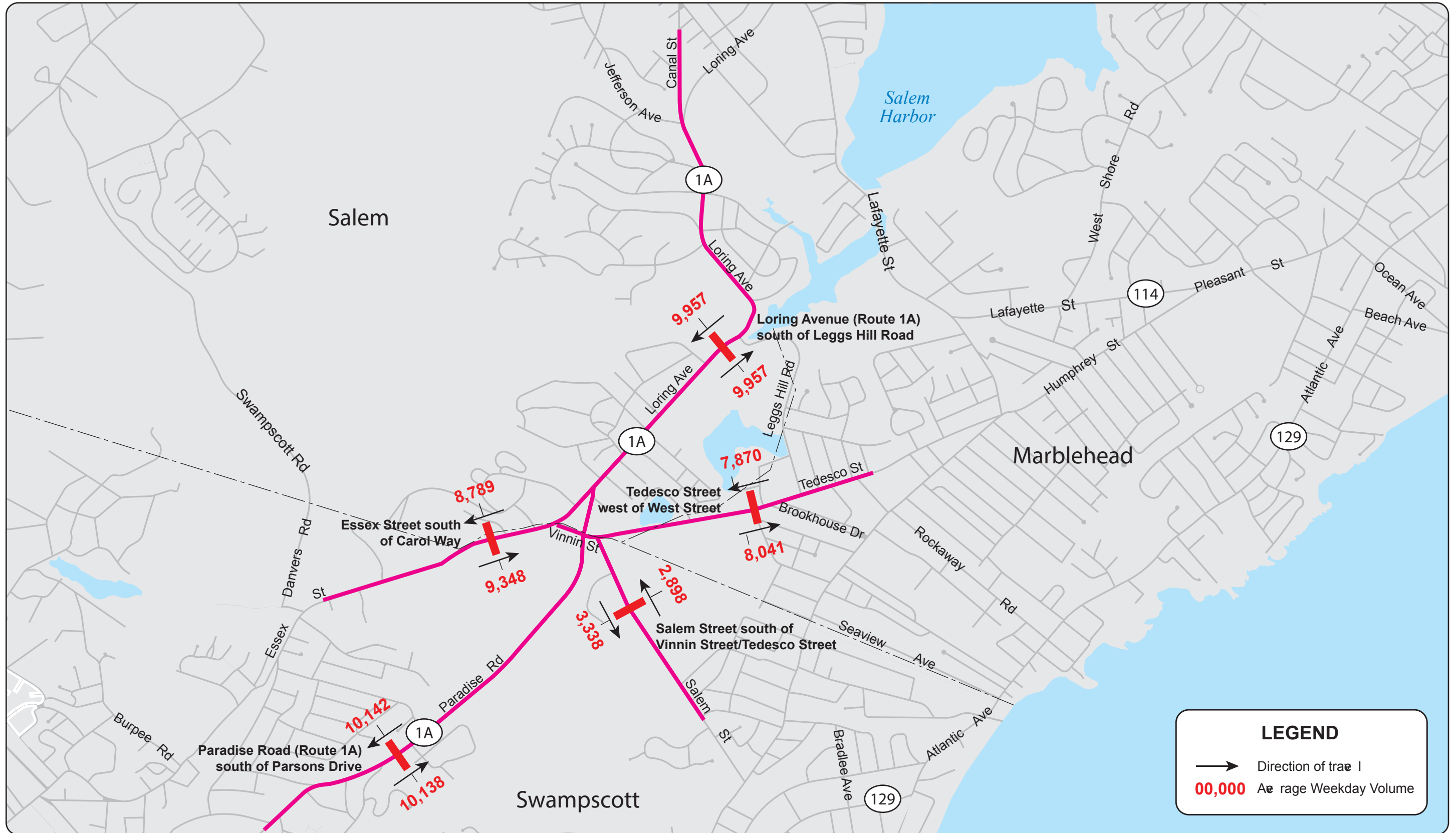
**Figure 5**  
**Study Intersections**



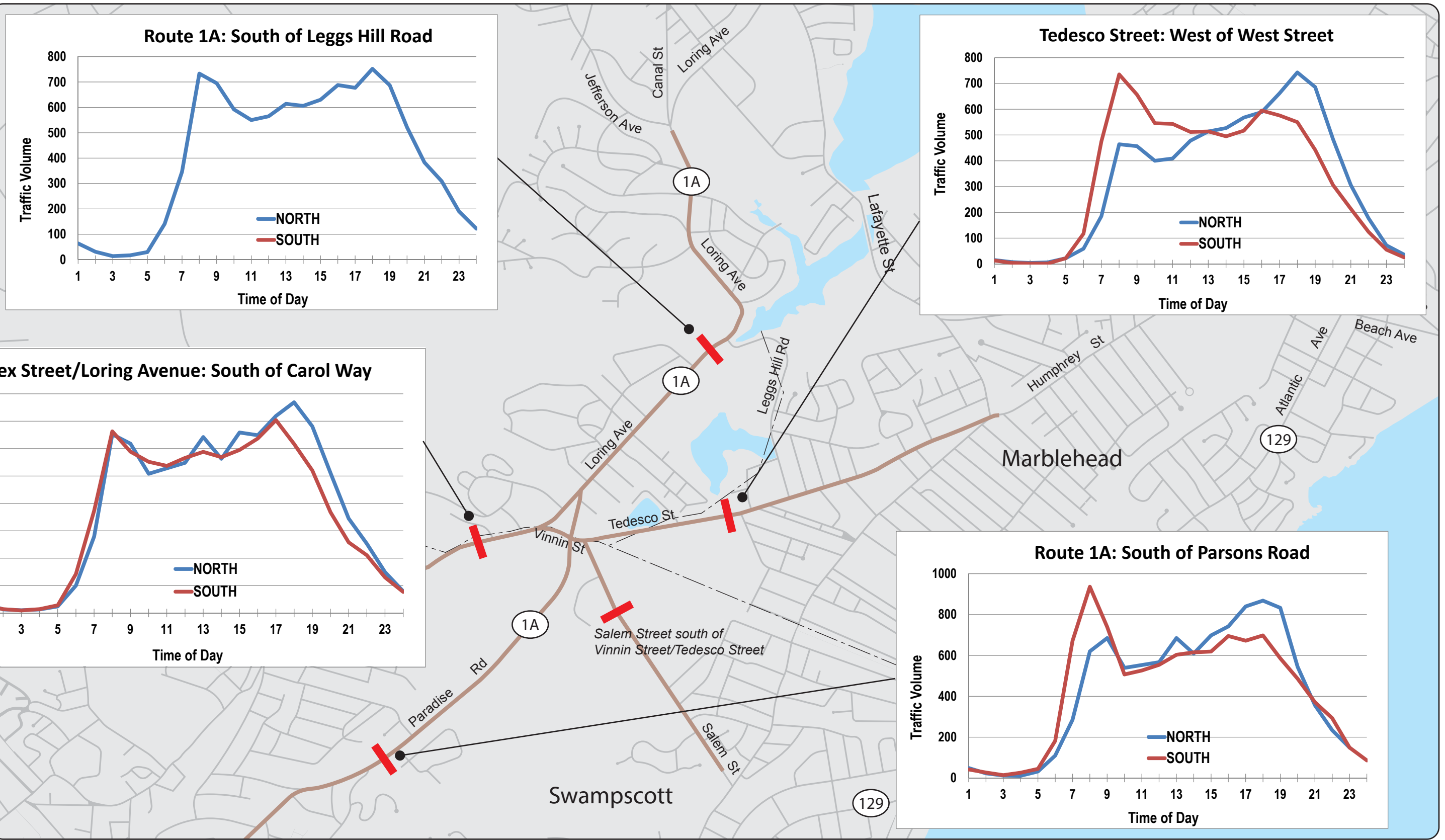
**Figure 6**  
**General Land Use/Zoning Map**



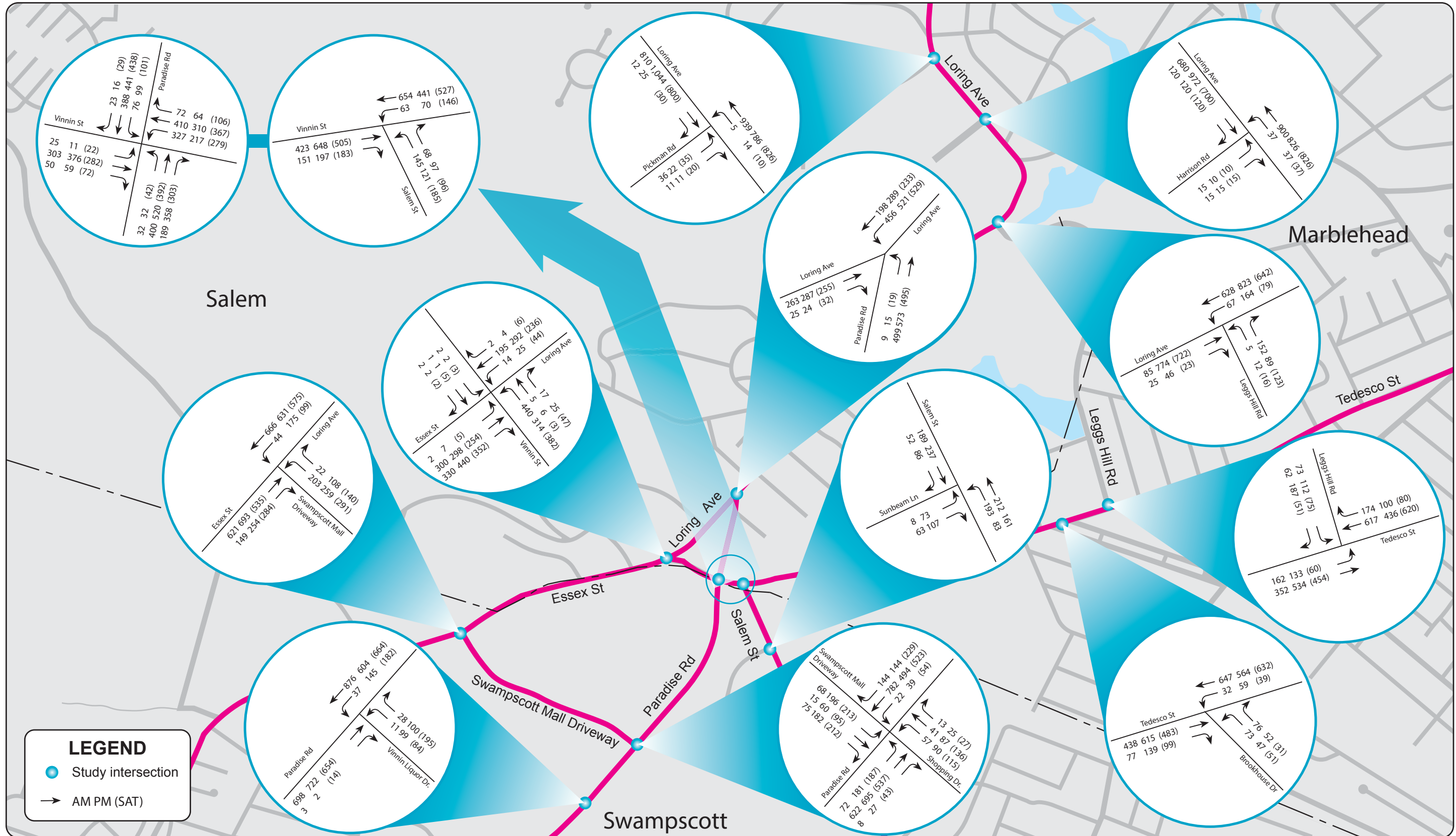
**Figure 7**  
**Planned Projects and Studies**



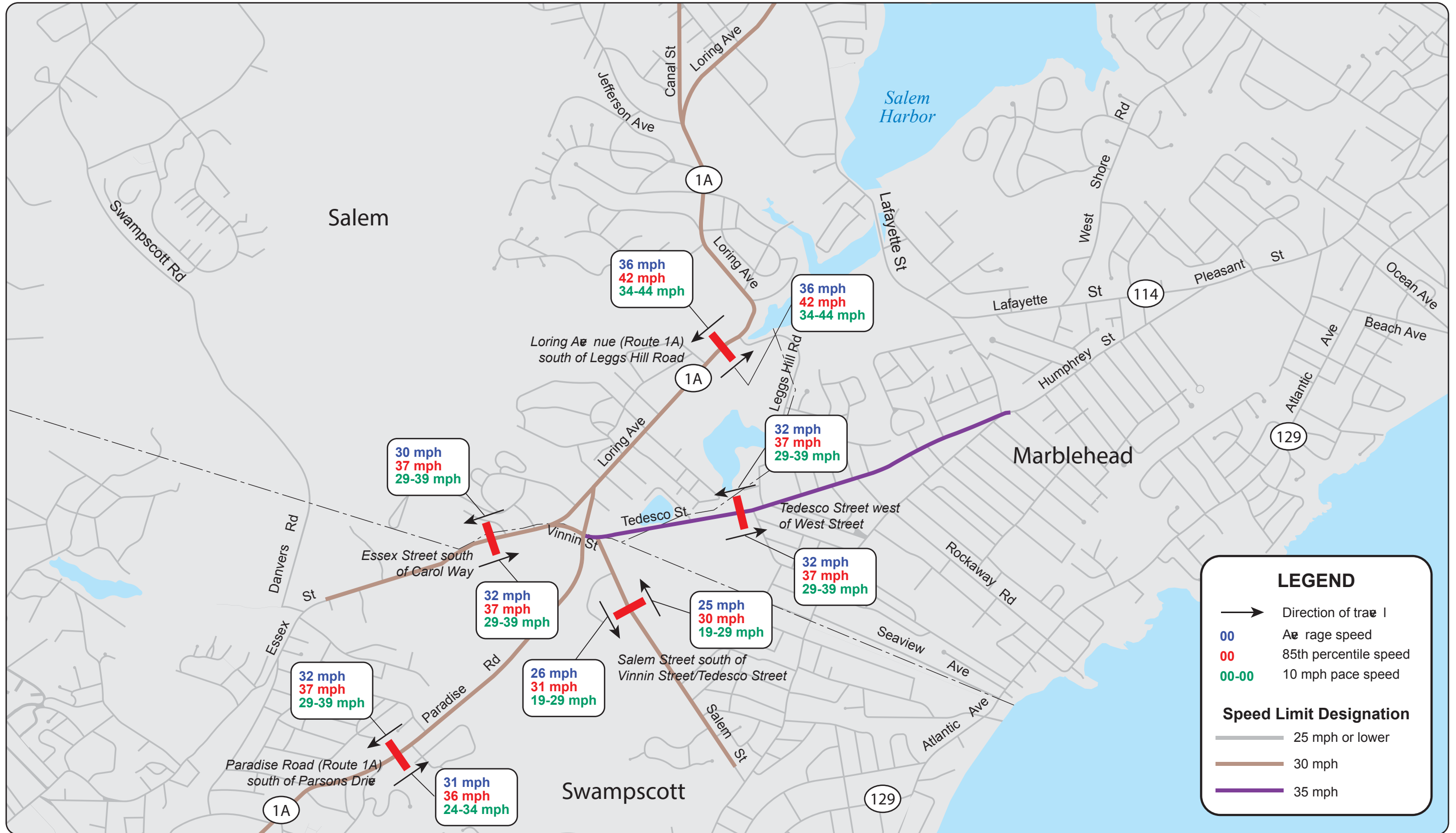
**Figure 8**  
**Average Weekday Traffic Volumes**



**Figure 9**  
**Hourly Traffic-Volume Distribution**



**Figure 10**  
**Intersection Turn Movement Volumes**

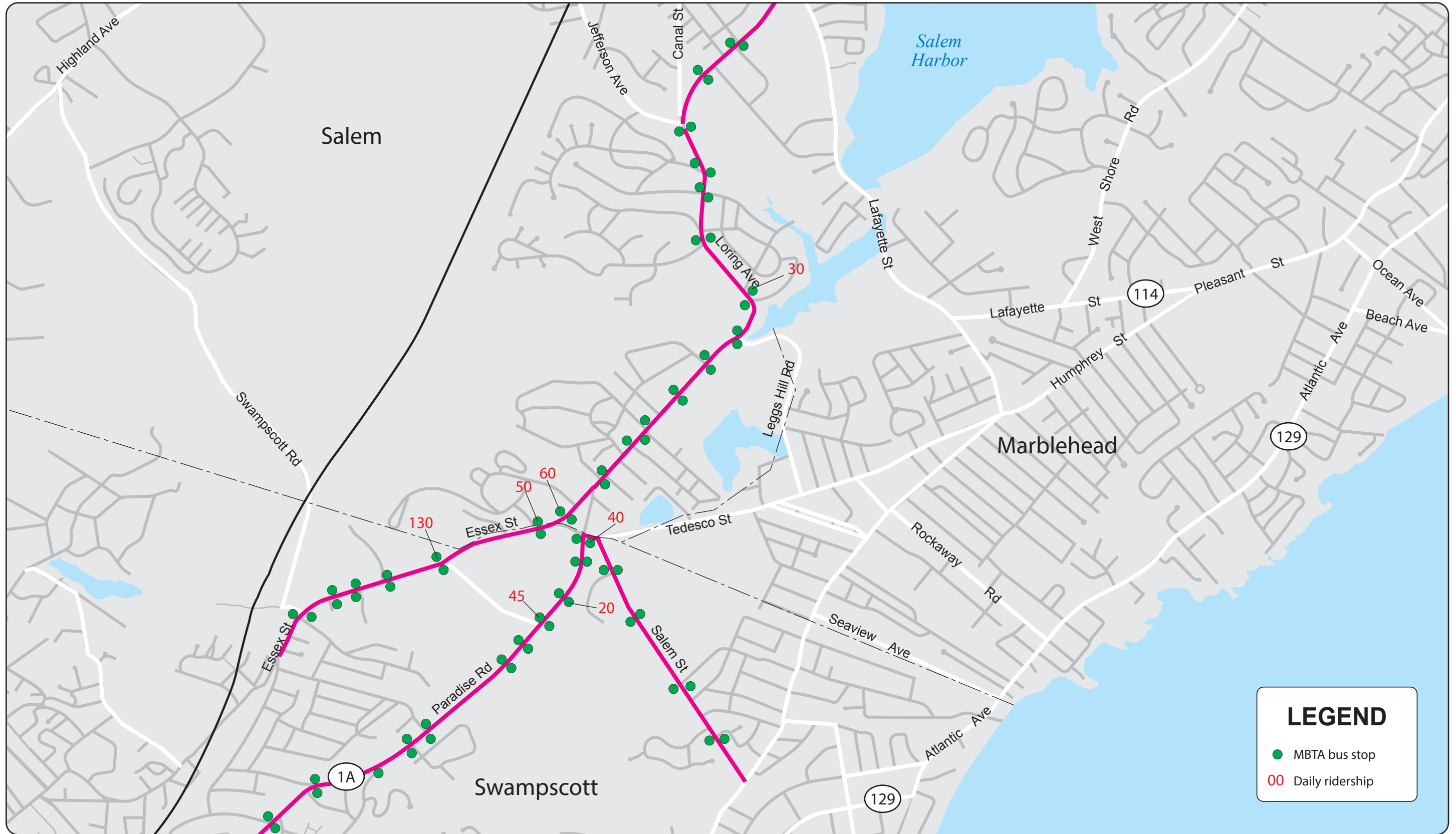


**Figure 11**  
**Designated Speed Limit and Summary of Spot Speed by Direction**



**Figure 12**  
**Regional Transit Service Map**

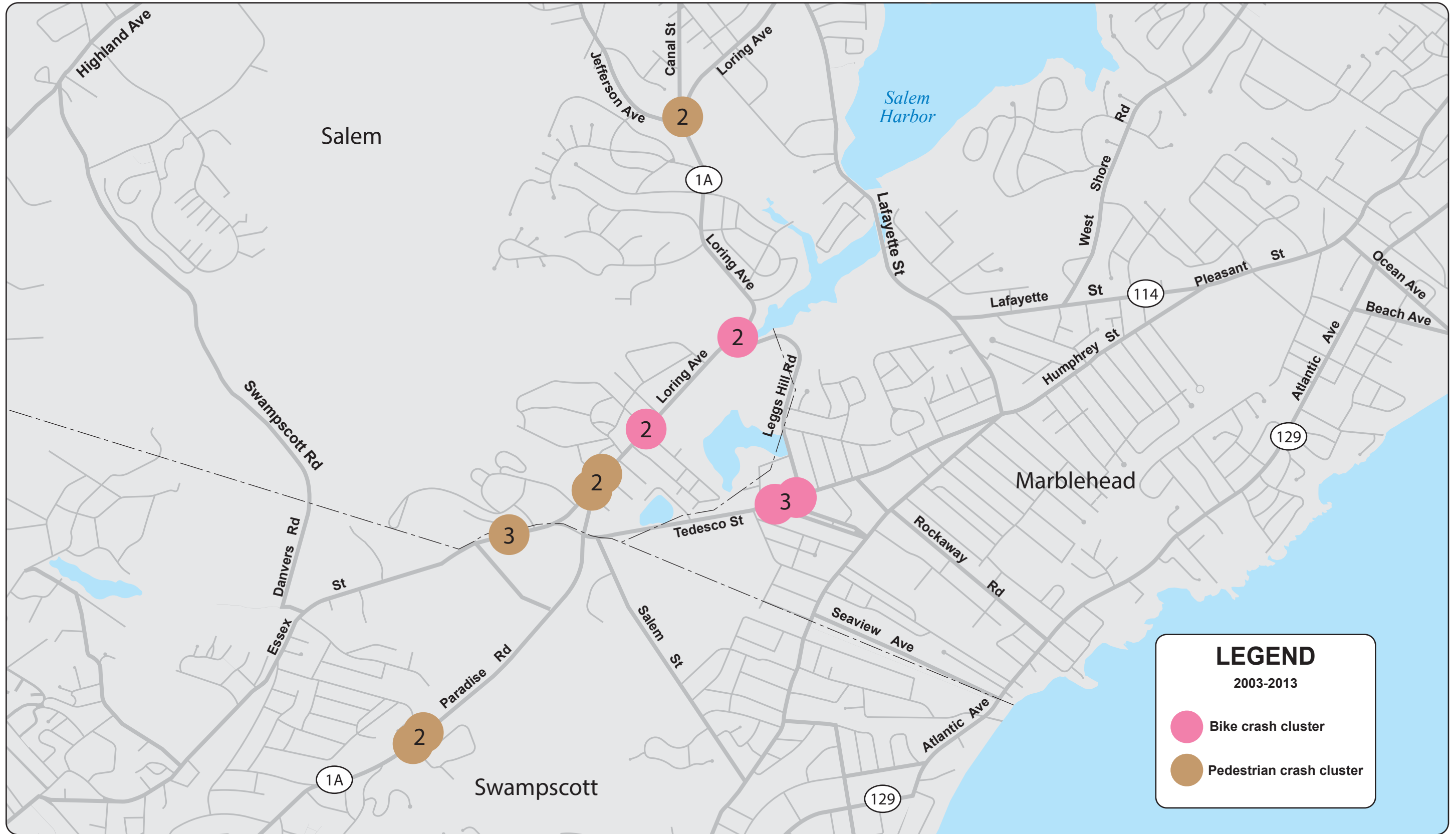




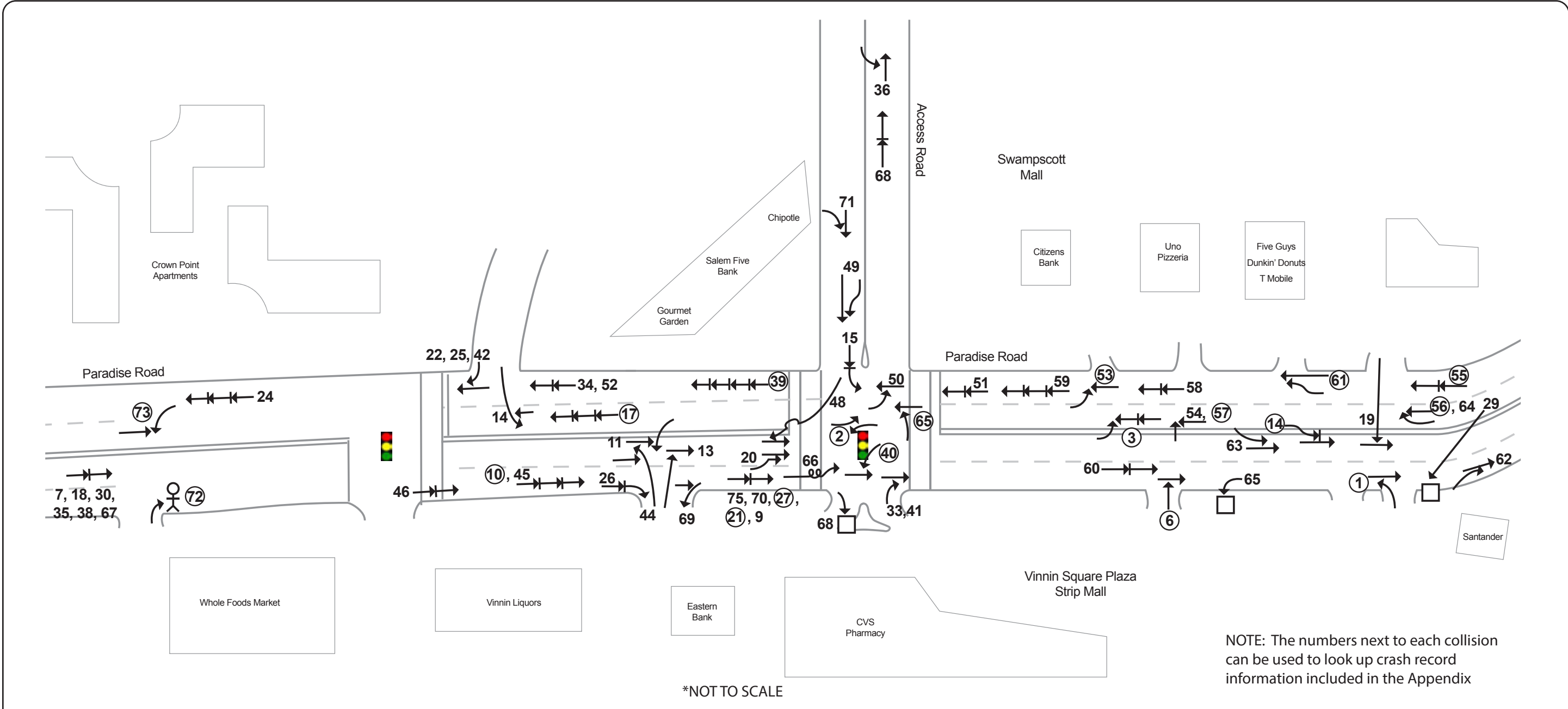
**Figure 13**  
**MBTA Bus Stop Locations and Average Weekday Boardings (On and Off) at Heavily Used Stops**







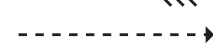


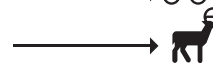
**Figure 14**  
**Crash Clusters (2011-2014)**








**Figure 15**  
**Bicycle and Pedestrian Crashes (2003-2013)**





**SYMBOLS**

- |  |  |
|--|--|
|  Moving Vehicle       |  Parked Vehicle |
|  Backing Vehicle      |  Fixed Object   |
|  Non-Involved Vehicle |  Bicycle        |
|  Pedestrian           |  Animal         |

**TYPES OF CRASH**

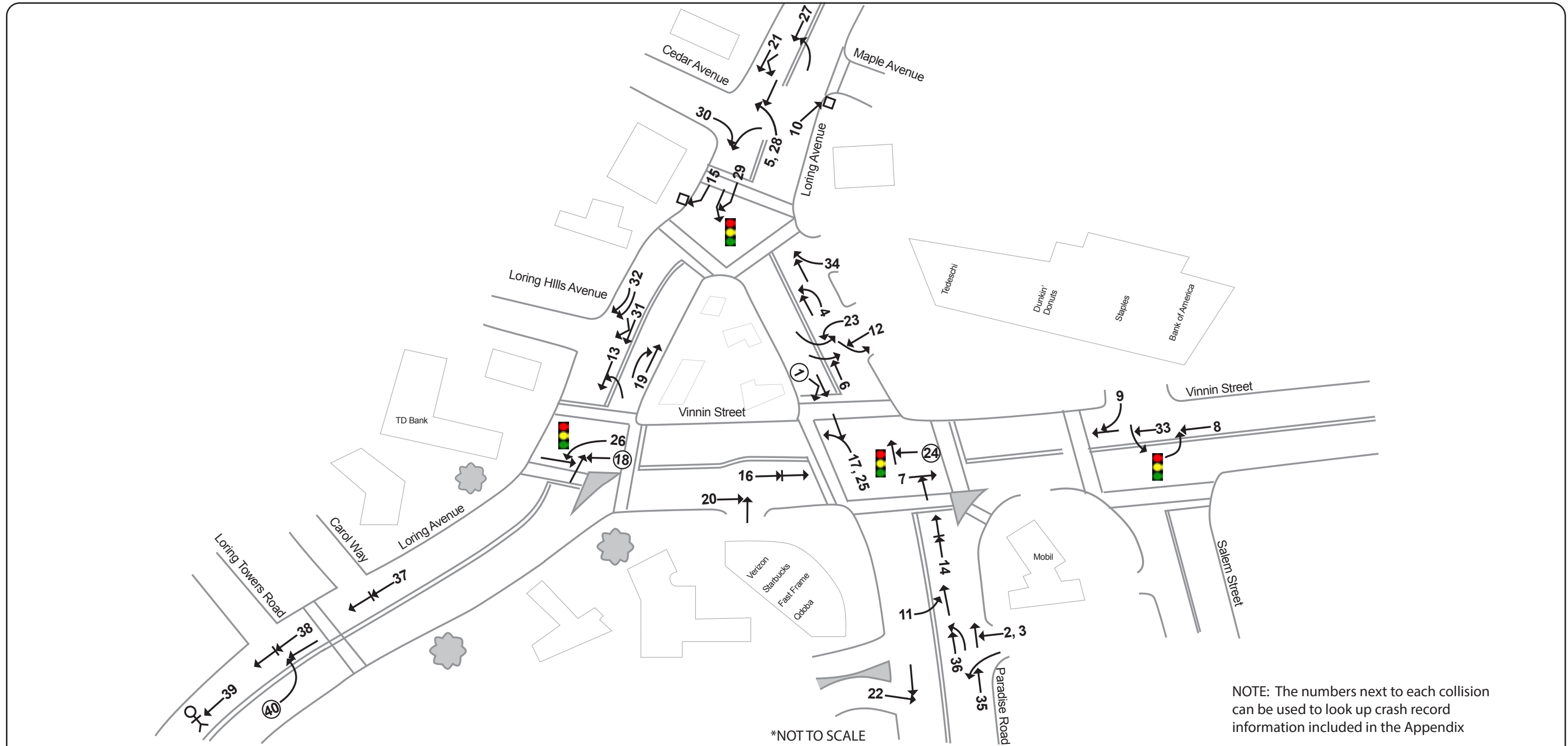
- |  |  |
|--|--|
|  Head On  |  Sideswipe      |
|  Angle    |  Out of Control |
|  Rear End |  |

**SEVERITY**

- |   |  |
|---|--|
|  Injury Accident |  Fatal Accident |
|---|--|



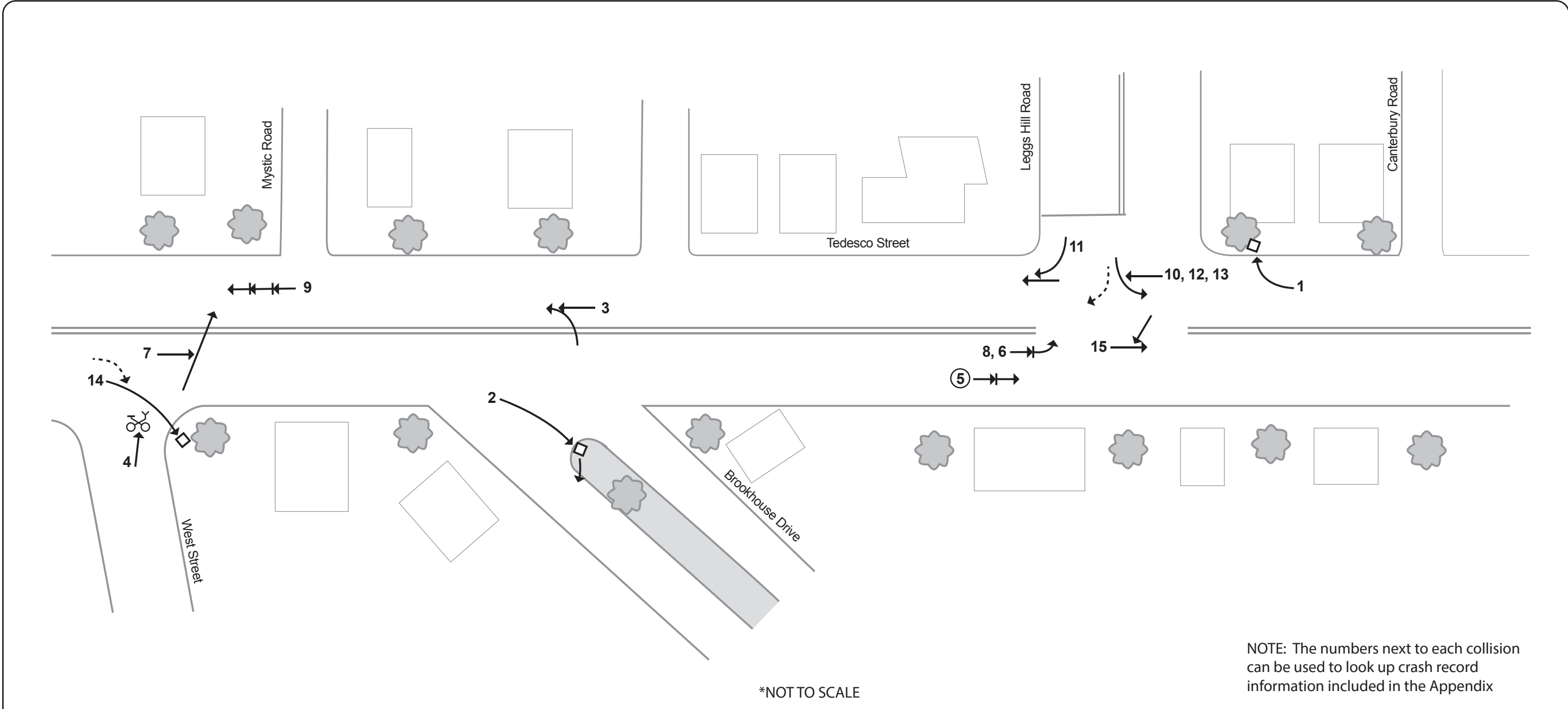
**Figure 16**  
**Collision Diagram for Crash Cluster 1**



SYMBOLS		TYPES OF CRASH		SEVERITY	
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	Injury Accident	Fatal Accident
Backing Vehicle	Fixed Object	Angle	Out of Control		
Non-Involved Vehicle	Bicycle	Rear End			
Pedestrian	Animal				



**Figure 17**  
**Collision Diagram for Crash Clusters 2 and 3**



NOTE: The numbers next to each collision can be used to look up crash record information included in the Appendix

SYMBOLS		TYPES OF CRASH		SEVERITY	
<ul style="list-style-type: none"> <li> Moving Vehicle</li> <li> Backing Vehicle</li> <li> Non-Involved Vehicle</li> <li> Pedestrian</li> </ul>	<ul style="list-style-type: none"> <li> Parked Vehicle</li> <li> Fixed Object</li> <li> Bicycle</li> <li> Animal</li> </ul>	<ul style="list-style-type: none"> <li> Head On</li> <li> Angle</li> <li> Rear End</li> <li> Sideswipe</li> <li> Out of Control</li> </ul>	<ul style="list-style-type: none"> <li style="text-align: center;"> Injury Accident</li> <li style="text-align: center;"> Fatal Accident</li> </ul>		



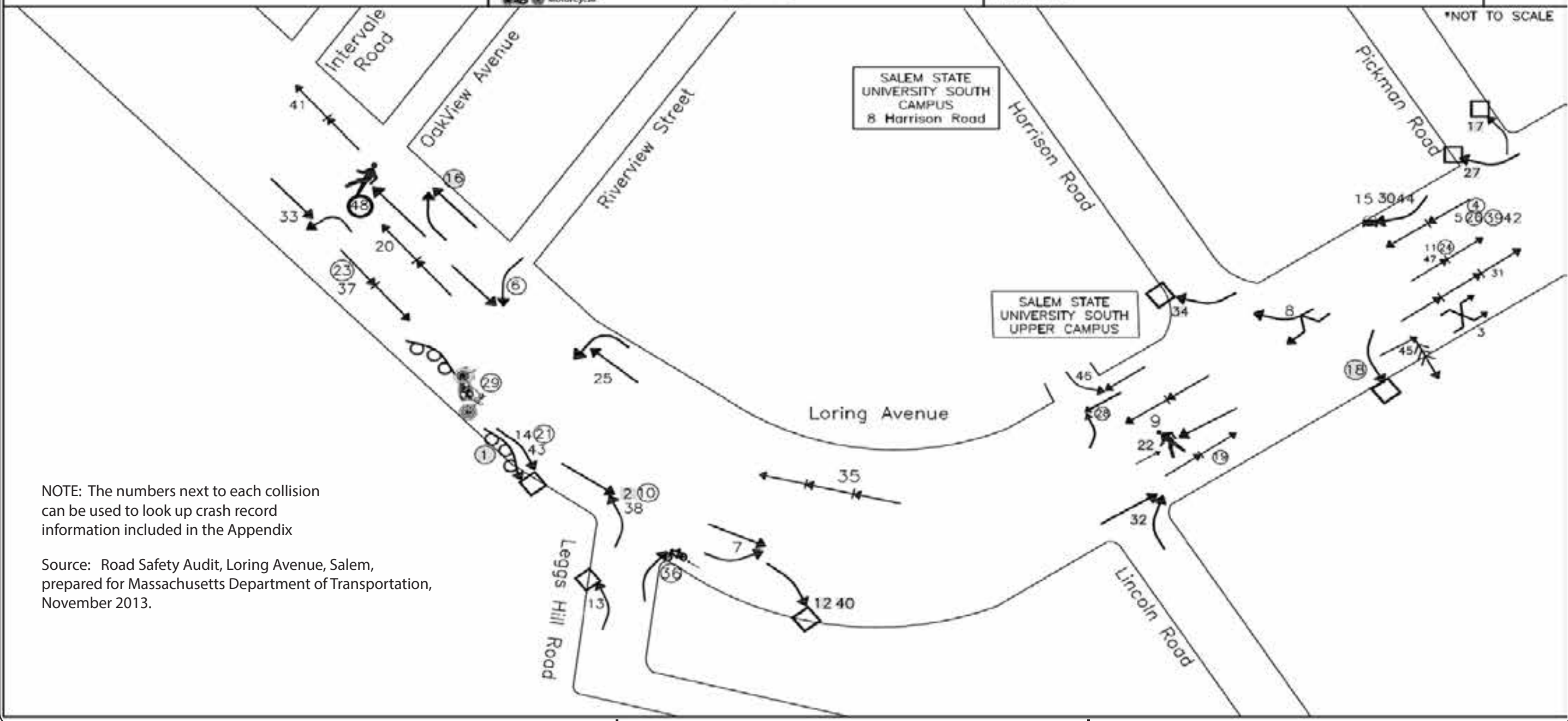
**Figure 18**  
**Collision Diagram for Crash Cluster 4**

**COLLISION DIAGRAM**

SYMBOLS	TYPES OF CRASH	SEVERITY

**SALEM, MA**  
**LORING AVENUE (Route 1A)**  
 REGION: MAPC

TIME PERIOD ANALYZED: 2010, 2011, 2012, 2013  
 SOURCE OF CRASH REPORTS: Salem Police Department  
 DATE PREPARED: 07/31/13  
 PREPARED BY: LJ

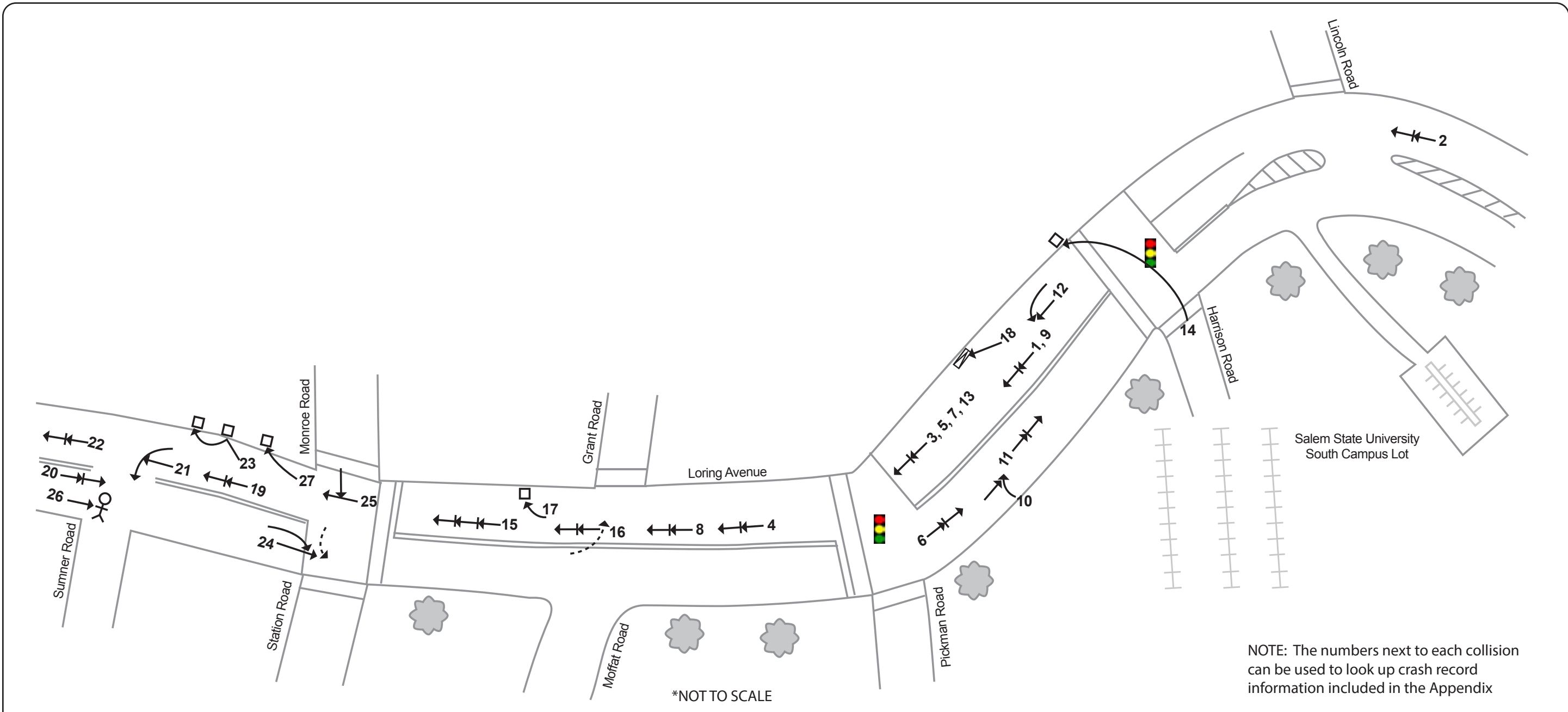


NOTE: The numbers next to each collision can be used to look up crash record information included in the Appendix

Source: Road Safety Audit, Loring Avenue, Salem, prepared for Massachusetts Department of Transportation, November 2013.



**Figure 19**  
**Collision Diagram for Crash Cluster 5**



\*NOT TO SCALE

NOTE: The numbers next to each collision can be used to look up crash record information included in the Appendix

**SYMBOLS**

**TYPES OF CRASH**

**SEVERITY**

- |                      |                |
|----------------------|----------------|
| Moving Vehicle       | Parked Vehicle |
| Backing Vehicle      | Fixed Object   |
| Non-Involved Vehicle | Bicycle        |
| Pedestrian           | Animal         |

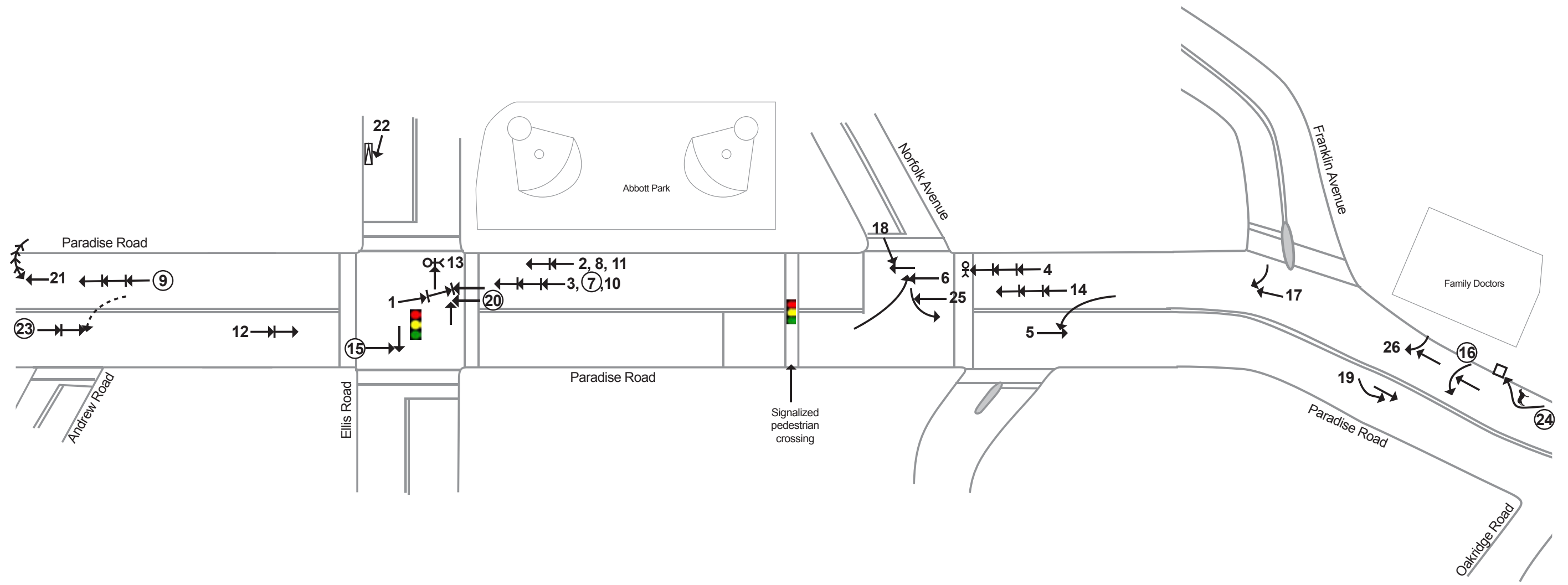
- |          |                |
|----------|----------------|
| Head On  | Sideswipe      |
| Angle    | Out of Control |
| Rear End |                |

- |                 |                |
|-----------------|----------------|
| Injury Accident | Fatal Accident |
|-----------------|----------------|



**Figure 20**  
**Collision Diagram for Crash Cluster 6**





\*NOT TO SCALE

NOTE: The numbers next to each collision can be used to look up crash record information included in the Appendix

SYMBOLS		TYPES OF CRASH		SEVERITY	
→ Moving Vehicle	→ [Trapezoid] Parked Vehicle	↔↔ Head On	↔ Sideswipe	○ Injury Accident	⊙ Fatal Accident
↔ Backing Vehicle	→ [Square] Fixed Object	↘↙ Angle	↻ Out of Control		
- - - Non-Involved Vehicle	→ [Bicycle] Bicycle	→  Rear End			
→ [Stick Figure] Pedestrian	→ [Animal] Animal				



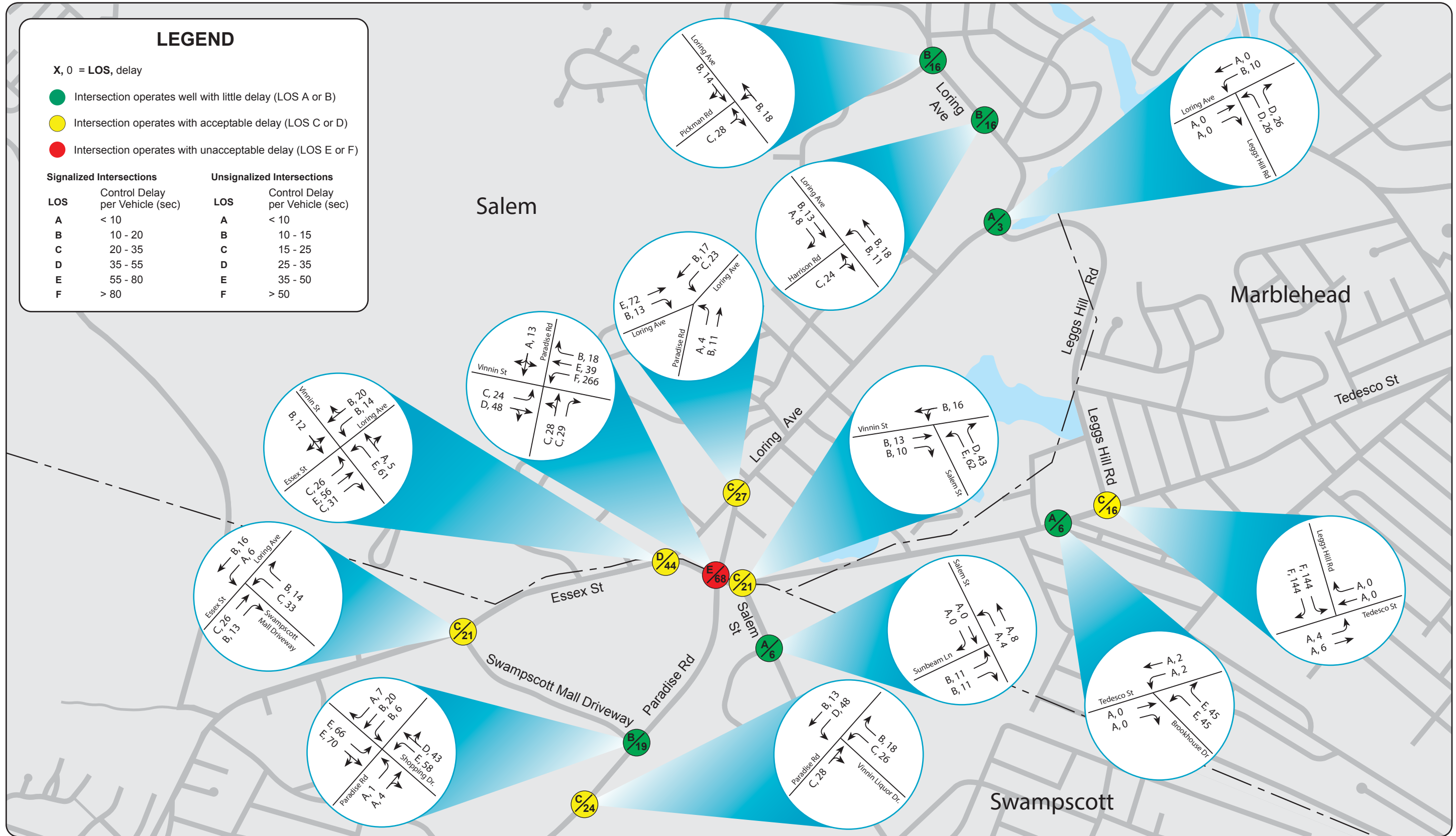
**Figure 21**  
**Collision Diagram for Crash Cluster 7**

# LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



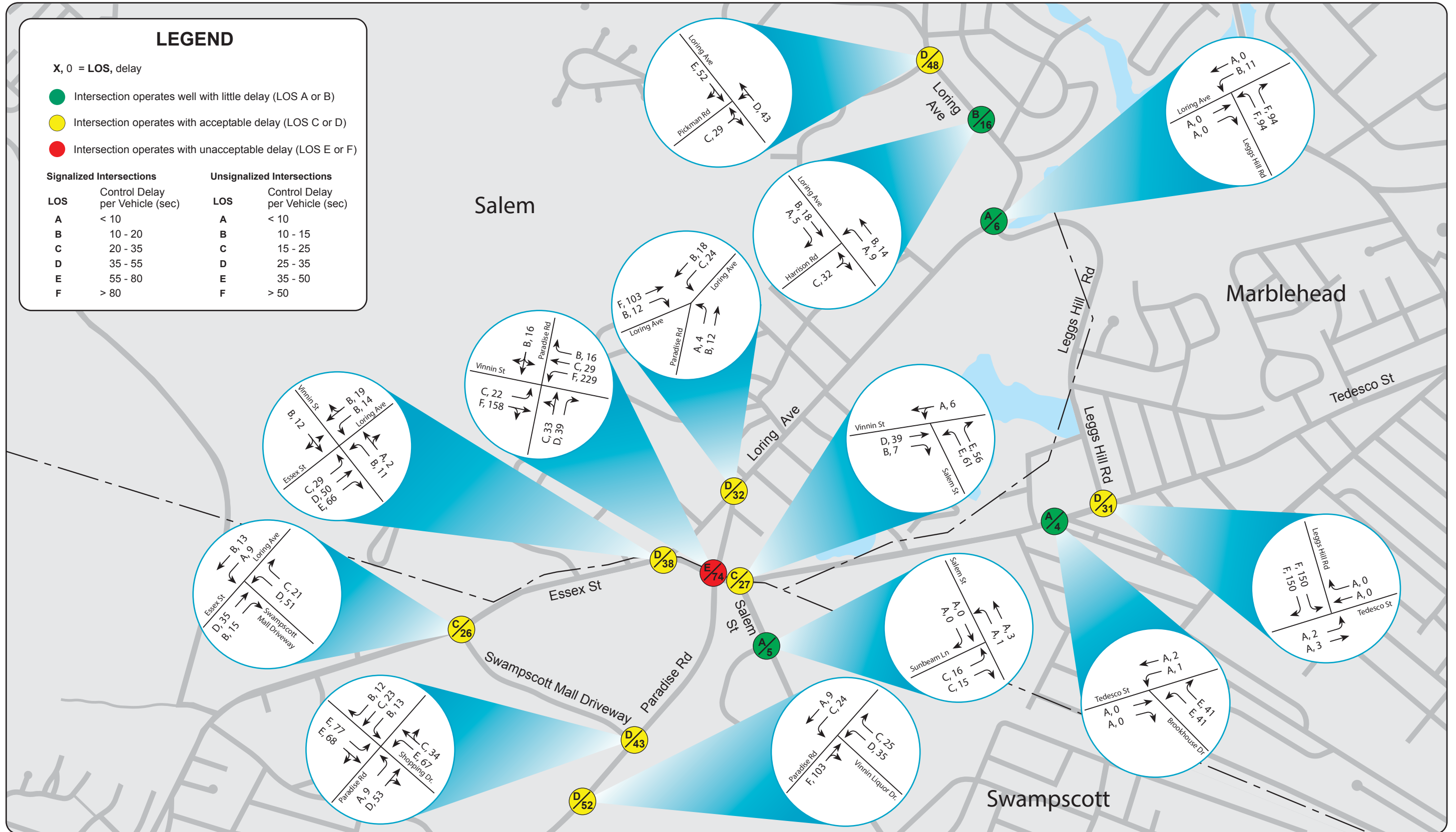
**Figure 22**  
Existing Conditions  
Weekday AM Peak Hour Level of Service and Delays

### LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



**Figure 23**  
Existing Conditions  
Weekday PM Peak Hour Level of Service and Delays

## LEGEND

X, 0 = LOS, delay

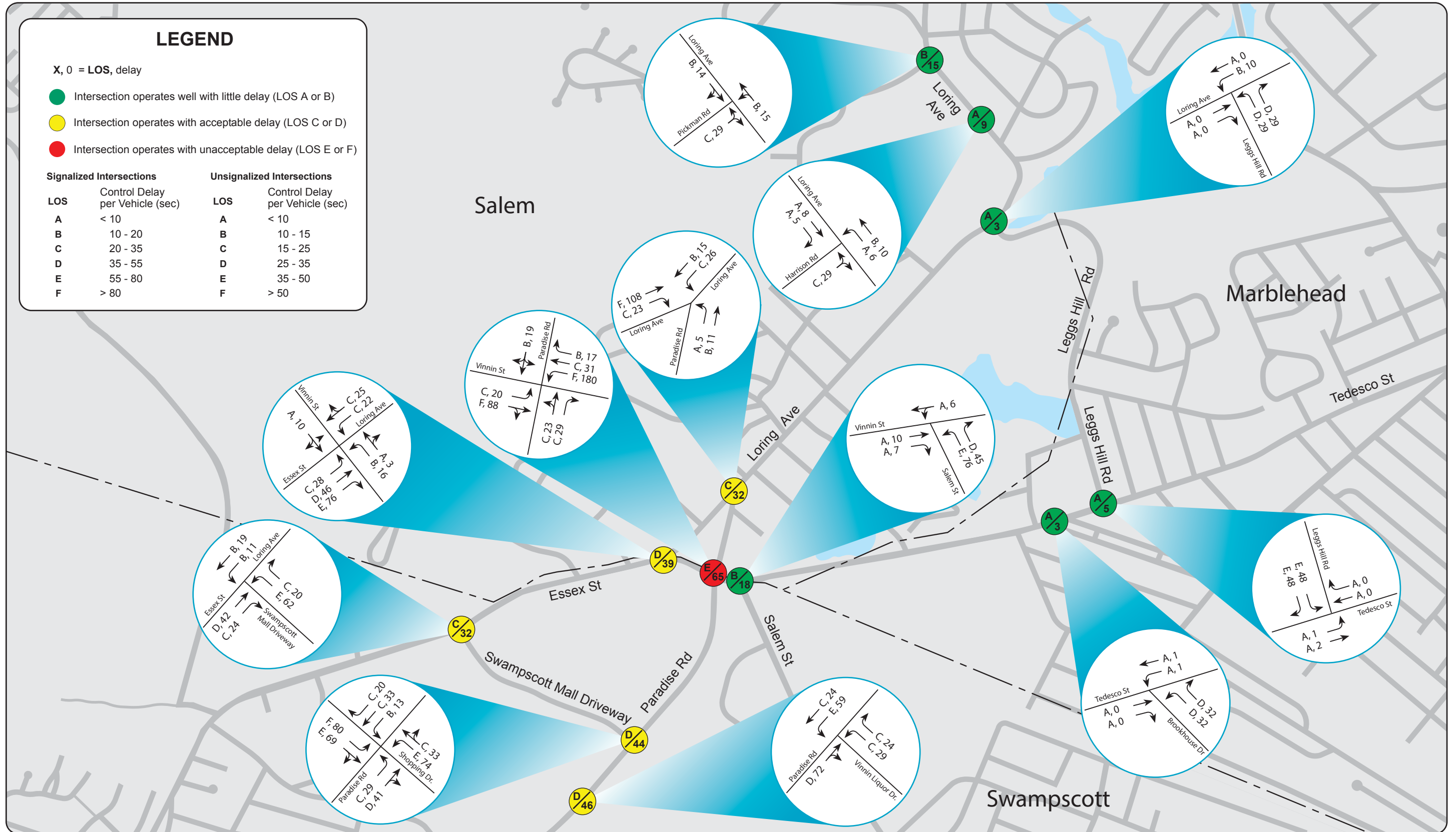
- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

### Signalized Intersections

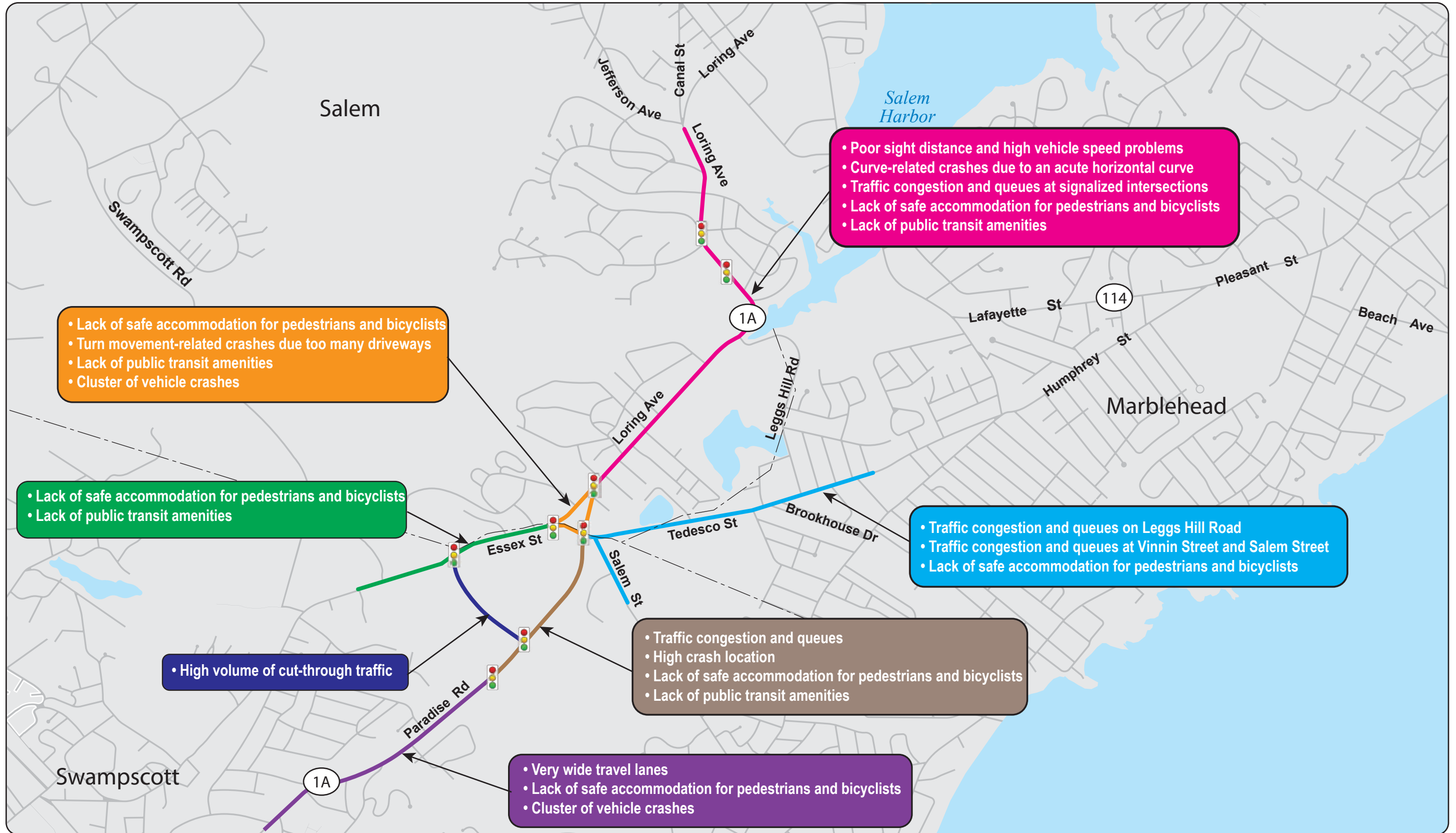
LOS	Control Delay per Vehicle (sec)
A	< 10
B	10 - 20
C	20 - 35
D	35 - 55
E	55 - 80
F	> 80

### Unsignalized Intersections

LOS	Control Delay per Vehicle (sec)
A	< 10
B	10 - 15
C	15 - 25
D	25 - 35
E	35 - 50
F	> 50



**Figure 24**  
**Existing Conditions**  
**Saturday PM Peak Hour Level of Service and Delays**



**Figure 25**  
**Problems Identified in the Study Area**



Wide travel lanes



Wide travel lanes



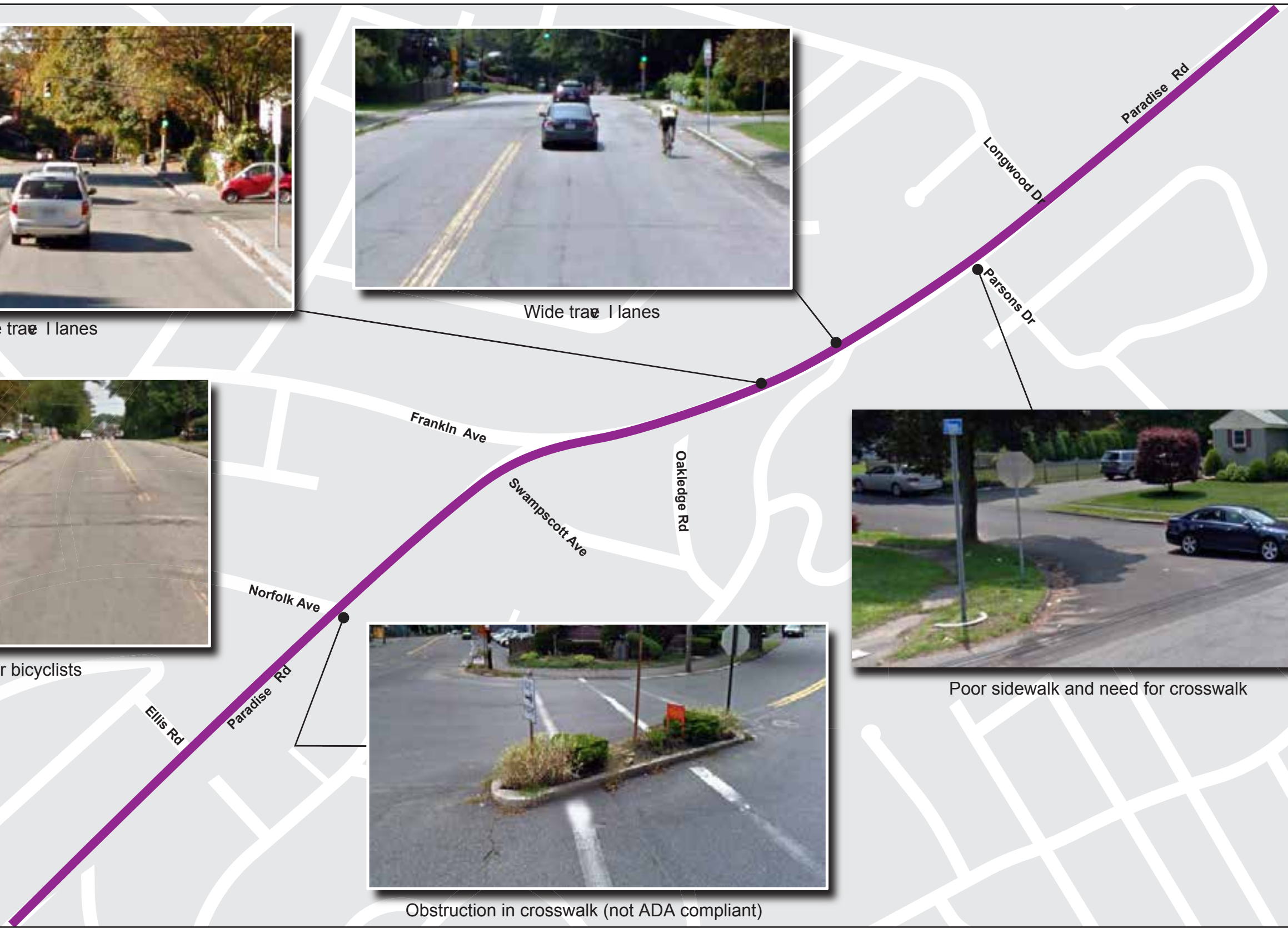
No accommodation for bicyclists



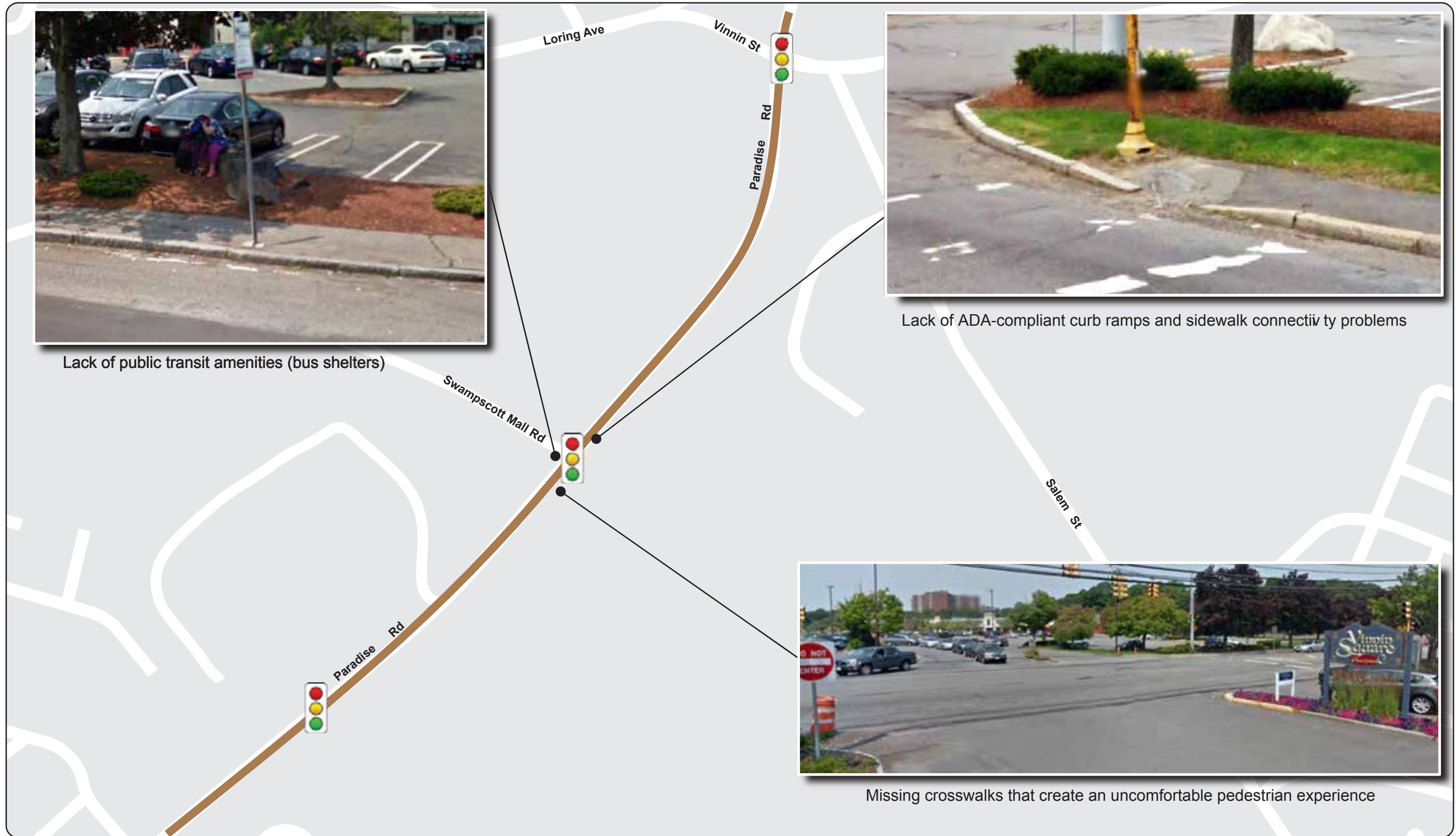
Poor sidewalk and need for crosswalk



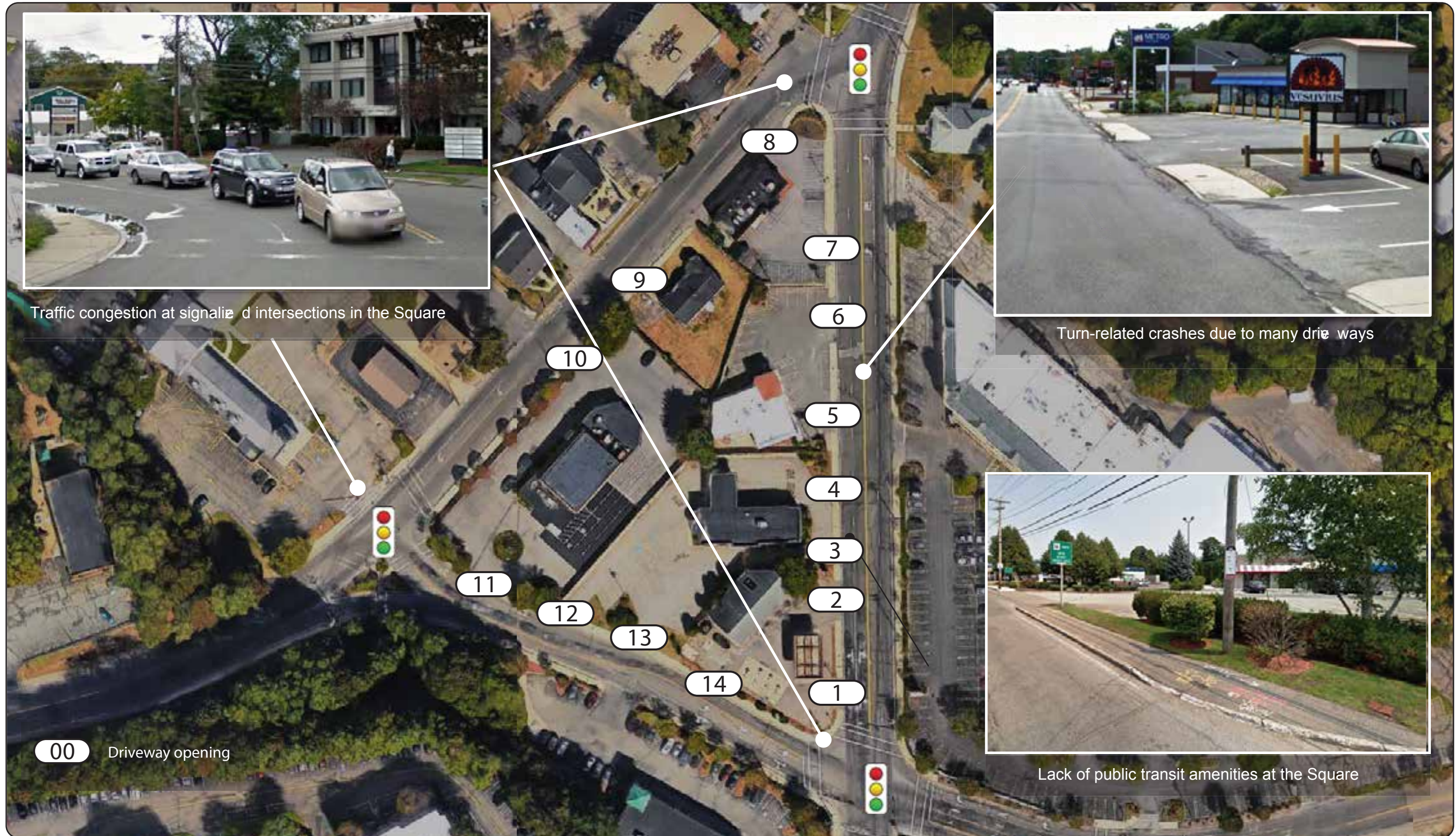
Obstruction in crosswalk (not ADA compliant)



**Figure 26**  
**Existing Problems:**  
**Paradise Road from Ellis Street to Longwood Drive**

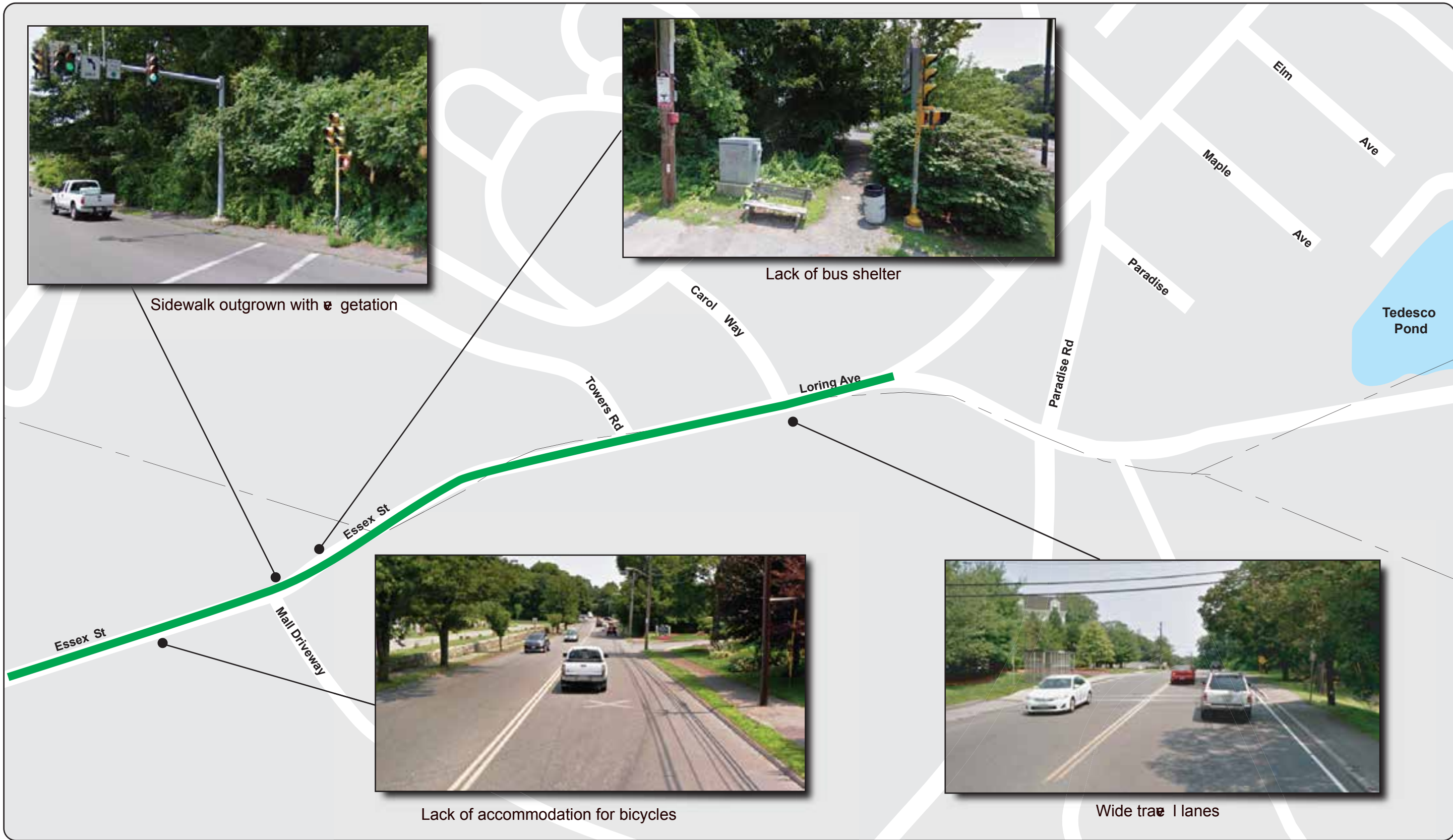


**Figure 27**  
**Existing Problems: Paradise Road at Swampscott Mall**



**Figure 28**  
**Existing Problems at Vinnin Square**





**Figure 29**  
**Existing Problems:**  
**Essex Street and Loring Avenue South of Vinnin Square**



Wide travel lanes and lack of accommodations for bicycles



Traffic congestion on Leggs Hill Road  
Lack of crosswalks at intersection

Vinnin St



Salem St

Tedesco St

West St

Brookhouse Dr

Leggs Hill Rd



Lack of crosswalk and long and unsafe crossing distance

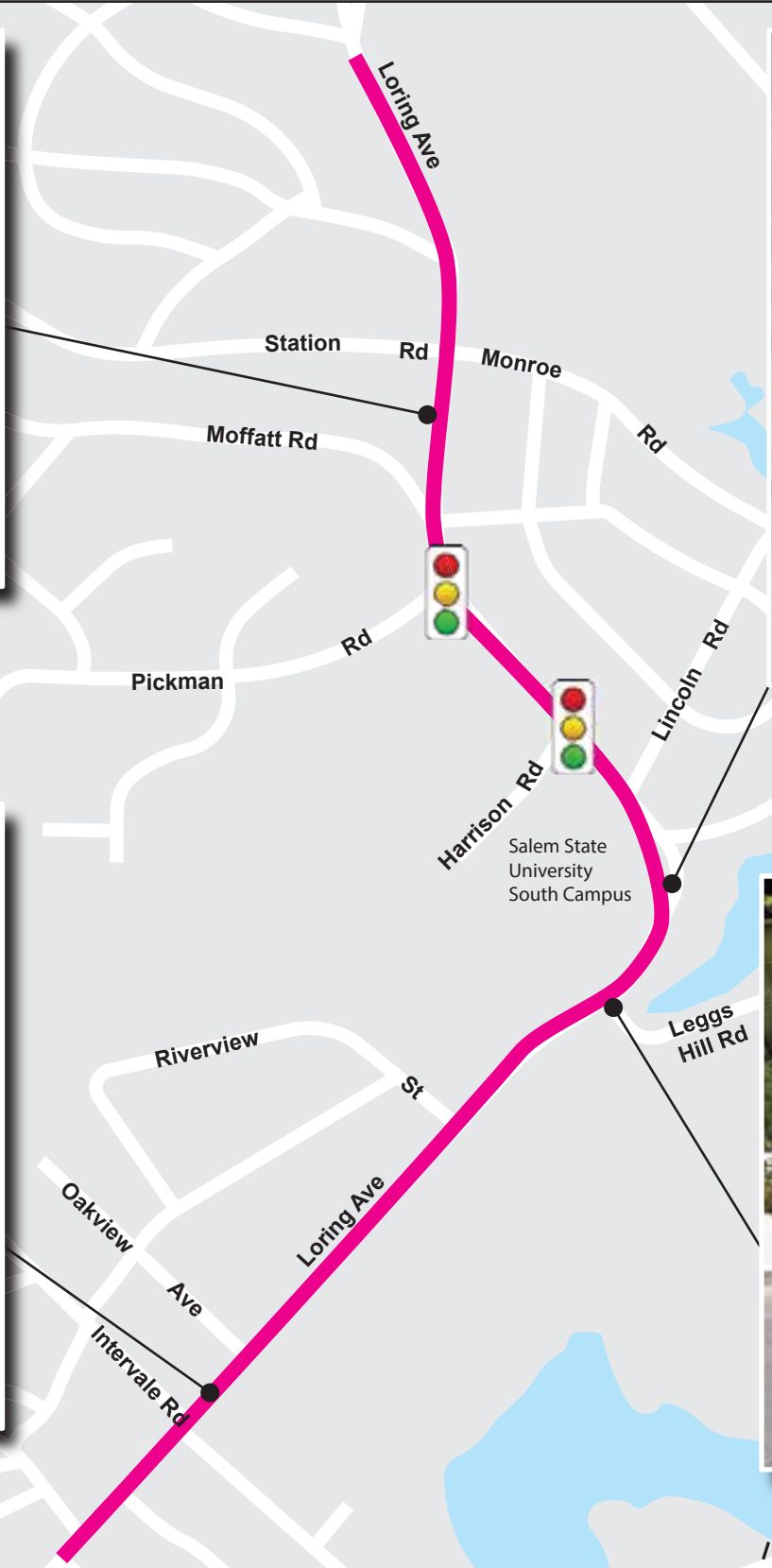




Congestion, queuing, and vehicular crashes  
 High-crash location (rear-end collisions)  
 Pedestrian safety (due to an impending school swap)  
 Lack of public transit amenities (bus shelters)



Sidewalk on the northbound side outgrown with vegetation



High vehicle speeds  
 Acute horizontal curves and poor sight distance  
 High-crash location (curve-related crashes)  
 Lack of a sidewalk on west side of Loring Avenue



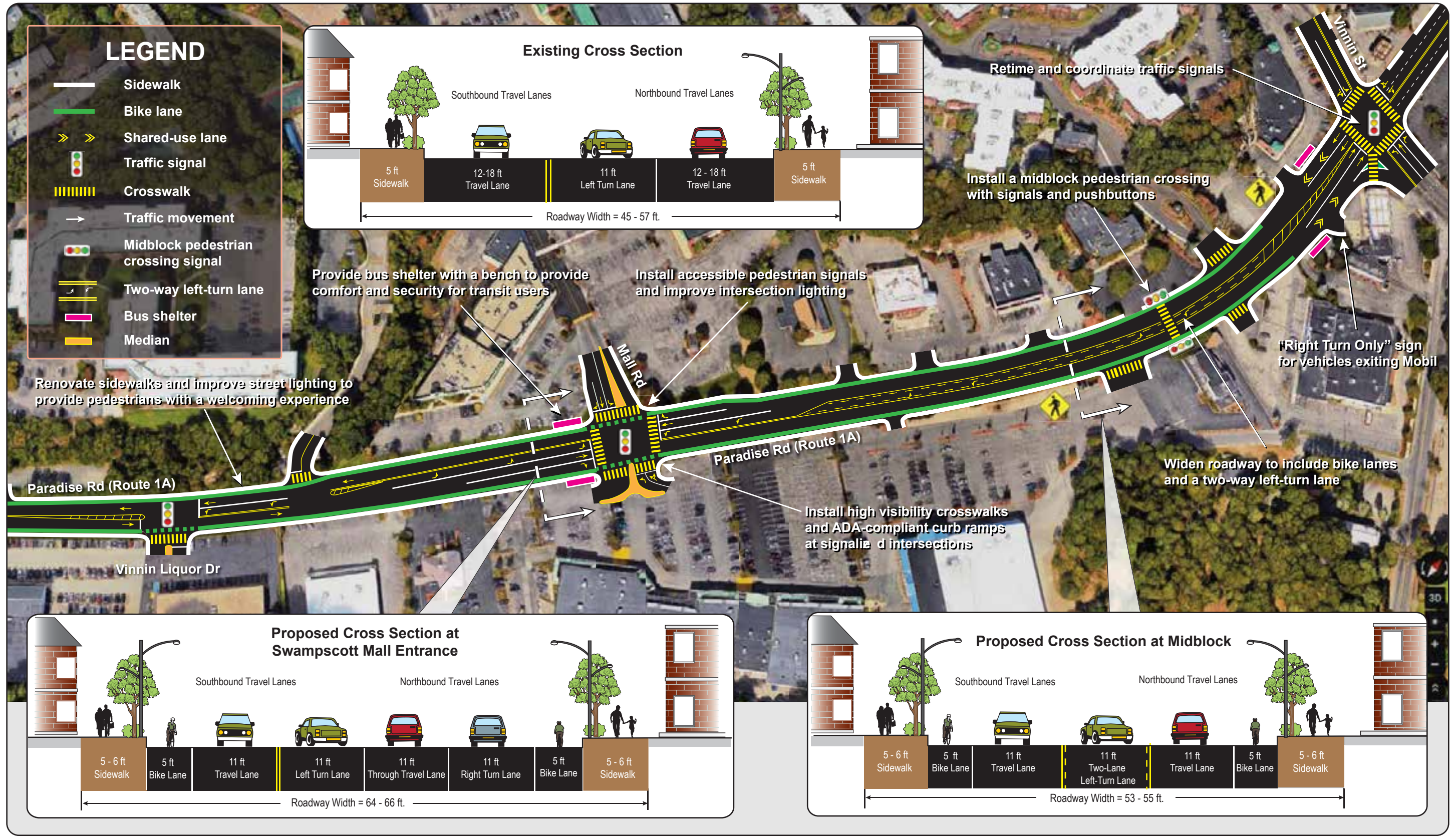
Bridge or culvert deteriorating



**Figure 31**  
**Existing Problems**  
**Loring Avenue from Vinnin Square to Sumner Road**

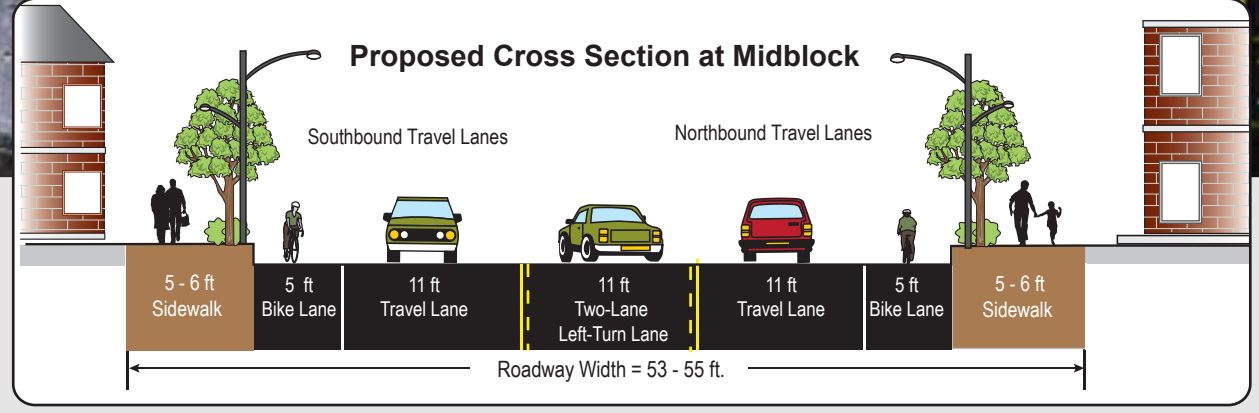
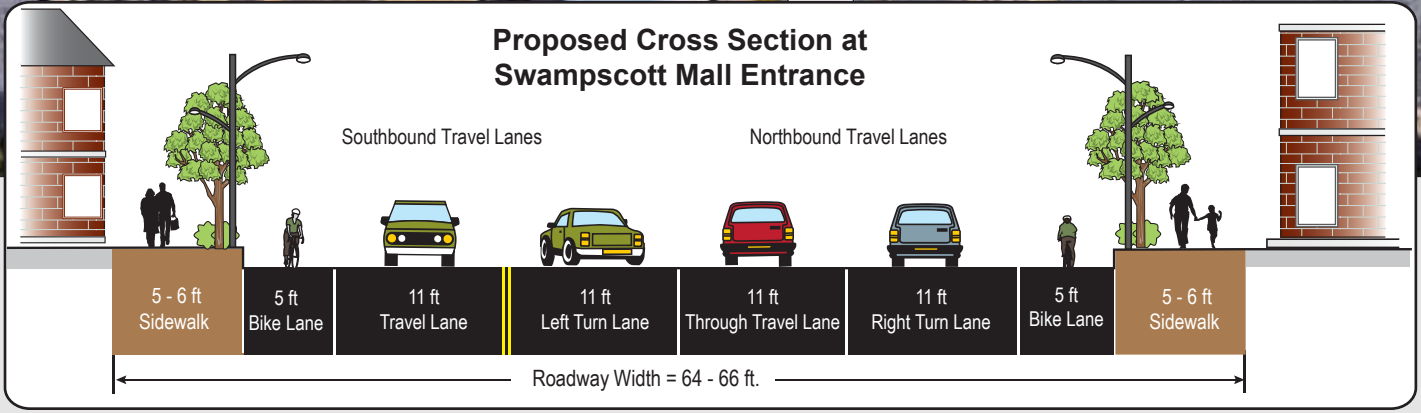
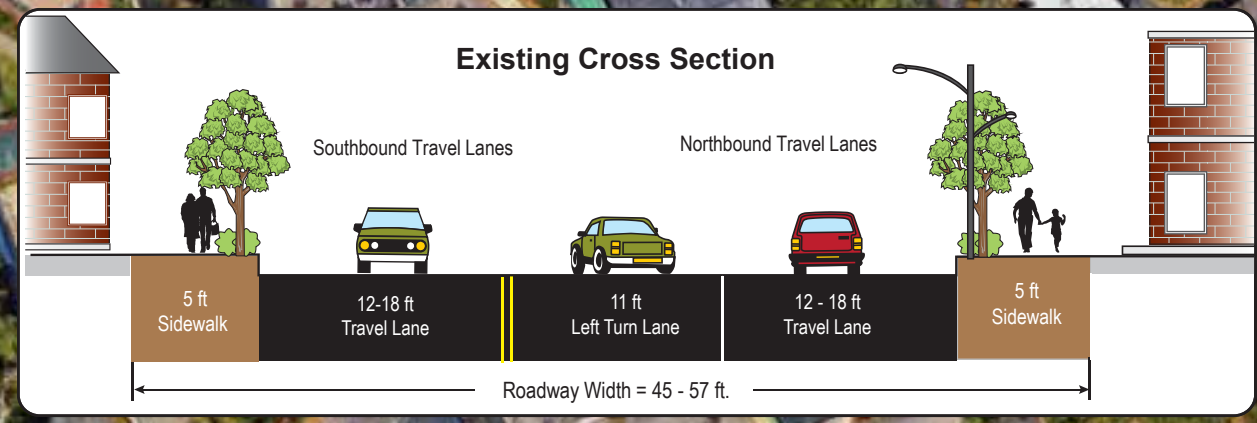


**Figure 32**  
**Proposed Improvements**  
**Paradise Road from Ellis Street to Longwood Drive**

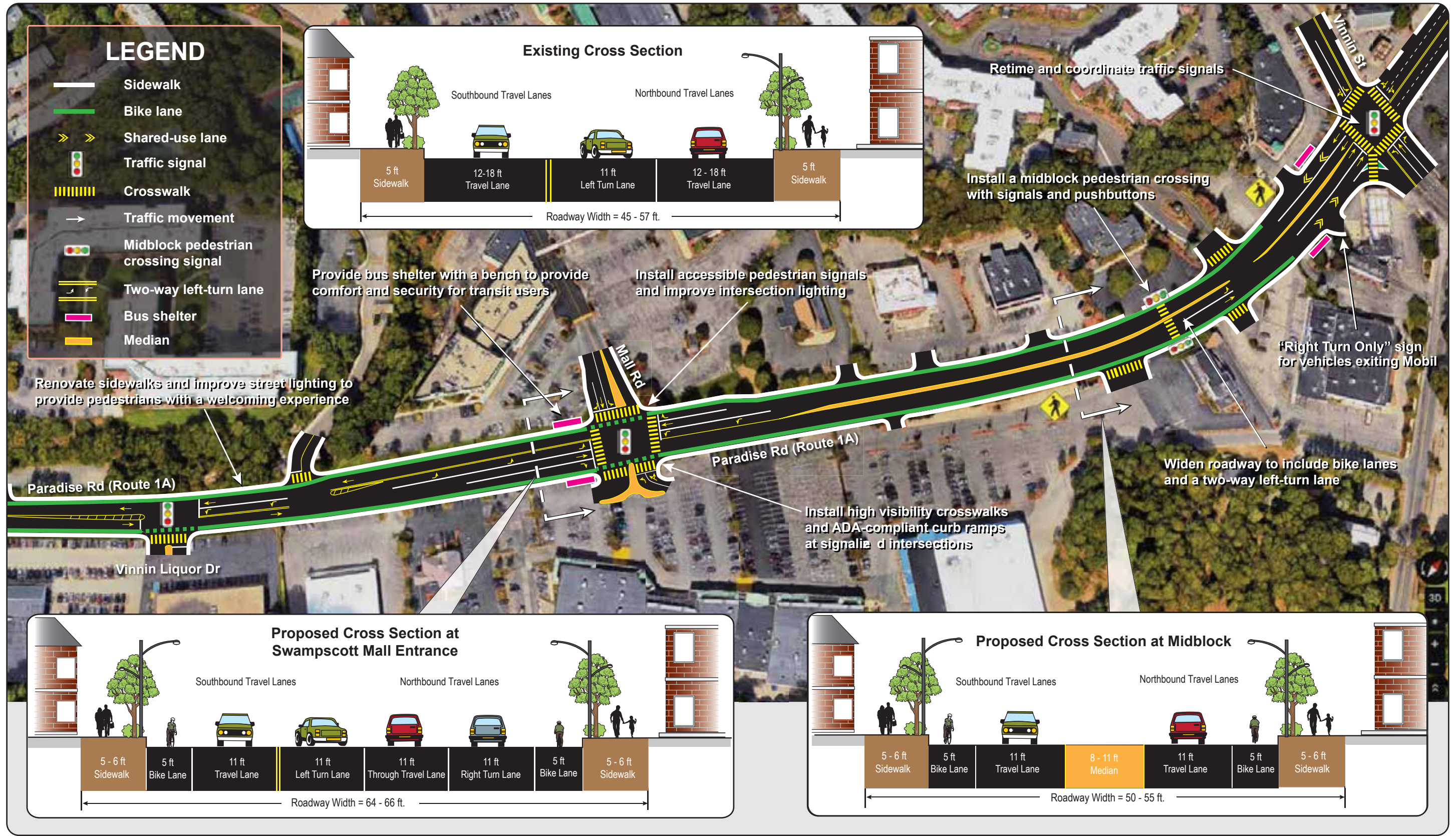


### LEGEND

- Sidewalk
- Bike lane
- Shared-use lane
- Traffic signal
- Crosswalk
- Traffic movement
- Midblock pedestrian crossing signal
- Two-way left-turn lane
- Bus shelter
- Median

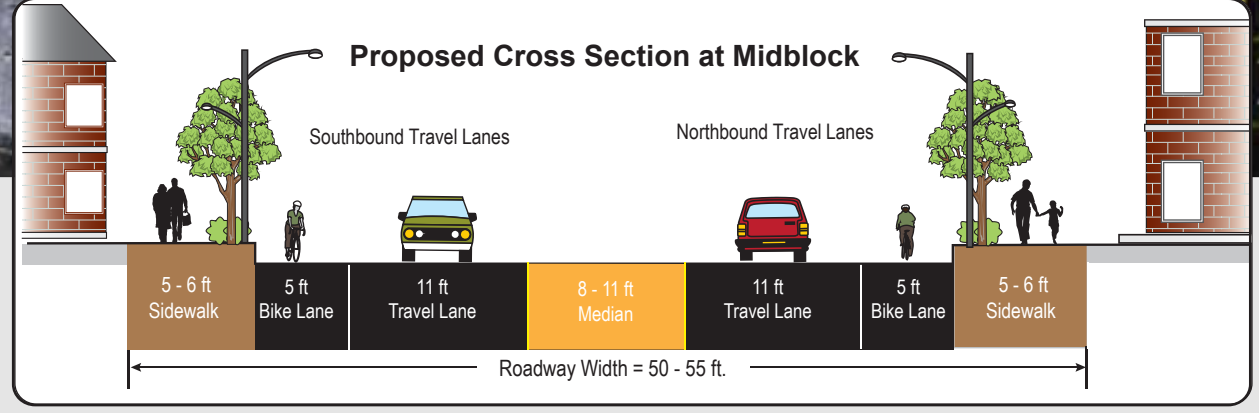
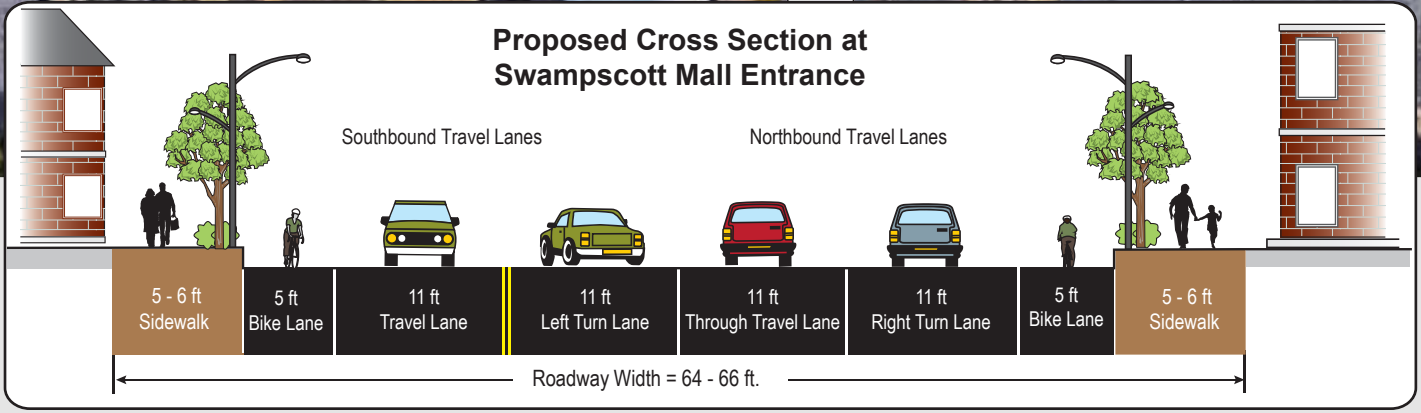
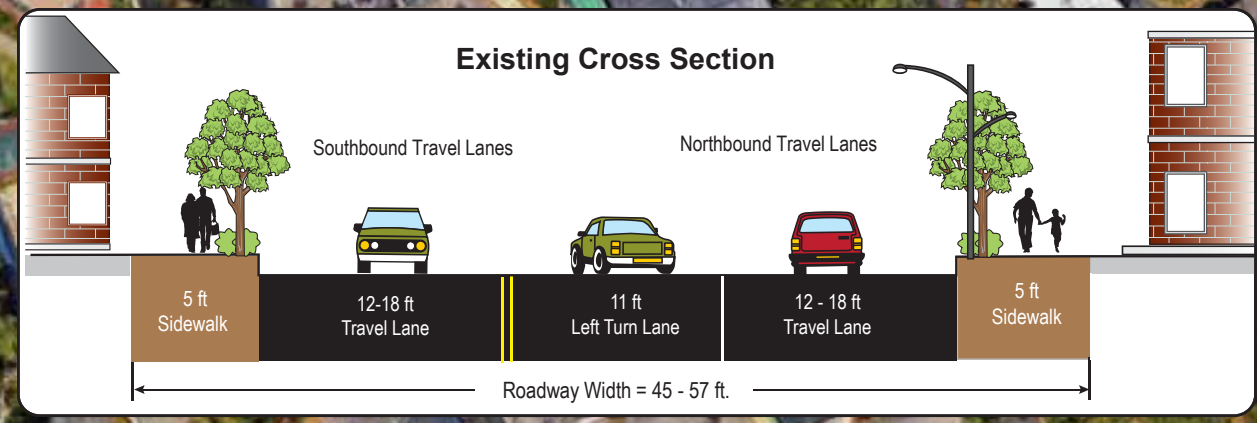


**Figure 33**  
**Proposed Improvements:**  
**Paradise Road at Swampscott Mall**  
**Alternative 1: Two-Lane Cross Section with Two-Way Left-Turn Lane and Bike Lanes**

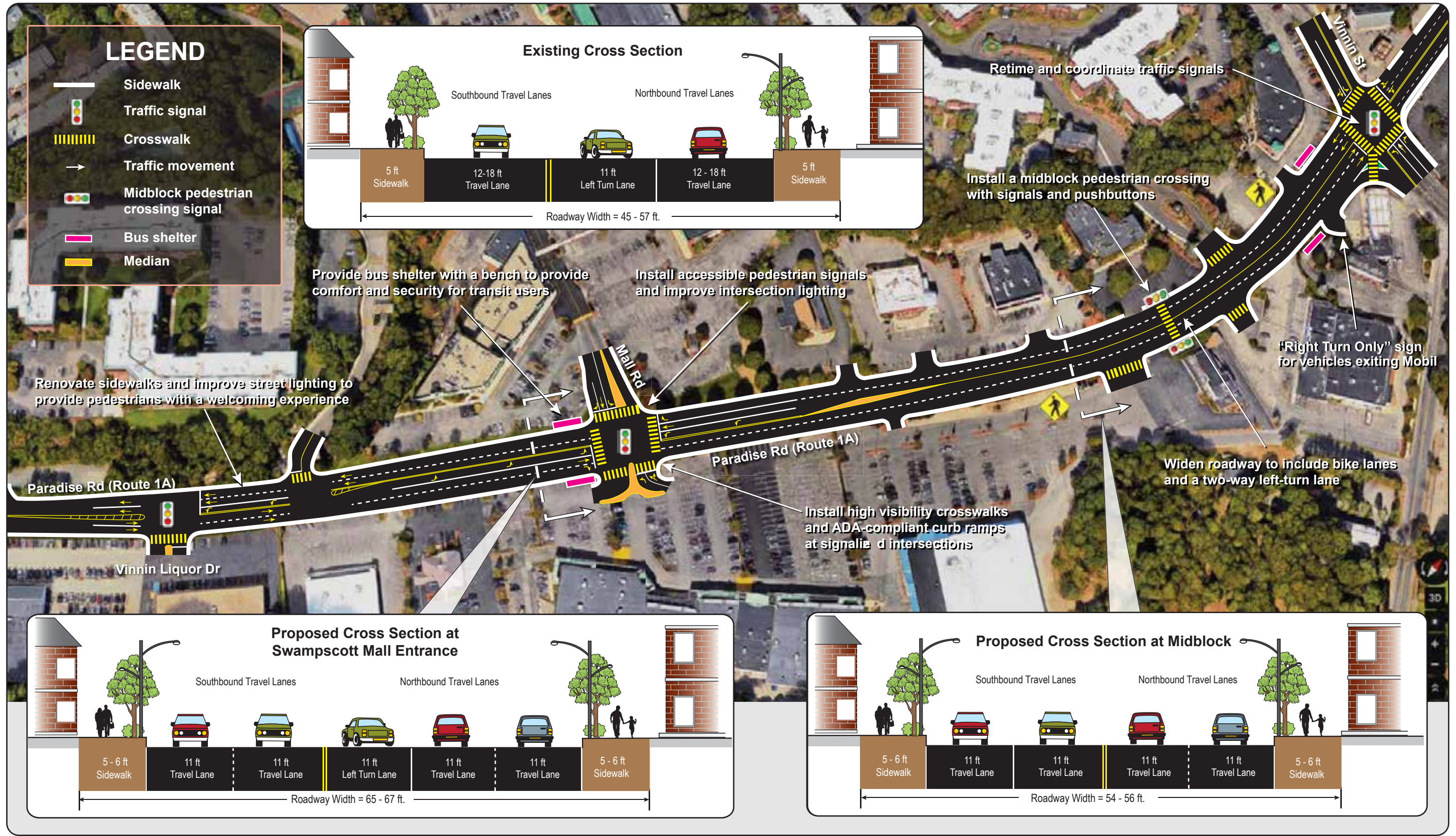


### LEGEND

- Sidewalk
- Bike lane
- Shared-use lane
- Traffic signal
- Crosswalk
- Traffic movement
- Midblock pedestrian crossing signal
- Two-way left-turn lane
- Bus shelter
- Median

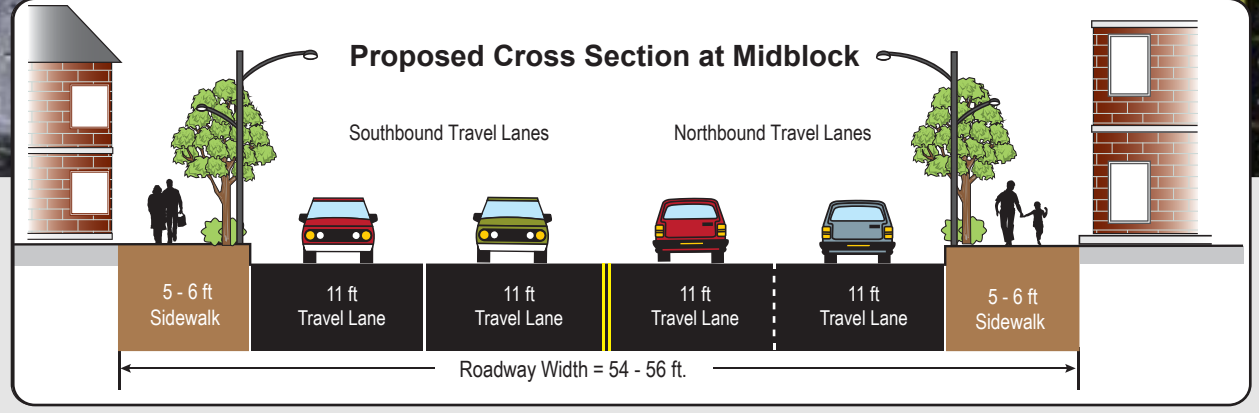
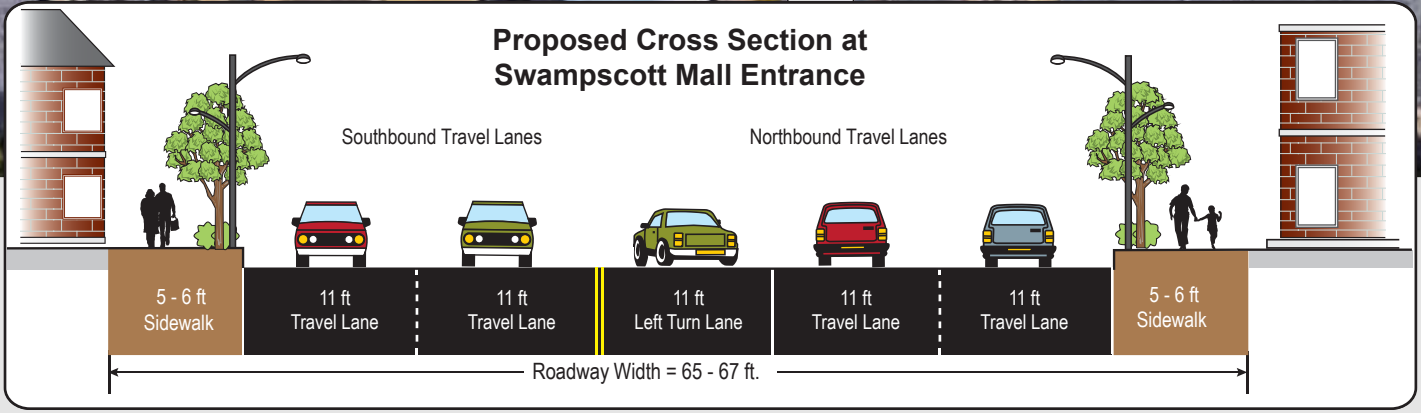
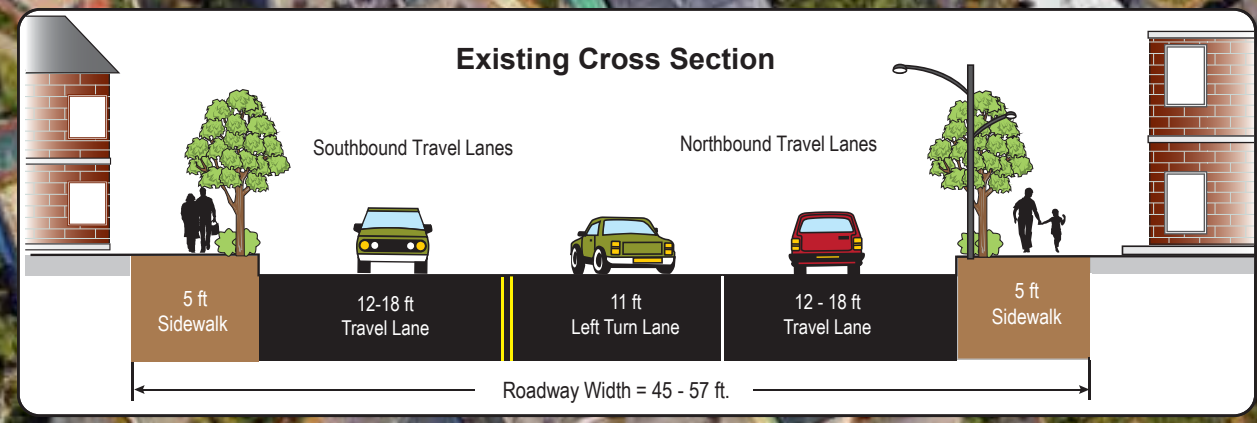


**Figure 34**  
**Proposed Improvements:**  
**Paradise Road at Swampscott Mall**  
**Alternative 2: Two-Lane Cross Section with Median, Left-Turn Lane, and Bike Lanes**

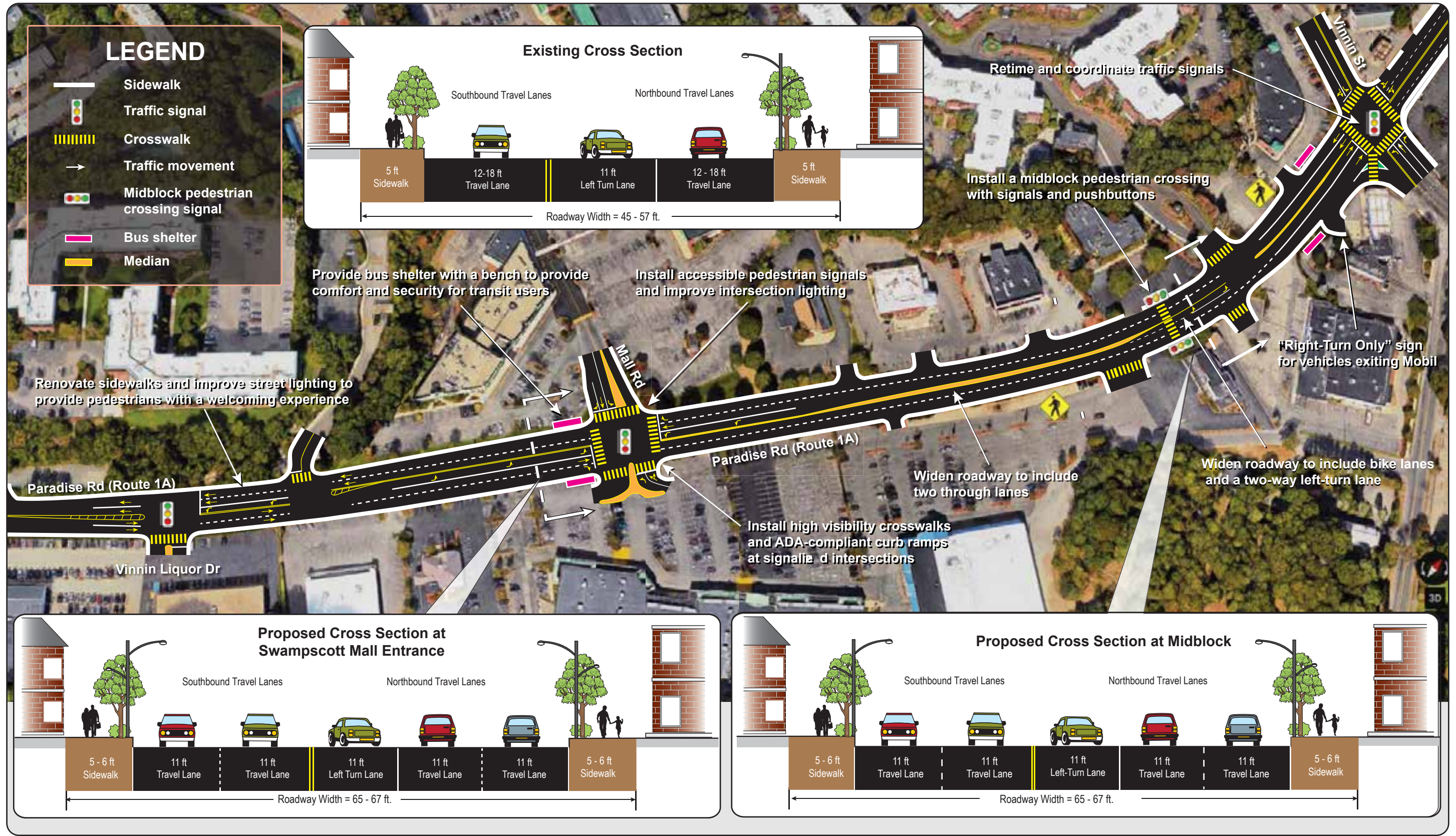


### LEGEND

- Sidewalk
- Traffic signal
- Crosswalk
- Traffic movement
- Midblock pedestrian crossing signal
- Bus shelter
- Median

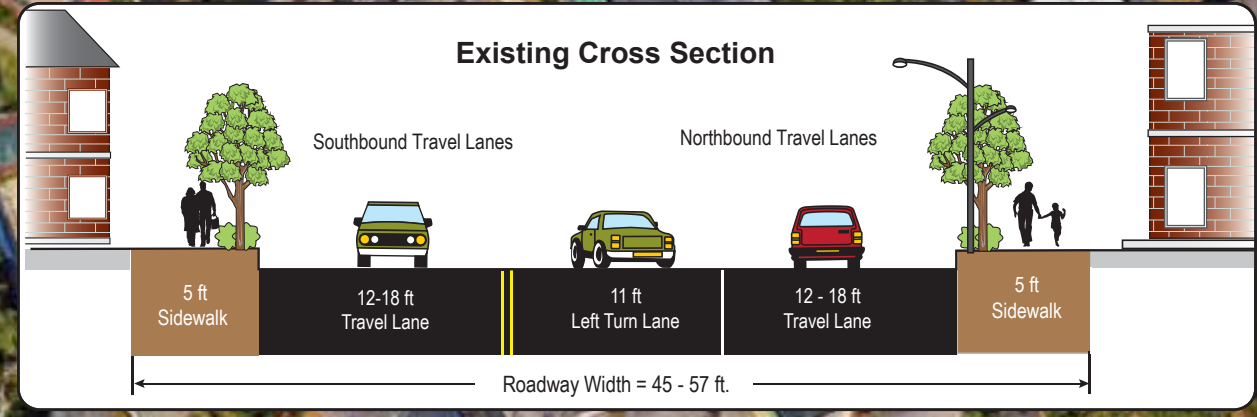


**Figure 35**  
**Proposed Improvements:**  
**Paradise Road at Swampscott Mall**  
**Alternative 3: Four-Lane Cross Section**



### LEGEND

-  Sidewalk
-  Traffic signal
-  Crosswalk
-  Traffic movement
-  Midblock pedestrian crossing signal
-  Bus shelter
-  Median



Renovate sidewalks and improve street lighting to provide pedestrians with a welcoming experience

Provide bus shelter with a bench to provide comfort and security for transit users

Install accessible pedestrian signals and improve intersection lighting

Retime and coordinate traffic signals

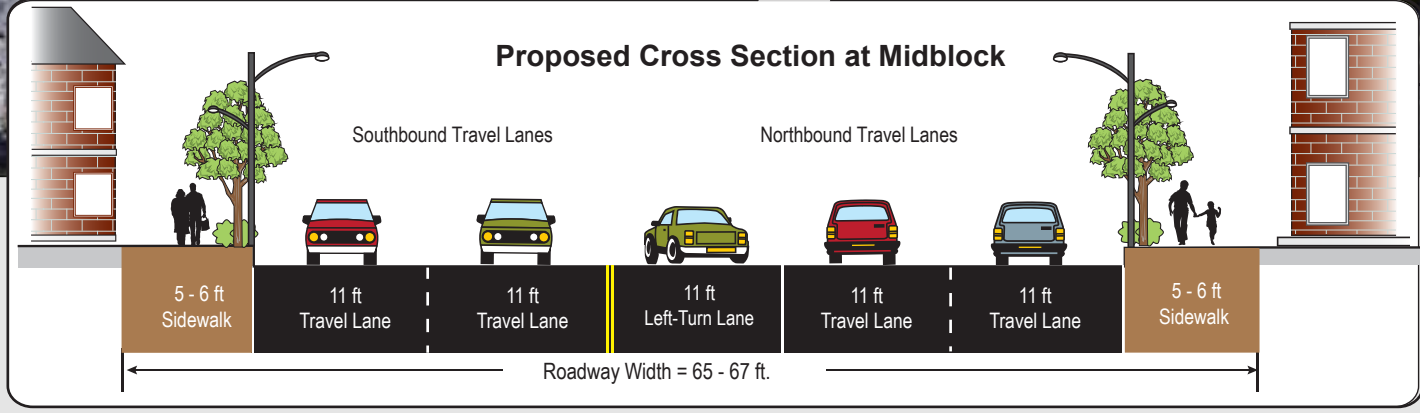
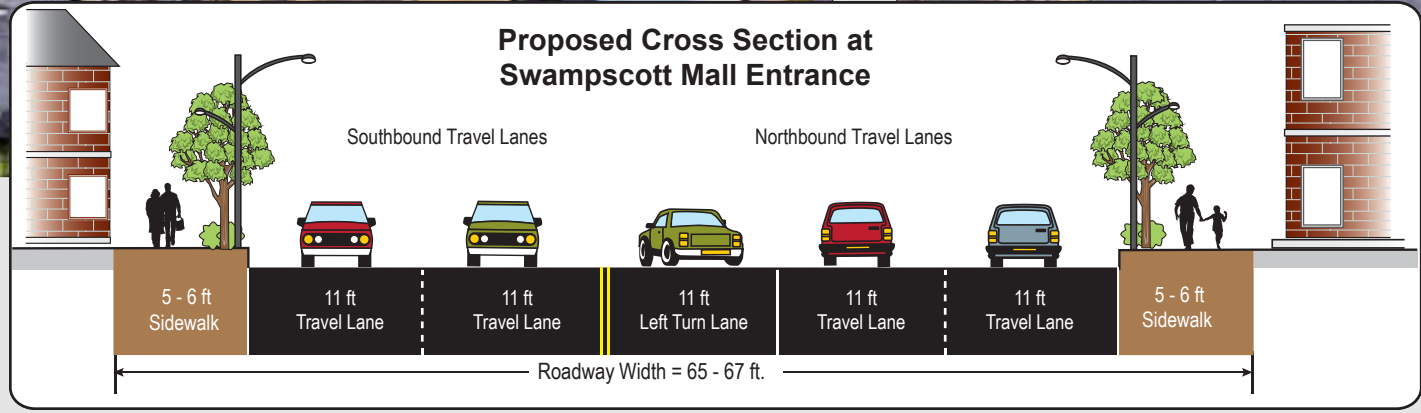
Install a midblock pedestrian crossing with signals and pushbuttons

"Right-Turn Only" sign for vehicles exiting Mobil

Widen roadway to include bike lanes and a two-way left-turn lane

Widen roadway to include two through lanes

Install high visibility crosswalks and ADA-compliant curb ramps at signalized intersections



**Figure 36**  
**Proposed Improvements:**  
**Paradise Road at Swampscott Mall**  
**Alternative 4: Four-Lane Cross Section with Median and Left-Turn Lane**

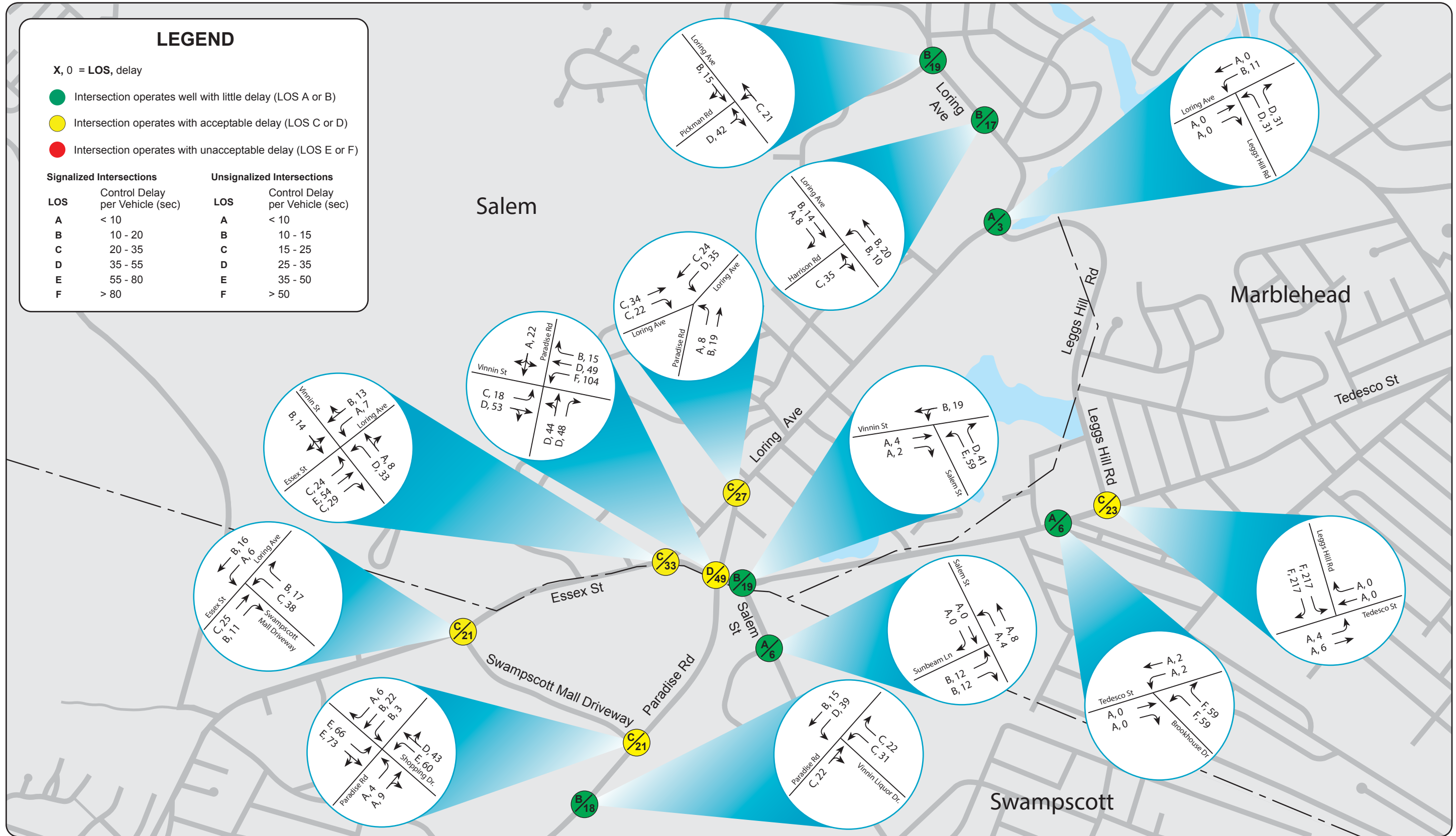


### LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



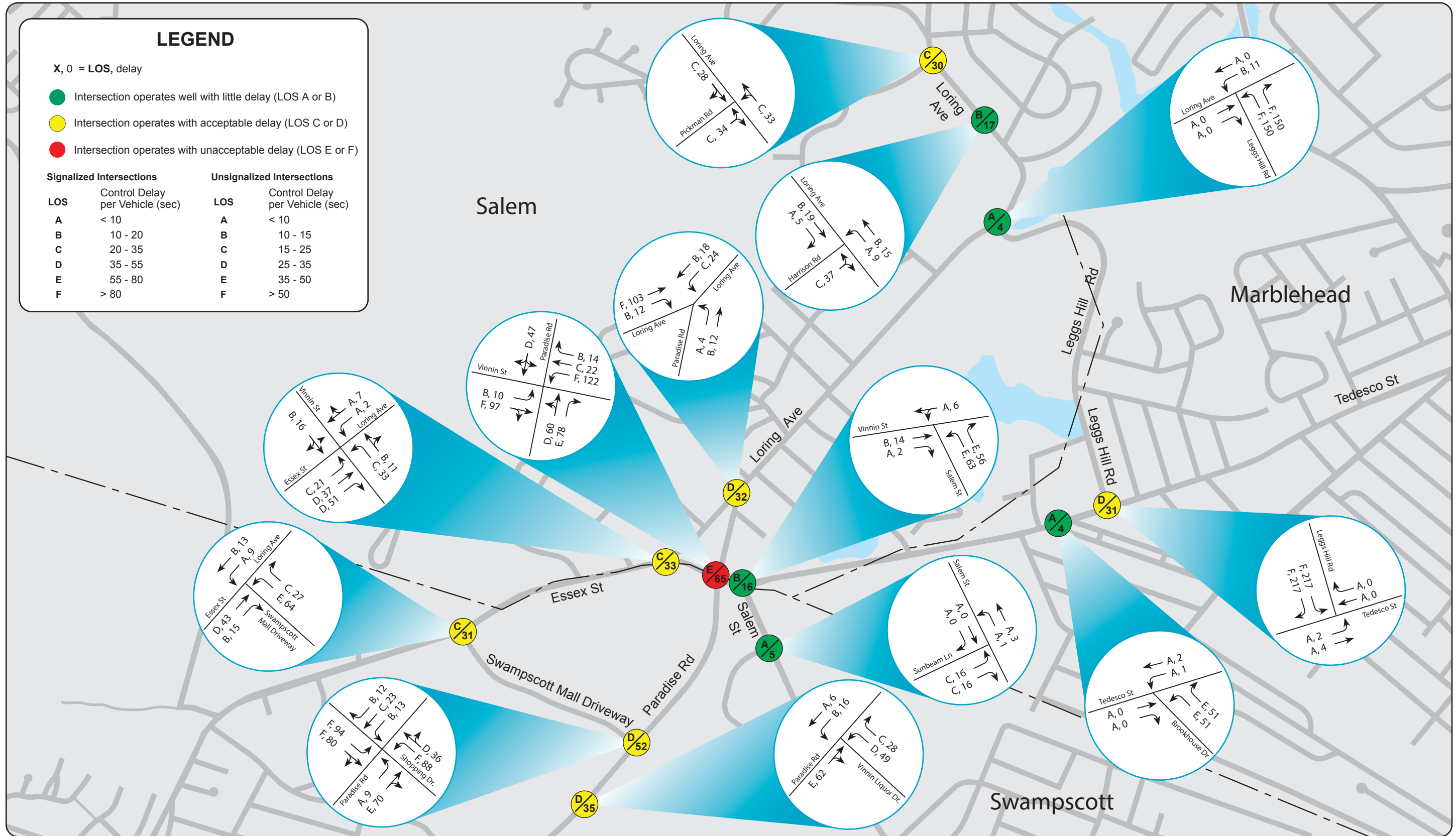
**Figure 37**  
**2040 Alternatives 1 and 2**  
**Weekday AM Peak Hour Level of Service and Delays**

### LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



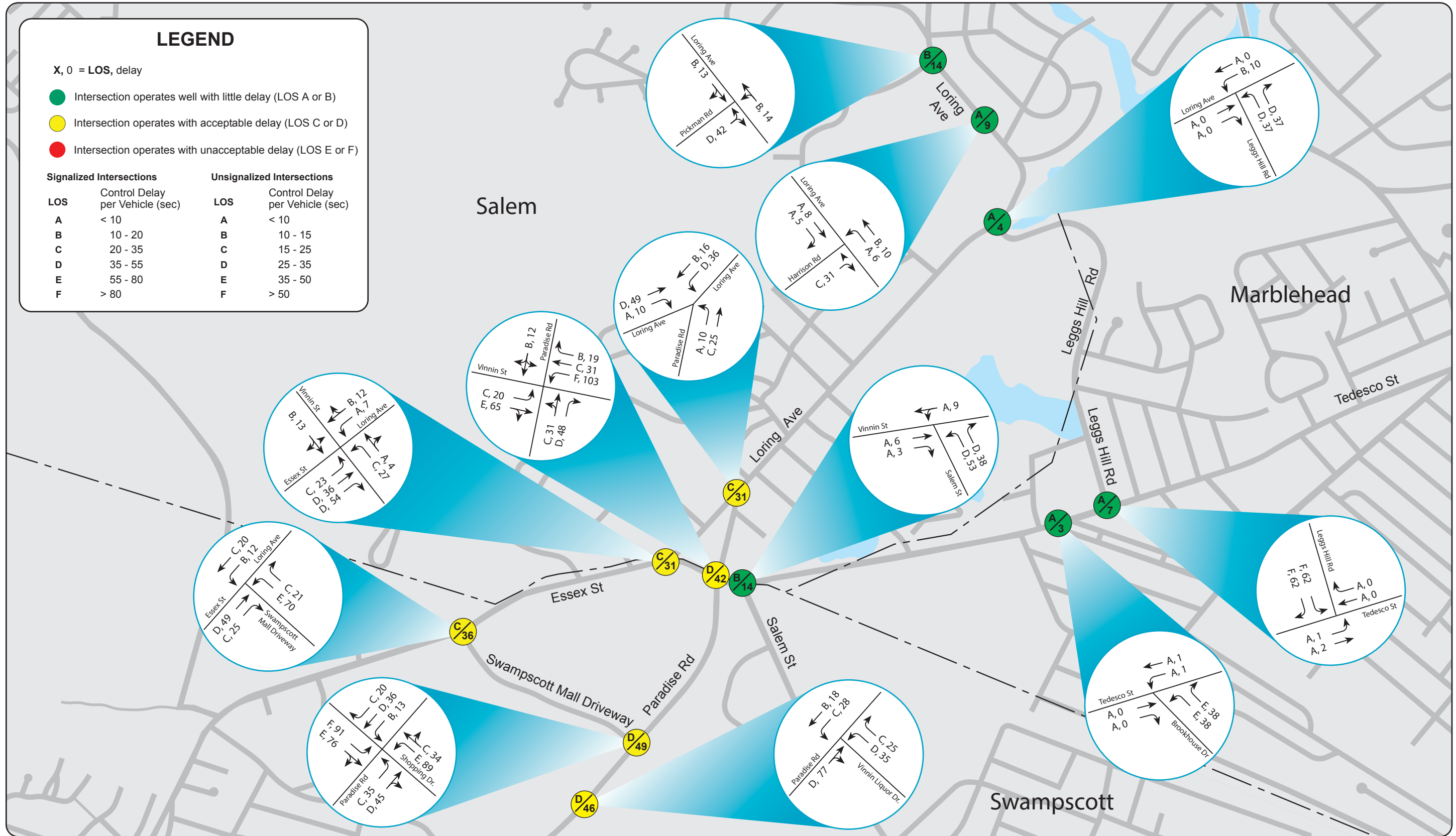
**Figure 38**  
**2040 Alternatives 1 and 2**  
**Weekday PM Peak Hour Level of Service and Delays**

### LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



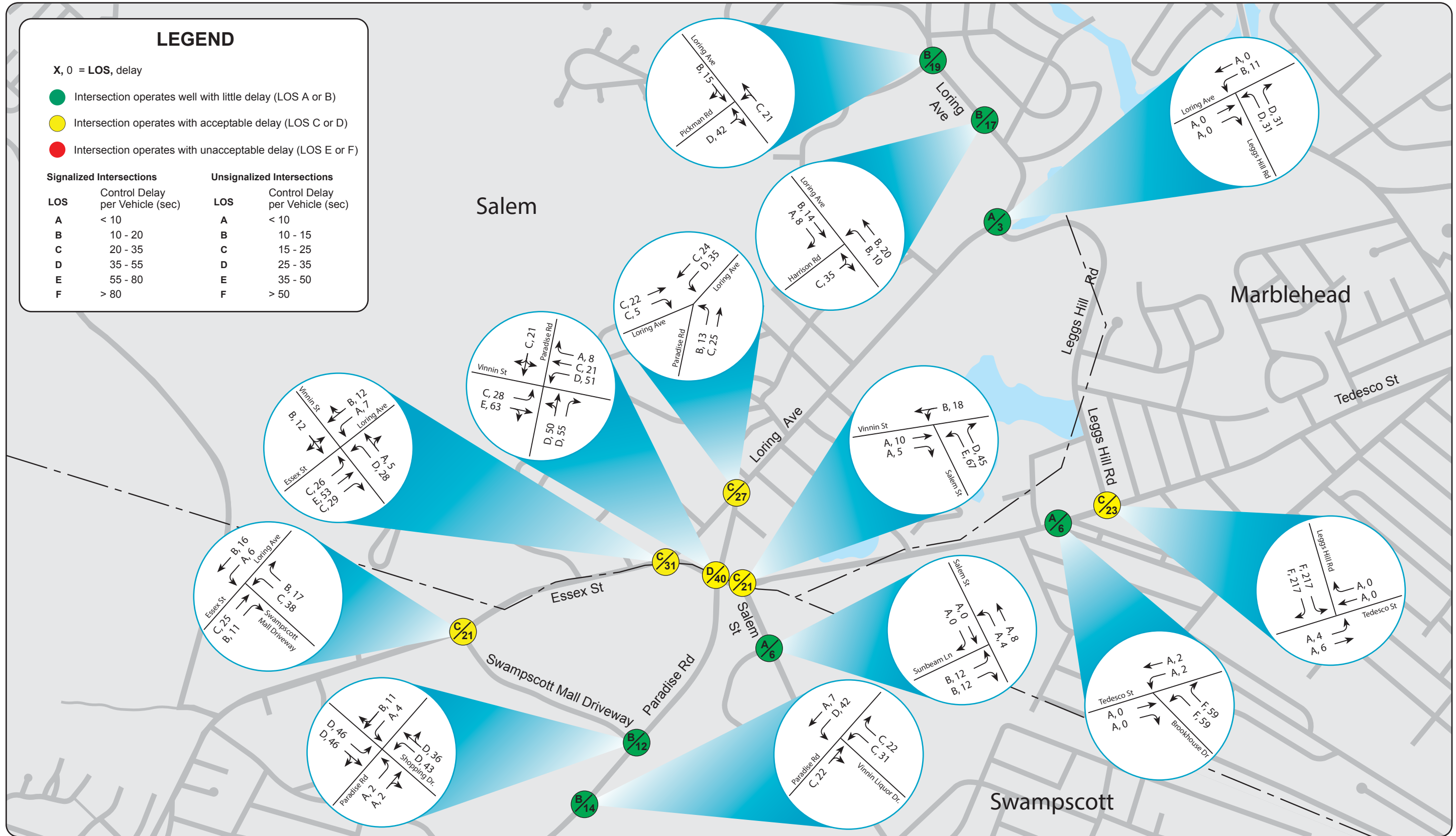
**Figure 39**  
**2040 Alternatives 1 and 2**  
**Saturday PM Peak Hour Level of Service and Delays**

# LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



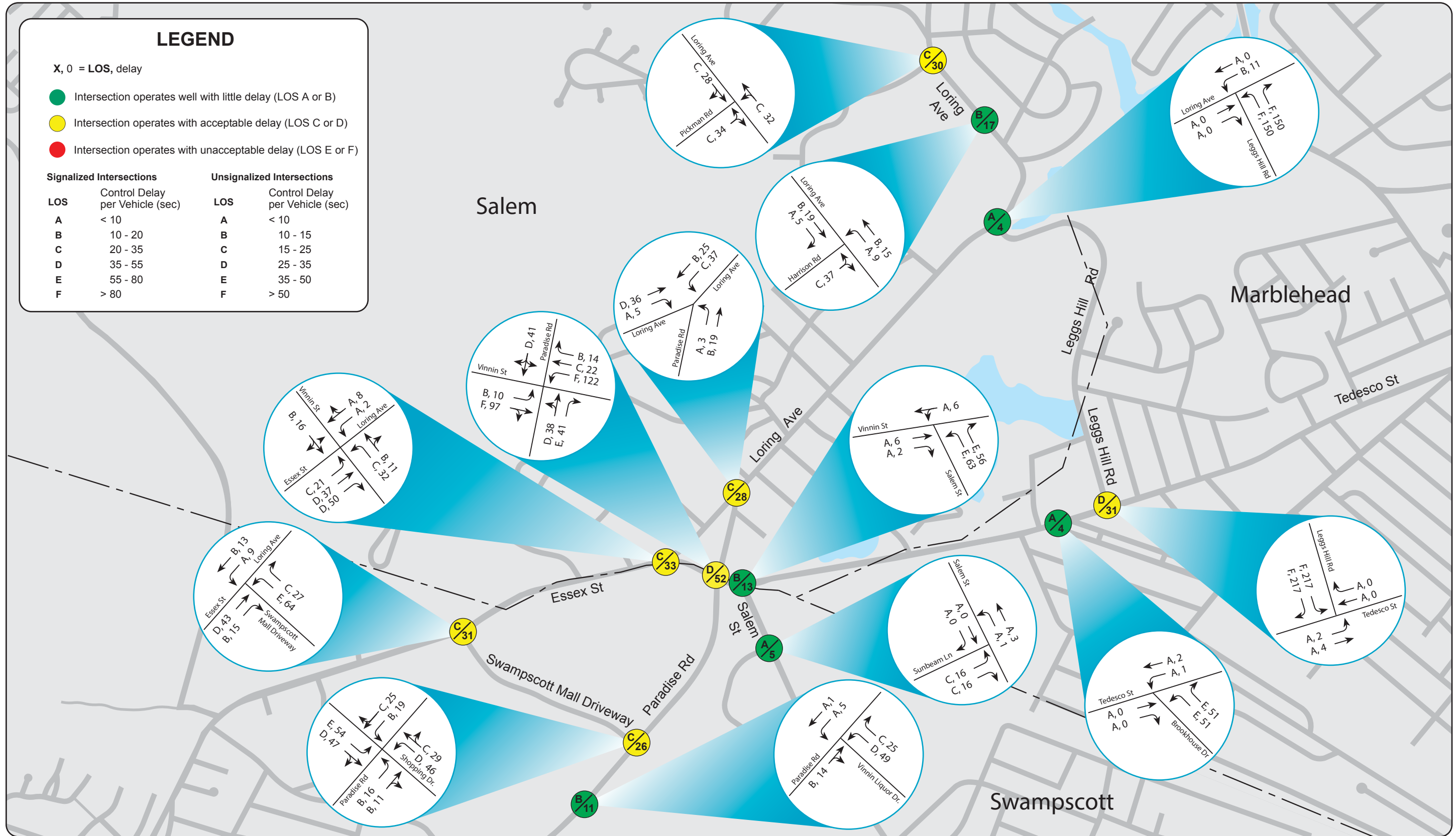
**Figure 40**  
**2040 Alternatives 3 and 4**  
**Weekday AM Peak Hour Level of Service and Delays**

### LEGEND

X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



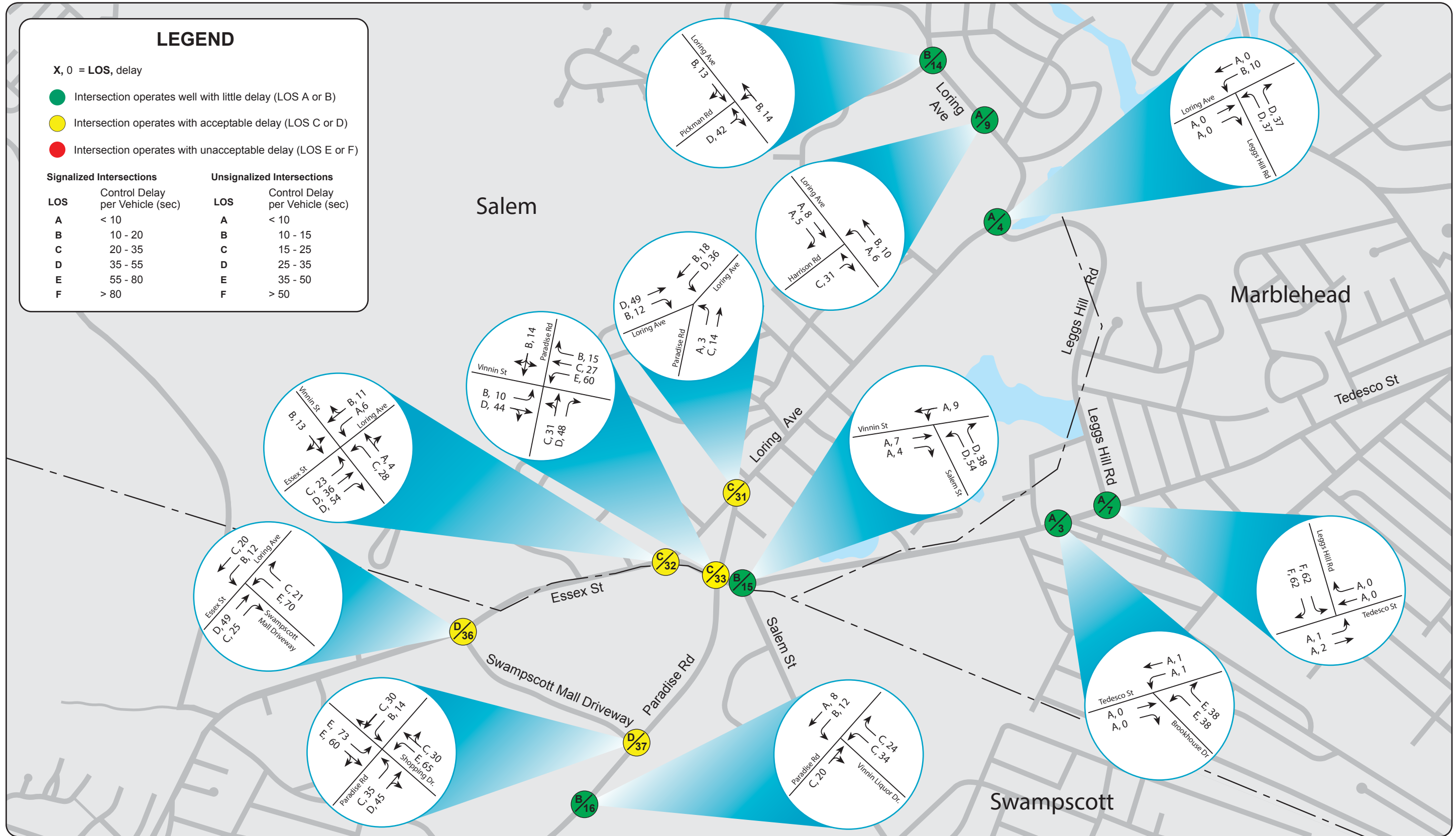
**Figure 41**  
**2040 Alternatives 3 and 4**  
**Weekday PM Peak Hour Level of Service and Delays**

### LEGEND

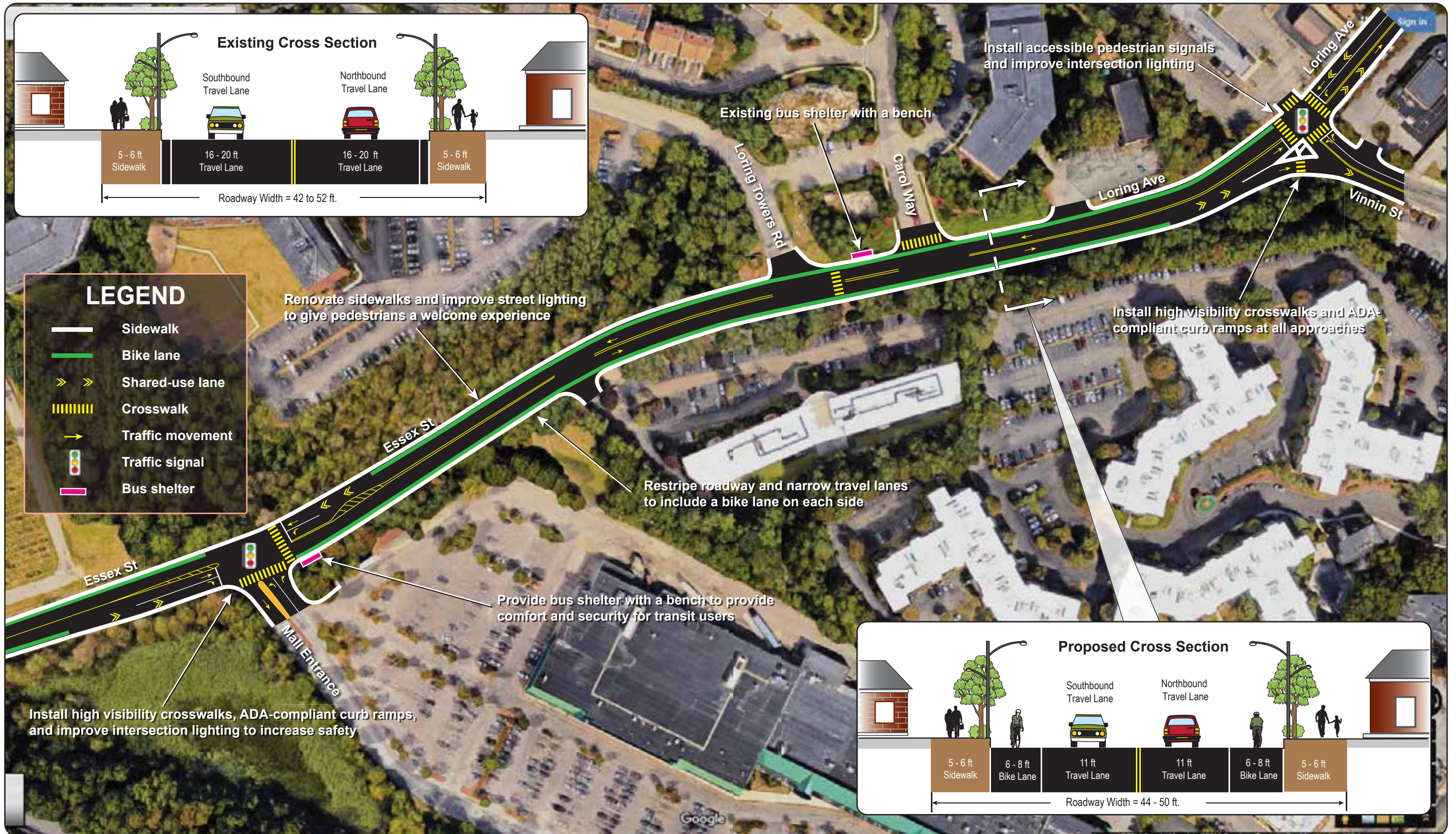
X, 0 = LOS, delay

- Intersection operates well with little delay (LOS A or B)
- Intersection operates with acceptable delay (LOS C or D)
- Intersection operates with unacceptable delay (LOS E or F)

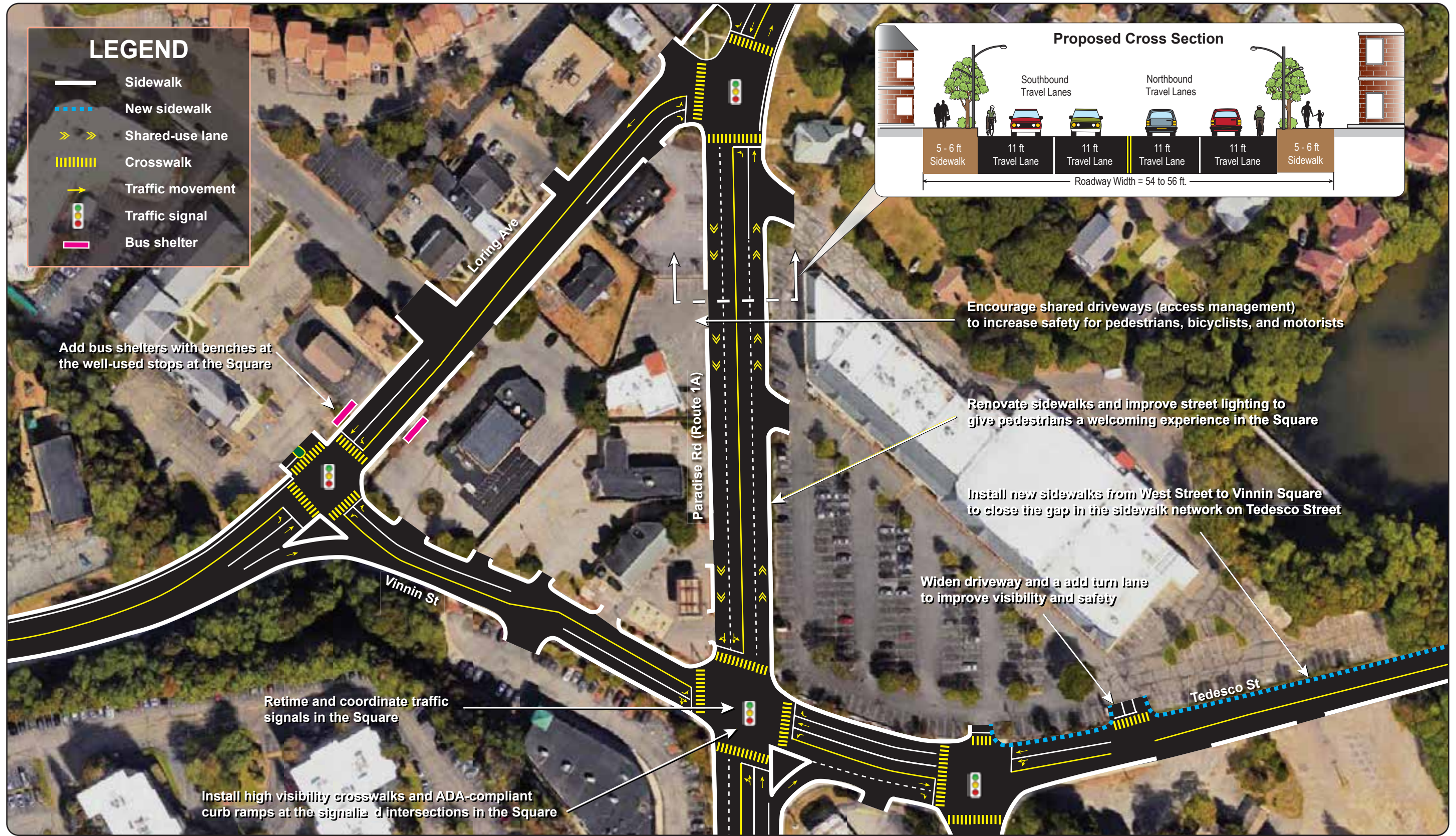
Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
A	< 10	A	< 10
B	10 - 20	B	10 - 15
C	20 - 35	C	15 - 25
D	35 - 55	D	25 - 35
E	55 - 80	E	35 - 50
F	> 80	F	> 50



**Figure 42**  
**2040 Alternatives 3 and 4**  
**Saturday PM Peak Hour Level of Service and Delays**



**Figure 43**  
**Proposed Improvements**  
**Essex Street and Loring Avenue South of Vinnin Square**

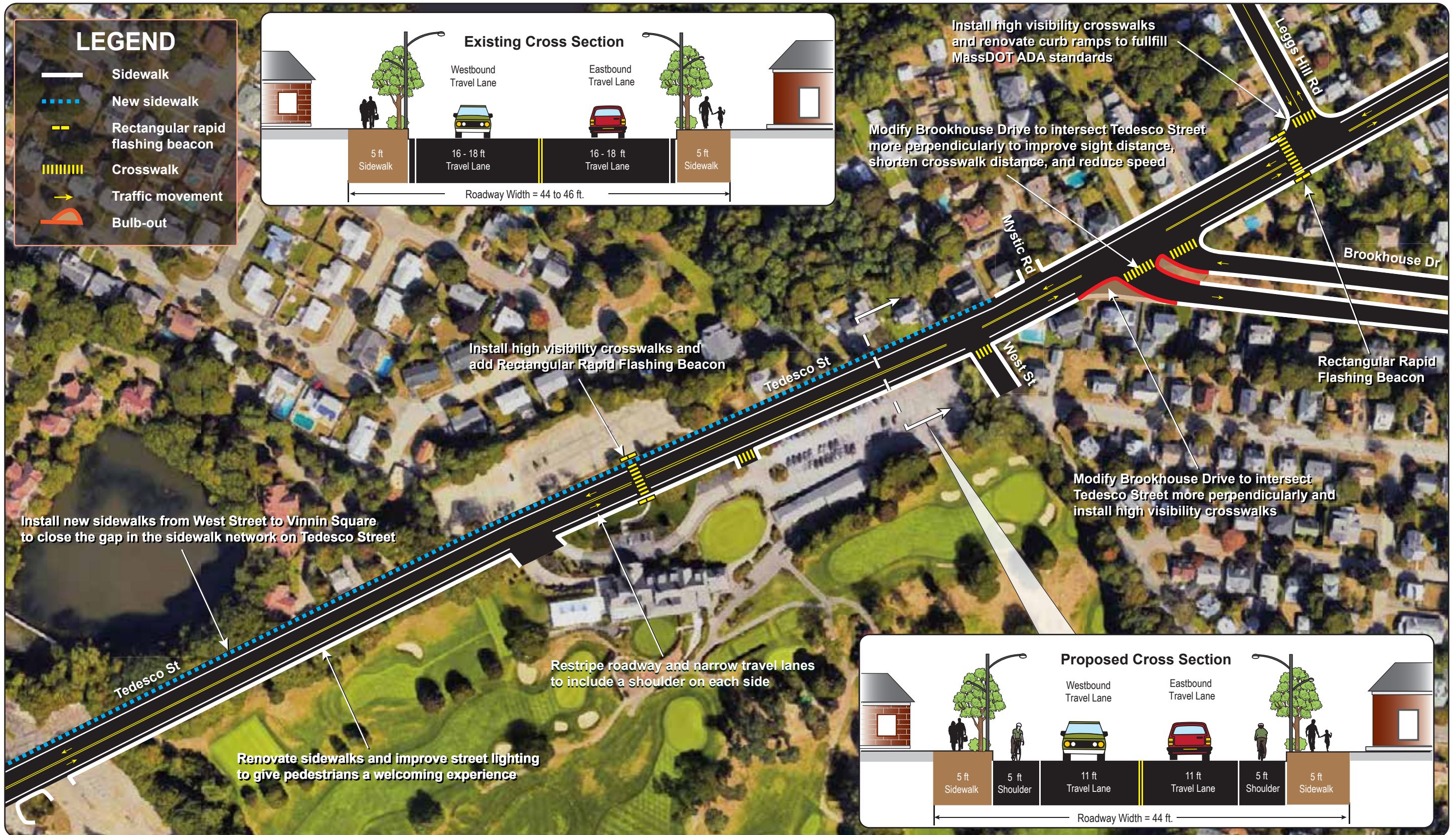


**Figure 44**  
**Proposed Improvements:**  
**Vinnin Square**  
**Alternative 1: Shared-Use Lanes**

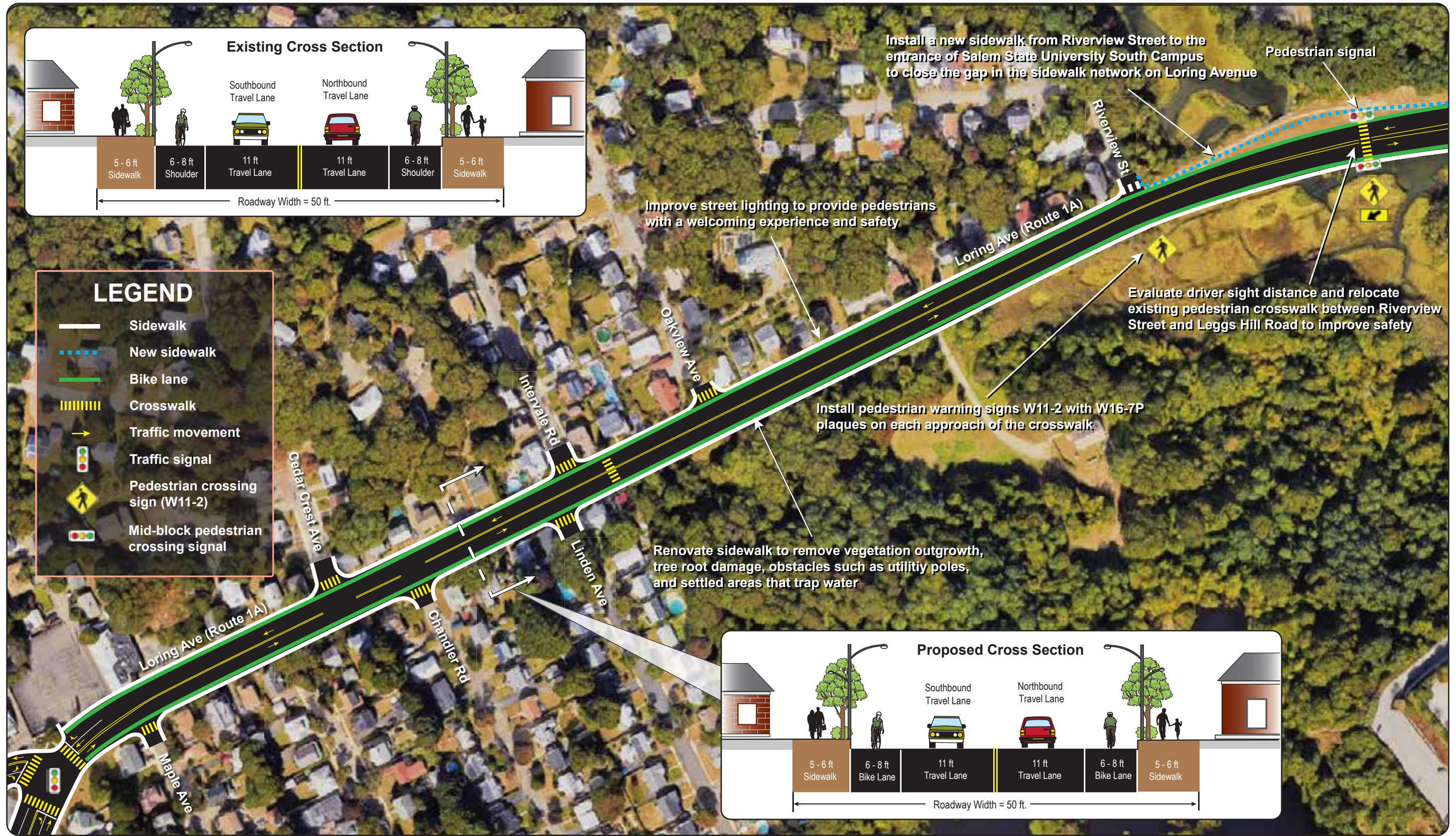




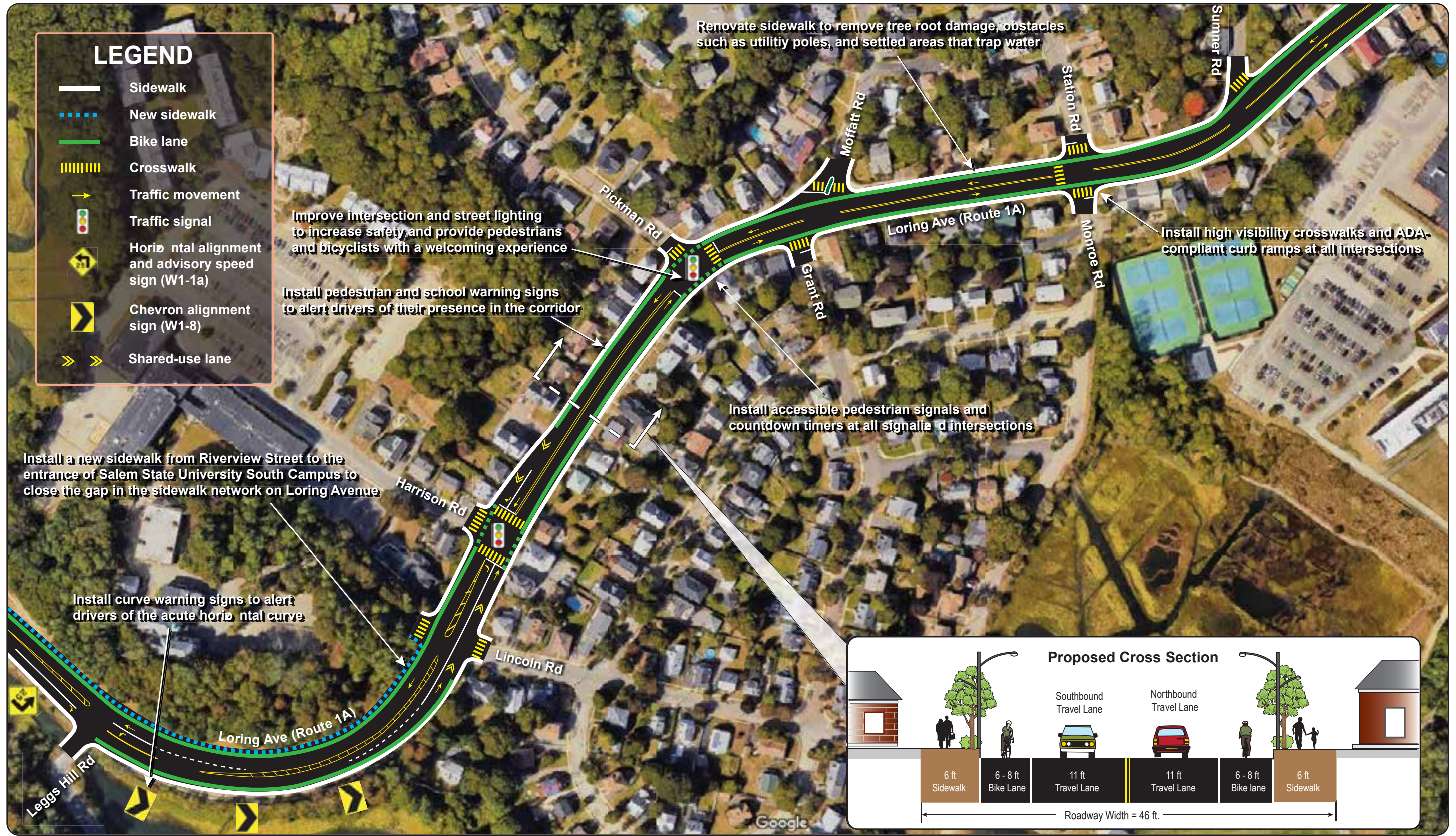
**Figure 45**  
**Proposed Improvements:**  
**Vinnin Square**  
**Alternative 2: Bike Lanes**



**Figure 46**  
**Proposed Improvements**  
**Tedesco Street from Vinnin Square to Leggs Hill Road**



**Figure 47**  
**Proposed Improvements**  
**Loring Avenue from Vinnin Square to Leggs Hill Road**



**Figure 48**  
**Proposed Improvements**  
**Loring Avenue from Leggs Hill Road to Sumner Road**



**Examples of ADA-accessible curb ramps**



**Examples of high visibility crosswalks**



Examples of sidewalk designs



Examples of median and pedestrian refuge areas



Examples of MBTA bus shelters



Examples of pedestrian crossing signals



Route 135 in Natick  
Two-lane, two-way roadway with shoulders and sidewalks with buffers



Route 109 in Westwood  
Two-lane, two-way roadway with shoulders and sidewalks



Route 109 in Medway  
Two-lane, two-way roadway with a two-way left-turn lane and sidewalks



Route 114 in Danvers  
Four-lane, two-way roadway with a two-way left-turn lane and sidewalks



# Appendices

# \*\*\*\*\*APPENDIX A

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# BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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Stephanie Pollack, MassDOT Secretary and CEO and MPO Chair  
Karl H. Quackenbush, Executive Director, MPO Staff

## TECHNICAL MEMORANDUM

**DATE:** March 17, 2016  
**TO:** Boston Region Metropolitan Planning Organization (MPO)  
**FROM:** Seth Asante and Katrina Crocker  
**RE:** Federal Fiscal Year (FFY) 2016 Priority Corridors  
for Long-Range Transportation Plan (LRTP)  
Needs Assessment: Selection of Study Locations

### 1 BACKGROUND

This memorandum presents the results of Task 2 of the work program for Priority Corridors for LRTP Needs Assessment: FFY 2016.<sup>1</sup> Task 2 of that work program—to select study locations—includes presenting the results to the MPO for discussion.

The existing needs for all transportation modes in the MPO region were identified as part of the Needs Assessment of the LRTP.<sup>2</sup> The LRTP Needs Assessment guides the process of deciding which projects to fund in future Transportation Improvement Programs (TIPs). Some of the current mobility requirements of the MPO region listed in the current LRTP Needs Assessment are:

- Maintaining and modernizing roadways with high levels of congestion and safety problems
- Increasing the quantity and quality of walking and bicycling
- Improving the efficiency of transit service and adherence to schedules

Based on previous and ongoing transportation-planning work—including the MPO's Congestion Management Process (CMP) and MPO planning studies—MPO staff identified several priority arterial roadway segments that require maintenance, modernization, safety improvements, and mobility improvements, and listed them in the LRTP Needs Assessment. To address problems of some

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<sup>1</sup> Karl H. Quackenbush, CTPS Executive Director, memorandum of a work program to the Boston Region Metropolitan Organization, "Priority Corridors for LRTP Needs Assessment: FFY 2016," October 15, 2015.

<sup>2</sup> Region Metropolitan Planning Organization, *Charting Progress to 2040: The New Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization*, endorsed by the Boston Region MPO on July 30, 2015.

of these arterial segments, a study was included in the federal fiscal year (FFY) 2016 Unified Planning Work Program (UPWP).<sup>3</sup>

By focusing on arterial segments rather than intersections, planners can evaluate multimodal transportation needs comprehensively (with the goal of creating “complete streets”). A holistic approach to analyzing problems and forming recommendations ensures that the needs of all public transportation users—including pedestrians, bicyclists, and motorists—are considered. Ultimately, this will result in roadways where it is safe to cross the street and walk or cycle to shops, schools, train stations, and recreational facilities, and where buses can run on time. Typically, the recommended improvements are within a roadway’s right-of-way. They take into account the needs of abutters and users, and the interests and support of stakeholders.

## 2 SELECTION PROCEDURE

The study selection process consisted of three steps. First, MPO staff assembled data about the arterial segments that are identified in the current LRTP and used them to screen the roadway segments. Next, MPO staff examined the arterial segments more closely by applying specific criteria. Finally, staff scored each arterial segment and assigned a priority of low, medium, or high to each segment.

### 2.1 Gathering Data

MPO staff identified 54 arterial segments in 39 municipalities in the MPO region. The assembled data are:

- The Massachusetts Department of Transportation (MassDOT) 2014 Road Inventory File and 2009–13 crash database – used to assemble the following information for each arterial segment in each municipality: roadway jurisdiction, National Highway System (NHS) status, average daily traffic (ADT), high-crash locations, and crash rates
- MPO Congestion Management Process data on arterial congestion – used to determine average travel speeds, travel time index (travel time in the peak period divided by travel time at free-flow conditions), and speed index (average travel speed divided by the speed limit) on each arterial segment
- MPO data on gaps in the bike network and MassDOT bike facilities – used to identify bicycle needs, including connectivity, and accommodations

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<sup>3</sup> Boston Region Metropolitan Planning Organization, Unified Planning Work Program, Federal Fiscal Year 2016, endorsed by the Boston Region Metropolitan Planning Organization on July 30, 2015.

- Data on MBTA bus service performance and passenger load – used to determine the percentage of bus trips that do not adhere to the schedule (in other words, that provide late service) or do not adhere to passenger load standards (resulting in crowding)
- Data on MBTA bus routes, subway lines, and commuter rail lines – used to identify which segments serve MBTA buses or stations
- Data on the Boston Region MPO’s Environmental Justice (EJ) transportation analysis zones – used to identify EJ areas
- Data selected from MassDOT’s project-information database; the MPO’s FFY 2016–20 TIP projects; MPO planning studies and other studies; and municipal websites – used to obtain data on projects, studies, and TIP projects that are planned or programmed for each arterial segment

Table 1 (at the end of this memorandum) presents, for each arterial segment, the data and information gathered for this study, including the municipality, MAPC subregion, jurisdiction, MassDOT district office, crash rate per million vehicle-miles traveled, number of top-200 high-crash locations, number of crash clusters that are eligible for Highway Safety Improvement Program (HSIP) funding, travel time index, transit service performance, whether the segment is located in, or within a half mile of, an EJ transportation analysis zone, and a list of relevant studies or projects. It also includes the score and priority rating that were determined by applying the selection criteria. The processes for scoring and assigning priority ratings to segments are described below.

## 2.2 Applying Criteria

MPO staff examined the arterial segments more closely by applying the following six criteria:

- *Safety Conditions, 0–4 points (each of the four criteria is worth 1 point)*
  - Location has a higher-than-average crash rate for its functional class
  - Location contains an HSIP-eligible crash cluster
  - Location is on the list of the Massachusetts top-200 high-crash locations
  - Location has a significant number of pedestrian and bicycle crashes per year (two or more per mile) or contains one or more HSIP-eligible bike-pedestrian clusters

- *Congested Conditions, 0–2 points (each of the two criteria is worth 1 point)*
  - Travel time index is at least 1.3
  - Travel time index is at least 2.0
  
- *Multimodal Significance, 0–3 points (each of the three criteria is worth 1 point)*
  - Location currently supports transit, bicycle, or pedestrian activities
  - Location needs to have improved transit, bicycle, or pedestrian facilities
  - Location has a high volume of truck traffic serving regional commerce
  
- *Regional Significance, 0–4 points (each of the four criteria is worth 1 point)*
  - Location is in the National Highway System
  - Location carries a significant portion of regional traffic (ADT is greater than 20,000)
  - Location lies within 0.5 miles of an EJ transportation analysis zone
  - Location is essential for the region’s economic, cultural, or recreational development
  
- *Regional equity, 0–2 points (each of the two criteria is worth 1 point)*
  - Location is in an MPO subregion for which there has not been a priority-corridor study
  - Location is in an MPO subregion for which there has been a priority-corridor study in the previous three years.
  
- *Implementation Potential, 0–3 points (each of the three criteria is worth 1 point)*
  - Location is proposed or endorsed by its roadway administrative agency
  - Location is proposed or endorsed by its MPO subregion and is a priority for that subregion
  - Location has strong support for improvements from other stakeholders

## 2.3 Scoring and Rating

Arterial segments that have a total score of 10 or fewer points were rated low priority; those with a score of 11 to 12 points were rated medium priority; and those with a total score 13 or more points were rated high priority. Eleven arterial segments were given a high-priority rating by MPO staff based on safety, operations, multimodal and regional significance, regional equity, and support from agencies and municipalities. The availability of funding determined the number of segments selected.

The high-priority segments were then examined more closely, and arterials that had projects meeting any of the following criteria were excluded from further consideration for this cycle of the priority-corridors study: recently completed, in construction, in design, under study, or programmed in the TIP. Figure 1 shows the general locations of previous priority-corridor studies, and also shows that the arterial segment selected for study is located in a subregion in which there has never been a priority-corridor study. Based on this evaluation, the segment described below was selected for study.

## 3 ARTERIAL SEGMENT SELECTED FOR STUDY: ROUTE 1A AT VINNIN SQUARE AREA IN SWAMPSCOTT, SALEM, AND MARBLEHEAD

MPO staff recommend that the corridor that includes Route 1A and ancillary streets in the Vinnin Square area of Swampscott, Salem, and Marblehead be selected for study. The Towns of Swampscott and Marblehead and the City of Salem requested this study via MPO outreach for the UPWP. Those municipalities asked the MPO staff to perform this study to identify problems related to recent and future developments expected in the area, and then to identify solutions that could be implemented in tandem with MassDOT. The MassDOT Highway Division District 4 Office and the North Shore Task Force expressed their support for and willingness to participate in a study of the selected arterial segment.

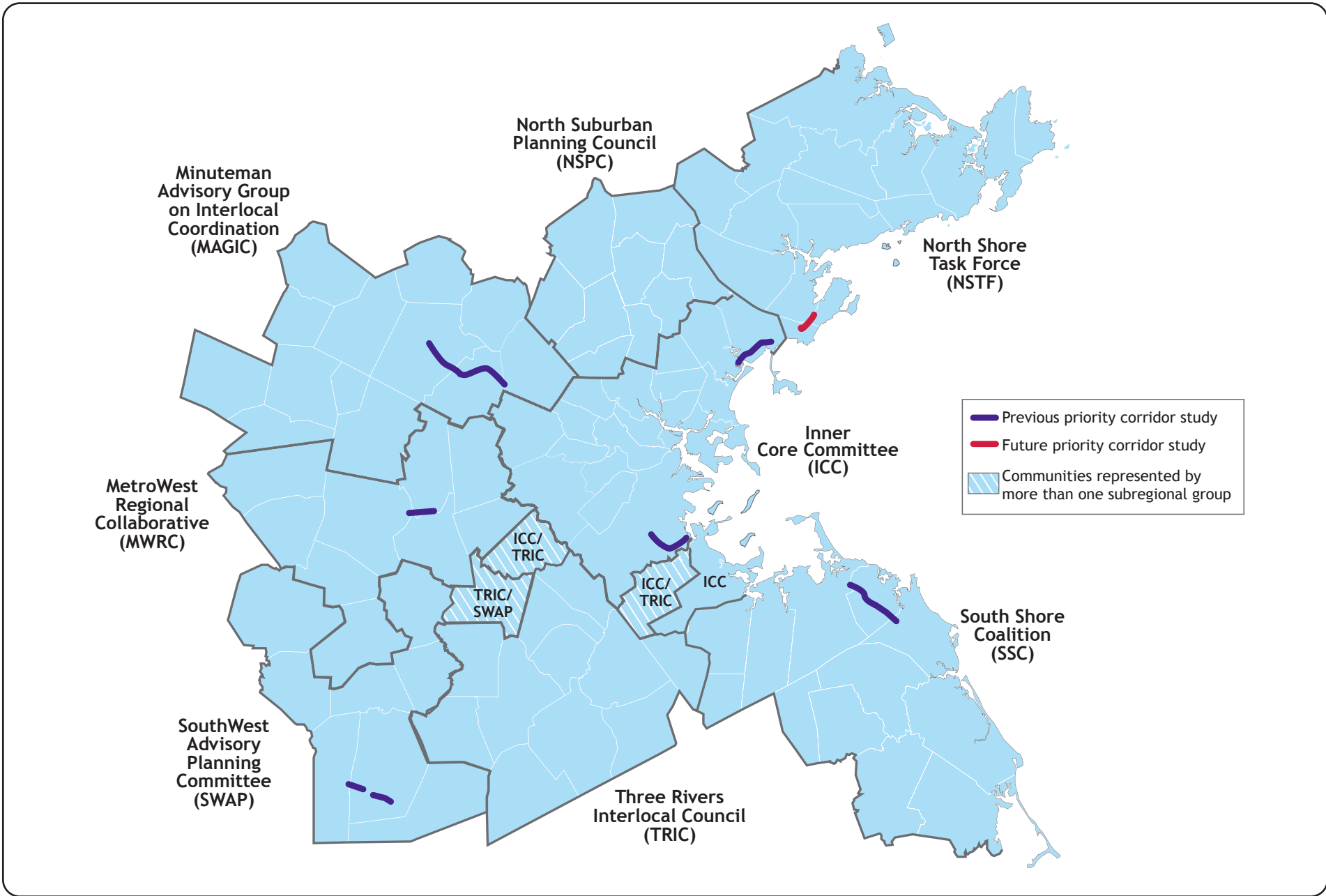
## 4 SUMMARY

The recommended arterial segment and its ancillary streets meet the selection criteria of this study, especially by supporting the transportation improvement priorities of the MPO's LRTP. While the work scope for this study assumed that "as many as two" arterial segments would be selected, the MPO staff does not propose studying a second arterial segment because this study will include ancillary streets (Loring Avenue, Essex Street, Vinnin Street, and Salem Street) in three municipalities, which would require considerable resources for evaluating alternatives (possible improvements).

Staff will present this recommendation to the MPO for discussion and approval. If the MPO approves this corridor selection, staff will meet with officials from Swampscott, Salem, Marblehead, MassDOT, and MAPC to discuss the study specifics, conduct field visits, collect data, and perform various analyses.

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**BOSTON REGION MPO**

**FIGURE 1**  
**Previous Priority Corridor Studies**

*FFY (2016)  
Priority Corridors for  
LRTP Needs Assessment*

**TABLE 1**  
**Arterial Segments Considered for Study: Priority Corridors for Long-Range Transportation Plan Needs Assessment Study**  
**(Arterial Segment Selected for Study Is Highlighted in Green)**

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 1A	Swampscott	NSTF	4	MassDOT and Town	Yes	2	1.7	3.9	1	1	1.3	27 MBTA bus stops  MBTA bus Routes 441 and 448  MBTA Commuter Rail at Swampscott and Lynn/Central Square	Yes	Yes	MassDOT Project #607761, Intersection and Signal Improvement at Route 1A (Paradise Road) at Swampscott Mall; in preliminary design	4	1	2	4	2	3	16	High	The Towns of Swampscott and Marblehead and the City of Salem requested this study to identify problems and solutions that can be implemented in tandem with MassDOT and the communities. The communities wanted a study of Route 1A at Vinnin Square area including other streets, such as Loring Avenue/Essex Street, Vinnin Street, and Salem Street, because of recent and future development in the area.  Location was suggested in 2016 UPWP and TIP outreach.  MassDOT Highway Division District 4 has jurisdiction of Route 1A and supports this study.  The NSTF supports this study.
Route 114	Salem	NSTF	4	MassDOT and City	Yes	2, 3	1.7	11.9	1	3	1.35	18 MBTA bus stops  MBTA bus Routes 450, 451, 455, 456, 459, and 465  MBTA Commuter Rail at Salem and Beverly  Ferry service	Yes	Yes  Half the segment abuts EJ zones.	Transportation Improvement Study for Routes 1A, 114, and 107 and Other Roadways in Downtown Salem, 2005 CTPS study  MassDOT Project #605332, Bridge Replacement (Route 114) North Street over North River; in preliminary design	4	1	2	4	2	2	15	High	Location suggested in 2012 UPWP outreach via an NSTF letter, which suggested that a study [on Routes 114/1A and Route 127 from Swampscott to Gloucester] would include suggestions about how to improve bike facilities and bike-to-rail connections in this heavily traveled tourist region. This builds on NSTF's primary recommendation for that year and the anticipated popularity of the Essex Coastal Scenic Byway in the region.
Route 9	Framingham	MWRC	3	MassDOT	Yes	2	2.4	3.6	2	8	2.23	MVRTA bus Routes 1, 2, 3, 7, and 9	None	Yes  Over half the route lies within or adjacent to an EJ zone.	MAPC Land Use/Route 9 Corridor Study (fall 2013).  MassDOT Project #603865 is located in Framingham at the intersection of Route 9 and Temple Street; in preliminary design  MassDOT Project #608006 Pedestrian Hybrid Beacon Installation at Route 9 and Maynard Road; 25% design stage  MassDOT Project #604991, Resurfacing and Related Work on Route 9, includes wheelchair ramp upgrades, additional sidewalks/repairs, and signal improvements; completed in 2011	4	2	3	4	0	1	14	High	This arterial segment was not selected because according to MassDOT District 3, most of the intersections on this corridor have already been studied. In addition, MPO staff studied Route 30 in Framingham and Natick under the FFY 2013 Priority Corridors for LRTP Needs Assessment.
Route 18	Weymouth	SSC	6	MassDOT	Yes	3	4.2	6.8	4	13	1.44	Nine MBTA bus stops  MBTA bus Route 225  MBTA Commuter Rail at South Weymouth	Yes	Yes  EJ zones lie adjacent to the segment.	Programmed TIP (2017) and MassDOT Project #601630, Reconstruction and Widening on Route 18 (Main Street), from Highland Place to Route 139; construction ends spring 2016  MassDOT Project #603161, Signalization and Improvements on Route 18 (Three Locations) at West Street, Park Avenue, and Columbian Street; completed in spring 2009  MassDOT Project #603738, Traffic Signal Improvements on Route 18 at Pond Street and Pleasant Street; completed in summer 2006	4	1	3	4	1	1	14	High	This arterial segment was not selected because according to MassDOT District 6, a MassDOT project is underway, and no project is needed at this time.
Route 16 (Revere Beach Parkway and Mystic Valley Parkway)	Medford	ICC	4	MassDOT and DCR	Yes	2, 3	1.3	4.8	0	2	2.59	MBTA bus Routes 90, 97, 99, 100, 106, 108, 110, 112, and 134  MBTA Rapid Transit on the Orange Line at Wellington and on the Red Line at Porter Square  MBTA Commuter Rail at West Medford and Porter Square	Yes	Yes  EJ zones are located at the ends of the segment in Somerville and Everett and 0.2 miles away in Medford.	DCR announced a \$500,000 comprehensive study of the parkway system for bike lanes in FFY 2015. The goals of the study include updated traffic information, assessment of parkway conditions, and assessment and understanding of deficiencies along the heavily cycled parkways.	3	2	3	4	0	1	13	High	This arterial segment was not selected because it is part of the Mystic River Working Group Study. In addition, the Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.
Route 1	Norwood	TRIC	5	MassDOT	Yes	3	4.8	1.2	0	6	2.69	MBTA Commuter Rail at Islington, Dedham Corp Center, Endicott, Norwood Depot, Norwood Central, Windsor Gardens, and Plimptonville	N/A	Yes  One EJ zones lies adjacent to the southern end of the segment.	MassDOT's I-95 South Corridor Study, provided a comprehensive evaluation of the I-95 and Route 1 corridors south of Route 128 that included a recommended plan of short-term and long-term improvements (June 2010)  MassDOT Project #608052, Route 1 at Morse Street (approved by PRC Nov. 2014); in preliminary design  MassDOT Project #605857, Route 1 at University Avenue and Everett Street; Town design is at pre-25%  MassDOT Project #605321, Bridge Preservation, Route 1 over the Neponset River; in design stage	1	2	3	4	2	1	13	High	The location has MassDOT projects and studies and it is not recommended for study.
Route 114	Peabody	NSTF	4	MassDOT and Town	Yes	2	3.5	2.8	2	7	1.3	Three MBTA bus stops  MBTA bus Routes 435, 465	Yes	Yes  Half the segment abuts an EJ zone.	No projects	3	1	2	3	2	2	13	High	Route 114 in Peabody was listed as a potential corridor in need of signal progression and improvements to accommodate pedestrians and bicyclists.

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 3A	Quincy	ICC	6	MassDOT, DCR, and City	Yes	3	2.3	5.6	2	7	1.31	MBTA bus Routes 201, 202, 210, 211, 212, 217, 275, 276 and 217  MBTA Red Line Rapid Transit at Quincy Center, Wollaston, and North Quincy  MBTA Commuter Rail at Quincy Center	Yes	Yes  The entire segment lies within or near EJ zones.	MassDOT Project #605729, Intersection and signal improvements at Hancock Street and East/West Squantum streets. The project consists of widening and improvements to the intersection of Hancock Street with East and West Squantum Streets and improvements along Hancock Street to the MBTA access drive; completed in fall 2015.  MassDOT Project #606518. As part of the Quincy Redevelopment project, the city plans to construct a new bridge over the existing MBTA tracks that will connect the downtown area at Market Square and Hancock Street. The main goal of the new bridge will be improved pedestrian conditions along Hancock Street.  An FFY 2012 CTPS safety and operations study addressed problems at Route 3A and Coddington Street intersection.	4	1	2	4	0	2	13	High	Route 3A (Hancock Street) is part of the Quincy Redevelopment project; study completed in April 2011
Route 28	Randolph	TRIC	6	MassDOT and Town	Yes	3	3.2	5.7	0	3	1.46	50 MBTA bus stops  MBTA bus Routes 240 and 238  MBTA Commuter Rail at Holbrook/Randolph  BAT Route 12	Yes	Yes  The entire segment lies within EJ Zones.	MassDOT Project #603716, Resurfacing and Related Work on a Section of Route 28; completed 2007/2008  Conceptual TIP #1002, Route 28 (N. Main Street) Bridge  Conceptual TIP #1010, Route 28 (N. Main Street) and Liberty Street intersections  Conceptual TIP #1011, Route 28 (N. Main Street) and West Street intersection  FFY 2008 Safety and Operations Analyses at Intersections study  Arterial Coordination Study, CTPS study (2010)	3	1	2	4	2	1	13	High	The location has several MassDOT projects and CTPS studies and it is not recommended for study.
Route 1A	Salem	NSTF	4	Town	Yes	2	0.8	14.7	0	1	1.32	16 MBTA bus stops  MBTA bus Routes 455 and 459  MBTA Commuter Rail at Salem  Ferry service	Yes	Yes  The entire segment lies within EJ zones.	CTPS Lower North Shore Transportation Improvement Study proposed improvements for Route 1A in Revere in October 2000; an update may be necessary.	3	1	2	4	2	1	13	High	The southern end of this arterial segment is included in the study of Route 1A study at the Vinnin Square area in Marblehead and in Swampscott, selected for study under the FFY 2016 Priority Corridors Study.
Route 129	Wilmington	NSPC	4	MassDOT and Town	Yes	3	2.9	6.8	1	8	1.3	MBTA Commuter Rail at Wilmington, North Wilmington, Anderson/Woburn, and Reading	N/A	None	MassDOT Project #601732, Rehabilitation, Route 129 (Lowell Street) from Route 38 (Main Street) to Woburn Street. The project includes full-depth reconstruction and widening, accessible (ADA-compliant) sidewalks, new tree plantings, and bicycle accommodation within the newly paved shoulders. The intersection of Route 129 and 38 was realigned with new traffic signals and the bridge over Maple Meadow Brook was replaced; completed in 2009.  MassDOT Project #608051 will reconstruct Route 38 from Route 62 to the Woburn city line and will add bike lanes, sidewalks, turn lanes, and signal upgrades; in preliminary design.	4	1	2	3	2	1	13	High	N/A
Route 60	Arlington	ICC	4	Town	Yes	3	0.9	6.0	1	2	1.34	Eight MBTA bus stops  MBTA bus Routes 67, 62, 76, 77, 78, 79, 80, 84, and 350	Yes	Yes	CTPS and MAPC Community Transportation Technical Assistance Program evaluated the high-crash location at the intersection at Massachusetts Avenue, March 2010.  MassDOT Project #606885, will connect the two legs of the Minuteman Bikeway and improve traffic operations and safety and pedestrian safety in the Arlington Center area. The critical segment in the Arlington Center area has a project programmed in the FFY 2014 TIP.	4	1	3	3	0	1	12	Medium	N/A
Alewife Brook Parkway	Cambridge	ICC	6	MassDOT and DCR	Yes	2	0.8	7.2	0	2	2.41	MBTA bus Routes 79, 350, 62, 67, 74, 76, 78, 84, and 351  MBTA Rapid Transit on the Red Line  MBTA Commuter Rail at Porter Square	Yes	Yes  Most of the segment lies within or adjacent to EJ zones.	Alewife Studies, Phase II, CTPS study (2009).  DCR announced a comprehensive study of the parkway system for bike lanes.  MassDOT Project #605637, Improvements at Route 2 and Route 16. The purpose of this project is to perform minor widening, eliminate a merge condition, and improve throughput capacity and vehicle queue storage at the intersection of Route 2 and Route 16 (Alewife Brook Parkway); under construction.	3	2	2	4	0	1	12	Medium	The Fresh Pond Residents Alliance identified Fresh Pond Parkway and Alewife Brook Parkway as locations in need of transportation improvements. Concerns include pedestrian safety of young students walking to Shady Hill School because of high traffic volumes, environmental issues, and livability.
Route 138	Canton	TRIC	6	MassDOT	No	3, 2	2.6	4.7	0	3	2.26	MBTA Commuter Rail at Route 128, Canton Junction, and Canton Center	N/A	None	MassDOT Project #603883, Reconstruction on Route 138, from I-93 to Dan Road; in preliminary design  MassDOT Project #605807, Improvements on Route 138 from Randolph Street to Washington Street; completed in 2011  MassDOT Project #602745, Improvements and Signalization, Route 138 at Washington Street and at Randolph Street; completed in spring 2009  Route 138 Corridor Study, CTPS study (July 2001)	3	2	2	2	2	1	12	Medium	Many locations in this segment have MassDOT projects or studies  MassDOT District 6 says that the area around I-93, which has congestion issues, was evaluated by a consultant for a private company.

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 16 (Revere Beach Parkway)	Chelsea	ICC	6	MassDOT and DCR	Yes	2	1	3.5	1	2	1.77	MBTA bus Routes 112 and 111 MBTA Commuter Rail at Chelsea	Yes	Yes The entire segment lies within EJ zone.	The Lower North Shore Transportation Improvement Study, CTPS study (2000) DCR announced a comprehensive study of the parkway system for bike lanes.	4	1	3	4	0	0	12	Medium	This arterial segment was not selected because it is part of the Mystic River Working Group Study. In addition, the Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.
Route 16 (Revere Beach Parkway)	Everett	ICC	4	MassDOT and DCR	Yes	2	1.7	2.8	1	7	1.38	MBTA bus Routes 97, 99, 106, 110, 112, 104, 105, and 109 MBTA Orange Line Rapid Transit at Wellington and MBTA Commuter Rail at Chelsea	Yes	Yes The entire segment lies within EJ zones.	DCR announced a \$500,000 comprehensive study of the parkway system for bike lanes in FFY 2015. The goals of the study include updated traffic information, assessment of parkway conditions, and assessment and understanding of deficiencies along the heavily cycled parkways.	3	1	3	4	0	1	12	Medium	This arterial segment was not selected because it is part of the Mystic River Working Group Study. In addition, the Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.
Routes 4 and 225	Lexington	MAGIC	4	MassDOT	Yes (part)	3, 5	0.7	6.3	0	2	1.3	Nine MBTA bus stops MBTA Route 62	Yes	None	MassDOT section from I-95 to Hartwell Ave, was the subject of a Town study (Hartwell Avenue Traffic Mitigation Plan -- Bedford Street Concept Plan), and a road safety audit was performed for this segment in November 2011  CTPS FFY 2008 Safety and Operations at Intersections Study, Massachusetts Avenue at Maple Street	3	1	2	3	1	2	12	Medium	The MAGIC subregion and the Towns of Lexington and Bedford requested that this corridor be included in the FFY 2012 UPWP for study.  The MassDOT section from I-95 to Hartwell Avenue was the subject of a Town study.
Route 1A (Lynnway)	Lynn	ICC	4	MassDOT and DCR	Yes	2, 3, and 5	3.1	3.2	0	5	1.36	35 MBTA bus stops MBTA bus Routes 426, 439, 441, 442, 448, 449 MBTA Commuter Rail at River Works, Lynn/Central Square, and Swampscott Ferry service	Yes	Yes The entire segment lies within EJ zones.	TIP Project #1321, Route 1A Lynnway at Blossom Street, conceptual TIP Project #1322, Route 1A Lynnway intersection at Market Street; conceptual	2	1	2	4	0	3	12	Medium	This arterial segment was selected for MPO study under FFY 2015 Priority Corridors Study for LRTP Needs Assessment.
Route 107	Lynn	ICC	4	MassDOT and Town	Yes	3	1.3	12.6	4	14	1.19	MBTA bus Routes 424, 426, 436, 441, 442, 450, 455, 456, 459, 429, and 435 MBTA Commuter Rail at River Works, Lynn/Central Square, and Swampscott Ferry service	Yes	Yes The entire segment lies within EJ zones.	MassDOT Project #604952, Bridge Replacement, Route 107 over the Saugus River MassDOT Project #26710, Bridge Replacement, Route 107 over the Saugus River (Fox Hill Bridge); completed spring 2013 MassDOT Project #603938, Western Avenue Bridge over Saugus River (Fox Hill Bridge) TIP Project #374, Lynn Garage (transit)	4	0	3	4	0	1	12	Medium	This arterial segment was not selected for study because there is an ongoing Route 107 Corridor Study in Lynn and Salem, which is being conducted by MassDOT in conjunction with Lynn and Salem.
Route 28	Milton	ICC and TRIC	6	MassDOT, DCR, and Town	Yes	3	3.8	3.3	1	4	1.3	51 MBTA bus stops MBTA bus Routes 240, 245, 24, 28, 26, 30, 31, and 33 MBTA Red Line Rapid Transit at Mattapan/Ashmont Station BAT Route 12	Yes	Yes EJ zones are located at the northern end.	MassDOT Project #607342, Intersection and Signal Improvements at Route 28 (Randolph Avenue) and Chickatawbut Road; in preliminary design MassDOT Project #106901, Roadway Reconstruction on Route 28 (Randolph Avenue) from Reedsdale Road to Milton/Quincy town line; completed 2008 Conceptual TIP #1008, Reconstruct the Intersection of Blue Hills Parkway and Brook Road	3	1	2	3	1	2	12	Medium	This arterial segment was not selected because there have been several improvements in this segment in recent years.
Route 9	Natick	MWRC	3	MassDOT	Yes	2	3.5	4.9	2	9	2.32	MWRTA bus Routes 1, 4, 9, and 10	None	Yes One EJ zone is 0.5 miles away.	MAPC Land Use/Route 9 Corridor Study (fall 2013) MassDOT Project #601586 is currently reconstructing the Route 9/Oak Street intersection and should address some of the congestion and safety issues at the intersection. MassDOT Project #605313 will reconstruct the Route 9/Route 27 interchange; 25% project design stage. MassDOT Project #604991, Resurfacing and Related Work on Route 9, includes wheelchair ramp upgrades, additional sidewalks/repairs, and signal improvements; completed in 2011	4	2	1	4	0	1	12	Medium	According to MassDOT District 3, the Route 9 and Oak Street intersection is currently under construction. The Route 9 and Route 27 interchange is currently in design.
Route 16	Newton	ICC	6	MassDOT and City	Yes	3	4.3	4.1	0	4	1.52	MBTA Routes 59, 170, 505, 553, 554, and 556 MBTA Green Line Rapid Transit MBTA Commuter Rail at West Newton	Yes	Yes An EJ zone lies adjacent to the segment.	MassDOT Project #606780, Bridge Rehabilitation, Route 16 (Washington Street) over I-90, MBTA/CSX Corporation and Access Road Conceptual TIP #1067, Washington Street (Phase 2), from Commonwealth Avenue to Perkins Street	3	1	2	4	0	2	12	Medium	In FFY 2014, a subregional study was conducted on Washington Street in Newton.  The location was suggested in 2014 LRTP outreach through verbal comments at a 495/MetroWest Partnership meeting.
Route 1	Walpole	TRIC	5	MassDOT	Yes	3	3.3	2.1	0	2	1.38	MBTA Commuter Rail at Sharon and Walpole	N/A	Yes One EJ zones lies adjacent to the southern end of the segment.	MassDOT's I-95 South Corridor Study presented a comprehensive evaluation of the I-95 and Route 1 corridors south of Route 128 and included a recommended plan of short-term and long-term improvements (June 2010)	1	1	3	4	2	1	12	Medium	The location has MassDOT projects and studies.

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 16	Wellesley	MWRC	6	MassDOT and Town	Yes	4	4.5	7.3	1	3	1.45	MBTA Commuter Rail at Wellesley Square, Wellesley Hills, and Wellesley Farms  MWRTA Route 8	N/A	Yes  The southern end of the segment lies in an EJ zone.	MassDOT Project #94762, Bridge Rehabilitation, Route 16 (Washington Street) over Route 9, including relocation of retaining wall; completed summer 2010.  MassDOT Project #600712, Reconstruction of Route 16 from Grantland Road to the Newton City Line. The work consisted of paving, drainage improvements, sidewalk reconstruction, traffic signals, and ornamental lighting on Route 16. A signal was installed at the Washington Street/Walnut Street intersection, and the pedestrian crossing 150 feet south of Hillside Road was upgraded, completed in 2004.	4	1	2	3	0	2	12	Medium	The location was suggested in 2014 LRTP outreach through verbal comments at a 495/MetroWest Partnership meeting.
Route 2	Acton	MAGIC	3	MassDOT	Yes	2	2.1	1.4	0	1	3.35	MBTA Commuter Rail at South Acton and West Concord	N/A	Yes	MassDOT Project #604472, Resurfacing and Related Work on Route 2 (includes all of Acton); completed in spring 2014  MassDOT Project #607748, Intersection and Signal Improvements on Route 2 and Route 111 at Piper Road and Taylor Road; in preliminary design  MassDOT Project #604609, Traffic Sign Replacement and Safety Improvements on Route 2; completed in summer 2009  TIP Project #606223, Bruce Freeman Rail Trail Construction (Phase II-B) in Acton and Concord to connect the trail across Route 2, programmed in TTY 2018 TIP	1	2	2	4	1	1	11	Medium	Location has MassDOT projects. A MassDOT road safety audit is scheduled for the Piper Road/Taylor Road intersection; the project is in the preliminary design phase.  The MAGIC subregion expressed interest in a Route 2 study.
Route 62	Bedford	MAGIC	4	MassDOT and Town	No	5	0.9	6.9	0	1	1.31	Three MBTA bus stops  MBTA bus Route 62	Yes	None	Great Road Project: Master Plan and Conceptual Design, prepared by Vanasse Hagen Brustlin Inc. (VHB) for the Town of Bedford in 2011. The plan was to improve pedestrian and bicycle access, recommend streetscape improvements that will highlight the "Center" of Bedford while taking into consideration traffic flow through the area, crosswalk locations, intersection and traffic control improvements, property access, and parking.	3	1	2	2	2	1	11	Medium	Forms part of Routes 4 and 225 arterial segment.
Route 2 (Fresh Pond Parkway)	Cambridge	ICC	6	DCR	Yes	2	1.3	3.5	0	2	1.51	MBTA bus Routes 75, 71, 72, 73, 74, and 78  MBTA Red Line Rapid Transit  MBTA Commuter Rail at Porter Square	Yes	Yes  Two EJ zones are located within 0.5 miles of the segment.	DCR announced that the agency will conduct a traffic study of several intersections along Mount Auburn Street and Fresh Pond Parkway, in partnership with the City of Cambridge and the MBTA. The study will focus on safety measures, bus prioritization, and accessibility.  Conceptual TIP project #987 would acquire Minuteman Path right-of-way in Watertown to connect Minuteman Bikeway from Arlington, Cambridge, and Watertown to Dr. Paul Dudley White Bike Path in Boston.	3	1	2	4	0	1	11	Medium	The Fresh Pond Residents Alliance identified Fresh Pond Parkway and Alewife Brook Parkway as locations in need of transportation improvements. Concerns include pedestrian safety of young students walking to Shady Hill School because of high traffic volumes, environmental issues, and livability.
Route 2	Concord	MAGIC	4	MassDOT	Yes	2	5.2	1.1	1	6	2.68	MBTA Commuter Rail at West Concord, Concord, and Lincoln	N/A	Yes.  One EJ zone is adjacent to the segment.	MassDOT Project #602894, Crosby's Corner (Route 2 at Route 2A) Improvements; under construction  MassDOT Project #602091, Concord Rotary; in preliminary design  MassDOT Project #604069, Bridge Replacement over Sudbury River; in preliminary design  MassDOT Project #604630, Resurfacing and Related Work on Route 2; completed in 2010  MassDOT Project #604472, Resurfacing and Related Work on Route 2; completed in 2014  Programmed (March 2014) TIP Project #606223: Bruce Freeman Rail Trail Construction (Phase II-B) in Acton and Concord, will connect the trail across Route 2, in preliminary design	2	2	2	4	1	0	11	Medium	FFY 2013 Priority Corridors for LRTP Needs Assessment Study (Concord and Lincoln)  Route 2 was suggested during MPO outreach as a route experiencing congestion that affects MAGIC communities as well as Cambridge.  There are many projects and studies conducted for this corridor, including the Route 2 (Crosby's Corner) improvements and Concord Rotary upgrade and improvements.
Route 99	Everett	ICC	4	MassDOT, DCR, and City	Yes	3	2.4	1.4	0	2	2.4	40 MBTA bus stops  MBTA bus Routes 97, 104, 105, 109, 110, 112, 99, and 106	Yes	Yes  The entire segment lies within EJ zones.	MassDOT Project #602383 reconstructed Route 99 with a traffic signal upgrade, from Second Street to the Malden city line in 2008.  MassDOT Project #601580 reconstructed Route 99 from Sweetser Circle to Second Street in 2004.  MassDOT Project #602382 reconstructed Route 99 from Sweetser Circle to the Alford Street Bridge in 2013.	2	2	2	4	0	1	11	Medium	Not recommended for study because the MassDOT projects listed completely reconstructed Route 99 with signal improvements from Alford Street Bridge to the Malden city line.
Route 30 between I-90 and Route 9	Framingham	MWRC	3	Town	Yes (part)	3	1.1	4.5	0		1.3	MWRTA bus Routes 10 and 11  MBTA Commuter Rail at Natick and West Natick	None	Yes.  The southern leg of the segment lies within an EJ Zone.	FFY 2013 Priority Corridors for LRTP Needs Assessment Study  MassDOT Project #86450, Roadway Reconstruction and Related Work on sections of Route 126 and Route 30 (includes traffic signal improvements at their intersection); construction ended in summer 2005.	3	1	2	3	1	1	11	Medium	This location is not recommended for study because of an FFY 2013 Priority Corridors for LRTP Needs Assessment Study that was performed for the corridor. Framingham and Natick have advanced some of the recommendations into projects.

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 3A	Hingham	SSC	5	MassDOT	Yes	3	4.7	1.9	0	1	1.3	MBTA Commuter Rail at Cohasset, Nantasket Junction, West Hingham, and East Weymouth  Ferry service	N/A	None	There are two approved projects that are not advancing in design:  MassDOT Project #603137, Intersection Improvements on Route 3A at Kirby Street. There has been local interest in installing a traffic signal at this intersection; in preliminary design.  MassDOT Project #605168, Intersection Improvements at Route 3A/Summer Street Rotary. The Town 's consultant prepared preliminary concepts for proposals at this location. Design is pre-25%.	2	1	2	3	0	3	11	Medium	In FFY 2015, a subregional priority roadway study was conducted for Route 3A in Hingham and Hull.  The location received strong support from the Towns of Hingham and Hull, as well as the South Shore Coalition and MassDOT Highway Division District 5 Office
Route 138	Milton	ICC and TRIC	6	MassDOT	Yes	2	3.6	4.2	0	3	1.58	MBTA bus Route 245 MBTA Commuter Rail at Route 128 Station  MBTA Red Line Rapid Transit at Mattapan Station	Yes	Yes  Half of the segment is contained within EJ zones.	MassDOT Project #607763, Intersection and Signal Improvements at Two Locations: Route 138 (Blue Hill Avenue) at Atherton Street and Bradlee Road and Route 138 (Blue Hill Avenue) at Milton Street and Dollar Lane, programmed in FFY 2019 TIP	3	1	2	3	1	1	11	Medium	Congestion issues have been identified on this route, from the I-93 interchange to Mattapan Square.
Route 9	Newton	ICC	6	MassDOT	Yes	2	3.1	1.7	0	2	1.73	Six MBTA bus stops  MBTA bus Routes 60, 52, and 59  MBTA Green Line	Yes	Yes  An EJ zone in Brookline is 0.3 mi from the segment.	MassDOT Project #604327, Resurfacing and Related Work on Route 9 (Boylston Street) from the Wellesley/Newton city line to Newton/Brookline city line; completed in 2012  MassDOT Project #601704, Reconstruction and Signal Improvements on Walnut Street, from Homer Street to Route 9; in design  MassDOT Project #606635, Reconstruction of Highland Avenue, Needham Street, and Charles River Bridge, from Webster Street to Route 9; 25% design stage MassDOT Project #604327, resurfaced this segment, including updates to guardrails and improvements to the existing drainage structures; construction was completed in 2012.	2	1	3	4	0	1	11	Medium	According to MassDOT District 6, improvements were recently made to accommodate new developments. An analysis of the new existing conditions would be helpful to compare with the future projected conditions.
Route 16 (Revere Beach Parkway)	Revere	ICC	4	MassDOT and DCR	Yes	2	1.5	2.9	0	3	1.43	MBTA bus Routes 110, 116, 117, 119, 424, 426, 428, 448, 449, 450, 455, and 459  MBTA Rapid Transit on Blue Line  MBTA Commuter Rail at Chelsea	Yes	Yes  The entire segment lies within EJ Zones.	DCR announced a \$500,000 comprehensive study of the parkway system for bike lanes in FFY 2015. The goals of the study include updated traffic information, assessment of parkway conditions, and assessment and understanding of deficiencies along the heavily cycled parkways.  The Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.	2	1	3	4	0	1	11	Medium	This arterial segment was not selected because it is part of the Mystic River Working Group Study. In addition, the Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.
Route 1A	Revere	ICC	4	MassDOT	Yes	2	1.5	2.9	0	1	3.17	15 MBTA bus stops  MBTA bus Routes 110, 116, 117, 411, 424, 426, 439, 441, 442, 448, 449, 450, and 455  MBTA Rapid Transit on Blue Line  MBTA Commuter Rail at Chelsea and River Works	Yes	Yes  The entire segment lies within EJ zones.	CTPS Lower North Shore Transportation Improvement Study proposed improvements for Route 1A in Revere in October 2000; an update may be necessary.  Conceptual TIP Project #982, Mahoney Circle (Bell Circle) Grade Separation	2	2	2	4	0	1	11	Medium	This arterial segment was not selected because it is part of the Mystic River Working Group Study. In addition, the Wynn Everett DEIR (2015) includes intersection improvements and mitigated traffic operations for Revere Beach Parkway and Mystic Valley Parkway.
Route 1	Sharon	TRIC	5	MassDOT	Yes	3	1.8	0.8	0	2	1.38	MBTA Commuter Rail at Sharon and Walpole	N/A	None	MassDOT's I-95 South Corridor Study, provided a comprehensive evaluation of the I-95 and Route 1 corridors south of Route 128 that included a recommended plan of short-term and long-term improvements (June 2010)  MassDOT Project #603622, Bridge Rehabilitations, Route 1/Route I-95; completed in 2010	2	1	3	2	2	1	11	Medium	Segment has MassDOT projects and studies.
Route 3A	Weymouth	SSC	6	MassDOT	Yes	3	1.9	3.6	0	2	1.14	30 MBTA bus stops MBTA bus Routes 220, 221, and 222  MBTA Commuter Rail at Quincy Center, Weymouth Landing/ East Braintree, and West Hingham  Ferry service	Yes	Yes  An EJ zone in Quincy is 0.2 miles from the segment.	Advertised (2008) TIP and MassDOT Project #604382, Route 3A (Washington Street) Bridge; construction ends winter 2016/2017  MassDOT Project #602703, Bridge Rehabilitation, Route 3A (Lincoln Street) over the Weymouth Back River; completed in autumn 2006	3	0	2	4	2	0	11	Medium	MassDOT District 6 and Town of Weymouth interest are critical for implementation.

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 16	Holliston	MWRC	3	MassDOT and Town	Yes	3	2.3	4.4	0	2	1.46	MWRTA bus Route 6	None	None	MassDOT Project #605745, Reconstruction of Route 16 from Quail Run to the Sherborn town line; in preliminary design  MassDOT Project #602462 will enhance safety and improve efficiency by installing a new traffic signal at the intersection of Route 16 at Route 126 and at Oak Street in Holliston; 25% design stage  2011 CTPS study, Route 126 Corridor: Transportation Improvement Study  2008 CTPS study, Washington Street (Route 16/126) at Hollis Street	3	1	1	3	0	2	10	Low	Location has MassDOT projects and CTPS studies, which have not been implemented.  The 495/MetroWest Partnership expressed interest in a Route 16 study.  The section that experiences the most crashes is the town center portion (under Town jurisdiction). A road safety audit was performed for the town center portion in December 2012.
Route 135	Wellesley	MWRC	6	MassDOT and Town	Yes	3	3	6.2	0	1	1.3	MBTA Commuter Rail at Natick, Wellesley Square, and Wellesley Hills  MWRTA bus Route 8	None	Yes  Most of the segment lies adjacent to EJ zones.	No projects	3	1	2	3	0	1	10	Low	None
Route 20	Weston	MWRC	6	MassDOT	Yes	3	3.3	2.7	0	2	2.43	MBTA bus Route 70  MBTA Commuter Rail at Waltham and Kendal Green	Yes	Yes  An EJ Zone is located 0.1 mi from the end of the segment.	No projects	1	2	2	4	0	1	10	Low	A congestion study was suggested through UPWP and LRTP outreach in 2012, 2013, and 2014 by MAGIC; a formal letter was submitted and verbal comments were made at an MWRC subregion meeting.  The location was resubmitted in comment on Draft FFY 2014 UPWP.
Memorial Drive (Routes 2 and 3)	Cambridge	ICC	6	DCR	Yes	2	4.2	3.0	0	5	1.3	MBTA bus Routes 747, 1, 47, 64, 66, 70, 70A, 71, 73, 86, and 701  MBTA Rapid Transit available on the Red and Green Lines  MBTA Commuter Rail at North Station, Back Bay, Yawkey, Porter Square, and Belmont	Yes	Yes  Most of the segment lies within or adjacent to EJ Zones.	DCR announced a \$500,000 comprehensive study of the parkway system for bike lanes in FFY 2015. The goals of the study include updated traffic information, assessment of parkway conditions, and assessment and understanding of deficiencies along the heavily cycled parkways.	2	1	2	4	0	0	9	Low	None
Route 3A	Cohasset	SSC	5	MassDOT	Yes	3	3.1	4.0	0	2	1.09	MBTA Commuter Rail at Nantasket Junction, Cohasset, and North Scituate	N/A	None	FFY 2013 Subregional Priority Corridor Study.  MassDOT Project #608007, Corridor Improvements and Related Work on Justice Cushing Highway (Route 3A), from Beechwood Street to the Scituate town line, includes new traffic signal equipment and pedestrian and bicycle accommodation; preliminary design  The corridor is within the limits of MassDOT Project #605664, Resurfacing and Related Work on Route 3A (Duxbury town line northerly to Scituate town line); 100% design stage; no construction funding identified	2	0	2	2	2	1	9	Low	FFY 2013 Subregional Priority Corridor study was conducted within the segment.  MassDOT District 5 comments note two approved projects: MassDOT Projects #608007 (in preliminary design stage) and Project #605664 (100% design stage).
Route 2	Lincoln	MAGIC	4	MassDOT	Yes	2	3	0.9	1	1	2.68	MBTA Commuter Rail at Concord and Lincoln	N/A	None	MassDOT Project #602894, Crosby's Corner (2 at 2A) Improvements; under construction  MassDOT Project #604629, Resurfacing and Related Work on Route 2; completed in 2010  FFY 2013 Priority Corridors for LRTP Needs Assessment Study (Concord and Lincoln)	2	2	2	2		1	9	Low	Route 2 was suggested during MPO outreach as a route experiencing congestion that affects MAGIC communities and Cambridge.  There are many projects and studies conducted for this corridor, including the Route 2 (Crosby's Corner) improvements.
Route 135	Natick	MWRC	3	Town	Yes	3	2.1	10.3	1	3	1.33	MWRTA bus Routes 10 and 11  MBTA Commuter Rail at Natick and West Natick	None	None	MassDOT Project #600573 reconstructed Route 135 in Natick in 2008. More extensive improvements were proposed in the downtown area, on East Central Street between North Main Street and Union Street, including signal upgrades, new sidewalks, pavement rehabilitation, and shoulders.  2010 CTPS study, West Central Street (Route 135) at Speen Street.	4	1	2	1	0	1	9	Low	Congestion in the downtown area; likely focus area would be on the intersection of Route 135 at Route 27 and the intersection of Route 135 at Speen Street because of the crash history of those locations.
Route 1	Westwood	TRIC	6	MassDOT	Yes	3	1.1	1.1	0	0	1.3	None	N/A	None	MassDOT's I-95 South Corridor Study provided a comprehensive evaluation of the I-95 and Route 1 corridors south of Route 128 and included a recommended plan of short-term and long-term improvements (June 2010)  MassDOT Project #603162, Route 128 Add-a-Lane Bridges (Bridge III), Route 1 and 1A over I-95/128; completed in 2012	0	1	2	3	2	1	9	Low	Segment has MassDOT projects and studies.
Routes 4 and 225	Bedford	MAGIC	4	MassDOT and Town	No	5	4	2.4	0	1	1.27	Three MBTA bus stops  MBTA bus Route 62	Yes	None	Great Road Project: Master Plan and Conceptual Design, prepared by VHB for the Town of Bedford in 2011, in preliminary design	2	0	2	1	2	1	8	Low	The MAGIC subregion and the Towns of Bedford and Lexington requested that the FFY 2012 UPWP and FFY 2013 UPWP include a study of Routes 4 and 225.
Route 62	Concord	MAGIC	4	MassDOT and Town	Yes	3	2.3	4.4	0	1	1.31	MBTA Commuter Rail at Concord and West Concord	N/A	None	No projects	3	1	1	1	1	1	8	Low	None

Arterial Segment	Community	MAPC Subregion	MassDOT District	Jurisdiction	National Highway System	Functional Class*	Distance (Miles)	Crash Rate (MVT)	Number of Top-200 High-Crash Locations 2011-13	Number of HSIP-Eligible Crash Clusters 2011-13**	Travel Time Index	Transit Service	Crowded or Late Bus	In or Near Environmental Justice Zone	Study, Project, or TIP Project	Safety Conditions	Congested Conditions	Multimodal Significance	Regional Significance	Regional Equity	Implementation Potential	Score	Priority Rating	Summary of Comments
Route 9	Wellesley	MWRC	6	MassDOT	Yes	2	5.2	3.3	0	9	1.31	MBTA Commuter Rail at Wellesley Hills and Wellesley Farms  MWRTA bus Route 1	None	None	MassDOT Project #601586, Intersection Improvements at Route 9 (Worcester Street) and Oak Street, from 1500 feet West of Oak Street to 300 feet East of Overbrook Drive; construction ended in spring 2015  MassDOT Project #607340, Resurfacing on Route 9, from Dearborn Street to the Natick town line; in preliminary design  MassDOT Project #606530, Drainage Improvements along Route 9 Boulder Creek Culvert (Design Only); 25% design stage  CTPS study: Route 9 Corridor in Wellesley, 2003  MAPC Land Use/Corridor Study (fall 2013)	1	1	2	3	0	1	8	Low	MassDOT has a preliminary assessment of this corridor that will develop into 25% design plans for roadway improvements.
Route 3A	Marshfield	SSC	5	MassDOT	Yes	3	7.3	2.1	0	0	1.09	GATRA bus  MBTA Commuter Rail at Greenbush	None	None	The corridor is within the limits of MassDOT Project #605664, Resurfacing and Related Work on Route 3A (Duxbury town line northerly to Scituate town line), work includes patching and microsurfacing, shoulder reconstruction, and drainage structures; 100% design stage; no construction funding identified	0	0	2	2	2	1	7	Low	None
Route 16	Natick	MWRC	3	Town	Yes	3	2.6	1.4	0	0	1.19	None	N/A	Yes	No projects	0	0	2	3	0	2	7	Low	The 495/MetroWest Partnership expressed interest in a Route 16 study. Specific issues in this segments include improvements to accommodate pedestrians and bicyclists.
Route 129	Reading	NSPC	4	MassDOT and Town	Yes	3	2.9	3.2	0	0	1.56	11 MBTA bus stops  MBTA bus Route 136  MBTA Commuter Rail at Wakefield, Reading, and Woburn	Yes	None	No projects	0	1	2	1	2	1	7	Low	None
Route 16	Sherborn	SWAP	3	Town	Yes	3	4.3	1.7	0	1	1.35	None	N/A	None	2002 CTPS study, Traffic Congestion in SWAP Subregion: Sherborn Town Center Traffic-Flow Improvement Study  Conceptual TIP #915, Washington Street (Route 16)	1	1	1	2	0	2	7	Low	Location was suggested in 2014 LRTP outreach at a 495/MetroWest Partnership meeting.  The section that experiences the most crashes and congestion is the town center portion, where Route 16 and Route 27 combine and split.
Route 3A	Scituate	SSC	5	MassDOT	Yes	3	4.8	1.0	0	0	1.04	MBTA Commuter Rail at Greenbush, North Scituate, and Cohasset	N/A	None	FFY 2013 Subregional Priority Corridor Study  The corridor is within the limits of MassDOT Project #605664, Resurfacing and Related Work on Route 3A (Duxbury town line northerly to Scituate town line); no construction funding identified. Work includes patching and microsurfacing, shoulder reconstruction, and drainage structures; 100% design stage.	0	0	2	1	2	1	6	Low	The FFY 2013 Subregional Priority Corridors Study was conducted within the segment. MassDOT District 5 comments refer to MassDOT Project #605664 (in 100% design stage).
Route 9	Southborough	MWRC	3	MassDOT	Yes	2	0.79	4.6	0	0	1.83	MWRTA bus Route 7	None	None	MAPC Land Use/Route 9 Corridor Study (fall 2013).  The CTPS Safety and Operations at Intersections study evaluated congestion and safety issues at the Route 9/Oak Hill Road/Central Street intersection in FFY 2012.  MassDOT's I-495/Route 9 study, November 2013. The western section of Route 9 in Southborough between the I-95 interchange and Crystal Pond Road was evaluated for short-term and long-term improvements as part of this study.  MassDOT Project #607172, Resurfacing and Related Work on Route 9, from Westborough to just west of White Bagley Road; construction ends in spring 2016	1	1	2	2	0	0	6	Low	Most of the intersections on this corridor have already been studied, as MassDOT District 3 has noted.

Source: Central Transportation Planning Staff.

**Selection Criteria:**

Safety Conditions: Segment has a high crash rate for its functional class, contains an HSIP-eligible crash location, a top-200 high-crash location, and/or a significant number or HSIP-eligible clusters of pedestrian or bicycle crashes.  
 Congested Conditions: Segment has a Travel Time Index of at least 1.3, which is assigned a score of one point; or a Travel Time Index of at least 2.0, which is assigned an additional point. A score of one or two signifies that the segment experiences delays during peak periods.  
 Multimodal Significance: Segment supports transit, bicycle, or pedestrian activities; needs to have improvements for those activities; and/or has a high volume of truck traffic serving regional commerce.  
 Regional Significance: Segment is in the National Highway System, carries a significant proportion of regional traffic, lies within 0.5 miles of Environmental Justice transportation analysis zones, and/or is essential for regional economic, cultural, or recreational development in its area.  
 Regional Equity: Segment is located in a subregion that has not had a priority corridor study before or location in a subregion that has not had a priority corridor study in the last three years.  
 Implementation Potential: Segment is proposed or endorsed by its roadway administrative agency or agencies; is proposed or endorsed by its subregion and is a priority for the subregion; and/or has strong support from other stakeholders.

**\*Functional Class**

2 = principal arterial; 3 = principal arterial other (rural minor arterial or urban principal arterial); 5 = minor arterial (urban minor arterial or rural major collector)

**\*\*Number of HSIP-eligible crash clusters**

HSIP-eligible crash clusters are defined by MassDOT as crash clusters that rank within the top 5 percent of crash clusters for each regional planning agency, based on the Equivalent Property Damage Only (EDPO) index. In the EDPO index, property-damage-only crashes are awarded one point each, crashes involving injuries are awarded five points each, and fatal crashes are given 10 points each. In the Boston region, the 896 intersections in the top 5 percent have crash clusters with an EDPO value of 42 or greater.

**Abbreviations**

AADT = annual average daily traffic. ADA = Americans with Disabilities Act. ADT = average daily traffic. BAT = Brockton Areas Transit Authority. CTPS = Central Transportation Planning Staff. DCR = Department of Conservation and Recreation. DEIR = Draft Environmental Impact Report. EJ = Environmental Justice. ENHC = Essex National Heritage Commission. EPDO = equivalent property damage only. FFY = federal fiscal year. GATRA = Greater Attleboro Taunton Regional Transit Authority. HSIP = Highway Safety Improvement Program. ICC = Inner Core Committee. LRTP = Long-Range Transportation Plan. MAGIC = Minuteman Advisory Group on Interlocal Coordination. MAPC = Metropolitan Area Planning Council. MassDOT = Massachusetts Department of Transportation. MBTA = Massachusetts Bay Transportation Authority. MPO = [Boston Region] Metropolitan Planning Organization. MVMT = million vehicle-miles traveled. MWRC = MetroWest Regional Collaborative. MWRTA = MetroWest Regional Transit Authority. NSPC = North Suburban Planning Council. NSTF = North Shore Task Force. PRC = MassDOT Project Review Committee. RSA = road safety audit. RTA = regional transit authority. SSC = South Shore Coalition. SWAP = South West Advisory Planning Committee. TIP = Transportation Improvement Program. TRIC = Three Rivers Interlocal Council. UPWP = Unified Planning Work Program.



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intersection of Salem St and Vinnin St, for a mixed-use or multi-family development under 40R smart growth regulations that could see up to or over 100 units. No plans have been filed but development concepts are being put together currently.

### STUDY AREA – ROAD SEGMENTS

We are looking for a technical study of the Vinnin Square area to identify problems and solutions that can be implemented in tandem between MassDOT, the City of Salem, and the Towns of Marblehead and Swampscott.

The area includes the primary Route 1A (Paradise Road) as well as feeder/arterials (many of which include additional lighted intersections). See the following map for reference. The street segments are:

- 330 Paradise Road north to Loring Ave intersection in Salem
- Essex Street/Loring Ave (from Stop & Shop signal east to Maple Ave, Salem)
- Vinnin Street (from Loring Ave east to Bank of America access)
- Salem Street (from Vinnin St south to Sunbeam Ln)



**Initial Scoping Meeting Summary  
Route 1A-Vinnin Square Priority Corridor Study in  
Marblehead, Salem, and Swampscott  
Swampscott Town Hall, First Floor Conference Room  
May 5, 2016**

**Meeting started at 12:00 Noon.**

Participants from the City of Salem, the Towns of Marblehead and Swampscott, MassDOT Office of Transportation Planning (OTP), MassDOT Highway Division's District 4 Office, and Central Transportation Planning Staff (CTPS) introduced themselves (see attached meeting roster).

**Study Background**

Mark Abbott of CTPS introduced the Boston Region Metropolitan Planning Organization (MPO) and the study background.

- The study is supported by funding from the MPO. The MPO is responsible for conducting federally required metropolitan transportation planning process. The work of the MPO is conducted by CTPS, staff to the MPO.
- The MPO's Long-Range Transportation Plan (LRTP), *Charting Progress to 2040*, identified needs for all modes of transportation in the MPO region. The LRTP identified arterial segments where roadways need improvements and modernization.
- The objectives of this study are to identify safety, mobility, access, and other transportation-related problems in the corridor and to develop multimodal solutions to the problems, including increasing the quantity and quality of walking and biking.
- CTPS went through an extensive and comprehensive process and selected this corridor from over 54 arterial segments in the MPO region for study.

**Overview of Study Area**

Seth Asante of CTPS provided an overview of the study area based on available transportation data. The area's roadway characteristics are summarized as below:

- Functional class: Principal urban arterials (Route 1A and Tedesco Street), minor arterial (Essex Street and Salem Street).
- Jurisdiction: MassDOT has jurisdiction over Route 1A in Salem and Swampscott; the Town of Swampscott has jurisdiction over Essex Street and Salem Street; the City of Salem has jurisdiction over Loring Avenue off of Route 1A and Vinnin Street; and the Town of Marblehead has jurisdiction over Tedesco Street.
- Route 1A and Tedesco Street are on the National Highway System.

- All of the roadways are two-lane, two-way undivided roadways.
- There are ten signalized intersections and several unsignalized intersections and major commercial driveways in the study area.
- Generally 30 mph is the speed limit on the roadways in study area.
- There are sidewalks on both sides of the roadway but few locations are missing sidewalks
- Generally, the study area's roadway has no shoulders or dedicated bike lanes.
- The adjacent land uses are mixed—residential, commercial, recreational, and educational.

## **Study Vision**

Seth Asante said that based on previous discussions with some of the advisory tasks force members, the visions include:

- Transform Route 1A and ancillary roadways to increase safety for all users
- Renovate the study area's roadways into a pedestrian friendly boulevard
- Upgrade the traffic system to be more efficient
- Create a walkable, livable community that promotes human interaction

## **Study Tasks**

Seth Asante presented the limits of the study area. Seth Asante provided an overview of each of the tasks that will be performed in this study, which are described below:

- **Collect data:** The data to be collected include traffic volumes, pedestrian and bicyclist volumes, vehicle speeds, crashes, traffic signal timings and sequence, and transit service data. MassDOT Highway Division will collect all the traffic volume and speed data and provide the signal timings and intersection layout information. The Massachusetts Bay Transportation Authority will provide transit service data.
- **Existing conditions analyses:** the analyses would include inventory of the corridor land uses, pedestrians and bicyclists needs, safety conditions (crashes involving vehicles, pedestrians and bicyclists), traffic signal equipment essentials, peak hour traffic operations analyses, and spot speed survey.
- **Forecast future traffic:** Use the regional travel demand model set to forecast 2040 traffic. The model was calibrated for 101 cities and towns in the MPO region and adopted for the Long-Range Transportation Plan.
- **Develop and analyze improvements:** Work in conjunction with the study task force to develop improvements and concepts that would reconfigure the roadways to improve safety and operations and make the roadways safer, convenient, and comfortable access for all users.
- **Document the study and present products of the tasks to the advisory task force for comment and feedback.** Prepare draft document for review and finalize report

Seth Asante said the study is expected to be completed in 12 month. Mark Abbott thanked the advisory force members for their participations and welcomed any suggestions or comments after the meeting via e-mails or phone calls.

Meeting was adjourned at 1:00 P.M.

## Route 1A-Vinnin Square Priority Corridor Study

Thursday, May 5, 2016 12:00 AM—1:00 PM

Swampscott Town Hall

22 Monument Avenue

First Floor Conference Room

### Project Team Members

1. Stacey Beuttell,	WalkBoston	sbeuttell@walkboston.org
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17. Scott Peterson	CTPS	speterson@ctps.org
18. Seth Asante	CTPS	sasante@ctps.org

**Route 1A-Vinnin Square Priority Corridor Study in  
Marblehead, Salem, and Swampscott**

**Presentation and Discussion of Existing Conditions and Improvements  
Salem City Hall Annex, 120 Washington Street  
Third Floor Large Conference Room**

**October 24, 2016  
Meeting Summary**

**Meeting started at 10:30 A.M.**

Participants from the City of Salem, Towns of Marblehead and Swampscott, MassDOT Office of Transportation Planning (OTP), MassDOT Highway Division's District 4 Office, and the Central Transportation Planning Staff (CTPS) introduced themselves (see attached meeting roster).

**Study Background**

Mark Abbott of CTPS introduced the study and the objectives and informed participants that CTPS went through an extensive and comprehensive process to identify safety, mobility, access, and other transportation-related problems in the corridor. Mark said that CTPS staff has developed multimodal solutions to the problems.

**Existing Conditions**

Seth Asante of CTPS presented the data collected for the evaluating the existing conditions. They include traffic volumes, spot speeds, crashes, and transit performance data. Seth Asante said that based on analysis of existing conditions, field reconnaissance, and input from the previous meeting the following problems were identified in the study area:

- Wide roadways, which creates inequity by placing too much emphasis on vehicular use and encourages higher vehicle speeds.
- A lack of shoulders or bike lanes makes the roadways uncomfortable for bicyclists and places the sidewalks close to the travel lanes.
- A lack of crosswalks at some major intersections and side streets challenges pedestrians and put them at risk.
- Non-compliant ADA curb ramps and sidewalk connectivity problems (gaps) create an unfriendly environment for pedestrians and for people with disabilities.
- A lack of bus shelters at the stops with high number of rider creates problems for riders, especially during inclement weather.

- High vehicular speeds and acute horizontal curve on Route 1A near Leggs Hill Road results in many crashes.
- Outdated signal-timing plans need to be updated to make the flow of traffic efficient throughout the study area.
- High volumes of traffic on Route 1A and Vinnin Street creates congestion at Vinnin Square and Swampscott Mall area.
- A Lack of turn lanes and traffic queues causes high number of crashes on Route 1A at Swampscott Mall, Vinnin Square, and between Harrison Road and Sumner Road in Salem.
- The numerous driveways at Vinnin Square and a lack of trees and greenery do not provide a welcoming environment for pedestrians and bicyclists and contributes too many crashes.

### **Improvement Alternatives**

Seth Asante provided an overview of the 2040 traffic projections and said that traffic on the area's roadways are expected to grow by about five percent between 2016 and 2040. Seth Asante presented the multimodal improvements that CTPS staff developed to address the problems. He said CTPS staff will work with the advisory task force and use their feedback to refine the improvements. Seth Asante said that most of the improvements and concepts fall within the existing roadways right-of-way width and they require no land takings and they would make the study area's roadways safer and more attractive to pedestrians and bicyclists while serving the needs of commuters, supporting economic activities, and livable communities. Seth Asante said a few of the improvements and concepts would require more space to build the improvements and they would involve land takings.

### **Comments and Feedback**

There was a discussion after the presentation and the task force provided feedback including adding an alternative with a median for the Route 1A segment at the Swampscott Mall, converting shoulders into bike lanes, and refining the land use map. Seth Asante thanked the advisory task force members for their participation in the study and welcomed any suggestions or comments after the meeting via e-mails or phone calls.

Meeting was adjourned at 12:00 PM.



**Route 1A-Vinnin Square Priority Corridor Study**

Monday, October 24, 2016 10:30 AM—12:00 PM

City Hall Annex, 120 Washington Street

3<sup>rd</sup> Floor Large Conference Room, Salem

Project Team Members

✓1. Stacey Beuttell,	WalkBoston	sbeuttell@walkboston.org
2. Ben Wood,	MPH	Ben.Wood@MassMail.State.MA.US
3. Steve Dibble,	City of Salem	sdibble@salem.com
✓4. Clark, Michael	MassDOT	michael.clark@state.ma.us
5. Connie Raphael	MassDOT	connie.raaphael@state.ma.us
✓6. Peter Kane	Town of Swampscott	pkane@town.swampscott.ma.us;
✓7. Tom Daniel	City of Salem	tdaniel@Salem.com
✓8. Becky Curran	Town of Marblehead	rebeccac@marblehead.org
✓9. Dominick Pangallo	City of Salem	dpangallo@Salem.com
10. Gino Cresta	Town of Swampscott	gcresta@town.swampscott.ma.us
11. Pounds, Bryan	MassDOT	bryan.pounds@state.ma.us
12. John Gregg	MassDOT	John.Gregg@state.ma.us
13. Sara Timoner	MassDOT	sara.timoner@state.ma.us
14. John Pelletier,	Mass-In-Motion	John_pelletier@harvard.edu
✓15. Mark Abbott	CTPS	mabbott@ctps.org
16. Scott Peterson	CTPS	speterson@ctps.org
✓17. Seth Asante	CTPS	sasante@ctps.org

✓ Eric Papetti  
✓ Jeff Elie

City of Salem

eric.papetti@gmail.com  
jelie@salem.com

## Seth Asante

---

**From:** Clark, Michael (DOT)  
**Sent:** Tuesday, October 25, 2016 3:00 PM  
**To:** Seth Asante  
**Cc:** Mark Abbott; Pounds, Bryan (DOT)  
**Subject:** Comments on CTPS Vinnin Square study

Hi Seth and Mark,

Please find below OTP's comments on the Vinnin Square study:

- Route 1A is mislabeled on some of the introductory figures (follows Paradise Rd., not Essex St.)
- We encourage you to not treat the parking allowance at the medical facility on Paradise Rd. in Swampscott (near Oakledge Rd. and Franklin Ave.) as a constraint for improvement concepts. Any changes to that allowance can be considered by the state at a later date. A crosswalk should be considered across Paradise at Oakledge Rd. to accommodate individuals parked on that side street.
- Ensure report includes recommendations from projects and studies detailed on Figure 13
- On Figure 18, "traffic congestion and queues at signalized intersections" is putting it a bit strongly for the Loring Ave. segment in Salem (red). Of the three intersections and three peak periods (nine instances), only one instance is LOS D – the rest are A or B. Congestion and queues seems to be incongruent with the other problems identified.
- Tie the new sidewalk at the Loring Street curve, the curve warning signs, and the reduced speed limits with explicit desire to improve safety at this location.
- Consider third leg of crosswalk at Harrison Rd. given future site of an elementary school. Pedestrians from Lincoln Rd. would need to cross Harrison Rd. to access school if using sole crosswalk across Loring Ave.
- Strongly favor Alternative 1 for Paradise Rd. at Swampscott Mall. Alternatives 2-4 do not have any bicycle accommodations.
- Show existing crosswalk at SE leg of traffic island at intersection of Vinnin St. and Paradise Rd. in all alternatives.
- So why no bicycle provisions proposed for stretch of Paradise Rd. at Vinnin Square? If unable to reduce from 4 traffic lanes given need for multiple lanes at intersections demonstrate in report. No bicycle provisions here breaks up consistency in bike lanes along Loring Ave. in Salem and Paradise Rd. in Swampscott.
- Similarly, Loring Ave. at Vinnin Square also does not show bicycle provisions despite there seeming to be some space in ROW. This rendering should show existing parking and evaluate future concepts. Understand the high number of curb cuts complicates things here but the three legs of the Vinnin Square triangle on Figure 28 don't seem to have been developed to the same scrutiny as the other segments.
- Good job on the examples of different improvements. This is something we had asked for before so wanted to note its inclusion.

And one last note – I noticed Ben Wood from DPH's name on the sign-in list yesterday. How was he included on the study? Just curious – we work with Ben and DPH on other studies and I was surprised to see his name there.

Thanks,  
Michael

### Michael Clark

Corridor Planning Unit – Office of Transportation Planning  
Massachusetts Department of Transportation  
10 Park Plaza, Suite #4150, Boston, MA 02116  
Phone: 857-368-8867



# TOWN OF SWAMPSCOTT

## PLANNING DEPARTMENT

ELIHU THOMSON ADMINISTRATION BUILDING  
22 MONUMENT AVENUE, SWAMPSCOTT, MA 01907

**S. PETER KANE**  
DIRECTOR OF  
COMMUNITY DEVELOPMENT

**ANDREW LEVIN**  
ASSISTANT TOWN PLANNER

Seth Asante  
Central Transportation Planning Staff  
Ten Park Plaza, Suite 2150  
Boston, MA 02116

31 October 2016

RE: Feedback on "Route 1A-Vinnin Square Priority Corridor Study" Initial Feedback

Seth:

Thank you for letting us provide feedback on the initial materials CTPS has developed as part of the Route 1A-Vinnin Square Priority Corridor Study that was presented to Swampscott, Salem, Marblehead, and MassDOT on Monday, October 24.

I've met with DPW, Fire, and Police in Swampscott in order to put together the below comments which we're hoping can be considered as you put together the draft study report. The comments here are broken down based on the Figure #s from the pages presented at the meeting.

- Figure 2 Study Area Map
  - The portion of Vinnin St between Loring Avenue and Paradise Road was missing its highlight.
  - The 1A marking is displayed on Essex St in Swampscott but should be on Paradise Road in Swampscott. This correction needs to be applied on all subsequent maps.
- Figure 3 Roadway Jurisdiction Map
  - Sunbeam Lane (off of Salem St in Swampscott) should be indicated as "Other" since it's a private road.
- Figure 8 Designated Speed Limit and Summary of Spot Speed by Direction
  - There's a portion of Paradise Road colored for "35 mph". The Town had MassDOT change that to 30 mph.
- Figure 14 General Land Use/Zoning Map
  - There's an area south of the pink "Commercial/Retail" area currently shown as "Park/Recreational" but is actually "Residential" (specifically the lands abutting the roads of Mountwood Road, Parsons Drive, and Alyward Drive (all in Swampscott)).
- Figure 25 Proposed Improvements Paradise Road from Ellis Street to Longwood Drive
  - We'd prefer the shoulders to be bike lanes.
  - The Town currently allows (along with MassDOT okay) parking along the north side of the street for 250 Paradise Road (in front of their building and the parking lots on either side of building). This would have to be balanced against the need for bike lanes.
- Figures 26-28 Proposed Improvements Paradise Road to Swampscott Mall
  - We prefer Option 1 far more than the other two options

- Medians are not a viable alternative due to the restriction they create on general drivers for left turns but also primarily the fire safety limitation it presents.
- Add a Rectangular Rapid Flashing Beacon at the mid-block pedestrian crossing.
- Pedestrian crosswalks for all commercial and multi-family driveway egress points on this portion.
- Figure 30 Proposed Improvements Essex Street and Loring Avenue South of Vinnin Street
  - We'd prefer the shoulders to be bike lanes.

Please let me know if you have any questions about the feedback provided here. We look forward to the next step in this study.

Sincerely,



S. Peter Kane  
Director of Community Development

CC: Interim Town Administrator

## Seth Asante

---

**From:** Becky Curran  
**Sent:** Wednesday, November 16, 2016 5:35 PM  
**To:** Seth Asante (sasante@ctps.org)  
**Subject:** marbelehad comments on MPO Route 1A -Vinnin Square Priority Corridor Study  
**Attachments:** 201611161726.pdf

Hi Seth - I met with the Police Chief, DPW Director and the Town Administrator to go over the plans we have the following comments

In favor of sidewalk on the northside Tedesco from Marblehead into Vinnin Square and geometry changes at Brookhouse Drive.

Salem bridge at Legg's hill road and Loring Ave (small bridge program?) should be rebuilt

Crosswalk at Tedesco should be re located to location where people from the parking lot across Tedesco St. are going. they will cross there should be in most convenient location

The town already put in the Rapid Flashing beacon and crosswalk FB on Tedesco at Legg's Hill road we also and also put in a crosswalk at Legg's hill road. As is suggested in the plan.

Attached are two mark ups one is to show the area marked as Tedesco country club but it is a vacant parcel of land which has a n overlay district in both Marblehead and Salem that allows for a high density development 30 units per acre.

The second mark up show the driveway on Tedesco street into the staples shopping area. This is a difficult place to take a left into or out of there is poor visibility and if it could be widened to create a turning lane.

Along paradise road the town prefers the option of looking at with a median and breaks in between with one lane in each direction to improve pedestrian environment.

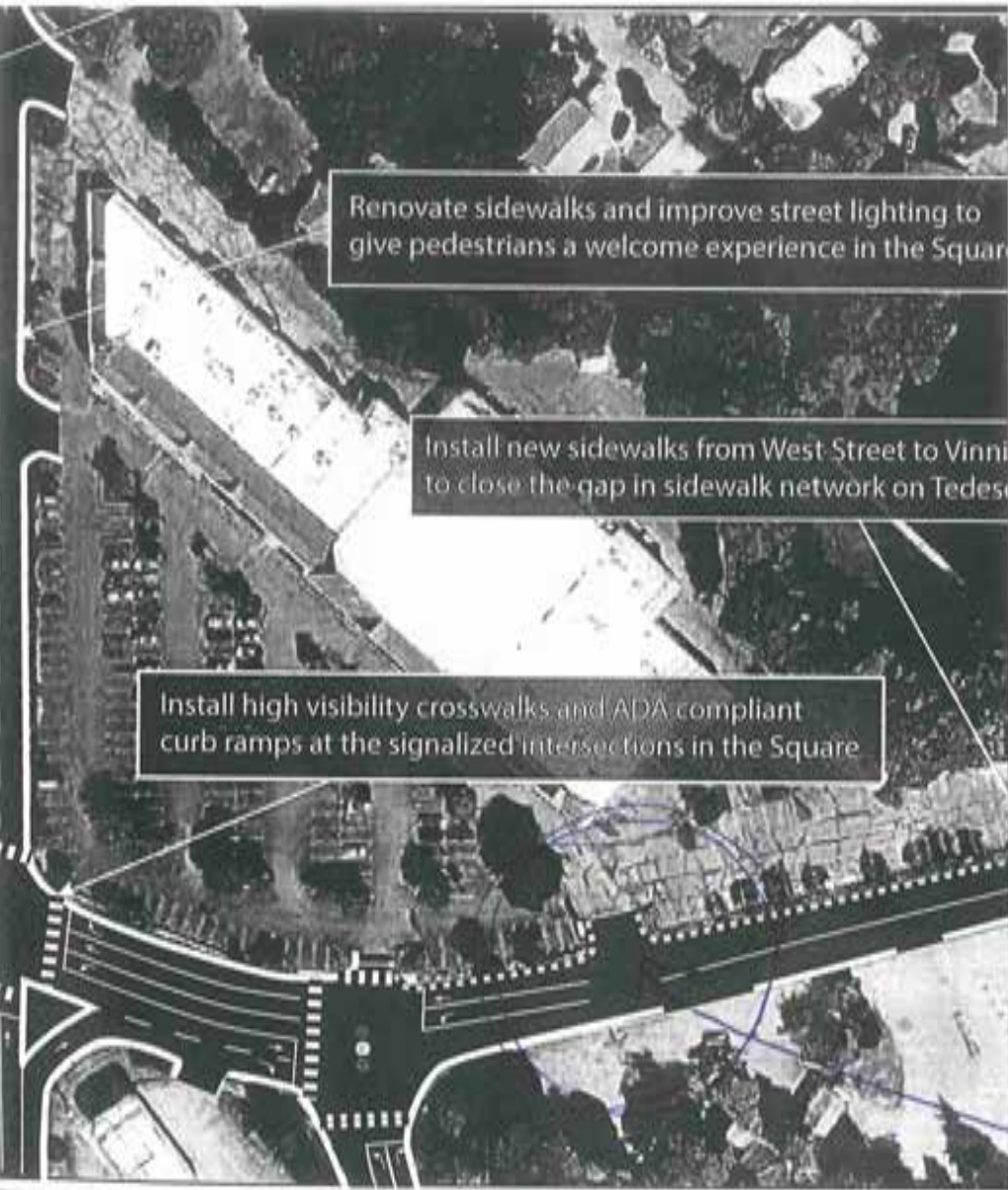
Rebecca Curran Cutting  
Town Planner  
Abbot Hall  
188 Washington Street  
Marblehead, Massachusetts 01945  
781.631.0000 telephone  
781.631.8571 fax  
[rebeccac@marblehead.org](mailto:rebeccac@marblehead.org)

-----Original Message-----

From: [selectmen@marblehead.org](mailto:selectmen@marblehead.org) [mailto:[selectmen@marblehead.org](mailto:selectmen@marblehead.org)]  
Sent: Wednesday, November 16, 2016 5:27 PM  
To: Becky Curran  
Subject: Message from "RNP0026735B8EF7"

This E-mail was sent from "RNP0026735B8EF7" (Aficio MP 4002).

Scan Date: 11.16.2016 17:26:54 (-0500)



Renovate sidewalks and improve street lighting to give pedestrians a welcome experience in the Square

Install new sidewalks from West Street to Vinnin Square to close the gap in sidewalk network on Tedesco Street

Install high visibility crosswalks and ADA compliant curb ramps at the signalized intersections in the Square

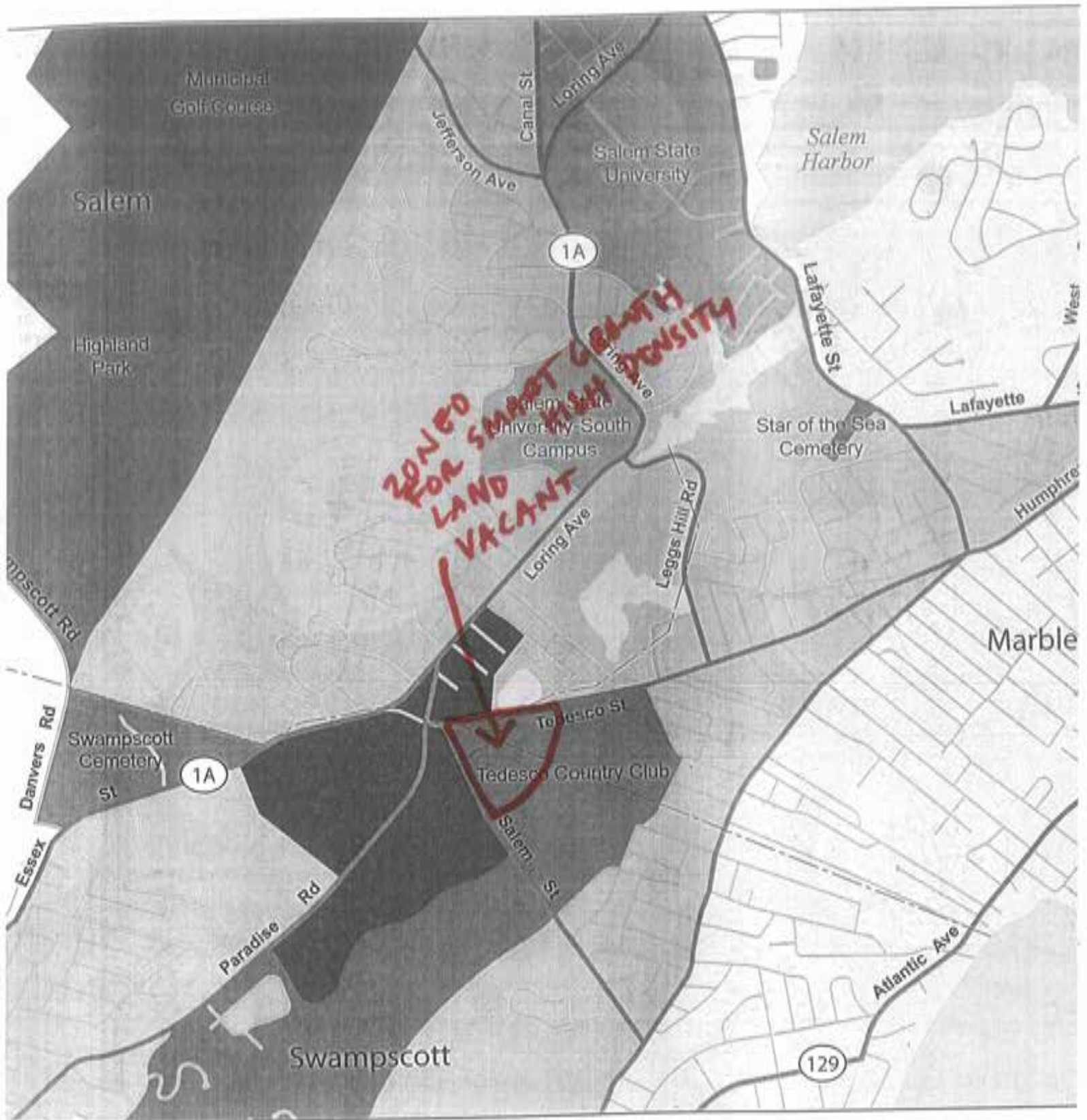
Widen to create a turning lane

Area of conflict people waiting out on taking left in & out problem with visibility

E 29  
Intersections at Vinnin Square



Route 1A-Vinnin Square  
Priority Corridor  
Swampscott/Salem/



**Figure 14**  
**General Land Use/Zoning Map**



## Seth Asante

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**From:** Raphael, Connie (DOT)  
**Sent:** Thursday, November 03, 2016 2:38 PM  
**To:** Seth Asante  
**Cc:** Timoner, Sara (DOT); Gregg, John (DOT)  
**Subject:** RE: Route 1A-Vinnin Square Priority Corridor Study

Hi Seth,

Thanks for sending the OTP and Town of Swampscott comments. In general we agree with these comments. Here are some specific comments.

- The minimum bike lane width is five feet. Please include this width for all recommendations with bike lanes.
- Sidewalks and bike lanes are required on both sides of the roadway. The District would only support alternatives meeting this criteria. Alternatives for improvements through Vinnin Square should conform to this requirement if possible.
- Try to avoid utility pole relocations when proposing alternatives. Example – Where there are existing 5 foot sidewalks we could widen them to six feet to the outside of the existing surface. We would not relocate the poles just to add sidewalk width. Any additional pavement surface should be dedicated to the bike lane/shoulder.
- In areas that are high crash locations the recommendation should be to conduct an Road Safety Audit (RSA). The information in this report could be considered as part of the RSA.

Connie Raphael  
District Four Planning Coordinator  
MassDOT – Highway Division  
519 Appleton Street  
Arlington, MA 02476  
781-641-8468

---

**From:** Seth Asante [<mailto:sasante@ctps.org>]  
**Sent:** Tuesday, November 01, 2016 10:35 AM  
**To:** Raphael, Connie (DOT); Timoner, Sara (DOT); Gregg, John (DOT)  
**Subject:** Route 1A-Vinnin Square Priority Corridor Study

Hi All,

I wanted to share with you the comments from OTP and Town of Swampscott (attached) so you can review them.

Thank you,  
Seth

**Seth A. Asante** | Chief Transportation Planner  
CENTRAL TRANSPORTATION PLANNING STAFF  
857.702.3644 | [sasante@ctps.org](mailto:sasante@ctps.org)  
[www.ctps.org/bostonmpo](http://www.ctps.org/bostonmpo)

Town Point Plaza, Rt. 1A, 21ND Boston, MA 02116-0002  
Tel: 617.702.3700 Fax: 617.770.9498 | TTY: 617.770.9498





## Seth Asante

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**From:** Eric Papetti  
**Sent:** Monday, October 31, 2016 7:49 AM  
**To:** sasante@ctps.org  
**Subject:** Vinnin Square Comment

Seth,

Thank you for coming to present the CTPS plan for the Vinnin Square area. I have a few comments below - I am a Salem resident and member of the Parking & Traffic Commission and Bicycle Advisory Committee, but these comments are only my personal observations, I hope that the city will have a chance to weigh in with its own official position soon.

First of all, I appreciate the attention you gave to the importance of lane width in maintaining safe travel speeds, its impact on pedestrian crossing distances, and impact on safety for bicyclists.

Nevertheless, on this and future projects, I encourage CTPS staff to devote analysis and presentation time addressing the criteria which are outlined in its own long-range plan - those of Safety, Preservation, Capacity, Clean Air/Communities, Equity, and Economic Vitality. In the presentation at the city, I heard a lot of discussion of safety, capacity, and preservation of the system, but very little discussion of equity, economic vitality, or clean air & clean communities. Merely designing roadways which adhere to ADA and basic MassDOT guidelines is not adequate - that is a floor, not a ceiling. We need to hear some intense, carefully considered analysis of those criteria and ways to address them, especially considering that 17% of Salem households do not own cars.

I have a few specific recommendations on the plan which I hope you have time to consider, starting with two recommendations relative to the planned move of the Horace Mann school. Safe Routes to School needs to include bicycles, and roadways and intersections near the school should be designed with children as design users, safe enough that they can navigate their way to school independently.

To that end:

**Intersection of Lincoln Rd. and Loring** - This is a key connection to off-street paths which lead to the Marblehead rail trail and future Canal Street path, and in turn, connects to many quiet, safe, neighborhood roads. Making this crossing safe for kids, so they can enter the school property with having to ride on 1A itself, will effectively open up a huge swath of Salem and Marblehead neighborhoods so that they have safe, convenient access to the new school.

**1A north of the new Horace Mann site, to where it connects with Jefferson & Loring reconstruction, should likewise be constructed to the same standard.** This will ultimately allow people to make safe connections from many more nearby neighborhoods. This is a good place for the city to consider a protected bike lane.

- On "deadman's curve," pedestrians are currently on the exposed side of the guardrail. This needs to be identified and corrected, preferably while moving bicycle lanes to the protected side of the guardrail as well. Both on deadman's curve and south of it, in the areas where no parking is currently allowed, the appropriate treatment here is definitely a raised, protected bike lane, not just striped shoulders. The state struggles to implement protected bike lanes in areas where parking removal is a political obstacle, so when you have a section of road where that isn't any issue - why not just do it?

- In general, throughout the project area, any shoulders which are intended for bicycle travel should be striped as bike lanes, otherwise people will drive on them.

- In areas throughout the project where roads can be narrowed for safety, communities should consider the benefits of actually removing pavement rather than just re-striping, so as to reduce the burden on city stormwater systems and improve the health of Salem sound through the resultant reduction in non-point-source pollution.

Thanks again for your consideration of these comments.

Regards,

Eric Papetti

11 Symonds St., #1  
Salem, MA 01970

# **APPENDIX B**

## **Traffic Data**

## **Automatic Traffic Recorder Counts**

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE  
 Starting: 4/11/2016

STA. 1  
 TOTAL

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: ROAD TOTAL

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		79	101	95		91			91	275
02:00		36	48	68		50			50	152
03:00		23	28	30		27			27	81
04:00		34	35	44		37			37	113
05:00		81	75	75		77			77	231
06:00		282	305	292		293			293	879
07:00		980	958	931		956			956	2869
08:00		1545	1548	1576		1556			1556	4669
09:00		1407	1424	1444		1425			1425	4275
10:00		1030	1047	1063		1046			1046	3140
11:00		1051	1130	1060		1080			1080	3241
12:00		1069	1175			1122			1122	2244
13:00	1244	1344	1277			1288			1288	3865
14:00	1213	1216	1244			1224			1224	3673
15:00	1344	1263	1346			1317			1317	3953
16:00	1407	1452	1452			1437			1437	4311
17:00	1510	1475	1554			1513			1513	4539
18:00	1572	1537	1591			1566			1566	4700
19:00	1434	1408	1415			1419			1419	4257
20:00	1003	1007	1091			1030			1030	3091
21:00	704	691	788			727			727	2183
22:00	513	546	523			527			527	1582
23:00	284	266	325			298			298	895
24:00	157	193	191			180			180	541
<hr/>										
TOTALS	12385	20035	20661	6678	0	20286	0	0	20286	59759
% AVG WKDY	61	98.7	101.8	32.9						
% AVG WEEK	61	98.7	101.8	32.9						
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		1545	1548	1576		1556			1556	
PM Times	18:00	18:00	18:00			18:00			18:00	
PM Peaks	1572	1537	1591			1566			1566	
D%	53	60	55	60						
R%	13	8	8	24						

42

COMB AWD 20286

FAC .96

COMB ADT 19,500

STAINB

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: NORTH

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		46	55	48		49			49	149
02:00		17	21	33		23			23	71
03:00		9	15	14		12			12	38
04:00		12	8	15		11			11	35
05:00		38	31	27		32			32	96
06:00		114	112	105		110			110	331
07:00		306	285	265		285			285	856
08:00		596	636	628		620			620	1860
09:00		665	698	693		685			685	2056
10:00		538	516	565		539			539	1619
11:00		544	583	534		553			553	1661
12:00		521	614			567			567	1135
13:00	662	730	664			685			685	2056
14:00	608	569	650			609			609	1827
15:00	758	645	692			698			698	2095
16:00	720	769	737			742			742	2226
17:00	827	845	849			840			840	2521
18:00	868	861	876			868			868	2605
19:00	843	817	839			833			833	2499
20:00	533	525	575			544			544	1633
21:00	360	344	366			356			356	1070
22:00	224	243	235			234			234	702
23:00	149	135	164			149			149	448
24:00	80	96	107			94			94	283
TOTALS	6632	9985	10328	2927	0	10138	0	0	10138	29872
# AVG WKDY	65.4	98.4	101.8	28.8						
# AVG WEEK	65.4	98.4	101.8	28.8						
AM Times		09:00	09:00	09:00		09:00			09:00	
AM Peaks		665	698	693		685			685	
PM Times	18:00	18:00	18:00			18:00			18:00	
PM Peaks	868	861	876			868			868	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 2  
 Starting: 4/11/2016

STA. 15B

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: SOUTH

File: SFD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		33	46	47		42			42	126
02:00		19	27	35		27			27	91
03:00		14	13	16		14			14	43
04:00		22	27	29		26			26	78
05:00		43	44	48		45			45	135
06:00		168	193	187		182			182	548
07:00		674	673	666		671			671	2013
08:00		949	912	948		936			936	2809
09:00		742	726	751		739			739	2219
10:00		492	531	498		507			507	1521
11:00		507	547	526		526			526	1580
12:00		548	561			554			554	1109
13:00	582	614	613			603			603	1809
14:00	605	647	594			615			615	1846
15:00	586	618	654			619			619	1858
16:00	687	683	715			695			695	2085
17:00	683	630	705			672			672	2018
18:00	704	676	715			698			698	2095
19:00	591	591	576			586			586	1758
20:00	470	482	506			486			486	1458
21:00	344	347	422			371			371	1113
22:00	289	303	288			293			293	880
23:00	135	151	161			149			149	447
24:00	77	97	84			86			86	258

TOTALS 5753 10050 10333 3751 0 10142 0 0 10142 29887

% AVG WKDY 56.7 99 101.8 36.9  
 % AVG WEEK 56.7 99 101.8 36.9

AM Times 08:00 08:00 08:00 08:00 08:00  
 AM Peaks 949 912 948 936 936

PM Times 18:00 16:00 16:00 18:00 18:00  
 PM Peaks 704 683 715 698 698

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 1  
 Starting: 4/11/2016

Page: 1

STA. 2 NB

Site Reference: 160070000873  
 Site ID: 110000000201  
 Location: RTE. 1A SOUTH OF LEGGS HILL RD.  
 Direction: NORTH

File: SPD-202.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED NB

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		60	67	65		64			64	192
02:00		26	29	38		31			31	93
03:00		12	15	17		14			14	44
04:00		17	12	23		17			17	52
05:00		33	37	21		30			30	91
06:00		141	138	145		141			141	424
07:00		355	341	342		346			346	1038
08:00		718	737	744		733			733	2199
09:00		665	707	715		695			695	2087
10:00		588	618	570		592			592	1776
11:00		545	556			550			550	1101
12:00		536	595			565			565	1131
13:00		606	622			614			614	1228
14:00	608	579	631			606			606	1818
15:00	638	645	609			630			630	1892
16:00	717	666	681			688			688	2064
17:00	682	647	703			677			677	2032
18:00	701	817	740			752			752	2258
19:00	688	655	718			687			687	2061
20:00	521	486	558			521			521	1565
21:00	383	371	395			383			383	1149
22:00	287	336	306			309			309	929
23:00	190	173	209			190			190	572
24:00	105	126	136			122			122	367

TOTALS	5520	9803	10160	2680	0	9957	0	0	9957	28163
% AVG WKDY	55.4	98.4	102	26.9						
% AVG WEEK	55.4	98.4	102	26.9						
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		718	737	744		733			733	
PM Times	16:00	18:00	18:00			18:00			18:00	
PM Peaks	717	817	740			752			752	

*Corrected Report 9/11/16*  
*F.A.L.*  
*CONFIDENTIAL*



STA. 2 SB

NO DATA

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE  
 Starting: 4/11/2016

STA. 3  
 TOTAL

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: ROAD TOTAL

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		57	64	74		65			65	195
02:00		28	19	36		27			27	83
03:00		19	20	20		19			19	59
04:00		28	22	32		27			27	82
05:00		54	55	50		53			53	159
06:00		253	244	229		242			242	726
07:00		664	665	629		652			652	1958
08:00		1309	1322	1316		1315			1315	3947
09:00		1199	1178	1248		1208			1208	3625
10:00		1080	1068	1036		1061			1061	3184
11:00		1054	1076			1065			1065	2130
12:00		1074	1155			1114			1114	2229
13:00		1210	1251			1230			1230	2461
14:00	1086	1097	1216			1133			1133	3399
15:00	1279	1161	1326			1255			1255	3766
16:00	1341	1233	1286			1286			1286	3860
17:00	1457	1393	1419			1423			1423	4269
18:00	1349	1405	1405			1386			1386	4159
19:00	1225	1191	1189			1201			1201	3605
20:00	854	874	912			880			880	2640
21:00	552	624	636			604			604	1812
22:00	441	451	504			465			465	1396
23:00	247	281	311			279			279	839
24:00	148	144	176			156			156	468
TOTALS	9979	17883	18519	4670	0	18146	0	0	18146	51051
% AVG WKDY	54.9	98.5	102	25.7						
% AVG WEEK	54.9	98.5	102	25.7						
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		1309	1322	1316		1315			1315	
PM Times	17:00	18:00	17:00			17:00			17:00	
PM Peaks	1457	1405	1419			1423			1423	
D%	50	55	50	50						
K%	15	8	8	28						

U5  
 COMB AWD 18146  
 FAC .93  
 COMB ADT 16,900

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 1  
 Starting: 4/11/2016

STA. 3 NB

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: NORTH

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		29	36	44		36			36	109
02:00		15	6	16		13			13	39
03:00		10	11	16		10			10	31
04:00		11	10	18		13			13	39
05:00		22	27	24		24			24	73
06:00		108	97	95		100			100	300
07:00		294	273	271		279			279	838
08:00		621	668	669		652			652	1958
09:00		596	605	655		618			618	1956
10:00		523	505	501		508			508	1526
11:00		522	534			528			528	1356
12:00		528	569			548			548	1097
13:00		643	641			642			642	1284
14:00	558	529	604			563			563	1691
15:00	665	611	703			659			659	1979
16:00	689	618	640			649			649	1947
17:00	738	696	723			719			719	2157
18:00	753	796	769			769			769	2307
19:00	682	672	690			681			681	2044
20:00	508	488	539			513			513	1535
21:00	326	346	365			345			345	1037
22:00	230	254	277			253			253	761
23:00	135	154	159			149			149	448
24:00	72	76	89			79			79	237
<hr/>										
TOTALS	5356	9149	9541	2303	0	9348	0	0	9348	26349
<hr/>										
% AVG WKDY	57.2	97.8	102	24.6						
% AVG WEEK	57.2	97.8	102	24.6						
<hr/>										
AM Times		06:00	08:00	08:00		08:00			09:00	
AM Peaks		621	668	669		652			652	
<hr/>										
PM Times	18:00	18:00	18:00			18:00			18:00	
PM Peaks	753	786	769			769			769	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 2  
 Starting: 4/11/2016

STA. 3 SB

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: SOUTH

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		28	28	30		28			28	86
02:00		13	11	20		14			14	44
03:00		9	9	10		9			9	28
04:00		17	12	14		14			14	43
05:00		32	28	26		28			28	86
06:00		145	147	134		142			142	426
07:00		370	392	358		373			373	1120
08:00		688	654	647		663			663	1989
09:00		603	573	593		589			589	1769
10:00		560	563	535		552			552	1658
11:00		532	542			537			537	1074
12:00		546	586			566			566	1132
13:00		567	610			588			588	1177
14:00	528	568	612			569			569	1708
15:00	614	550	623			595			595	1787
16:00	652	615	646			637			637	1913
17:00	719	697	696			704			704	2112
18:00	596	619	637			617			617	1852
19:00	543	519	499			520			520	1561
20:00	346	386	373			368			368	1105
21:00	226	278	271			258			258	775
22:00	211	197	227			211			211	635
23:00	112	127	152			130			130	391
24:00	76	68	87			77			77	231

TOTALS	4623	8734	8978	2367	0	8789	0	0	8789	24702
% AVG WKDY	52.5	99.3	102.1	26.9						
% AVG WEEK	52.5	99.3	102.1	26.9						
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		688	654	647		663			663	
PM Times	17:00	17:00	17:00			17:00			17:00	
PM Peaks	719	697	696			704			704	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE  
 Starting: 4/11/2016

STA. 4  
 TOTAL

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: ROAD TOTAL

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		7	11	14		10			10	32
02:00		8	4	13		8			8	25
03:00		2	9	3		4			4	14
04:00		1	5	3		3			3	9
05:00		17	7	11		11			11	35
06:00		32	48	45		41			41	125
07:00		131	141	140		137			137	412
08:00		419	440	446		435			435	1305
09:00		399	439	466		434			434	1304
10:00		371	388	390		383			383	1149
11:00		369	423			396			396	792
12:00		371	416			393			393	787
13:00		519	490			504			504	1009
14:00	405	384	496			428			428	1285
15:00	517	395	584			498			498	1496
16:00	513	421	494			476			476	1428
17:00	463	451	518			477			477	1432
18:00	437	472	520			476			476	1429
19:00	414	418	404			412			412	1236
20:00	301	299	321			307			307	921
21:00	181	234	196			203			203	611
22:00	111	140	130			127			127	381
23:00	48	42	66			52			52	156
24:00	35	32	22			29			29	89
<hr/>										
TOTALS	3425	5934	6572	1531	0	6244	0	0	6244	17462
% AVG WKDY	54.8	95	105.2	24.5						
% AVG WEEK	54.8	95	105.2	24.5						
AM Times		08:00	08:00	09:00		08:00			08:00	
AM Peaks		419	440	466		435			435	
PM Times	15:00	13:00	15:00			13:00			13:00	
PM Peaks	517	519	584			504			504	
D%	50	55	55	55						
R%	15	9	9	30						

45

COMB AWD 6244

FAL .93

COMB APT 5,800

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 1  
 Starting: 4/11/2016

Page: 1

STA. 4 NB

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: NORTH

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		3	5	7		5			5	15
02:00		3	3	7		4			4	13
03:00		1	5	0		2			2	6
04:00		1	3	3		2			2	7
05:00		11	5	8		8			8	24
06:00		18	28	24		23			23	70
07:00		74	78	77		76			76	229
08:00		222	227	234		227			227	683
09:00		210	219	217		215			215	646
10:00		168	186	176		176			176	530
11:00		183	197			190			190	380
12:00		174	189			181			181	362
13:00		242	220			231			231	462
14:00	165	184	232			193			193	581
15:00	251	185	276			237			237	712
16:00	247	188	243			226			226	678
17:00	192	206	229			209			209	627
18:00	198	213	246			215			215	647
19:00	185	187	193			185			185	555
20:00	126	116	140			127			127	382
21:00	82	101	82			88			88	265
22:00	42	59	50			50			50	151
23:00	20	13	31			21			21	64
24:00	7	10	6			7			7	23
TOTALS	1505	2772	3082	753	0	2898	0	0	2898	8112
% AVG WKDY	51.9	95.6	106.3	25.9						
% AVG WEEK	51.9	95.6	106.3	25.9						
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		222	227	234		227			227	
PM Times	15:00	13:00	15:00			15:00			15:00	
PM Peaks	251	242	276			237			237	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 2  
 Starting: 4/11/2016

Page: 2

STA. 4 SB

Site Reference: 160D70000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: SOUTH

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		4	6	7		5			5	17
02:00		5	1	6		4			4	12
03:00		1	4	3		2			2	8
04:00		0	2	0		0			0	2
05:00		6	2	3		3			3	11
06:00		14	20	21		18			18	55
07:00		57	63	63		61			61	183
08:00		197	213	212		207			207	622
09:00		189	220	249		219			219	658
10:00		203	202	214		206			206	619
11:00		186	226			206			206	412
12:00		197	228			212			212	425
13:00		277	270			273			273	547
14:00	240	200	264			234			234	704
15:00	266	210	308			261			261	784
16:00	266	233	251			250			250	750
17:00	271	245	289			268			268	805
18:00	249	259	274			260			260	782
19:00	229	231	221			227			227	681
20:00	175	183	181			179			179	539
21:00	99	133	114			115			115	346
22:00	69	81	80			76			76	230
23:00	28	29	35			30			30	92
24:00	28	22	16			22			22	66
TOTALS	1920	3162	3490	778	0	3338	0	0	3338	9350
% AVG WKDY	57.5	94.7	104.5	23.3						
% AVG WEEK	57.5	94.7	104.5	23.3						
AM Times		10:00	12:00	09:00		09:00			09:00	
AM Peaks		203	228	249		219			219	
PM Times	17:00	13:00	15:00			13:00			13:00	
PM Peaks	271	277	308			273			273	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE  
 Starting: 4/11/2016

Page: 3

STA. 5  
 TOTAL

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: ROAD TOTAL

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		27	29	32		29			29	88
02:00		10	9	17		12			12	36
03:00		10	4	6		6			6	20
04:00		8	7	11		8			8	26
05:00		44	38	52		44			44	134
06:00		181	185	165		177			177	531
07:00		693	674	613		660			660	1980
08:00		1213	1181	1204		1199			1199	3598
09:00		1156	1097	1090		1114			1114	3343
10:00		962	954	926		947			947	2842
11:00		952	954			953			953	1906
12:00		944	1037			990			990	1981
13:00		994	1062			1028			1028	2056
14:00	1029	912	1127			1022			1022	3068
15:00	1080	1024	1152			1085			1085	3256
16:00	1256	1130	1167			1184			1184	3553
17:00	1192	1234	1289			1238			1238	3715
18:00	1250	1269	1364			1294			1294	3883
19:00	1082	1141	1164			1129			1129	3387
20:00	768	771	834			791			791	2373
21:00	474	508	579			520			520	1561
22:00	299	297	311			302			302	907
23:00	111	120	151			127			127	382
24:00	58	62	66			62			62	186
<hr/>										
TOTALS	8599	15662	16435	4116	0	15921	0	0	15921	44812
<hr/>										
% AVG WKDY	54	98.3	103.2	25.8						
% AVG WEEK	54	98.3	103.2	25.8						
<hr/>										
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		1213	1181	1204		1199			1199	
<hr/>										
PM Times	16:00	18:00	18:00			18:00			18:00	
PM Peaks	1256	1269	1364			1294			1294	
<hr/>										
D%	50	60	55	60						
K%	15	8	8	29						

U3

COMB AWD 15921  
 FAC .94  
 COMB APT 15,000



MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 1  
 Starting: 4/11/2016

STA. 5 NB

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: NORTH

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		13	12	16		13			13	41
02:00		4	2	7		4			4	13
03:00		5	0	3		2			2	8
04:00		1	2	3		2			2	6
05:00		22	21	23		22			22	66
06:00		114	122	116		117			117	352
07:00		492	489	444		475			475	1425
08:00		780	710	716		735			735	2206
09:00		674	656	642		657			657	1972
10:00		558	544	538		546			546	1640
11:00		546	541			543			543	1087
12:00		501	523			512			512	1024
13:00		492	536			514			514	1028
14:00	525	431	531			495			495	1487
15:00	500	499	552			517			517	1551
16:00	637	573	576			595			595	1786
17:00	542	555	632			576			576	1729
18:00	535	507	610			550			550	1652
19:00	404	450	473			442			442	1327
20:00	297	315	308			306			306	920
21:00	185	228	230			214			214	643
22:00	132	117	125			124			124	374
23:00	48	51	67			55			55	166
24:00	22	29	26			25			25	77
<hr/>										
TOTALS	3827	7957	8288	2508	0	8041	0	0	8041	22580
% AVG WKDY	47.5	98.9	103	31.1						
% AVG WEEK	47.5	98.9	103	31.1						
<hr/>										
AM Times		08:00	08:00	08:00		08:00			08:00	
AM Peaks		780	710	716		735			735	
<hr/>										
PM Times	16:00	16:00	17:00			16:00			16:00	
PM Peaks	637	573	632			595			595	

MassDOT Highway Division  
 WEEKLY SUMMARY FOR LANE 2  
 Starting: 4/11/2016

STA. 55B

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: SOUTH

File: SPD-5-0102.prn  
 City: WINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	MON 11	TUE 12	WED 13	THU 14	FRI	WKDAY AVG	SAT	SUN	WEEK AVG	TOTAL
01:00		14	17	16		15			15	47
02:00		6	7	10		7			7	23
03:00		5	4	3		4			4	12
04:00		7	5	8		6			6	20
05:00		22	17	29		22			22	68
06:00		67	63	49		59			59	179
07:00		201	185	169		185			185	555
08:00		433	471	488		464			464	1392
09:00		482	441	448		457			457	1371
10:00		404	410	388		400			400	1202
11:00		406	413			409			409	819
12:00		443	514			478			478	957
13:00		502	526			514			514	1028
14:00	504	481	596			527			527	1581
15:00	580	525	600			568			568	1705
16:00	619	557	591			589			589	1767
17:00	650	679	657			662			662	1986
18:00	715	762	754			743			743	2231
19:00	678	691	691			686			686	2060
20:00	471	456	526			484			484	1453
21:00	289	280	349			306			306	918
22:00	167	180	186			177			177	533
23:00	63	69	84			72			72	216
24:00	36	33	40			36			36	109
<hr/>										
TOTALS	4772	7705	8147	1608	0	7870	0	0	7870	22232
<hr/>										
% AVG WKDY	60.6	97.9	103.5	20.4						
% AVG WEEK	60.6	97.9	103.5	20.4						
<hr/>										
AM Times		09:00	12:00	08:00		12:00			12:00	
AM Peaks		482	514	488		478			478	
<hr/>										
PM Times	18:00	18:00	18:00			18:00			18:00	
PM Peaks	715	762	754			743			743	

## **Turning Movement Volumes**

**Study Name** Swampscott - Route 1A and Ellis Road TMC # 1 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound						Northwestbound						Northeastbound						Southeastbound						Total	Crosswalk								
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O		Pedestrians	Total							
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	21	21
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%		
7:00 AM - 9:00 AM	Cars	29	608	3	0	640	396	7	42	12	0	61	46	5	368	4	0	377	624	4	38	21	0	63	75	1141	SE	10	10						
One Hour Peak	%	94%	92%	60%	0%	92%	89%	100%	95%	86%	0%	94%	79%	63%	88%	80%	0%	88%	92%	100%	84%	95%	0%	89%	94%	90%	100%								
7:30 AM - 8:30 AM	Light Goods Vehicles	2	37	2	0	41	31	0	0	2	0	2	12	3	30	1	0	34	39	0	7	1	0	8	3	85	SW	12	12						
	%	6%	6%	40%	0%	6%	7%	0%	0%	14%	0%	3%	21%	38%	7%	20%	0%	8%	6%	0%	16%	5%	0%	11%	4%	7%	100%								
	Buses	0	7	0	0	7	6	0	0	0	0	0	0	0	6	0	0	6	7	0	0	0	0	0	0	13	NW	3	3						
	%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	100%								
	Single-Unit Trucks	0	4	0	0	4	9	0	0	0	0	0	0	0	9	0	0	9	4	0	0	0	0	0	0	13		46	46						
	%	0%	1%	0%	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	1%	0%	0%	0%	0%	0%	0%	1%									
	Articulated Trucks	0	2	0	0	2	4	0	0	0	0	0	0	0	4	0	0	4	2	0	0	0	0	0	0	6									
	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%									
	Bicycles on Road	0	1	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	2	3									
	%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%									
	<b>Total</b>	<b>31</b>	<b>659</b>	<b>5</b>	<b>0</b>	<b>695</b>	<b>446</b>	<b>7</b>	<b>44</b>	<b>14</b>	<b>0</b>	<b>65</b>	<b>58</b>	<b>8</b>	<b>417</b>	<b>5</b>	<b>0</b>	<b>430</b>	<b>677</b>	<b>4</b>	<b>45</b>	<b>22</b>	<b>0</b>	<b>71</b>	<b>80</b>	<b>1261</b>									
	PHF	0.6	0.98	0.31	0	0.97	0.94	0.58	0.42	0.7	0	0.48	0.72	0.67	0.93	0.62	0	0.92	0.96	0.33	0.62	0.61	0	0.89	0.56	0.91									
	Approach %					55%	35%					5%	5%					34%	54%					6%	6%										
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	15	15						
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%								
4:00 PM - 6:00 PM	Cars	15	386	4	0	405	617	2	8	1	0	11	34	11	589	2	0	602	389	2	19	26	0	47	25	1065	SE	0	0						
One Hour Peak	%	100%	92%	80%	0%	92%	94%	100%	100%	100%	0%	100%	89%	85%	94%	100%	0%	94%	92%	100%	95%	93%	0%	94%	100%	93%	0%								
5:00 PM - 6:00 PM	Light Goods Vehicles	0	25	0	0	25	32	0	0	0	0	0	3	2	30	0	0	32	25	0	1	2	0	3	0	60	SW	1	1						
	%	0%	6%	0%	0%	6%	5%	0%	0%	0%	0%	0%	8%	15%	5%	0%	0%	5%	6%	0%	5%	7%	0%	6%	0%	5%	100%								
	Buses	0	7	0	0	7	3	0	0	0	0	0	0	0	3	0	0	3	7	0	0	0	0	0	0	10	NW	0	0						
	%	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	1%	0%								
	Single-Unit Trucks	0	2	0	0	2	3	0	0	0	0	0	0	0	3	0	0	3	2	0	0	0	0	0	0	5		16	16						
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%									
	Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%									
	Bicycles on Road	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1									
	%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%									
	<b>Total</b>	<b>15</b>	<b>420</b>	<b>5</b>	<b>0</b>	<b>440</b>	<b>655</b>	<b>2</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>11</b>	<b>38</b>	<b>13</b>	<b>625</b>	<b>2</b>	<b>0</b>	<b>640</b>	<b>423</b>	<b>2</b>	<b>20</b>	<b>28</b>	<b>0</b>	<b>50</b>	<b>25</b>	<b>1141</b>									
	PHF	0.75	0.91	0.62	0	0.92	0.86	0.5	0.67	0.25	0	0.69	0.73	0.65	0.85	0.5	0	0.86	0.91	0.5	0.71	0.64	0	0.69	0.89	0.93									
	Approach %					39%	57%					1%	3%					56%	37%					4%	2%										

**Study Name** Swampscott - Route 1A and Ellis Road TMC # 1 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound						Northwestbound						Northeastbound						Southeastbound						Crosswalk			
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	Total	Pedestrians	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	5	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	5	NE	2	2
Specified Period	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	100%		
12:00 PM - 2:00 PM	Cars	8	422	0	0	430	426	1	5	0	0	6	5	0	407	1	0	408	425	3	5	18	1	27	15	871	SE	2	2
One Hour Peak	%	100%	91%	0%	0%	91%	93%	100%	100%	0%	0%	100%	63%	0%	93%	100%	0%	93%	91%	100%	71%	95%	100%	90%	100%	92%	100%		
12:00 PM - 1:00 PM	Light Goods Vehicles	0	38	0	0	38	18	0	0	0	0	0	3	1	18	0	0	19	38	0	2	0	0	2	0	59	SW	4	4
	%	0%	8%	0%	0%	8%	4%	0%	0%	0%	0%	0%	38%	100%	4%	0%	0%	4%	8%	0%	29%	0%	0%	7%	0%	6%	100%		
	Buses	0	2	0	0	2	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	3	NW	6	6
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%		
	Single-Unit Trucks	0	1	0	0	1	7	0	0	0	0	0	0	0	6	0	0	6	1	0	0	1	0	1	0	8		14	14
	%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	5%	0%	3%	0%	1%			
	Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Bicycles on Road	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>8</b>	<b>465</b>	<b>0</b>	<b>0</b>	<b>473</b>	<b>457</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>8</b>	<b>1</b>	<b>437</b>	<b>1</b>	<b>0</b>	<b>439</b>	<b>468</b>	<b>3</b>	<b>7</b>	<b>19</b>	<b>1</b>	<b>30</b>	<b>15</b>	<b>948</b>			
	PHF	0.4	0.9	0	0	0.91	0.91	0.25	0.62	0	0	0.5	0.67	0.25	0.93	0.25	0	0.93	0.9	0.38	0.88	0.68	0.25	0.75	0.54	0.96			
	Approach %					50%	48%					1%	1%					46%	49%					3%	2%				

**Study Name** Swampscott - Route 1A and Norfolk Avenue TMC # 2 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Northeastbound					Eastbound					Crosswalk			
		BR	T	U	I	O	T	HL	U	I	O	HR	BL	U	I	O	Total	Pedestrians	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	13	13
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%		
7:00 AM - 9:00 AM	Cars	134	613	0	747	456	380	22	0	402	640	27	76	0	103	156	1252	SW	0	0
One Hour Peak	%	92%	92%	0%	92%	88%	89%	96%	0%	89%	92%	96%	86%	0%	89%	93%	91%	0%		
7:30 AM - 8:30 AM	Light Goods Vehicles	7	39	0	46	41	30	1	0	31	40	1	11	0	12	8	89	W	4	4
	%	5%	6%	0%	6%	8%	7%	4%	0%	7%	6%	4%	13%	0%	10%	5%	6%	100%		
	Buses	0	7	0	7	6	6	0	0	6	7	0	0	0	0	0	13		17	17
	%	0%	1%	0%	1%	1%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	1%			
	Single-Unit Trucks	3	4	0	7	9	8	0	0	8	4	0	1	0	1	3	16			
	%	2%	1%	0%	1%	2%	2%	0%	0%	2%	1%	0%	1%	0%	1%	2%	1%			
	Articulated Trucks	0	2	0	2	4	4	0	0	4	2	0	0	0	0	0	6			
	%	0%	0%	0%	0%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%			
	Bicycles on Road	1	1	0	2	0	0	0	0	0	1	0	0	0	0	1	2			
	%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%			
	<b>Total</b>	<b>145</b>	<b>666</b>	<b>0</b>	<b>811</b>	<b>516</b>	<b>428</b>	<b>23</b>	<b>0</b>	<b>451</b>	<b>694</b>	<b>28</b>	<b>88</b>	<b>0</b>	<b>116</b>	<b>168</b>	<b>1378</b>			
	PHF	0.74	0.97	0	0.93	0.89	0.96	0.64	0	0.93	0.95	0.44	0.67	0	0.59	0.82	0.93			
	Approach %				59%	37%				33%	50%				8%	12%				
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
4:00 PM - 6:00 PM	Cars	37	398	0	435	662	609	20	0	629	412	14	53	0	67	57	1131	SW	0	0
One Hour Peak	%	88%	93%	0%	92%	95%	95%	95%	0%	95%	93%	100%	96%	0%	97%	90%	94%	0%		
5:00 PM - 6:00 PM	Light Goods Vehicles	5	23	0	28	28	26	1	0	27	23	0	2	0	2	6	57	W	1	1
	%	12%	5%	0%	6%	4%	4%	5%	0%	4%	5%	0%	4%	0%	3%	10%	5%	100%		
	Buses	0	7	0	7	3	3	0	0	3	7	0	0	0	0	0	10		1	1
	%	0%	2%	0%	1%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	1%			
	Single-Unit Trucks	0	2	0	2	3	3	0	0	3	2	0	0	0	0	0	5			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>42</b>	<b>430</b>	<b>0</b>	<b>472</b>	<b>696</b>	<b>641</b>	<b>21</b>	<b>0</b>	<b>662</b>	<b>444</b>	<b>14</b>	<b>55</b>	<b>0</b>	<b>69</b>	<b>63</b>	<b>1203</b>			
	PHF	0.7	0.94	0	0.94	0.86	0.83	0.75	0	0.85	0.95	0.88	0.62	0	0.69	0.79	0.95			
	Approach %				39%	58%				55%	37%				6%	5%				

**Study Name** Swampscott - Route 1A and Norfolk Avenue TMC # 2 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Northeastbound					Eastbound					Crosswalk			
		BR	T	U	I	O	T	HL	U	I	O	HR	BL	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	1	0	0	1	5	5	0	0	5	0	0	0	0	0	1	6	NE	5	5
Specified Period	%	2%	0%	0%	0%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	1%	1%		100%	
12:00 PM - 2:00 PM	Cars	57	420	0	477	462	421	11	1	433	431	10	41	0	51	68	961	SW	0	0
One Hour Peak	%	88%	91%	0%	91%	93%	94%	92%	100%	94%	91%	71%	80%	0%	78%	88%	92%		0%	
12:00 PM - 1:00 PM	Light Goods Vehi	7	35	0	42	24	14	1	0	15	39	4	10	0	14	8	71	W	3	3
	%	11%	8%	0%	8%	5%	3%	8%	0%	3%	8%	29%	20%	0%	22%	10%	7%		100%	
	Buses	0	2	0	2	1	1	0	0	1	2	0	0	0	0	0	3		8	8
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	0	1	0	1	5	5	0	0	5	1	0	0	0	0	0	6			
	%	0%	0%	0%	0%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%			
	articulated Truc	0	1	0	1	1	1	0	0	1	1	0	0	0	0	0	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	icycles on Roa	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>65</b>	<b>460</b>	<b>0</b>	<b>525</b>	<b>498</b>	<b>447</b>	<b>12</b>	<b>1</b>	<b>460</b>	<b>475</b>	<b>14</b>	<b>51</b>	<b>0</b>	<b>65</b>	<b>77</b>	<b>1050</b>			
	PHF	0.86	0.91	0	0.94	0.86	0.89	0.6	0.25	0.91	0.91	0.7	0.67	0	0.74	0.96	0.94			
	Approach %				50%	47%				44%	45%				6%	7%				

**Study Name** Swampscott - Route 1A at Whole Foods Market and Vinnin Liquors TMC # 3 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Westbound					Northeastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	Pedestria	Total	
<b>Peak 1</b>	Motorcycles	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	NE	1	1
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		100%	
7:00 AM - 9:00 AM	Cars	812	37	0	849	662	25	11	0	36	39	2	637	0	639	823	1524	E	1	1
One Hour Peak	%	93%	100%	0%	93%	91%	89%	100%	0%	92%	98%	67%	91%	0%	91%	93%	92%		100%	
7:30 AM - 8:30 AM	Food Goods Vehi	43	0	0	43	47	3	0	0	3	0	0	44	0	44	43	90	SW	0	0
	%	5%	0%	0%	5%	6%	11%	0%	0%	8%	0%	0%	6%	0%	6%	5%	5%		0%	
	Buses	9	0	0	9	7	0	0	0	0	0	0	7	0	7	9	16		2	2
	%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	1%			
	Single-Unit Truc	9	0	0	9	7	0	0	0	0	0	0	7	0	7	9	16			
	%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	1%			
	Articulated Truc	2	0	0	2	3	0	0	0	0	1	1	3	0	4	2	6			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	33%	0%	0%	1%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>876</b>	<b>37</b>	<b>0</b>	<b>913</b>	<b>726</b>	<b>28</b>	<b>11</b>	<b>0</b>	<b>39</b>	<b>40</b>	<b>3</b>	<b>698</b>	<b>0</b>	<b>701</b>	<b>887</b>	<b>1653</b>			
	PHF	0.94	0.54	0	0.96	0.93	0.58	0.69	0	0.61	0.5	0.25	0.94	0	0.95	0.94	0.97			
	Approach %				55%	44%				2%	2%				42%	54%				
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
4:00 PM - 6:00 PM	Cars	557	137	0	694	881	202	91	0	293	157	20	679	0	699	648	1686	E	1	1
One Hour Peak	%	92%	94%	0%	93%	94%	95%	92%	0%	94%	93%	87%	94%	0%	94%	92%	93%		100%	
4:30 PM - 5:30 PM	Food Goods Vehi	40	8	0	48	45	9	8	0	17	10	2	36	0	38	48	103	SW	0	0
	%	7%	6%	0%	6%	5%	4%	8%	0%	5%	6%	9%	5%	0%	5%	7%	6%		0%	
	Buses	6	0	0	6	1	0	0	0	0	0	0	1	0	1	6	7		1	1
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%			
	Single-Unit Truc	1	0	0	1	7	1	0	0	1	1	1	6	0	7	1	9			
	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	4%	1%	0%	1%	0%	0%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>604</b>	<b>145</b>	<b>0</b>	<b>749</b>	<b>934</b>	<b>212</b>	<b>99</b>	<b>0</b>	<b>311</b>	<b>168</b>	<b>23</b>	<b>722</b>	<b>0</b>	<b>745</b>	<b>703</b>	<b>1805</b>			
	PHF	0.89	0.86	0	0.92	0.96	0.91	0.88	0	0.94	0.86	0.64	0.92	0	0.9	0.9	0.96			
	Approach %				41%	52%				17%	9%				41%	39%				



**Study Name** Swampscott - Route 1A at Whole Foods Market and Vinnin Liquors TMC # 3 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Westbound					Northeastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	1	0	0	1	7	1	0	0	1	0	0	6	0	6	1	8	NE	1	1
Specified Period	%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%		100%	
12:00 PM - 2:00 PM	Cars	609	169	0	778	785	187	79	0	266	183	14	598	0	612	688	1656	E	8	8
One Hour Peak	%	92%	93%	0%	92%	92%	96%	94%	0%	95%	93%	100%	91%	0%	92%	92%	92%		100%	
12:00 PM - 1:00 PM	Food Goods Vehi	48	12	0	60	49	6	5	0	11	12	0	43	0	43	53	114	SW	0	0
	%	7%	7%	0%	7%	6%	3%	6%	0%	4%	6%	0%	7%	0%	6%	7%	6%		0%	
	Buses	2	0	0	2	1	0	0	0	0	0	0	1	0	1	2	3		9	9
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	2	1	0	3	7	1	0	0	1	1	0	6	0	6	2	10			
	%	0%	1%	0%	0%	1%	1%	0%	0%	0%	1%	0%	1%	0%	1%	0%	1%			
	articulated Truc	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	icycles on Roa	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>664</b>	<b>182</b>	<b>0</b>	<b>846</b>	<b>849</b>	<b>195</b>	<b>84</b>	<b>0</b>	<b>279</b>	<b>196</b>	<b>14</b>	<b>654</b>	<b>0</b>	<b>668</b>	<b>748</b>	<b>1793</b>			
	PHF	0.94	0.91	0	0.94	0.94	0.83	0.66	0	0.77	0.92	0.88	0.89	0	0.89	0.92	0.95			
	Approach %				47%	47%				16%	11%				37%	42%				

**Study Name** Swampscott - Route 1A at Swampscott Mall and Vinnin Square Plaza TMC #4 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Westbound					Northbound					Eastbound					Crosswalk								
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	Total	pedestrian	Total		
<b>Peak 1</b>	Motorcycles	1	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	1	1	3	N	0	0		
Specified Period	%	1%	0%	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%		0%	0%		
7:00 AM - 9:00 AM	Cars	126	721	21	0	868	649	11	39	53	0	103	43	7	571	65	0	643	839	65	15	67	0	147	230	1761	E	0	0	
One Hour Peak	%	88%	92%	95%	0%	92%	91%	85%	95%	93%	0%	93%	96%	88%	92%	90%	0%	92%	93%	96%	100%	89%	0%	93%	89%	92%		0%	0%	
7:30 AM - 8:30 AM	Light Goods Vehicle	15	38	1	0	54	42	1	2	3	0	6	2	1	35	4	0	40	44	3	0	6	0	9	21	109	S	1	1	
	%	10%	5%	5%	0%	6%	6%	8%	5%	5%	0%	5%	4%	13%	6%	6%	0%	6%	5%	4%	0%	8%	0%	6%	8%	6%		100%	0%	
	Buses	1	9	0	0	10	7	0	0	0	0	0	0	0	7	0	0	7	9	0	0	0	0	0	1	17	W	1	1	
	%	1%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0	1	1%		100%	0%	
	Single-Unit Truck	0	11	0	0	11	8	1	0	0	0	1	0	0	6	2	0	8	11	0	0	1	0	1	2	21		2	2	
	%	0%	1%	0%	0%	1%	1%	8%	0%	0%	0%	1%	0%	0%	1%	3%	0%	1%	1%	0%	0%	1%	0%	1%	1%	1%				0%
	Articulated Truck	1	2	0	0	3	3	0	0	0	0	0	0	0	3	1	0	4	2	0	0	0	0	0	2	7				0%
	%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0	2	7				0%
	Motorcycles on Road	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1				0%
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	1				0%
	<b>Total</b>	<b>144</b>	<b>782</b>	<b>22</b>	<b>0</b>	<b>948</b>	<b>710</b>	<b>13</b>	<b>41</b>	<b>57</b>	<b>0</b>	<b>111</b>	<b>45</b>	<b>8</b>	<b>622</b>	<b>72</b>	<b>0</b>	<b>702</b>	<b>907</b>	<b>68</b>	<b>15</b>	<b>75</b>	<b>0</b>	<b>158</b>	<b>257</b>	<b>1919</b>				0%
	PHF	0.75	0.95	0.79	0	0.96	0.94	0.46	0.73	0.79	0	0.73	0.7	0.67	0.95	0.82	0	0.93	0.96	0.89	0.54	0.82	0	0.84	0.76	0.95				0%
	Approach %					49%	37%					6%	2%				37%	47%					8%	13%						0%
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	3	3	
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0		100%	0%	0%
4:00 PM - 6:00 PM	Cars	191	454	38	0	683	866	25	87	87	0	199	115	24	654	173	0	851	711	170	53	187	0	410	451	2143	E	1	1	
One Hour Peak	%	93%	92%	97%	0%	92%	95%	100%	100%	97%	0%	99%	91%	89%	94%	96%	0%	94%	93%	93%	88%	95%	0%	94%	95%	94%		100%	0%	0%
4:30 PM - 5:30 PM	Light Goods Vehicle	13	35	1	0	49	41	0	0	3	0	3	11	3	34	8	0	45	48	10	7	7	0	24	21	121	S	0	0	
	%	6%	7%	3%	0%	7%	4%	0%	0%	3%	0%	1%	9%	11%	5%	4%	0%	5%	6%	5%	12%	4%	0%	5%	4%	5%		0%	0%	0%
	Buses	2	4	0	0	6	1	0	0	0	0	0	0	0	1	0	0	1	6	2	0	0	0	2	2	9	W	0	0	
	%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0	0	0%		0%	0%	0%
	Single-Unit Truck	0	1	0	0	1	8	0	0	0	0	0	0	0	6	0	0	6	1	0	0	2	0	2	0	9		4	4	
	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	1%	0%	0	0	0%				0%
	Articulated Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0%
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	0				0%
	Motorcycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0%
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	0				0%
	<b>Total</b>	<b>206</b>	<b>494</b>	<b>39</b>	<b>0</b>	<b>739</b>	<b>916</b>	<b>25</b>	<b>87</b>	<b>90</b>	<b>0</b>	<b>202</b>	<b>126</b>	<b>27</b>	<b>695</b>	<b>181</b>	<b>0</b>	<b>903</b>	<b>766</b>	<b>182</b>	<b>60</b>	<b>196</b>	<b>0</b>	<b>438</b>	<b>474</b>	<b>2282</b>				0%
	PHF	0.9	0.88	0.81	0	0.91	0.97	0.78	0.84	0.78	0	0.87	0.81	0.61	0.94	0.78	0	0.93	0.92	0.91	0.79	0.88	0	0.9	0.85	0.97				0%
	Approach %					32%	40%					9%	6%					40%	34%					19%	21%					0%

**Study Name** Swampscott - Route 1A at Swampscott Mall and Vinnin Square Plaza TMC #4 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Westbound					Northbound					Eastbound					Crosswalk							
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	Total	Pedestrian	Total	
<b>Peak 1</b>	Motorcycles	1	1	0	0	2	6	0	0	0	0	0	0	0	6	0	0	6	1	0	0	0	0	0	1	8	N	12	12
Specified Period	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%		100%	
12:00 PM - 2:00 PM	Cars	214	473	52	0	739	725	26	133	113	0	272	186	41	502	175	0	718	783	197	93	197	0	487	522	2216	E	4	4
One Hour Peak	%	93%	90%	96%	0%	92%	93%	96%	98%	98%	0%	98%	97%	95%	93%	94%	0%	94%	92%	93%	98%	92%	0%	94%	95%	93%		100%	
12:00 PM - 1:00 PM	Int Goods Vehi	11	44	2	0	57	38	1	3	2	0	6	6	2	23	10	0	35	58	12	2	14	0	28	24	126	S	11	11
	%	5%	8%	4%	0%	7%	5%	4%	2%	2%	0%	2%	3%	5%	4%	5%	0%	5%	7%	6%	2%	7%	0%	5%	4%	5%		100%	
	Buses	0	2	0	0	2	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	3	W	1	1
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		100%	
	Single-Unit Truc	3	2	0	0	5	7	0	0	0	0	0	0	0	5	2	0	7	4	2	0	2	0	4	5	16		28	28
	%	1%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	1%	0%	1%	0%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>229</b>	<b>523</b>	<b>54</b>	<b>0</b>	<b>806</b>	<b>777</b>	<b>27</b>	<b>136</b>	<b>115</b>	<b>0</b>	<b>278</b>	<b>192</b>	<b>43</b>	<b>537</b>	<b>187</b>	<b>0</b>	<b>767</b>	<b>850</b>	<b>212</b>	<b>95</b>	<b>213</b>	<b>0</b>	<b>520</b>	<b>552</b>	<b>2371</b>			
	PHF	0.81	0.92	0.84	0	0.99	0.96	0.84	0.81	0.82	0	0.83	0.91	0.83	0.93	0.87	0	0.94	0.93	0.85	0.82	0.93	0	0.88	0.87	0.97			
	Approach %					34%	33%					12%	8%					32%	36%					22%	23%				

**Study Name** Swampscott - Route 1A and Vinnin Street TMC # 5 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Westbound					Northbound					Eastbound					Crosswalk								
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	Total	Pedestrian Total			
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	0	0		
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
7:00 AM - 9:00 AM	Cars	20	357	60	0	437	451	65	370	300	0	735	484	163	366	31	0	560	697	40	261	20	0	321	421	2053	E	0	0	
One Hour Peak	%	80%	92%	79%	0%	89%	91%	90%	90%	92%	0%	91%	85%	86%	92%	97%	0%	90%	91%	80%	86%	80%	0%	85%	90%	89%	0%	0%		
7:30 AM - 8:30 AM	Light Goods Vehicle	3	21	15	0	39	32	4	36	18	0	58	68	19	26	0	0	45	47	8	34	2	0	44	39	186	S	0	0	
	%	12%	5%	20%	0%	8%	6%	6%	9%	6%	0%	7%	12%	10%	7%	0%	0%	7%	6%	16%	11%	8%	0%	12%	8%	8%	0%	0%		
	Buses	0	4	0	0	4	4	0	1	5	0	6	4	3	4	0	0	7	9	0	1	0	0	1	1	18	W	2	2	
	%	0%	1%	0%	0%	1%	1%	0%	0%	2%	0%	1%	1%	2%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	100%	0%		
	Single-Unit Tractor	2	6	1	0	9	10	3	3	2	0	8	12	4	4	1	0	9	10	2	7	3	0	12	6	38		2	2	
	%	8%	2%	1%	0%	2%	2%	4%	1%	1%	0%	1%	2%	2%	1%	3%	0%	1%	1%	4%	2%	12%	0%	3%	1%	2%				
	Articulated Tractor	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	2				
	%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>25</b>	<b>388</b>	<b>76</b>	<b>0</b>	<b>489</b>	<b>497</b>	<b>72</b>	<b>410</b>	<b>327</b>	<b>0</b>	<b>809</b>	<b>568</b>	<b>189</b>	<b>400</b>	<b>32</b>	<b>0</b>	<b>621</b>	<b>765</b>	<b>50</b>	<b>303</b>	<b>25</b>	<b>0</b>	<b>378</b>	<b>467</b>	<b>2297</b>				
	PHF	0.62	0.95	0.61	0	0.94	0.92	0.86	0.92	0.97	0	0.97	0.89	0.8	0.9	0.8	0	0.92	0.95	0.83	0.88	0.69	0	0.94	0.89	0.97				
	Approach %					21%	22%					35%	25%				27%	33%					16%	20%						
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	1	1		
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	
4:00 PM - 6:00 PM	Cars	12	420	92	0	524	504	56	277	203	0	536	783	341	440	29	0	810	675	52	350	8	0	410	318	2280	E	1	1	
One Hour Peak	%	75%	95%	93%	0%	94%	92%	88%	89%	94%	0%	91%	94%	95%	93%	91%	0%	94%	94%	88%	93%	73%	0%	92%	89%	93%	100%	0%	0%	
4:30 PM - 5:30 PM	Light Goods Vehicle	4	18	6	0	28	36	8	29	10	0	47	43	15	27	3	0	45	34	6	22	1	0	29	36	149	S	3	3	
	%	25%	4%	6%	0%	5%	7%	13%	9%	5%	0%	8%	5%	4%	6%	9%	0%	5%	5%	10%	6%	9%	0%	7%	10%	6%	100%	0%	0%	
	Buses	0	3	1	0	4	2	0	1	3	0	4	2	1	0	0	0	1	6	0	0	2	0	2	1	11	W	3	3	
	%	0%	1%	1%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	18%	0%	0%	0%	0%	100%	0%	0%	
	Single-Unit Tractor	0	0	0	0	0	5	0	3	1	0	4	5	1	5	0	0	6	2	1	4	0	0	5	3	15		8	8	
	%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	1%	1%	0%	1%	0%	0%	1%	0%	2%	1%	0%	0%	1%	1%	1%				
	Articulated Tractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>16</b>	<b>441</b>	<b>99</b>	<b>0</b>	<b>556</b>	<b>547</b>	<b>64</b>	<b>310</b>	<b>217</b>	<b>0</b>	<b>591</b>	<b>833</b>	<b>358</b>	<b>472</b>	<b>32</b>	<b>0</b>	<b>862</b>	<b>717</b>	<b>59</b>	<b>376</b>	<b>11</b>	<b>0</b>	<b>446</b>	<b>358</b>	<b>2455</b>				
	PHF	0.5	0.94	0.82	0	0.9	0.86	0.73	0.88	0.89	0	0.95	0.9	0.9	0.84	0.73	0	0.91	0.94	0.82	0.89	0.55	0	0.91	0.84	0.95				
	Approach %					23%	22%					24%	34%				35%	29%					18%	15%						

**Study Name** Swampscott - Route 1A and Vinnin Street TMC # 5 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound						Westbound						Northbound						Eastbound						Crosswalk	
		R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	R	T	L	U	I	O	Total	Pedestrian Total
<b>Peak 1</b>	Motorcycles	0	1	0	0	1	6	0	0	1	0	1	2	0	6	0	0	6	2	0	2	0	0	2	0	10	N 3 3
Specified Period	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	100%
12:00 PM - 2:00 PM	Cars	25	407	87	0	519	481	95	321	258	0	674	613	282	365	38	0	685	732	67	244	21	0	332	384	2210	E 3 3
One Hour Peak	%	86%	93%	86%	0%	91%	93%	90%	87%	92%	0%	90%	89%	93%	93%	90%	0%	93%	93%	93%	87%	95%	0%	88%	88%	91%	100%
12:00 PM - 1:00 PM	Int Goods Vehi	4	26	12	0	42	30	11	41	19	0	71	62	18	18	3	0	39	50	5	32	1	0	38	48	190	S 1 1
	%	14%	6%	12%	0%	7%	6%	10%	11%	7%	0%	9%	9%	6%	5%	7%	0%	5%	6%	7%	11%	5%	0%	10%	11%	8%	100%
	Buses	0	1	1	0	2	0	0	0	1	0	1	2	1	0	0	0	1	2	0	0	0	0	0	0	4	W 9 9
	%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
	Single-Unit Truc	0	2	1	0	3	3	0	5	0	0	5	7	3	3	1	0	7	2	0	3	0	0	3	6	18	16 16
	%	0%	0%	1%	0%	1%	1%	0%	1%	0%	0%	1%	1%	1%	1%	2%	0%	1%	0%	0%	1%	0%	0%	1%	1%	1%	100%
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Motorcycles on Roa	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	2	
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	<b>Total</b>	<b>29</b>	<b>438</b>	<b>101</b>	<b>0</b>	<b>568</b>	<b>520</b>	<b>106</b>	<b>367</b>	<b>279</b>	<b>0</b>	<b>752</b>	<b>687</b>	<b>304</b>	<b>392</b>	<b>42</b>	<b>0</b>	<b>738</b>	<b>789</b>	<b>72</b>	<b>282</b>	<b>22</b>	<b>0</b>	<b>376</b>	<b>438</b>	<b>2434</b>	
	PHF	0.66	0.96	0.77	0	0.97	0.88	0.95	0.96	0.92	0	0.97	0.96	0.89	0.84	0.66	0	0.89	0.96	0.75	0.89	0.69	0	0.97	0.89	0.97	
	Approach %					23%	21%					31%	28%					30%	32%					15%	18%		

**Study Name** Swampscott - Route 1A and Loring Avenue TMC # 6 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Northbound					Northeastbound					Crosswalk			
		BR	T	U	I	O	T	HL	U	I	O	HR	BL	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
7:00 AM - 9:00 AM	Cars	169	410	0	579	683	458	6	0	464	424	14	225	0	239	175	1282	S	0	0
One Hour Peak	%	85%	90%	0%	89%	90%	92%	67%	0%	91%	88%	56%	86%	0%	83%	85%	88%		0%	
7:30 AM - 8:30 AM	Light Goods Vehi	16	31	0	47	52	29	2	0	31	35	4	23	0	27	18	105	SW	0	0
	%	8%	7%	0%	7%	7%	6%	22%	0%	6%	7%	16%	9%	0%	9%	9%	7%		0%	
	Buses	5	5	0	10	11	5	0	0	5	5	0	6	0	6	5	21		0	0
	%	3%	1%	0%	2%	1%	1%	0%	0%	1%	1%	0%	2%	0%	2%	2%	1%		0	0
	Single-Unit Truc	6	10	0	16	15	6	1	0	7	17	7	9	0	16	7	39			
	%	3%	2%	0%	2%	2%	1%	11%	0%	1%	4%	28%	3%	0%	6%	3%	3%			
	Articulated Truc	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	2			
	%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%			
	<b>Total</b>	<b>198</b>	<b>456</b>	<b>0</b>	<b>654</b>	<b>762</b>	<b>499</b>	<b>9</b>	<b>0</b>	<b>508</b>	<b>481</b>	<b>25</b>	<b>263</b>	<b>0</b>	<b>288</b>	<b>207</b>	<b>1450</b>			
	PHF	0.88	0.89	0	0.95	0.94	0.96	0.75	0	0.96	0.92	0.57	0.9	0	0.86	0.89	0.97			
	Approach %				45%	53%				35%	33%				20%	14%				
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
4:00 PM - 6:00 PM	Cars	266	492	0	758	802	535	14	0	549	512	20	267	0	287	280	1594	S	2	2
One Hour Peak	%	92%	94%	0%	94%	93%	93%	93%	0%	93%	94%	83%	93%	0%	92%	92%	93%		100%	
5:00 PM - 6:00 PM	Light Goods Vehi	18	22	0	40	49	34	1	0	35	26	4	15	0	19	19	94	SW	2	2
	%	6%	4%	0%	5%	6%	6%	7%	0%	6%	5%	17%	5%	0%	6%	6%	6%		100%	
	Buses	2	6	0	8	2	0	0	0	0	6	0	2	0	2	2	10		4	4
	%	1%	1%	0%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	1%	1%			
	Single-Unit Truc	2	1	0	3	6	4	0	0	4	1	0	2	0	2	2	9			
	%	1%	0%	0%	0%	1%	1%	0%	0%	1%	0%	0%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	1	0	0	1	1	0	0	0	0	0	0	1	0	1	1	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>289</b>	<b>521</b>	<b>0</b>	<b>810</b>	<b>860</b>	<b>573</b>	<b>15</b>	<b>0</b>	<b>588</b>	<b>545</b>	<b>24</b>	<b>287</b>	<b>0</b>	<b>311</b>	<b>304</b>	<b>1709</b>			
	PHF	0.93	0.97	0	0.96	0.91	0.96	0.31	0	0.91	0.96	0.6	0.82	0	0.8	0.84	0.91			
	Approach %				47%	50%				34%	32%				18%	18%				

**Study Name** Swampscott - Route 1A and Loring Avenue TMC # 6 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Northbound					Northeastbound					Crosswalk			
		BR	T	U	I	O	T	HL	U	I	O	HR	BL	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	1	0	1	6	6	0	0	6	1	0	0	0	0	0	7	N	0	0
Specified Period	%	0%	0%	0%	0%	1%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%		0%	
12:00 PM - 2:00 PM	Cars	200	477	0	677	684	454	18	0	472	508	31	230	0	261	218	1410	S	1	1
One Hour Peak	%	90%	90%	0%	90%	91%	92%	95%	0%	92%	91%	97%	90%	0%	91%	90%	91%		100%	
12:00 PM - 1:00 PM	Light Goods Vehi	19	46	0	65	50	31	0	0	31	46	0	19	0	19	19	115	SW	4	4
	%	9%	9%	0%	9%	7%	6%	0%	0%	6%	8%	0%	7%	0%	7%	8%	7%		100%	
	Buses	2	2	0	4	1	0	0	0	0	2	0	1	0	1	2	5		5	5
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%			
	Single-Unit Truc	1	2	0	3	7	2	1	0	3	3	1	5	0	6	2	12			
	%	0%	0%	0%	0%	1%	0%	5%	0%	1%	1%	3%	2%	0%	2%	1%	1%			
	Articulated Truc	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	1	1	0	2	0	0	0	0	0	1	0	0	0	0	1	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>223</b>	<b>529</b>	<b>0</b>	<b>752</b>	<b>749</b>	<b>494</b>	<b>19</b>	<b>0</b>	<b>513</b>	<b>561</b>	<b>32</b>	<b>255</b>	<b>0</b>	<b>287</b>	<b>242</b>	<b>1552</b>			
	PHF	0.82	0.95	0	0.92	0.89	0.85	0.68	0	0.84	0.96	0.8	0.87	0	0.88	0.86	0.93			
	Approach %				48%	48%				33%	36%				18%	16%				

**Study Name** Swampscott - Route 1A and Leggs Hill Road TMC # 7 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound						Northwestbound						Northeastbound						Crosswalk	
		T	L	U	I	O	R	L	U	I	O	R	T	U	I	O	R	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00 AM - 9:00 AM	Cars	544	61	0	605	841	140	5	0	145	85	24	701	0	725	549	1475	SE	0	0	
One Hour Peak	%	87%	91%	0%	87%	90%	92%	100%	0%	92%	92%	96%	89%	0%	90%	87%	89%	0%	0%	0%	
7:30 AM - 8:30 AM	Light Goods Vehi	54	5	0	59	64	9	0	0	9	6	1	55	0	56	54	124	SW	0	0	
	%	9%	7%	0%	8%	7%	6%	0%	0%	6%	7%	4%	7%	0%	7%	9%	7%	0%	0%	0%	
	Buses	9	0	0	9	11	0	0	0	0	0	0	11	0	11	9	20	0	0	0	
	%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	1%	0	0	0	
	Single-Unit Truc	17	1	0	18	18	3	0	0	3	1	0	15	0	15	17	36				
	%	3%	1%	0%	3%	2%	2%	0%	0%	2%	1%	0%	2%	0%	2%	3%	2%				
	Articulated Truc	2	0	0	2	3	0	0	0	0	0	0	3	0	3	2	5				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	Motorcycles on Roa	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	2				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	<b>Total</b>	<b>628</b>	<b>67</b>	<b>0</b>	<b>695</b>	<b>937</b>	<b>152</b>	<b>5</b>	<b>0</b>	<b>157</b>	<b>92</b>	<b>25</b>	<b>785</b>	<b>0</b>	<b>810</b>	<b>633</b>	<b>1662</b>				
	PHF	0.91	0.8	0	0.9	0.93	0.83	0.62	0	0.82	0.82	0.89	0.92	0	0.92	0.91	0.96				
	Approach %				42%	56%				9%	6%				49%	38%					
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	0	0	
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
4:00 PM - 6:00 PM	Cars	764	155	0	919	804	83	11	0	94	199	44	721	0	765	775	1778	SE	2	2	
One Hour Peak	%	93%	95%	0%	93%	93%	93%	92%	0%	93%	95%	96%	93%	0%	93%	93%	93%	100%	0%	0%	
5:00 PM - 6:00 PM	Light Goods Vehi	46	9	0	55	48	6	0	0	6	11	2	42	0	44	46	105	SW	0	0	
	%	6%	5%	0%	6%	6%	7%	0%	0%	6%	5%	4%	5%	0%	5%	6%	6%	0%	0%	0%	
	Buses	8	0	0	8	2	0	0	0	0	0	0	2	0	2	8	10	2	2	2	
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%				
	Single-Unit Truc	4	0	0	4	9	0	1	0	1	0	0	9	0	9	5	14				
	%	0%	0%	0%	0%	1%	0%	8%	0%	1%	0%	0%	1%	0%	1%	1%	1%				
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	Motorcycles on Roa	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	<b>Total</b>	<b>823</b>	<b>164</b>	<b>0</b>	<b>987</b>	<b>863</b>	<b>89</b>	<b>12</b>	<b>0</b>	<b>101</b>	<b>210</b>	<b>46</b>	<b>774</b>	<b>0</b>	<b>820</b>	<b>835</b>	<b>1908</b>				
	PHF	0.92	0.82	0	0.94	0.98	0.93	0.6	0	0.9	0.78	0.68	0.99	0	0.97	0.93	0.97				
	Approach %				52%	45%				5%	11%				43%	44%					



**Study Name** Swampscott - Route 1A and Leggs Hill Road TMC # 7 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound						Northwestbound						Northeastbound						Crosswalk	
		T	L	U	I	O	R	L	U	I	O	R	T	U	I	O	Total	pedestria	Total		
<b>Peak 1</b>	Motorcycles	1	0	0	1	6	0	0	0	0	0	0	6	0	6	1	7	NE	0	0	
Specified Period	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%		0%		
12:00 PM - 2:00 PM	Cars	642	79	0	721	778	117	15	0	132	99	20	661	0	681	657	1534	SE	3	3	
One Hour Peak	%	90%	94%	0%	90%	92%	95%	94%	0%	95%	93%	87%	92%	0%	91%	90%	91%		100%		
12:00 PM - 1:00 PM	Light Goods Vehi	64	5	0	69	50	6	1	0	7	8	3	44	0	47	65	123	SW	0	0	
	%	9%	6%	0%	9%	6%	5%	6%	0%	5%	7%	13%	6%	0%	6%	9%	7%		0%		
	Buses	3	0	0	3	1	0	0	0	0	0	0	1	0	1	3	4		3	3	
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	Single-Unit Truc	3	0	0	3	10	0	0	0	0	0	0	10	0	10	3	13				
	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%				
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	Motorcycles on Roa	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1				
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%				
	<b>Total</b>	<b>714</b>	<b>84</b>	<b>0</b>	<b>798</b>	<b>845</b>	<b>123</b>	<b>16</b>	<b>0</b>	<b>139</b>	<b>107</b>	<b>23</b>	<b>722</b>	<b>0</b>	<b>745</b>	<b>730</b>	<b>1682</b>				
	PHF	0.94	0.81	0	0.94	0.91	0.88	0.8	0	0.89	0.86	0.72	0.91	0	0.9	0.94	0.93				
	Approach %				47%	50%				8%	6%				44%	43%					

**Study Name** Swampscott - Essex Street and Stop and Shop Driveway TMC # 8 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Northbound					Northeastbound					Crosswalk			
		T	BL	U	I	O	BR	HL	U	I	O	HR	T	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	1	0	1	1	1	0	0	1	1	2	NE	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%		0%	
7:00 AM - 9:00 AM	Cars	600	43	0	643	526	20	183	0	203	174	131	506	0	637	783	1483	S	1	1
One Hour Peak	%	90%	98%	0%	91%	82%	91%	90%	0%	90%	90%	88%	81%	0%	83%	90%	87%		100%	
7:30 AM - 8:30 AM	Light Goods Vehi	46	0	0	46	75	2	15	0	17	13	13	73	0	86	61	149	SW	0	0
	%	7%	0%	0%	6%	12%	9%	7%	0%	8%	7%	9%	12%	0%	11%	7%	9%		0%	
	Buses	8	0	0	8	6	0	1	0	1	0	0	6	0	6	9	15		1	1
	%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	1%			
	Single-Unit Truc	10	1	0	11	35	0	2	0	2	5	4	35	0	39	12	52			
	%	2%	2%	0%	2%	5%	0%	1%	0%	1%	3%	3%	6%	0%	5%	1%	3%			
	Articulated Truc	0	0	0	0	1	0	1	0	1	0	0	1	0	1	1	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>666</b>	<b>44</b>	<b>0</b>	<b>710</b>	<b>643</b>	<b>22</b>	<b>203</b>	<b>0</b>	<b>225</b>	<b>193</b>	<b>149</b>	<b>621</b>	<b>0</b>	<b>770</b>	<b>869</b>	<b>1705</b>			
	PHF	0.9	0.85	0	0.93	0.93	0.69	0.79	0	0.79	0.88	0.89	0.92	0	0.93	0.89	0.96			
	Approach %				42%	38%				13%	11%				45%	51%				
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
4:00 PM - 6:00 PM	Cars	566	65	0	631	737	99	244	0	343	300	235	638	0	873	810	1847	S	0	0
One Hour Peak	%	90%	98%	0%	91%	92%	92%	94%	0%	93%	94%	93%	92%	0%	92%	91%	92%		0%	
4:30 PM - 5:30 PM	Light Goods Vehi	57	1	0	58	55	9	14	0	23	19	18	46	0	64	71	145	SW	0	0
	%	9%	2%	0%	8%	7%	8%	5%	0%	6%	6%	7%	7%	0%	7%	8%	7%		0%	
	Buses	2	0	0	2	4	0	0	0	0	0	0	4	0	4	2	6		0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%			
	Single-Unit Truc	6	0	0	6	4	0	1	0	1	1	1	4	0	5	7	12			
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>631</b>	<b>66</b>	<b>0</b>	<b>697</b>	<b>801</b>	<b>108</b>	<b>259</b>	<b>0</b>	<b>367</b>	<b>320</b>	<b>254</b>	<b>693</b>	<b>0</b>	<b>947</b>	<b>890</b>	<b>2011</b>			
	PHF	0.92	0.87	0	0.92	0.93	0.84	0.79	0	0.87	0.85	0.85	0.92	0	0.94	0.88	0.93			
	Approach %				35%	40%				18%	16%				47%	44%				

**Study Name** Swampscott - Essex Street and Stop and Shop Driveway TMC # 8 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Northbound					Northeastbound					Crosswalk			
		T	BL	U	I	O	BR	HL	U	I	O	HR	T	U	I	O	Total	pedestria	Total	
<b>Peak 1</b>	Motorcycles	1	0	0	1	1	0	0	0	0	0	0	1	0	1	1	2	NE	2	2
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		100%	
12:00 PM - 2:00 PM	Cars	503	96	0	599	595	131	278	0	409	358	262	464	0	726	781	1734	S	2	2
One Hour Peak	%	87%	97%	0%	89%	88%	94%	96%	0%	95%	93%	92%	87%	0%	89%	90%	90%		100%	
12:30 PM - 1:30 PM	Light Goods Vehi	54	3	0	57	64	8	10	0	18	23	20	56	0	76	64	151	SW	0	0
	%	9%	3%	0%	8%	9%	6%	3%	0%	4%	6%	7%	10%	0%	9%	7%	8%		0%	
	Buses	3	0	0	3	1	0	0	0	0	0	0	1	0	1	3	4		4	4
	%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	13	0	0	13	12	0	2	0	2	2	2	12	0	14	15	29			
	%	2%	0%	0%	2%	2%	0%	1%	0%	0%	1%	1%	2%	0%	2%	2%	2%			
	Articulated Truc	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	1	0	0	1	2	1	0	0	1	0	0	1	0	1	1	3			
	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>575</b>	<b>99</b>	<b>0</b>	<b>674</b>	<b>675</b>	<b>140</b>	<b>291</b>	<b>0</b>	<b>431</b>	<b>383</b>	<b>284</b>	<b>535</b>	<b>0</b>	<b>819</b>	<b>866</b>	<b>1924</b>			
	PHF	0.96	0.88	0	0.96	0.9	0.83	0.87	0	0.86	0.97	0.99	0.92	0	0.94	0.96	0.95			
	Approach %				35%	35%				22%	20%				43%	45%				

**Study Name** Swampscott - Loring Avenue and Vinnin Street TMC # 9 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Westbound					Northeastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	Pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NE	1	1
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		100%	
7:00 AM - 9:00 AM	Cars	131	14	0	145	204	16	321	0	337	284	270	188	0	458	452	940	E	0	0
One Hour Peak	%	85%	100%	0%	86%	86%	94%	90%	0%	90%	83%	82%	86%	0%	83%	88%	86%		0%	
7:15 AM - 8:15 AM	Light Goods Vehi	9	0	0	9	16	1	30	0	31	44	44	15	0	59	39	99	SW	0	0
	%	6%	0%	0%	5%	7%	6%	8%	0%	8%	13%	13%	7%	0%	11%	8%	9%		0%	
	Buses	6	0	0	6	5	0	2	0	2	4	4	5	0	9	8	17		1	1
	%	4%	0%	0%	4%	2%	0%	1%	0%	1%	1%	1%	2%	0%	2%	2%	2%			
	Single-Unit Truc	8	0	0	8	10	0	4	0	4	12	12	10	0	22	12	34			
	%	5%	0%	0%	5%	4%	0%	1%	0%	1%	3%	4%	5%	0%	4%	2%	3%			
	Articulated Truc	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>154</b>	<b>14</b>	<b>0</b>	<b>168</b>	<b>236</b>	<b>17</b>	<b>357</b>	<b>0</b>	<b>374</b>	<b>344</b>	<b>330</b>	<b>219</b>	<b>0</b>	<b>549</b>	<b>511</b>	<b>1091</b>			
	PHF	0.79	0.58	0	0.79	0.8	0.47	0.74	0	0.72	0.77	0.76	0.84	0	0.82	0.75	0.81			
	Approach %				15%	22%				34%	32%				50%	47%				
<b>Peak 2</b>	Motorcycles	3	0	0	3	0	0	6	0	6	0	0	0	0	0	9	9	NE	5	5
Specified Period	%	1%	0%	0%	1%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	1%	1%		100%	
4:00 PM - 6:00 PM	Cars	268	24	0	292	297	25	278	0	303	427	403	272	0	675	546	1270	E	1	1
One Hour Peak	%	92%	96%	0%	92%	92%	100%	89%	0%	89%	92%	92%	91%	0%	91%	90%	91%		100%	
4:45 PM - 5:45 PM	Light Goods Vehi	17	1	0	18	22	0	27	0	27	32	31	22	0	53	44	98	SW	1	1
	%	6%	4%	0%	6%	7%	0%	9%	0%	8%	7%	7%	7%	0%	7%	7%	7%		100%	
	Buses	1	0	0	1	2	0	1	0	1	1	1	2	0	3	2	5		7	7
	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%			
	Single-Unit Truc	2	0	0	2	1	0	2	0	2	5	5	1	0	6	4	10			
	%	1%	0%	0%	1%	0%	0%	1%	0%	1%	1%	1%	0%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	1	0	0	1	1	0	0	0	0	0	0	1	0	1	1	2			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>292</b>	<b>25</b>	<b>0</b>	<b>317</b>	<b>323</b>	<b>25</b>	<b>314</b>	<b>0</b>	<b>339</b>	<b>465</b>	<b>440</b>	<b>298</b>	<b>0</b>	<b>738</b>	<b>606</b>	<b>1394</b>			
	PHF	0.91	0.62	0	0.95	0.87	0.62	0.82	0	0.8	0.9	0.91	0.84	0	0.91	0.91	0.92			
	Approach %				23%	23%				24%	33%				53%	43%				

**Study Name** Swampscott - Loring Avenue and Vinnin Street TMC # 9 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southwestbound					Westbound					Northeastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	Pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	2	2	0	0	2	0	2	NE	3	3
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%		100%	
12:00 PM - 2:00 PM	Cars	213	44	0	257	278	44	335	0	379	352	308	234	0	542	548	1178	E	0	0
One Hour Peak	%	90%	100%	0%	92%	92%	94%	88%	0%	88%	89%	88%	92%	0%	89%	89%	90%		0%	
12:00 PM - 1:00 PM	Light Goods Vehi	20	0	0	20	18	2	39	0	41	36	36	16	0	52	59	113	SW	0	0
	%	8%	0%	0%	7%	6%	4%	10%	0%	10%	9%	10%	6%	0%	9%	10%	9%		0%	
	Buses	2	0	0	2	1	0	0	0	0	0	0	1	0	1	2	3		3	3
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	1	0	0	1	4	1	8	0	9	5	5	3	0	8	9	18			
	%	0%	0%	0%	0%	1%	2%	2%	0%	2%	1%	1%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>236</b>	<b>44</b>	<b>0</b>	<b>280</b>	<b>301</b>	<b>47</b>	<b>382</b>	<b>0</b>	<b>429</b>	<b>396</b>	<b>352</b>	<b>254</b>	<b>0</b>	<b>606</b>	<b>618</b>	<b>1315</b>			
	PHF	0.86	0.73	0	0.83	0.96	0.84	0.88	0	0.88	0.93	0.93	0.95	0	0.95	0.94	0.95			
	Approach %				21%	23%				33%	30%				46%	47%				

**Study Name** Swampscott - Vinnin Street at Salem Street and Paradise Plaza Exit Driveway TMC # 10 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Westbound					Northbound					Eastbound					Crosswalk					
		R	T	L	I	O	T	L	U	I	O	R	L	U	I	O	R	T	U	I	O	Total	Pedestrian	Total			
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	N	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00 AM - 9:00 AM	Cars	4	1	0	5	0	596	56	0	652	428	63	130	0	193	184	127	365	0	492	730	1342	E	0	0	0	
One Hour Peak	%	100%	100%	0%	100%	0%	91%	89%	0%	91%	87%	93%	90%	0%	91%	86%	84%	86%	0%	86%	91%	89%	0%	0%	0%	0%	
7:30 AM - 8:30 AM	Light Goods Vehicle	0	0	0	0	0	49	3	0	52	53	4	6	0	10	19	16	49	0	65	55	127	S	0	0	0	
	%	0%	0%	0%	0%	0%	7%	5%	0%	7%	11%	6%	4%	0%	5%	9%	11%	12%	0%	11%	7%	8%	0%	0%	0%	0%	
	Buses	0	0	0	0	0	2	0	0	2	1	0	6	0	6	2	2	1	0	3	8	11	W	0	0	0	
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	3%	1%	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	
	Single-Unit Tractor	0	0	0	0	0	7	1	0	8	8	1	1	0	2	7	6	7	0	13	8	23	0	0	0	0	
	%	0%	0%	0%	0%	0%	1%	2%	0%	1%	2%	1%	1%	0%	1%	3%	4%	2%	0%	2%	1%	2%	0	0	0	0	
	Articulated Tractor	0	0	0	0	0	0	1	0	1	1	0	2	0	2	1	0	1	0	1	2	4	0	0	0	0	
	%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	
	Motorcycles on Road	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	
	%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	
	<b>Total</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>654</b>	<b>63</b>	<b>0</b>	<b>717</b>	<b>491</b>	<b>68</b>	<b>145</b>	<b>0</b>	<b>213</b>	<b>215</b>	<b>151</b>	<b>423</b>	<b>0</b>	<b>574</b>	<b>803</b>	<b>1509</b>					
	PHF	0.5	0.25	0	0.62	0	0.97	0.88	0	0.97	0.93	0.94	0.86	0	0.93	0.88	0.8	0.93	0	0.91	0.97	0.97					
	Approach %				0%	0%				48%	33%				14%	14%				38%	53%						
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N	0	0	0	
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
4:00 PM - 6:00 PM	Cars	22	2	0	24	0	402	63	0	465	694	93	109	0	202	249	184	601	0	785	533	1476	E	0	0	0	
One Hour Peak	%	100%	100%	0%	100%	0%	91%	90%	0%	91%	93%	96%	90%	0%	93%	93%	93%	93%	0%	93%	91%	92%	0%	0%	0%	0%	
4:45 PM - 5:45 PM	Light Goods Vehicle	0	0	0	0	0	34	4	0	38	48	4	11	0	15	12	8	44	0	52	45	105	S	0	0	0	
	%	0%	0%	0%	0%	0%	8%	6%	0%	7%	6%	4%	9%	0%	7%	4%	4%	7%	0%	6%	8%	7%	0%	0%	0%	0%	
	Buses	0	0	0	0	0	1	2	0	3	1	0	1	0	1	4	2	1	0	3	2	7	W	0	0	0	
	%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Single-Unit Tractor	0	0	0	0	0	4	0	0	4	2	0	0	0	0	3	3	2	0	5	4	9	0	0	0	0	
	%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	1%	2%	0%	0%	1%	1%	1%	0	0	0	0	
	Articulated Tractor	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	
	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	
	Motorcycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	0	0	0	
	<b>Total</b>	<b>22</b>	<b>2</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>441</b>	<b>70</b>	<b>0</b>	<b>511</b>	<b>745</b>	<b>97</b>	<b>121</b>	<b>0</b>	<b>218</b>	<b>269</b>	<b>197</b>	<b>648</b>	<b>0</b>	<b>845</b>	<b>584</b>	<b>1598</b>					
	PHF	0.5	0.5	0	0.55	0	0.93	0.83	0	0.91	0.9	0.87	0.92	0	0.92	0.93	0.95	0.9	0	0.91	0.94	0.95					
	Approach %				2%	0%				32%	47%				14%	17%				53%	37%						

**Study Name** Swampscott - Vinnin Street at Salem Street and Paradise Plaza Exit Driveway TMC # 10 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound					Westbound					Northbound					Eastbound					Crosswalk			
		R	T	L	I	O	T	L	U	I	O	R	L	U	I	O	R	T	U	I	O	Total	Direction	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	2	0	2	0	2	1	1
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	100%		
12:00 PM - 2:00 PM	Cars	32	10	0	42	0	464	135	0	599	545	90	164	0	254	301	156	455	0	611	660	1506	E	0	0
One Hour Peak	%	100%	91%	0%	98%	0%	88%	92%	0%	89%	91%	94%	89%	0%	90%	89%	85%	90%	0%	89%	89%	89%	0%		
12:00 PM - 1:00 PM	Light Goods Vehi	0	1	0	1	0	56	8	0	64	48	4	16	0	20	28	19	44	0	63	72	148	S	2	2
	%	0%	9%	0%	2%	0%	11%	5%	0%	10%	8%	4%	9%	0%	7%	8%	10%	9%	0%	9%	10%	9%	100%		
	Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	2	0	2	W	3	3
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	100%		
	Single-Unit Truc	0	0	0	0	0	6	2	0	8	6	1	5	0	6	6	4	5	0	9	11	23		6	6
	%	0%	0%	0%	0%	0%	1%	1%	0%	1%	1%	1%	3%	0%	2%	2%	2%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	1	1	0	2	2	1	0	0	1	1	0	1	0	1	1	4			
	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>32</b>	<b>11</b>	<b>0</b>	<b>43</b>	<b>0</b>	<b>527</b>	<b>146</b>	<b>0</b>	<b>673</b>	<b>601</b>	<b>96</b>	<b>185</b>	<b>0</b>	<b>281</b>	<b>340</b>	<b>183</b>	<b>505</b>	<b>0</b>	<b>688</b>	<b>744</b>	<b>1685</b>			
	PHF	0.89	0.55	0	0.77	0	0.95	0.89	0	0.94	0.96	0.92	0.91	0	0.92	0.89	0.88	0.96	0	0.97	0.97	0.97			
	Approach %				3%	0%				40%	36%				17%	20%				41%	44%				

**Study Name** Swampscott - Tedesco Street and Brookhouse Drive TMC # 11 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Westbound					Northwestbound					Eastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	Pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	E	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%		0%	
7:00 AM - 9:00 AM	Cars	586	28	0	614	424	75	67	0	142	94	66	349	0	415	653	1171	SE	1	1
One Hour Peak	%	91%	88%	0%	91%	86%	99%	92%	0%	95%	86%	86%	84%	0%	84%	91%	89%		100%	
7:30 AM - 8:30 AM	Light Goods Vehi	47	3	0	50	51	1	5	0	6	12	9	50	0	59	52	115	W	0	0
	%	7%	9%	0%	7%	10%	1%	7%	0%	4%	11%	12%	12%	0%	12%	7%	9%		0%	
	Buses	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2	2		1	1
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	5	1	0	6	15	0	0	0	0	3	2	15	0	17	5	23			
	%	1%	3%	0%	1%	3%	0%	0%	0%	0%	3%	3%	4%	0%	3%	1%	2%			
	Articulated Truc	2	0	0	2	1	0	0	0	0	0	0	1	0	1	2	3			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>643</b>	<b>32</b>	<b>0</b>	<b>675</b>	<b>491</b>	<b>76</b>	<b>73</b>	<b>0</b>	<b>149</b>	<b>109</b>	<b>77</b>	<b>415</b>	<b>0</b>	<b>492</b>	<b>716</b>	<b>1316</b>			
	PHF	0.94	0.62	0	0.92	0.87	0.73	0.76	0	0.85	0.85	0.88	0.9	0	0.93	0.95	0.91			
	Approach %				51%	37%				11%	8%				37%	54%				
<b>Peak 2</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	E	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
4:00 PM - 6:00 PM	Cars	492	58	0	550	602	51	42	0	93	186	128	551	0	679	534	1322	SE	3	3
One Hour Peak	%	91%	98%	0%	91%	93%	98%	89%	0%	94%	94%	92%	93%	0%	93%	91%	92%		100%	
4:45 PM - 5:45 PM	Light Goods Vehi	43	1	1	45	38	1	5	0	6	11	10	36	0	46	48	97	W	0	0
	%	8%	2%	100%	7%	6%	2%	11%	0%	6%	6%	7%	6%	0%	6%	8%	7%		0%	
	Buses	2	0	0	2	2	0	0	0	0	0	0	2	0	2	2	4		3	3
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Single-Unit Truc	4	0	0	4	2	0	0	0	0	1	1	2	0	3	4	7			
	%	1%	0%	0%	1%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	1%	0%			
	Articulated Truc	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>542</b>	<b>59</b>	<b>1</b>	<b>602</b>	<b>644</b>	<b>52</b>	<b>47</b>	<b>0</b>	<b>99</b>	<b>198</b>	<b>139</b>	<b>591</b>	<b>0</b>	<b>730</b>	<b>589</b>	<b>1431</b>			
	PHF	0.9	0.78	0.25	0.89	0.91	0.93	0.78	0	0.85	0.88	0.94	0.91	0	0.92	0.91	0.93			
	Approach %				42%	45%				7%	14%				51%	41%				



**Study Name** Swampscott - Tedesco Street and Brookhouse Drive TMC # 11 TMC  
**Start Date** Saturday, April 09, 2016 12:00 PM  
**End Date** Tuesday, April 12, 2016 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Westbound					Northwestbound					Eastbound					Crosswalk			
		T	HL	U	I	O	HR	BL	U	I	O	BR	T	U	I	O	Total	Pedestria	Total	
<b>Peak 1</b>	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	E	0	0
Specified Period	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	
12:00 PM - 2:00 PM	Cars	585	39	0	624	473	29	43	0	72	125	86	444	0	530	628	1226	SE	0	0
One Hour Peak	%	93%	100%	0%	93%	92%	94%	84%	0%	88%	91%	87%	92%	0%	91%	92%	92%		0%	
12:15 PM - 1:15 PM	Light Goods Vehi	39	0	0	39	36	2	6	0	8	11	11	34	0	45	45	92	W	0	0
	%	6%	0%	0%	6%	7%	6%	12%	0%	10%	8%	11%	7%	0%	8%	7%	7%		0%	
	Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0	0
	Single-Unit Truc	6	0	0	6	4	0	2	0	2	2	2	4	0	6	8	14			
	%	1%	0%	0%	1%	1%	0%	4%	0%	2%	1%	2%	1%	0%	1%	1%	1%			
	Articulated Truc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Motorcycles on Roa	2	0	0	2	1	0	0	0	0	0	0	1	0	1	2	3			
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	<b>Total</b>	<b>632</b>	<b>39</b>	<b>0</b>	<b>671</b>	<b>514</b>	<b>31</b>	<b>51</b>	<b>0</b>	<b>82</b>	<b>138</b>	<b>99</b>	<b>483</b>	<b>0</b>	<b>582</b>	<b>683</b>	<b>1335</b>			
	PHF	0.91	0.81	0	0.91	0.91	0.65	0.8	0	0.82	0.91	0.88	0.94	0	0.95	0.9	0.95			
	Approach %				50%	39%				6%	10%				44%	51%				

Tedesco St and Leggs Hill Rd  
6/7/2016

File Name : TedescoLeggsHillAM+PM  
Site Code : 06071601  
Start Date : 6/7/2016  
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

Start Time	From North					From East					From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	14	0	10	0	24	20	154	0	0	174	0	0	0	0	0	0	67	22	0	89	287
07:15 AM	17	0	14	0	31	33	137	0	0	170	0	0	0	0	0	0	81	21	0	102	303
07:30 AM	14	0	16	0	30	33	137	0	0	170	0	0	0	0	0	0	105	28	0	133	333
07:45 AM	10	0	20	2	32	41	166	0	0	207	0	0	0	0	0	0	83	38	0	121	360
Total	55	0	60	2	117	127	594	0	0	721	0	0	0	0	0	0	336	109	0	445	1283
08:00 AM	19	1	12	0	32	47	170	0	0	217	0	0	0	0	0	0	81	47	0	128	377
08:15 AM	18	0	25	0	43	53	144	0	0	197	0	0	0	0	0	0	83	49	0	132	372
08:30 AM	29	0	13	0	42	33	138	0	0	171	0	0	0	0	0	0	78	41	0	119	332
08:45 AM	36	0	15	1	52	28	126	0	0	154	0	0	0	0	0	0	97	28	1	126	332
Total	102	1	65	1	169	161	578	0	0	739	0	0	0	0	0	0	339	165	1	505	1413
*** BREAK ***																					
04:00 PM	20	0	23	0	43	21	129	0	0	150	0	0	0	0	0	0	119	37	0	156	349
04:15 PM	36	0	26	0	62	30	108	0	0	138	0	0	0	0	0	0	136	36	0	172	372
04:30 PM	37	0	24	0	61	27	101	0	0	128	0	0	0	0	0	0	134	30	0	164	353
04:45 PM	30	0	25	2	57	19	110	0	0	129	1	0	0	0	1	0	134	36	0	170	357
Total	123	0	98	2	223	97	448	0	0	545	1	0	0	0	1	0	523	139	0	662	1431
05:00 PM	44	0	24	0	68	18	115	0	0	133	0	0	0	0	0	0	125	38	0	163	364
05:15 PM	50	0	25	0	75	23	108	0	0	131	0	0	0	0	0	0	123	29	0	152	358
05:30 PM	56	0	41	0	97	25	93	0	0	118	0	0	0	0	0	0	132	32	0	164	379
05:45 PM	37	0	22	0	59	34	120	0	0	154	0	0	0	0	0	0	154	34	0	188	401
Total	187	0	112	0	299	100	436	0	0	536	0	0	0	0	0	0	534	133	0	667	1502
Grand Total	467	1	335	5	808	485	2056	0	0	2541	1	0	0	0	1	0	1732	546	1	2279	5629
Apprch %	57.8	0.1	41.5	0.6		19.1	80.9	0	0		100	0	0	0		0	76	24	0		
Total %	8.3	0	6	0.1	14.4	8.6	36.5	0	0	45.1	0	0	0	0	0	0	30.8	9.7	0	40.5	
Unshifted	462	0	327	5	794	479	2009	0	0	2488	1	0	0	0	1	0	1664	540	1	2205	5488
% Unshifted	98.9	0	97.6	100	98.3	98.8	97.7	0	0	97.9	100	0	0	0	100	0	96.1	98.9	100	96.8	97.5
Bank 1	3	1	7	0	11	5	44	0	0	49	0	0	0	0	0	0	64	4	0	68	128
% Bank 1	0.6	100	2.1	0	1.4	1	2.1	0	0	1.9	0	0	0	0	0	0	3.7	0.7	0	3	2.3
Bank 2	2	0	1	0	3	1	3	0	0	4	0	0	0	0	0	0	4	2	0	6	13
% Bank 2	0.4	0	0.3	0	0.4	0.2	0.1	0	0	0.2	0	0	0	0	0	0	0.2	0.4	0	0.3	0.2

Tedesco St and Leggs Hill Rd  
6/7/2016

File Name : TedescoLeggsHillAM+PM  
Site Code : 06071601  
Start Date : 6/7/2016  
Page No : 3

Start Time	From North					From East					From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	14	0	16	0	30	33	137	0	0	170	0	0	0	0	0	0	105	28	0	133	333
07:45 AM	10	0	20	2	32	41	166	0	0	207	0	0	0	0	0	0	83	38	0	121	360
08:00 AM	19	1	12	0	32	47	170	0	0	217	0	0	0	0	0	0	81	47	0	128	377
08:15 AM	18	0	25	0	43	53	144	0	0	197	0	0	0	0	0	0	83	49	0	132	372
Total Volume	61	1	73	2	137	174	617	0	0	791	0	0	0	0	0	0	352	162	0	514	1442
% App. Total	44.5	0.7	53.3	1.5		22	78	0	0		0	0	0	0		0	68.5	31.5	0		
PHF	.803	.250	.730	.250	.797	.821	.907	.000	.000	.911	.000	.000	.000	.000	.000	.000	.838	.827	.000	.966	.956

Tedesco St and Leggs Hill Rd  
6/7/2016

File Name : TedescoLeggsHillAM+PM  
Site Code : 06071601  
Start Date : 6/7/2016  
Page No : 6

Start Time	From North					From East					From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	08:00 AM					07:45 AM					07:00 AM					07:30 AM				
+0 mins.	19	1	12	0	32	41	166	0	0	207	0	0	0	0	0	0	105	28	0	133
+15 mins.	18	0	25	0	43	47	170	0	0	217	0	0	0	0	0	0	83	38	0	121
+30 mins.	29	0	13	0	42	53	144	0	0	197	0	0	0	0	0	0	81	47	0	128
+45 mins.	36	0	15	1	52	33	138	0	0	171	0	0	0	0	0	0	83	49	0	132
Total Volume	102	1	65	1	169	174	618	0	0	792	0	0	0	0	0	0	352	162	0	514
% App. Total	60.4	0.6	38.5	0.6		22	78	0	0		0	0	0	0		0	68.5	31.5	0	
PHF	.708	.250	.650	.250	.813	.821	.909	.000	.000	.912	.000	.000	.000	.000	.000	.000	.838	.827	.000	.966

Tedesco St and Leggs Hill Rd  
6/7/2016

File Name : TedescoLeggsHillAM+PM  
Site Code : 06071601  
Start Date : 6/7/2016  
Page No : 9

Start Time	From North					From East					From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	44	0	24	0	68	18	115	0	0	133	0	0	0	0	0	0	125	38	0	163	364
05:15 PM	50	0	25	0	75	23	108	0	0	131	0	0	0	0	0	0	123	29	0	152	358
05:30 PM	56	0	41	0	97	25	93	0	0	118	0	0	0	0	0	0	132	32	0	164	379
05:45 PM	37	0	22	0	59	34	120	0	0	154	0	0	0	0	0	0	154	34	0	188	401
Total Volume	187	0	112	0	299	100	436	0	0	536	0	0	0	0	0	0	534	133	0	667	1502
% App. Total	62.5	0	37.5	0		18.7	81.3	0	0		0	0	0	0	0	0	80.1	19.9	0		
PHF	.835	.000	.683	.000	.771	.735	.908	.000	.000	.870	.000	.000	.000	.000	.000	.000	.867	.875	.000	.887	.936

Tedesco St and Leggs Hill Rd  
6/7/2016

File Name : TedescoLeggsHillAM+PM  
Site Code : 06071601  
Start Date : 6/7/2016  
Page No : 12

Start Time	From North					From East					From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	05:00 PM					04:00 PM					04:00 PM					04:15 PM					
+0 mins.	44	0	24	0	68	21	<b>129</b>	0	0	<b>150</b>	0	0	0	0	0	0	<b>136</b>	36	0	<b>172</b>	
+15 mins.	50	0	25	0	75	<b>30</b>	108	0	0	138	0	0	0	0	0	0	134	30	0	164	
+30 mins.	<b>56</b>	0	<b>41</b>	0	<b>97</b>	27	101	0	0	128	0	0	0	0	0	0	134	36	0	170	
+45 mins.	37	0	22	0	59	19	110	0	0	129	<b>1</b>	0	0	0	<b>1</b>	0	125	<b>38</b>	0	163	
Total Volume	187	0	112	0	299	97	448	0	0	545	1	0	0	0	1	0	529	140	0	669	
% App. Total	62.5	0	37.5	0		17.8	82.2	0	0		100	0	0	0		0	79.1	20.9	0		
PHF	.835	.000	.683	.000	.771	.808	.868	.000	.000	.908	.250	.000	.000	.000	.250	.000	.972	.921	.000	.972	

## **Spot Speed Data**

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Site Reference: 16J070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: ROAD TOTAL

STA. 1  
 TOTAL

File: SPD1-3102.prn  
 City: VINTYIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
13:00	5	54	296	530	315	41	3	0	0	0	0	0	0	0	0	1244
14:00	11	50	293	526	261	39	2	0	1	0	0	0	0	0	0	1213
15:00	15	91	403	567	234	34	0	0	0	0	0	0	0	0	0	1344
16:00	7	78	381	569	322	42	2	0	0	0	0	0	0	0	0	1407
17:00	9	74	394	663	334	36	0	0	0	0	0	0	0	0	0	1510
18:00	5	62	439	658	353	33	2	0	0	0	0	0	0	0	0	1572
19:00	14	77	330	612	357	40	2	0	0	0	0	0	0	0	0	1434
20:00	2	37	262	445	228	26	2	0	0	0	0	0	0	0	0	1003
21:00	3	51	191	287	158	21	0	0	0	0	0	0	0	0	0	704
22:00	0	21	107	211	143	29	2	0	0	0	0	0	0	0	0	513
23:00	2	9	52	123	60	16	4	1	0	0	0	0	0	0	0	284
24:00	1	5	37	52	50	10	1	1	0	0	0	0	0	0	0	157
DAY TOTAL	76	639	3192	5233	2855	367	20	2	1	0	0	0	0	0	0	12385
PERCENTS	0.7%	5.2%	25.6%	42.3%	23.0%	2.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 25.8 mph

85th Percentile Speed  
 36.4 mph

Median Speed  
 31.2 mph

Average Speed  
 31.0 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 6425 vehicles in pace  
 Representing 68.0% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: ROAD TOTAL

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	3	13	28	21	11	2	0	0	1	0	0	0	0	0	79
02:00	0	0	8	12	9	6	0	1	0	0	0	0	0	0	0	36
03:00	0	0	3	9	7	1	3	0	0	0	0	0	0	0	0	23
04:00	0	2	4	5	15	7	0	1	0	0	0	0	0	0	0	34
05:00	2	4	8	17	32	11	5	2	0	0	0	0	0	0	0	81
06:00	2	7	31	82	116	37	7	0	0	0	0	0	0	0	0	282
07:00	2	27	176	400	308	56	11	0	0	0	0	0	0	0	0	980
08:00	12	55	387	726	335	29	1	0	0	0	0	0	0	0	0	1545
09:00	13	62	399	636	305	28	4	0	0	0	0	0	0	0	0	1407
10:00	1	45	226	465	255	36	2	0	0	0	0	0	0	0	0	1030
11:00	4	73	268	426	244	34	2	0	0	0	0	0	0	0	0	1051
12:00	5	47	232	461	285	33	5	1	0	0	0	0	0	0	0	1069
13:00	5	106	463	554	184	30	2	0	0	0	0	0	0	0	0	1344
14:00	5	72	356	542	215	25	1	0	0	0	0	0	0	0	0	1216
15:00	7	59	373	526	274	24	0	0	0	0	0	0	0	0	0	1263
16:00	8	86	418	621	298	19	2	0	0	0	0	0	0	0	0	1452
17:00	10	85	467	625	257	29	2	0	0	0	0	0	0	0	0	1475
18:00	7	54	379	683	382	28	4	0	0	0	0	0	0	0	0	1537
19:00	4	46	346	642	329	39	1	1	0	0	0	0	0	0	0	1408
20:00	0	51	237	437	244	35	3	0	0	0	0	0	0	0	0	1007
21:00	4	34	159	317	155	18	4	0	0	0	0	0	0	0	0	691
22:00	0	39	136	208	133	30	0	0	0	0	0	0	0	0	0	546
23:00	0	20	49	112	89	15	1	0	0	0	0	0	0	0	0	286
24:00	0	5	37	59	65	23	3	0	0	1	0	0	0	0	0	193
DAY TOTAL	91	982	5135	8593	4557	604	65	6	0	2	0	0	0	0	0	20035
PERCENTS	0.5%	5.0%	25.7%	42.8%	22.7%	3.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
25.9 mph

85th Percentile Speed  
36.5 mph

Median Speed  
31.2 mph

Average Speed  
31.1 mph

10 MPH Pace Speed  
24 mph to 34 mph  
13728 vehicles in pace  
Representing 68.5% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000795  
 Site ID: 1100C0000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: ROAD TOTAL

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	1	0	18	38	28	12	3	1	0	0	0	0	0	0	0	101
02:00	0	4	9	16	13	5	1	0	0	0	0	0	0	0	0	48
03:00	0	0	3	8	10	5	2	0	0	0	0	0	0	0	0	28
04:00	0	0	3	6	14	11	1	0	0	0	0	0	0	0	0	35
05:00	1	1	9	13	27	13	8	3	0	0	0	0	0	0	0	75
06:00	2	5	42	88	114	41	13	0	0	0	0	0	0	0	0	305
07:00	6	17	99	335	413	83	5	0	0	0	0	0	0	0	0	958
08:00	15	57	363	731	347	31	2	2	0	0	0	0	0	0	0	1548
09:00	4	38	261	674	393	51	3	0	0	0	0	0	0	0	0	1424
10:00	6	22	190	437	340	47	4	1	0	0	0	0	0	0	0	1047
11:00	9	54	223	475	319	45	5	0	0	0	0	0	0	0	0	1130
12:00	12	48	253	513	302	45	2	0	0	0	0	0	0	0	0	1175
13:00	11	48	342	536	296	41	2	0	0	1	0	0	0	0	0	1277
14:00	6	60	280	547	321	27	3	0	0	0	0	0	0	0	0	1244
15:00	36	87	356	550	293	20	4	0	0	0	0	0	0	0	0	1346
16:00	20	74	419	551	349	34	4	1	0	0	0	0	0	0	0	1452
17:00	49	84	370	639	359	49	3	0	1	0	0	0	0	0	0	1554
18:00	58	97	450	649	309	26	2	0	0	0	0	0	0	0	0	1591
19:00	2	67	384	601	338	22	1	0	0	0	0	0	0	0	0	1415
20:00	6	44	280	473	250	25	3	0	0	0	0	0	0	0	0	1081
21:00	4	39	182	369	174	19	1	0	0	0	0	0	0	0	0	788
22:00	2	22	120	250	109	16	3	1	0	0	0	0	0	0	0	523
23:00	0	14	59	128	103	18	2	1	0	0	0	0	0	0	0	325
24:00	0	2	32	59	67	27	3	1	0	0	0	0	0	0	0	191
DAY TOTAL	250	884	4747	8686	5289	713	80	11	1	1	0	0	0	0	0	20661
PERCENTS	1.3%	4.3%	23.0%	42.1%	25.6%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
26.1 mph

85th Percentile Speed  
36.8 mph

Median Speed  
31.6 mph

Average Speed  
31.4 mph

10 MPH Pace Speed  
29 mph to 39 mph  
13974 vehicles in pace  
Representing 67.6% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: ROAD TOTAL

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	4	12	25	34	19	1	0	0	0	0	0	0	0	0	95
02:00	0	1	6	25	21	14	1	0	0	0	0	0	0	0	0	68
03:00	0	3	5	6	16	0	0	0	0	0	0	0	0	0	0	30
04:00	0	4	5	9	16	10	0	0	0	0	0	0	0	0	0	44
05:00	0	3	8	13	27	20	3	0	1	0	0	0	0	0	0	75
06:00	1	3	34	84	109	52	9	0	0	0	0	0	0	0	0	292
07:00	3	15	106	330	394	78	4	1	0	0	0	0	0	0	0	931
08:00	7	62	332	722	412	37	4	0	0	0	0	0	0	0	0	1576
09:00	4	33	324	643	396	42	1	1	0	0	0	0	0	0	0	1444
10:00	1	40	222	430	314	51	5	0	0	0	0	0	0	0	0	1063
11:00	6	36	220	456	298	42	2	0	0	0	0	0	0	0	0	1060
DAY TOTAL	22	204	1274	2743	2037	365	30	2	1	0	0	0	0	0	0	6678
PERCENTS	0.4%	3.1%	19.1%	41.1%	30.5%	5.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 27.1 mph

85th Percentile Speed  
 37.5 mph

Median Speed  
 32.4 mph

Average Speed  
 32.3 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 4780 vehicles in pace  
 Representing 71.5% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

STAINB

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: NORTH  
 Lane: 1

File: SFD1-0102.prn  
 City: VINNEN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
13:00	3	23	138	284	141	23	0	0	0	0	0	0	0	0	0	662
14:00	8	38	149	268	144	19	1	0	1	0	0	0	0	0	0	608
15:00	14	53	254	287	130	20	0	0	0	0	0	0	0	0	0	758
16:00	0	46	219	284	151	20	0	0	0	0	0	0	0	0	0	720
17:00	4	34	220	316	198	25	0	0	0	0	0	0	0	0	0	827
18:00	0	47	259	348	193	19	2	0	0	0	0	0	0	0	0	868
19:00	14	26	181	379	217	22	2	0	0	0	0	0	0	0	0	843
20:00	0	28	149	225	120	10	1	0	0	0	0	0	0	0	0	533
21:00	2	23	115	140	72	8	0	0	0	0	0	0	0	0	0	350
22:00	0	17	46	92	57	12	0	0	0	0	0	0	0	0	0	224
23:00	1	7	36	58	41	5	1	0	0	0	0	0	0	0	0	149
24:00	0	5	22	27	19	5	0	1	0	0	0	0	0	0	0	80
DAY TOTAL	46	347	1841	2716	1463	186	7	1	1	0	0	0	0	0	0	6532
PERCENTS	0.7%	5.3%	27.8%	41.0%	22.3%	2.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 25.6 mph

85th Percentile Speed  
 36.3 mph

Median Speed  
 31.0 mph

Average Speed  
 30.9 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 4559 vehicles in pace  
 Representing 69.7% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: NORTH  
 Lane: 1

File: SP01-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	3	11	19	9	3	1	0	0	0	0	0	0	0	0	46
02:00	0	0	5	7	3	1	0	1	0	0	0	0	0	0	0	17
03:00	0	0	3	4	2	0	0	0	0	0	0	0	0	0	0	9
04:00	0	2	4	1	4	1	0	0	0	0	0	0	0	0	0	12
05:00	1	2	2	12	14	3	3	1	0	0	0	0	0	0	0	38
06:00	1	7	18	35	38	12	3	0	0	0	0	0	0	0	0	114
07:00	1	18	77	99	82	23	6	0	0	0	0	0	0	0	0	306
08:00	1	32	105	274	87	16	1	0	0	0	0	0	0	0	0	596
09:00	11	41	196	276	129	10	2	0	0	0	0	0	0	0	0	665
10:00	1	32	127	252	118	7	1	0	0	0	0	0	0	0	0	538
11:00	0	46	157	221	105	15	0	0	0	0	0	0	0	0	0	544
12:00	5	27	139	208	123	16	2	1	0	0	0	0	0	0	0	521
13:00	4	79	283	271	78	13	2	0	0	0	0	0	0	0	0	730
14:00	0	41	175	242	100	11	0	0	0	0	0	0	0	0	0	569
15:00	2	40	228	237	129	9	0	0	0	0	0	0	0	0	0	645
16:00	6	47	238	349	119	9	1	0	0	0	0	0	0	0	0	769
17:00	2	46	296	377	114	9	1	0	0	0	0	0	0	0	0	845
18:00	2	31	204	394	212	17	1	0	0	0	0	0	0	0	0	861
19:00	1	25	218	371	177	23	1	1	0	0	0	0	0	0	0	817
20:00	0	25	143	223	123	11	0	0	0	0	0	0	0	0	0	525
21:00	1	29	96	150	59	7	2	0	0	0	0	0	0	0	0	344
22:00	0	34	75	89	37	8	0	0	0	0	0	0	0	0	0	243
23:00	0	17	32	41	40	5	0	0	0	0	0	0	0	0	0	135
24:00	0	5	27	35	24	5	0	0	0	0	0	0	0	0	0	96

DAY TOTAL	39	629	2939	4187	1926	234	27	4	0	0	0	0	0	0	0	9985
PERCENTS	0.4%	6.3%	29.5%	42.0%	19.3%	2.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
25.4 mph

85th Percentile Speed  
35.8 mph

Median Speed  
30.7 mph

Average Speed  
30.6 mph

10 MPH Pace Speed  
24 mph to 34 mph  
7126 vehicles in pace  
Representing 71.3% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: NORTH  
 Lane: 1

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	1	0	13	22	14	4	1	0	0	0	0	0	0	0	0	55
02:00	0	3	5	3	5	3	0	0	0	0	0	0	0	0	0	21
03:00	0	0	3	5	5	2	0	0	0	0	0	0	0	0	0	15
04:00	0	0	1	3	1	3	0	0	0	0	0	0	0	0	0	8
05:00	1	0	8	6	11	3	2	0	0	0	0	0	0	0	0	31
06:00	0	4	27	41	26	11	3	0	0	0	0	0	0	0	0	112
07:00	1	16	51	108	77	31	1	0	0	0	0	0	0	0	0	285
08:00	3	26	203	283	198	11	0	2	0	0	0	0	0	0	0	636
09:00	2	21	175	312	170	16	2	0	0	0	0	0	0	0	0	698
10:00	3	13	127	229	126	16	1	0	0	0	0	0	0	0	0	516
11:00	7	38	136	256	130	14	2	0	0	0	0	0	0	0	0	593
12:00	5	28	145	273	145	18	0	0	0	0	0	0	0	0	0	614
13:00	3	35	206	267	135	17	1	0	0	0	0	0	0	0	0	664
14:00	0	31	188	296	124	11	0	0	0	0	0	0	0	0	0	650
15:00	25	58	184	297	119	6	1	0	0	0	0	0	0	0	0	692
16:00	5	36	246	267	168	14	1	0	0	0	0	0	0	0	0	737
17:00	30	58	239	315	187	19	2	0	0	0	0	0	0	0	0	849
18:00	54	46	247	338	176	13	2	0	0	0	0	0	0	0	0	876
19:00	1	46	232	341	206	13	0	0	0	0	0	0	0	0	0	839
20:00	3	24	161	248	127	11	1	0	0	0	0	0	0	0	0	575
21:00	3	23	106	149	77	8	0	0	0	0	0	0	0	0	0	366
22:00	1	13	59	113	46	4	0	0	0	0	0	0	0	0	0	235
23:00	0	10	45	65	36	8	0	0	0	0	0	0	0	0	0	164
24:00	0	1	25	32	36	10	2	1	0	0	0	0	0	0	0	107

DAY TOTAL	148	510	2630	4271	2255	268	22	4	0	0	0	0	0	0	0	10328
PERCENTS	1.5%	5.2%	27.5%	41.3%	21.8%	2.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
25.5 mph

85th Percentile Speed  
36.2 mph

Median Speed  
30.9 mph

Average Speed  
30.7 mph

10 MPH Pace Speed  
24 mph to 34 mph  
7101 vehicles in pace  
Representing 68.7% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160370000795  
 Site ID: 1103000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: NORTH  
 Lane: 1

File: SPD1-0102.prn  
 City: VIKING SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	4	8	15	13	7	1	0	0	0	0	0	0	0	0	48
02:00	0	1	4	15	8	5	0	0	0	0	0	0	0	0	0	33
03:00	0	3	5	2	4	0	0	0	0	0	0	0	0	0	0	14
04:00	0	4	2	2	5	2	0	0	0	0	0	0	0	0	0	15
05:00	0	3	7	5	5	5	1	0	1	0	0	0	0	0	0	27
06:00	0	3	24	35	35	7	1	0	0	0	0	0	0	0	0	105
07:00	2	14	58	93	85	12	1	0	0	0	0	0	0	0	0	265
08:00	1	41	194	251	136	14	1	0	0	0	0	0	0	0	0	628
09:00	1	22	191	298	158	22	0	1	0	0	0	0	0	0	0	693
10:00	0	19	157	245	116	25	3	0	0	0	0	0	0	0	0	545
11:00	3	17	136	236	125	17	0	0	0	0	0	0	0	0	0	534
-----																
DAY TOTAL	7	131	776	1197	630	116	8	1	1	0	0	0	0	0	0	2927
PERCENTS	0.3%	4.5%	26.6%	40.9%	23.6%	3.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 25.9 mph

85th Percentile Speed  
 36.7 mph

Median Speed  
 31.3 mph

Average Speed  
 31.3 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 1973 vehicles in pace  
 Representing 67.4% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SURVEY  
 Mon 4/11/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF FARSONS DR.  
 Direction: SOUTH  
 Lane: 2

STA. 153

File: SFD1-0102.prn  
 City: WINNIN SQUARE STUDY  
 County: SPEED N6S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
13:00	2	31	108	246	174	18	3	0	0	0	0	0	0	0	0	582
14:00	3	22	144	279	137	20	1	0	0	0	0	0	0	0	0	605
15:00	1	38	149	290	104	14	3	0	0	0	0	0	0	0	0	586
16:00	7	32	168	295	171	22	2	0	0	0	0	0	0	0	0	667
17:00	5	40	174	317	136	11	0	0	0	0	0	0	0	0	0	661
18:00	5	35	160	310	160	14	0	0	0	0	0	0	0	0	0	704
19:00	2	51	147	233	140	18	0	0	0	0	0	0	0	0	0	591
20:00	2	9	114	220	108	16	1	0	0	0	0	0	0	0	0	470
21:00	1	28	76	140	86	13	0	0	0	0	0	0	0	0	0	344
22:00	0	4	61	119	86	17	2	0	0	0	0	0	0	0	0	289
23:00	1	2	16	62	39	11	3	1	0	0	0	0	0	0	0	135
24:00	1	2	14	25	31	5	1	0	0	0	0	0	0	0	0	77
DAY TOTAL	30	292	1351	2515	1372	179	13	1	0	0	0	0	0	0	0	5753
PERCENTS	3.6%	5.1%	23.5%	43.7%	23.8%	3.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
26.0 mph

85th Percentile Speed  
36.6 mph

Median Speed  
31.4 mph

Average Speed  
31.3 mph

10 MPH Pace Speed  
29 mph to 39 mph  
3687 vehicles in pace  
Representing 67.5% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: SOUTH  
 Lane: 2

File: SPD1-0102.prn  
 City: VINNIE SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	2	9	12	8	1	0	0	1	0	0	0	0	0	33
02:00	0	0	3	5	6	5	0	0	0	0	0	0	0	0	0	19
03:00	0	0	0	5	5	1	3	0	0	0	0	0	0	0	0	14
04:00	0	0	0	4	11	6	0	1	0	0	0	0	0	0	0	22
05:00	1	2	6	5	18	8	2	1	0	0	0	0	0	0	0	43
06:00	1	0	13	47	78	25	4	0	0	0	0	0	0	0	0	168
07:00	1	9	99	301	226	33	5	0	0	0	0	0	0	0	0	674
08:00	11	23	202	452	248	13	0	0	0	0	0	0	0	0	0	949
09:00	2	21	163	360	176	18	2	0	0	0	0	0	0	0	0	742
10:00	0	13	99	213	137	29	1	0	0	0	0	0	0	0	0	492
11:00	4	27	111	205	139	19	2	0	0	0	0	0	0	0	0	507
12:00	0	20	93	253	162	17	3	0	0	0	0	0	0	0	0	548
13:00	1	27	180	283	106	17	0	0	0	0	0	0	0	0	0	614
14:00	5	31	181	300	115	14	1	0	0	0	0	0	0	0	0	647
15:00	5	19	145	289	145	15	0	0	0	0	0	0	0	0	0	618
16:00	2	39	180	272	179	10	1	0	0	0	0	0	0	0	0	683
17:00	8	39	171	248	143	20	1	0	0	0	0	0	0	0	0	630
18:00	5	23	175	289	170	11	3	0	0	0	0	0	0	0	0	676
19:00	3	21	128	271	152	16	0	0	0	0	0	0	0	0	0	591
20:00	0	26	94	214	121	24	3	0	0	0	0	0	0	0	0	482
21:00	3	5	63	167	96	11	2	0	0	0	0	0	0	0	0	347
22:00	0	5	61	119	96	22	0	0	0	0	0	0	0	0	0	303
23:00	0	3	17	71	49	10	1	0	0	0	0	0	0	0	0	151
24:00	0	0	10	24	41	18	3	0	0	1	0	0	0	0	0	97

DAY TOTAL	52	353	2196	4406	2631	370	39	2	0	2	0	0	0	0	0	10050
PERCENTS	0.6%	3.6%	21.9%	43.9%	26.1%	3.6%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
26.5 mph

85th Percentile Speed  
36.9 mph

Median Speed  
31.8 mph

Average Speed  
31.7 mph

10 MPH Pace Speed  
29 mph to 39 mph  
7037 vehicles in pace  
Representing 70.0% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000795  
 Site ID: 110000000101  
 Location: RTE. 1 SOUTH OF PARSONS DR.  
 Direction: SOUTH  
 Lane: 2

File: SPD1-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	5	16	14	8	2	1	0	0	0	0	0	0	0	46
02:00	0	1	4	11	9	2	1	0	0	0	0	0	0	0	0	27
03:00	0	0	0	3	5	3	2	0	0	0	0	0	0	0	0	13
04:00	0	0	2	3	13	8	1	0	0	0	0	0	0	0	0	27
05:00	0	1	1	7	16	16	6	3	0	0	0	0	0	0	0	44
06:00	2	1	15	47	88	30	10	0	0	0	0	0	0	0	0	193
07:00	5	1	48	227	336	52	4	0	0	0	0	0	0	0	0	673
08:00	12	31	160	448	239	20	2	0	0	0	0	0	0	0	0	912
09:00	2	17	86	362	223	35	1	0	0	0	0	0	0	0	0	726
10:00	3	9	63	208	214	31	3	0	0	0	0	0	0	0	0	531
11:00	2	16	87	219	189	31	3	0	0	0	0	0	0	0	0	547
12:00	7	20	198	240	157	27	2	0	0	0	0	0	0	0	0	561
13:00	8	13	136	269	161	24	1	0	0	1	0	0	0	0	0	613
14:00	6	29	92	251	197	16	3	0	0	0	0	0	0	0	0	594
15:00	11	29	172	253	174	12	3	0	0	0	0	0	0	0	0	654
16:00	15	38	173	284	181	20	3	1	0	0	0	0	0	0	0	715
17:00	19	26	132	324	172	30	1	0	1	0	0	0	0	0	0	705
18:00	4	51	203	311	133	13	0	0	0	0	0	0	0	0	0	715
19:00	1	21	152	260	132	9	1	0	0	0	0	0	0	0	0	576
20:00	3	20	119	225	123	14	2	0	0	0	0	0	0	0	0	506
21:00	1	16	76	220	97	11	1	0	0	0	0	0	0	0	0	422
22:00	1	9	62	137	63	12	3	1	0	0	0	0	0	0	0	288
23:00	0	4	14	63	67	10	2	1	0	0	0	0	0	0	0	161
24:00	0	1	7	27	31	17	1	0	0	0	0	0	0	0	0	84
DAY TOTAL	102	354	1917	4415	3033	445	58	7	1	1	0	0	0	0	0	10333
PERCENTS	1.0%	3.5%	19.6%	42.8%	29.3%	4.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 26.9 mph

85th Percentile Speed  
 37.3 mph

Median Speed  
 32.2 mph

Average Speed  
 32.0 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 7448 vehicles in pace  
 Representing 72.0% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000795  
 Site ID: 116000000101  
 Location: RTE. 1 SOUTH OF FARSONS DR.  
 Direction: SOUTH  
 Lane: 2

File: SPD1-0102.ppt  
 City: WINNIE SQUARE STUDY  
 County: SPEED N43

TIME	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85+	Total
01:00	0	0	4	10	21	12	0	0	0	0	0	0	0	0	0	47
02:00	0	0	2	10	13	9	1	0	0	0	0	0	0	0	0	35
03:00	0	0	0	4	12	0	0	0	0	0	0	0	0	0	0	16
04:00	0	0	3	7	11	8	0	0	0	0	0	0	0	0	0	29
05:00	0	0	1	9	22	15	2	0	0	0	0	0	0	0	0	48
06:00	1	0	10	49	74	45	8	0	0	0	0	0	0	0	0	187
07:00	1	1	48	237	309	66	3	1	0	0	0	0	0	0	0	666
08:00	6	21	148	471	276	23	3	0	0	0	0	0	0	0	0	948
09:00	3	11	133	345	238	20	1	0	0	0	0	0	0	0	0	751
10:00	1	21	65	195	198	26	2	0	0	0	0	0	0	0	0	498
11:00	3	19	84	220	173	25	2	0	0	0	0	0	0	0	0	526
-----																
DAY TOTAL	15	73	498	1546	1347	249	22	1	0	0	0	0	0	0	0	3751
PERCENTS	0.4%	2.0%	13.3%	41.3%	35.9%	6.6%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 29.6 mph

85th Percentile Speed  
 37.9 mph

Median Speed  
 33.2 mph

Average Speed  
 33.1 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 2893 vehicles in pace  
 Representing 77.1% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

STA. 2 NB

Site Reference: 16007C000373  
 Site ID: 11000000201  
 Location: RTE. 1A SOUTH OF LEGGS HILL RD.  
 Direction: NORTH  
 Lane: 1

File: SPD-202.prn  
 City: VINNIN SQUARE STUDY  
 County: SPOON NB

TIME	15	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
14:00	47	9	9	57	288	164	22	5	2	0	3	0	1	0	2	608
15:00	39	1	3	99	333	152	15	2	0	0	0	0	4	1	0	638
16:00	42	9	21	150	324	140	18	1	0	1	2	2	2	1	4	717
17:00	50	9	11	81	342	161	22	2	0	0	1	0	2	1	0	682
18:00	46	2	11	81	327	203	21	2	1	0	0	0	6	0	1	701
19:00	19	5	1	70	383	172	30	4	1	0	0	0	1	3	0	688
20:00	14	1	5	62	262	155	19	1	0	0	0	0	0	0	2	521
21:00	7	1	5	59	188	86	22	1	0	0	2	0	0	2	0	393
22:00	5	0	8	46	116	83	21	6	2	0	0	0	0	0	0	297
23:00	0	0	5	20	80	70	15	0	0	0	0	0	0	0	0	190
24:00	0	1	0	10	48	30	14	2	0	0	0	0	0	0	0	105
DAY TOTAL	267	38	78	735	2691	1416	219	26	6	1	8	2	16	8	9	5520
PERCENTS	4.9%	0.7%	1.5%	13.4%	48.8%	25.7%	4.0%	0.4%	0.1%	0.0%	0.1%	0.0%	0.2%	0.1%	0.1%	100%

Statistical Information...

15th Percentile Speed  
32.0 mph

85th Percentile Speed  
42.1 mph

Median Speed  
37.1 mph

Average Speed  
36.3 mph

10 MPH Pace Speed  
34 mph to 44 mph  
4187 vehicles in pace  
Representing 76.4% of the total vehicles

Vehicles > 65 MPH  
43  
0.8%

SB - NO DATA

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000873  
 Site ID: 110000000201  
 Location: RTE. 1A SOUTH OF LEGGS HILL RD.  
 Direction: NORTH  
 Lane: 1

File: SPD-202.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED NB

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	2	8	29	18	2	1	0	0	0	0	0	0	0	60
02:00	0	0	0	3	9	7	7	0	0	0	0	0	0	0	0	26
03:00	0	0	0	2	2	6	0	1	0	0	0	1	0	0	0	12
04:00	0	0	0	4	3	4	3	3	0	0	0	0	0	0	0	17
05:00	1	0	1	5	13	6	6	1	0	0	0	0	0	0	0	33
06:00	2	0	2	23	48	50	11	5	0	0	0	0	0	0	0	141
07:00	15	0	3	31	167	100	36	3	0	0	0	0	0	0	0	355
08:00	38	12	38	140	329	138	23	0	0	0	0	0	0	0	0	718
09:00	25	0	4	106	329	181	13	0	0	0	0	3	0	2	2	665
10:00	29	6	5	77	280	170	17	0	3	0	1	0	0	0	0	588
11:00	13	3	12	114	269	116	15	1	0	0	0	2	0	0	0	545
12:00	17	0	10	82	260	145	18	2	0	0	0	2	0	0	0	536
13:00	5	1	6	103	315	148	23	3	0	0	0	0	0	2	0	606
14:00	21	1	11	102	288	134	17	2	0	1	0	0	0	0	2	579
15:00	8	0	22	111	324	157	17	3	2	0	0	0	0	0	1	645
16:00	25	2	23	91	319	175	28	2	0	0	0	0	0	0	1	666
17:00	11	1	19	113	341	140	18	0	0	1	2	1	0	0	0	647
18:00	29	2	24	146	412	172	26	2	0	0	0	0	4	0	0	817
19:00	20	1	6	75	321	203	19	4	0	1	0	0	1	3	1	655
20:00	7	1	3	68	242	139	20	4	0	0	0	0	0	0	2	486
21:00	4	0	3	56	196	91	21	0	0	0	0	0	0	0	0	371
22:00	1	0	4	48	169	99	11	2	2	0	0	0	0	0	0	336
23:00	0	1	0	22	72	60	15	3	0	0	0	0	0	0	0	173
24:00	0	0	2	14	51	42	16	1	0	0	0	0	0	0	0	126
DAY TOTAL	271	31	200	1544	4788	2501	382	43	7	3	3	9	5	7	9	9803
PERCENTS	2.8%	0.4%	2.1%	15.8%	48.9%	25.6%	3.9%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
32.1 mph

85th Percentile Speed  
42.0 mph

Median Speed  
37.0 mph

Average Speed  
36.6 mph

10 MPH Pace Speed  
34 mph to 44 mph  
7289 vehicles in pace  
Representing 74.3% of the total vehicles

Vehicles > 65 MPH  
33  
0.3%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000873  
 Site ID: 110000000201  
 Location: RTE. 1A SOUTH OF LEGGS HILL RD.  
 Direction: NORTH  
 Lane: 1

File: SPD-202.prn  
 City: VINMIN SQUARE STUDY  
 County: SPEED NB

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	85+	Tota
01:00	0	0	1	5	25	23	12	1	0	0	0	0	0	0	0	67
02:00	1	1	2	1	16	6	2	0	0	0	0	0	0	0	0	29
03:00	0	0	0	0	4	6	4	1	0	0	0	0	0	0	0	15
04:00	0	0	1	0	2	2	4	2	1	0	0	0	0	0	0	12
05:00	0	0	3	5	11	10	5	3	0	0	0	0	0	0	0	37
06:00	0	0	0	15	49	42	29	3	0	0	0	0	0	0	0	138
07:00	3	0	1	20	147	132	34	3	1	0	0	0	0	0	0	341
08:00	24	15	25	93	353	185	34	3	0	0	0	2	0	2	1	737
09:00	31	0	9	44	335	243	33	4	2	2	0	0	0	4	0	707
10:00	38	3	7	63	268	200	24	1	3	3	6	0	0	2	0	618
11:00	55	5	8	43	266	160	14	3	0	0	0	0	0	2	0	556
12:00	24	7	48	240	233	40	2	0	0	0	0	1	0	0	0	595
13:00	13	8	76	275	208	39	1	0	0	0	0	1	0	0	1	622
14:00	23	26	109	269	153	39	1	3	0	0	3	2	0	3	0	631
15:00	69	0	4	85	252	153	27	2	1	0	6	3	2	2	3	609
16:00	112	12	17	116	270	123	24	2	0	2	2	0	0	0	1	681
17:00	100	0	3	73	331	166	17	3	2	0	2	0	2	3	1	703
18:00	70	1	1	101	336	199	18	0	0	2	1	1	0	6	4	740
19:00	22	0	11	85	359	204	34	0	0	0	0	0	2	0	1	718
20:00	10	1	5	87	305	135	15	0	0	0	0	0	0	0	0	558
21:00	0	1	15	85	191	91	11	1	0	0	0	0	0	0	0	395
22:00	2	0	6	52	160	75	9	0	2	0	0	0	0	0	0	306
23:00	0	0	5	33	94	62	12	3	0	0	0	0	0	0	0	209
24:00	0	0	0	22	48	48	12	6	0	0	0	0	0	0	0	136

DAY TOTAL	597	80	357	1812	4416	2383	378	44	12	9	20	10	6	24	12	10160
PERCENTS	5.9%	0.8%	3.6%	17.9%	43.5%	23.5%	3.8%	0.5%	0.1%	0.0%	0.1%	0.0%	0.0%	0.2%	0.1%	100%

Statistical Information...

15th Percentile Speed  
30.4 mph

85th Percentile Speed  
41.9 mph

Median Speed  
36.5 mph

Average Speed  
35.5 mph

10 MPH Pace Speed  
34 mph to 44 mph  
6799 vehicles in pace  
Representing 66.9% of the total vehicles

Vehicles > 65 MPH  
72  
0.7%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160370000873  
 Site ID: 110300000201  
 Location: RTE. 1A SOUTH OF LEGGS HILL RD.  
 Direction: NORTH  
 Lane: 1

File: SPD-202.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED NB

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	96+	Total
01:00	0	0	1	5	21	24	7	3	0	2	2	0	0	0	0	65
02:00	0	0	0	3	10	11	4	3	0	0	0	0	0	0	0	38
03:00	0	0	0	3	6	7	1	0	0	0	0	0	0	0	0	17
04:00	0	1	1	3	3	12	2	1	0	0	0	0	0	0	0	23
05:00	0	0	1	1	6	6	3	2	2	0	0	0	0	0	0	21
06:00	1	2	1	11	57	47	18	7	0	1	0	0	0	0	0	145
07:00	8	0	6	56	123	107	38	4	0	0	0	0	0	0	0	342
08:00	29	2	13	76	317	252	52	0	0	0	0	0	0	2	1	744
09:00	45	6	16	66	325	225	20	6	1	1	0	0	0	1	3	715
10:00	42	0	1	55	268	176	23	3	0	0	0	0	0	1	1	570
DAY TOTAL	125	11	40	234	1136	867	168	31	3	4	2	0	0	4	5	2680
PERCENTS	4.7%	0.5%	1.5%	10.6%	42.4%	32.4%	6.3%	1.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	100%

Statistical Information...

15th Percentile Speed  
33.8 mph

85th Percentile Speed  
42.9 mph

Median Speed  
37.9 mph

Average Speed  
37.1 mph

10 MPH Pace Speed  
34 mph to 44 mph  
2003 vehicles in pace  
Representing 74.7% of the total vehicles

Vehicles > 65 MPH  
11  
0.4%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Site Reference: 1600TC000783  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: ROAD TOTAL

STA. 3  
 TOTAL

File: SPD-3-0102.prn  
 City: WINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
14:00	39	49	209	479	258	47	5	0	0	0	0	0	0	0	0	1086
15:00	53	98	305	592	269	20	2	0	0	0	0	0	0	0	0	1279
16:00	82	92	293	616	239	28	1	0	0	0	0	0	0	0	0	1341
17:00	79	116	308	657	268	24	4	1	0	0	0	0	0	0	0	1457
18:00	30	49	237	632	349	50	1	0	0	0	0	0	0	0	0	1349
19:00	27	45	241	547	329	31	6	0	0	0	0	0	0	0	0	1225
20:00	12	25	148	391	240	33	4	1	0	0	0	0	0	0	0	854
21:00	1	7	70	274	157	36	5	2	0	0	0	0	0	0	0	552
22:00	0	7	57	178	158	39	2	3	0	0	0	0	0	0	0	441
23:00	2	1	33	86	89	31	2	2	0	0	0	0	0	0	0	247
24:00	0	0	15	57	54	20	2	0	0	0	0	0	0	0	0	148
DAY TOTAL	325	461	1916	4509	2348	359	34	6	0	0	0	0	0	0	0	9979
PERCENTS	3.3%	4.9%	19.3%	45.2%	23.5%	3.5%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 25.8 mph

85th Percentile Speed  
 36.7 mph

Median Speed  
 31.5 mph

Average Speed  
 31.0 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 6857 vehicles in pace  
 Representing 68.7% of the total vehicles

Vehicles > 45 MPH  
 1  
 0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: ROAD TOTAL

File: SPD-3-0102.prn  
 City: WINNIE SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	3	23	18	10	3	0	0	0	0	0	0	0	0	57
02:00	0	0	5	10	7	5	0	1	0	0	0	0	0	0	0	28
03:00	0	0	0	7	7	4	1	0	0	0	0	0	0	0	0	19
04:00	0	0	2	8	12	5	1	0	0	0	0	0	0	0	0	29
05:00	0	0	7	9	21	14	3	0	0	0	0	0	0	0	0	54
06:00	0	2	15	77	107	44	7	1	0	0	0	0	0	0	0	253
07:00	1	7	67	245	252	83	9	0	0	0	0	0	0	0	0	664
08:00	66	77	310	553	270	30	3	0	0	0	0	0	0	0	0	1309
09:00	49	59	252	564	240	33	2	0	0	0	0	0	0	0	0	1199
10:00	27	52	191	470	310	27	3	0	0	0	0	0	0	0	0	1080
11:00	26	28	273	479	212	35	1	0	0	0	0	0	0	0	0	1054
12:00	25	59	254	510	200	24	1	0	0	0	0	0	0	0	1	1074
13:00	29	75	381	523	181	21	0	0	0	0	0	0	0	0	0	1210
14:00	28	73	292	502	184	17	1	0	0	0	0	0	0	0	0	1097
15:00	57	60	331	500	196	16	1	0	0	0	0	0	0	0	0	1161
16:00	77	67	338	504	215	29	3	0	0	0	0	0	0	0	0	1233
17:00	76	112	350	589	238	23	2	1	0	0	2	0	0	0	0	1393
18:00	26	68	213	730	331	34	3	0	0	0	0	0	0	0	0	1405
19:00	25	42	227	536	314	44	3	0	0	0	0	0	0	0	0	1191
20:00	10	20	141	425	246	28	3	1	0	0	0	0	0	0	0	874
21:00	0	18	70	308	194	30	3	1	0	0	0	0	0	0	0	624
22:00	2	9	45	213	149	30	2	1	0	0	0	0	0	0	0	451
23:00	1	1	23	121	108	23	2	1	1	0	0	0	0	0	0	281
24:00	0	1	10	48	65	15	4	1	0	0	0	0	0	0	0	144
DAY TOTAL	525	830	3800	7954	4077	624	61	8	1	0	2	0	0	0	1	17883
PERCENTS	3.0%	4.7%	21.3%	44.5%	22.8%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
25.8 mph

85th Percentile Speed  
36.6 mph

Median Speed  
31.4 mph

Average Speed  
30.9 mph

10 MPH Pace Speed  
29 mph to 39 mph  
12031 vehicles in pace  
Representing 67.2% of the total vehicles

Vehicles > 65 MPH  
3  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000780  
 Site ID: 11D000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: ROAD TOTAL

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	5	18	27	5	5	3	0	0	1	0	0	0	0	64
02:00	0	0	0	8	7	4	0	0	0	0	0	0	0	0	0	19
03:00	0	0	1	8	8	2	1	0	0	0	0	0	0	0	0	20
04:00	0	0	3	4	10	3	2	0	0	0	0	0	0	0	0	22
05:00	0	0	4	10	23	14	2	2	0	0	0	0	0	0	0	55
06:00	0	2	17	52	111	54	8	0	0	0	0	0	0	0	0	244
07:00	1	12	75	206	269	93	6	3	0	0	0	0	0	0	0	665
08:00	21	53	270	600	334	38	6	0	0	0	0	0	0	0	0	1322
09:00	22	51	153	531	364	52	5	0	0	0	0	0	0	0	0	1178
10:00	31	31	161	475	320	44	6	0	0	0	0	0	0	0	0	1068
11:00	27	45	178	504	266	51	4	1	0	0	0	0	0	0	0	1076
12:00	20	37	190	540	318	46	4	0	0	0	0	0	0	0	0	1155
13:00	63	77	219	570	283	33	1	0	0	1	0	2	0	0	2	1251
14:00	28	60	294	511	281	35	3	0	0	2	0	0	0	0	2	1216
15:00	94	98	338	560	201	30	3	1	1	0	0	0	0	0	0	1326
16:00	76	46	235	562	304	53	4	0	0	2	0	0	0	0	4	1286
17:00	70	63	261	607	354	53	7	0	0	0	0	2	0	0	2	1419
18:00	81	95	279	607	293	44	2	2	0	0	0	0	0	2	0	1405
19:00	49	46	229	571	249	39	5	1	0	0	0	0	0	0	0	1189
20:00	3	25	158	481	205	33	7	0	0	0	0	0	0	0	0	912
21:00	1	16	75	317	197	24	5	1	0	0	0	0	0	0	0	636
22:00	1	2	68	217	188	24	3	1	0	0	0	0	0	0	0	504
23:00	3	8	19	132	118	26	3	2	0	0	0	0	0	0	0	311
24:00	0	0	6	70	71	25	4	0	0	0	0	0	0	0	0	176
DAY TOTAL	591	767	3238	8161	4801	825	96	17	1	5	1	4	0	2	10	18519
PERCENTS	3.2%	4.2%	17.5%	44.1%	26.0%	4.5%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
26.2 mph

85th Percentile Speed  
37.1 mph

Median Speed  
31.9 mph

Average Speed  
31.4 mph

10 MPH Pace Speed  
29 mph to 39 mph  
12962 vehicles in pace  
Representing 69.9% of the total vehicles

Vehicles > 65 MPH  
17  
0.1%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2015

Site Reference: 16007000790  
 Site ID: 110090000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: ROAD TOTAL

File: SPD-3-C102.prn  
 City: VIKING SQUARE STUDY  
 County: SPEED N&S

TIME	15	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	7	31	21	7	1	1	0	0	0	0	0	0	0	74
02:00	0	0	3	16	9	4	1	1	0	0	0	0	0	0	0	36
03:00	1	0	2	5	5	7	0	0	0	0	0	0	0	0	0	20
04:00	0	0	4	8	15	4	1	0	0	0	0	0	0	0	0	32
05:00	0	0	4	13	17	11	2	3	0	0	0	0	0	0	0	50
06:00	0	3	16	53	94	52	9	2	0	0	0	0	0	0	0	229
07:00	2	7	47	221	260	90	12	0	0	0	0	0	0	0	0	629
08:00	52	43	243	538	381	55	4	0	0	0	0	0	0	0	0	1316
09:00	16	33	193	570	370	56	10	0	0	0	0	0	0	0	0	1248
10:00	13	19	126	506	319	46	5	0	2	0	0	0	0	0	0	1036
DAY TOTAL	84	105	645	1963	1497	322	45	7	2	0	0	0	0	0	0	4670
PERCENTS	1.8%	2.1%	13.9%	42.1%	32.1%	6.8%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 23.0 mph

85th Percentile Speed  
 37.9 mph

Median Speed  
 32.8 mph

Average Speed  
 32.7 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 3450 vehicles in pace  
 Representing 74.0% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

STA. 3 NB

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: NORTH  
 Lane: 1

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
14:00	1	16	105	263	146	26	1	0	0	0	0	0	0	0	0	558
15:00	3	44	165	356	92	3	2	0	0	0	0	0	0	0	0	665
16:00	8	20	151	379	116	14	1	0	0	0	0	0	0	0	0	689
17:00	6	35	147	389	142	16	2	1	0	0	0	0	0	0	0	738
18:00	1	15	121	408	187	20	0	0	0	0	0	0	0	0	1	753
19:00	5	15	125	325	188	20	4	0	0	0	0	0	0	0	0	682
20:00	4	6	92	243	146	15	1	1	0	0	0	0	0	0	0	508
21:00	1	2	39	177	82	21	3	1	0	0	0	0	0	0	0	326
22:00	0	4	35	97	74	19	1	0	0	0	0	0	0	0	0	230
23:00	2	2	15	44	56	14	1	1	0	0	0	0	0	0	0	135
24:00	0	0	7	28	30	6	1	0	0	0	0	0	0	0	0	72
-----																
DAY TOTAL	31	159	1002	2709	1259	174	17	4	0	0	0	0	0	0	1	5356
PERCENTS	0.6%	3.0%	18.8%	50.6%	23.5%	3.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 27.1 mph

Median Speed  
 31.8 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 3968 vehicles in pace  
 Representing 74.0% of the total vehicles

85th Percentile Speed  
 36.6 mph

Average Speed  
 31.7 mph

Vehicles > 65 MPH  
 1  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: NORTH  
 Lane: 1

File: SPD-3-0102.prn  
 City: VINNIK SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	3	16	6	4	0	0	0	0	0	0	0	0	0	29
02:00	0	0	4	4	4	3	0	0	0	0	0	0	0	0	0	15
03:00	0	0	0	5	2	3	0	0	0	0	0	0	0	0	0	10
04:00	0	0	0	2	6	3	0	0	0	0	0	0	0	0	0	11
05:00	0	0	3	2	11	4	2	0	0	0	0	0	0	0	0	22
06:00	0	0	8	40	36	19	4	1	0	0	0	0	0	0	0	108
07:00	1	0	33	118	105	32	5	0	0	0	0	0	0	0	0	294
08:00	1	14	171	291	126	16	2	0	0	0	0	0	0	0	0	621
09:00	1	2	115	329	131	18	0	0	0	0	0	0	0	0	0	596
10:00	0	8	90	245	158	18	1	0	0	0	0	0	0	0	0	520
11:00	0	4	139	252	111	16	1	0	0	0	0	0	0	0	0	522
12:00	0	11	107	295	106	9	0	0	0	0	0	0	0	0	0	528
13:00	0	18	225	302	88	10	0	0	0	0	0	0	0	0	0	643
14:00	2	13	143	271	85	10	0	0	0	0	0	0	0	0	0	529
15:00	1	8	196	298	104	4	0	0	0	0	0	0	0	0	0	611
16:00	0	12	196	285	110	14	1	0	0	0	0	0	0	0	0	618
17:00	3	36	181	341	121	11	2	0	0	0	1	0	0	0	0	696
18:00	1	21	108	441	192	23	0	0	0	0	0	0	0	0	0	786
19:00	0	6	112	347	171	34	2	0	0	0	0	0	0	0	0	672
20:00	0	9	87	257	125	9	1	0	0	0	0	0	0	0	0	488
21:00	0	8	34	166	122	15	1	0	0	0	0	0	0	0	0	346
22:00	0	4	22	119	87	20	1	1	0	0	0	0	0	0	0	254
23:00	1	1	13	60	61	15	1	1	1	0	0	0	0	0	0	154
24:00	0	1	8	26	30	9	2	0	0	0	0	0	0	0	0	76

DAY TOTAL	11	176	2002	4512	2098	319	26	3	1	0	1	0	0	0	0	9149
PERCENTS	0.2%	2.0%	21.9%	49.4%	22.9%	3.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.0 mph

85th Percentile Speed  
36.6 mph

Median Speed  
31.7 mph

Average Speed  
31.7 mph

10 MPH Pace Speed  
29 mph to 39 mph  
6610 vehicles in pace  
Representing 72.2% of the total vehicles

Vehicles > 65 MPH  
1  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: NORTH  
 Lane: 1

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	1	10	18	1	3	3	0	0	0	0	0	0	0	36
02:00	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	8
03:00	0	0	0	4	4	2	1	0	0	0	0	0	0	0	0	11
04:00	0	0	1	1	4	2	2	0	0	0	0	0	0	0	0	10
05:00	0	0	2	6	8	8	2	1	0	0	0	0	0	0	0	27
06:00	0	1	9	18	40	25	4	0	0	0	0	0	0	0	0	97
07:00	0	2	34	84	106	42	2	3	0	0	0	0	0	0	0	273
08:00	1	11	120	331	184	18	3	0	0	0	0	0	0	0	0	668
09:00	1	11	62	278	214	36	3	0	0	0	0	0	0	0	0	605
10:00	10	9	61	216	178	27	4	0	0	0	0	0	0	0	0	505
11:00	6	20	84	263	134	24	3	0	0	0	0	0	0	0	0	534
12:00	1	8	75	291	163	29	2	0	0	0	0	0	0	0	0	569
13:00	4	21	99	332	162	23	0	0	0	0	0	0	0	0	0	641
14:00	0	7	163	261	150	20	3	0	0	0	0	0	0	0	0	604
15:00	3	24	194	354	112	14	2	0	0	0	0	0	0	0	0	703
16:00	0	4	90	329	184	32	1	0	0	0	0	0	0	0	0	640
17:00	2	9	131	329	220	30	2	0	0	0	0	0	0	0	0	723
18:00	1	15	162	382	178	27	1	0	0	0	0	0	0	2	0	768
19:00	4	4	133	375	150	20	3	1	0	0	0	0	0	0	0	690
20:00	0	3	104	317	97	15	3	0	0	0	0	0	0	0	0	539
21:00	1	7	39	193	112	10	2	1	0	0	0	0	0	0	0	365
22:00	1	2	38	121	102	11	1	1	0	0	0	0	0	0	0	277
23:00	0	1	13	69	58	14	3	1	0	0	0	0	0	0	0	159
24:00	0	0	5	32	37	15	0	0	0	0	0	0	0	0	0	89
DAY TOTAL	35	159	1620	4600	2619	445	50	11	0	0	0	0	0	2	0	9541
PERCENTS	0.4%	1.7%	17.0%	48.3%	27.4%	4.6%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 27.8 mph

85th Percentile Speed  
 37.2 mph

Median Speed  
 32.2 mph

Average Speed  
 32.4 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 7219 vehicles in pace  
 Representing 75.6% of the total vehicles

Vehicles > 65 MPH  
 2  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000780  
 Site ID: 110003000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: NORTH  
 Lane: 1

File: SPD-3-0102.prm  
 City: WINNIE SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	95+	Total
01:00	0	0	5	17	19	2	1	0	0	0	0	0	0	0	0	44
02:00	0	0	2	11	1	1	1	0	0	0	0	0	0	0	0	16
03:00	0	0	0	3	1	6	0	0	0	0	0	0	0	0	0	10
04:00	0	0	2	5	3	3	0	0	0	0	0	0	0	0	0	18
05:00	0	0	1	5	10	5	0	3	0	0	0	0	0	0	0	24
06:00	0	1	6	22	39	18	7	2	0	0	0	0	0	0	0	95
07:00	0	3	16	109	100	35	9	0	0	0	0	0	0	0	0	271
08:00	2	10	119	313	200	25	0	0	0	0	0	0	0	0	0	669
09:00	1	2	80	324	214	32	2	0	0	0	0	0	0	0	0	655
10:00	1	0	46	275	156	21	0	0	2	0	0	0	0	0	0	501
DAY TOTAL	4	13	279	1094	748	143	20	5	2	0	0	0	0	0	0	2303
PERCENTS	0.2%	0.5%	12.2%	47.1%	32.5%	6.4%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 29.2 mph

85th Percentile Speed  
 37.9 mph

Median Speed  
 33.0 mph

Average Speed  
 33.3 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 1812 vehicles in pace  
 Representing 79.5% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 6/11/2016

STA-35B

Site Reference: 160C7000078C  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: SOUTH  
 Lane: 2

File: SPD-3-0102.prr  
 City: VENKIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
14:00	38	33	104	216	112	21	4	0	0	0	0	0	0	0	0	528
15:00	50	54	140	236	117	17	0	0	0	0	0	0	0	0	0	614
16:00	74	62	142	237	123	14	0	0	0	0	0	0	0	0	0	652
17:00	73	81	161	268	126	8	2	0	0	0	0	0	0	0	0	719
18:00	29	34	116	224	162	30	1	0	0	0	0	0	0	0	0	596
19:00	22	30	116	222	140	11	2	0	0	0	0	0	0	0	0	543
20:00	8	19	56	148	94	18	3	0	0	0	0	0	0	0	0	346
21:00	0	5	31	97	75	15	2	1	0	0	0	0	0	0	0	226
22:00	0	3	22	81	84	20	1	0	0	0	0	0	0	0	0	211
23:00	0	1	18	42	32	17	1	1	0	0	0	0	0	0	0	112
24:00	0	0	6	29	24	14	1	0	0	0	0	0	0	0	0	76
DAY TOTAL	294	322	914	1800	1069	185	17	2	0	0	0	0	0	0	0	4623
PERCENTS	6.4%	7.0%	19.8%	39.8%	23.3%	4.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
24.4 mph

85th Percentile Speed  
36.8 mph

Median Speed  
31.2 mph

Average Speed  
30.1 mph

10 MPH Pace Speed  
29 mph to 39 mph  
2889 vehicles in pace  
Representing 62.4% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: SOUTH  
 Lane: 2

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	96+	Total
01:00	0	0	0	7	12	6	3	0	0	0	0	0	0	0	0	28
02:00	0	0	1	6	3	2	0	1	0	0	0	0	0	0	0	13
03:00	0	0	0	2	5	1	1	0	0	0	0	0	0	0	0	9
04:00	0	0	2	6	6	2	1	0	0	0	0	0	0	0	0	17
05:00	0	0	4	7	10	10	1	0	0	0	0	0	0	0	0	32
06:00	0	2	7	37	71	25	3	0	0	0	0	0	0	0	0	145
07:00	0	7	34	127	147	51	4	0	0	0	0	0	0	0	0	370
08:00	65	63	139	262	144	14	1	0	0	0	0	0	0	0	0	688
09:00	48	57	137	235	109	15	2	0	0	0	0	0	0	0	0	603
10:00	27	44	101	225	152	9	2	0	0	0	0	0	0	0	0	560
11:00	26	24	135	227	101	19	0	0	0	0	0	0	0	0	0	532
12:00	25	49	147	215	94	15	1	0	0	0	0	0	0	0	0	546
13:00	29	57	156	221	93	11	0	0	0	0	0	0	0	0	0	567
14:00	26	63	144	231	99	7	1	0	0	0	0	0	0	0	0	568
15:00	56	52	135	202	92	12	1	0	0	0	0	0	0	0	0	550
16:00	77	55	142	219	105	15	2	0	0	0	0	0	0	0	0	615
17:00	73	76	169	248	117	12	0	1	0	0	1	0	0	0	0	697
18:00	25	47	105	289	139	11	3	0	0	0	0	0	0	0	0	619
19:00	25	36	115	189	143	10	1	0	0	0	0	0	0	0	0	519
20:00	10	11	54	168	121	19	2	1	0	0	0	0	0	0	0	386
21:00	0	10	36	142	72	15	2	1	0	0	0	0	0	0	0	278
22:00	2	5	23	94	62	10	1	0	0	0	0	0	0	0	0	197
23:00	0	0	10	61	47	6	1	0	0	0	0	0	0	0	0	127
24:00	0	0	2	22	35	6	2	1	0	0	0	0	0	0	0	68

DAY TOTAL	514	654	1799	3442	1979	305	35	5	0	0	1	0	0	0	1	8734
PERCENTS	5.9%	7.5%	20.6%	39.5%	22.7%	3.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
24.4 mph

85th Percentile Speed  
36.6 mph

Median Speed  
31.3 mph

Average Speed  
30.0 mph

10 MPH Pace Speed  
29 mph to 33 mph  
5421 vehicles in pace  
Representing 62.0% of the total vehicles

Vehicles > 65 MPH  
2  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: SOUTH  
 Lane: 2

File: SPD-3-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	4	8	3	4	2	0	0	0	1	0	0	0	0	28
02:00	0	0	0	4	3	4	0	0	0	0	0	0	0	0	0	11
03:00	0	0	1	4	4	0	0	0	0	0	0	0	0	0	0	9
04:00	0	3	2	3	6	1	0	0	0	0	0	0	0	0	0	12
05:00	0	0	2	4	15	6	0	1	0	0	0	0	0	0	0	28
06:00	0	1	8	34	71	29	4	0	0	0	0	0	0	0	0	147
07:00	1	10	41	122	163	51	4	0	0	0	0	0	0	0	0	392
08:00	20	42	150	269	150	20	3	0	0	0	0	0	0	0	0	654
09:00	21	40	91	253	150	16	2	0	0	0	0	0	0	0	0	573
10:00	21	22	100	259	142	17	2	0	0	0	0	0	0	0	0	563
11:00	21	25	94	241	132	27	1	1	0	0	0	0	0	0	0	542
12:00	19	29	115	249	155	17	2	0	0	0	0	0	0	0	0	586
13:00	59	56	120	239	121	10	1	0	0	1	0	2	0	0	2	610
14:00	28	53	131	250	131	15	0	0	0	2	0	0	0	0	2	612
15:00	91	74	144	206	89	16	1	1	1	0	0	0	0	0	0	623
16:00	76	42	145	233	120	21	3	0	0	2	0	0	0	0	4	646
17:00	68	54	130	279	134	23	5	0	0	0	0	2	0	0	2	696
18:00	80	80	117	225	115	17	1	2	0	0	0	0	0	0	0	637
19:00	45	42	96	196	99	19	2	0	0	0	0	0	0	0	0	499
20:00	3	22	54	144	108	18	4	0	0	0	0	0	0	0	0	373
21:00	0	9	36	124	85	14	3	0	0	0	0	0	0	0	0	271
22:00	0	0	30	96	86	13	2	0	0	0	0	0	0	0	0	227
23:00	3	7	6	63	60	12	0	1	0	0	0	0	0	0	0	152
24:00	0	0	1	38	34	10	4	0	0	0	0	0	0	0	0	87
DAY TOTAL	556	608	1619	3561	2182	380	66	6	1	5	1	4	0	0	10	8978
PERCENTS	6.2%	6.8%	18.1%	39.7%	24.4%	4.2%	0.5%	0.3%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	100%

Statistical Information...

15th Percentile Speed  
 24.6 mph

85th Percentile Speed  
 37.0 mph

Median Speed  
 31.4 mph

Average Speed  
 30.4 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 5743 vehicles in pace  
 Representing 63.9% of the total vehicles

Vehicles > 65 MPH  
 15  
 0.2%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 1600TG000780  
 Site ID: 110000000301  
 Location: ESSEX ST., SOUTH OF CAROL WAY  
 Direction: SOUTH  
 Lane: 2

File: SPD-3-0102.pzn  
 City: WINNIN SQUARE STUDY  
 County: SPECT N43

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	2	14	8	5	0	1	0	0	0	0	0	0	0	30
02:00	0	0	1	7	8	3	0	1	0	0	0	0	0	0	0	20
03:00	1	0	2	2	4	1	0	6	0	0	0	0	0	0	0	10
04:00	0	0	2	3	7	1	1	0	0	0	0	0	0	0	0	14
05:00	0	0	3	8	7	6	2	0	0	0	0	0	0	0	0	26
06:00	0	2	10	31	55	34	2	0	0	0	0	0	0	0	0	134
07:00	2	7	29	112	160	45	3	0	0	0	0	0	0	0	0	358
08:00	50	31	124	225	181	30	4	0	0	0	0	0	0	0	0	647
09:00	15	31	113	246	156	24	8	0	0	0	0	0	0	0	0	593
10:00	12	19	80	231	163	25	5	0	0	0	0	0	0	0	0	535
DAY TOTAL	80	92	366	679	749	174	25	2	0	0	0	0	0	0	0	2367
PERCENTS	3.4%	3.9%	15.5%	28.7%	31.7%	7.3%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 26.5 mph

85th Percentile Speed  
 38.0 mph

Median Speed  
 32.7 mph

Average Speed  
 32.1 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 1628 vehicles in pace  
 Representing 68.7% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Site Reference: 16027000479  
 Site ID: 11000000431  
 Location: SALEM ST., SOUTH OF VEHNIN ST.  
 Direction: ROAD TOTAL

STA-4  
 TOTAL

File: SPD-4-0102.prs  
 City: WINNIX SQUARE STUDY  
 County: SPEED NIS

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	96+	Total
14:00	20	108	193	77	6	0	1	0	0	0	0	0	0	0	0	405
15:00	79	154	196	84	4	0	0	0	0	0	0	0	0	0	0	517
16:00	54	166	234	52	7	0	0	0	0	0	0	0	0	0	0	513
17:00	33	133	189	99	9	0	0	0	0	0	0	0	0	0	0	463
18:00	18	96	192	116	15	0	0	0	0	0	0	0	0	0	0	437
19:00	36	109	175	87	7	0	0	0	0	0	0	0	0	0	0	414
20:00	9	54	146	75	6	0	1	0	0	0	0	0	0	0	0	391
21:00	3	20	97	54	7	0	0	0	0	0	0	0	0	0	0	181
22:00	2	16	40	44	8	1	0	0	0	0	0	0	0	0	0	111
23:00	1	6	15	20	1	1	0	0	0	0	0	0	0	0	0	48
24:00	3	7	8	13	4	0	0	0	0	0	0	0	0	0	0	35
DAY TOTAL	256	679	1489	721	74	2	2	0	0	0	0	0	0	0	0	3425
PERCENTS	7.6%	25.7%	43.5%	21.1%	2.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 20.5 mph

85th Percentile Speed  
 31.0 mph

Median Speed  
 25.9 mph

Average Speed  
 25.2 mph

10 MPH Pace Speed  
 19 mph to 29 mph  
 2368 vehicles in pace  
 Representing 69.1% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: ROAD TOTAL

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	2	0	4	1	0	0	0	0	0	0	0	0	0	0	0	7
02:00	0	1	5	2	0	0	0	0	0	0	0	0	0	0	0	8
03:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
04:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:00	2	4	6	3	2	0	0	0	0	0	0	0	0	0	0	17
06:00	0	4	15	11	2	0	0	0	0	0	0	0	0	0	0	32
07:00	4	21	56	45	5	0	0	0	0	0	0	0	0	0	0	131
08:00	37	106	190	79	7	0	0	0	0	0	0	0	0	0	0	419
09:00	38	119	180	57	5	0	0	0	0	0	0	0	0	0	0	399
10:00	27	94	173	73	3	1	0	0	0	0	0	0	0	0	0	371
11:00	41	104	176	42	6	0	0	0	0	0	0	0	0	0	0	369
12:00	22	111	167	67	4	0	0	0	0	0	0	0	0	0	0	371
13:00	50	151	228	84	5	1	0	0	0	0	0	0	0	0	0	519
14:00	26	134	168	55	1	0	0	0	0	0	0	0	0	0	0	384
15:00	41	111	177	63	3	0	0	0	0	0	0	0	0	0	0	395
16:00	17	131	182	80	11	0	0	0	0	0	0	0	0	0	0	421
17:00	27	133	198	84	9	0	0	0	0	0	0	0	0	0	0	451
18:00	38	129	207	89	8	1	0	0	0	0	0	0	0	0	0	472
19:00	12	94	190	109	13	0	0	0	0	0	0	0	0	0	0	418
20:00	5	76	143	68	7	0	0	0	0	0	0	0	0	0	0	299
21:00	6	52	95	72	8	1	0	0	0	0	0	0	0	0	0	234
22:00	1	17	69	43	10	0	0	0	0	0	0	0	0	0	0	140
23:00	1	5	14	17	5	0	0	0	0	0	0	0	0	0	0	42
24:00	0	6	12	11	2	1	0	0	0	0	0	0	0	0	0	32
DAY TOTAL	397	1603	2656	1155	118	5	0	0	0	0	0	0	0	0	0	5934
PERCENTS	6.7%	27.1%	44.6%	19.5%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
20.5 mph

85th Percentile Speed  
30.7 mph

Median Speed  
25.8 mph

Average Speed  
25.2 mph

10 MPH Pace Speed  
19 mph to 29 mph  
4259 vehicles in pace  
Representing 71.7% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 16007000J479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: ROAD TOTAL

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N4S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	1	5	3	2	0	0	0	0	0	0	0	0	0	0	11
02:00	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
03:00	0	0	5	3	1	0	0	0	0	0	0	0	0	0	0	9
04:00	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	5
05:00	0	0	2	4	1	0	0	0	0	0	0	0	0	0	0	7
06:00	3	2	21	19	2	1	0	0	0	0	0	0	0	0	0	48
07:00	10	24	53	41	10	3	0	0	0	0	0	0	0	0	0	141
09:00	13	89	206	112	18	2	0	0	0	0	0	0	0	0	0	440
09:00	32	96	200	99	12	0	0	0	0	0	0	0	0	0	0	439
10:00	33	91	151	96	17	0	0	0	0	0	0	0	0	0	0	388
11:00	38	102	191	82	10	0	0	0	0	0	0	0	0	0	0	423
12:00	52	113	166	79	6	0	0	0	0	0	0	0	0	0	0	416
13:00	34	138	216	88	14	0	0	0	0	0	0	0	0	0	0	490
14:00	33	135	216	104	8	0	0	0	0	0	0	0	0	0	0	496
15:00	81	160	249	89	5	0	0	0	0	0	0	0	0	0	0	584
16:00	48	122	221	89	14	0	0	0	0	0	0	0	0	0	0	494
17:00	47	135	215	110	11	0	0	0	0	0	0	0	0	0	0	518
18:00	28	134	231	106	20	1	0	0	0	0	0	0	0	0	0	520
19:00	9	103	174	106	11	1	0	0	0	0	0	0	0	0	0	404
20:00	8	76	152	77	8	0	0	0	0	0	0	0	0	0	0	321
21:00	2	39	95	56	4	0	0	0	0	0	0	0	0	0	0	196
22:00	0	19	72	36	3	0	0	0	0	0	0	0	0	0	0	130
23:00	1	8	24	24	5	4	0	0	0	0	0	0	0	0	0	66
24:00	0	1	7	8	5	1	0	0	0	0	0	0	0	0	0	22

DAY TOTAL	472	1590	2875	1434	188	13	0	0	0	0	0	0	0	0	0	6572
PERCENTS	7.2%	24.2%	43.8%	21.9%	2.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
20.6 mph

85th Percentile Speed  
31.3 mph

Median Speed  
26.1 mph

Average Speed  
25.5 mph

10 MPH Pace Speed  
19 mph to 29 mph  
4465 vehicles in pace  
Representing 67.9% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF WINNEN ST.  
 Direction: ROAD TOTAL

File: SPD-4-C102.prn  
 City: WINNEY SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	1	5	6	2	0	0	0	0	0	0	0	0	0	0	14
02:00	0	0	4	7	1	1	0	0	0	0	0	0	0	0	0	13
03:00	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
04:00	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
05:00	0	0	3	5	2	0	1	0	0	0	0	0	0	0	0	11
06:00	5	1	23	12	3	1	0	0	0	0	0	0	0	0	0	45
07:00	5	15	62	51	5	1	0	0	0	0	0	0	0	0	0	140
08:00	63	90	180	100	11	2	0	0	0	0	0	0	0	0	0	446
09:00	49	81	213	96	10	0	0	0	0	0	0	0	0	0	0	466
10:00	32	90	177	83	7	1	0	0	0	0	0	0	0	0	0	390
DAY TOTAL	156	291	674	366	41	6	1	0	0	0	0	0	0	0	0	1531
PERCENTS	10.1%	19.1%	44.1%	23.8%	2.6%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 20.3 mph

85th Percentile Speed  
 31.5 mph

Median Speed  
 26.4 mph

Average Speed  
 25.4 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 1036 vehicles in pace  
 Representing 67.7% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: NORTH  
 Lane: 1

STA 4 NB

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
14:00	11	42	63	46	3	0	0	0	0	0	0	0	0	0	0	165
15:00	47	76	96	30	2	0	0	0	0	0	0	0	0	0	0	251
16:00	32	85	108	19	3	0	0	0	0	0	0	0	0	0	0	247
17:00	19	68	64	36	5	0	0	0	0	0	0	0	0	0	0	192
18:00	10	54	71	43	10	0	0	0	0	0	0	0	0	0	0	188
19:00	26	53	77	28	1	0	0	0	0	0	0	0	0	0	0	185
20:00	6	35	55	27	2	0	1	0	0	0	0	0	0	0	0	126
21:00	2	13	41	24	2	0	0	0	0	0	0	0	0	0	0	82
22:00	2	10	12	16	1	1	0	0	0	0	0	0	0	0	0	42
23:00	0	2	10	6	1	1	0	0	0	0	0	0	0	0	0	20
24:00	2	1	3	0	1	0	0	0	0	0	0	0	0	0	0	7
DAY TOTAL	157	439	600	275	31	2	1	0	0	0	0	0	0	0	0	1505
PERCENTS	10.5%	29.2%	39.9%	18.3%	2.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 19.8 mph

85th Percentile Speed  
 30.5 mph

Median Speed  
 25.3 mph

Average Speed  
 24.4 mph

10 MPH Pace Speed  
 19 mph to 29 mph  
 1039 vehicles in pace  
 Representing 69.0% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: NORTH  
 Lane: 1

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3
02:00	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:00	1	2	3	3	2	0	0	0	0	0	0	0	0	0	0	11
06:00	0	3	6	7	2	0	0	0	0	0	0	0	0	0	0	18
07:00	0	8	30	32	4	0	0	0	0	0	0	0	0	0	0	74
08:00	32	59	90	36	5	0	0	0	0	0	0	0	0	0	0	222
09:00	32	64	85	26	3	0	0	0	0	0	0	0	0	0	0	210
10:00	14	47	75	29	2	1	0	0	0	0	0	0	0	0	0	168
11:00	32	47	86	14	4	0	0	0	0	0	0	0	0	0	0	183
12:00	13	52	72	35	2	0	0	0	0	0	0	0	0	0	0	174
13:00	34	80	91	36	0	1	0	0	0	0	0	0	0	0	0	242
14:00	21	68	73	21	1	0	0	0	0	0	0	0	0	0	0	184
15:00	28	64	67	26	0	0	0	0	0	0	0	0	0	0	0	185
16:00	14	63	74	32	5	0	0	0	0	0	0	0	0	0	0	188
17:00	18	69	84	32	3	0	0	0	0	0	0	0	0	0	0	206
18:00	27	69	86	29	1	1	0	0	0	0	0	0	0	0	0	213
19:00	11	62	76	34	4	0	0	0	0	0	0	0	0	0	0	187
20:00	3	32	53	26	2	0	0	0	0	0	0	0	0	0	0	116
21:00	3	30	40	26	2	0	0	0	0	0	0	0	0	0	0	101
22:00	1	9	23	20	6	0	0	0	0	0	0	0	0	0	0	59
23:00	0	3	3	5	2	0	0	0	0	0	0	0	0	0	0	13
24:00	0	3	2	4	0	1	0	0	0	0	0	0	0	0	0	10
DAY TOTAL	285	834	1124	474	51	4	0	0	0	0	0	0	0	0	0	2772
PERCENTS	10.3%	30.1%	40.6%	17.1%	1.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 19.8 mph

85th Percentile Speed  
 30.2 mph

Median Speed  
 25.2 mph

Average Speed  
 24.3 mph

10 MPH Pace Speed  
 19 mph to 29 mph  
 1958 vehicles in pace  
 Representing 70.6% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000479

Site ID: 110000000401

Location: SALEM ST., SOUTH OF VINNIN ST.

Direction: NORTH

Lane: 1

File: SPD-4-0102.prn

City: VINNIN SQUARE STUDY

County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	5
02:00	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
04:00	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	3
05:00	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	5
06:00	1	0	14	11	2	0	0	0	0	0	0	0	0	0	0	28
07:00	2	9	30	28	7	2	0	0	0	0	0	0	0	0	0	78
08:00	12	59	94	51	10	1	0	0	0	0	0	0	0	0	0	227
09:00	26	49	93	43	8	0	0	0	0	0	0	0	0	0	0	219
10:00	27	45	63	44	7	0	0	0	0	0	0	0	0	0	0	186
11:00	23	44	87	40	3	0	0	0	0	0	0	0	0	0	0	197
12:00	15	65	79	28	1	0	0	0	0	0	0	0	0	0	0	188
13:00	23	64	85	41	7	0	0	0	0	0	0	0	0	0	0	220
14:00	14	69	92	51	6	0	0	0	0	0	0	0	0	0	0	232
15:00	54	69	114	37	2	0	0	0	0	0	0	0	0	0	0	276
16:00	39	69	92	37	6	0	0	0	0	0	0	0	0	0	0	243
17:00	34	67	91	34	3	0	0	0	0	0	0	0	0	0	0	229
18:00	19	75	99	45	7	1	0	0	0	0	0	0	0	0	0	246
19:00	8	59	77	36	2	1	0	0	0	0	0	0	0	0	0	183
20:00	5	36	63	34	2	0	0	0	0	0	0	0	0	0	0	140
21:00	2	20	37	20	3	0	0	0	0	0	0	0	0	0	0	82
22:00	0	10	27	12	1	0	0	0	0	0	0	0	0	0	0	50
23:00	1	3	10	11	3	3	0	0	0	0	0	0	0	0	0	31
24:00	0	1	2	0	2	1	0	0	0	0	0	0	0	0	0	6

DAY TOTAL	305	815	1257	612	84	9	0	0	0	0	0	0	0	0	0	3082
PERCENTS	9.9%	26.5%	40.8%	19.9%	2.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
20.0 mph

85th Percentile Speed  
31.0 mph

Median Speed  
25.7 mph

Average Speed  
24.8 mph

10 MPH Pace Speed  
19 mph to 29 mph  
2072 vehicles in pace  
Representing 67.2% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIK ST.  
 Direction: NORTH  
 Lane: 1

File: SPD-4-0102.grn  
 City: VINNIK SQUARE STUDY  
 County: SPEED N4S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	1	0	4	2	0	0	0	0	0	0	0	0	0	0	7
02:00	0	0	2	3	1	1	0	0	0	0	0	0	0	0	0	7
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
05:00	0	0	2	4	2	0	0	0	0	0	0	0	0	0	0	8
06:00	1	0	13	6	3	1	0	0	0	0	0	0	0	0	0	24
07:00	1	7	31	35	2	1	0	0	0	0	0	0	0	0	0	77
08:00	48	54	87	41	7	1	0	0	0	0	0	0	0	0	0	234
09:00	37	45	101	31	3	0	0	0	0	0	0	0	0	0	0	217
10:00	21	40	73	41	1	0	0	0	0	0	0	0	0	0	0	176
DAY TOTAL	108	147	309	158	17	4	0	0	0	0	0	0	0	0	0	753
PERCENTS	14.4%	19.6%	41.0%	22.1%	2.2%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 19.2 mph

85th Percentile Speed  
 31.3 mph

Median Speed  
 26.0 mph

Average Speed  
 24.5 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 477 vehicles in pace  
 Representing 63.3% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

STA. 4 SB

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-4-0102.prn  
 City: WINNIP SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
14:00	9	66	130	31	3	0	1	0	0	0	0	0	0	0	0	240
15:00	32	78	100	54	2	0	0	0	0	0	0	0	0	0	0	266
16:00	22	81	126	33	4	0	0	0	0	0	0	0	0	0	0	266
17:00	14	65	125	62	4	0	0	0	0	0	0	0	0	0	0	271
18:00	8	42	121	73	5	0	0	0	0	0	0	0	0	0	0	249
19:00	10	55	59	55	6	0	0	0	0	0	0	0	0	0	0	229
20:00	3	29	91	48	4	0	0	0	0	0	0	0	0	0	0	175
21:00	1	7	56	30	5	0	0	0	0	0	0	0	0	0	0	99
22:00	0	6	28	28	7	0	0	0	0	0	0	0	0	0	0	69
23:00	1	4	9	14	0	0	0	0	0	0	0	0	0	0	0	28
24:00	1	6	5	13	3	0	0	0	0	0	0	0	0	0	0	28
DAY TOTAL	101	440	899	446	43	0	1	0	0	0	0	0	0	0	0	1920
PERCENTS	5.3%	23.0%	46.3%	23.2%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 21.1 mph

85th Percentile Speed  
 31.3 mph

Median Speed  
 26.4 mph

Average Speed  
 25.9 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 1335 vehicles in pace  
 Representing 69.5% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	4
02:00	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	5
03:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	6
06:00	0	1	9	4	0	0	0	0	0	0	0	0	0	0	0	14
07:00	4	13	26	13	1	0	0	0	0	0	0	0	0	0	0	57
08:00	5	47	100	43	2	0	0	0	0	0	0	0	0	0	0	197
09:00	6	55	95	31	2	0	0	0	0	0	0	0	0	0	0	189
10:00	13	47	98	44	1	0	0	0	0	0	0	0	0	0	0	263
11:00	9	57	90	28	2	0	0	0	0	0	0	0	0	0	0	186
12:00	9	59	95	32	2	0	0	0	0	0	0	0	0	0	0	197
13:00	16	71	137	49	5	0	0	0	0	0	0	0	0	0	0	277
14:00	5	66	95	34	0	0	0	0	0	0	0	0	0	0	0	200
15:00	13	47	110	37	3	0	0	0	0	0	0	0	0	0	0	210
16:00	3	69	108	48	6	0	0	0	0	0	0	0	0	0	0	233
17:00	9	64	114	52	6	0	0	0	0	0	0	0	0	0	0	245
18:00	11	60	121	60	7	0	0	0	0	0	0	0	0	0	0	259
19:00	1	32	114	75	9	0	0	0	0	0	0	0	0	0	0	231
20:00	2	44	90	42	5	0	0	0	0	0	0	0	0	0	0	183
21:00	3	22	55	46	6	1	0	0	0	0	0	0	0	0	0	133
22:00	0	8	46	23	4	0	0	0	0	0	0	0	0	0	0	81
23:00	1	2	11	12	3	0	0	0	0	0	0	0	0	0	0	29
24:00	0	3	10	7	2	0	0	0	0	0	0	0	0	0	0	22
DAY TOTAL	112	769	1532	681	67	1	0	0	0	0	0	0	0	0	0	3162
PERCENTS	3.6%	24.4%	48.4%	21.5%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 21.4 mph

85th Percentile Speed  
 31.0 mph

Median Speed  
 26.3 mph

Average Speed  
 26.0 mph

10 MPH Pace Speed  
 19 mph to 29 mph  
 2301 vehicles in pace  
 Representing 72.7% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000479  
 Site ID: 110000000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	3	1	2	0	0	0	0	0	0	0	0	0	0	6
02:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	4
04:00	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
06:00	2	2	7	8	0	1	0	0	0	0	0	0	0	0	0	20
07:00	8	15	23	13	3	1	0	0	0	0	0	0	0	0	0	63
08:00	1	30	112	61	8	1	0	0	0	0	0	0	0	0	0	213
09:00	6	47	107	56	4	0	0	0	0	0	0	0	0	0	0	220
10:00	6	46	88	52	10	0	0	0	0	0	0	0	0	0	0	202
11:00	15	58	104	42	7	0	0	0	0	0	0	0	0	0	0	226
12:00	37	48	87	51	5	0	0	0	0	0	0	0	0	0	0	228
13:00	11	74	131	47	7	0	0	0	0	0	0	0	0	0	0	270
14:00	19	66	124	53	2	0	0	0	0	0	0	0	0	0	0	264
15:00	27	91	135	52	3	0	0	0	0	0	0	0	0	0	0	308
16:00	9	53	129	52	8	0	0	0	0	0	0	0	0	0	0	251
17:00	13	68	124	76	9	0	0	0	0	0	0	0	0	0	0	289
18:00	9	59	132	61	13	0	0	0	0	0	0	0	0	0	0	274
19:00	1	44	97	70	9	0	0	0	0	0	0	0	0	0	0	221
20:00	3	40	89	43	6	0	0	0	0	0	0	0	0	0	0	181
21:00	0	19	58	36	1	0	0	0	0	0	0	0	0	0	0	114
22:00	0	9	45	24	2	0	0	0	0	0	0	0	0	0	0	80
23:00	0	5	14	13	2	1	0	0	0	0	0	0	0	0	0	35
24:00	0	0	5	8	3	0	0	0	0	0	0	0	0	0	0	16
DAY TOTAL	167	775	1618	822	104	4	0	0	0	0	0	0	0	0	0	3490
PERCENTS	4.8%	22.3%	46.4%	23.5%	2.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed 21.3 mph	85th Percentile Speed 31.5 mph
Median Speed 26.5 mph	Average Speed 26.1 mph
10 MPH Pace Speed 24 mph to 34 mph 2440 vehicles in pace Representing 69.9% of the total vehicles	Vehicles > 65 MPH 0 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000479  
 Site ID: 110003000401  
 Location: SALEM ST., SOUTH OF VINNIN ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-4-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N4S

TIME	13	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	6
03:00	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	3
06:00	4	1	10	6	0	0	0	0	0	0	0	0	0	0	0	21
07:00	4	9	31	15	3	0	0	0	0	0	0	0	0	0	0	62
08:00	15	36	93	59	8	1	0	0	0	0	0	0	0	0	0	212
09:00	12	48	117	55	7	0	0	0	0	0	0	0	0	0	0	249
10:00	11	50	104	42	6	1	0	0	0	0	0	0	0	0	0	214
JAY TOTAL	46	144	365	196	24	2	1	0	0	0	0	0	0	0	0	778
PERCENTS	6.0%	18.6%	47.0%	25.1%	3.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 21.5 mph

85th Percentile Speed  
 31.7 mph

Median Speed  
 26.7 mph

Average Speed  
 26.2 mph

10 MPH Pace Speed  
 24 mph to 34 mph  
 561 vehicles in pace  
 Representing 72.1% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: ROAD TOTAL

STA. 5  
 TOTAL

File: SPD-5-C102.prn  
 City: WINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	96+	Total
14:00	13	19	141	502	310	41	3	3	0	0	0	0	0	0	0	1029
15:00	4	49	205	573	231	18	3	3	0	0	0	0	0	0	0	1090
16:00	17	46	252	591	318	32	1	1	0	0	0	0	0	0	0	1256
17:00	2	26	220	590	336	26	3	0	0	0	0	0	0	0	0	1192
18:00	23	39	201	613	327	44	3	3	0	0	0	0	0	0	0	1250
19:00	15	41	177	478	331	37	2	1	0	0	0	0	0	0	0	1062
20:00	3	6	100	399	233	27	3	0	0	0	0	0	0	0	0	768
21:00	2	6	73	193	166	26	8	0	0	0	0	0	0	0	0	474
22:00	2	4	34	114	125	16	4	0	0	0	0	0	0	0	0	299
23:00	0	0	7	52	36	11	3	0	0	0	0	0	0	0	0	111
24:00	0	0	5	21	27	1	3	1	0	0	0	0	0	0	0	58
DAY TOTAL	78	234	1415	4116	2442	281	30	3	0	0	0	0	0	0	0	8599
PERCENTS	1.0%	2.8%	16.5%	47.9%	28.3%	3.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 27.5 mph

85th Percentile Speed  
 37.0 mph

Median Speed  
 32.1 mph

Average Speed  
 32.0 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 6553 vehicles in pace  
 Representing 76.2% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%



MaasDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000758

Site ID: 110000000501

Location: TEDESCO ST., WEST OF WEST ST.

Direction: ROAD TOTAL

File: SPD-5-0102.prn

City: VINNIN SQUARE STUDY

County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	1	2	8	11	5	0	0	0	0	0	0	0	0	0	27
02:00	0	0	1	5	2	0	1	1	0	0	0	0	0	0	0	10
03:00	0	0	1	4	4	1	0	0	0	0	0	0	0	0	0	10
04:00	0	0	0	0	5	3	0	0	0	0	0	0	0	0	0	8
05:00	0	2	3	12	12	9	5	1	0	0	0	0	0	0	0	44
06:00	1	2	36	48	71	37	6	0	0	0	0	0	0	0	0	181
07:00	6	16	83	236	285	60	7	0	0	0	0	0	0	0	0	693
08:00	4	30	182	650	303	43	1	0	0	0	0	0	0	0	0	1213
09:00	7	49	210	571	290	28	1	0	0	0	0	0	0	0	0	1156
10:00	2	13	136	471	309	29	2	0	0	0	0	0	0	0	0	962
11:00	6	39	191	423	257	34	2	0	0	0	0	0	0	0	0	952
12:00	2	16	143	451	289	40	3	0	0	0	0	0	0	0	0	944
13:00	4	34	165	473	283	32	3	0	0	0	0	0	0	0	0	994
14:00	4	23	129	411	296	45	4	0	0	0	0	0	0	0	0	912
15:00	6	34	194	483	278	27	1	1	0	0	0	0	0	0	0	1024
16:00	6	32	208	593	262	25	4	0	0	0	0	0	0	0	0	1130
17:00	12	29	259	632	281	18	3	0	0	0	0	0	0	0	0	1234
18:00	7	34	254	653	299	22	0	0	0	0	0	0	0	0	0	1269
19:00	9	46	215	498	329	38	6	0	0	0	0	0	0	0	0	1141
20:00	1	17	89	438	204	22	0	0	0	0	0	0	0	0	0	771
21:00	0	11	51	255	164	23	2	2	0	0	0	0	0	0	0	508
22:00	0	4	30	120	127	15	1	0	0	0	0	0	0	0	0	297
23:00	0	3	10	42	51	14	0	0	0	0	0	0	0	0	0	120
24:00	0	2	7	17	23	10	2	1	0	0	0	0	0	0	0	62
DAY TOTAL	77	437	2579	7494	4435	580	54	6	0	0	0	0	0	0	0	15662
PERCENTS	0.5%	2.8%	16.5%	47.9%	28.3%	3.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.6 mph

85th Percentile Speed  
37.1 mph

Median Speed  
32.2 mph

Average Speed  
32.1 mph

10 MPH Pace Speed  
29 mph to 39 mph  
11929 vehicles in pace  
Representing 76.1% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: ROAD TOTAL

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	85+	Total
01:00	0	0	2	9	12	5	0	0	1	0	0	0	0	0	0	29
02:00	0	0	0	2	5	0	2	0	0	0	0	0	0	0	0	9
03:00	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	4
04:00	0	0	0	1	2	3	1	0	0	0	0	0	0	0	0	7
05:00	0	3	3	8	14	8	2	0	0	0	0	0	0	0	0	36
06:00	0	4	8	42	86	37	7	1	0	0	0	0	0	0	0	185
07:00	2	5	51	238	305	61	6	0	0	0	0	0	0	0	0	674
08:00	3	10	136	567	398	65	2	0	0	0	0	0	0	0	0	1161
09:00	9	24	129	563	346	23	2	1	0	0	0	0	0	0	0	1097
10:00	5	11	128	458	310	61	1	0	0	0	0	0	0	0	0	954
11:00	4	23	107	507	285	25	3	0	0	0	0	0	0	0	0	954
12:00	1	22	140	524	303	47	0	0	0	0	0	0	0	0	0	1037
13:00	9	16	144	538	319	34	2	0	0	0	0	0	0	0	0	1062
14:00	17	68	258	543	206	33	0	1	1	0	0	0	0	0	0	1127
15:00	13	20	200	585	304	29	1	0	0	0	0	0	0	0	0	1152
16:00	5	29	212	536	350	31	4	0	0	0	0	0	0	0	0	1167
17:00	11	48	255	630	321	22	2	0	0	0	0	0	0	0	0	1289
18:00	15	39	278	703	304	22	2	1	0	0	0	0	0	0	0	1364
19:00	8	43	223	532	327	29	2	0	0	0	0	0	0	0	0	1164
20:00	6	27	150	403	220	26	2	0	0	0	0	0	0	0	0	834
21:00	2	15	134	275	143	9	1	0	0	0	0	0	0	0	0	579
22:00	0	7	34	130	120	20	0	0	0	0	0	0	0	0	0	311
23:00	0	1	11	56	62	20	1	0	0	0	0	0	0	0	0	151
24:00	0	2	8	15	29	11	1	0	0	0	0	0	0	0	0	66
DAY TOTAL	110	417	2617	7866	4773	602	44	4	2	0	0	0	0	0	0	16435
PERCENTS	0.7%	2.6%	16.0%	47.9%	29.0%	3.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.7 mph

85th Percentile Speed  
37.1 mph

Median Speed  
32.2 mph

Average Speed  
32.2 mph

10 MPH Pace Speed  
29 mph to 39 mph  
12639 vehicles in pace  
Representing 76.9% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160370000758

Site ID: 116030000501

Location: TEDESCO ST., WEST OF WEST ST.

Direction: ROAD TOTAL

File: SPS-5-C102.prr

City: VINNIX SQUARE STUDY

County: SPEED S&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	1	14	12	4	1	0	0	0	0	0	0	0	0	32
02:00	0	0	2	6	8	2	0	0	0	0	0	0	0	0	0	17
03:00	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0	6
04:00	0	0	0	3	6	0	2	0	0	0	0	0	0	0	0	11
05:00	0	5	7	8	25	5	2	0	0	0	0	0	0	0	0	52
06:00	0	1	7	35	82	35	5	0	0	0	0	0	0	0	0	165
07:00	1	7	54	179	301	66	4	1	0	0	0	0	0	0	0	613
08:00	6	14	161	583	392	43	3	0	0	0	0	0	0	0	0	1204
09:00	1	25	164	572	302	25	1	0	0	0	0	0	0	0	0	1030
10:00	12	30	153	435	252	41	3	0	0	0	0	0	0	0	0	926
DAY TOTAL	20	82	551	1840	1381	220	21	1	0	0	0	0	0	0	0	6116
PERCENTS	0.5%	2.0%	13.4%	46.8%	33.5%	5.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
28.7 mph

85th Percentile Speed  
37.7 mph

Median Speed  
32.8 mph

Average Speed  
32.8 mph

10 MPH Pace Speed  
29 mph to 39 mph  
3221 vehicles in pace  
Representing 73.2% of the total vehicles

Vehicles > 55 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

Page: 1

STA. 5 NB

Site Reference: 16307G00075E  
 Site ID: 110000000501  
 Location: TEDDSOQ ST., WEST OF WEST ST.  
 Direction: NORTH  
 Lane: 1

File: SPD-5-0102.prn  
 City: WINNIX SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
14:00	6	14	79	297	112	17	0	0	0	0	0	0	0	0	0	525
15:00	1	29	114	261	93	12	0	0	0	0	0	0	0	0	0	500
16:00	4	25	145	322	132	9	0	0	0	0	0	0	0	0	0	637
17:00	1	19	108	263	135	17	0	0	0	0	0	0	0	0	0	542
18:00	3	19	117	265	120	11	1	0	0	0	0	0	0	0	0	535
19:00	4	5	70	211	107	7	0	0	0	0	0	0	0	0	0	404
20:00	0	4	48	159	77	9	0	0	0	0	0	0	0	0	0	297
21:00	1	2	34	83	54	8	3	0	0	0	0	0	0	0	0	165
22:00	2	2	21	59	44	4	0	0	0	0	0	0	0	0	0	132
23:00	0	0	6	23	14	4	1	0	0	0	0	0	0	0	0	48
24:00	0	0	2	10	9	0	1	0	0	0	0	0	0	0	0	22
<b>DAY TOTAL</b>	<b>22</b>	<b>117</b>	<b>744</b>	<b>1953</b>	<b>987</b>	<b>98</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3627</b>
<b>PERCENTS</b>	<b>0.6%</b>	<b>3.1%</b>	<b>19.5%</b>	<b>51.1%</b>	<b>23.1%</b>	<b>2.5%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100%</b>

Statistical Information...

15th Percentile Speed  
26.9 mph

95th Percentile Speed  
36.4 mph

Median Speed  
31.6 mph

Average Speed  
31.5 mph

10 MPH Pace Speed  
29 mph to 39 mph  
2840 vehicles in pace  
Representing 74.2% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: NORTH  
 Lane: 1

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	1	1	3	6	2	0	0	0	0	0	0	0	0	0	13
02:00	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	4
03:00	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	5
04:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
05:00	0	2	1	5	7	5	2	0	0	0	0	0	0	0	0	22
06:00	1	2	13	26	50	19	3	0	0	0	0	0	0	0	0	114
07:00	1	14	64	164	200	44	5	0	0	0	0	0	0	0	0	492
08:00	0	18	111	451	188	11	1	0	0	0	0	0	0	0	0	780
09:00	3	32	140	339	153	7	0	0	0	0	0	0	0	0	0	674
10:00	1	10	90	278	168	11	0	0	0	0	0	0	0	0	0	556
11:00	3	31	130	237	137	8	0	0	0	0	0	0	0	0	0	546
12:00	2	11	85	256	129	18	0	0	0	0	0	0	0	0	0	501
13:00	2	14	90	258	119	9	0	0	0	0	0	0	0	0	0	492
14:00	2	13	90	207	109	8	2	0	0	0	0	0	0	0	0	431
15:00	1	19	104	255	107	12	0	1	0	0	0	0	0	0	0	499
16:00	3	10	115	322	117	6	0	0	0	0	0	0	0	0	0	573
17:00	1	14	105	302	125	6	2	0	0	0	0	0	0	0	0	555
18:00	2	13	93	261	132	6	0	0	0	0	0	0	0	0	0	507
19:00	5	16	73	192	139	24	1	0	0	0	0	0	0	0	0	450
20:00	0	6	34	182	85	8	0	0	0	0	0	0	0	0	0	315
21:00	0	3	31	123	63	5	1	2	0	0	0	0	0	0	0	226
22:00	0	3	20	49	40	5	0	0	0	0	0	0	0	0	0	117
23:00	0	0	6	21	20	4	0	0	0	0	0	0	0	0	0	51
24:00	0	2	2	9	10	4	2	0	0	0	0	0	0	0	0	29
DAY TOTAL	27	234	1400	3944	2106	224	19	3	0	0	0	0	0	0	0	7957
PERCENTS	0.4%	3.0%	17.6%	49.6%	26.4%	2.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 27.3 mph

85th Percentile Speed  
 36.8 mph

Median Speed  
 31.9 mph

Average Speed  
 31.9 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 6050 vehicles in pace  
 Representing 76.0% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000758

Site ID: 110000000501

Location: TEDESCO ST., WEST OF WEST ST.

Direction: NORTH

Lane: 1

File: SPD-5-0102.prn

City: VINNIN SQUARE STUDY

County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	1	4	4	2	0	0	1	0	0	0	0	0	0	12
02:00	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
05:00	0	3	3	4	5	5	1	0	0	0	0	0	0	0	0	21
06:00	0	4	6	27	56	24	5	0	0	0	0	0	0	0	0	122
07:00	2	4	46	156	231	45	5	0	0	0	0	0	0	0	0	489
08:00	1	7	82	339	243	37	1	0	0	0	0	0	0	0	0	710
09:00	4	13	84	350	197	8	0	0	0	0	0	0	0	0	0	656
10:00	1	2	78	276	161	26	0	0	0	0	0	0	0	0	0	544
11:00	1	14	66	295	152	12	1	0	0	0	0	0	0	0	0	541
12:00	0	7	83	255	156	22	0	0	0	0	0	0	0	0	0	523
13:00	3	8	73	268	169	14	1	0	0	0	0	0	0	0	0	536
14:00	3	29	108	252	117	20	0	1	1	0	0	0	0	0	0	531
15:00	13	10	98	272	143	15	1	0	0	0	0	0	0	0	0	552
16:00	5	17	100	280	160	14	0	0	0	0	0	0	0	0	0	576
17:00	8	22	138	316	141	7	0	0	0	0	0	0	0	0	0	632
18:00	6	19	137	310	129	8	1	0	0	0	0	0	0	0	0	610
19:00	3	8	105	217	131	9	0	0	0	0	0	0	0	0	0	473
20:00	2	11	63	151	70	11	0	0	0	0	0	0	0	0	0	308
21:00	1	6	45	122	53	3	0	0	0	0	0	0	0	0	0	230
22:00	0	6	16	49	47	7	0	0	0	0	0	0	0	0	0	125
23:00	0	1	6	26	23	10	1	0	0	0	0	0	0	0	0	67
24:00	0	0	3	10	7	5	1	0	0	0	0	0	0	0	0	26

DAY TOTAL	53	191	1341	3979	2397	304	20	1	2	0	0	0	0	0	0	8288
PERCENTS	0.7%	2.4%	16.2%	48.0%	28.9%	3.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.7 mph

85th Percentile Speed  
37.1 mph

Median Speed  
32.2 mph

Average Speed  
32.2 mph

10 MPH Pace Speed  
29 mph to 39 mph  
6376 vehicles in pace  
Representing 76.9% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 160070000758  
 Site ID: 110000000361  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: NORTH  
 Lane: 1

File: SPD-5-0102.prc  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	0	6	6	3	1	0	0	0	0	0	0	0	0	16
02:00	0	0	2	3	1	1	0	0	0	0	0	0	0	0	0	7
03:00	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	3
04:00	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	3
05:00	0	4	4	5	6	3	1	0	0	0	0	0	0	0	0	23
06:00	0	1	6	27	56	22	4	0	0	0	0	0	0	0	0	116
07:00	1	4	36	115	237	47	3	1	0	0	0	0	0	0	0	444
08:00	2	11	83	345	247	26	2	0	0	0	0	0	0	0	0	716
09:00	0	13	105	347	161	16	0	0	0	0	0	0	0	0	0	642
10:00	4	6	85	293	137	12	1	0	0	0	0	0	0	0	0	536
DAY TOTAL	7	39	322	1142	954	130	13	1	0	0	0	0	0	0	0	2538
PERCENTS	0.3%	1.6%	12.9%	45.6%	34.0%	5.1%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 29.0 mph

85th Percentile Speed  
 37.7 mph

Median Speed  
 32.9 mph

Average Speed  
 33.0 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 1995 vehicles in pace  
 Representing 79.5% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Mon 4/11/2016

STA. 5SB

Site Reference: 16070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: SOUTH  
 Lane: 2

File: SFD-5-C102.prn  
 City: VINTNER SQUARE STUDY  
 County: SPEED H&S

TIME	15	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
14:00	7	5	62	205	198	24	3	0	0	0	0	0	0	0	0	504
15:00	3	30	91	312	149	6	0	0	0	0	0	0	0	0	0	590
16:00	13	19	107	269	186	23	1	1	0	0	0	0	0	0	0	619
17:00	1	8	112	317	291	11	0	0	0	0	0	0	0	0	0	650
18:00	23	21	94	348	287	33	2	0	0	0	0	0	0	0	0	715
19:00	11	36	107	267	224	30	2	1	0	0	0	0	0	0	0	678
20:00	0	2	52	240	156	18	3	0	0	0	0	0	0	0	0	471
21:00	1	4	39	110	112	18	5	0	0	0	0	0	0	0	0	289
22:00	0	2	13	55	81	12	4	0	0	0	0	0	0	0	0	167
23:00	0	0	1	25	24	7	2	0	0	0	0	0	0	0	0	63
24:00	0	0	3	11	18	1	2	1	0	0	0	0	0	0	0	35
<hr/>																
DAY TOTAL	56	117	671	2163	1555	183	24	3	0	0	0	0	0	0	0	4772
PERCENTS	1.2%	2.5%	14.1%	45.4%	32.5%	3.8%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
26.1 mph

85th Percentile Speed  
37.4 mph

Median Speed  
32.6 mph

Average Speed  
32.4 mph

10 MPH Pace Speed  
29 mph to 39 mph  
3719 vehicles in pace  
Representing 77.9% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%



MassDOT Highway Division  
 SPEED SUMMARY  
 Tue 4/12/2016

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	85+	Total
01:00	0	0	1	5	5	3	0	0	0	0	0	0	0	0	0	14
02:00	0	0	0	2	2	0	1	1	0	0	0	0	0	0	0	6
03:00	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	5
04:00	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	7
05:00	0	0	2	7	5	4	3	1	0	0	0	0	0	0	0	22
06:00	0	0	3	22	21	18	3	0	0	0	0	0	0	0	0	67
07:00	5	2	19	72	85	16	2	0	0	0	0	0	0	0	0	201
08:00	4	12	71	199	115	32	0	0	0	0	0	0	0	0	0	433
09:00	4	17	70	232	137	21	1	0	0	0	0	0	0	0	0	482
10:00	1	3	46	193	141	18	2	0	0	0	0	0	0	0	0	404
11:00	3	6	61	186	120	26	2	0	0	0	0	0	0	0	0	406
12:00	0	5	58	195	160	22	3	0	0	0	0	0	0	0	0	443
13:00	2	20	75	215	164	23	3	0	0	0	0	0	0	0	0	502
14:00	2	10	39	204	187	37	2	0	0	0	0	0	0	0	0	481
15:00	5	15	30	228	171	15	1	0	0	0	0	0	0	0	0	525
16:00	3	22	33	271	145	19	4	0	0	0	0	0	0	0	0	557
17:00	11	15	154	330	156	12	1	0	0	0	0	0	0	0	0	679
18:00	5	21	161	392	167	16	0	0	0	0	0	0	0	0	0	762
19:00	4	30	142	306	190	14	5	0	0	0	0	0	0	0	0	691
20:00	1	11	55	256	119	14	0	0	0	0	0	0	0	0	0	456
21:00	0	6	20	132	101	19	1	0	0	0	0	0	0	0	0	280
22:00	0	1	10	71	87	10	1	0	0	0	0	0	0	0	0	180
23:00	0	3	4	21	31	10	0	0	0	0	0	0	0	0	0	69
24:00	0	0	5	8	13	6	0	1	0	0	0	0	0	0	0	33
DAY TOTAL	50	203	1179	3550	2329	356	35	3	0	0	0	0	0	0	0	7705
PERCENTS	0.7%	2.7%	15.4%	46.0%	30.2%	4.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.8 mph

85th Percentile Speed  
37.4 mph

Median Speed  
32.4 mph

Average Speed  
32.4 mph

10 MPH Pace Speed  
29 mph to 35 mph  
5879 vehicles in pace  
Representing 76.3% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Wed 4/13/2016

Site Reference: 160070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-5-0102.prn  
 City: VINNIN SQUARE STUDY  
 County: SPEED N&S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Tota
01:00	0	0	1	5	8	3	0	0	0	0	0	0	0	0	0	17
02:00	0	0	0	2	5	0	0	0	0	0	0	0	0	0	0	7
03:00	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	4
04:00	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	5
05:00	0	0	0	4	9	3	1	0	0	0	0	0	0	0	0	17
06:00	0	0	2	15	30	13	2	1	0	0	0	0	0	0	0	63
07:00	0	1	11	82	74	16	1	0	0	0	0	0	0	0	0	185
08:00	2	3	54	228	155	28	1	0	0	0	0	0	0	0	0	471
09:00	5	11	45	213	149	15	2	1	0	0	0	0	0	0	0	441
10:00	4	9	50	182	149	15	1	0	0	0	0	0	0	0	0	410
11:00	3	9	41	212	133	13	2	0	0	0	0	0	0	0	0	413
12:00	1	15	57	269	147	25	0	0	0	0	0	0	0	0	0	514
13:00	6	8	71	270	150	20	1	0	0	0	0	0	0	0	0	526
14:00	14	39	150	291	89	13	0	0	0	0	0	0	0	0	0	596
15:00	0	10	102	313	161	14	0	0	0	0	0	0	0	0	0	600
16:00	0	12	112	256	190	17	4	0	0	0	0	0	0	0	0	591
17:00	3	26	117	314	180	15	2	0	0	0	0	0	0	0	0	657
18:00	9	20	141	393	175	14	1	1	0	0	0	0	0	0	0	754
19:00	5	35	118	315	196	20	2	0	0	0	0	0	0	0	0	691
20:00	4	16	87	252	150	15	2	0	0	0	0	0	0	0	0	526
21:00	1	9	89	153	90	6	1	0	0	0	0	0	0	0	0	349
22:00	0	1	19	81	73	13	0	0	0	0	0	0	0	0	0	186
23:00	0	0	5	30	39	10	0	0	0	0	0	0	0	0	0	84
24:00	0	2	5	5	22	6	0	0	0	0	0	0	0	0	0	40
DAY TOTAL	57	226	1276	3887	2376	298	24	3	0	0	0	0	0	0	0	8147
PERCENTS	0.7%	2.8%	15.7%	47.8%	29.2%	3.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
27.7 mph

85th Percentile Speed  
37.1 mph

Median Speed  
32.2 mph

Average Speed  
32.2 mph

10 MPH Pace Speed  
29 mph to 39 mph  
6263 vehicles in pace  
Representing 76.8% of the total vehicles

Vehicles > 65 MPH  
0  
0.0%

MassDOT Highway Division  
 SPEED SUMMARY  
 Thu 4/14/2016

Site Reference: 16070000758  
 Site ID: 110000000501  
 Location: TEDESCO ST., WEST OF WEST ST.  
 Direction: SOUTH  
 Lane: 2

File: SPD-5-C102.prn  
 City: VINWIN SQUARE STUDY  
 County: SP3ED N4S

TIME	19	24	29	34	39	44	49	54	59	64	69	74	79	85	86+	Total
01:00	0	0	1	8	6	1	0	0	0	0	0	0	0	0	0	16
02:00	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	10
03:00	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
04:00	0	0	0	3	4	0	1	0	0	0	0	0	0	0	0	8
05:00	0	1	3	3	19	2	1	0	0	0	0	0	0	0	0	29
06:00	0	0	1	6	26	13	1	0	0	0	0	0	0	0	0	49
07:00	0	3	16	64	64	19	1	0	0	0	0	0	0	0	0	169
08:00	4	3	76	240	145	17	1	0	0	0	0	0	0	0	0	488
09:00	1	12	59	225	141	9	1	0	0	0	0	0	0	0	0	448
10:00	9	24	68	142	115	29	2	0	0	0	0	0	0	0	0	368
DAY TOTAL	13	43	229	698	527	90	8	0	0	0	0	0	0	0	0	1508
PERCENTS	0.9%	2.7%	14.3%	43.5%	32.7%	5.5%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Statistical Information...

15th Percentile Speed  
 28.1 mph

85th Percentile Speed  
 37.7 mph

Median Speed  
 32.7 mph

Average Speed  
 32.6 mph

10 MPH Pace Speed  
 29 mph to 39 mph  
 1225 vehicles in pace  
 Representing 76.1% of the total vehicles

Vehicles > 65 MPH  
 0  
 0.0%



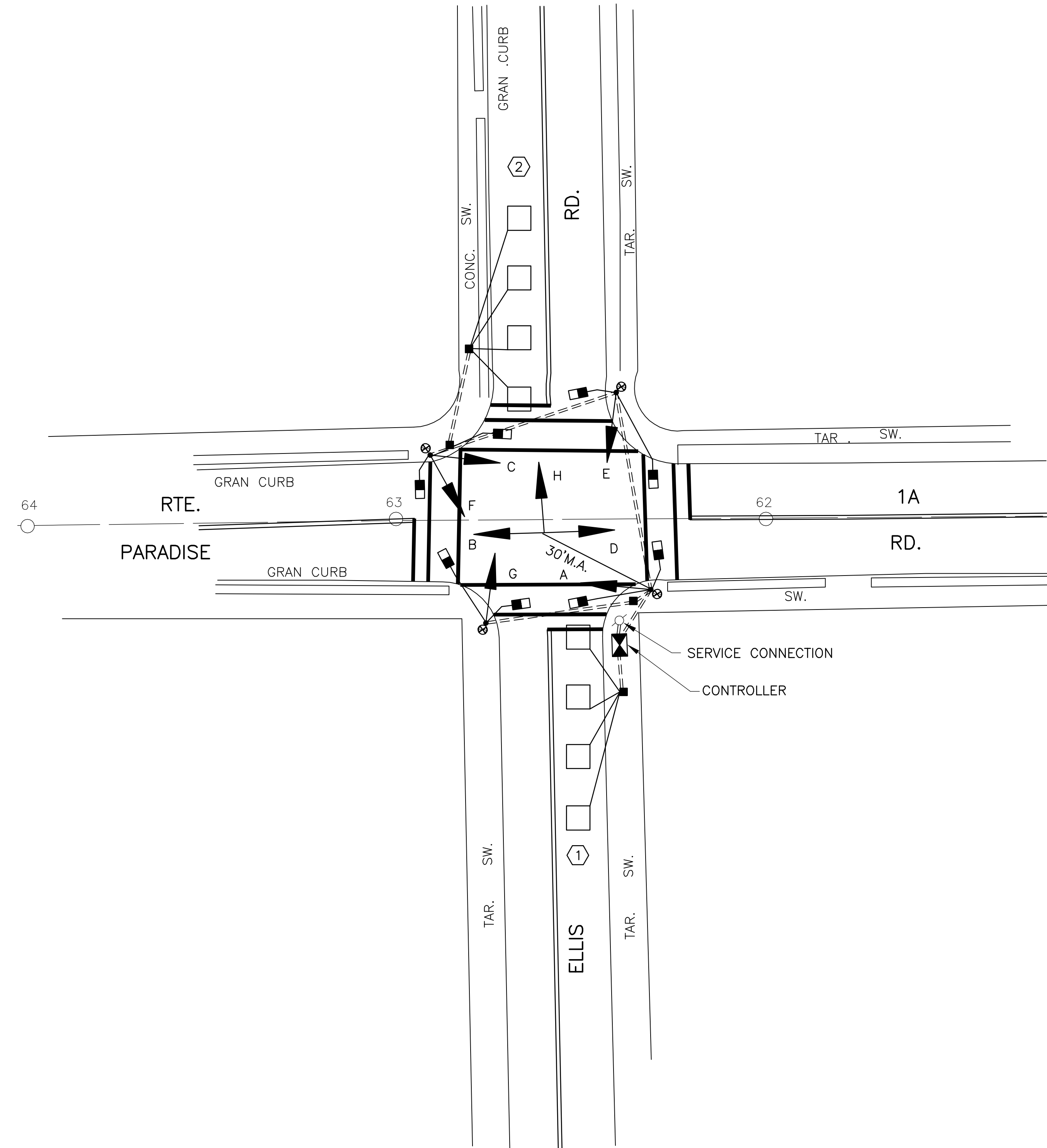
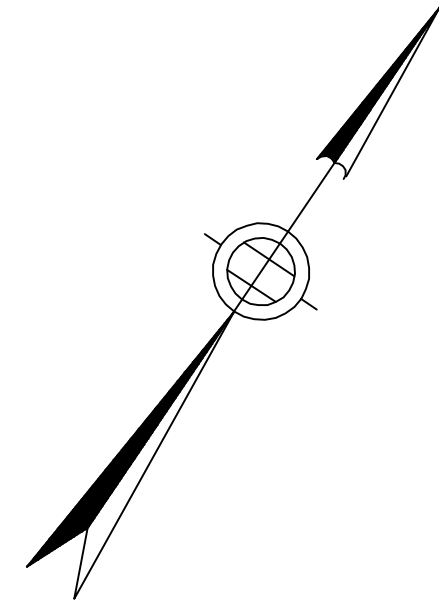
# **APPENDIX C**

## **Traffic Signal Timing and Layout Information**

**SWAMPSCOTT**  
RTE. 1A AT ELLIS RD.

STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	0282	01	2	

TRAFFIC SIGNAL PLAN

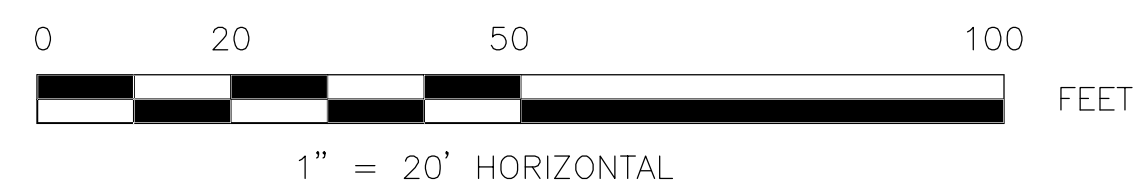


**LEGEND**

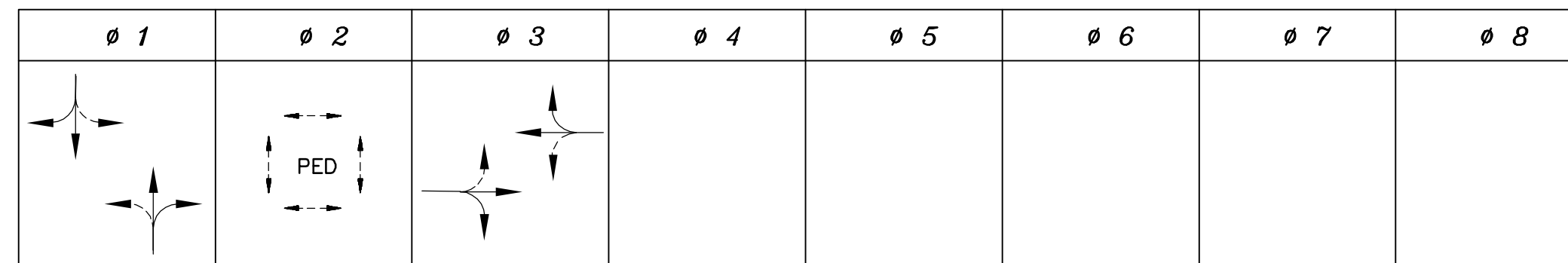
	SIGNAL CONTROLLER
	VEHICULAR SIGNAL
	OPTICALLY PROGRAMMED VEHICULAR SIGNAL
	FIRE PRE-EMPTION RECEIVER
	FIRE PRE-EMPTION STROBE LIGHT
	PEDESTRIAN SIGNAL
	PEDESTRIAN PUSH BUTTON
	PULL BOX

APPROVED BY: \_\_\_\_\_

STATE TRAFFIC ENGINEER      Date



APPROX. NORTH



**SEQUENCE AND TIMING FOR SEMI-ACTUATED CONTROL (ISOLATED)**

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	FLASH OFF
PARADISE ROAD (RTE. 1A)	NB	A,B	G	Y	R	R	R	R	R	R	R																FY
PARADISE ROAD (RTE. 1A)	SB	C,D	G	Y	R	R	R	R	R	R	R																FY
ELLIS RD.	EB	G,H	R	R	R	R	R	R	G	Y	R																FR
ELLIS RD.	WB	E,F	R	R	R	R	R	R	G	Y	R																FR
PEDESTRIAN	ALL	ALL	DW	DW	DW	W	FDW	DW	DW	DW	DW																OFF

TIMING IN SECONDS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	EMERGENCY ONLY
MINIMUM GREEN (INITIAL)		30						6																		
PASSAGE TIME (VEHICLE)		1						3																		
MAXIMUM 1		30						16																		
MAXIMUM 2		0						0																		
YELLOW CLEARANCE			4							4																
RED CLEARANCE				2																						
WALK (W)					10																					
PEDESTRIAN CLEARANCE						8																				
RECALL			OFF																							
MEMORY			NON-LOCKING	NON-LOCKING	NON-LOCKING																					

MAJOR ITEMS REQUIRED	
QUANTITY	ITEM
1	CONTROLLER TYPE 3W, CAB. & FDN.
1	SERVICE CONNECTION, TYPE OVERHEAD
3	10' SIGNAL POLE, BASE, & FDN.
1	30 FT MAST ARM ASSEMBLY, BASE & FDN. TY. 1
1	3 WAY, 3 SECTION, SIGNAL HOUSING (12" LENS)
1	2 WAY, 3 SECTION, SIGNAL HOUSING (12" LENS)
3	1 WAY, 3 SECTION, SIGNAL HOUSING (12" LENS)
8	PEDESTRIAN HOUSING (TYPE INCANDESCENT)
4	PEDESTRIAN PUSH BUTTON, SIGN & SADDLES
2	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
8	ROADWAY LOOP DETECTOR
4	12"x12" PULL BOX
<i>Necessary duct, cable, labor, miscellaneous material and equipment to complete the installation.</i>	

**NOTES:**

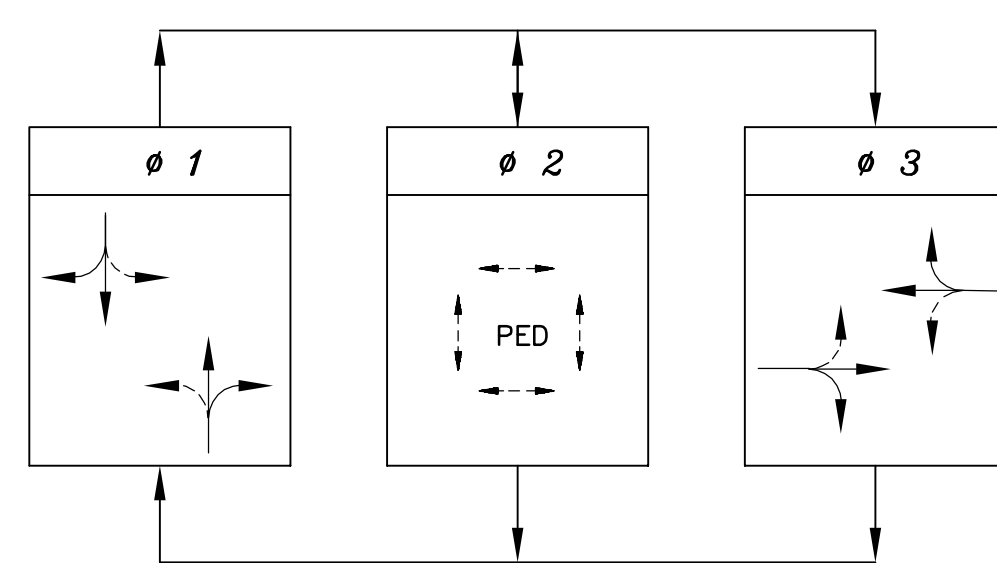
SEQUENCE AND TIMING NOTES:

- PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
- PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
- THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S) UNLESS OTHERWISE NOTED.

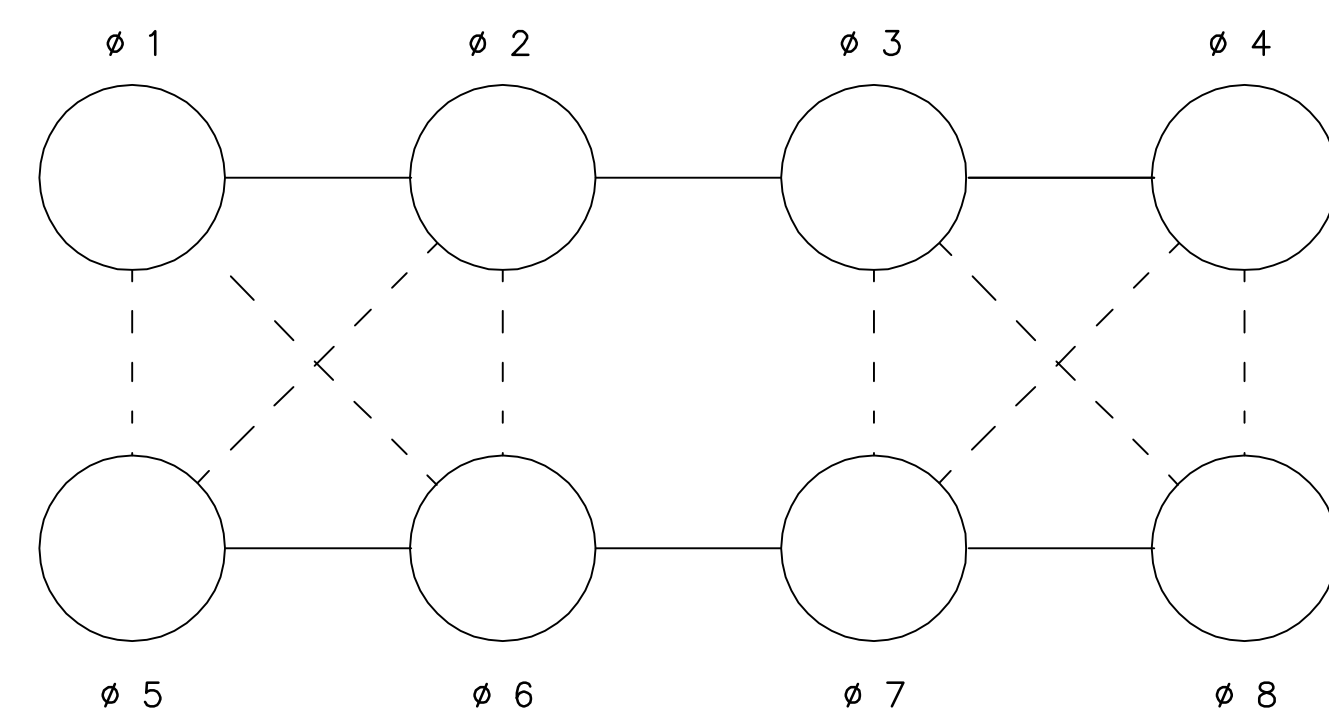
LOOP DETECTOR NOTES:

- SEE LOOP DETECTOR DETAIL SHEET FROM DESIGN DOCUMENT FOR SPLICE PATTERN AND OTHER INFORMATION.
- DELAY AND EXTENSION TIMES ARE IN SECONDS.
- DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY THE DETECTOR.

PREFERENTIAL PHASING SEQUENCE



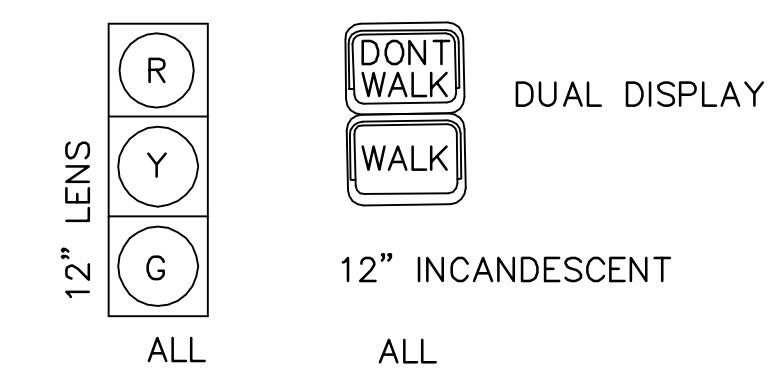
NEMA DUAL RING PHASING NOTES:



LOOP DETECTOR DATA

DETECTOR NUMBER	NUMBER OF SEGMENTS	LOOP SIZE	NUM. OF TURNS	Ø CALLED	Ø EXT.	MODE PULSE PRESENCE	DELAY TIME	EXT. TIME
1	4	6'x6'		Ø <sub>3</sub>	Ø <sub>3</sub>	PRESENCE		
2	4	6'x6'		Ø <sub>3</sub>	Ø <sub>3</sub>	PRESENCE		

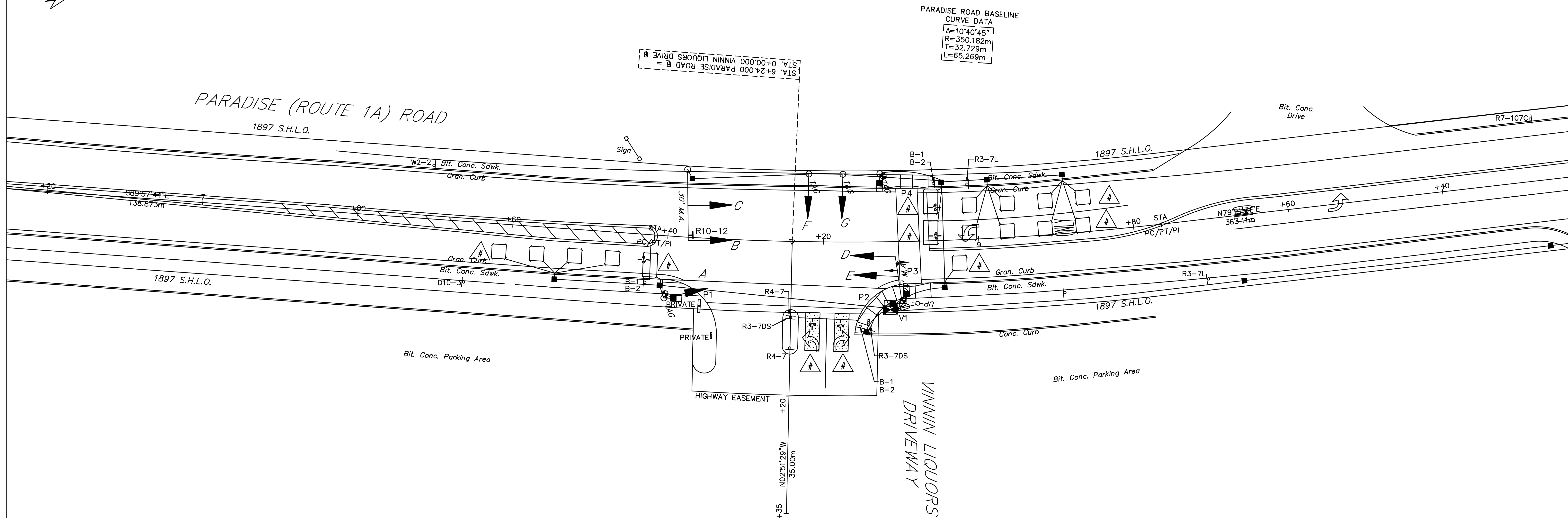
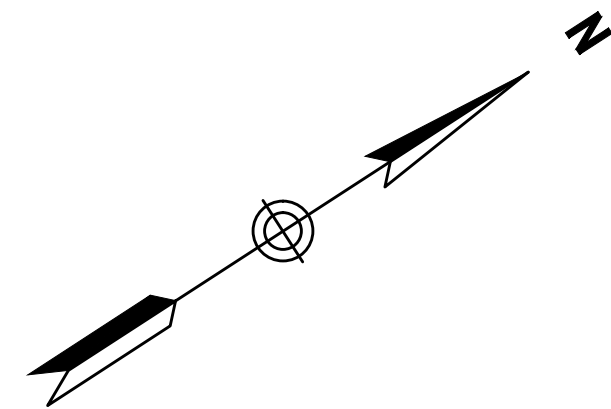
SIGNAL IDENTIFICATION



CONTROLLER MAKE & MODEL: EAGLE DP 300  
 UTILITY POLE No. MECO 38, NET&T 38/8  
 METER No. 95 059 822  
 EMERGENCY PRE-EMPTION (TYPE): NONE

**APPROVED BY:**

**STATE TRAFFIC ENGINEER** Date



LEGEND

	SIGNAL CONTROLLER
	VEHICULAR SIGNAL
	OPTICALLY PROGRAMMED VEHICULAR SIGNAL
	FIRE PRE-EMPTION RECEIVER
	FIRE PRE-EMPTION STROBE LIGHT
	PEDESTRIAN SIGNAL
	PEDESTRIAN PUSH BUTTON
	PULL BOX

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date





TRAFFIC SIGNAL DATA

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1	←	Ø1&Ø6
D2	2	↘	Ø2

SEQUENCE & TIMING NOTES:

- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
- THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
- IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
- IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

SEQUENCE AND TIMING																		
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	FLASHING OPERATION
MINIMUM INTERVAL			6			6			4			6						
VEHICLE EXTENSION			2			2			2			2						
MAXIMUM 1			16			45			25			45						
MAXIMUM 2			16			45			25			45						
YELLOW CLEARANCE				4			4			4			4					
RED CLEARANCE					1			1			1			1				
PEDESTRIAN INTERVAL						7/18			7/12									
PARADISE RD	EB	D,E	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
PARADISE RD	WB	A,B	←G-R	←Y-R	R	R	R	R	R	R	R	G	Y	R				FY
PARADISE RD	WB	C	R	R	R	R	R	R	R	R	R	G	Y	R				FY
DRIVEWAY	NB	F	R	R	R	R	R	R	G	Y	R	R	R	R				FR
DRIVEWAY	NB	G	R-G	R-Y	R	R	R	R	G	Y	R	R	R	R				FR
PEDESTRIAN X-ING	EB-WB	P1-P2	DW	DW	DW	W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OUT
PEDESTRIAN X-ING	NB-SB	P3-P4	DW	DW	DW	DW	DW	DW	W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	OUT
DETECTOR			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK						
RECALL			OFF			SOFT			OFF			SOFT						
			Ø1			Ø2			Ø4			Ø6			Ø3,Ø5,Ø7 & Ø8			
															NOT USED			

NOTES:

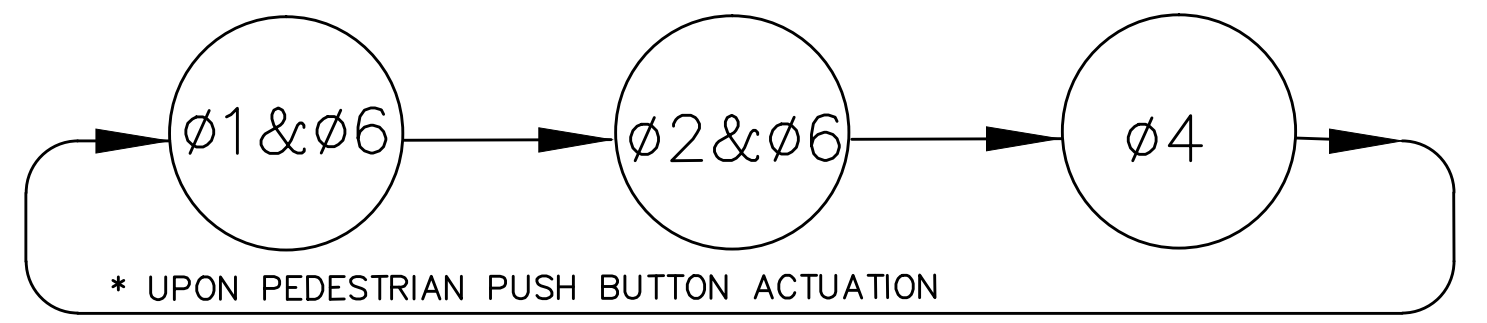
- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
- \* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
- OL = OVERLAP
- PERM = PERMISSIVE
- Ø2 "ON" OMITTS Ø1
- MAXIMUM 1 = NORMAL OPERATION
- MAXIMUM 2 = NOT USED
- STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
- DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
- INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

COORDINATION DATA  
(ALL ENTRIES IN SECONDS)

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	85 SEC	90 SEC	100 SEC
OFFSET	78	81	87
SPLIT Ø1&Ø6	12	12	15
SPLIT Ø2&Ø6	49	51	55
SPLIT Ø4	24	27	30
COORDINATED PHASE	Ø2&Ø6	Ø2&Ø6	Ø2&Ø6

- NOTES:
- Ø2&Ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF Ø2&Ø6 GREEN.
  - FLOATING FORCE OFF SHALL BE IN EFFECT.
  - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

PREFERENTIAL PHASE SEQUENCE



DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 85" CYCLE	0700-1100	-	-
PLAN 2 90" CYCLE	1100-1900	-	-
PLAN 3 100" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

ITEM 816.07  
TRAFFIC SIGNAL RECONSTRUCTION  
PARADISE ROAD @ VINNIN LIQUOR STORE  
LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXIST TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED TIMINGS SHOWN
3	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
1	TROUBLE-SHOOT & REESTABLISH COMMUNICATION LINK TO MASTER
7	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
2	12" YELLOW LEFT ARROW L.E.D. MODULES (A,B)
1	12" YELLOW RIGHT ARROW L.E.D. MODULES (A,B)
1	TYPE C, 2-CHANNEL CARD RACK LOOP DETECTOR AMPLIFIER
1	EMERGENCY PRE-EMPTION STROBE (WHITE LENS)

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

DETECTOR SCHEDULE

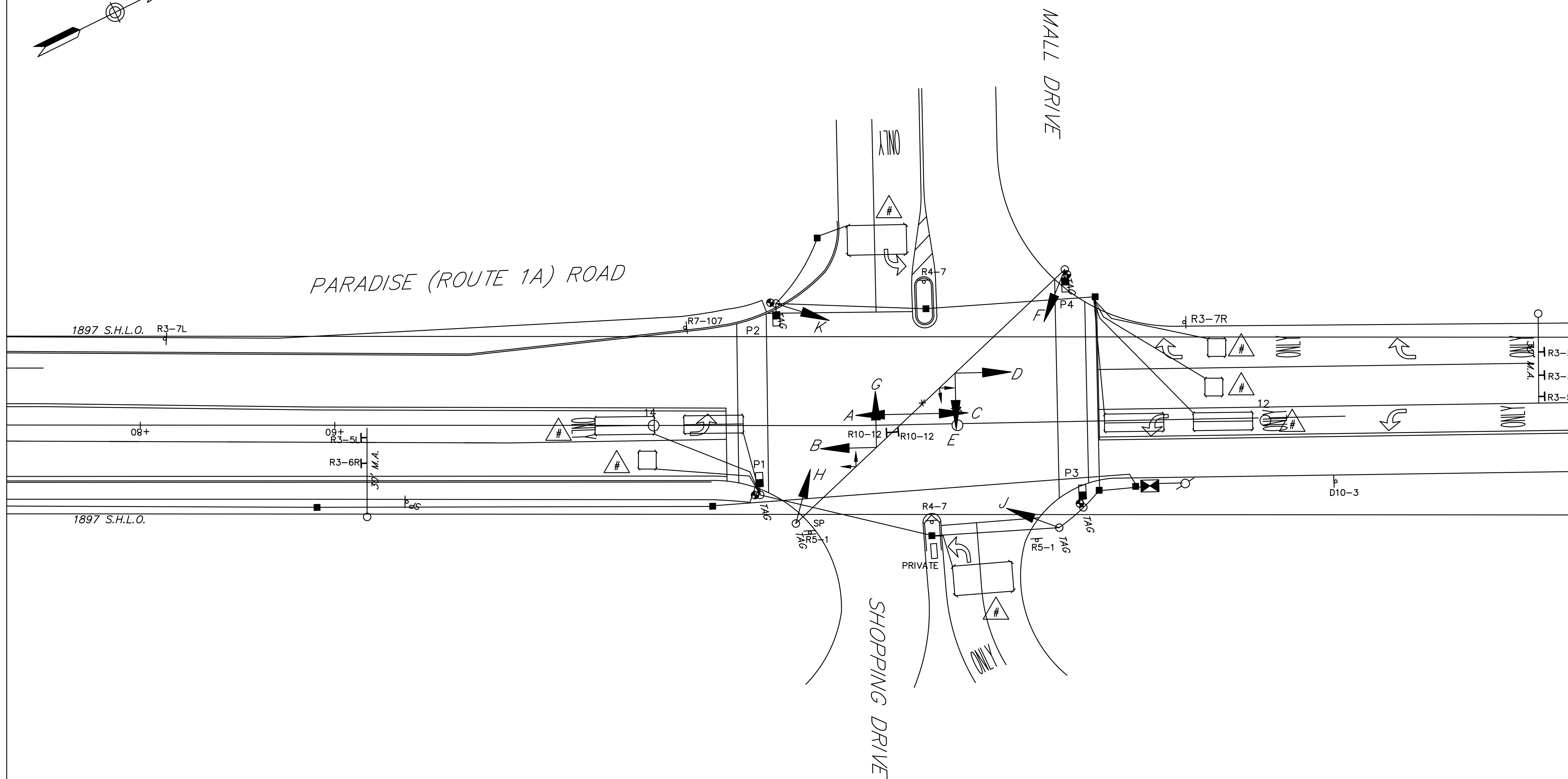
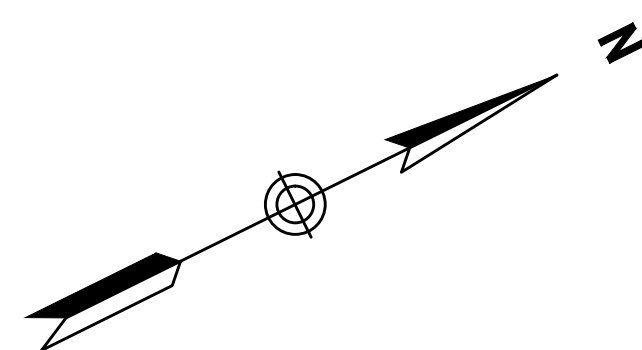
NO.	STREET	DIRECTION	LANE	AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/EXTENSION	LOOPS			DETECTION MODE	
				CHANNEL	SETTING				SIZE (FT)	SEGMENTS	TURNS		CONNECTIONS
1	PARADISE RD	SB	LEFT	1	PRESENCE	1	1	4	6 X 6	4	EXISTING	EXISTING	PRESENCE
2	PARADISE RD	SB	THROUGH	2	PRESENCE	6	6		6 X 6	4	EXISTING	EXISTING	PRESENCE
3	PARADISE RD	NB	RIGHT/THROUGH	3	PRESENCE	2	2		6 X 6	4	EXISTING	EXISTING	PRESENCE
B1	PARADISE RD	SB	LEFT	6	PRESENCE	1	1	4	6 X 10	1	EXISTING	EXISTING	PRESENCE
B2	PARADISE RD	SB	THROUGH	7	PRESENCE	6	6		6 X 10	1	EXISTING	EXISTING	PRESENCE
B3	PARADISE RD	NB	RIGHT/THROUGH	8	PRESENCE	2	2	6	6 X 10	1	EXISTING	EXISTING	PRESENCE
S1	PARADISE RD	NB	THROUGH	11	PULSE	-	-		6 X 6	1	EXISTING	EXISTING	SYSTEM

DETECTOR DATA					
DETECTOR NO.	ZONE SIZE	CAMERA	DELAY/EXT	CALL PHASE	AMPLIFIER CHANNEL
4	-	V1	4 SEC DELAY	Ø4	16
5	-	V1	6 SEC DELAY	Ø4	16

NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY

CONTROLLER MAKE & MODEL: PEEK 3000E  
UTILITY POLE No. 138, BELL ATLANTIC 1/138  
35492239  
EMERGENCY PRE-EMPTION (TYPE): OPTICOM

SIGNAL HEAD DATA					
A	B	G	C,D,E	F	P1-P4
ALL 12" LENS					



LEGEND

	SIGNAL CONTROLLER
	VEHICULAR SIGNAL
	OPTICALLY PROGRAMMED VEHICULAR SIGNAL
	FIRE PRE-EMPTION RECEIVER
	FIRE PRE-EMPTION STROBE LIGHT
	PEDESTRIAN SIGNAL
	PEDESTRIAN PUSH BUTTON
	PULL BOX

APPROVED BY:

STATE TRAFFIC ENGINEER

Date

TRAFFIC SIGNAL DATA

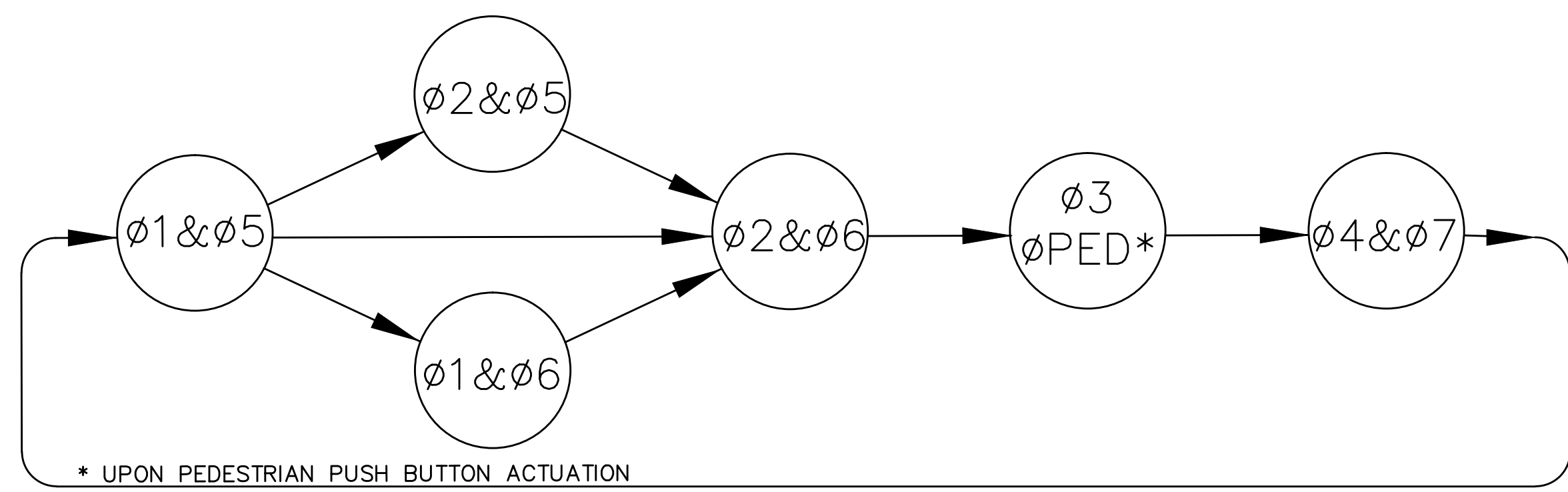
		SEQUENCE AND TIMING																								FLASHING OPERATION	
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
MINIMUM INTERVAL			6			10						8			6			10			8						
VEHICLE EXTENSION			1			3						2			1			2			2						
MAXIMUM 1			15			35						25			15			35			15						
MAXIMUM 2			15			25						25			15			25			15						
YELLOW CLEARANCE				4			4						4			4			4			4					
RED CLEARANCE					1			1					1			1			1			1					
PEDESTRIAN INTERVAL									7	16	1																
PARADISE RD	NB	A	R	R	R	G	Y	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
PARADISE RD	NB	B,J	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
PARADISE RD	SB	C	G	R	Y	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	FY
PARADISE RD	SB	D,K	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	FY
SHOPPING DRIVE	EB	E,F	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
MALL DR	WB	G,H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R					FR
PEDESTRIAN X-ING	ALL	ALL	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OUT

- SEQUENCE & TIMING NOTES:
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
  - THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
  - IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
  - IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1		ø2&ø5
D2	2		ø1&ø6
D3	3		ø4
D4	4		ø7

- NOTES:
- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
  - \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
  - PERM = PERMISSIVE
  - MAXIMUM 1 = ALL OTHER TIMES
  - MAXIMUM 2 = 11:00AM - 7:00PM, SUN-SAT
  - ø2 OMITTS ø5; ø6 OMITTS ø1
  - STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
  - DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

PREFERENTIAL PHASE SEQUENCE



DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 85" CYCLE	0700-1100	-	-
PLAN 2 90" CYCLE	1100-1900	-	-
PLAN 3 100" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3, D4) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

COORDINATION DATA (ALL ENTRIES IN SECONDS)

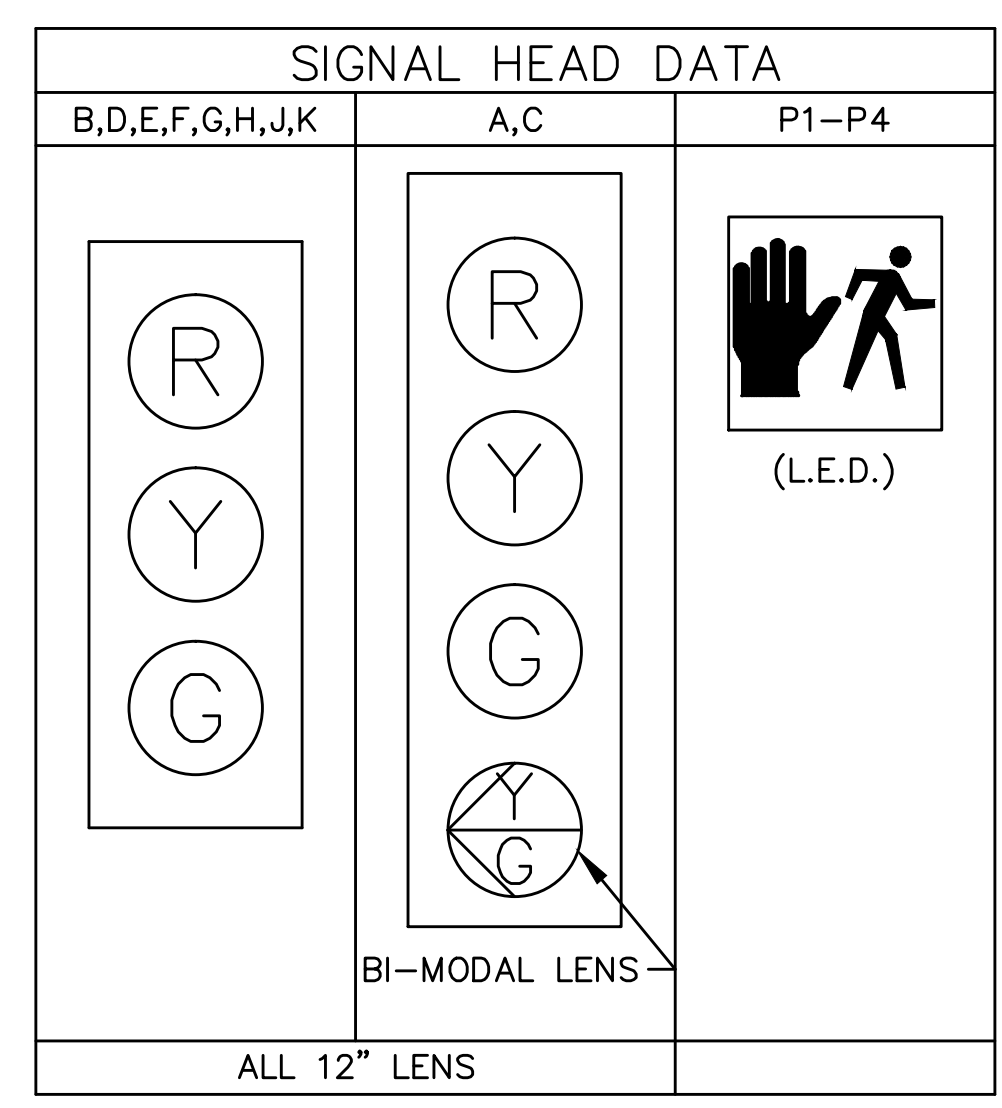
	PLAN 1 85 SEC	PLAN 2 90 SEC	PLAN 3 100 SEC
CYCLE LENGTH	85	90	100
OFFSET	0	0	0
SPLIT ø1&ø5	12 (12)	12 (12)	12 (12)
SPLIT ø2&ø6	59 (34)	54 (29)	53 (28)
SPLIT ø3 PED	- (25)	- (25)	- (25)
SPLIT ø4&ø7	14 (14)	24 (24)	35 (35)
COORDINATED PHASE	ø2&ø6	ø2&ø6	ø2&ø6

- NOTES:
- ø2&ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF ø2&ø6 GREEN.
  - FLOATING FORCE OFF SHALL BE IN EFFECT.
  - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  - ( ) = SPLIT TIMES WITH PEDESTRIAN PHASE ACTUATED.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - PERMISSIVE MODE SHALL BE IN EFFECT.

ITEM 816.06 TRAFFIC SIGNAL RECONSTRUCTION PARADISE ROAD @ SWAMPSCOTT MALL/SHOPPING CENTER LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXIST TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED PHASING & TIMINGS SHOWN
3	1-SECTION PEDESTRIAN SIGNAL HEAD (L.E.D.)
4	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
9	WIRE LOOP DETECTOR
1	EMERGENCY PRE-EMPTION OPTICAL DETECTORS (MODEL 722) & DETECTOR CABLE
10	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
8	12" CIRCULAR GREEN L.E.D. MODULES
3	SIGNAL HEAD VISORS (TUNNEL)
1	REPAIR DAMAGED PB

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

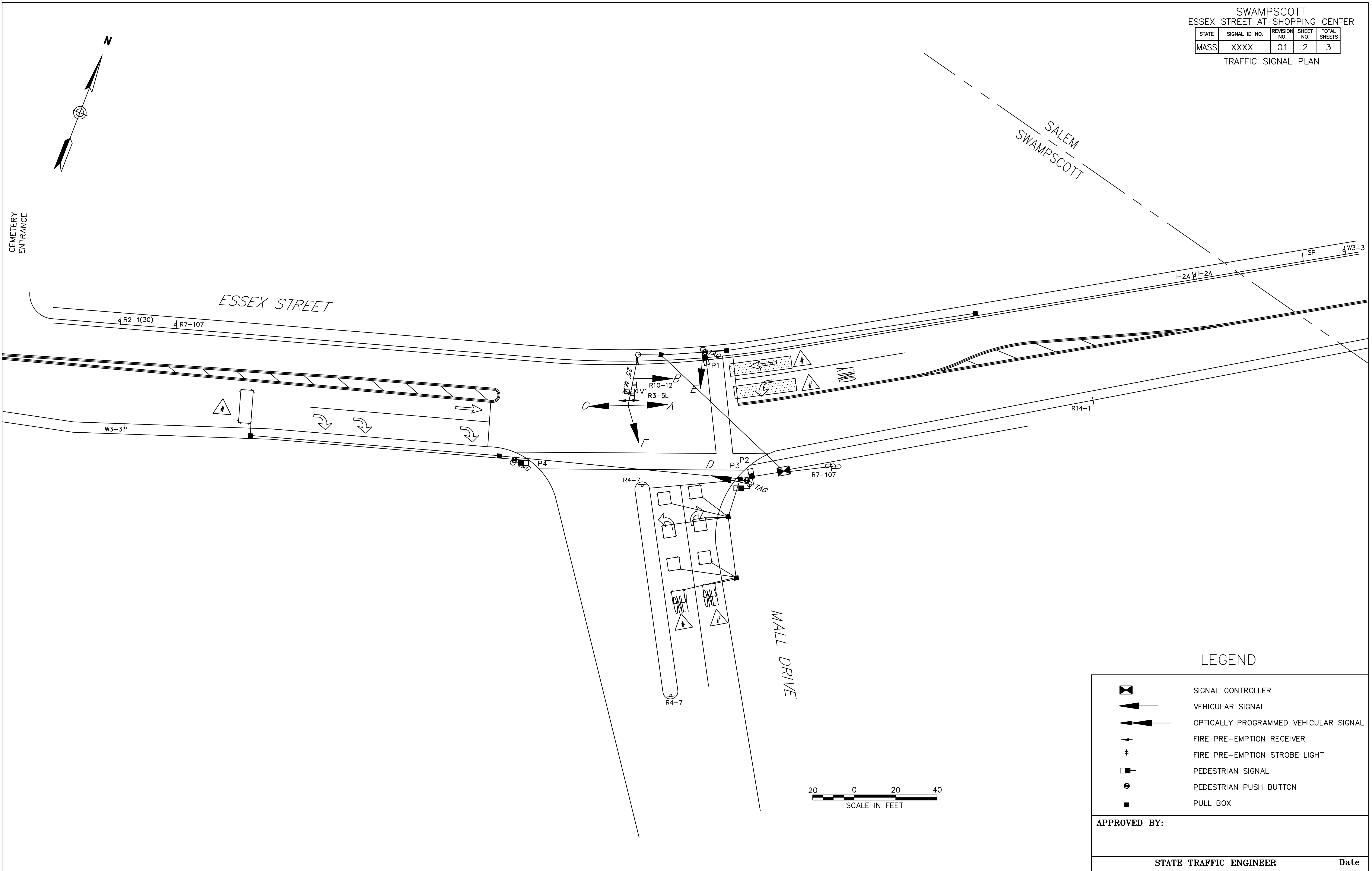
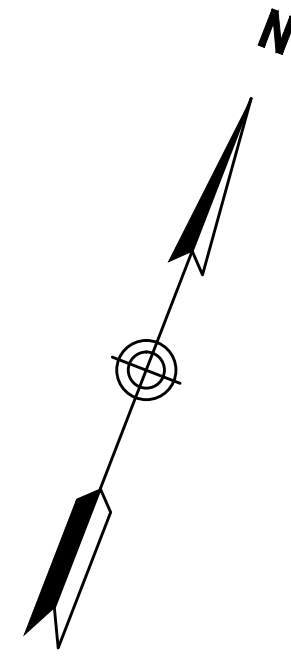


DETECTOR SCHEDULE

NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	NO.	CHANNEL				SETTING	SIZE (FT)	SEGMENTS	TURNS	
1	PARADISE RD	NB	THROUGH	1	1	PRESENCE	2	2	6 X 6	1	EXISTING	-	PRESENCE
2	PARADISE RD	NB	LEFT	1	2	PRESENCE	5	5	6 X 20	2	EXISTING	EXISTING	PRESENCE
3	PARADISE RD	SB	RIGHT	2	1	PRESENCE	6	6	6 X 6	1	EXISTING	-	PRESENCE
4	PARADISE RD	SB	THROUGH	2	2	PRESENCE	6	6	6 X 6	1	EXISTING	-	PRESENCE
5	PARADISE RD	SB	LEFT	3	1	PRESENCE	1	1	6 X 20	2	EXISTING	EXISTING	PRESENCE
6	SHOPPING DRIVE	WB	ALL	3	2	PRESENCE	7	7	10 X 20	1	EXISTING	-	PRESENCE
7	MALL DRIVE	EB	ALL	4	1	PRESENCE	4	4	10 X 20	1	EXISTING	-	PRESENCE

CONTROLLER MAKE & MODEL: PEEK 3000E  
 UTILITY POLE No. NET&T 156, BELL ATLANTIC 1/156  
 METER No. NO METER  
 EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date



LEGEND

	SIGNAL CONTROLLER
	VEHICULAR SIGNAL
	OPTICALLY PROGRAMMED VEHICULAR SIGNAL
	FIRE PRE-EMPTION RECEIVER
	FIRE PRE-EMPTION STROBE LIGHT
	PEDESTRIAN SIGNAL
	PEDESTRIAN PUSH BUTTON
	PULL BOX

APPROVED BY: \_\_\_\_\_

STATE TRAFFIC ENGINEER      Date

SEQUENCE AND TIMING																		FLASHING OPERATION				
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	
MINIMUM INTERVAL			6			10						6			10							
VEHICLE EXTENSION			2			4						2			4							
MAXIMUM 1			10			35						20			35							
MAXIMUM 2			15			50						25			50							
YELLOW CLEARANCE				4			4						4			4						
RED CLEARANCE					1			1						1				1				
PEDESTRIAN INTERVAL									7	27	1											
ESSEX ST	EB	C,D	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
ESSEX ST	WB	A	<del>G-R</del>	<del>Y-R</del>	R	R	R	R	R	R	R	R	R	R	G	Y	R					FY
ESSEX ST	WB	B	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R					FY
MALL DRIVE	NB	E	<del>R-G</del>	<del>R-Y</del>	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FR
MALL DRIVE	NB	F	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FR
PEDESTRIAN X-ING	ALL	ALL	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW					OUT

SEQUENCE & TIMING NOTES:

- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
- THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
- IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
- IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1	→	ø2
D2	2	↔	ø1&ø6
D3	3	↑	ø4

NOTES:

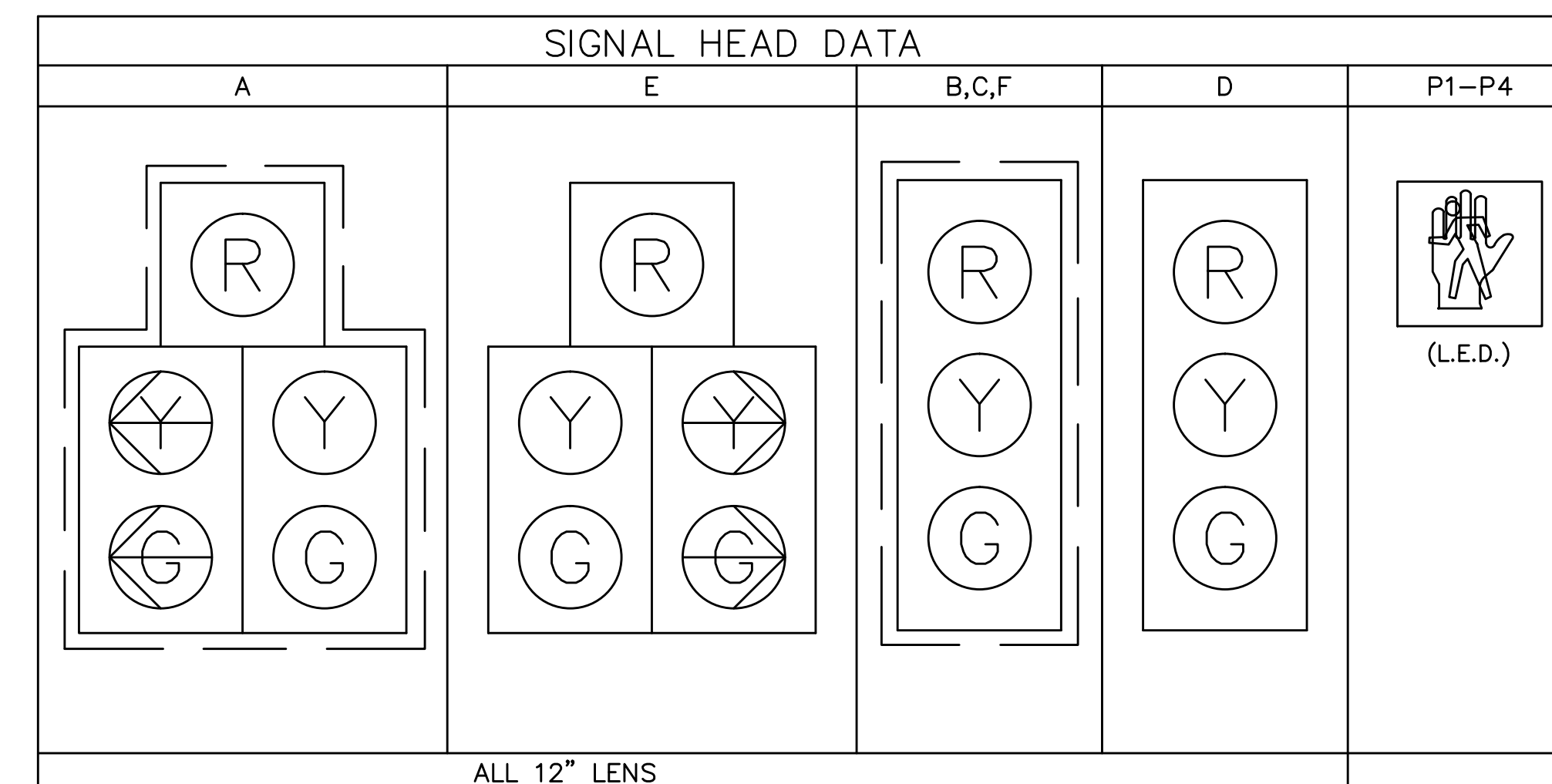
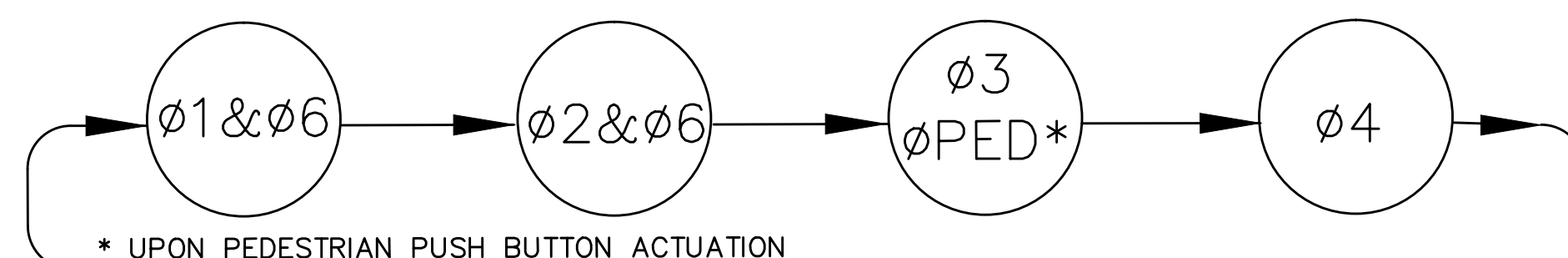
- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
- \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
- OL = OVERLAP
- PERM = PERMISSIVE
- MAXIMUM 1 = NORMAL OPERATION
- MAXIMUM 2 = 3PM - 7PM
- STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
- DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.

DETECTOR	NON-LOCK	LOCK	NON-LOCK	LOCK	NON-LOCK	
RECALL	OFF	SOFT	OFF	OFF	SOFT	
	ø1	ø2	ø3	ø4	ø6	ø5,ø7 & ø8
						NOT USED

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.

PREFERENTIAL PHASE SEQUENCE



ITEM 816.05  
TRAFFIC SIGNAL RECONSTRUCTION  
ESSEX STREET @ MALL DRIVEWAY  
LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXISTING TS PEEK 3000E CONTROLLER AND CABINET TO PROPOSED TIMINGS SHOWN
3	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
2	AUDIBLE PED DEVICE
1	PULL BOX-12"x12" - FRAME & COVER
1	VIDEO DETECTION SYSTEM (1 CAMERA, VDP & CABLES)
6	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
1	12" YELLOW LEFT ARROW L.E.D. MODULES (A)
1	12" YELLOW RIGHT ARROW L.E.D. MODULES (E)

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGN DESCRIPTION

DETECTOR DATA				
DETECTOR NO.	ZONE SIZE	CAMERA	DELAY /EXT	CALL PHASE
1	TO BE FIELD ADJUSTED	V1	0	ø1&ø6
2	TO BE FIELD ADJUSTED	V1	0	ø6

NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY

DETECTOR SCHEDULE

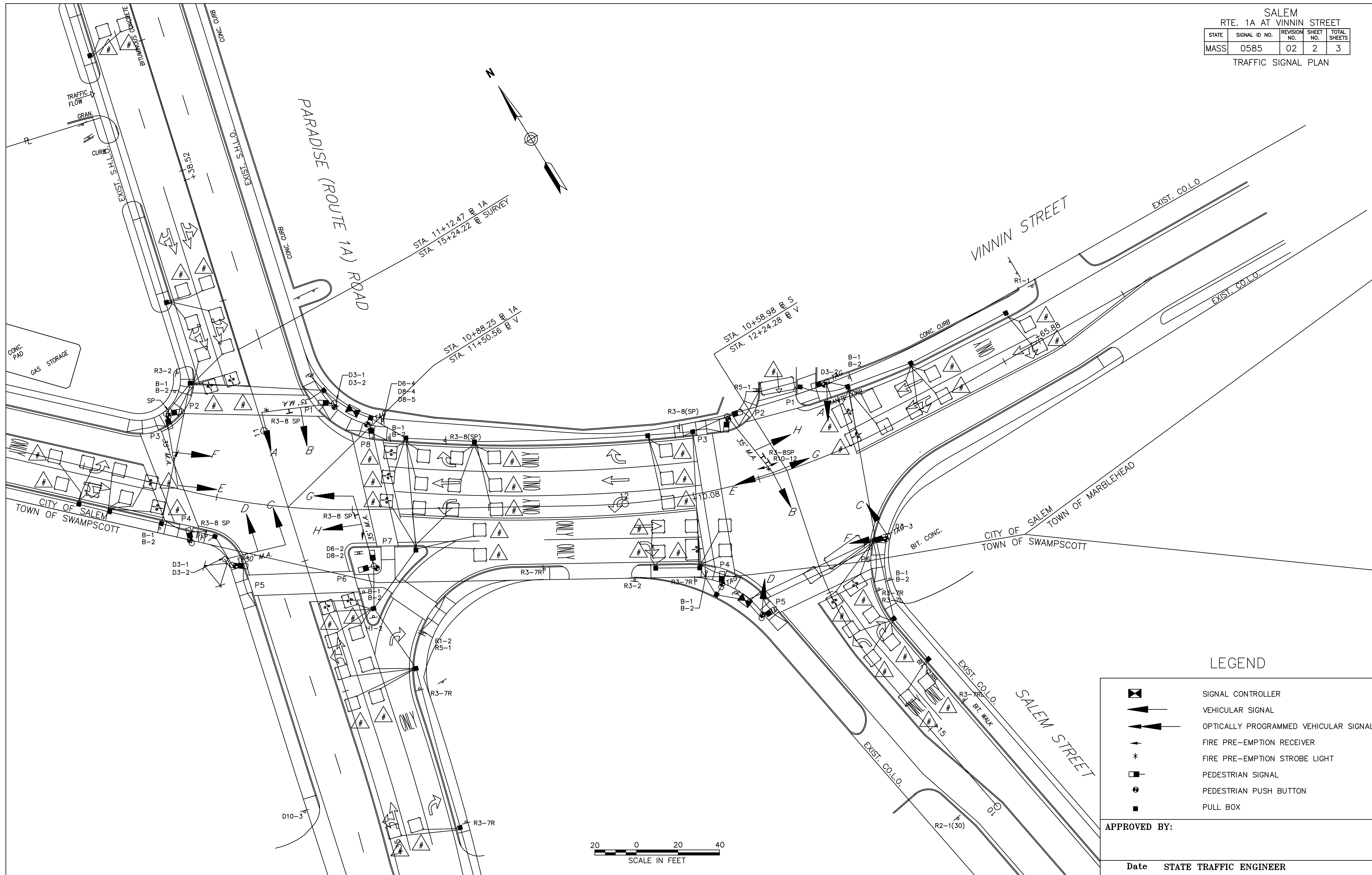
NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/ EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	NO.	CHANNEL				SETTING	SIZE (FT)	SEGMENTS	TURNS	
3	ESSEX STREET	EB	THROUGH	2	1	PRESENCE	2	2	6 X 16	1	EXISTING	-	PRESENCE
4	MALL DRIVE	NB	LEFT	2	2	PRESENCE	4	4	6 X 6	4	EXISTING	EXISTING	PRESENCE
5	MALL DRIVE	NB	RIGHT	3	1	PRESENCE	7	4&7	6 X 6	4	EXISTING	EXISTING	PRESENCE

CONTROLLER MAKE & MODEL: PEEK 3000E  
UTILITY POLE No. NET&T 17, 135  
METER No. 86 400 280  
EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY:

STATE TRAFFIC ENGINEER

Date



LEGEND

- SIGNAL CONTROLLER
- VEHICULAR SIGNAL
- OPTICALLY PROGRAMMED VEHICULAR SIGNAL
- FIRE PRE-EMPTION RECEIVER
- FIRE PRE-EMPTION STROBE LIGHT
- PEDESTRIAN SIGNAL
- PEDESTRIAN PUSH BUTTON
- PULL BOX

APPROVED BY: \_\_\_\_\_

Date \_\_\_\_\_ STATE TRAFFIC ENGINEER

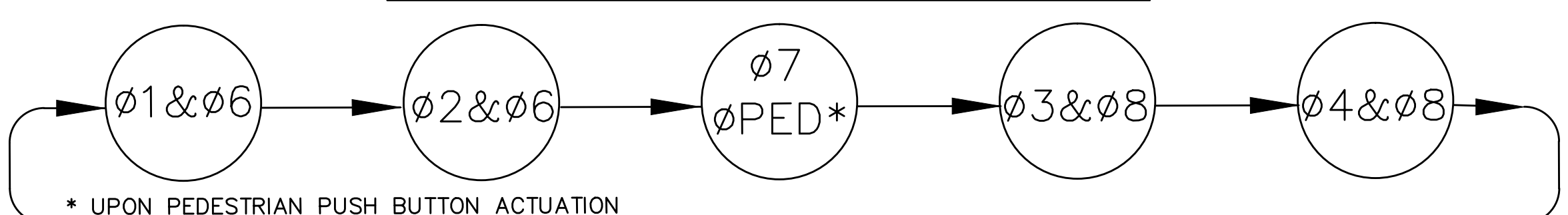
		SEQUENCE AND TIMING																								FLASHING OPERATION	
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
MINIMUM INTERVAL			6			10			6			8			10						8						
VEHICLE EXTENSION			1			2			1			3			2						2						
MAXIMUM 1			12			25			15			35			25						35						
MAXIMUM 2			14			25			15			40			25						40						
YELLOW CLEARANCE				4			4			4			4							3							
RED CLEARANCE					1			1			1			1										1			
PEDESTRIAN INTERVAL																				7	15	0					
PARADISE RD	NB	A,B	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
PARADISE RD	SB	C	G-R	Y-R	R	G	Y	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
PARADISE RD	SB	D	R	R	R	G	Y	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FY
VINNIN ST	EB	G,H	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	FR
VINNIN ST	WB	E	R	R	R	R	R	R	R	R	G-R	Y-R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	FR
VINNIN ST	WB	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	FR
PEDESTRIAN X-ING	ALL	ALL	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	OUT	

DETECTOR	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK
RECALL	OFF	SOFT	OFF	OFF	SOFT	OFF	OFF
	ø1	ø2	ø3	ø4	ø6	ø7*	ø8
							ø5 & ø7
							NOT USED

- NOTES:
1. AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
  2. \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
  3. PERM = PERMISSIVE
  4. Y = YIELD CONTROL
  5. ø4 & ø8 DUAL ENTRY
  6. MAXIMUM 1 = ALL OTHER TIMES
  7. MAXIMUM 2 = 11:00AM - 7:00PM, SUN-SAT
  8. STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
  9. DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
  10. INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

- SEQUENCE & TIMING NOTES:
1. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
  2. THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
  3. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
  4. IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PREFERENTIAL PHASE SEQUENCE



\* UPON PEDESTRIAN PUSH BUTTON ACTUATION

DETECTOR SCHEDULE

NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/ EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	CHANNEL	SETTING				SIZE (FT)	SEGMENTS	TURNS	CONNECTIONS	
1	PARADISE RD	NB	LEFT/THROUGH	1	PRESENCE	2	2		6 X 6	3	3	SERIES	PRESENCE
2	PARADISE RD	NB	LEFT/THROUGH	2	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
3	PARADISE RD	NB	THROUGH	3	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
4	PARADISE RD	NB	THROUGH	4	PRESENCE	2	2		6 X 6	3	3	SERIES	PRESENCE
5	PARADISE RD	SB	LEFT/THROUGH	5	PRESENCE	1&6	1&6		6 X 6	3	3	SERIES	PRESENCE
6	PARADISE RD	SB	LEFT/THROUGH	6	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
7	PARADISE RD	SB	RIGHT/THROUGH	7	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
8	PARADISE RD	SB	RIGHT/THROUGH	8	PRESENCE	6	6		6 X 6	3	3	SERIES	PRESENCE
9	VINNIN STREET	EB	LEFT	9	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
10	VINNIN STREET	EB	RIGHT/THROUGH	10	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
11	VINNIN STREET	EB	LEFT	11	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
12	VINNIN STREET	EB	THROUGH	12	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
13	VINNIN STREET	WB	LEFT	13	PRESENCE	3	3		6 X 6	3	3	SERIES	PRESENCE
14	VINNIN STREET	WB	THROUGH	14	PRESENCE	8	8		6 X 6	3	3	SERIES	PRESENCE
15	VINNIN STREET	WB	RIGHT	15	PRESENCE	8	8		6 X 6	3	3	SERIES	PRESENCE
16	VINNIN STREET	WB	LEFT	16	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
17	VINNIN STREET	WB	THROUGH	17	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
18	VINNIN STREET	WB	RIGHT	18	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
B1	PARADISE RD	NB	LEFT/THROUGH	19	PRESENCE	2	2		6 X 6	1	4	-	BICYCLE
B4	PARADISE RD	NB	THROUGH	20	PRESENCE	2	2		6 X 6	1	4	-	BICYCLE
B5	PARADISE RD	SB	LEFT/THROUGH	21	PRESENCE	1	1		6 X 6	1	4	-	BICYCLE
B8	PARADISE RD	SB	RIGHT/THROUGH	22	PRESENCE	6	6		6 X 6	1	4	-	BICYCLE
B9	VINNIN STREET	EB	LEFT	23	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE
B10	VINNIN STREET	EB	RIGHT/THROUGH	24	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE
B13	VINNIN STREET	WB	LEFT	25	PRESENCE	3	3		6 X 6	1	4	-	BICYCLE
B14	VINNIN STREET	WB	THROUGH	26	PRESENCE	8	8		6 X 6	1	4	-	BICYCLE
B15	VINNIN STREET	WB	RIGHT	27	PRESENCE	8	8		6 X 6	1	4	-	BICYCLE

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

1. EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
2. PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
3. IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
4. UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
5. MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
6. PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
7. EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

SALEM				
ROUTE 1A AT VINNIN STREET				
STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	0585	02	3	

TRAFFIC SIGNAL DATA

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1		ø2
D2	2		ø1&ø6
D3	3		ø4
			ø3&ø8

COORDINATION DATA (ALL ENTRIES IN SECONDS)

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	100 SEC	100 SEC	90 SEC
OFFSET	0	0	0
SPLIT ø1&ø6	12 (12)	12 (12)	12 (12)
SPLIT ø2&ø6	40 (16)	42 (18)	40 (16)
SPLIT ø7 PED	- (24)	- (24)	- (24)
SPLIT ø3&ø8	12 (12)	12 (12)	12 (12)
SPLIT ø4&ø8	36 (36)	34 (34)	26 (26)
COORDINATED PHASE	ø2&ø6	ø2&ø6	ø2&ø6

DAILY & WEEKLY COORDINATION PROGRAM

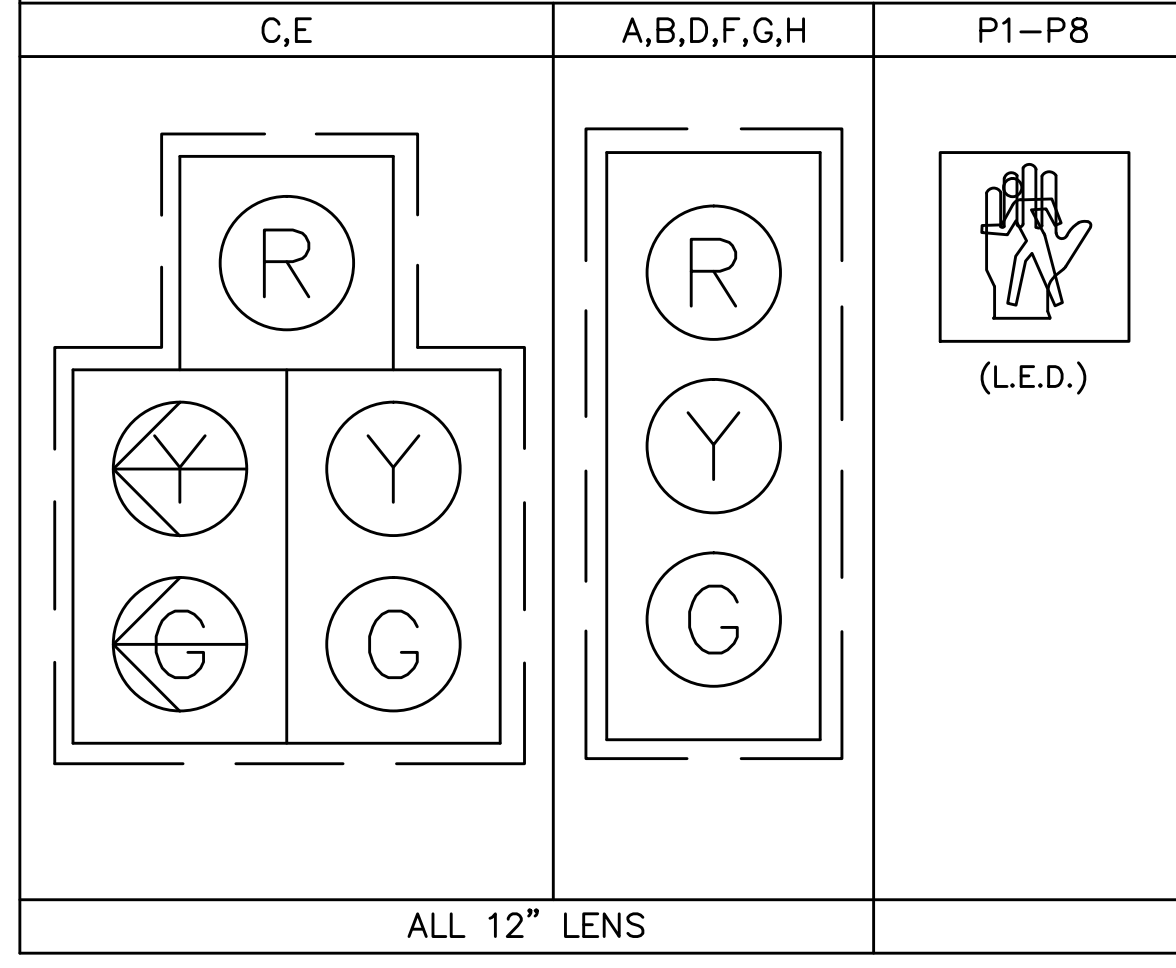
	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 100" CYCLE	0700-1100	-	-
PLAN 2 100" CYCLE	1100-1900	-	-
PLAN 3 90" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

- NOTES:
1. ø2&ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  2. OFFSET: BEGINNING OF ø2&ø6 GREEN.
  3. FLOATING FORCE OFF SHALL BE IN EFFECT.
  4. SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  5. ( ) = SPLIT TIMES WITH PEDESTRIAN PHASE ACTUATED.
  6. INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  7. PERMISSIVE MODE SHALL BE IN EFFECT.

ITEM 816.01 TRAFFIC SIGNAL RECONSTRUCTION PARADISE ROAD @ VINNIN STREET LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXISTING TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED TIMINGS SHOWN
1	AUDIBLE PEDESTRIAN DEVICE
8	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
2	12" YELLOW LEFT ARROW L.E.D. MODULES (C,E)
1	3-SECTION SIGNAL HEAD ASTROBRAC
2	PEDESTRIAN SIGNAL HEAD VISOR (1-SECTION)
PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.	
-	MODIFY EXIST TS PEEK M3000E SYSTEM MASTER CONTROLLER AND MODEM TO PROPOSED TIMINGS SHOWN (INCLUDED UNDER ITEM 815.923)

SIGNAL HEAD DATA



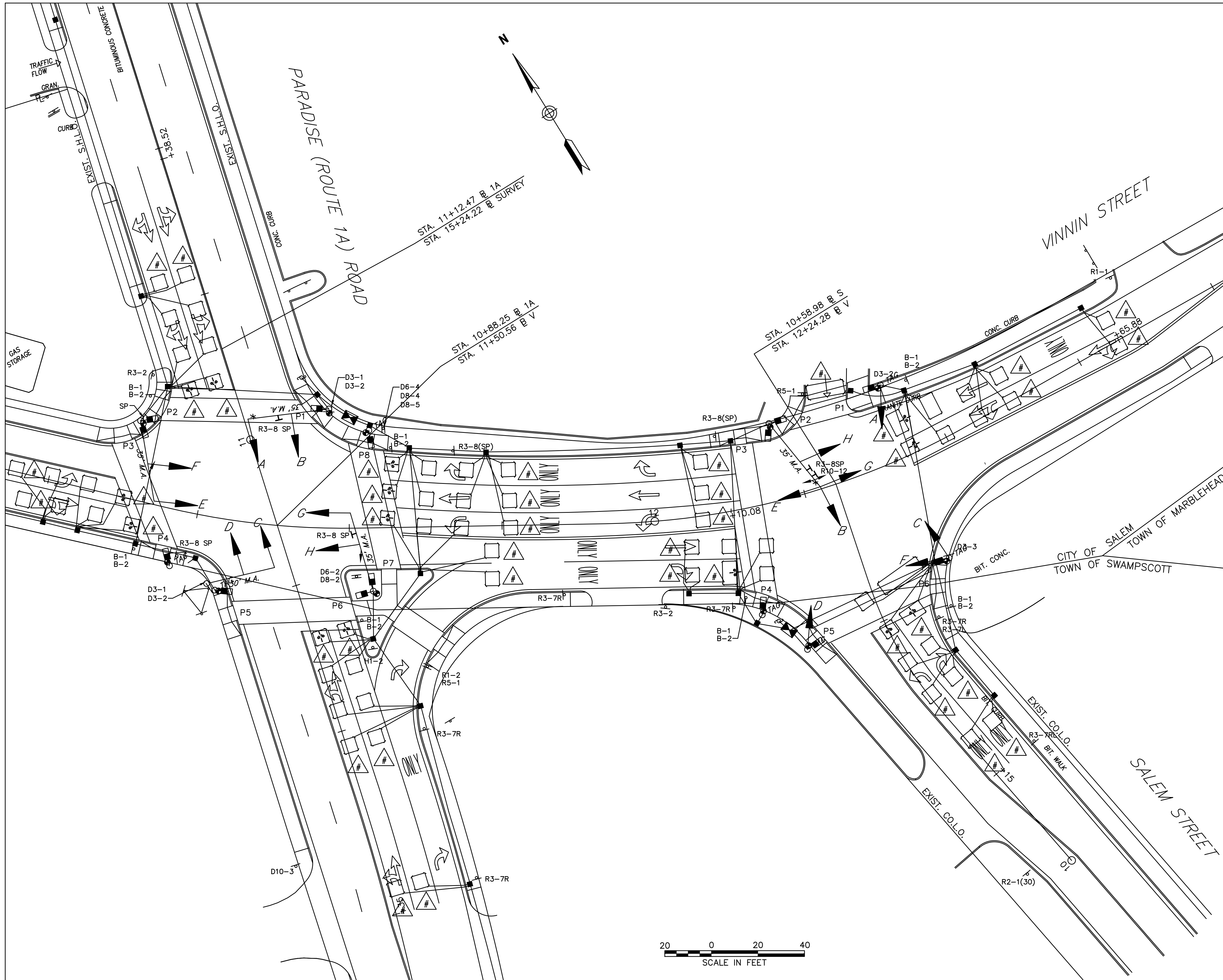
CONTROLLER MAKE & MODEL: PEEK 3000E  
 UTILITY POLE No. MECO 3872  
 METER No. 05073193  
 EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date

SALEM  
VINNIN STREET AT SALEM STREET

STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	1200	01	2	3

TRAFFIC SIGNAL PLAN



LEGEND

	SIGNAL CONTROLLER
	VEHICULAR SIGNAL
	OPTICALLY PROGRAMMED VEHICULAR SIGNAL
	FIRE PRE-EMPTION RECEIVER
	FIRE PRE-EMPTION STROBE LIGHT
	PEDESTRIAN SIGNAL
	PEDESTRIAN PUSH BUTTON
	PULL BOX

APPROVED BY:

Date STATE TRAFFIC ENGINEER



TRAFFIC SIGNAL DATA

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1		ø4
D2	2		ø2
D3	3		ø1&ø6

SEQUENCE & TIMING NOTES:

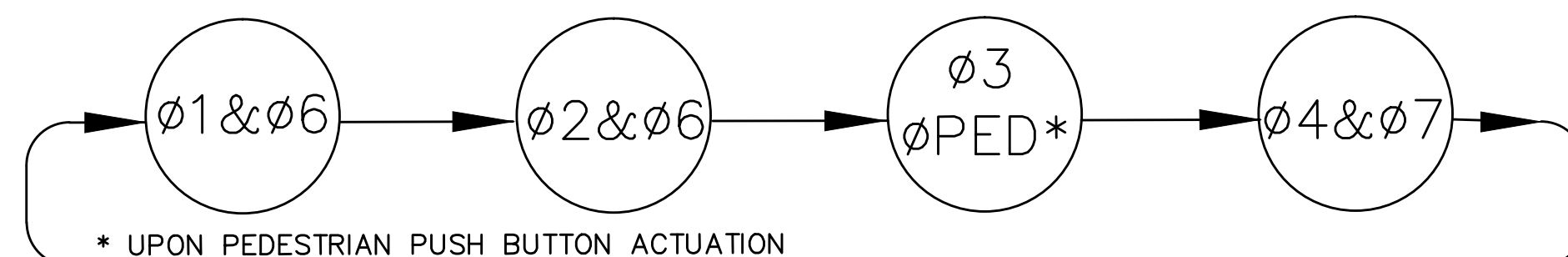
- IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
- THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
- IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
- IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

SEQUENCE AND TIMING																						FLASHING OPERATION	
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		20
MINIMUM INTERVAL			6			10						6			10			6					
VEHICLE EXTENSION			1			2						1			2			1					
MAXIMUM 1			15			35						25			35			25					
MAXIMUM 2			16			45						30			45			30					
YELLOW CLEARANCE				4			4			3			4			4			4				
RED CLEARANCE					1			1			1			1			1			1			
PEDESTRIAN INTERVAL									7	17													
VINNIN ST	EB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
VINNIN ST	WB	G	G	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
VINNIN ST	WB	H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
SALEM ST	NB	A,B	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R
STAPLES DR	SB	C,D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R		
PEDESTRIAN X-ING			DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW			
DETECTOR			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK								
RECALL			OFF			SOFT			OFF			SOFT			OFF								
			ø1			ø2			ø3*			ø4			ø6			ø7			ø5 & ø8		
																					NOT USED		

NOTES:

- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
- \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
- PERM = PERMISSIVE
- ø4 & ø7 DUAL ENTRY
- MAXIMUM 1 = ALL OTHER TIMES
- MAXIMUM 2 = 11:00AM - 7:00PM, SUN-SAT
- STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
- DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
- INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

PREFERENTIAL PHASE SEQUENCE



COORDINATION DATA  
(ALL ENTRIES IN SECONDS)

	PLAN 1 100 SEC	PLAN 2 100 SEC	PLAN 3 90 SEC
OFFSET	50	51	49
SPLIT ø1&ø6	12 (12)	12 (12)	12 (12)
SPLIT ø2&ø6	62 (36)	64 (38)	59 (33)
SPLIT ø3 PED	- (26)	- (26)	- (26)
SPLIT ø4&ø7	26 (26)	24 (24)	19 (19)
COORDINATED PHASE	ø2&ø6	ø2&ø6	ø2&ø6

- NOTES:
- ø2&ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF ø2&ø6 GREEN.
  - FLOATING FORCE OFF SHALL BE IN EFFECT.
  - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  - ( ) = SPLIT TIMES WITH PEDESTRIAN PHASE ACTUATED.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - PERMISSIVE MODE SHALL BE IN EFFECT.

ITEM 816.02  
TRAFFIC SIGNAL RECONSTRUCTION  
VINNIN STREET @ SALEM STREET  
LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXISTING TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED TIMINGS SHOWN
1	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
1	AUDIBLE PEDESTRIAN DEVICE
8	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
1	12" YELLOW LEFT ARROW L.E.D. MODULES (G)

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

DETECTOR SCHEDULE

NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	CHANNEL	SETTING				SIZE (FT)	SEGMENTS	TURNS	CONNECTIONS	
1	SALEM STREET	NB	LEFT	1	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
2	SALEM STREET	NB	RIGHT	2	PRESENCE	4	4		*	3	3	SERIES	PRESENCE
3	SALEM STREET	NB	LEFT	3	PRESENCE	4	-		6 X 6	1	3	-	SYSTEM
4	SALEM STREET	NB	RIGHT	4	PRESENCE	4	-		6 X 6	1	3	-	SYSTEM
5	VINNIN STREET	WB	LEFT/THROUGH	5	PRESENCE	1&6	1&6		6 X 6	3	3	SERIES	PRESENCE
6	VINNIN STREET	WB	THROUGH	6	PRESENCE	6	6		**	3	3	SERIES	PRESENCE
7	VINNIN STREET	WB	LEFT/THROUGH	7	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
8	VINNIN STREET	WB	THROUGH	8	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
9	VINNIN STREET	EB	THROUGH	9	PRESENCE	2	2		6 X 6	3	3	SERIES	PRESENCE
10	VINNIN STREET	EB	RIGHT	10	PRESENCE	2	2		6 X 6	2	3	SERIES	PRESENCE
11	VINNIN STREET	EB	THROUGH	11	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
12	VINNIN STREET	EB	RIGHT	12	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
13	STAPLES EXIT	SB	ALL	13	PRESENCE	7	7		6 X 10	1	3	-	PRESENCE
B1	SALEM STREET	NB	LEFT	14	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE
B2	SALEM STREET	NB	RIGHT	15	PRESENCE	4	4		6 X 12	1	4	-	BICYCLE
B5	VINNIN STREET	WB	LEFT/THROUGH	16	PRESENCE	1&6	1&6		6 X 6	1	4	-	BICYCLE
B6	VINNIN STREET	WB	THROUGH	17	PRESENCE	6	6		6 X 12	1	4	-	BICYCLE
B10	VINNIN STREET	EB	RIGHT	18	PRESENCE	2	2		6 X 9	1	4	-	BICYCLE

\* 2 - 6 x 6, 1 - 6 x 20 \*\* 1 - 6 x 6, 1 - 6 x 10

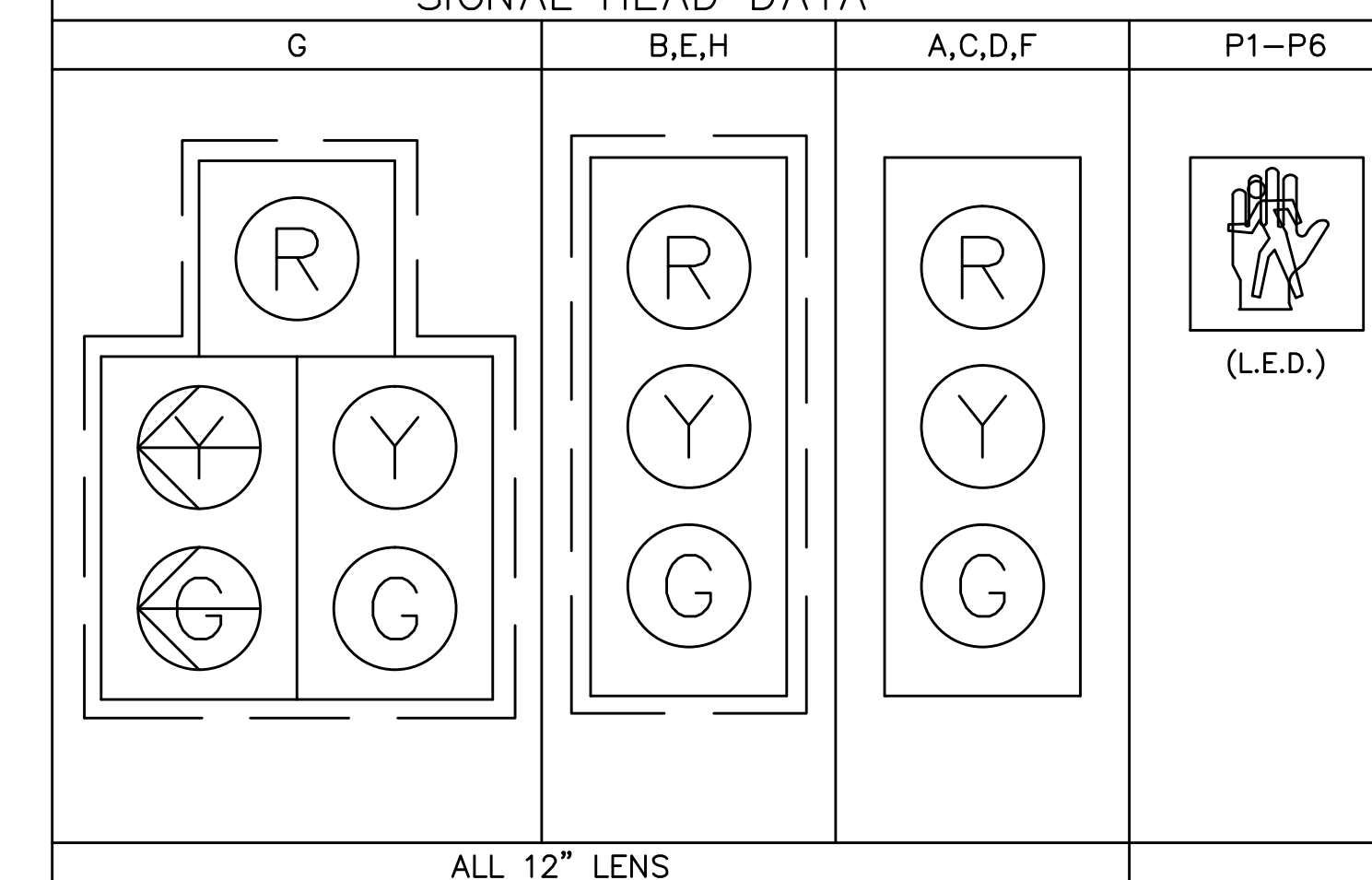
DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 100" CYCLE	0700-1100	-	-
PLAN 2 100" CYCLE	1100-1900	-	-
PLAN 3 90" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

SIGNAL HEAD DATA

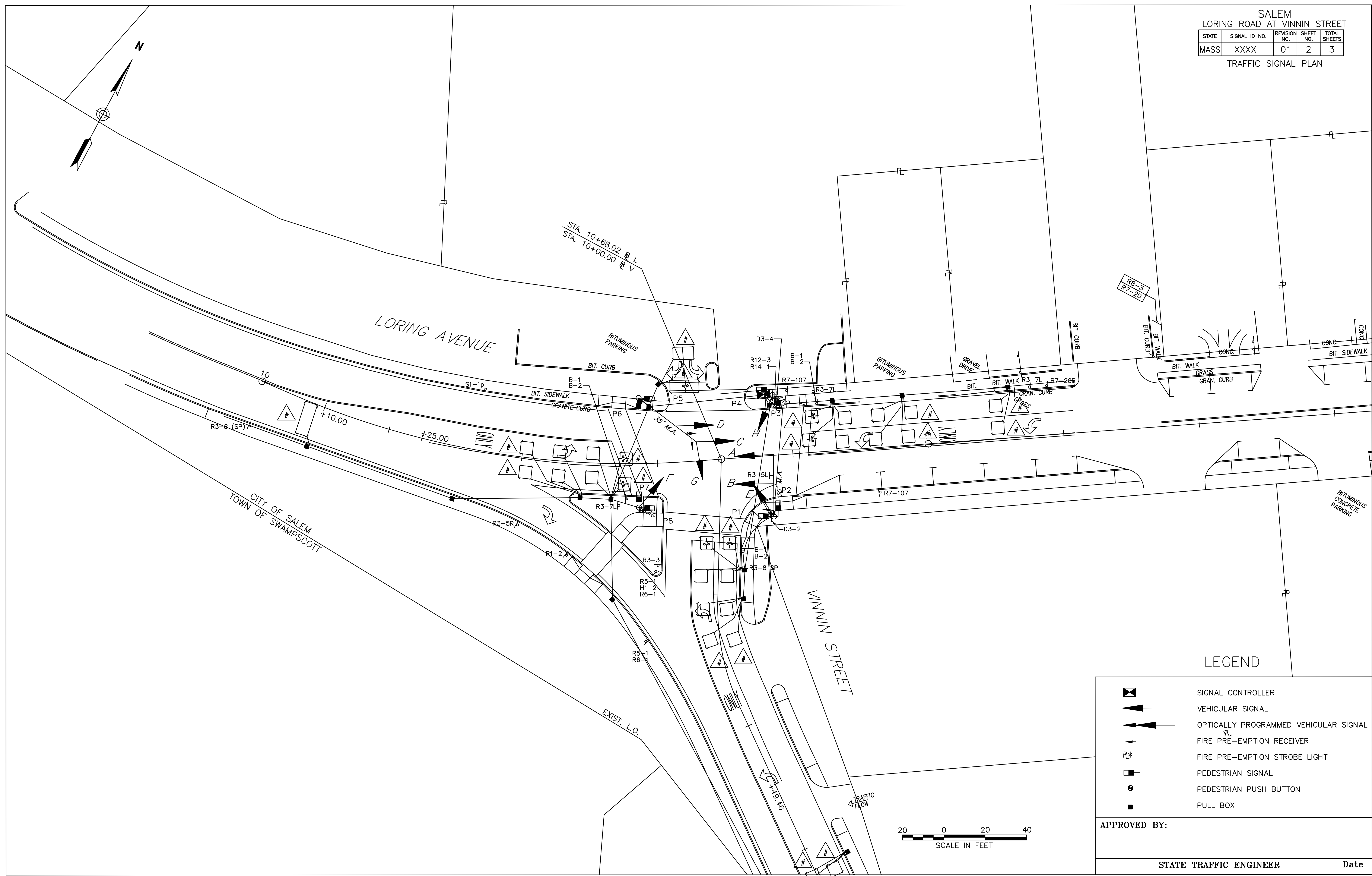


CONTROLLER MAKE & MODEL: PEEK 3000E  
UTILITY POLE No. NET&T 029, MECO 65  
METER No. 021 878 487  
EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY:

STATE TRAFFIC ENGINEER

Date



LEGEND

- SIGNAL CONTROLLER
- VEHICULAR SIGNAL
- OPTICALLY PROGRAMMED VEHICULAR SIGNAL
- FIRE PRE-EMPTION RECEIVER
- FIRE PRE-EMPTION STROBE LIGHT
- PEDESTRIAN SIGNAL
- PEDESTRIAN PUSH BUTTON
- PULL BOX

APPROVED BY: \_\_\_\_\_

STATE TRAFFIC ENGINEER Date

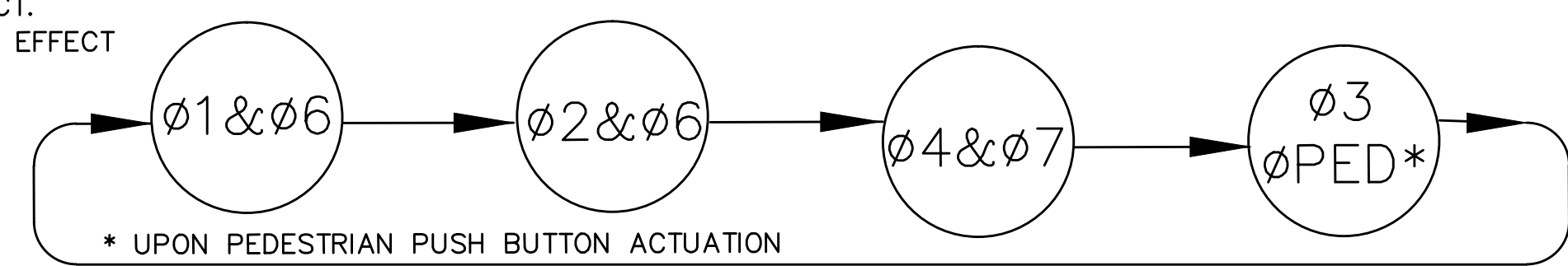


SEQUENCE AND TIMING																								
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	FLASHING OPERATION
MINIMUM INTERVAL			6			10						8			10			8						
VEHICLE EXTENSION			1			2						2			2			2						
MAXIMUM 1			10			30						30			30			30						
MAXIMUM 2			10			40						35			40			35						
YELLOW CLEARANCE				4			4						4			4			4					
RED CLEARANCE					1			1					1				1			1				
PEDESTRIAN INTERVAL										7	12													
LORING AVE	NB	A,B	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
LORING AVE	SB	C	G	R	Y	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
LORING AVE	SB	D	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
VINNIN ST	WB	G,H	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
DRIVEWAY	EB	E,F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	FR
PEDESTRIAN X-ING	ALL	ALL	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OUT

DETECTOR	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK	NON-LOCK
RECALL	OFF	OFF	OFF	SOFT	OFF	OFF
	ø1	ø2	ø3*	ø4	ø6	ø7
						NOT USED

- NOTES:
- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
  - \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
  - PERM = PERMISSIVE
  - Y = YIELD
  - MAXIMUM 1 = ALL OTHER TIMES
  - MAXIMUM 2 = 11:00AM - 7:00PM, SUN-SAT
  - ø2 & ø6 DUAL ENTRY
  - STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
  - DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

PREFERENTIAL PHASE SEQUENCE



COORDINATION DATA  
(ALL ENTRIES IN SECONDS)

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	100 SEC	100 SEC	90 SEC
OFFSET	45	46	41
SPLIT ø1&ø6	12 (12)	13 (13)	12 (12)
SPLIT ø2&ø6	33 (33)	30 (30)	25 (25)
SPLIT ø4&ø7	55 (34)	57 (36)	53 (32)
SPLIT ø3 PED	- (21)	- (21)	- (21)
COORDINATED PHASE	ø4&ø7	ø4&ø7	ø4&ø7

- NOTES:
- ø4&ø7 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF ø4&ø7 GREEN.
  - FLOATING FORCE OFF SHALL BE IN EFFECT.
  - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  - ( ) = SPLIT TIMES WITH PEDESTRIAN PHASE ACTUATED.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - PERMISSIVE MODE SHALL BE IN EFFECT.

ITEM 816.04  
TRAFFIC SIGNAL RECONSTRUCTION  
VINNIN STREET @ LORING AVENUE  
LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	MODIFY EXIST TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED SEQUENCE & TIMINGS SHOWN
2	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
1	DISCONNECT SWITCH
8	12" CIRCULAR YELLOW L.E.D. MODULES (ALL)
1	12" YELLOW LEFT ARROW L.E.D. MODULES (C)
3	SIGNAL HEAD ASTROBRAC

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

DETECTOR SCHEDULE

NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	CHANNEL	SETTING				SIZE (FT)	SEGMENTS	TURNS	CONNECTIONS	
1	LORING AVENUE	NB	LEFT	1	PRESENCE	2	2		6 X 6	3	3	S/P	PRESENCE
2	LORING AVENUE	NB	ALL	2	PRESENCE	-	-		6 X 16	1	3	-	SYSTEM
3	LORING AVENUE	NB	THROUGH	3	PRESENCE	2	2		6 X 6	3	3	S/P	PRESENCE
4	LORING AVENUE	SB	LEFT	4	PRESENCE	1&6	1&6		6 X 6	3	3	S/P	PRESENCE
5	LORING AVENUE	SB	LEFT	5	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
6	LORING AVENUE	SB	RIGHT/THROUGH	6	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
7	LORING AVENUE	SB	RIGHT/THROUGH	7	PRESENCE	6	6		6 X 6	3	3	S/P	PRESENCE
8	VINNIN STREET	WB	LEFT	8	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
9	VINNIN STREET	WB	RIGHT/THROUGH	9	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
10	VINNIN STREET	WB	LEFT	10	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
11	VINNIN STREET	WB	RIGHT/THROUGH	11	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
12	SITE DRIVE	EB	ALL	12	PRESENCE	7	7		6 X 10	2	3	SERIES	PRESENCE
B1	LORING AVENUE	NB	LEFT	13	PRESENCE	2	2		6 X 6	1	4	-	BICYCLE
B3	LORING AVENUE	NB	THROUGH	14	PRESENCE	2	2		6 X 6	1	4	-	BICYCLE
B4	LORING AVENUE	SB	LEFT	15	PRESENCE	1&6	1&6		6 X 6	1	4	-	BICYCLE
B7	LORING AVENUE	SB	RIGHT/THROUGH	16	PRESENCE	6	6		6 X 6	1	4	-	BICYCLE
B8	VINNIN STREET	WB	LEFT	17	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE
B9	VINNIN STREET	WB	RIGHT/THROUGH	18	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE
B12	SITE DRIVE	EB	ALL	19	PRESENCE	7	7		6 X 10	1	4	-	BICYCLE

SALEM  
LORING ROAD AT VINNIN STREET

STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	XXXX	01	3	

TRAFFIC SIGNAL DATA

- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
- THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
- IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
- IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PRE-EMPTION PHASING & PRIORITY

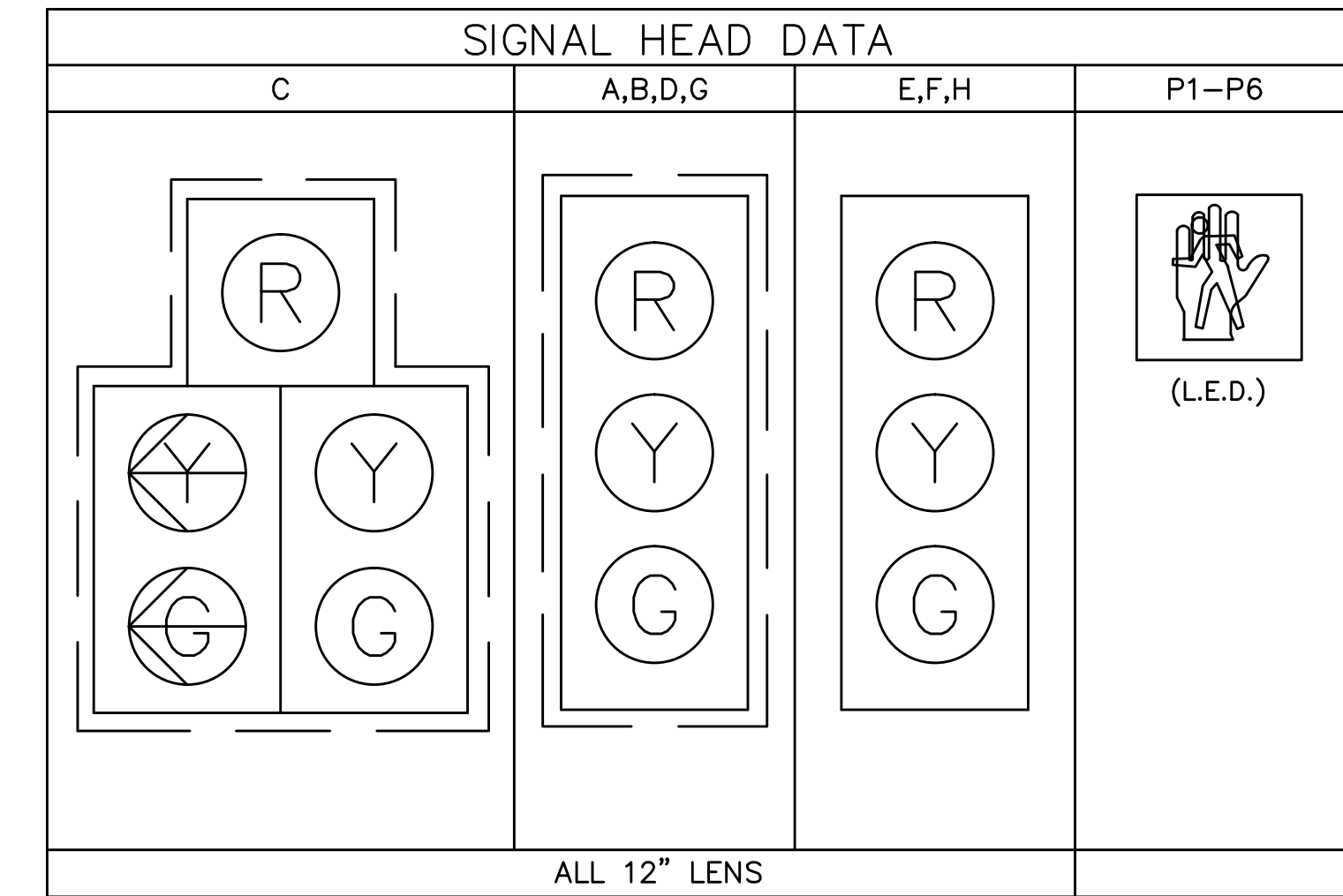
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1	⇌	ø2
D2	2	⇌	ø1&ø6
D3	3	⇌	ø4

DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 100" CYCLE	0700-1100	-	-
PLAN 2 100" CYCLE	1100-1900	-	-
PLAN 3 90" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

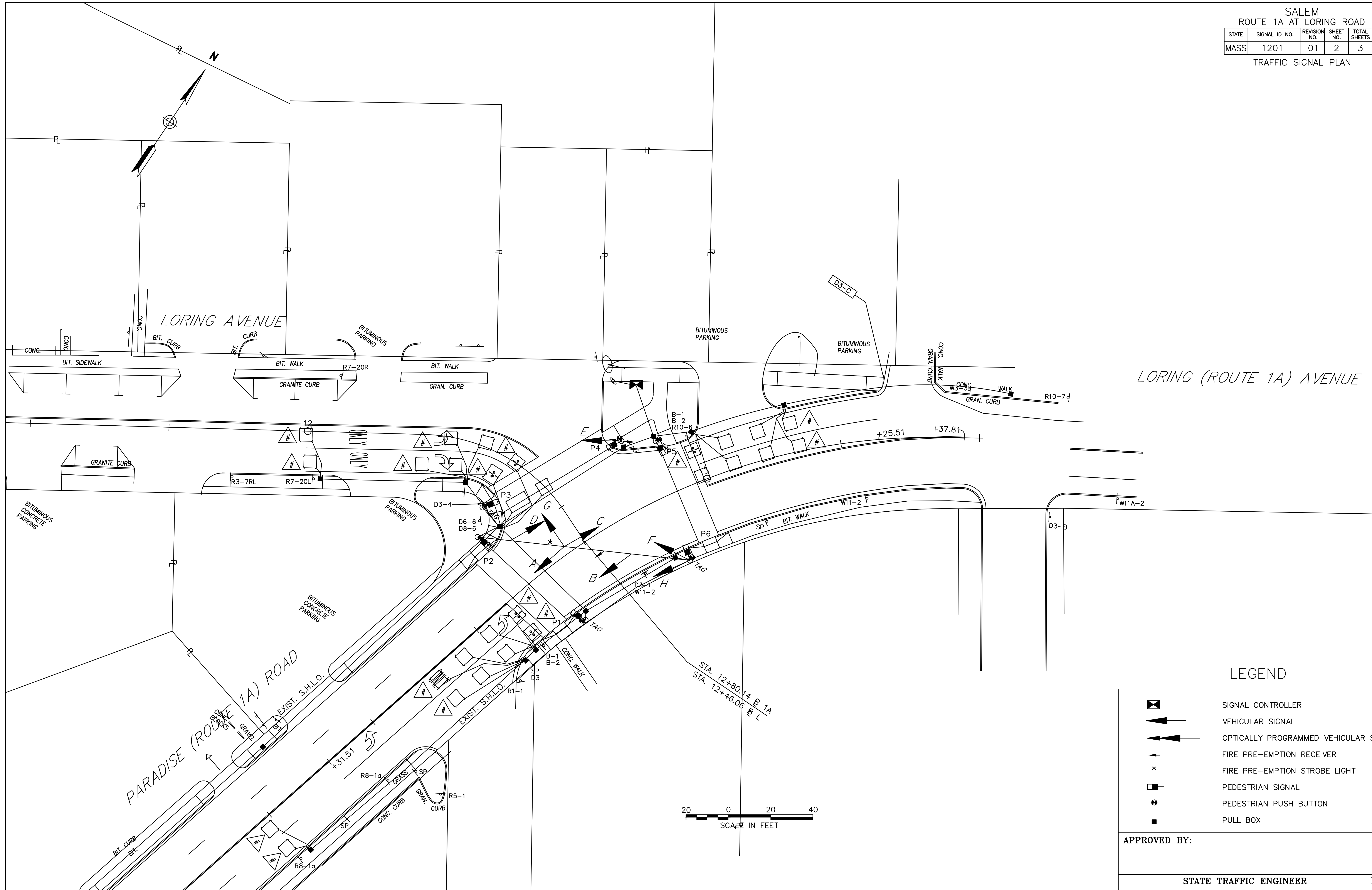
- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.



CONTROLLER MAKE & MODEL: PEEK 3000E  
 UTILITY POLE No. NYNEX 1/92, MECO 2646  
 METER No. 12 261 930  
 EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date \_\_\_\_\_

XXXX01.DWG



LEGEND

- SIGNAL CONTROLLER
- VEHICULAR SIGNAL
- OPTICALLY PROGRAMMED VEHICULAR SIGNAL
- FIRE PRE-EMPTION RECEIVER
- FIRE PRE-EMPTION STROBE LIGHT
- PEDESTRIAN SIGNAL
- PEDESTRIAN PUSH BUTTON
- PULL BOX

APPROVED BY: \_\_\_\_\_

STATE TRAFFIC ENGINEER      Date

SALEM ROUTE 1A AT LORING ROAD				
STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	1201	01	3	

TRAFFIC SIGNAL DATA

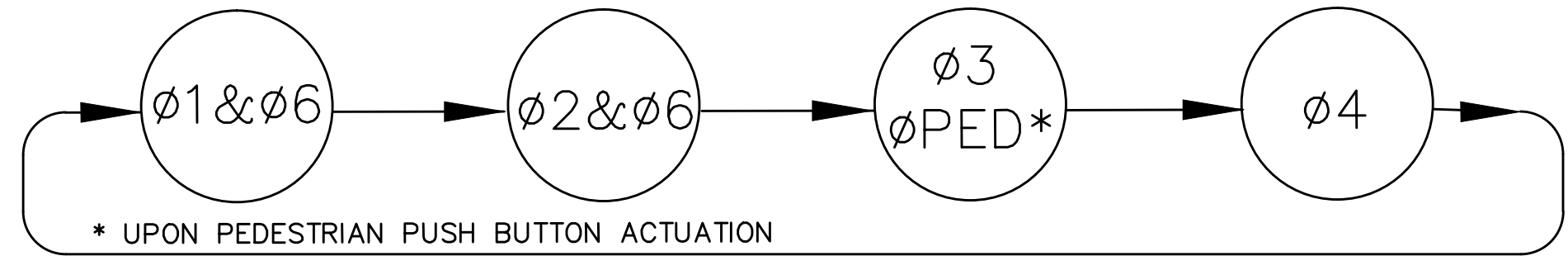
SEQUENCE AND TIMING																						
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	FLASHING OPERATION	
MINIMUM INTERVAL			6			10						8										
VEHICLE EXTENSION			1			2						3										
MAXIMUM 1			10			30						25										
MAXIMUM 2			10			30						25										
YELLOW CLEARANCE				4			4				3			4								
RED CLEARANCE					1			1				1			1							
PEDESTRIAN INTERVAL											7	15										
PARADISE RD	NB	A	<G	<Y	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<FR	
PARADISE RD	NB	B,H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
LORING AVE	SB	C,D	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
LORING AVE	EB	E,F,G	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	FR
PEDESTRIAN X-ING	ALL	ALL	DW	DW	DW	DW	DW	DW	W	FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OUT
DETECTOR			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK							
RECALL			OFF			SOFT			OFF			OFF			SOFT							
			ø1			ø2			ø3*			ø4			ø6			ø5,ø7 & ø8				
						⇄			⇄									NOT USED				
			⇄			⇄			⇄			⇄			⇄			⇄				

- SEQUENCE & TIMING NOTES:
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
  - THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
  - IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
  - IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1	⇄	ø1&ø6
D2	2	⇄	ø2
D3	3	⇄	ø4

- NOTES:
- AUTOMATIC FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.12.
  - \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
  - MAXIMUM 1 = ALL OTHER TIMES
  - MAXIMUM 2 = 11:00AM - 7:00PM, SUN-SAT
  - STOP AND GO OPERATION FOR 24 HOURS PER FLASHING OPERATION FOR EMERGENCY ONLY.
  - DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL BE IN EFFECT.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.

PREFERENTIAL PHASE SEQUENCE



COORDINATION DATA (ALL ENTRIES IN SECONDS)

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	100 SEC	100 SEC	90 SEC
OFFSET	93	92	83
SPLIT ø1&ø6	16 (16)	14 (14)	13 (13)
SPLIT ø2&ø6	55 (31)	57 (33)	54 (30)
SPLIT ø3 PED	- (24)	- (24)	- (24)
SPLIT ø4	29 (29)	29 (29)	23 (23)
COORDINATED PHASE	ø2&ø6	ø2&ø6	ø2&ø6

- NOTES:
- ø2&ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF ø2&ø6 GREEN.
  - FLOATING FORCE OFF SHALL BE IN EFFECT.
  - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
  - ( ) = SPLIT TIMES WITH PEDESTRIAN PHASE ACTUATED.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - PERMISSIVE MODE SHALL BE IN EFFECT.

DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 100" CYCLE	0700-1100	-	-
PLAN 2 100" CYCLE	1100-1900	-	-
PLAN 3 90" CYCLE	-	1000-1800	-
FREE OPERATION	0000-0700 1900-2400	0000-1000 1800-2400	0000-2400
FLASH OPERATION	-	-	-

EMERGENCY VEHICLE PRE-EMPTION OPERATION

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME, FIRST SERVE BASIS.
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- UNLESS OTHERWISE STATED, ONCE A PRE-EMPTION CALL HAS BEEN RECEIVED BY THE TRAFFIC SIGNAL CONTROLLER AND THE PRE-EMPTION PHASE IS BEING SERVICED, IT SHALL REMAIN IN THAT PHASE AS LONG AS THE CALL IS PRESENT.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

ITEM 816.03  
TRAFFIC SIGNAL RECONSTRUCTION  
PARADISE ROAD @ LORING AVENUE  
LIST OF MAJOR ITEMS REQUIRED

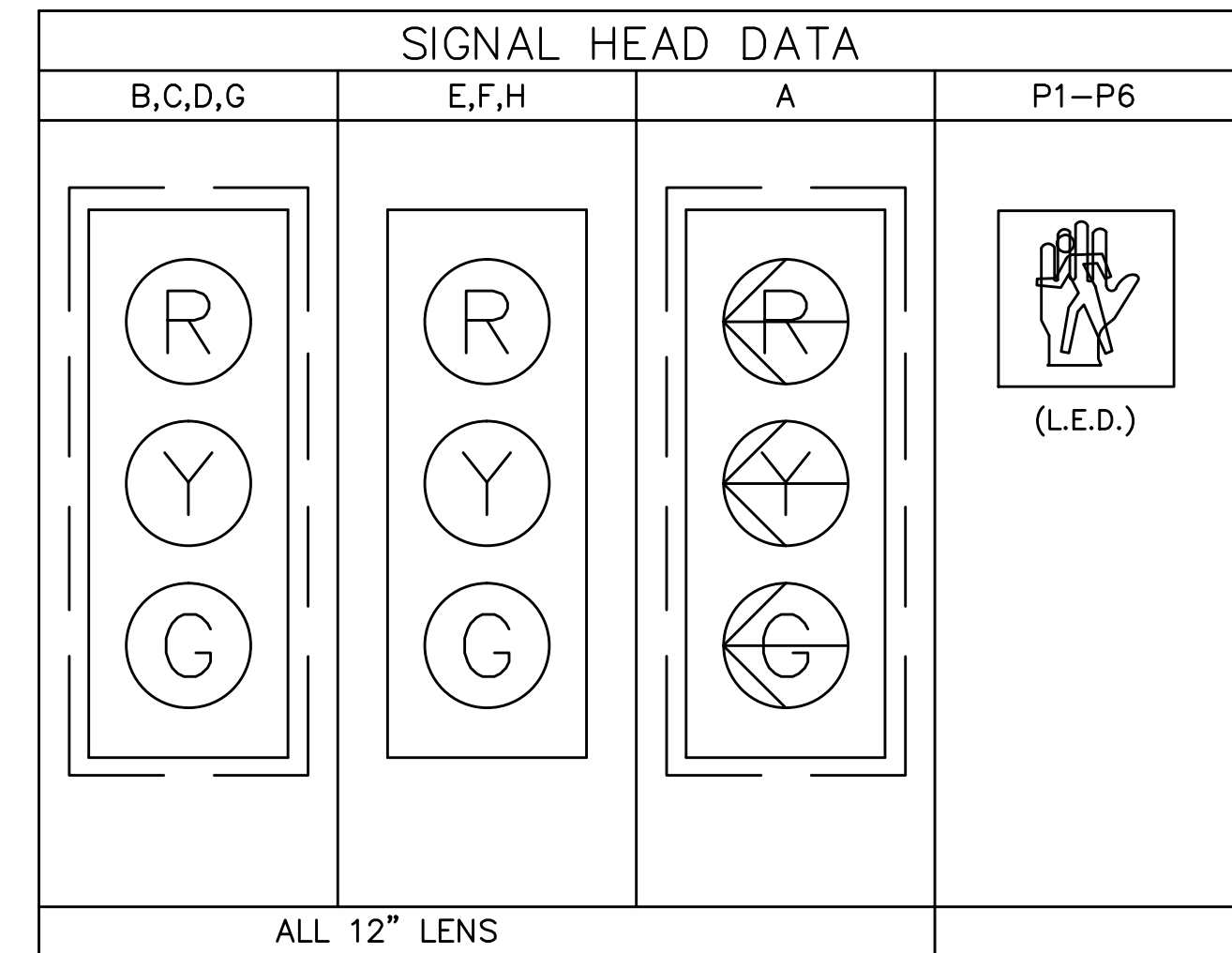
QUANTITY	DESCRIPTION
1	MODIFY EXIST TS PEEK 3000E CONTROLLER & CABINET TO PROPOSED TIMINGS SHOWN
2	PEDESTRIAN PUSH BUTTON W/R10-3f AND SIGN SADDLE
7	12" CIRCULAR YELLOW L.E.D. MODULES (B,C,D,E,F,G,H)
1	12" YELLOW LEFT ARROW L.E.D. MODULES (A)

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

DETECTOR SCHEDULE

NO.	DETECTOR			AMPLIFIER		PHASE CALLED	PHASE EXTENDED	DELAY/EXTENSION	LOOPS				DETECTION MODE
	STREET	DIRECTION	LANE	CHANNEL	SETTING				SIZE (FT)	SEGMENTS	TURNS	CONNECTIONS	
1	PARADISE RD	NB	LEFT	1	PRESENCE	1	1		6 X 6	3	3	SERIES	PRESENCE
2	PARADISE RD	NB	LEFT	2	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
3	PARADISE RD	NB	THROUGH	3	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
4	PARADISE RD	NB	THROUGH	4	PRESENCE	6	6		6 X 6	3	3	SERIES	PRESENCE
5	LORING AVENUE	SB	RIGHT/THROUGH	5	PRESENCE	2	2		6 X 6	3	3	SERIES	PRESENCE
7	LORING AVENUE	SB	THROUGH	7	PRESENCE	2	2		6 X 6	4	3	S/P	PRESENCE
8	LORING AVENUE	NEB	RIGHT	8	PRESENCE	4	4		*	3	3	SERIES	PRESENCE
9	LORING AVENUE	NEB	RIGHT	9	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
10	LORING AVENUE	NEB	LEFT	10	PRESENCE	-	-		6 X 6	1	3	-	SYSTEM
11	LORING AVENUE	NEB	LEFT	11	PRESENCE	4	4		6 X 6	3	3	SERIES	PRESENCE
B1	PARADISE RD	NB	LEFT	12	PRESENCE	1	1		6 X 6	1	4	-	BICYCLE
B4	PARADISE RD	NB	THROUGH	13	PRESENCE	6	6		6 X 6	1	4	-	BICYCLE
B5	LORING AVENUE	SB	RIGHT/THROUGH	14	PRESENCE	2	2		6 X 6	1	4	-	BICYCLE
B8	LORING AVENUE	NEB	RIGHT	15	PRESENCE	4	4		6 X 8	1	4	-	BICYCLE
B11	LORING AVENUE	NEB	LEFT	16	PRESENCE	4	4		6 X 6	1	4	-	BICYCLE

\* 2 - 6 x 6, 1 - 6 x 10



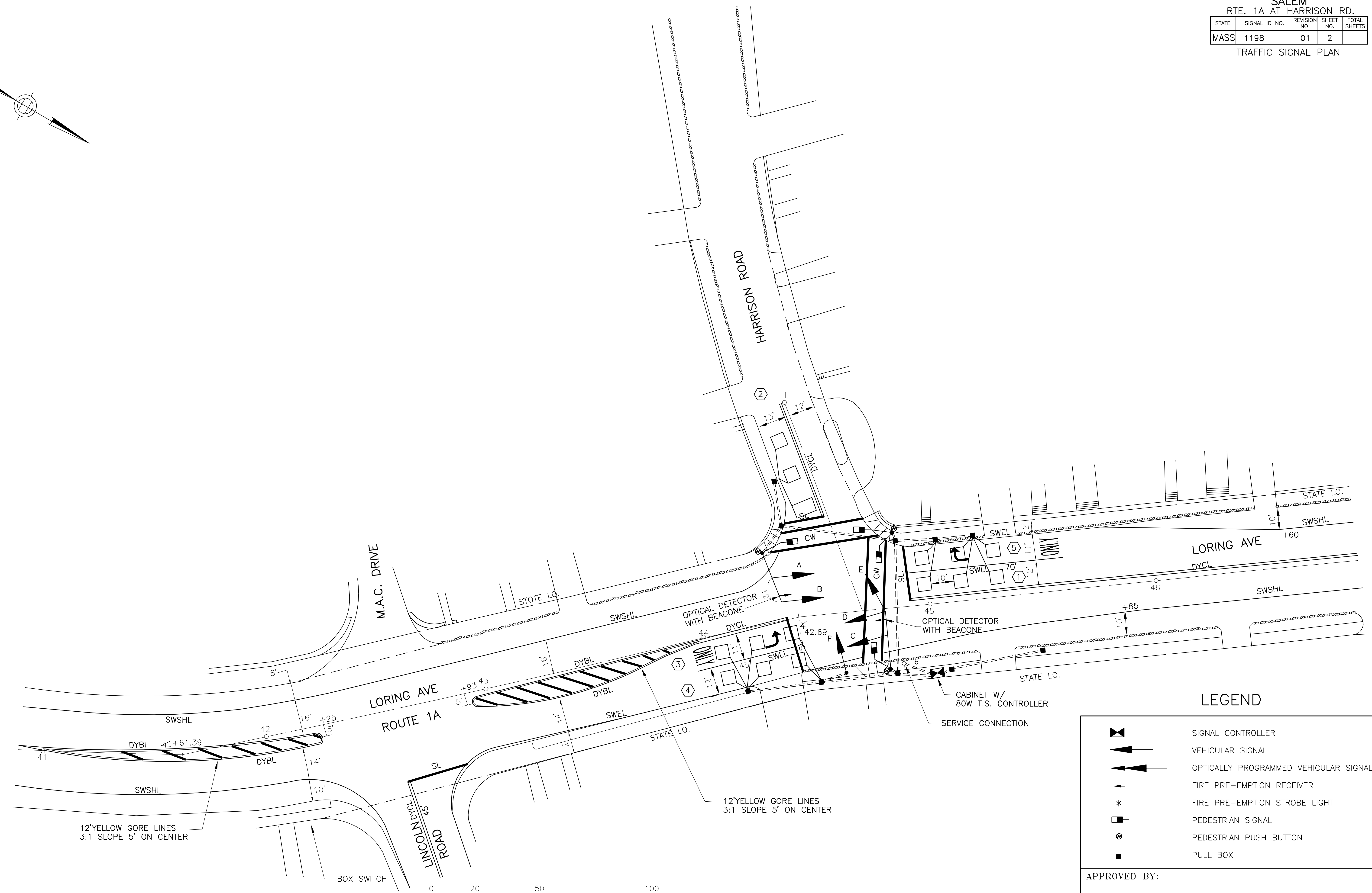
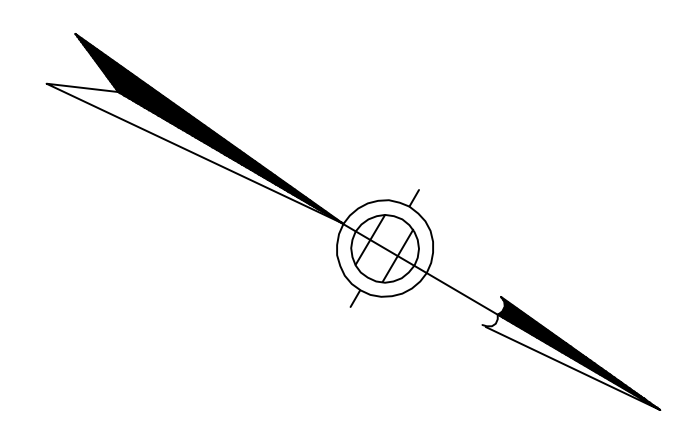
CONTROLLER MAKE & MODEL: PEEK 3000E  
 UTILITY POLE No. NET&T 87, MECO 2641  
 METER No. 94717408  
 EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date

**SALEM**  
RTE. 1A AT HARRISON RD.

STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	1198	01	2	

TRAFFIC SIGNAL PLAN

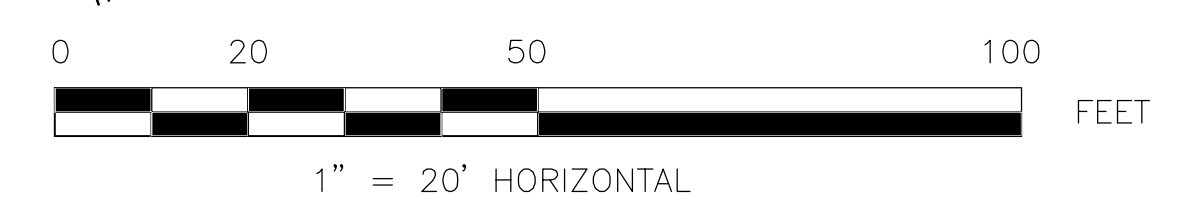


**LEGEND**

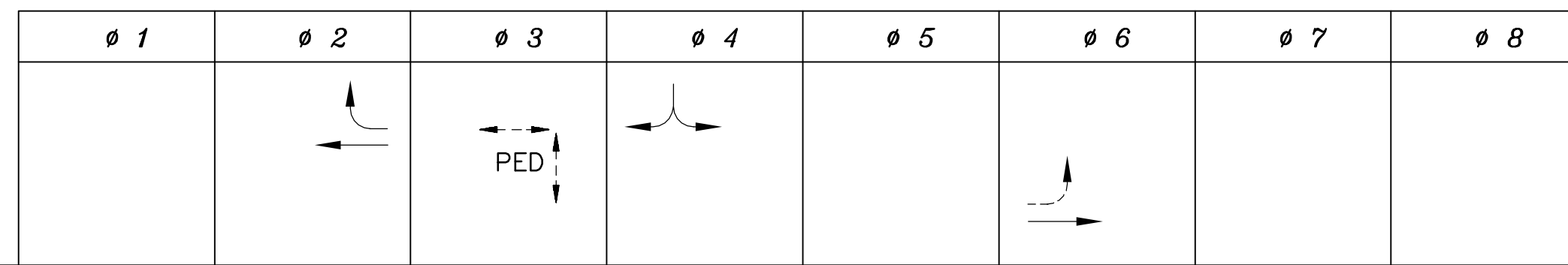
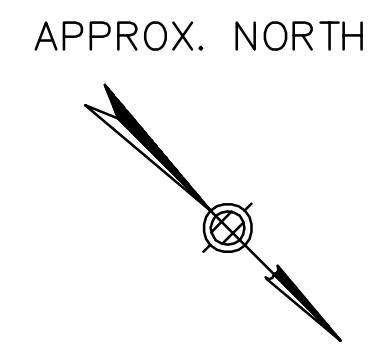
- SIGNAL CONTROLLER
- VEHICULAR SIGNAL
- OPTICALLY PROGRAMMED VEHICULAR SIGNAL
- FIRE PRE-EMPTION RECEIVER
- FIRE PRE-EMPTION STROBE LIGHT
- PEDESTRIAN SIGNAL
- PEDESTRIAN PUSH BUTTON
- PULL BOX

APPROVED BY: \_\_\_\_\_

STATE TRAFFIC ENGINEER      Date



1:198P0101.DWG



SEQUENCE AND TIMING FOR FULL ACTUATED CONTROL (ISOLATED)																											
STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	FLASH OFF
LORING AVE (RTE. 1A)	NB	C,D				R	R	R	R	R	R	R	R	R				G	Y	R							FY
LORING AVE (RTE. 1A)	SB	A,B				G	Y	R	R	R	R	R	R	R				R	R	R							FY
HARRISON RD.	EB	E,F				R	R	R	R	R	R	G	Y	R				R	R	R							FR
PEDESTRIAN	ALL	ALL				DW	DW	DW	W	FDW	DW	DW	DW	DW				DW	DW	DW							OFF
TIMING IN SECONDS																											
MINIMUM GREEN (INITIAL)						10						8						10									
PASSAGE TIME (VEHICLE)						4						4						4									
MAXIMUM 1						52						13						52									
MAXIMUM 2						50						15						50									
YELLOW CLEARANCE							3						3						3								
RED CLEARANCE								2						2						2							
WALK (W)									4																		
PEDESTRIAN CLEARANCE										14																	
RECALL								SOFT		OFF		OFF						SOFT									
MEMORY								LOCKING		NON-LOCKING		NON-LOCKING						LOCKING									

QUANTITY	ITEM
1	CONTROLLER TYPE 8DW, CAB. & FDN.
1	SERVICE CONNECTION, TYPE OVERHEAD
2	8' SIGNAL POLE, BASE, & FDN.
1	10' SIGNAL POLE, BASE, & FDN.
2	25 FT MAST ARM ASSEMBLY, BASE & FDN.
4	1 WAY, 3 SECTION, SIGNAL HOUSING (12" LENS)
1	2 WAY, 3 SECTION, SIGNAL HOUSING (12" LENS)
4	PEDESTRIAN HOUSING (TYPE FIBER OPTIC)
3	PEDESTRIAN PUSH BUTTON, SIGN & SADDLES
3	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
15	ROADWAY LOOP DETECTOR
10	12" X 12" PULL BOX
	Necessary duct, cable, labor, miscellaneous material and equipment to complete the installation.

**NOTES:**

SEQUENCE AND TIMING NOTES:

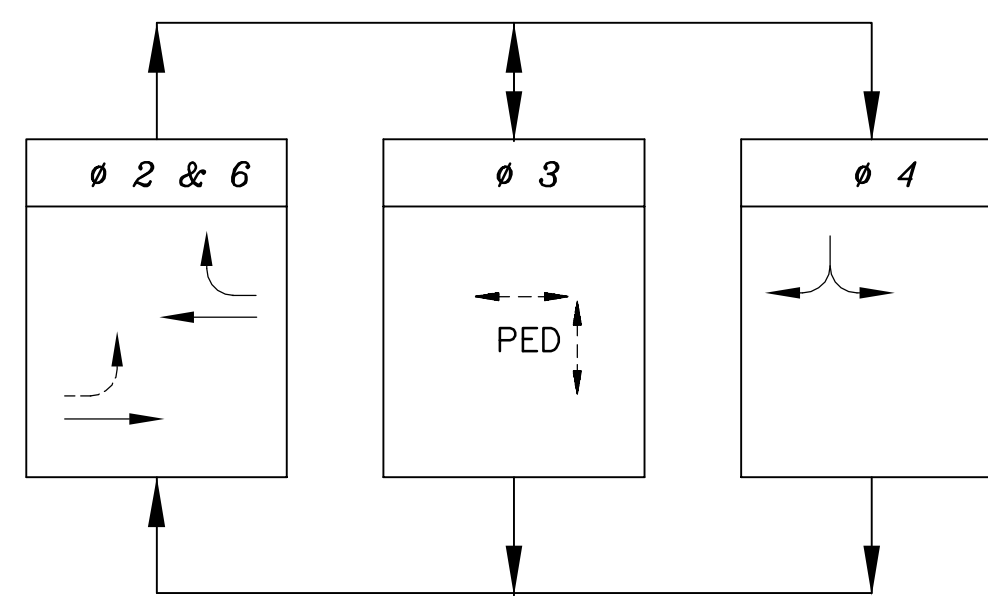
NEMA DUAL RING PHASING NOTES:

- PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
- PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
- THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S) UNLESS OTHERWISE NOTED.

LOOP DETECTOR NOTES:

- SEE LOOP DETECTOR DETAIL SHEET FROM DESIGN DOCUMENT FOR SPLICE PATTERN AND OTHER INFORMATION.
- DELAY AND EXTENSION TIMES ARE IN SECONDS.
- DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY THE DETECTOR.

PREFERENTIAL PHASING SEQUENCE



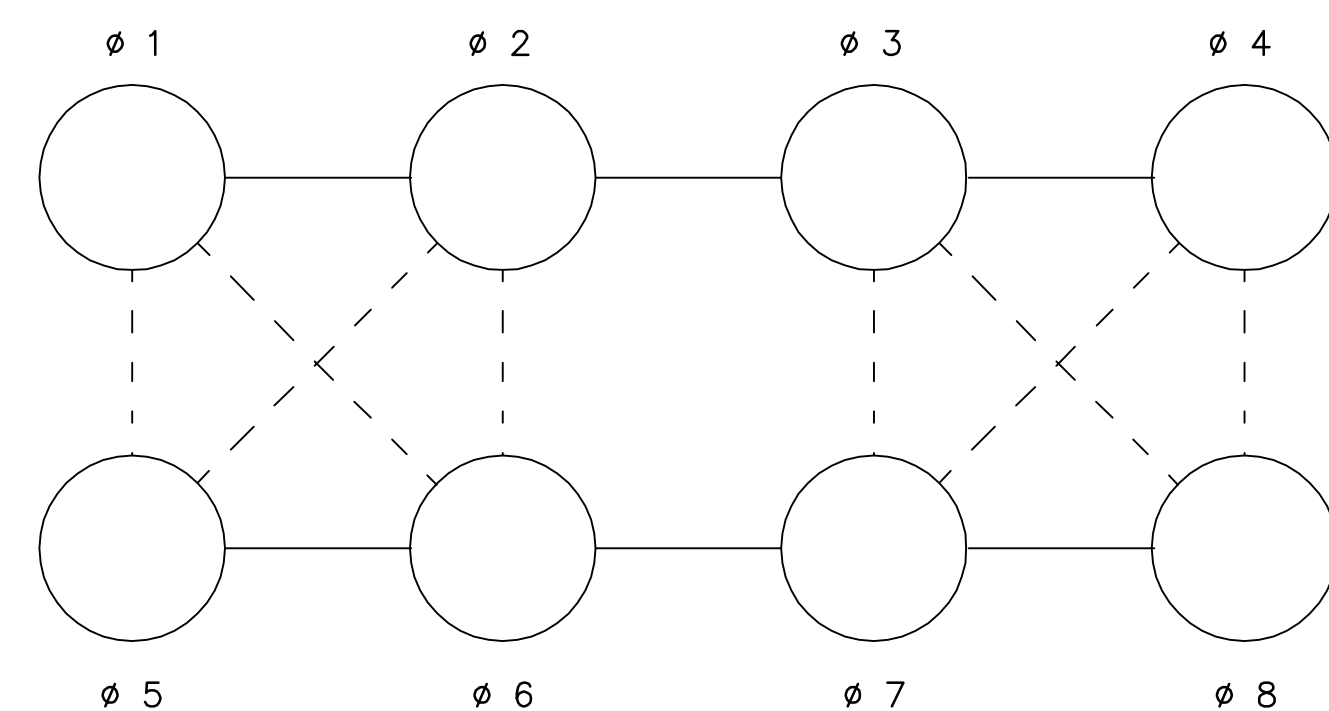
EMERGENCY PRE-EMPTION DATA

APPROACH	PHASE	TIME (SEC)

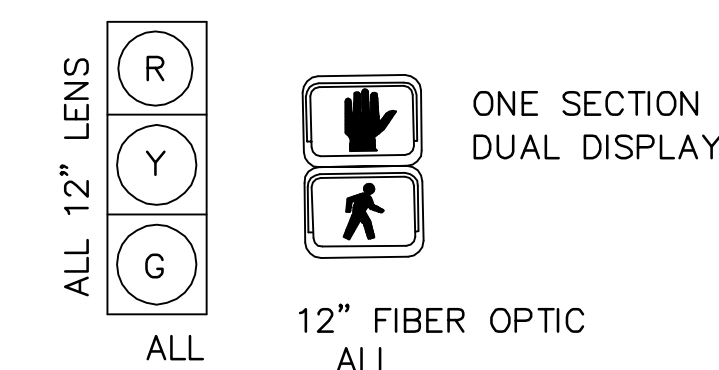
LOOP DETECTOR DATA

DETECTOR NUMBER	NUMBER OF SEGMENTS	LOOP SIZE	NUM. OF TURNS	ø CALLED	ø EXT.	MODE PULSE PRESENCE	DELAY TIME	EXT. TIME
1	3	6'x6'	3	ø <sub>2</sub>	ø <sub>2</sub>	PRESENCE	-	-
2	1	10'x6"	2	ø <sub>4</sub>	ø <sub>4</sub>	PRESENCE	3	-
3	3	6'x6'	3	ø <sub>6</sub>	ø <sub>6</sub>	PRESENCE	-	-
4	3	6'x6'	3	ø <sub>6</sub>	ø <sub>6</sub>	PRESENCE	-	-
5	3	6'x6'	3	ø <sub>2</sub>	ø <sub>2</sub>	PRESENCE	3	-

NEMA DUAL RING PHASING NOTES:



SIGNAL IDENTIFICATION



CONTROLLER MAKE & MODEL:	TCT LMD 9200
UTILITY POLE No.	MECO 2606
METER No.	98 966 009
EMERGENCY PRE-EMPTION (TYPE):	OPTICOM

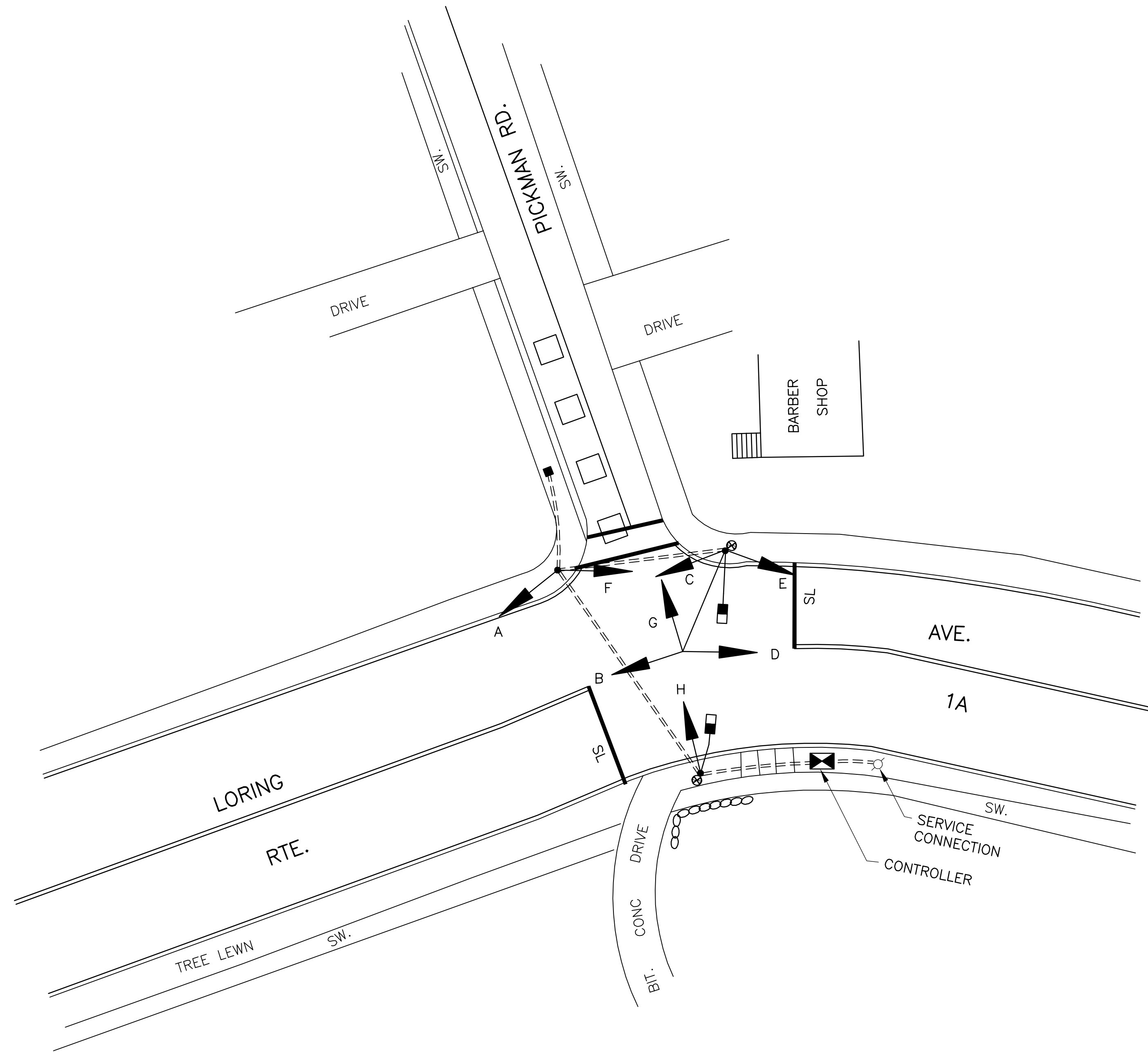
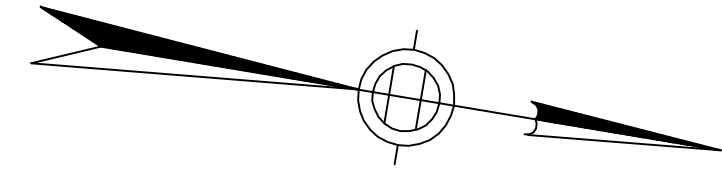
**APPROVED BY:**

**STATE TRAFFIC ENGINEER**      **Date**









**SALEM**  
RTE. 1A AT PICKMAN RD.

STATE	SIGNAL ID NO.	REVISION NO.	SHEET NO.	TOTAL SHEETS
MASS	0415	01	2	

TRAFFIC SIGNAL PLAN

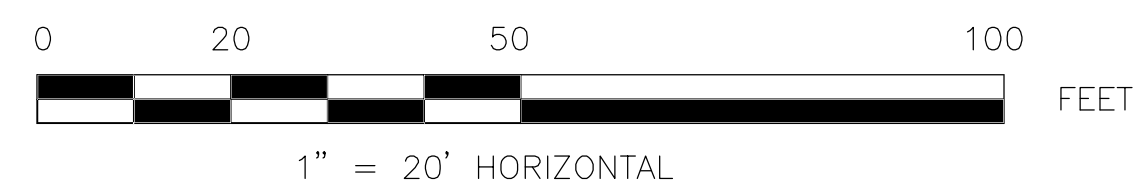


**LEGEND**

-  SIGNAL CONTROLLER
-  VEHICULAR SIGNAL
-  OPTICALLY PROGRAMMED VEHICULAR SIGNAL
-  FIRE PRE-EMPTION RECEIVER
-  FIRE PRE-EMPTION STROBE LIGHT
-  PEDESTRIAN SIGNAL
-  PEDESTRIAN PUSH BUTTON
-  PULL BOX

APPROVED BY: \_\_\_\_\_

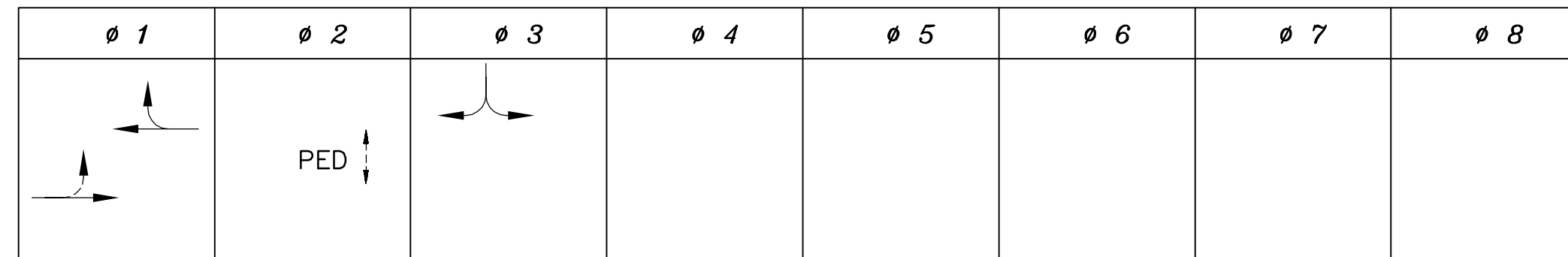
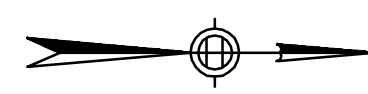
STATE TRAFFIC ENGINEER      Date



0415P0101.DWG



APPROX. NORTH



SEQUENCE AND TIMING FOR SEMI ACTUATED CONTROL (ISOLATED)

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	FLASH OFF	
LORING AVE (RTE. 1A)	NB	A,B,C	G	Y	R	R	R	R	R	R	R																FY	
LORING AVE (RTE. 1A)	SB	D,E,F	G	Y	R	R	R	R	R	R	R																FY	
PICKMAN RD.	EB	G,H	R	R	R	R	R	R	G	Y	R															FR		
PEDESTRIAN	ALL	ALL	DW	DW	DW	W	FDW	DW	DW	DW	DW																OFF	
			<b>TIMING IN SECONDS</b>																									
MINIMUM GREEN (INITIAL)			0						7																			
PASSAGE TIME (VEHICLE)			5						5																			
MAXIMUM 1			35						20																			
MAXIMUM 2																												
YELLOW CLEARANCE				4							4																	
RED CLEARANCE						2				1												1						
WALK (W)								7																				
PEDESTRIAN CLEARANCE									9																			
RECALL																												
MEMORY																												

EMERGENCY ONLY

MAJOR ITEMS REQUIRED

QUANTITY	ITEM
1	CONTROLLER, CAB. & FDN.
1	SERVICE CONNECTION, TYPE OVERHEAD
1	MAST ARM ASSEMBLY 30', BASE & FDN.
2	10' SIGNAL POLE, BASE, & FDN.
1	1 WAY 3 SECTION SIGNAL HEAD, 12" LENS
2	2 WAY 3 SECTION SIGNAL HEAD, 12" LENS
1	3 WAY 3 SECTION SIGNAL HEAD, 12" LENS
2	PEDESTRIAN HOUSING INCANDESCENT
2	PEDESTRIAN PUSH BUTTON, SIGN & SADDLES
1	DUAL CHANNEL LOOP DETECTOR AMPLIFIER
4	ROADWAY LOOP DETECTOR
1	12" x 12" PULL BOX
	Necessary duct, cable, labor, miscellaneous material and equipment to complete the installation.

NOTES:

SEQUENCE AND TIMING NOTES:

NEMA DUAL RING PHASING NOTES:

- PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
- PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
- THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S) UNLESS OTHERWISE NOTED.

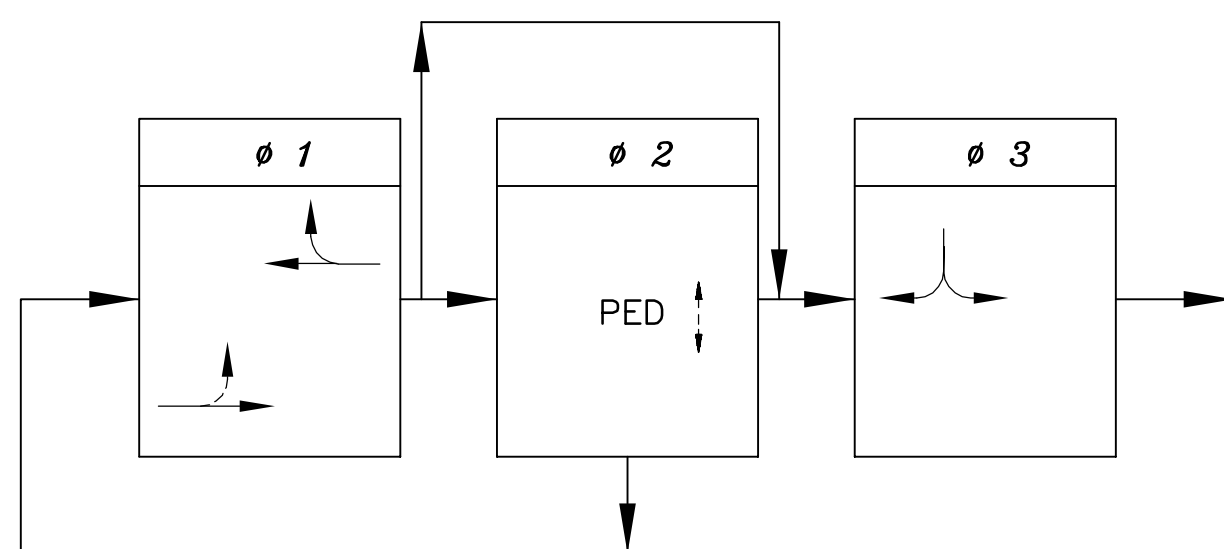
LOOP DETECTOR NOTES:

- SEE LOOP DETECTOR DETAIL SHEET FROM DESIGN DOCUMENT FOR SPLICE PATTERN AND OTHER INFORMATION.
- DELAY AND EXTENSION TIMES ARE IN SECONDS.
- DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY THE DETECTOR.

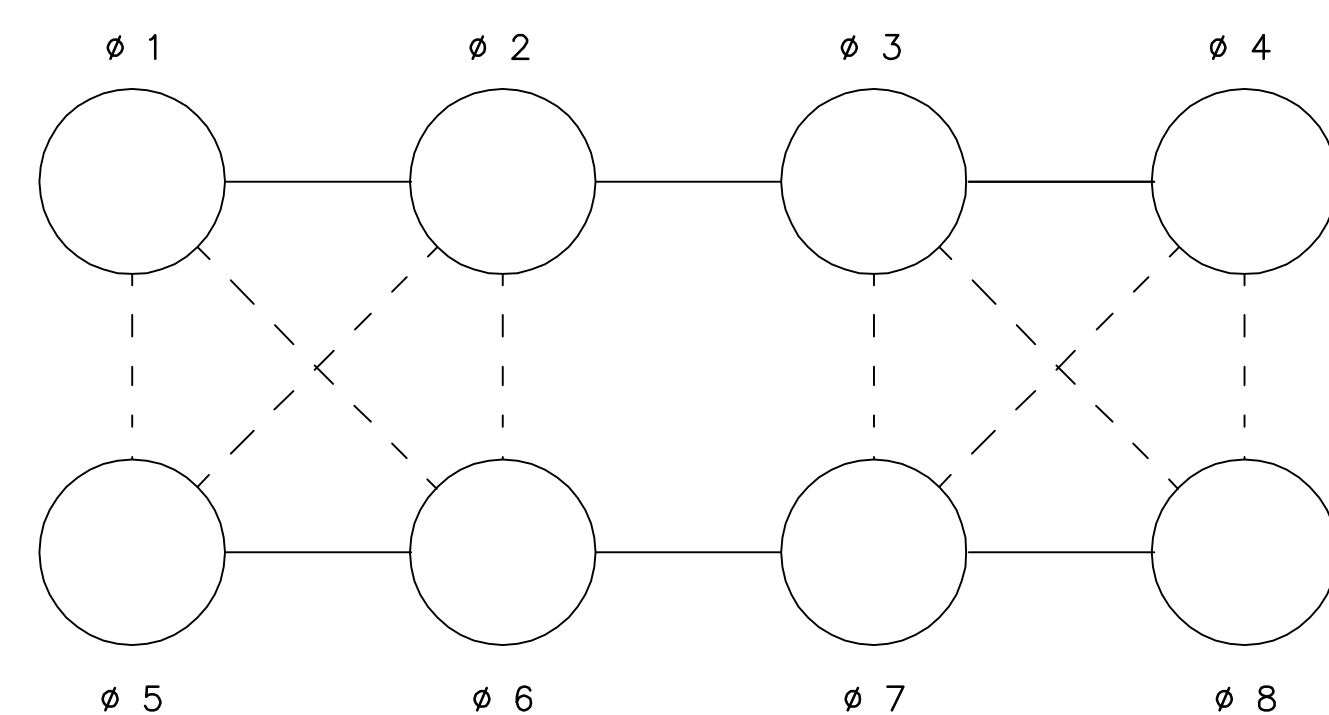
LOOP DETECTOR DATA

DETECTOR NUMBER	NUMBER OF SEGMENTS	LOOP SIZE	NUM. OF TURNS	φ CALLED	φ EXT.	MODE PULSE PRESENCE	DELAY TIME	EXT. TIME
1	4	6'x6'		φ3	φ3	PRESENCE	-	-
2								
3								
4								
5								
6								
7								
8								

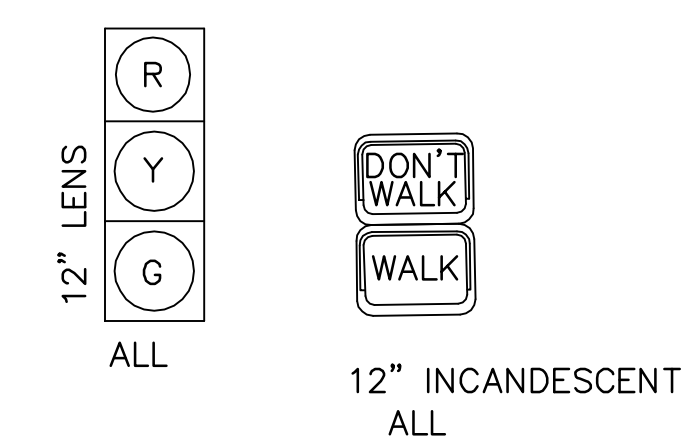
PREFERENTIAL PHASING SEQUENCE



NEMA DUAL RING PHASING NOTES:



SIGNAL IDENTIFICATION

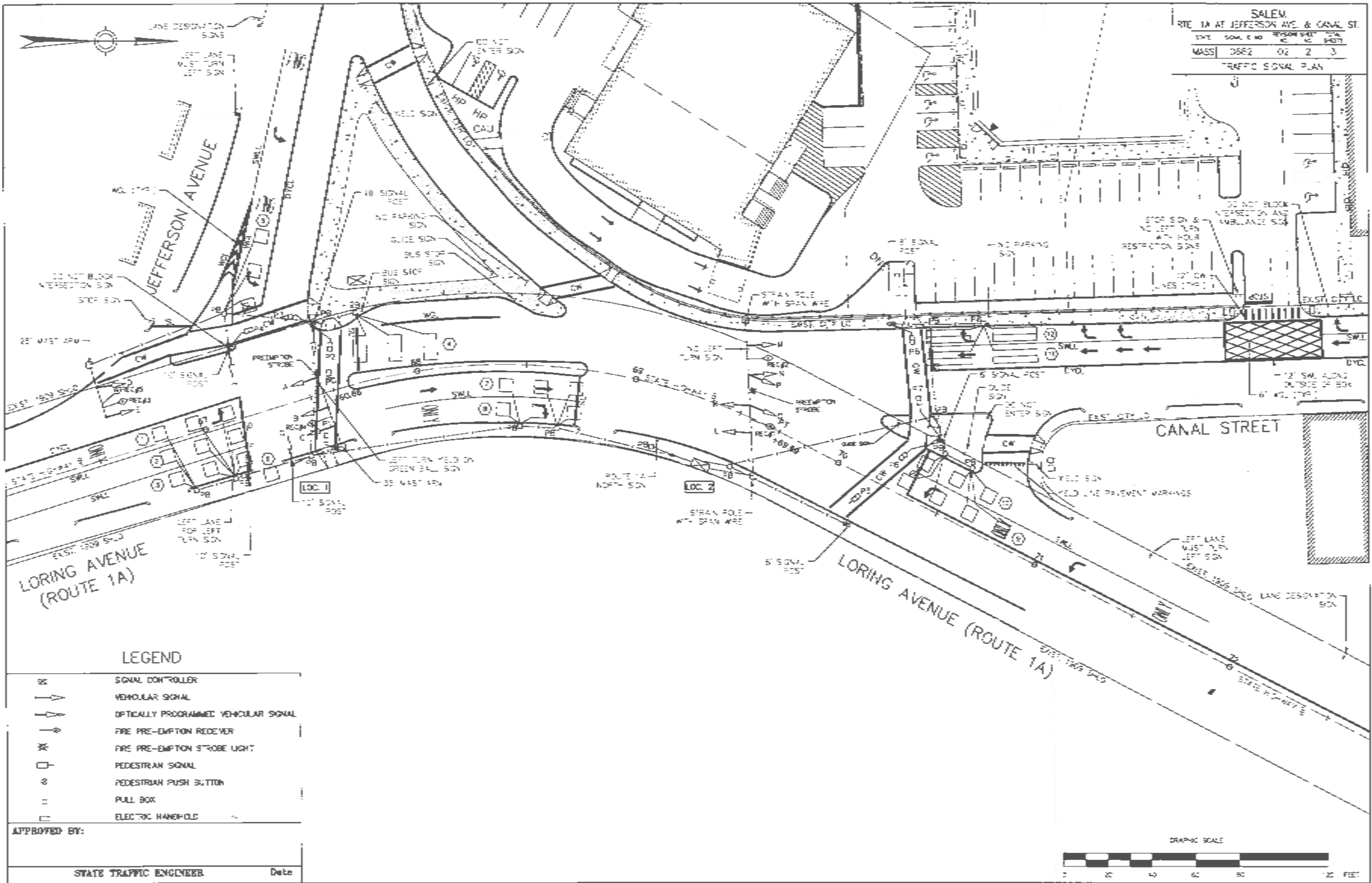


CONTROLLER MAKE & MODEL: EPAC 300  
 UTILITY POLE No. NET & T 44 MECO 2595  
 METER No. 93 049 597  
 EMERGENCY PRE-EMPTION (TYPE): NONE










APPROVED BY:

STATE TRAFFIC ENGINEER

Date

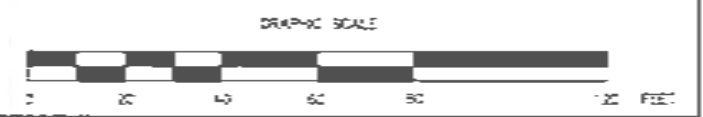


LEGEND

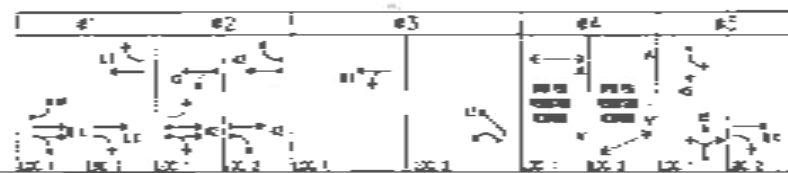
-  SIGNAL CONTROLLER
-  VEHICULAR SIGNAL
-  OPTICALLY PROGRAMMED VEHICULAR SIGNAL
-  FIRE PRE-EMPTION RECEIVER
-  FIRE PRE-EMPTION STROBE LIGHT
-  PEDESTRIAN SIGNAL
-  PEDESTRIAN PUSH BUTTON
-  PULL BOX
-  ELECTRIC HANDHOLD

APPROVED BY:

STATE TRAFFIC ENGINEER Date



APPROX NORTH

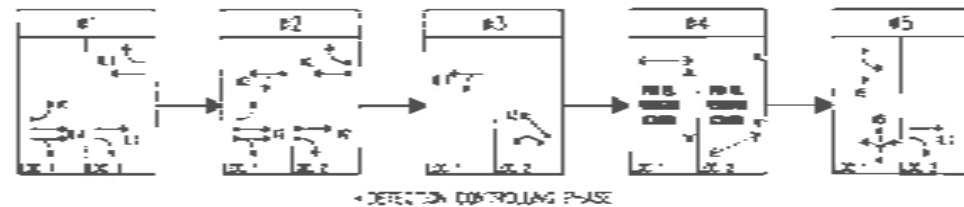


SEQUENCE AND TIMING

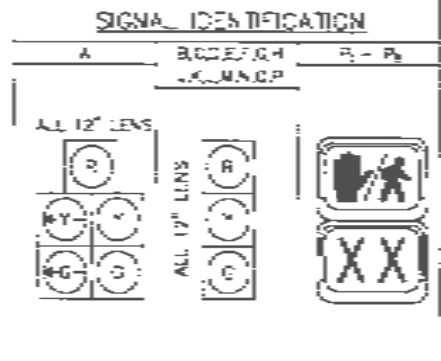
STREET	DIRECTION	HOLDINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	FLASH OPER.
LORING AVENUE (RTE 1A)	NB	A	G	Y	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	RY
LORING AVENUE (RTE 1A)	SB	BC	G	Y	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	RY
LORING AVENUE (RTE 1A)	NB	KL	G	Y	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	RY
LORING AVENUE (RTE 1A)	SB	DE	R	R	R	G	Y	R	G	G	Y	R	R	R	R	R	R	R	R	RY
LORING AVENUE (RTE 1A)	SB	CP	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	RY
CANAL STREET	SB	MA	G	Y	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	FR
JEFFERSON AVENUE	EB	FD	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
DRIVEWAY	WE	NJ	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
PEDESTRIAN	A	P-RB	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	R	FOR	DR	DR	DR	DR	OUT
TIMING IN SECONDS																				
MINIMUM TOTAL			8			10					2	10								5
PASSAGE			2			2					2									2
MAXIMUM 1 (ALL OTHER TIMES)			8.5			11.5					2.2									27.5
MAXIMUM 2 (W-F: 6am-6pm)			12.5			15.5					2.1									40.5
MAXIMUM 3 (SAT: 11am-2pm)			14.5			23.5					1.9									30.5
CHANGE				4	3.5		4.0	3.5		4.0	2.0	4.0	2.0						4.0	3.5
PEDESTRIAN																				
RECALL				EXT		EXT				OFF				OFF						OFF
MEMORY				NON-LOOKING		NON-LOOKING				NON-LOOKING				NON-LOOKING						NON-LOOKING

EMERGENCY

PREFERENTIAL PHASE SEQUENCE



APPROACH	PHASE	TIME (SEC)
LORING AVE. (RTE 1A) S/B	#2	-
LORING AVE. (RTE 1A) & CANAL ST SE	#2	-
LORING AVE. (RTE 1A) NB	#1	-
JEFFERSON AVE. EB	#5	-



QUANTITY	DESCRIPTION
1	CONTROLLER TYPE 804L CABINET & FON
1	SERVICE CONNECTION (OVERHEAD)
1	SPANNING ASSEMBLY W/ TETHER, POLES & FON
1	25' MAST ARM ASSEMBLY, BASE & FON
1	25' MAST ARM ASSEMBLY, BASE & FON
4	10' SIGNAL POST, BASE & FON
3	8' SIGNAL POST, BASE & FON
12	1 WAY 3 SECTION SIGNAL HEAD, 12" LED LENS
2	2 WAY 3 SECTION SIGNAL HEAD, 12" LED LENS
1	1 WAY 3 SECTION SIGNAL HEAD, 12" LED LENS
8	PEDESTRIAN HOUSING GRAPHIC LED W/ DOWN-TIME
5	PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
5	24V, 3-CHANNEL LOOP DETECTOR AMPLIFIER RACK MOUNT
29	ROADWAY VEHICLE LOOP DETECTOR
4	ROADWAY VEHICLE LOOP DETECTOR (QUAD-POLE TYPE)
18	PULL BOX 12" x 12" - 3000'
5	PREEMPTION RECEIVER
1	PREEMPTION CONFIRMATION STROBE (CLEAR)

P.L.S. ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.

LOOP DETECTOR DATA

DETECTOR NO.	NO. OF SEGMENTS	LOOP SIZE	SPLICE PATTERN	NO. OF TURNS	# CALLED	# EXT.	MODE A=PULSE B=PREP.	DELAY TIME	EXT. TIME
1	3	5'x5'	P	-	-	1	B	-	-
2	3	5'x5'	P	-	2	2	B	-	-
3	3	5'x5'	P	-	2	2	B	-	-
4	3	5'x2'	P	-	2	2	B	-	-
5	5	5'x5'	P	-	5	5	B	-	-
6	-	5'x5'	P	-	5	5	B	-	-
7	3	5'x5'	P	-	2	2	B	-	-
8	3	5'x5'	P	-	2	2	B	-	-
9	4	5'x5'	P	-	3	1	B	-	-
10	3	5'x5'	P	-	3	2	B	-	-
11	2	5'x20'	P	QUAD-POLE TYPE	2	2	B	-	-
12	2	5'x20'	P	QUAD-POLE TYPE	2	2	B	-	-

SALEM  
 RTE. 1A AT JEFFERSON AVE. & CANAL ST.  
 DATE: MASS 0682  
 REVISION SHEET NO. 02  
 TOTAL SHEETS 3  
 TRAFFIC SIGNAL DATA

- NOTES:**
- SEQUENCE AND TIMING NOTES:**
- W/F/W ONLY LOOK UPON PED. ACTIVATION.
- LOOP DETECTOR NOTES:**
- DELAY AND EXTENSION TIMES ARE 4 SECONDS.
  - DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY THE DETECTOR.
- SIGNAL IDENTIFICATION NOTES:**
- ALL INDICATORS ARE LED TYPE.
  - ALL OVER-HEAD SIGNALS ARE RIGIDLY MOUNTED.
- EMERGENCY PRE-EMPTION DATA NOTES:**
- ACTIVATION OF FIRE PRE-EMPTION SHALL RESULT IN IMMEDIATE CLEARANCE OF ANY CONFLICTING MOVEMENTS IN PROGRESS, FOLLOWED BY FIRE PRE-EMPTION PHASE, FOLLOWED BY RETURN TO THE BEGINNING OF THE CYCLE.

CONTROLLER MAKE & MODEL: TGT LMD 8000  
 POLE No.: NET-T 1/23 MECO 2577  
 METER No.: 4" 673 55C  
 EMERGENCY PRE-EMPTION (TYPE): OPTICOM

APPROVED BY: \_\_\_\_\_  
 STATE TRAFFIC ENGINEER Date

06/20/01.DWG

SALEM CANAL STREET			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	6MHS/377-0025/820X	64	200
PROJECT FILE NO. 025148			

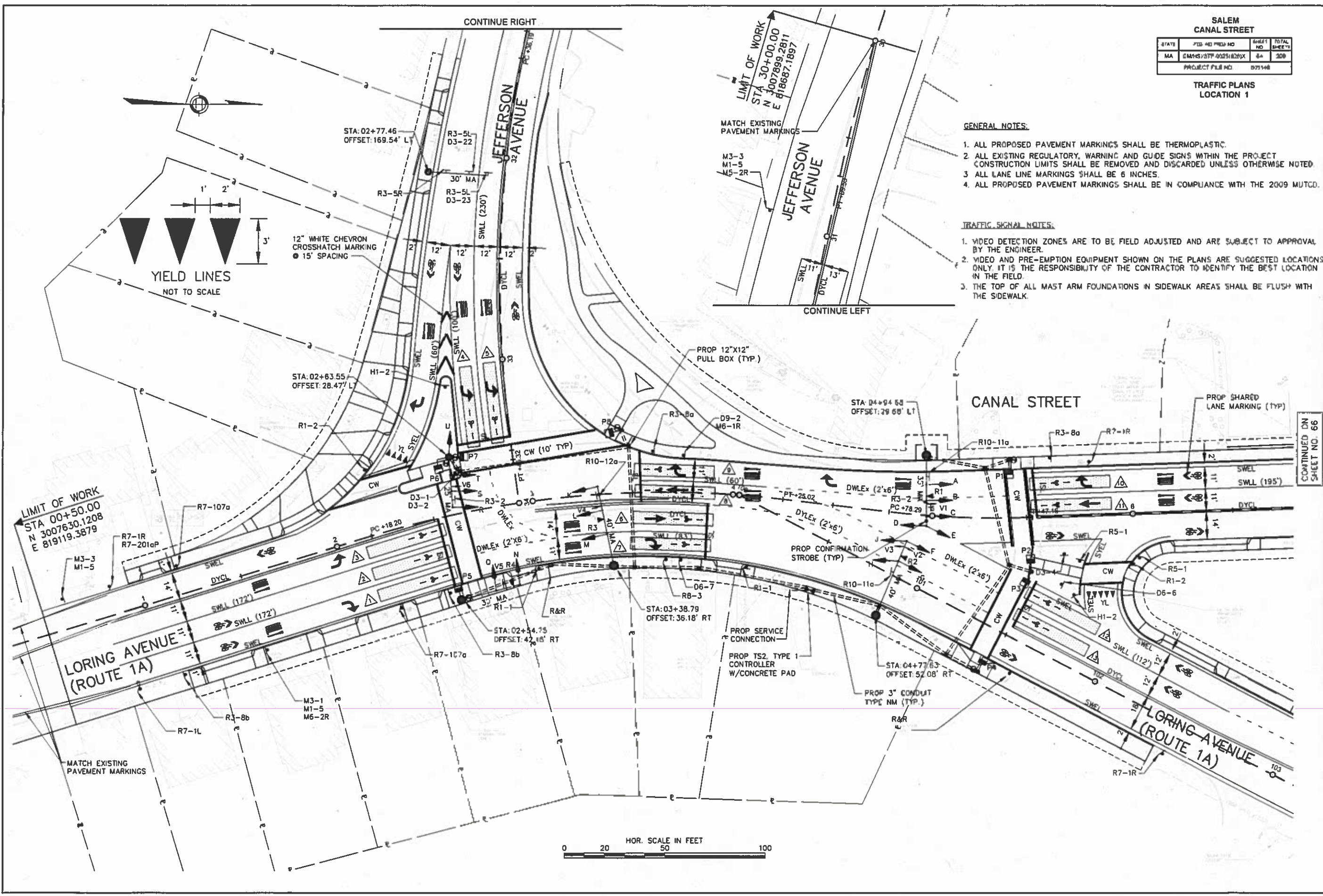
TRAFFIC PLANS  
LOCATION 1

GENERAL NOTES:

1. ALL PROPOSED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.
2. ALL EXISTING REGULATORY, WARNING AND GUIDE SIGNS WITHIN THE PROJECT CONSTRUCTION LIMITS SHALL BE REMOVED AND DISCARDED UNLESS OTHERWISE NOTED.
3. ALL LANE LINE MARKINGS SHALL BE 6 INCHES.
4. ALL PROPOSED PAVEMENT MARKINGS SHALL BE IN COMPLIANCE WITH THE 2009 MUTCD.

TRAFFIC SIGNAL NOTES:

1. VIDEO DETECTION ZONES ARE TO BE FIELD ADJUSTED AND ARE SUBJECT TO APPROVAL BY THE ENGINEER.
2. VIDEO AND PRE-EMPTION EQUIPMENT SHOWN ON THE PLANS ARE SUGGESTED LOCATIONS ONLY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO IDENTIFY THE BEST LOCATION IN THE FIELD.
3. THE TOP OF ALL MAST ARM FOUNDATIONS IN SIDEWALK AREAS SHALL BE FLUSH WITH THE SIDEWALK.



CONTINUED ON  
SHEET NO. 66

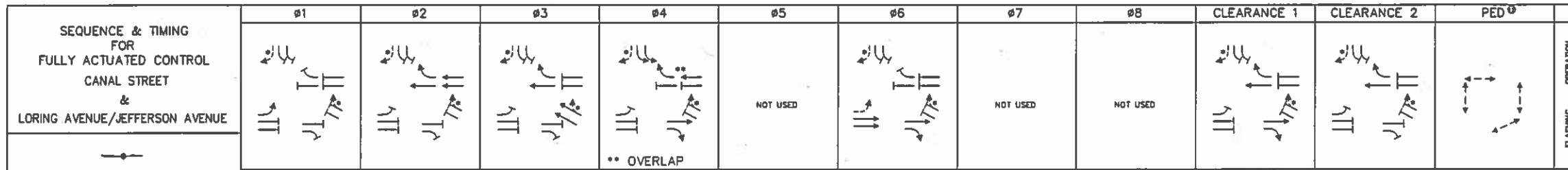
1-8-2015

SALEM  
CANAL STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMH-SUSTR-002S(826)X	65	209
PROJECT FILE NO.		805148	

SEQUENCE & TIMING PLAN  
LOCATION 1

9382 PS&E SEQUENCING LOC1 DWG 3-Sep-2015



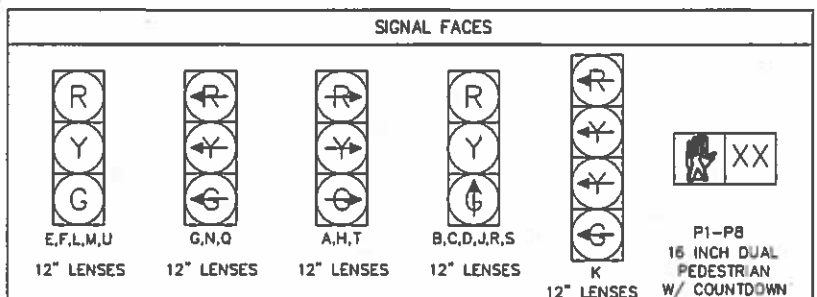
APPROACH	DIRECT.	FACES	INTERVALS																																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
CANAL STREET	SB	A	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
CANAL STREET	SB	B,C	R	R	R	⊙	⊙	⊙	R	R	R	R	R																							
LORING AVENUE	NB	D,J	R	R	R	R	R	R	R	R	R	R	R																							
LORING AVENUE	SB	E,F	R	R	R	R	R	R	R	R	R	R	R																							
LORING AVENUE	SB	G	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	NB	H	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	NB	K	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	NB	L,M	R	R	R	R	R	R	R	R	R	R	R																							
LORING AVENUE	NB	N,O	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	SB	R,S	R	R	R	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	SB	T	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙																							
LORING AVENUE	EB	U	R	R	R	R	R	R	R	R	R	R	R																							
PEDESTRIAN	ALL	P1-P8	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW																							

	TIMING IN SECONDS																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
MINIMUM GREEN	4			10						4																										
MAX GREEN 1 (M - F, 8AM TO 5PM)	18			39						19																										
MAX GREEN 2 (ALL OTHER TIMES)	11			38						20																										
VEHICLE EXTENSION	3			3						3																										
PED INTERVALS																																				
YELLOW CLEARANCE		3			4					4																										
RED CLEARANCE			2			3					3																									
DETECTION (MEMORY)																																				
RECALL																																				

- NOTES:**
- STANDARD NEMA CLEARANCES SHALL APPLY.
  - ANY TWO NON-CONFLICTING PHASES MAY RUN CONCURRENTLY. IN PRESENCE OF CALLS ON MULTIPLE PHASES SEQUENCE SHALL CONFORM TO PREFERENTIAL DIAGRAM.
  - ⊙ IF FOLLOWED BY ø4.
  - ⊙ IF FOLLOWED BY ø2+ø6.
  - ⊙ IF FOLLOWED BY ø2+ø6.
  - ⊙ IF FOLLOWED BY ø4 OR ø2+ø6.
  - ⊙ IF FOLLOWED BY ø2+ø6.
  - ⊙ IF FOLLOWED BY ø4 OR ø2+ø6.
  - F+YA IF FOLLOWED BY ø2+ø6.
  - ⊙ IF FOLLOWED BY ø2+ø6 OR ø3.
  - ⊙ IF FOLLOWED BY ø2+ø6 OR ø3.
  - EXCLUSIVE PED PHASE SHALL BE CALLED UPON PUSH BUTTON ACTUATION ONLY.

RECEIVER AND PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
R1	1	⊙	SB ø2
R2	2	⊙	NB ø3
R3	3	⊙	NB ø1 & ø6
R4	4	⊙	EB ø4

- NOTES:**
- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL RECEIVERS LOCATED AT THE INTERSECTION.
  - PRE-EMPTION SIGNALS SHALL BE SERVICED IN THE ORDER IN WHICH THEY ARE RECEIVED, WITH NO PRIORITY.
  - IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL RECEIVER R1 (OR OTHERS AS PROVIDED) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY PRE-EMPTION THE ASSOCIATED GREEN PHASE FOR A MINIMUM OF TEN (10) SECONDS, OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN PROVIDE PRE-EMPTION PHASE CLEARANCE SERVICE THEN RESUME NORMAL OPERATION, AND RETURN TO THE START OF ø2 + ø6.
  - MINIMUM GREEN, NORMAL VEHICLE AND PEDESTRIAN CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
  - EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.



- NOTES:**
- ALL VEHICLE AND PEDESTRIAN LENSES SHALL BE LED TYPE.
  - ALL HOUSINGS TO BE PROVIDED WITH TUNNEL WSORS AND 5" BACKPLATES.
  - ALL HOUSINGS TO BE FIXED MOUNTED.
  - ALL HOUSINGS TO HAVE LOUVERED BACKPLATES WITH 2" YELLOW RETRO-REFLECTIVE BORDERS.

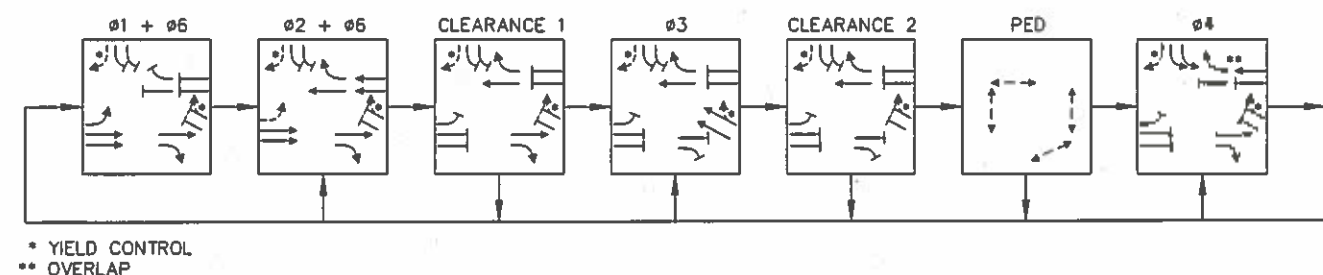
QUANTITY	ITEM NO.	DESCRIPTION
1		TS2 TYPE 1 CONTROLLER W/CABINET & FOUNDATION
4		SIGNAL POST & BASE - W/ FDM - 8'
1		25' MAST ARM - STEEL, TYPE II W/ FDM
1		30' MAST ARM - STEEL, TYPE II W/ FDM
1		35' MAST ARM - STEEL, TYPE II W/ FDM
2		40' MAST ARM - STEEL, TYPE II W/ FDM
1		1 WAY 3 SECTION VEHICLE SIGNAL HOUSING - 12" LED, R/Y/G LEFT TURN ARROWS
3	B16.01	1 WAY 3 SECTION VEHICLE SIGNAL HOUSING - 12" LED, R/Y/G RIGHT TURN ARROWS
5		1 WAY 3 SECTION VEHICLE SIGNAL HOUSING - 12" LED
1		1 WAY 3 SECTION VEHICLE SIGNAL HOUSING - 12" LED G STRAIGHT ARROW
1		1 WAY 4 SECTION VEHICLE SIGNAL HOUSING - 12" LED R/Y/G LEFT TURN ARROWS, FLASHING YELLOW ARROW
8		PEDESTRIAN SIGNAL HOUSING - 18" GRAPHIC LED
8		ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY W/R10-3E SIGN
1		SERVICE CONNECTION (OVERHEAD)
4		OPTICAL RECEIVER (DETECTOR) - ONE WAY
2		OPTICAL PHASE SELECTOR - TWO CHANNELS
2		PREDICTION CONFIRMATION STROBE (WHITE)
8	B11.31	12" x 12" PULLBOX (SD2.031)
6		VIDEO CAMERA
6	B16.01	MAST ARM CAMERA MOUNT EXTENSION BRACKETS - 8'
6		VIDEO DETECTION PROCESSOR
2		BUS INTERFACE UNIT (SPARE)
2		MAJUNCTION MANAGEMENT UNIT (MMU)

PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION

**NOTE:** TRAFFIC SIGNAL MAST ARMS, POSTS AND BASES, SHALL BE ORNAMENTAL TYPE CONSISTENT WITH CITY OF SALEM STANDARDS AND PAINTED BLACK.

DETECTION ZONE	VIDEO CAMERA	SIZE	OPERATION	CALL Ø	CALL DELAY (SECONDS)	EXTEND Ø
1	V4	6'x40'	PRESENCE	6	-	6
2	V4	6'x40'	PRESENCE	6	-	6
3	V4	6'x40'	PRESENCE	1	-	1
4	V5	6'x40'	PRESENCE	4	-	4
5	V5	6'x40'	PRESENCE	4	-	4
6	V3	6'x40'	PRESENCE	6	-	6 & 4
7	V3	6'x40'	PRESENCE	6	-	6 & 4
8	V6	6'x40'	PRESENCE	2	-	2 & 3
9	V6	6'x40'	PRESENCE	2	-	2 & 3
10	V1	6'x40'	PRESENCE	2	-	2
11	V1	6'x40'	PRESENCE	2	-	2
12	V2	6'x40'	PRESENCE	3	-	3
13	V2	6'x40'	PRESENCE	3	-	3

PREFERENTIAL SEQUENCE DIAGRAM  
(CALLS ON ALL PHASES)  
FOR  
CANAL STREET & LORING AVENUE/JEFFERSON AVENUE

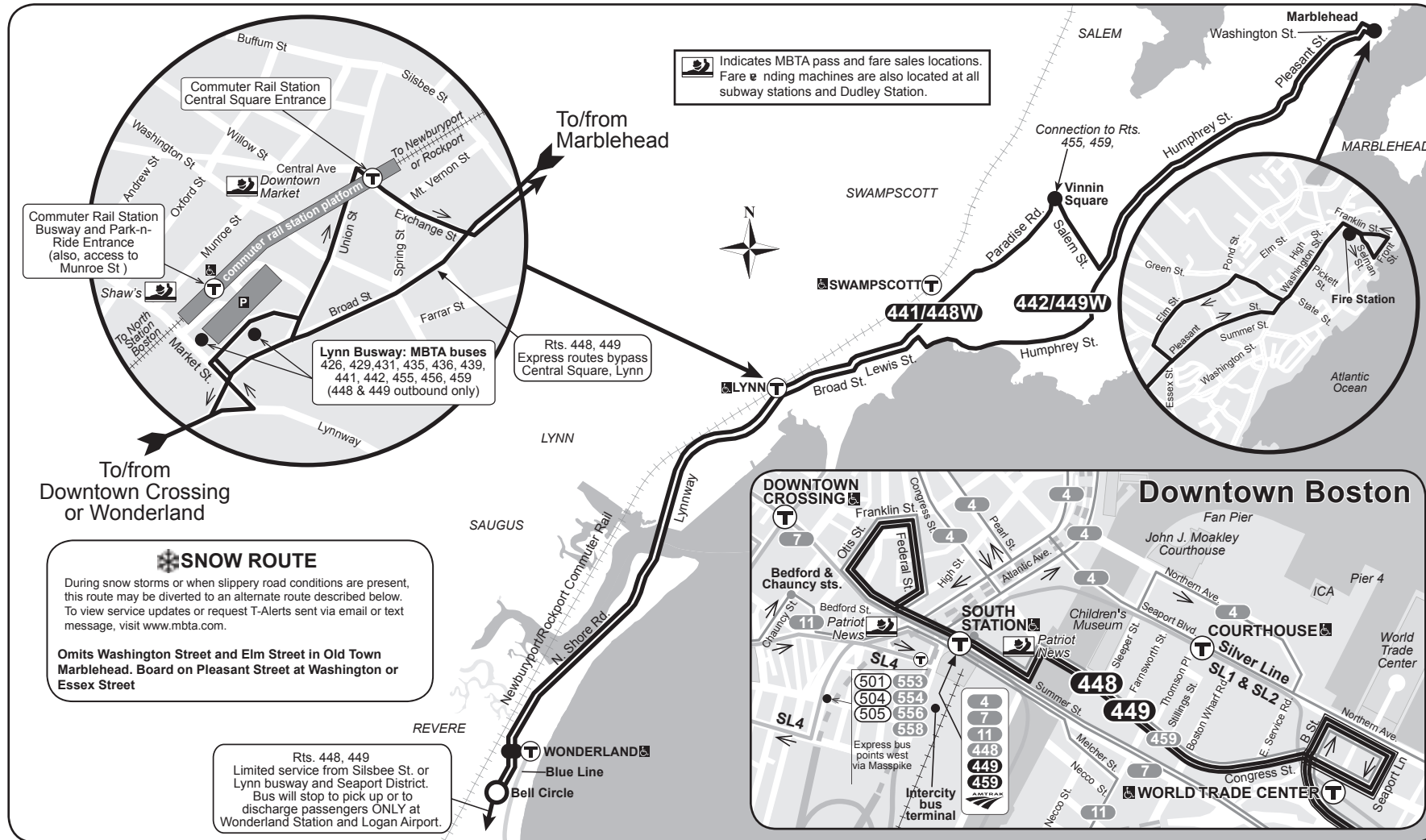




# **APPENDIX D**

## **Bus Schedules**

**Route 441/442 Marblehead - Wonderland**  
**Route 448/449 Marblehead - Downtown Crossing**



schedule change

**441/442•448/449**

Fall September 3, 2016 - December 30, 2016

**441/442 Marblehead-Wonderland**  
**448/449 Marblehead-Downtown Crossing**

**Serving**

- Vinnin Square
- Swampscott
- Wonderland Station
- Central Square, Lynn
- Logan Airport
- Blue Line
- Green Line
- Red Line
- Orange Line
- Newburyport/Rockport Commuter Rail



Massachusetts Bay Transportation Authority **massDOT**  
 Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100  
 (TTY) 617-222-5146 • [www.mbta.com](http://www.mbta.com)



**441/442 & 448/449**

**Weekday**

Inbound						
Leae Marble-head	L/v Arrie Phillips Beach v a Paradise	L/v Arrie Phillips Beach v a Humphrey	L/v Arrie Central Square	Arrie Wonderland Station	Arrie Logan Term. C	Arrie Otis & Summer Sts.
.....	.....	.....	5:45A	5:59A	.....	.....
5:40A	.....	5:50A	6:05	6:21	.....	.....
.....	.....	6:00	6:18	6:30	.....	.....
a 6:00	.....	6:11	.....	6:36	6:49A	7:03A
6:10	6:20A	.....	6:40	6:56	.....	.....
.....	.....	6:30	6:48	7:01	.....	.....
a 6:28	6:40	.....	.....	7:21	7:32	7:53
.....	6:45	.....	7:01	7:21	.....	.....
6:43	.....	6:54	7:13	7:34	.....	.....
.....	.....	7:00	7:16	7:36	.....	.....
a 6:58	.....	7:12	.....	7:45	8:06	8:22
.....	7:15	.....	7:35	7:58	.....	.....
.....	.....	7:30	7:46	8:05	.....	.....
7:13	7:26	.....	7:46	8:09	.....	.....
a 7:28	7:41	.....	.....	8:24	8:40	9:01
.....	7:45	.....	8:05	8:28	.....	.....
7:43	.....	7:57	8:24	8:44	.....	.....
a 7:58	.....	8:12	.....	8:45	9:06	9:22
.....	8:15	.....	8:35	8:51	.....	.....
.....	.....	8:30	8:47	9:05	.....	.....
8:13	8:26	.....	8:46	9:09	.....	.....
.....	8:45	.....	9:04	9:20	.....	.....
8:50	.....	9:04	9:31	9:51	.....	.....
9:10	9:23	.....	9:44	10:01	.....	.....
9:40	.....	9:54	10:21	10:41	.....	.....
10:10	10:22	.....	10:44	11:01	.....	.....
10:40	.....	10:54	11:19	11:36	.....	.....
11:10	11:22	.....	11:44	12:01P	.....	.....
11:40	.....	11:52	12:14P	12:31	.....	.....
12:10P	12:22P	.....	12:46P	1:04P	.....	.....
12:40	.....	12:52P	1:14	1:31	.....	.....
1:10	1:23	.....	1:47	2:06	.....	.....
1:40	.....	1:52	2:14	2:31	.....	.....
2:10	2:25	.....	2:49	3:08	.....	.....
2:40	.....	2:52	3:14	3:31	.....	.....
.....	.....	.....	3:41	3:56	.....	.....
3:10	3:23	.....	3:46	4:04	.....	.....
3:40	.....	3:52	4:10	4:29	.....	.....
.....	.....	.....	4:40	4:55	.....	.....
4:10	4:22	.....	4:45	5:01	.....	.....
.....	.....	.....	5:10	5:28	.....	.....
4:50	.....	5:05	5:25	5:42	.....	.....
5:20	5:35	.....	5:54	6:13	.....	.....
5:35	.....	5:47	6:09	6:25	.....	.....
5:50	6:03	.....	6:22	6:41	.....	.....
6:05	.....	6:17	6:35	6:49	.....	.....
w 6:34	6:44	.....	7:00	.....	.....	.....
6:35	.....	6:47	7:02	7:16	.....	.....
w 7:06	7:16	.....	7:32	.....	.....	.....
7:15	.....	7:27	7:41	7:56	.....	.....
w 7:30	7:41	.....	7:56	.....	.....	.....
8:15	.....	8:26	8:40	8:55	.....	.....
9:15	.....	9:26	9:40	9:55	.....	.....
10:15	.....	10:26	10:40	10:55	.....	.....
11:15	.....	11:26	11:40	11:55	.....	.....
w 12:10A	.....	12:20A	12:28A	.....	.....	.....

Outbound						
Leae Marble-head	Arrie Central Square	L/v Arrie Wonderland Station	Arrie Phillips Beach v a Humphrey	Arrie Phillips Beach v a Paradise	Arrie Otis & Summer Sts.	Arrie Marble-head
.....	.....	.....	5:13A	5:22A	.....	5:32A
.....	.....	6:00A	6:13	6:31	.....	.....
.....	.....	w 6:16	.....	6:29	6:40	.....
.....	.....	6:27	6:39	.....	.....	.....
.....	.....	w 6:42	6:39	.....	6:55	7:06
.....	.....	6:48	7:06	.....	.....	.....
.....	.....	6:35	6:48	7:06	.....	.....
.....	.....	6:45	6:56	7:09	.....	7:20
.....	.....	7:30	7:42	.....	7:57	8:10
.....	.....	7:35	7:47	.....	8:04	.....
.....	.....	7:40	7:53	8:11	.....	.....
7:15A	7:29A	7:47	7:59	8:14	.....	8:26
.....	.....	7:50	8:03	8:21	.....	.....
.....	.....	8:06	8:17	8:30	.....	8:41
7:45	7:59	8:18	8:30	.....	8:45	8:55
.....	.....	8:35	8:47	.....	9:01	9:13
.....	.....	8:55	9:07	.....	.....	.....
.....	.....	9:15	9:27	9:42	.....	9:54
.....	.....	9:40	9:53	.....	10:11	10:23
.....	.....	10:15	10:29	10:44	.....	10:56
.....	.....	10:45	10:58	.....	11:16	11:28
.....	.....	11:20	11:32	11:47	.....	12:00N
.....	.....	11:45	11:58	.....	12:18P	12:30P
.....	.....	12:15P	12:27P	12:42P	.....	12:55P
.....	.....	12:45	12:56	.....	1:13P	1:24
.....	.....	1:15	1:28	1:45	.....	2:01
.....	.....	1:45	2:00	.....	2:19	2:32
.....	.....	2:05	2:18	2:35	.....	2:51
.....	.....	2:30	2:44	.....	3:08	3:23
.....	.....	3:00	3:13	3:30	.....	3:43
.....	.....	3:15	3:30	.....	.....	.....
.....	.....	3:30	3:45	.....	.....	.....
.....	.....	3:35	3:49	.....	4:13	4:28
.....	.....	4:00	4:15	.....	.....	.....
.....	.....	4:05	4:21	4:40	.....	4:53
.....	.....	4:10	4:25	.....	.....	.....
.....	.....	4:20	4:34	.....	4:58	5:09
.....	.....	4:35	4:51	5:10	.....	5:23
.....	.....	4:44	4:59	.....	.....	.....
.....	.....	4:50	5:05	.....	5:29	5:40
.....	.....	5:00	5:15	.....	.....	.....
.....	.....	5:05	5:19	5:37	.....	5:50
.....	.....	5:20	5:35	.....	5:59	6:08
a 4:45	5:05	5:26	5:39	5:56	.....	6:07
.....	.....	5:35	5:49	.....	.....	6:16
.....	.....	5:50	6:04	.....	6:26	6:36
a 5:15	5:35	5:52	6:05	.....	6:25	6:34
.....	.....	6:05	6:18	6:32	.....	6:44
a 5:45	6:04	6:25	6:38	6:55	.....	7:06
.....	.....	6:35	6:49	.....	7:05	7:16
a 6:15	6:33	6:51	7:01	.....	7:21	7:30
.....	.....	7:05	7:18	.....	.....	.....
.....	.....	7:15	7:28	7:42	.....	7:54
.....	.....	7:47	8:00	.....	.....	.....
.....	.....	8:15	8:27	8:40	.....	8:52
.....	.....	9:15	9:27	9:40	.....	9:52
.....	.....	10:15	10:27	10:40	.....	10:52
.....	.....	11:15	11:26	11:38	.....	11:47
.....	.....	12:15A	12:26A	12:38A	.....	12:47A
.....	.....	x 1:10	1:22	.....	.....	.....

**441/442 Saturday**

Inbound			Outbound		
Leae Marble-head	Arrie Central Square	Arrie Wonderland Station	Leae Marble-head	L/v Arrie Central Square	Arrie Marble-head
p 6:30A	6:56A	7:09A	.....	wp 6:05A	6:28A
h 7:00	7:25	7:39	.....	wh 6:30	6:53
p 7:25	7:52	8:06	p 6:45A	6:57	7:21
h 7:53	8:18	8:32	h 7:10	7:20	7:42
p 8:25	8:52	9:08	p 7:45	7:57	8:21
h 8:56	9:21	9:36	h 8:13	8:23	8:48
p 9:25	9:54	10:11	p 8:40	8:52	9:17
h 10:00	10:28	10:44	h 9:15	9:28	9:55
p 10:25	10:57	11:15	p 9:40	9:52	10:18
h 10:55	11:23	11:39	h 10:00	10:13	10:40
p 11:20	11:52	12:10P	p 10:25	10:40	11:08
h 11:50	12:17P	12:34	h 10:55	11:08	11:35
p 12:15P	12:48P	1:06P	p 11:22	11:36	12:05P
h 12:45	1:13	1:30	h 11:50	12:03P	12:30
p 1:10	1:43	2:01	p 12:17P	12:31P	1:01P
h 1:40	2:08	2:25	h 12:45	12:58	1:25
p 2:05	2:38	2:56	p 1:12	1:26	1:56
h 2:35	3:03	3:20	h 1:40	1:56	2:22
p 3:00	3:33	3:51	p 2:07	2:20	2:48
h 3:30	3:58	4:15	h 2:35	2:52	3:20
p 3:55	4:26	4:43	p 3:02	3:15	3:43
h 4:25	4:53	5:10	h 3:30	3:44	4:12
p 4:50	5:18	5:34	p 3:57	4:10	4:38
h 5:20	5:46	6:02	h 4:25	4:38	5:02
p 5:45	6:12	6:28	p 4:52	5:05	5:33
h 6:15	6:41	6:57	h 5:20	5:33	5:57
p 6:40	7:07	7:23	p 5:47	6:00	6:28
h 7:10	7:34	7:48	h 6:15	6:28	6:52
h 7:35	7:59	8:13	h 6:40	6:53	7:16
h 8:00	8:24	8:38	h 7:10	7:23	7:47
h 8:35	8:59	9:13	h 7:40	7:53	8:17
h 9:35	9:59	10:10	h 8:40	8:53	9:16
h 10:35	10:57	11:08	h 9:40	9:50	10:13
h 11:35	11:57	12:08A	h 10:40	10:50	11:13
h 12:25A	12:47A	12:58	h 11:40	11:50	12:13A

a - Omits Point of Pines.  
 h - Via Humphrey St.  
 p - Via Paradise Rd.  
 w - To or from W. Lynn & operates v a Western Ave. and does not serve Wonderland Station  
 x - Waits for last train to arrive at station.

**Route 441/442 & 448/449  
 Marblehead-  
 Wonderland Station or  
 Downtown Crossing**

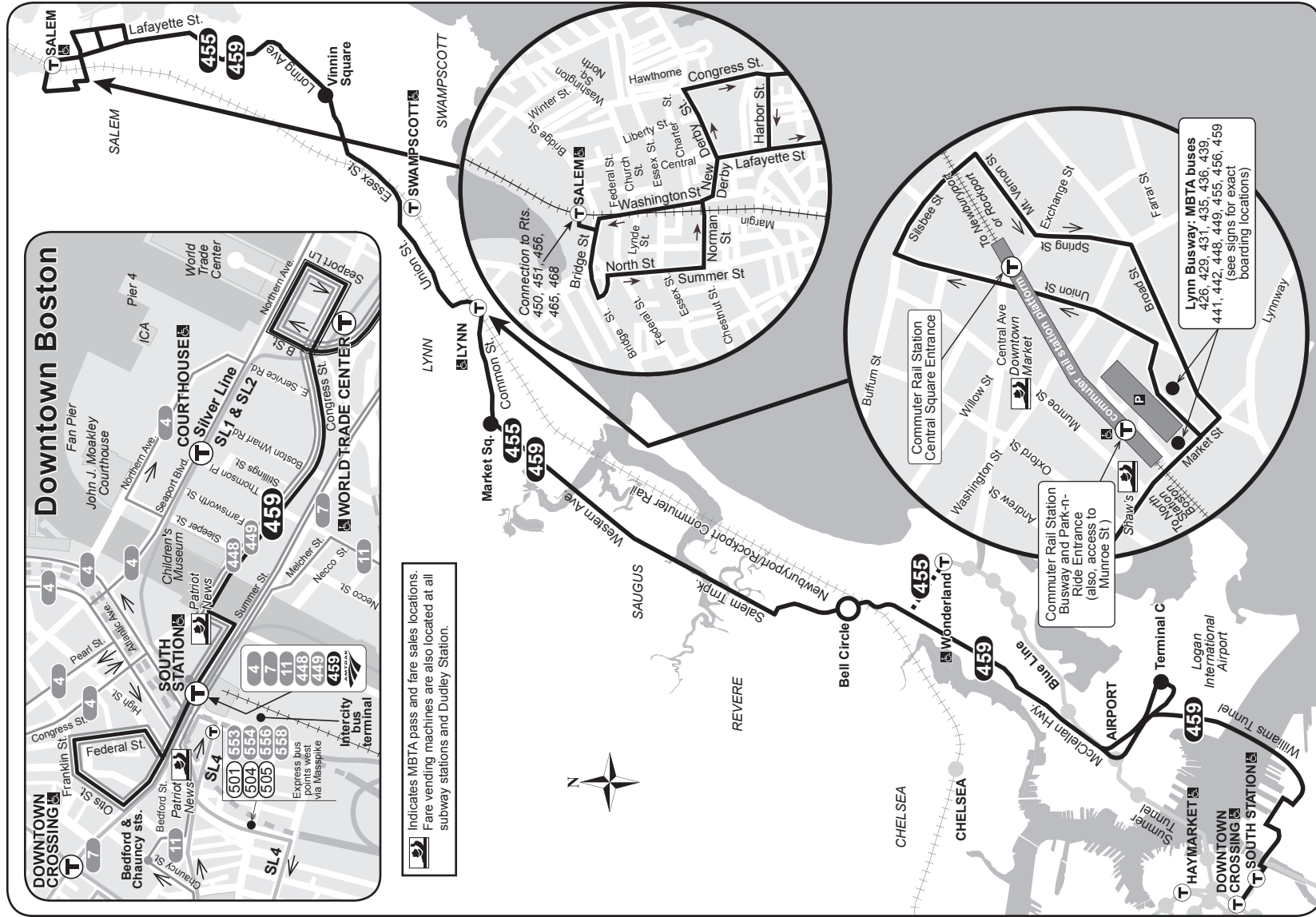
**441/442 Sunday**

Inbound			Outbound		
Leae Marble-head	Arrie Central Square	Arrie Wonderland Station	Leae Marble-head	L/v Arrie Central Square	Arrie Marble-head
h 7:55	8:14	8:37	.....	wh 7:30	7:54
h 8:55	9:13	9:37	.....	wh 8:30	8:54
p 9:25	9:45	10:07	p 8:45	9:00	9:23
h 10:00	10:18	10:42	h 9:15	9:25	9:50
p 10:40	11:00	11:22	p 9:45	10:00	10:23
h 11:05	11:23	11:47	h 10:10	10:20	10:45
p 11:35	11:55	12:22P	p 10:40	10:55	11:19
.....	.....	.....	h 11:05	11:16	11:42
h 12:00N	12:20P	12:44P	p 11:35	11:50	12:15P
p 12:30	12:49	1:16	.....	.....	.....
h 12:55	1:15	1:39	h 12:00N	12:11P	12:37P
p 1:25	1:44	2:11	p 12:30	12:45	1:10
h 1:50	2:08	2:32	h 12:55	1:06	1:32
p 2:20	2:39	3:06	p 1:25	1:40	2:05
h 2:45	3:03	3:27	h 1:50	2:01	2:27
p 3:15	3:34	4:01	p 2:20	2:34	2:59
h 3:40	3:57	4:21	h 2:45	2:56	3:22
p 4:10	4:28	4:51	p 3:15	3:29	3:54
h 4:35	4:52	5:16	h 3:40	3:52	4:18
p 5:05	w 5:23	.....	p 4:10	4:24	4:47
h 5:30	5:47	6:11	h 4:35	4:47	5:12
p 6:00	6:18	6:41	p 5:05	5:19	5:42
h 6:25	6:40	7:02	h 5:30	5:41	6:06
p 6:55	7:13	7:36	p 6:00	6:14	6:37
h 7:25	7:40	8:02	h 6:45	6:56	7:21
h 8:25	8:40	9:02	h 7:45	7:56	8:21
h 9:25	9:40	10:02	h 8:45	8:56	9:21
h 10:25	10:39	11:00	h 9:45	9:55	10:18
h 11:25	w 11:42	.....	h 10:45	10:55	11:18
h 12:25A	12:39A	1:00A	h 11:45	11:55	12:18

Fare	Inner Express	Inner Express + Local Bus	Inner Express + Subway
CharlieCard	\$4.00	\$4.00	\$4.00
CharlieTicket	\$5.00	\$7.00	\$7.75
Cash-on-Board	\$5.00	\$7.00	\$7.75
Student*	\$2.50	\$2.50	\$2.50
Senior/TAP**	\$2.50	\$2.50	\$2.50

VALID PASSES: Inner Express Bus (\$128/mo.), Outer Express Bus

**Route 455 Salem Depot - Wonderland  
Route 459 Salem Depot - Downtown Boston**



# 455•459

Fall September 3, 2016 - December 30, 2016

**455 Salem Depot-Wonderland**  
**459 Salem Depot-Downtown Boston**

**Serving**

- Vinnin Square
- Salem State University
- Shetland Office Park
- Red Line
- Blue Line
- Green Line
- Orange Line
- Newburyport/Rockport Commuter Rail

**Massachusetts Bay Transportation Authority** *massDOT*  
Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100  
(TTY) 617-222-5146 • www.mbta.com

**455/459**

**Weekday**

Inbound							Outbound						
Leae Salem Depot	Arrie Vinnin Square	Lv Arrie Central Square	Arrie West Lynn	Arrie Wonderland Station	Arrie Logan Term. C	Arrie Downtown Crossing	Leae Downtown Crossing	Arrie Logan Term. C	Leae Wonderland Station	Lv Arrie West Lynn	Arrie Central Square	Arrie Vinnin Square	Arrie Salem Depot
.....	.....	5:00A	5:07A	5:20A	.....	.....	.....	.....	5:21A	5:27A	5:37A	5:50A	.....
.....	.....	5:15	5:22	5:35	.....	.....	.....	.....	5:57	6:04	6:15	6:30	.....
5:10A	5:23A	5:34	5:44	5:56	.....	.....	.....	.....	6:15A	6:26	6:35	6:48	7:06
5:30	5:44	5:53	6:03	6:15	.....	.....	6:20A	6:35A	.....	6:52	7:06	7:21	7:39
5:50	6:04	6:17	6:27	.....	6:47A	7:03A	.....	.....	7:05	7:17	7:27	7:40	7:58
6:10	6:24	6:39	6:47	6:59	.....	.....	.....	.....	7:55	8:07	8:17	8:30	8:48
6:30	6:44	6:59	7:11	7:26	.....	.....	7:45	8:02	.....	8:18	8:31	8:46	9:06
6:50	7:06	7:22	7:34	7:49	.....	.....	.....	.....	8:50	9:02	9:12	9:25	9:43
7:05	7:21	7:38	7:49	.....	8:16	8:34	9:00	9:17	.....	9:34	9:48	10:04	10:22
7:20	7:39	7:55	8:07	8:22	.....	.....	.....	.....	10:00	10:12	10:22	10:37	10:56
7:35	7:54	8:10	8:22	8:37	.....	.....	10:10	10:24	.....	10:42	10:56	11:12	11:30
7:55	8:14	8:30	8:42	8:57	.....	.....	.....	.....	11:10	11:23	11:35	11:49	12:08P
8:15	8:37	8:52	9:03	.....	9:19	9:39	11:20	11:34	.....	11:51	12:03P	12:19P	12:45
8:50	9:09	9:25	9:37	9:52	.....	.....	.....	.....	12:20P	12:33P	12:48P	1:04P	1:25P
9:30	9:49	10:07	10:22	.....	10:43	10:57	12:30P	12:46P	.....	1:04	1:16	1:28	1:52
10:05	10:24	10:40	10:52	11:07	.....	.....	.....	.....	1:30	1:43	1:58	2:14	2:35
10:45	11:09	11:26	11:41	.....	12:02P	12:16P	.....	.....	1:40	1:56	.....	2:14	2:36
11:20	11:39	11:55	12:07P	12:22P	.....	.....	.....	.....	.....	2:40	2:53	3:08	3:26
11:55	12:19P	12:36P	12:51	.....	1:15	1:34	.....	.....	2:50	3:08	.....	3:33	3:46
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3:50	4:09	4:22	4:40
12:30P	12:55P	1:13P	1:26P	1:39P	.....	.....	4:00	4:20	.....	4:45	4:58	5:11	5:31
1:05	1:28	1:44	1:58	.....	2:22P	2:42P	.....	.....	5:00	5:19	5:32	5:50	6:08
1:40	2:05	2:25	2:41	2:53	.....	.....	5:10	5:32	.....	6:03	6:14	6:26	6:43
e 2:35	.....	2:47	3:01	.....	.....	.....	.....	.....	6:10	6:25	6:39	6:54	7:10
2:15	2:38	2:55	3:06	.....	3:26	3:42	6:20	6:38	.....	7:01	7:09	7:21	7:32
2:50	3:15	3:35	3:47	3:57	.....	.....	.....	.....	7:15	7:30	7:39	7:51	8:06
3:25	3:50	4:07	4:18	.....	4:37	4:49	7:25	7:40	.....	7:56	8:04	8:16	8:27
4:00	4:27	4:45	4:57	5:07	.....	.....	.....	.....	8:25	8:37	8:46	8:58	9:13
4:35	4:59	5:14	5:23	.....	5:39	5:53	.....	.....	9:30	9:42	9:51	10:03	10:18
5:10	5:37	5:55	6:05	6:17	.....	.....	.....	.....	10:30	10:40	10:50	11:02	11:17
5:45	6:04	6:19	6:28	.....	6:44	6:58	.....	.....	11:30	11:40	11:50	12:01A	12:12A
6:15	6:33	6:49	6:59	7:11	.....	.....	.....	.....	12:30A	12:38A	12:47A	12:57	1:10
7:15	7:33	7:49	7:59	8:11	.....	.....	.....	.....	.....	.....	.....	.....	.....
8:15	8:33	8:49	8:59	9:10	.....	.....	.....	.....	.....	.....	.....	.....	.....
9:20	9:36	9:49	9:57	10:08	.....	.....	.....	.....	.....	.....	.....	.....	.....
10:35	10:51	11:03	11:08	11:18	.....	.....	.....	.....	.....	.....	.....	.....	.....
11:30	11:42	11:53	11:58	12:08A	.....	.....	.....	.....	.....	.....	.....	.....	.....
12:30A	12:42A	12:53A	12:58A	1:08	.....	.....	.....	.....	.....	.....	.....	.....	.....

Shaded area trips serve Logan Airport, the Seaport District and Downtown Crossing (Route 459).

**Weekday Note:** All trips to/from Salem Depot serve Shetland Office Park.

**455**

**Saturday**

Inbound					Outbound						
Leae Salem Depot	Arrie Vinnin Square	Lv Arrie Central Square	Arrie Wonderland Station	Leae Wonderland Station	Arrie Central Square	Arrie Vinnin Square	Arrie Salem Depot	Leae Wonderland Station	Arrie Central Square	Arrie Vinnin Square	Arrie Salem Depot
.....	.....	5:15A	5:37A	.....	a 5:28A	5:39A	5:51A	.....	a 5:58	6:09	6:21
.....	.....	5:55	6:17	.....	a 6:28	6:39	6:51	.....	a 6:28	6:39	6:51
6:05A	6:16A	6:32	6:53	6:35A	6:58	7:12	7:23	7:05	7:28	7:42	7:53
6:35	6:46	7:02	7:23	7:05	7:16	7:32	7:53	7:35	7:46	8:02	8:25
7:05	7:16	7:32	7:53	7:35	7:46	8:02	8:25	8:05	8:17	8:33	8:56
7:35	7:46	8:02	8:25	8:05	8:17	8:33	8:56	8:35	8:47	9:03	9:26
8:05	8:17	8:33	8:56	9:05	9:17	9:33	9:56	9:35	9:48	10:04	10:27
8:35	8:47	9:03	9:26	10:05	10:18	10:34	10:58	10:35	10:49	11:06	11:30
9:05	9:17	9:33	9:56	11:10	11:24	11:41	12:06P	11:10	11:24	11:41	12:06P
9:35	9:48	10:04	10:27	11:45	11:59	12:16P	12:42P	11:45	12:12P	12:27P	12:41P
10:05	10:18	10:34	10:58	12:20P	12:36P	12:53P	1:18P	12:20P	12:47P	1:02P	1:16P
10:35	10:49	11:06	11:30	12:55	1:10	1:25	1:50	12:55	1:22	1:37	1:51
11:10	11:24	11:41	12:06P	1:30	1:44	1:59	2:24	1:30	1:57	2:12	2:26
11:45	11:59	12:16P	12:42P	2:05	2:19	2:34	2:59	2:05	2:32	2:47	3:01
.....	.....	.....	.....	2:40	2:54	3:09	3:34	2:40	3:07	3:22	3:36
.....	.....	.....	.....	3:15	3:29	3:44	4:08	3:15	3:41	3:56	4:10
.....	.....	.....	.....	3:50	4:03	4:18	4:42	3:50	4:15	4:30	4:44
.....	.....	.....	.....	4:25	4:38	4:53	5:17	4:25	4:50	5:05	5:19
.....	.....	.....	.....	5:00	5:13	5:28	5:52	5:00	5:25	5:40	5:53
.....	.....	.....	.....	5:35	5:48	6:03	6:24	5:35	5:57	6:12	6:25
.....	.....	.....	.....	6:05	6:17	6:32	6:53	6:05	6:27	6:42	6:55
.....	.....	.....	.....	6:35	6:47	7:02	7:23	6:35	6:57	7:12	7:25
.....	.....	.....	.....	a 7:05	7:16	a 7:30	.....	7:35	7:57	8:12	8:25
.....	.....	.....	.....	7:35	7:47	8:02	8:23	8:35	8:56	9:10	9:22
.....	.....	.....	.....	8:35	8:47	9:02	9:23	9:35	9:56	10:10	10:22
.....	.....	.....	.....	9:35	9:47	10:02	10:21	10:35	10:56	11:10	11:20
.....	.....	.....	.....	10:35	10:45	11:00	11:19	c11:20	12:02A	12:18A	12:32A
.....	.....	.....	.....	11:35	11:45	12:00M	12:19A	.....	.....	.....	.....

**Weekend Note:** This route does not serve Shetland Office Park.

All buses are accessible to persons with disabilities

**Route 455 & 459  
Salem Depot-Wonderland Station or  
Downtown Crossing**

**455**

**Sunday**

Inbound				Outbound			
Leae Salem Depot	Arrie Vinnin Square	Arrie Central Square	Arrie Wonderland Station	Leae Wonderland Station	Lv Arrie Central Square	Arrie Vinnin Square	Arrie Salem Depot
7:05A	7:19A	7:35A	7:58A	.....	a 6:30A	6:44A	6:54A
8:05	8:19	8:35	8:58	.....	a 7:00	7:14	7:24
9:05	9:19	9:35	9:58	8:05A	8:30	8:44	8:54
10:05	10:19	10:35	10:58	9:05	9:30	9:44	9:54
11:05	11:19	11:35	11:58	10:05	10:30	10:44	10:54
.....	.....	.....	.....	11:05	11:30	11:44	11:54
12:05P	12:19P	12:35P	12:58P	12:05P	12:30P	12:44P	12:54P
1:05	1:19	1:35	1:58	1:05	1:30	1:44	1:54
2:05	2:19	2:35	2:58	2:05	2:30	2:44	2:54
3:05	3:19	3:35	3:58	3:05	3:30	3:44	3:54
4:05	4:19	4:35	4:58	4:05	4:30	4:44	4:54
5:05	5:19	5:35	5:58	5:05	5:30	5:44	5:54
6:05	6:19	6:35	6:58	6:05	6:30	6:44	6:54
7:05	7:19	7:35	7:58	7:05	7:30	7:44	7:54
8:05	8:19	8:35	8:58	8:05	8:30	8:44	8:54
9:05	9:19	9:35	9:58	9:05	9:30	9:44	9:54
10:05	10:19	10:35	10:58	10:05	10:30	10:44	10:54
a 11:05	11:22	11:35	.....	11:05	11:30	11:44	11:54
11:30	11:44	12:00M	12:23A	10:58	11:23	11:37	11:47

a - To/from West Lynn Garage  
c - Route 426 via Cliffondale Square  
e - From Brookline St. at Empire St. and does NOT run during school vacation

Fare	Local Bus	Inner Express	Inner Express + Local Bus	Inner Express + Subway
CharlieCard	\$1.70	\$4.00	\$4.00	\$4.00
CharlieTicket	\$2.00	\$5.00	\$7.00	\$7.75
Cash-on-Board	\$2.00	\$5.00	\$7.00	\$7.75
Student*	\$0.85	\$2.50	\$2.50	\$2.50
Senior/TAP**	\$0.85	\$2.50	\$2.50	\$2.50

VALID PASSES: Inner Express Bus (\$128/mo.), Outer Express Bus (\$168/mo.), commuter rail, and boat passes.  
FREE FARES: Children under 12 ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.  
\* Requires Student CharlieCard, available to students through participating middle schools and high schools.  
\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Local bus fare applies if your trip does not cross the Tobin Bridge or Boston Harbor

**Fall 2016 Holidays**  
October 10 & November 11: see Weekday  
September 5, November 24 & December 26: see Sunday

# NEWBURYPORT/ROCKPORT LINE Effective November 21, 2016

Trains shaded in blue WILL NOT OPERATE when the Commuter Rail is operating at a BLUE LEVEL

### Monday to Friday

Inbound to Boston. Table with columns for AM and PM, and rows for stations 8 Rockport to 1A North Station. Includes times and flag stop indicators.

### Monday to Friday

Outbound from Boston. Table with columns for AM and PM, and rows for stations 1A North Station to 8 Rockport. Includes times and flag stop indicators.

### Saturday & Sunday

Inbound to Boston. Table with columns for AM and PM, and rows for stations 8 Rockport to 1A North Station. Includes times and flag stop indicators.

### Saturday & Sunday

Outbound from Boston. Table with columns for AM and PM, and rows for stations 1A North Station to 8 Rockport. Includes times and flag stop indicators.

Keep in Mind: This schedule will be effective from November 21, 2016, and will replace the schedule of May 23, 2016.

Presidents' Day and 4th of July operate on a Saturday service schedule. New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, and Christmas Day operate on a Sunday service schedule.

For all other holiday schedules, please check MBTA.com or call 617-222-3200.

- Times in purple with "f" indicate a flag stop: Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.
Times in blue indicate an early departure (L stop): The train may leave ahead of schedule at these stops.
Bikes: Bicycles are allowed on trains with the bicycle symbol shown below the train number.

PLEASE NOTE: Schedules may change in the event of severe weather. Throughout the winter, the MBTA and Keolis will closely monitor weather forecasts to determine if conditions necessitate any change in schedule for the Commuter Rail.

Color key for schedule changes: PURPLE (Normal schedule), BLUE (Moderate changes to train schedule. Shaded trains WILL NOT operate), ORANGE (Major changes to train schedule. Schedules will be available in Boston stations, at MBTA.com and via Twitter @MBTA\_CR), GRAY (No passenger service on the Commuter Rail).

Call MBTA Customer Service at 617-222-3200. Stay connected with us on Twitter. Make your train on time. Download the official MBTA Commuter Rail mobile app.

During this time, colors will be used to communicate the system's service level and impact on passengers. The color for the next day will be announced by mid-afternoon the day prior.

WEB112116V1

# **APPENDIX E**

## **Traffic Safety Data**



**Crash Cluster 1  
2011 to 2014**

Collision Number	Crash Number1	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injury	Total Fatal Injury	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
1	2949513	17-Jan-2011	1:55 PM	Non-fatal injury	2	3	0	Angle	Dry	Daylight	Clear		
2	2949518	23-Jan-2011	12:20 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
3	2949520	24-Jan-2011	7:58 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Not reported	Clear		
4	2949567	01-Jul-2011	5:44 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear		
5	2949576	04-Aug-2011	8:21 PM	Property damage only (n	2	0	0	Rear-end	Dry	Dark - lighted road	Clear		
6	2949591	09-Dec-2011	2:10 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear		
7	2949593	15-Dec-2011	8:58 AM	Non-fatal injury	2	2	0	Angle	Wet	Daylight	Cloudy/Rain		
8	2949609	14-Feb-2012	4:02 PM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Clear		
9	2949630	17-Feb-2011	2:16 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
10	2949647	22-May-2011	8:37 PM	Property damage only (n	2	0	0	Rear-end	Dry	Dark - lighted road	Cloudy/Clear		
11	2949680	09-Sep-2011	2:49 PM	Non-fatal injury	3	6	0	Rear-end	Dry	Daylight	Clear		
12	2949716	11-Dec-2011	10:22 AM	Non-fatal injury	2	4	0	Rear-end	Dry	Daylight	Clear		
13	2949737	27-Jan-2012	2:35 PM	Non-fatal injury	2	2	0	Angle	Wet	Daylight	Rain/Cloudy		
14	2949740	02-Feb-2012	2:12 PM	Not Reported	2	0	0	Sideswipe, same di	Dry	Daylight	Cloudy		
15	2949741	10-Feb-2012	00:00 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Dark - lighted road	Clear		
16	3001162	03-May-2011	6:32 AM	Not Reported	3	0	0	Angle	Dry	Daylight	Cloudy/Cloudy		
17	3340479	10-Oct-2012	10:51 AM	Property damage only (n	3	0	0	Rear-end	Wet	Daylight	Rain		
18	3340480	10-Oct-2012	10:58 AM	Property damage only (n	2	0	0	Angle	Wet	Daylight	Rain		
19	3340493	06-Nov-2012	5:40 PM	Not Reported	2	0	0	Rear-end	Dry	Dark - lighted road	Clear		
20	3340611	27-Sep-2012	2:25 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear		
21	3340614	05-Oct-2012	2:50 AM	Not Reported	1	0	0	Single vehicle crash	Wet	Dark - lighted road	Fog, smog, smoke/Rain		
22	3340616	04-Dec-2012	8:57 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Cloudy		
23	3340625	19-Dec-2012	11:03 AM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Cloudy/Cloudy		
24	3340627	26-Dec-2012	10:56 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear		
25	3340873	21-Dec-2012	2:03 PM	Not Reported	2	0	0	Rear-end	Wet	Daylight	Rain		
26	3340874	01-Oct-2012	10:28 AM	Property damage only (n	2	0	0	Head-on	Dry	Daylight	Not Reported		
27	3368117	12-Feb-2013	7:39 PM	Property damage only (n	2	0	0	Rear-end	Dry	Dark - lighted road	Clear		
28	3368119	23-Feb-2013	11:56 AM	Non-fatal injury	4	1	0	Rear-end	Dry	Daylight	Cloudy		
29	3391555	12-Mar-2013	9:17 AM	Not Reported	2	0	0	Angle	Dry	Daylight	Cloudy		
30	3391556	20-Mar-2013	12:57 PM	Property damage only (n	2	0	0	Rear-end	Not reported	Daylight	Clear		
31	3481858	12-May-2013	4:02 PM	Non-fatal injury	2	2	0	Head-on	Dry	Daylight	Clear/Clear		
32	3482063	18-May-2013	5:25 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
33	3590764	10-Jun-2013	5:26 PM	Property damage only (n	2	0	0	Sideswipe, opposit	Dry	Daylight	Cloudy/Cloudy		
34	3590769	21-Jun-2013	6:30 PM	Property damage only (n	3	0	0	Rear-end	Dry	Daylight	Clear		
35	3590779	06-Jul-2013	11:20 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear	P6:Other noped	
36	3590791	30-Aug-2013	8:29 PM	Property damage only (n	2	0	0	Sideswipe, opposit	Dry	Dark - lighted road	Clear		
37	3590840	08-Aug-2013	6:43 PM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Clear		
38	3591025	07-Jun-2013	7:49 AM	Property damage only (n	2	0	0	Angle	Wet	Daylight	Rain/Cloudy		
39	3663054	12-Oct-2013	8:46 AM	Not Reported	2	0	0	Rear-end	Dry	Daylight	Clear		
40	3663439	03-Oct-2013	2:57 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear		
41	3711696	03-Sep-2013	8:17 AM	Non-fatal injury	2	2	0	Angle	Dry	Daylight	Not Reported		
42	2949608	14-Feb-2012	3:54 PM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Cloudy/Cloudy		
43	2949686	22-Sep-2011	2:17 PM	Non-fatal injury	2	2	0	Rear-end	Wet	Daylight	Cloudy		
44	3340482	17-Oct-2012	10:09 AM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		





**Crash Cluster 2  
2011 to 2014**

Collision Number	Crash Number_1	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injury	Total Fatal Injury	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Bike_Ped
	2711429	27-Feb-2011	2:30 AM	Property damage only (no	2	0	0	Not reported	Not reported	Not reported	Not Reported	
	2720884	22-Apr-2011	11:21 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear/Cloudy	
	2737603	03-Jun-2011	8:06 AM	Property damage only (no	3	0	0	Sideswipe, same directi	Dry	Daylight	Clear/Other	
	2743378	21-Jun-2011	6:45 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear	
	2956630	10-Nov-2011	3:34 PM	Property damage only (no	3	0	0	Rear-end	Wet	Daylight	Cloudy/Rain	
	2957630	21-Nov-2011	5:05 PM	Non-fatal injury	2	3	0	Rear-end	Dry	Dark - lighted road	Clear	
	3066445	23-Feb-2012	12:55 PM	Property damage only (no	2	0	0	Sideswipe, same directi	Wet	Daylight	Rain/Cloudy	
	3116137	06-Mar-2012	3:55 PM	Property damage only (no	3	0	0	Rear-end	Dry	Daylight	Clear	
	3245624	28-Apr-2012	11:00 PM	Property damage only (no	1	0	0	Single vehicle crash	Dry	Dark - lighted road	Clear	
8	3826322	20-May-2014	6:41 AM	Non-fatal injury	1	1	0	Single vehicle crash	Wet	Daylight	Cloudy/Rain	
	3388582	16-Feb-2013	00:00 AM	Property damage only (no	2	0	0	Rear-end	Wet	Daylight	Cloudy	
9	3999130	04-Dec-2014	5:06 PM	Property damage only (no	1	0	0	Head-on	Dry	Dark - roadway no	Clear/Clear	ped
	3422220	07-Apr-2013	7:14 PM	Property damage only (no	2	0	0	Rear-end	Dry	Daylight	Clear	
	3429093	15-Apr-2013	6:32 PM	Property damage only (no	2	0	0	Rear-end	Dry	Daylight	Clear	
	3487734	25-May-2013	4:38 PM	Non-fatal injury	1	1	0	Single vehicle crash	Wet	Dark - lighted road	Cloudy/Rain	
1	3562261	15-Aug-2013	11:17 AM	Property damage only (no	2	0	0	Rear-end	Dry	Daylight	Clear	
	3563577	28-Jun-2013	9:04 AM	Non-fatal injury	2	1	0	Head-on	Not reported	Daylight	Rain	
2	3590784	19-Jul-2013	9:37 AM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear	
6	3623145	15-Oct-2013	11:20 AM	Property damage only (no	1	0	0	Single vehicle crash	Dry	Daylight	Cloudy/Cloudy	
	3665400	31-Oct-2013	9:10 AM	Property damage only (no	2	0	0	Not reported	Not reported	Not reported	Not Reported	
	3711092	20-Dec-2013	12:32 PM	Property damage only (no	3	0	0	Rear-end	Dry	Daylight	Clear/Clear	

**Crash Cluster 3  
2011 to 2014**

Collision Number	Crash Number 1	Crash Date_1	Crash Time_1	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
1	3603666	04-Sep-2013	10:02 AM	Property damage only (no	2	0	0	Sideswipe, same direc	Dry	Daylight	Clear/Clear		
2	3663044	10-Sep-2013	7:44 AM	Not Reported	2	0	0	Angle	Dry	Daylight	Clear/Clear		
3	3663051	03-Oct-2013	6:17 PM	Property damage only (no	2	0	0	Angle	Dry	Dusk	Clear/Clear		
4	3710967	23-Dec-2013	1:45 PM	Property damage only (no	2	0	0	Angle	Wet	Daylight	Cloudy/Rain		
5	3711086	13-Dec-2013	5:07 PM	Property damage only (no	2	0	0	Angle	Dry	Dark - lighted rd	Clear/Cloudy		
6	3710971	26-Dec-2013	12:31 PM	Non-fatal injury	3	1	0	Angle	Wet	Daylight	Cloudy/Cloudy		
7	3711087	14-Dec-2013	9:18 PM	Property damage only (no	2	0	0	Angle	Dry	Dark - lighted rd	Clear		
8	3711093	21-Dec-2013	1:20 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
9	3554204	10-Aug-2013	11:33 AM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
10	3573534	25-Aug-2013	2:03 AM	Property damage only (no	1	0	0	Single vehicle crash	Dry	Dark - lighted rd	Clear/Clear		
11	3608232	01-Oct-2013	7:40 AM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
12	3743308	13-Feb-2014	1:18 PM	Property damage only (no	2	0	0	Angle	Snow	Daylight	Snow/Sleet, hail (freezing rain or drizzle)		
13	3803390	28-Apr-2014	12:45 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
14	4003331	14-Nov-2014	4:26 PM	Not Reported	2	0	0	Rear-end	Dry	Dusk	Clear		
15	3803608	13-Apr-2014	3:45 AM	Property damage only (no	1	0	0	Single vehicle crash	Dry	Dark - lighted rd	Clear		
16	3803925	09-May-2014	11:30 AM	Property damage only (no	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
17	3865095	13-Jun-2014	1:16 PM	Non-fatal injury	2	1	0	Sideswipe, opposite d	Wet	Daylight	Cloudy/Rain		
18	3981741	01-Nov-2014	1:00 PM	Non-fatal injury	2	2	0	Angle	Wet	Daylight	Rain/Rain		
19	4000028	09-Dec-2014	3:05 PM	Property damage only (no	2	0	0	Sideswipe, same direc	Wet	Dusk	Cloudy/Rain		
20	3870842	24-Jun-2014	6:30 PM	Property damage only (no	2	0	0	Head-on	Dry	Daylight	Clear/Clear		
21	3909961	17-Jul-2014	1:52 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
22	3928096	13-Aug-2014	8:45 AM	Non-fatal injury	2	1	0	Angle	Wet	Daylight	Rain/Cloudy		
23	3943769	19-Aug-2014	5:49 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
24	3975093	19-Oct-2014	10:45 AM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
25	3975101	23-Oct-2014	6:06 PM	Property damage only (no	2	0	0	Angle	Wet	Dark - lighted rd	Rain/Rain		
26	3980611	04-Nov-2014	1:24 PM	Property damage only (no	2	0	0	Sideswipe, opposite d	Dry	Daylight	Clear		
27	3741261	07-Nov-2013	5:45 PM	Property damage only (no	2	0	0	Angle	Wet	Dark - lighted rd	Cloudy/Rain		
28	3563599	15-Jun-2013	4:00 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
29	3424882	27-Apr-2013	1:15 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
30	3420007	20-Mar-2013	4:56 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
31	3417906	14-Mar-2013	8:45 PM	Not Reported	2	0	0	Sideswipe, same direc	Dry	Dark - lighted rd	Clear		
32	3382631	25-Jan-2013	3:38 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
33	3374070	09-Jan-2013	2:15 AM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Cloudy		

**Crash Cluster 3  
2011 to 2014**

Collision Number	Crash Number 1	Crash Date_1	Crash Time_1	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
34	3741257	27-Nov-2013	2:55 PM	Non-fatal injury	2	1	0	Angle	Wet	Daylight	Cloudy/Rain		
35	3352280	31-Jan-2013	1:20 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear/Clear		
36	3590785	19-Jul-2013	6:14 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
37	3562261	15-Aug-2013	11:17 AM	Property damage only (no	2	0	0	Rear-end	Dry	Daylight	Clear		
38	3826322	20-May-2014	6:41 AM	Non-fatal injury	1	1	0	Single vehicle crash	Wet	Daylight	Cloudy/Rain		
39	3999130	04-Dec-2014	5:06 PM	Property damage only (no	1	0	0	Head-on	Dry	Dark - roadway	Clear/Clear		ped
	2702347	22-Jan-2011		1 Property damage only (no	3	0	0	Rear-end	Dry	Daylight	Clear		
	2711456	18-Feb-2011	10:15 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	2712878	13-Feb-2011	4:05 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
	2721437	16-Apr-2011	8:49 PM	Non-fatal injury	2	1	0	Head-on	Wet	Dark - lighted rd	Rain		
	2728110	18-May-2011	2:45 AM	Non-fatal injury	2	3	0	Rear-end	Wet	Daylight	Cloudy/Rain		
	2729229	06-May-2011	7:34 PM	Non-fatal injury	2	1	0	Head-on	Dry	Dawn	Clear		
	2743355	27-Jun-2011	9:45 PM	Non-fatal injury	2	1	0	Angle	Dry	Dark - lighted rd	Clear		
	2743381	21-Jun-2011	3:43 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	2751552	26-Jul-2011	6:33 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
	2764237	07-Sep-2011	5:07 PM	Property damage only (no	2	0	0	Head-on	Wet	Daylight	Rain		
	2791278	04-Oct-2011	2:26 PM	Non-fatal injury	3	1	0	Rear-end	Wet	Daylight	Cloudy		
	2850972	23-Oct-2011	5:58 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
	2902580	28-Feb-2011	8:00 AM	Non-fatal injury	1	1	0	Single vehicle crash	Ice	Daylight	Rain/Sleet, hail (freezing rain or drizzle)		
	2949608	14-Feb-2012	3:54 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Cloudy/Cloudy		
	2954364	07-Nov-2011	2:30 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	3038448	17-Jan-2012	9:42 PM	Property damage only (no	2	0	0	Head-on	Wet	Dark - lighted rd	Rain		
	3063175	13-Jan-2012	12:30 PM	Non-fatal injury	2	2	0	Rear-end	Dry	Daylight	Cloudy		
	3066730	21-Feb-2012	12:19 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear/Clear		
	3090230	24-Feb-2012	7:13 PM	Property damage only (no	2	0	0	Head-on	Wet	Dark - lighted rd	Rain		
	3091131	01-Mar-2012	9:35 PM	Property damage only (no	2	0	0	Rear-end	Snow	Dark - lighted rd	Snow		
	3105753	27-Apr-2012	2:52 AM	Non-fatal injury	1	2	0	Single vehicle crash	Wet	Dark - lighted rd	Rain		
	3114094	30-Mar-2012	4:37 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
	3222219	09-Jun-2012	2:33 PM	Property damage only (no	3	0	0	Rear-end	Dry	Daylight	Clear		
	3270683	24-Jul-2012	4:19 PM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear		
	3279002	14-Aug-2012	9:16 PM	Non-fatal injury	2	1	0	Angle	Dry	Dark - lighted rd	Clear/Clear		
	3289518	01-Sep-2012	11:40 AM	Property damage only (no	2	0	0	Angle	Dry	Daylight	Clear/Clear		
	3289651	19-Sep-2012	12:19 PM	Property damage only (no	2	0	0	Head-on	Dry	Daylight	Clear		
	3291152	27-Sep-2012	5:45 PM	Property damage only (no	2	0	0	Rear-end	Dry	Daylight	Clear		
	3293319	10-Oct-2012	12:45 PM	Non-fatal injury	2	1	0	Rear-end	Wet	Daylight	Cloudy/Rain		
	3333437	06-Nov-2012	4:00 PM	Property damage only (no	2	0	0	Sideswipe, same direc	Dry	Daylight	Clear		
	3339951	19-Oct-2012	6:43 AM	Property damage only (no	2	0	0	Angle	Wet	Dawn	Rain		
	3340621	14-Dec-2012	10:03 AM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
	3360617	25-Dec-2012	8:32 PM	Property damage only (no	2	0	0	Sideswipe, same direc	Dry	Dark - lighted rd	Clear		
	3488231	03-Jun-2013	9:19 AM	Property damage only (no	2	0	0	Angle	Wet	Daylight	Rain/Cloudy		
	3603329	19-Sep-2013	4:12 PM	Property damage only (no	2	0	0	Sideswipe, same direc	Dry	Daylight	Clear		

**Crash Cluster 4  
2011 to 2014**

Collision Number	Crash Number1	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injury	Total Fatal Injury	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
1	2750404	28-Jul-2011	00:00 AM	Not Reported	1	0	0	Single vehicle crash	Dry	Dark - lighted roadw	Clear		
2	2833039	09-Nov-2011	8:17 PM	Property damage only (nc	1	0	0	Single vehicle crash	Dry	Dark - lighted roadw	Clear		
3	3360264	13-Dec-2012	5:08 PM	Property damage only (nc	2	0	0	Rear-end	Dry	Dark - lighted roadw	Clear		
4	3361576	01-Feb-2012	3:31 PM	Property damage only (nc	2	0	0	Angle	Dry	Daylight	Clear		
5	3361651	02-Nov-2011	7:50 AM	Non-fatal injury	1	1	0	Single vehicle crash	Dry	Daylight	Clear/Cloudy	P2:Pedalcyclis	cyc
6	3361712	25-Mar-2012	10:52 AM	Property damage only (nc	2	0	0	Rear-end	Dry	Daylight	Clear/Cloudy		
7	3361918	07-Aug-2012	2:42 PM	Not Reported	2	0	0	Rear-end	Dry	Daylight	Clear		
8	3361926	31-Jan-2012	6:48 PM	Property damage only (nc	3	0	0	Rear-end	Dry	Dark - lighted roadw	Clear		
9	3362137	05-Mar-2012	6:53 PM	Property damage only (nc	2	0	0	Single vehicle crash	Dry	Dark - lighted roadw	Clear		
10	3733725	19-Dec-2013	5:19 PM	Property damage only (nc	2	0	0	Angle	Dry	Dark - lighted roadw	Clear		
11	3733735	18-Feb-2013	7:47 PM	Property damage only (nc	2	0	0	Angle	Dry	Dark - lighted roadw	Clear		
12	3822228	41782	2:47 PM	Property damage only (nc	2	0	0	Angle	Dry	Daylight	Clear/Cloudy		
13	3822331	41787	8:24 AM	Non-fatal injury	2	2	0	Angle	Wet	Daylight	Rain/Cloudy		
14	3893435	41847	4:36 AM	Property damage only (nc	1	0	0	Single vehicle crash	Dry	Daylight	Clear		
15	3954558	41913	4:26 PM	Property damage only (nc	2	0	0	Head-on	Wet	Daylight	Cloudy/Rain		
	2832863	02-Nov-2011	7:50 AM	Non-fatal injury	1	1	0	Single vehicle crash	Dry	Daylight	Clear/Cloudy	P2:Pedalcyclis	cyc
	2919331	20-Dec-2011	5:24 PM	Property damage only (nc	2	0	0	Rear-end	Dry	Dark - lighted roadw	Clear		

# Crash Data Summary Table

Loring Avenue, Salem MA  
2010, 2011, 2012, 2013

Crash Diagram Ref #	Crash Date <i>m/d/y</i>	Crash Day	Time of Day	Manner of Collision <i>Type</i>	Light Condition <i>Type</i>	Weather Condition <i>Type</i>	Road Surface <i>Type</i>	Driver Contributing Code <i>Type</i>	Ages			Comments
									D1	D2	D3	
1	1/10/10	Sunday	4:03 AM	Single Vehicle Crash	Dark - lighted roadway	Snow	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	20			MV lost out of control and struck a hydrant and telephone pole
2	1/11/10	Monday	4:45 PM	Angle	Dark - lighted roadway	Cloudy	Dry	Other improper action	23	33		
3	2/26/10	Friday	1:17 PM	Sideswipe, same direction	Daylight	Cloudy	Dry	Unknown	25	47		MV3(uninvolved) was traveling very slowly in front of MV1 and MV2. MV1 and MV2 were both trying to pass MV3 and each claimed that the other MV was at fault for crash. 219 Loring Avenue
4	4/14/10	Wednesday	12:18 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	36	23		MV's stopped in traffic. 221 Loring Avenue
5	4/16/10	Friday	1:30 PM	Rear-end	Daylight	Rain	Wet	Followed too closely	33	38		MV's stopped in traffic. 223 Loring Avenue
6	4/30/10	Friday	11:32 AM	Angle	Daylight	Clear	Dry	Failed to yield to right of way	21	27		
7	5/27/10	Thursday	12:33 PM	Angle	Daylight	Clear	Dry	Failed to yield to right of way	33	18		MV2 pulled out in front of MV1 in an attempt to reverse direction and collided with MV1
8	6/1/10	Tuesday	3:34 PM	Angle	Daylight	Rain	Wet	Failure to keep in proper lane or running off road	23	19		MV1 in lane designated for a right hand turn, MV2 collided with MV1. 220 Loring Avenue
9	6/18/10	Friday	4:11 PM	Rear-end	Daylight	Clear	Dry	Inattention	40	51		MV's stopped in heavy traffic, MV was distracted by someone at the side of the road. 220 Loring Avenue
10	7/5/10	Monday	2:00 PM	Angle	Daylight	Clear	Dry	Failed to yield to right of way	22	22		256 Loring Avenue
11	11/1/10	Monday	9:20 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	24	53		MV's stopped in traffic
12	12/6/10	Monday	1:20 AM	Head on	Dark - lighted roadway	Clear	Dry	Failure to keep in proper lane or running off road	27			MV struck flashing yellow traffic light and a telephone pole
13	12/20/10	Monday	2:59 PM	Single Vehicle Crash	Daylight	Snow	Snow	No Improper Driving	20			MV slid into the guardrail due to the inclement weather
14	1/1/11	Saturday	12:20 PM	Single Vehicle Crash	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	27			MV swerved in road striking a snowbank
15	2/3/11	Thursday	1:20 PM	Rear-end	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	23			MV struck parked car
16	2/13/11	Sunday	6:00 PM	Angle	Dark - lighted roadway	Clear	Dry	Unknown	78	32		MV turning into driveway at 462 Loring Avenue
17	3/10/11	Thursday	12:57 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	93			Operator claims he saw a pedestrian in the middle of the road which caused him to swerve to the right and strike a tree. Operator charged with OUI
18	4/2/11	Saturday	2:25 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Wet	No Improper Driving	18			MV crossed into the opposite lane of traffic, drove over the curb and struck house at 221 Loring Ave, charged for OUI
19	4/8/11	Friday	8:30 AM	Rear-end	Daylight	Clear	Dry	Unknown	65	49		MV stopped at traffic light was rear-ended
20	4/12/11	Tuesday	10:30 AM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	65	67		MV stopped for a turkey in the road was rear-ended. 452 Loring Avenue
21	6/16/11	Thursday	3:30 PM	Single Vehicle Crash	Daylight	Clear	Dry	Illness	46			Operator may have blacked out and and struck a fire hydrant and utility pole
22	6/25/11	Saturday	1:05 AM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	21			MV struck a pedestrian who was walking along the solid double yellow line, MV charged with OUI
23	7/2/11	Saturday	10:59 AM	Rear-end	Daylight	Clear	Dry	Distracted	33	28		Operator of MV2 was distracted and rear-ended MV1 as traffic slowed. 430 Loring Avenue
24	7/13/11	Wednesday	3:00 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	53	41		MV's stopped in traffic. 229 Loring Avenue
25	8/3/11	Wednesday	3:02 PM	Sideswipe, opposite direction	Daylight	Clear	Dry	Made an improper turn	45	35		MV attempted to make an illegal U-Turn. 270 Loring Avenue
26	9/19/11	Monday	12:04 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	24	26		MV's stopped in traffic at Loring Ave & Harrison Rd
27	9/25/11	Sunday	2:27 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	Exceeded authorized speed limit	28			MV swerved to the right and struck standing traffic light tower
28	10/14/11	Friday	11:45 AM	Angle	Daylight	Rain	Wet	Failed to yield to right of way	23	23		Entering Salem State University South Campus
29	11/19/11	Saturday	12:30 PM	Single Vehicle Crash	Daylight	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	24			MC traveling at a high rate of speed and "doing wheelies", lost control and crashed onto the pavement
30	1/12/12	Thursday	11:24 PM	Rear-end	Dark - lighted roadway	Cloudy	Wet	Exceeded authorized speed limit	22			MV traveling at a high rate of speed crossed over the solid white lines striking parked MV. 208 Loring Avenue
31	2/19/12	Sunday	11:30 AM	Rear-end	Daylight	Clear	Dry	No Improper Driving	62	21	36	MV's stopped in traffic
32	4/6/12	Friday	11:16 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	18	18		MV2 was following a friend when turning out of Lincoln Rd. and did not see MV1. 206 Loring Avenue

## Crash Data Summary Table

Loring Avenue, Salem MA  
2010, 2011, 2012, 2013

Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Ages			Comments
	<i>m/d/y</i>			<i>Type</i>	<i>Type</i>	<i>Type</i>	<i>Type</i>	<i>Type</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	
33	5/16/12	Wednesday	5:41 PM	Head on	Daylight	Clear	Dry	Made an improper turn	23	68		MV2 attempted to make an illegal U-Turn on Loring Avenue from the SB lane into the NB lane and was hit by MV1 who was traveling NB on Loring Avenue; No injuries reported.
34	6/22/12	Friday	3:13 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	24			MV traveling at a high rate of speed crashed into a utility pole
35	7/25/12	Wednesday	10:00 AM	Rear-end	Daylight	Clear	Dry	No Improper Driving	48	47	31	MV's stopped in traffic
36	8/10/12	Friday	9:55 AM	Angle	Daylight	Clear	Dry	No Improper Driving	43	35		Bicyclist operating outbound on Loring Ave (Inbound Breakdown lane) & hit MV.
37	8/26/12	Sunday	2:01 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	71	69		MV stopped for pedestrians crossing the street. 450 Loring Avenue
38	9/14/12	Friday	9:00 AM	Angle	Daylight	Clear	Dry	Failed to yield to right of way	28	47		
39	9/28/12	Friday	10:35 AM	Rear-end	Daylight	Rain	Wet	Followed too closely	36	39		Stopped for traffic light
40	12/2/12	Sunday	9:23 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Failure to keep in proper lane or running off road	19			MV traveling at high rate of speed, hitting the curb and striking utility pole and then guardrail
41	2/2/13	Saturday	9:30 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	38	42		MV's stopped in traffic
42	2/5/13	Tuesday	5:26 PM	Rear-end	Dusk	Clear	Dry	Followed too closely	52	30		MV's stopped in traffic. 214 Loring Avenue
43	3/1/13	Friday	3:20 PM	Single Vehicle Crash	Daylight	Cloudy	Dry	Exceeded authorized speed limit	59			MV took his eyes off the road and drove up on the curb, struck a hydrant
44	3/4/13	Monday	11:33 AM	Angle	Daylight	Clear	Dry	No Improper Driving	21			MV failed to stay in marked lanes and struck legally parked MV's. 220 Loring Avenue
45	3/26/13	Tuesday	6:49 AM	Angle	Daylight	Clear	Dry	No Improper Driving	28	51		MV backing out of a driveway at 223 Loring Avenue
46	4/23/13	Tuesday	1:38 PM	Angle	Daylight	Cloudy	Wet	Failed to yield to right of way	59	24		Turning out of the Salem State University Driveway
47	5/6/13	Monday	11:12 AM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	45	87		MV's stopped for traffic. 215 Loring Avenue
48	6/29/13	Saturday	9:11 AM	Single Vehicle Crash	Daylight	Cloudy	Dry	Unknown	unk			Hit & run crash; Pedestrian struck & killed while crossing the street in front of her residence

Summary based on Crash Reports obtained from the Salem Police Department

**Crash Cluster 6  
2011 to 2014**

Cluster Number	Crash Number	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal injuries	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
1	3549768	26-Jul-2013	8:15 AM	Property damage only (n	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
2	3380037	08-Feb-2013	5:26 PM	Property damage only (n	2	0	0	Rear-end	Dry	Dusk	Clear		
3	3563584	25-Jun-2013	1:12 PM	Property damage only (n	1	0	0	Unknown	Dry	Daylight	Clear/Clear		
4	3740408	27-Nov-2013	10:55 AM	Property damage only (n	3	0	0	Rear-to-rear	Wet	Daylight	Cloudy/Rain		
5	3743294	31-Jan-2014	12:44 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
6	3803562	21-Mar-2014	3:01 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
7	3803580	31-Mar-2014	4:44 PM	Property damage only (n	2	0	0	Rear-end	Wet	Daylight	Cloudy/Cloudy		
8	3943753	12-Jul-2014	8:22 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
9	3980617	6-Nov-2014	3:42 PM	Non-fatal injury	3	1	0	Rear-end	Wet	Dusk	Cloudy/Rain		
10	3579631	08-Aug-2013	5:00 PM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Clear		
11	3549774	01-Aug-2013	4:03 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
12	3430021	06-May-2013	11:12 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Cloudy		
13	3422444	26-Mar-2013	6:19 AM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Clear		
14	3740427	23-Nov-2013	00:00 AM	Property damage only (n	1	0	0	Single vehicle crash	Wet	Dark - lighted roadway	Rain/Rain		
15	3422214	27-Mar-2013	3:51 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
16	3647352	25-Oct-2013	1:08 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
17	3608241	10-Oct-2013	2:00 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
18	3689058	29-Aug-2013	1:24 AM	Not Reported	2	0	0	Sideswipe, opposite dir	Dry	Dark - lighted roadway	Clear/Clear		
19	3603303	05-Sep-2013	8:11 AM	Property damage only (n	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
20	3965585	04-Sep-2013	5:55 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear		
21	3743293	31-Jan-2014	8:08 AM	Property damage only (n	2	0	0	Angle	Dry	Daylight	Cloudy/Cloudy		
22	3803520	25-Feb-2014	5:01 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
23	3803604	11-Apr-2014	1:36 AM	Non-fatal injury	5	1	0	Rear-end	Dry	Dark - lighted roadway	Clear/Clear		
24	3865087	03-Jun-2014	12:17 PM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
25	3965675	30-Sep-2014	8:14 AM	Property damage only (n	2	0	0	Angle	Wet	Daylight	Cloudy/Rain		
26	3995707	26-Nov-2014	7:01 PM	Property damage only (n	1	0	0	Single vehicle crash	Wet	Dark - lighted roadway	Rain/Sleet, hail (freezing rain o	ped	
27	4000270	29-Dec-2014	2:20 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear/Clear		
	2721398	08-Apr-2011	8:30 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	3118258	11-Apr-2011	3:07 AM	Property damage only (n	1	0	0	Single vehicle crash	Wet	Dark - lighted roadway	Clear		
	2743363	25-Jun-2011	1:05 AM	Property damage only (n	1	0	0	Single vehicle crash	Wet	Dark - lighted roadway	Rain	P5:Pedestr	ped
	2752171	13-Jul-2011	3:00 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	2789096	19-Sep-2011	12:04 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	2791854	25-Sep-2011	2:27 AM	Property damage only (n	1	0	0	Single vehicle crash	Dry	Dark - lighted roadway	Clear		
	2791290	30-Sep-2011	2:14 PM	Non-fatal injury	2	2	0	Rear-end	Dry	Daylight	Clear/Clear		
	2853309	14-Oct-2011	11:45 AM	Non-fatal injury	3	2	0	Angle	Wet	Daylight	Cloudy/Rain		
	2990334	12-Jan-2012	11:24 PM	Property damage only (n	2	0	0	Rear-end	Wet	Dark - lighted roadway	Cloudy		
	3089895	01-Feb-2012	3:56 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	3066830	19-Feb-2012	11:30 AM	Property damage only (n	3	0	0	Rear-end	Dry	Daylight	Clear		
	3066441	24-Feb-2012	11:30 AM	Property damage only (n	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
	3102759	06-Apr-2012	11:16 PM	Property damage only (n	2	0	0	Angle	Dry	Dark - lighted roadway	Clear		
	3220334	22-Jun-2012	3:13 AM	Property damage only (n	1	0	0	Single vehicle crash	Dry	Dark - lighted roadway	Clear		
	3291149	28-Sep-2012	10:35 AM	Non-fatal injury	2	1	0	Rear-end	Wet	Daylight	Rain		
	3357052	15-Dec-2012	9:30 AM	Property damage only (n	2	0	0	Rear-end	Dry	Daylight	Clear		
	3389742	04-Mar-2013	11:33 AM	Property damage only (n	3	0	0	Angle	Dry	Daylight	Clear		

**Crash Cluster 6  
2011 to 2014**

Cluster Number	Crash Number	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal injuries	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Non Motorist Type	Bike_Ped
	3865880	24-Apr-2014	11:00 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Dark - lighted roadway	Clear		
	2709094	28-Jan-2011	4:05 PM	Property damage only (no injuries)	2	0	0	Angle	Dry	Daylight	Clear		
	2707350	08-Feb-2011	4:25 PM	Property damage only (no injuries)	3	0	0	Rear-end	Wet	Daylight	Clear		
	2716541	31-Mar-2011	8:10 PM	Property damage only (no injuries)	2	0	0	Rear-end	Wet	Dark - lighted roadway	Rain/Sleet, hail (freezing rain or drizzle)		
	3154064	01-Jun-2011	12:47 PM	Fatal injury	2	0	1	Rear-end	Dry	Daylight	Clear		
	2765632	14-Aug-2011	7:25 PM	Property damage only (no injuries)	2	0	0	Angle	Dry	Daylight	Clear		
	2764265	01-Sep-2011	3:35 PM	Property damage only (no injuries)	3	0	0	Rear-end	Dry	Daylight	Clear		
	2763559	09-Sep-2011	5:20 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear		
	2789091	20-Sep-2011	3:00 PM	Property damage only (no injuries)	2	0	0	Single vehicle crash	Wet	Daylight	Cloudy/Rain		
	2791266	23-Sep-2011	2:32 PM	Property damage only (no injuries)	3	0	0	Rear-end	Wet	Daylight	Rain		
	3297927	19-Oct-2012	2:23 PM	Property damage only (no injuries)	2	0	0	Sideswipe, same direction	Dry	Daylight	Cloudy/Cloudy		
	3045263	03-Feb-2012	1:50 PM	Property damage only (no injuries)	2	0	0	Angle	Dry	Daylight	Clear/Clear		
	3116477	21-Mar-2012	3:07 AM	Property damage only (no injuries)	2	0	0	Rear-end	Dry	Daylight	Clear		
	3068433	18-Apr-2012	1:01 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
	3245618	03-May-2012	10:40 AM	Non-fatal injury	2	1	0	Rear-end	Wet	Daylight	Cloudy		
	3270668	30-Jul-2012	3:00 AM	Non-fatal injury	2	1	0	Angle	Dry	Dark - lighted roadway	Clear		
	3254625	23-Aug-2012	2:30 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
	3289842	07-Sep-2012	2:34 AM	Property damage only (no injuries)	2	0	0	Sideswipe, same direction	Dry	Dark - lighted roadway	Clear		
	3293315	10-Oct-2012	4:20 PM	Property damage only (no injuries)	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
	3333937	13-Nov-2012	8:15 AM	Property damage only (no injuries)	2	0	0	Rear-end	Wet	Daylight	Cloudy/Rain		
	3360625	31-Dec-2012	6:00 PM	Property damage only (no injuries)	2	0	0	Sideswipe, same direction	Wet	Dark - lighted roadway	Clear		
	3420013	20-Mar-2013	4:20 PM	Property damage only (no injuries)	2	0	0	Rear-end	Dry	Daylight	Clear		
	3430829	29-Apr-2013	5:00 PM	Property damage only (no injuries)	3	0	0	Rear-end	Dry	Dusk	Clear/Clear		
	3689058	29-Aug-2013	1:24 AM	Not Reported	2	0	0	Sideswipe, opposite direction	Dry	Dark - lighted roadway	Clear/Clear		



**Crash Cluster 7  
2011 to 2014**

Collision Number	Crash Number	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injury	Total Fatal Injury	Manner of Collision	Road Surface	Ambient Light Conditions	Weather Conditions	Non Motorist Crash	Bike_Ped
1	2949506	03-Jan-2011	6:03 PM	Non-fatal injury	3	2	0	Head-on	Dry	Dark - lighted roadway	Clear		
2	2949540	01-Feb-2011	9:57 AM	Non-fatal injury	2	1	0	Rear-end	Snow	Daylight	Snow		
3	2949638	05-Apr-2011	7:27 PM	Non-fatal injury	3	2	0	Rear-end	Wet	Dark - lighted roadway	Clear		
4	2949681	09-Sep-2011	3:14 PM	Not Reported	3	0	0	Rear-end	Dry	Daylight	Clear		
5	2949720	21-Dec-2011	2:25 PM	Property damage only (no injury)	2	0	0	Angle	Wet	Daylight	Rain/Cloudy		
6	3340481	14-Oct-2012	7:57 PM	Non-fatal injury	3	2	0	Angle	Dry	Dark - lighted roadway	Clear		
7	3340597	06-Aug-2012	4:18 PM	Not Reported	3	0	0	Rear-end	Dry	Daylight	Clear		
8	3340485	21-Oct-2012	3:43 PM	Property damage only (no injury)	2	0	0	Not reported	Dry	Daylight	Clear		
9	3340497	14-Nov-2012	4:56 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Dark - lighted roadway	Clear		
10	3663437	24-Sep-2013	7:21 AM	Not Reported	3	0	0	Not reported	Not reported	Not reported	Not Reported		
11	3745230	23-Dec-2013	4:05 PM	Non-fatal injury	2	1	0	Rear-end	Wet	Dusk	Rain/Cloudy		
12	3352276	01-Jan-2013	2:22 PM	Property damage only (no injury)	1	0	0	Single vehicle crash	Dry	Daylight	Clear		
13	3590836	16-Jul-2013	2:26 PM	Non-fatal injury	1	1	0	Angle	Dry	Daylight	Clear	P3:Skater	ped
14	3590844	24-Aug-2013	2:54 PM	Non-fatal injury	3	1	0	Rear-end	Dry	Daylight	Clear		
15	3591009	02-Jul-2013	9:51 PM	Non-fatal injury	2	2	0	Angle	Dry	Dusk	Cloudy		
16	3745243	15-Jan-2014	11:00 AM	Non-fatal injury	2	1	0	Angle	Wet	Daylight	Clear/Clear		
17	3745245	22-Jan-2014	9:53 PM	Property damage only (no injury)	2	0	0	Sideswipe, same direction	Dry	Dark - lighted roadway	Clear		
18	3928070	20-May-2014	8:43 AM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
19	3928377	23-Jun-2014	6:41 AM	Property damage only (no injury)	2	0	0	Rear-end	Dry	Daylight	Clear		
20	3928084	14-Jul-2014	4:44 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear		
21	3928095	13-Aug-2014	7:13 AM	Not Reported	2	0	0	Angle	Wet	Daylight	Rain/Cloudy		
22	3928131	17-Feb-2014	1:39 AM	Property damage only (no injury)	2	0	0	Not reported	Not reported	Dark - lighted roadway	Clear		
23	3928143	22-Mar-2014	1:20 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Cloudy		
24	3928151	10-May-2014	3:41 AM	Non-fatal injury	1	1	0	Single vehicle crash	Dry	Dark - roadway not lighted	Cloudy		
25	4003338	26-Nov-2014	11:56 AM	Property damage only (no injury)	2	0	0	Angle	Wet	Daylight	Rain/Cloudy		
26	4003336	24-Nov-2014	9:33 AM	Non-fatal injury	2	1	0	Angle	Wet	Daylight	Rain/Cloudy		
	2949659	27-Jun-2011	7:02 PM	Non-fatal injury	2	2	0	Rear-end	Dry	Daylight	Clear		
	2949639	15-Apr-2011	10:23 AM	Non-fatal injury	2	1	0	Sideswipe, same direction	Dry	Daylight	Clear/Clear		
	2949594	15-Dec-2011	3:30 PM	Property damage only (no injury)	2	0	0	Angle	Wet	Daylight	Cloudy		
	2949635	27-Mar-2011	6:55 AM	Non-fatal injury	1	1	0	Single vehicle crash	Dry	Dawn	Clear		
	2949703	28-Oct-2011	4:56 PM	Property damage only (no injury)	3	0	0	Rear-end	Dry	Daylight	Clear		
	2949555	30-Apr-2011	12:58 PM	Non-fatal injury	1	1	0	Single vehicle crash	Dry	Daylight	Cloudy	P2:Pedestrian	ped
	2949597	23-Dec-2011	3:54 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Dusk	Cloudy		
	3348276	08-Oct-2011	4:19 PM	Property damage only (no injury)	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
	2949588	15-Nov-2011	7:18 PM	Non-fatal injury	2	2	0	Angle	Dry	Dark - lighted roadway	Cloudy		
	2949721	23-Dec-2011	3:08 PM	Non-fatal injury	2	2	0	Rear-end	Dry	Daylight	Clear/Clear		
	2949646	21-May-2011	1:26 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	3340612	28-Sep-2012	5:38 PM	Non-fatal injury	2	2	0	Rear-end	Wet	Dusk	Rain/Cloudy		
	3340617	06-Dec-2012	5:41 PM	Unknown	2	0	0	Sideswipe, same direction	Dry	Dark - lighted roadway	Clear		
	3340596	01-Aug-2012	9:01 AM	Not Reported	2	0	0	Not reported	Not reported	Not reported	Not Reported		
	3340601	15-Aug-2012	10:26 AM	Not Reported	2	0	0	Rear-end	Wet	Daylight	Cloudy		
	3340857	09-Aug-2012	7:27 AM	Non-fatal injury	3	2	0	Sideswipe, opposite direction	Dry	Daylight	Clear		
	3340600	11-Aug-2012	10:34 AM	Non-fatal injury	2	6	0	Rear-end	Dry	Daylight	Clear		
	3590787	26-Jul-2013	3:10 PM	Non-fatal injury	2	1	0	Rear-end	Wet	Daylight	Cloudy/Rain		

**Crash Cluster 7  
2011 to 2014**

Collision Number	Crash Number	Crash Date1	Crash Time1	Crash Severity	Number of Vehicles	Total Nonfatal Injury	Total Fatal Injury	Manner of Collision	Road Surface	Ambient Light Conditions	Weather Conditions	Non Motorist Crash	Bike_Ped
	3591133	20-Aug-2013	2:36 PM	Non-fatal injury	2	3	0	Angle	Dry	Daylight	Clear/Clear		
	3481865	26-May-2013	3:15 PM	Non-fatal injury	3	2	0	Rear-end	Dry	Daylight	Clear		
	3391557	22-Mar-2013	1:36 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	3590763	09-Jun-2013	11:11 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		
	4003335	22-Nov-2014	6:31 PM	Non-fatal injury	2	1	0	Rear-end	Dry	Dark - lighted roadway	Clear		
	4003309	23-Sep-2014	9:31 AM	Property damage only (no injury)	2	0	0	Rear-end	Dry	Daylight	Clear/Clear		
	3928098	25-Aug-2014	9:58 AM	Non-fatal injury	2	1	0	Rear-end	Dry	Daylight	Clear		

## **Crash Rate Worksheets**

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Swampscott COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

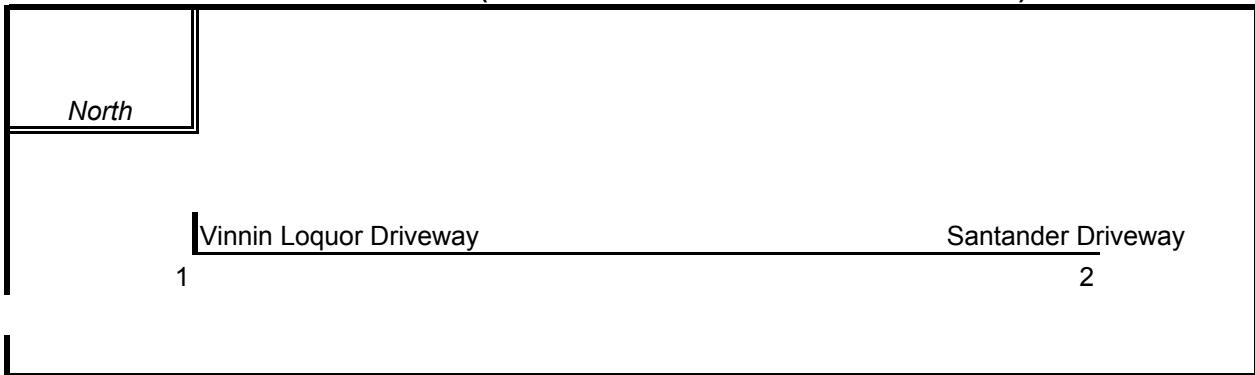
ROADWAY NAME: Route 1A (Cluster 1)

START POINT: Vinnin Liquor/Whole Foods Driveway

END POINT: Santander Driveway

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ):	0.35
AVERAGE DAILY TRAFFIC VOLUME ( V ):	19,500

TOTAL # OF CRASHES:	73	# OF YEARS :	4	AVERAGE # OF CRASHES PER YEAR ( A ):	18.25
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CRASH RATE CALCULATION :

**7.33**

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Salem/Swampscott COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

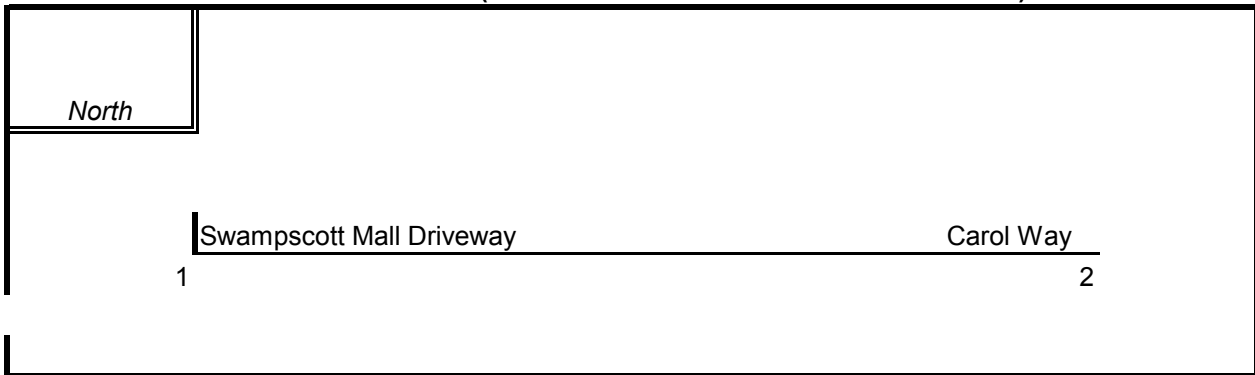
ROADWAY NAME: Essex Street (Cluster 2)

START POINT: Swampscott Mall Driveway

END POINT: Carol Way

FUNCTIONAL CLASSIFICATION OF ROADWAY: Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ):	<b>0.3</b>
AVERAGE DAILY TRAFFIC VOLUME ( V ):	16,900

TOTAL # OF CRASHES:	<b>22</b>	# OF YEARS :	<b>4</b>	AVERAGE # OF CRASHES PER YEAR ( A ):	<b>5.50</b>
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CRASH RATE CALCULATION :

**2.97**

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Salem/Swampscott COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

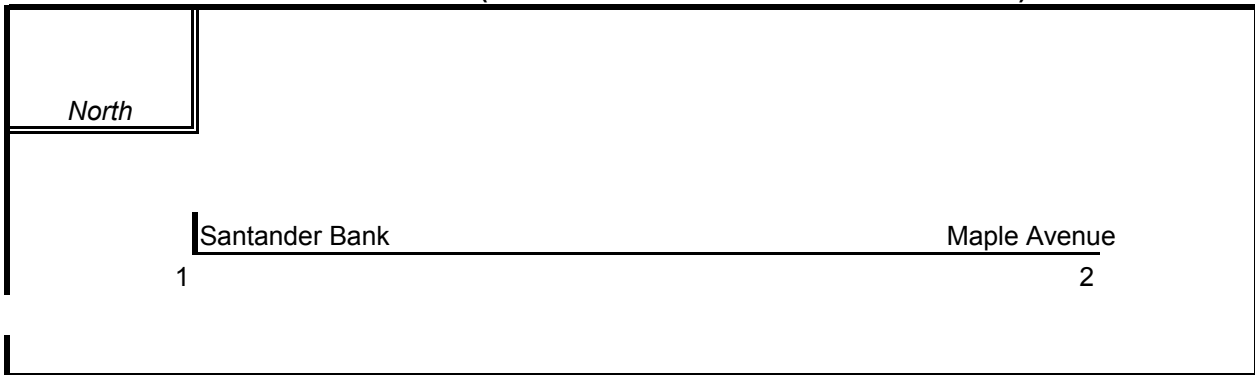
ROADWAY NAME: Vinnin Square (Cluster 3)

START POINT: Santander Bank

END POINT: Maple Avenue

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ):	0.6
AVERAGE DAILY TRAFFIC VOLUME ( V ):	19,500

TOTAL # OF CRASHES:	74	# OF YEARS :	4	AVERAGE # OF CRASHES PER YEAR ( A ):	18.50
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CRASH RATE CALCULATION :

**4.33**

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Marblehead COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

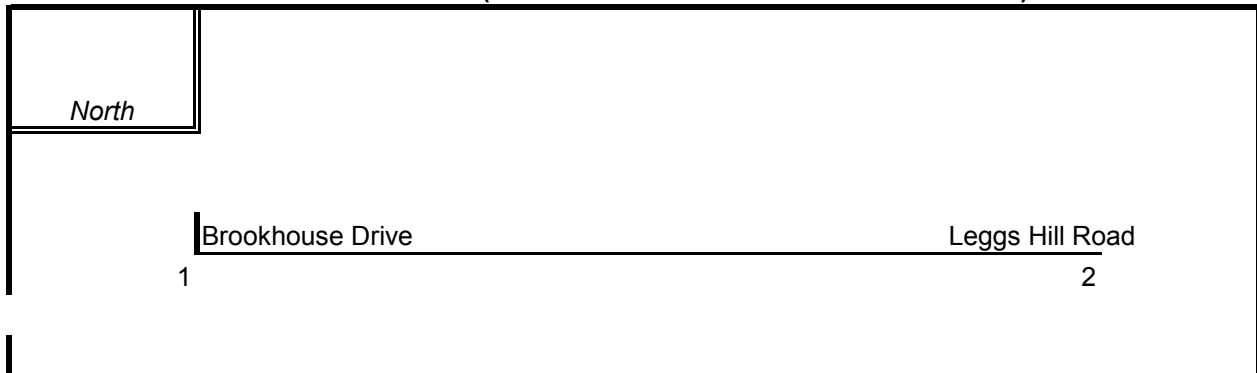
ROADWAY NAME: Tedesco Street(Cluster 4)

START POINT: Brookhouse Drive

END POINT: leggs Hill Road

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): 0.23

AVERAGE DAILY TRAFFIC VOLUME ( V ): 15,000

TOTAL # OF CRASHES: 17 # OF YEARS : 4 AVERAGE # OF CRASHES PER YEAR ( A ): 4.25

CRASH RATE CALCULATION :

3.38

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Salem COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

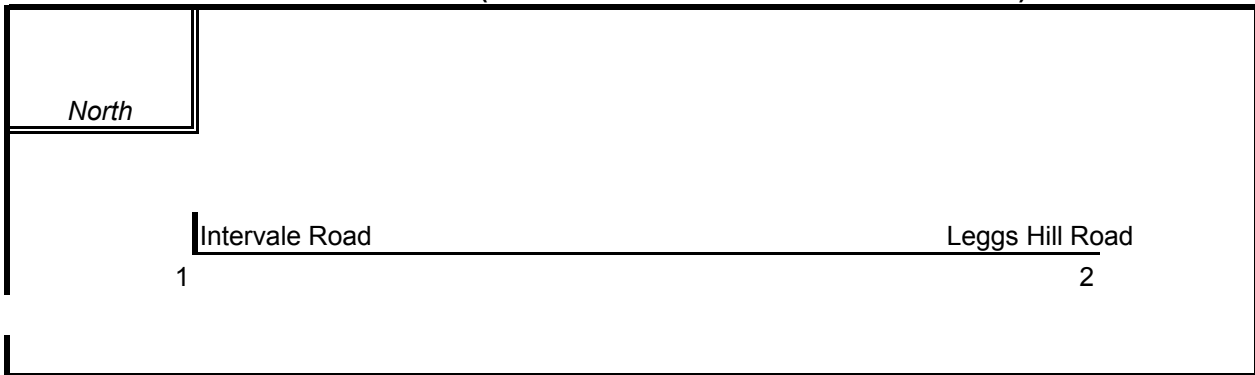
ROADWAY NAME: Route 1A-Loring Avenue (Cluster 5)

START POINT: Intervale Road

END POINT: Leggs Hill Road

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): 0.35

AVERAGE DAILY TRAFFIC VOLUME ( V ): 19,000

TOTAL # OF CRASHES: 25 # OF YEARS : 4 AVERAGE # OF CRASHES PER YEAR ( A ): 6.25

CRASH RATE CALCULATION :

2.57

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study



## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Salem COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

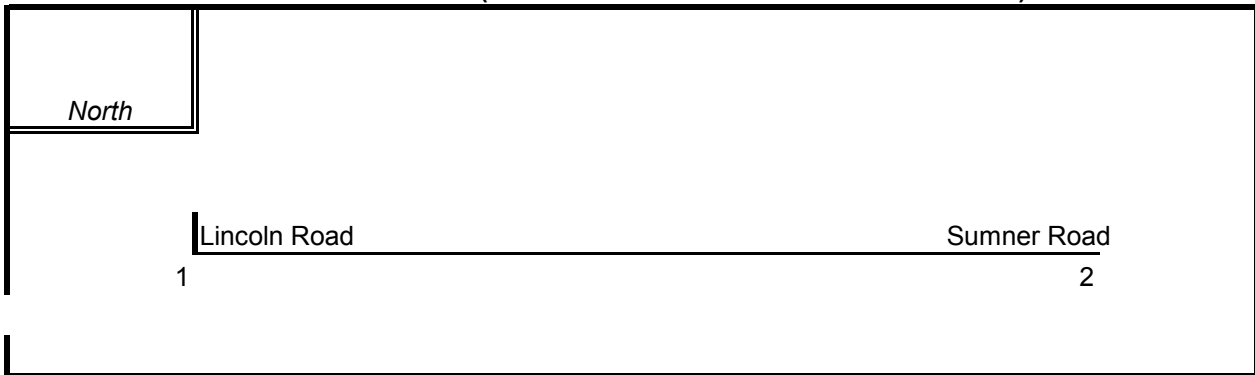
ROADWAY NAME: Route 1A-Loring Avenue (Cluster 6)

START POINT: Lincoln Road

END POINT: Sumner Road

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ):	<b>0.4</b>
AVERAGE DAILY TRAFFIC VOLUME ( V ):	19,000

TOTAL # OF CRASHES:	<b>68</b>	# OF YEARS :	<b>4</b>	AVERAGE # OF CRASHES PER YEAR ( A ):	<b>17.00</b>
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CRASH RATE CALCULATION :

**6.13**

$$\text{RATE} = \frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

## SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Swampscott COUNT DATE : May-16

DISTRICT : 4

~ SEGMENT DATA ~

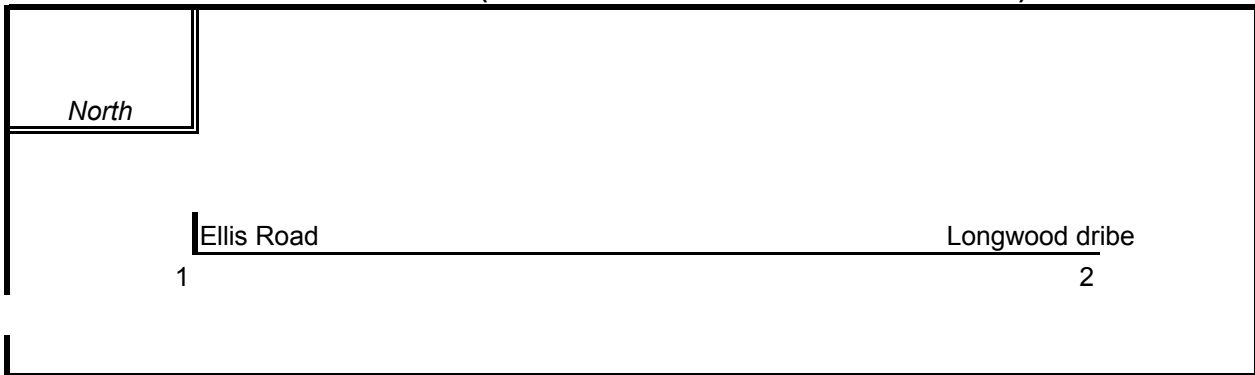
ROADWAY NAME: Route 1A (Cluster 7)

START POINT: Ellis Road

END POINT: Longwood Drive

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): 0.85

AVERAGE DAILY TRAFFIC VOLUME ( V ): 19,500

TOTAL # OF CRASHES: 51 # OF YEARS : 4 AVERAGE # OF CRASHES PER YEAR ( A ): 12.75

CRASH RATE CALCULATION :

2.11

RATE = 
$$\frac{(A * 1,000,000)}{(L * V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: Route 1A Vinnin Square Priority Corridor Study

# **APPENDIX F**

**Level of Service (LOS) Analysis  
Existing Conditions**



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Future Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Satd. Flow (prot)	0	1761	0	0	1754	0	0	1793	0	0	1790	0
Flt Permitted		0.869			0.901			0.993			0.997	
Satd. Flow (perm)	0	1554	0	0	1598	0	0	1783	0	0	1784	0
Satd. Flow (RTOR)		3			7			2			4	
Lane Group Flow (vph)	0	77	0	0	72	0	0	472	0	0	763	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	16.0	16.0		16.0	16.0		36.0	36.0		36.0	36.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		8.4			8.3			37.0			37.0	
Actuated g/C Ratio		0.15			0.15			0.68			0.68	
v/c Ratio		0.32			0.29			0.39			0.63	
Control Delay		29.3			27.5			13.1			19.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		29.3			27.5			13.1			19.7	
LOS		C			C			B			B	
Approach Delay		29.3			27.5			13.1			19.7	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		20			17			61			126	
Queue Length 95th (ft)		71			65			275			#610	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		320			332			1214			1216	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.24			0.22			0.39			0.63	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 54.3  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 18.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 55.3%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Road & Ellis Rd

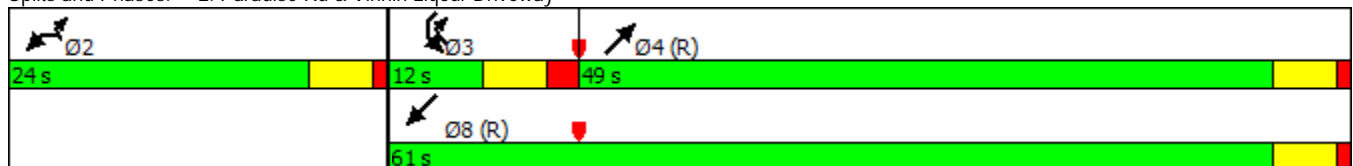


Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	11	28	698	3	37	876
Future Volume (vph)	11	28	698	3	37	876
Satd. Flow (prot)	1496	1338	1510	0	1496	1511
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1450	1338	1510	0	1484	1511
Satd. Flow (RTOR)						
Lane Group Flow (vph)	11	29	723	0	38	903
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases						
Total Split (s)	24.0		49.0		12.0	61.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	19.0	31.0	48.8		6.0	56.0
Actuated g/C Ratio	0.22	0.36	0.57		0.07	0.66
v/c Ratio	0.03	0.06	0.83		0.36	0.91
Control Delay	26.3	18.1	27.8		48.4	19.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	26.3	18.1	27.8		48.4	19.4
LOS	C	B	C		D	B
Approach Delay	20.4		27.8			20.6
Approach LOS	C		C			C
Queue Length 50th (ft)	5	10	337		23	139
Queue Length 95th (ft)	18	28	#584		m28	#677
Internal Link Dist (ft)	133		711			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	334	487	866		105	995
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.03	0.06	0.83		0.36	0.91

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 78 (92%), Referenced to phase 4:NET and 8:SWT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 23.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 2: Paradise Rd & Vinnin Liqour Driveway**



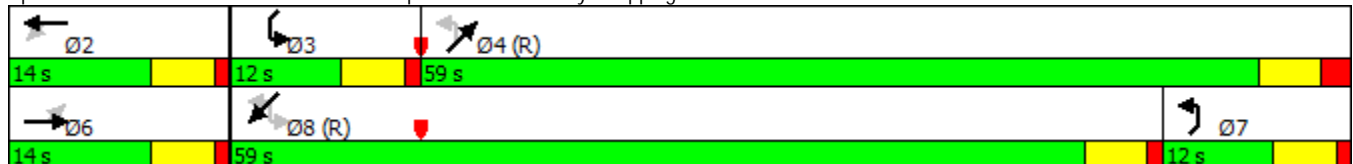


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Future Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Satd. Flow (prot)	1496	1282	0	1496	1485	0	1496	1507	0	1496	1511	1338
Flt Permitted	0.720			0.695			0.261			0.293		
Satd. Flow (perm)	1084	1282	0	1049	1485	0	409	1507	0	459	1511	1277
Satd. Flow (RTOR)												
Lane Group Flow (vph)	72	95	0	60	57	0	76	663	0	23	823	152
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	14.0	14.0		14.0	14.0		12.0	59.0		12.0	59.0	59.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	8.6	8.6		8.6	8.6		61.8	60.8		56.8	56.8	56.8
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.73	0.72		0.67	0.67	0.67
v/c Ratio	0.66	0.74		0.57	0.38		0.20	0.62		0.06	0.82	0.18
Control Delay	66.1	69.8		58.0	43.2		1.3	3.5		6.1	20.4	6.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	66.1	69.8		58.0	43.2		1.3	3.5		6.1	20.4	6.8
LOS	E	E		E	D		A	A		A	C	A
Approach Delay		68.2			50.8			3.3			18.0	
Approach LOS		E			D			A			B	
Queue Length 50th (ft)	38	50		31	29		1	15		4	314	30
Queue Length 95th (ft)	#101	#125		#83	66		m2	m25		12	#605	56
Internal Link Dist (ft)		1622			222			783			407	
Turn Bay Length (ft)	150						500			150		
Base Capacity (vph)	114	135		111	157		386	1077		392	1009	853
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.63	0.70		0.54	0.36		0.20	0.62		0.06	0.82	0.18

Intersection Summary

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 73.5%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Future Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Satd. Flow (prot)	1496	1535	0	1417	1491	1338	0	2979	1285	0	2318	0
Flt Permitted	0.485			0.235				0.886			0.779	
Satd. Flow (perm)	764	1535	0	350	1491	1300	0	2650	1248	0	1820	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	26	364	0	337	423	74	0	445	195	0	504	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	36.0	36.0		12.0	48.0	48.0	40.0	40.0	40.0	12.0	52.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	27.4	27.4		39.4	39.4	39.4		35.0	35.0		50.6	
Actuated g/C Ratio	0.27	0.27		0.39	0.39	0.39		0.35	0.35		0.51	
v/c Ratio	0.12	0.87		1.59	0.72	0.14		0.48	0.45		0.52	
Control Delay	23.5	48.3		301.1	27.7	17.6		27.5	29.1		12.8	
Queue Delay	0.0	0.0		0.0	11.7	0.0		0.0	0.0		0.0	
Total Delay	23.5	48.3		301.1	39.4	17.6		27.5	29.1		12.8	
LOS	C	D		F	D	B		C	C		B	
Approach Delay		46.6			143.2			28.0			12.8	
Approach LOS		D			F			C			B	
Queue Length 50th (ft)	15	238		-248	172	23		115	95		46	
Queue Length 95th (ft)	m18	m310		m#450	m291	m39		163	162		82	
Internal Link Dist (ft)		529			213			331			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	236	475		212	641	559		927	436		973	
Starvation Cap Reductn	0	0		0	193	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.11	0.77		1.59	0.94	0.13		0.48	0.45		0.52	

Intersection Summary

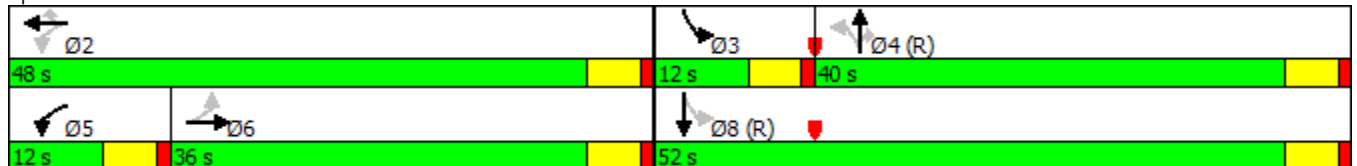
Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.59  
 Intersection Signal Delay: 68.4  
 Intersection LOS: E  
 Intersection Capacity Utilization 93.5%  
 ICU Level of Service F  
 Analysis Period (min) 15

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Paradise Rd & Vinnin St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	263	25	9	499	456	198
Future Volume (vph)	263	25	9	499	456	198
Satd. Flow (prot)	1133	1056	1496	1511	1511	1338
Flt Permitted	0.950		0.335			
Satd. Flow (perm)	1133	1017	527	1511	1511	1270
Satd. Flow (RTOR)						
Lane Group Flow (vph)	271	26	9	514	470	204
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	29.0	29.0	16.0	71.0	55.0	55.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	24.0	24.0	66.0	66.0	50.0	50.0
Actuated g/C Ratio	0.24	0.24	0.66	0.66	0.50	0.50
v/c Ratio	1.00	0.11	0.02	0.52	0.62	0.32
Control Delay	71.6	13.4	3.9	10.7	22.7	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.6	13.4	3.9	10.7	22.7	16.7
LOS	E	B	A	B	C	B
Approach Delay	66.5			10.6	20.9	
Approach LOS	E			B	C	
Queue Length 50th (ft)	188	17	1	91	208	74
Queue Length 95th (ft)	m#266	m12	m3	131	318	126
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	271	244	454	997	755	635
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.11	0.02	0.52	0.62	0.32

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 93 (93%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.00  
 Intersection Signal Delay: 26.3      Intersection LOS: C  
 Intersection Capacity Utilization 58.0%      ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
     Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 5: Paradise Rd & Loring Ave**





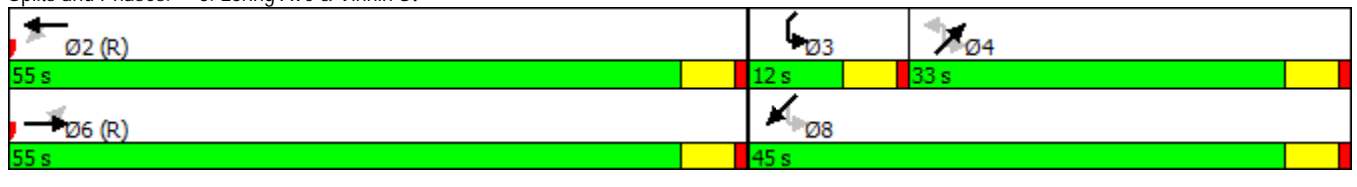


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Future Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Satd. Flow (prot)	0	1362	0	1170	1005	0	1481	1497	1326	1481	1495	0
Flt Permitted		0.968		0.754			0.608			0.242		
Satd. Flow (perm)	0	1345	0	928	1005	0	948	1497	1263	377	1495	0
Satd. Flow (RTOR)									*200			
Lane Group Flow (vph)	0	5	0	543	27	0	2	370	407	17	243	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	55.0	55.0		55.0	55.0		33.0	33.0	33.0	12.0	45.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		56.8		56.8	56.8		28.5	28.5	28.5	33.2	33.2	
Actuated g/C Ratio		0.57		0.57	0.57		0.28	0.28	0.28	0.33	0.33	
v/c Ratio		0.01		1.03	0.05		0.01	0.87	0.81	0.09	0.49	
Control Delay		12.2		61.2	4.5		26.0	55.7	30.6	14.4	19.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		12.2		61.2	4.5		26.0	55.7	30.6	14.4	19.6	
LOS		B		E	A		C	E	C	B	B	
Approach Delay		12.3			58.5			42.5			19.3	
Approach LOS		B			E			D			B	
Queue Length 50th (ft)		1		-185	3		1	207	116	4	61	
Queue Length 95th (ft)		7		#532	m5		6	#326	205	9	65	
Internal Link Dist (ft)		69			529			662			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		763		526	570		279	440	512	202	598	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		1.03	0.05		0.01	0.84	0.79	0.08	0.41	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 45 (45%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 44.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 66.9%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St

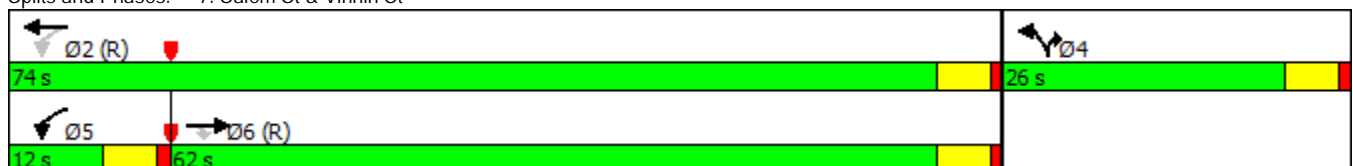


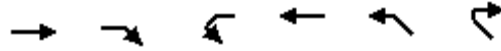
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↕	↖	↗
Traffic Volume (vph)	423	151	63	654	145	68
Future Volume (vph)	423	151	63	654	145	68
Satd. Flow (prot)	1231	1046	0	1522	1192	1024
Flt Permitted				0.870	0.950	
Satd. Flow (perm)	1231	994	0	1328	1175	1024
Satd. Flow (RTOR)						
Lane Group Flow (vph)	436	156	0	739	149	70
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	62.0	62.0	12.0	74.0	26.0	26.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	73.2	73.2		73.2	16.8	16.8
Actuated g/C Ratio	0.73	0.73		0.73	0.17	0.17
v/c Ratio	0.48	0.21		0.76	0.74	0.41
Control Delay	11.4	8.9		16.0	61.1	43.0
Queue Delay	1.4	0.6		0.3	0.4	0.0
Total Delay	12.7	9.5		16.3	61.5	43.0
LOS	B	A		B	E	D
Approach Delay	11.9			16.3	55.6	
Approach LOS	B			B	E	
Queue Length 50th (ft)	129	43		132	90	40
Queue Length 95th (ft)	m166	m65		261	154	81
Internal Link Dist (ft)	213			312	357	
Turn Bay Length (ft)						150
Base Capacity (vph)	901	727		972	250	215
Starvation Cap Reductn	272	318		0	0	0
Spillback Cap Reductn	0	0		27	8	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.69	0.38		0.78	0.62	0.33

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 50 (50%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 20.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 97.2%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



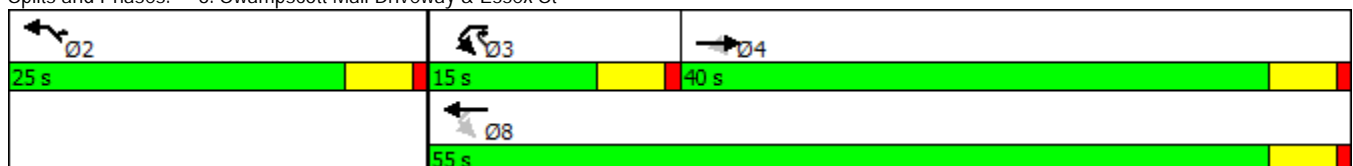


Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (vph)	621	149	44	666	203	22
Future Volume (vph)	621	149	44	666	203	22
Satd. Flow (prot)	1589	1297	1510	1526	1510	1351
Flt Permitted			0.209		0.950	
Satd. Flow (perm)	1589	1237	332	1526	1510	1351
Satd. Flow (RTOR)						
Lane Group Flow (vph)	647	155	46	694	211	23
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	40.0	40.0	15.0	55.0	25.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	31.5	31.5	37.4	37.4	14.2	26.6
Actuated g/C Ratio	0.50	0.50	0.60	0.60	0.23	0.43
v/c Ratio	0.81	0.25	0.14	0.76	0.62	0.04
Control Delay	25.7	12.7	6.4	15.9	33.0	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	12.7	6.4	15.9	33.0	14.5
LOS	C	B	A	B	C	B
Approach Delay	23.2			15.3	31.2	
Approach LOS	C			B	C	
Queue Length 50th (ft)	229	37	6	169	86	6
Queue Length 95th (ft)	#491	85	20	353	161	21
Internal Link Dist (ft)	1242			517	1622	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	973	758	403	1219	523	648
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.20	0.11	0.57	0.40	0.04

**Intersection Summary**

Cycle Length: 80  
 Actuated Cycle Length: 62.5  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 21.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.5%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St





Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↑	↑	↑	↑	↑	
Traffic Volume (vph)	680	120	37	900	15	15	
Future Volume (vph)	680	120	37	900	15	15	
Satd. Flow (prot)	1731	1471	1678	1731	1542	0	
Flt Permitted			0.298		0.976		
Satd. Flow (perm)	1731	1422	525	1731	1507	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	739	130	40	978	32	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	50.0	50.0	50.0	50.0	15.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	52.6	52.6	52.6	52.6	9.0		
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.14		
v/c Ratio	0.53	0.11	0.10	0.70	0.15		
Control Delay	13.1	8.4	10.1	18.2	34.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.2	8.4	10.1	18.2	34.5		
LOS	B	A	B	B	C		
Approach Delay	12.4			17.9	34.5		
Approach LOS	B			B	C		
Queue Length 50th (ft)	0	0	0	0	8		
Queue Length 95th (ft)	#580	72	31	#883	45		
Internal Link Dist (ft)	497			268	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1388	1140	421	1388	254		
Starvation Cap Reductn	16	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.54	0.11	0.10	0.70	0.13		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 65.6  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 15.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.4%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave

Ø2 50 s	Ø4 15 s	Ø9 25 s
Ø6 50 s		

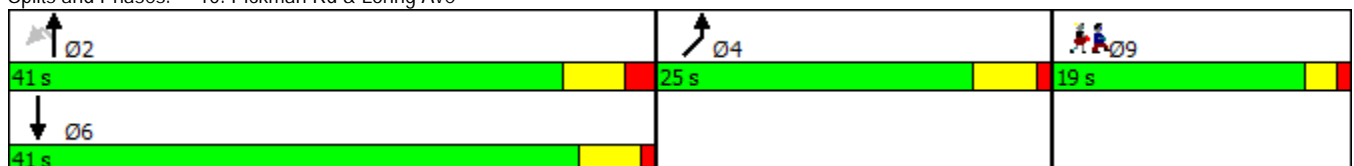


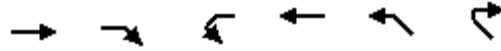
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	5	939	810	12	36	11	
Future Volume (vph)	5	939	810	12	36	11	
Satd. Flow (prot)	0	1731	1726	0	1630	0	
Flt Permitted		0.996			0.963		
Satd. Flow (perm)	0	1724	1726	0	1630	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	1026	893	0	51	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	41.0	41.0	41.0		25.0		19.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		46.2	46.8		7.7		
Actuated g/C Ratio		0.76	0.77		0.13		
v/c Ratio		0.78	0.67		0.25		
Control Delay		18.1	13.7		28.3		
Queue Delay		0.0	0.0		0.0		
Total Delay		18.1	13.7		28.3		
LOS		B	B		C		
Approach Delay		18.1	13.7		28.3		
Approach LOS		B	B		C		
Queue Length 50th (ft)		217	145		18		
Queue Length 95th (ft)		#844	#693		53		
Internal Link Dist (ft)		497	670		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1312	1330		544		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.78	0.67		0.09		

Intersection Summary

Cycle Length: 85  
 Actuated Cycle Length: 60.7  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 67.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave





Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↖	↑	↗	↖
Traffic Volume (veh/h)	785	25	67	628	5	152
Future Volume (Veh/h)	785	25	67	628	5	152
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	818	26	70	654	5	158
Pedestrians	5			5	5	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	914					
pX, platoon unblocked					0.79	
vC, conflicting volume	849			1622	828	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	849			1654	828	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	91			93	57	
cM capacity (veh/h)	776			76	364	

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	818	26	70	654	163
Volume Left	0	0	70	0	5
Volume Right	0	26	0	0	158
cSH	1700	1700	776	1700	327
Volume to Capacity	0.48	0.02	0.09	0.38	0.50
Queue Length 95th (ft)	0	0	7	0	66
Control Delay (s)	0.0	0.0	10.1	0.0	26.5
Lane LOS	B			D	
Approach Delay (s)	0.0			1.0	26.5
Approach LOS				D	

**Intersection Summary**

Average Delay	2.9				
Intersection Capacity Utilization	65.7%		ICU Level of Service	C	
Analysis Period (min)	15				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	162	352	617	174	73	62
Future Volume (Veh/h)	162	352	617	174	73	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	178	387	678	191	80	68
Pedestrians		10	10		10	
Lane Width (ft)		11.0	11.0		11.0	
Walking Speed (ft/s)		3.0	3.0		3.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	879				1536	794
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	879				1536	794
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	76				15	82
cM capacity (veh/h)	753				94	377

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	565	869	148
Volume Left	178	0	80
Volume Right	0	191	68
cSH	753	1700	144
Volume to Capacity	0.24	0.51	1.03
Queue Length 95th (ft)	23	0	192
Control Delay (s)	5.9	0.0	143.7
Lane LOS	A		F
Approach Delay (s)	5.9	0.0	143.7
Approach LOS			F

Intersection Summary			
Average Delay		15.6	
Intersection Capacity Utilization		90.5%	ICU Level of Service E
Analysis Period (min)		15	



Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	88	28	23	428	666	145
Future Volume (Veh/h)	88	28	23	428	666	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	95	30	25	460	716	156
Pedestrians	30			30	30	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	3			3	3	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				706		
pX, platoon unblocked	0.86					
vC, conflicting volume	1364	854	902			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1342	854	902			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	28	91	97			
cM capacity (veh/h)	131	337	731			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	125	485	872			
Volume Left	95	25	0			
Volume Right	30	0	156			
cSH	154	731	1700			
Volume to Capacity	0.81	0.03	0.51			
Queue Length 95th (ft)	132	3	0			
Control Delay (s)	87.9	1.0	0.0			
Lane LOS	F	A				
Approach Delay (s)	87.9	1.0	0.0			
Approach LOS	F					
<b>Intersection Summary</b>						
Average Delay			7.7			
Intersection Capacity Utilization			62.1%	ICU Level of Service	B	
Analysis Period (min)	15					





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	63	193	212	189	52
Future Volume (Veh/h)	8	63	193	212	189	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	68	210	230	205	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						437
pX, platoon unblocked						
vC, conflicting volume	884	234	262			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884	234	262			
tC, single (s)	6.4	6.2	*6.4			
tC, 2 stage (s)						
tF (s)	3.5	3.3	*3.3			
p0 queue free %	96	92	73			
cM capacity (veh/h)	230	806	770			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	77	440	262			
Volume Left	9	210	0			
Volume Right	68	0	57			
cSH	623	770	1700			
Volume to Capacity	0.12	0.27	0.15			
Queue Length 95th (ft)	11	28	0			
Control Delay (s)	11.6	7.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	7.3	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			5.3			
Intersection Capacity Utilization			59.8%	ICU Level of Service	B	
Analysis Period (min)			15			
* User Entered Value						



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Future Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Satd. Flow (prot)	0	1743	0	0	1752	0	0	1795	0	0	1790	0
Flt Permitted					0.963			0.999			0.994	
Satd. Flow (perm)	0	1792	0	0	1694	0	0	1793	0	0	1781	0
Satd. Flow (RTOR)		2			2			2			3	
Lane Group Flow (vph)	0	54	0	0	12	0	0	688	0	0	473	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	16.0	16.0		16.0	16.0		36.0	36.0		36.0	36.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		7.7			7.4			37.3			37.3	
Actuated g/C Ratio		0.17			0.16			0.80			0.80	
v/c Ratio		0.18			0.04			0.48			0.33	
Control Delay		22.7			21.7			11.4			8.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.7			21.7			11.4			8.3	
LOS		C			C			B			A	
Approach Delay		22.7			21.7			11.4			8.3	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		9			2			0			0	
Queue Length 95th (ft)		54			19			#526			275	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		419			397			1435			1425	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.13			0.03			0.48			0.33	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 46.6  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.48  
 Intersection Signal Delay: 10.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 54.3%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Rd & Ellis Rd

Ø2 16 s	Ø4 36 s	Ø9 23 s
Ø6 16 s	Ø8 36 s	

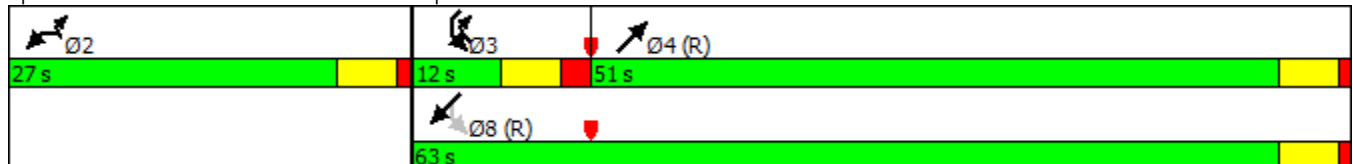


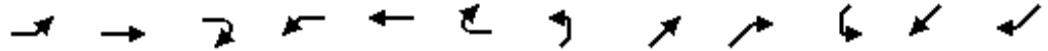
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	99	100	722	23	145	604
Future Volume (vph)	99	100	722	23	145	604
Satd. Flow (prot)	1540	1378	1274	0	1215	1279
Flt Permitted	0.950				0.176	
Satd. Flow (perm)	1540	1378	1274	0	225	1279
Satd. Flow (RTOR)						
Lane Group Flow (vph)	103	104	776	0	151	629
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	27.0		51.0		12.0	63.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	11.3	28.7	51.3		67.7	68.7
Actuated g/C Ratio	0.13	0.32	0.57		0.75	0.76
v/c Ratio	0.53	0.24	1.07		0.52	0.64
Control Delay	46.2	22.7	76.1		14.0	6.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	46.2	22.7	76.1		14.0	6.2
LOS	D	C	E		B	A
Approach Delay	34.4		76.1			7.7
Approach LOS	C		E			A
Queue Length 50th (ft)	56	43	-493		14	56
Queue Length 95th (ft)	101	76	#757		m42	m128
Internal Link Dist (ft)	133		711			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	376	439	726		293	976
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.27	0.24	1.07		0.52	0.64

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 78 (87%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 40.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 86.2%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr**



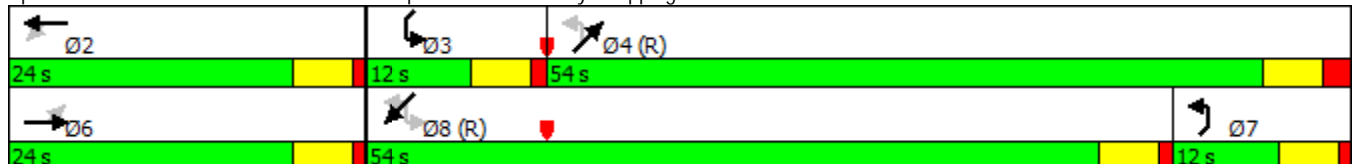


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Future Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Satd. Flow (prot)	1540	1389	0	1540	1550	0	1215	1234	0	1215	1254	1066
Flt Permitted	0.682			0.386			0.450			0.131		
Satd. Flow (perm)	1105	1389	0	626	1550	0	576	1234	0	168	1254	1018
Satd. Flow (RTOR)												
Lane Group Flow (vph)	202	250	0	93	116	0	187	778	0	40	509	148
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	24.0	24.0		24.0	24.0		12.0	54.0		12.0	54.0	54.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	18.2	18.2		18.2	18.2		54.6	53.6		49.8	49.8	49.8
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.61	0.60		0.55	0.55	0.55
v/c Ratio	0.90	0.89		0.73	0.37		0.47	1.06		0.24	0.73	0.26
Control Delay	76.5	67.9		67.4	34.4		7.6	56.3		13.2	23.4	12.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	76.5	67.9		67.4	34.4		7.6	56.3		13.2	23.4	12.4
LOS	E	E		E	C		A	E		B	C	B
Approach Delay		71.8			49.1			46.9			20.5	
Approach LOS		E			D			D			C	
Queue Length 50th (ft)	112	138		49	57		21	-529		10	208	42
Queue Length 95th (ft)	#237	#271		#129	107		m23	m#531		25	350	80
Internal Link Dist (ft)		1630			222			783			390	
Turn Bay Length (ft)	150						500					150
Base Capacity (vph)	233	293		132	327		399	734		173	693	563
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.87	0.85		0.70	0.35		0.47	1.06		0.23	0.73	0.26

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.06  
 Intersection Signal Delay: 44.0 Intersection LOS: D  
 Intersection Capacity Utilization 100.6% ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive**

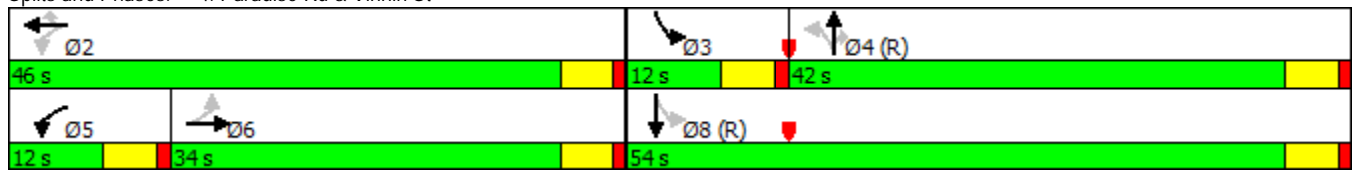


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Future Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Satd. Flow (prot)	1215	1251	0	1215	1279	1088	0	2424	1088	0	2398	0
Flt Permitted	0.563			0.143				0.890			0.664	
Satd. Flow (perm)	720	1251	0	183	1279	1073	0	2163	1069	0	1607	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	12	458	0	228	326	67	0	581	377	0	585	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	34.0	34.0		12.0	46.0	46.0	42.0	42.0	42.0	12.0	54.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	29.0	29.0		41.0	41.0	41.0		37.0	37.0		49.0	
Actuated g/C Ratio	0.29	0.29		0.41	0.41	0.41		0.37	0.37		0.49	
v/c Ratio	0.06	1.27		1.55	0.62	0.15		0.73	0.82		0.69	
Control Delay	21.5	157.9		299.2	26.6	16.2		33.5	37.5		15.5	
Queue Delay	0.0	0.0		0.0	2.7	0.0		0.0	1.4		0.2	
Total Delay	21.5	157.9		299.2	29.3	16.2		33.5	38.9		15.7	
LOS	C	F		F	C	B		C	D		B	
Approach Delay		154.4			127.0			35.6			15.7	
Approach LOS		F			F			D			B	
Queue Length 50th (ft)	6	~380		~155	178	22		165	163		52	
Queue Length 95th (ft)	m7	m#388		#305	276	m43		233	#335		101	
Internal Link Dist (ft)		529			213			1004			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	208	362		147	524	439		800	458		842	
Starvation Cap Reductn	0	0		0	106	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	17		20	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.06	1.27		1.55	0.78	0.15		0.73	0.85		0.71	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.55  
 Intersection Signal Delay: 73.9  
 Intersection LOS: E  
 Intersection Capacity Utilization 110.0%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Paradise Rd & Vinnin St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	287	24	15	573	521	289
Future Volume (vph)	287	24	15	573	521	289
Satd. Flow (prot)	1191	1378	1540	1588	1588	1350
Flt Permitted	0.950		0.272			
Satd. Flow (perm)	1191	1338	441	1588	1588	1286
Satd. Flow (RTOR)						
Lane Group Flow (vph)	315	26	16	630	573	318
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	29.0	29.0	14.0	71.0	57.0	57.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	24.0	24.0	66.0	66.0	52.0	52.0
Actuated g/C Ratio	0.24	0.24	0.66	0.66	0.52	0.52
v/c Ratio	1.11	0.08	0.04	0.60	0.69	0.48
Control Delay	102.9	12.3	4.1	11.6	23.6	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	102.9	12.3	4.1	11.6	23.6	18.3
LOS	F	B	A	B	C	B
Approach Delay	96.0			11.4	21.7	
Approach LOS	F			B	C	
Queue Length 50th (ft)	-240	11	2	71	261	123
Queue Length 95th (ft)	m#359	m13	m4	186	393	199
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	285	321	389	1048	825	668
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.08	0.04	0.60	0.69	0.48

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 93 (93%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.11  
 Intersection Signal Delay: 31.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 64.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave





	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Traffic Volume (vph)	648	197	70	441	121	97
Future Volume (vph)	648	197	70	441	121	97
Satd. Flow (prot)	1588	1378	0	2414	1191	1088
Flt Permitted				0.782	0.950	
Satd. Flow (perm)	1588	1378	0	1901	1191	1088
Satd. Flow (RTOR)						
Lane Group Flow (vph)	682	207	0	538	127	102
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	64.0	64.0	12.0	76.0	24.0	24.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	75.0	75.0		75.0	15.0	15.0
Actuated g/C Ratio	0.75	0.75		0.75	0.15	0.15
v/c Ratio	0.57	0.20		0.38	0.71	0.63
Control Delay	8.8	6.1		5.8	61.1	55.9
Queue Delay	30.4	1.1		0.0	0.0	0.0
Total Delay	39.2	7.2		5.8	61.1	55.9
LOS	D	A		A	E	E
Approach Delay	31.8			5.8	58.8	
Approach LOS	C			A	E	
Queue Length 50th (ft)	201	51		54	77	61
Queue Length 95th (ft)	m210	m53		91	136	114
Internal Link Dist (ft)	213			175	347	
Turn Bay Length (ft)						150
Base Capacity (vph)	1190	1033		1424	226	206
Starvation Cap Reductn	535	612		0	0	0
Spillback Cap Reductn	0	0		27	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	1.04	0.49		0.39	0.56	0.50

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 50 (50%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 27.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 79.8%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



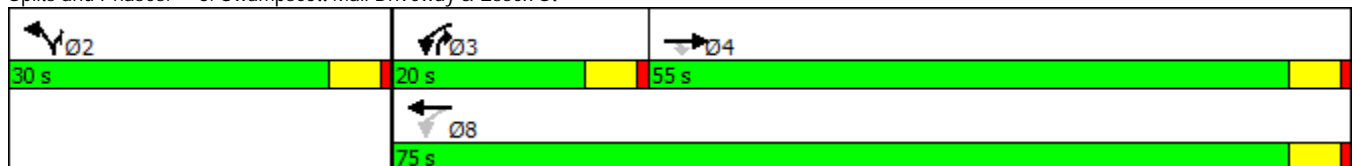


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	693	254	66	631	259	108
Future Volume (vph)	693	254	66	631	259	108
Satd. Flow (prot)	1459	1240	1540	1588	1540	1378
Flt Permitted			0.171		0.950	
Satd. Flow (perm)	1459	1240	277	1588	1540	1378
Satd. Flow (RTOR)						
Lane Group Flow (vph)	745	273	71	678	278	116
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	55.0	55.0	20.0	75.0	30.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	50.2	50.2	62.3	62.3	21.0	33.2
Actuated g/C Ratio	0.54	0.54	0.67	0.67	0.22	0.36
v/c Ratio	0.95	0.41	0.25	0.64	0.80	0.24
Control Delay	45.7	16.3	8.5	13.3	52.4	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.7	16.3	8.5	13.3	52.4	22.1
LOS	D	B	A	B	D	C
Approach Delay	37.8			12.8	43.5	
Approach LOS	D			B	D	
Queue Length 50th (ft)	409	94	14	220	156	48
Queue Length 95th (ft)	#718	171	31	363	#270	88
Internal Link Dist (ft)	1242			509	1630	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	783	665	388	1194	413	598
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.41	0.18	0.57	0.67	0.19

**Intersection Summary**

Cycle Length: 105  
 Actuated Cycle Length: 93.4  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 30.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.0%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St





Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↑↗	↙	↑	↙↗		
Traffic Volume (vph)	972	120	37	826	10	15	
Future Volume (vph)	972	120	37	826	10	15	
Satd. Flow (prot)	1493	1218	1621	1433	1623	0	
Flt Permitted			0.161		0.980		
Satd. Flow (perm)	1493	1182	275	1433	1623	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1057	130	40	898	27	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	55.0	55.0	55.0	55.0	20.0		22.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	55.5	55.5	55.5	55.5	8.5		
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.13		
v/c Ratio	0.83	0.13	0.17	0.73	0.13		
Control Delay	18.1	5.1	8.6	14.2	32.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	18.1	5.1	8.6	14.2	32.2		
LOS	B	A	A	B	C		
Approach Delay	16.7			14.0	32.2		
Approach LOS	B			B	C		
Queue Length 50th (ft)	0	0	0	0	8		
Queue Length 95th (ft)	#1022	67	35	#840	40		
Internal Link Dist (ft)	486			296	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1279	1013	235	1228	390		
Starvation Cap Reductn	2	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.83	0.13	0.17	0.73	0.07		

**Intersection Summary**

Cycle Length: 97  
 Actuated Cycle Length: 64.8  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 15.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 69.0%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave



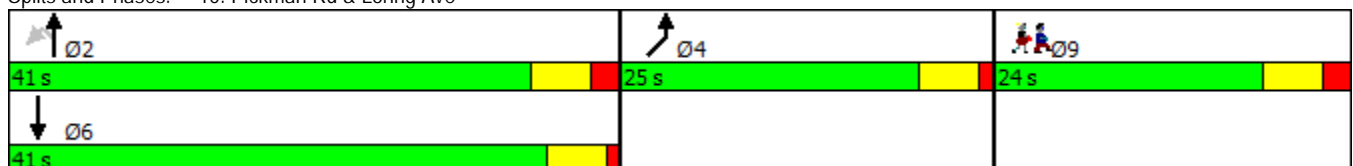


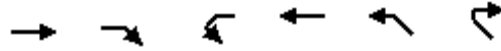
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	14	786	1044	25	22	11	
Future Volume (vph)	14	786	1044	25	22	11	
Satd. Flow (prot)	0	1352	1349	0	1665	0	
Flt Permitted		0.788			0.968		
Satd. Flow (perm)	0	1066	1349	0	1665	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	869	1162	0	36	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	41.0	41.0	41.0		25.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		49.7	50.1		7.0		
Actuated g/C Ratio		0.83	0.83		0.12		
v/c Ratio		0.99	1.04		0.18		
Control Delay		44.2	52.1		28.5		
Queue Delay		0.0	0.0		0.0		
Total Delay		44.2	52.1		28.5		
LOS		D	D		C		
Approach Delay		44.2	52.1		28.5		
Approach LOS		D	D		C		
Queue Length 50th (ft)		0	0		11		
Queue Length 95th (ft)		#853	#1095		42		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		880	1122		561		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.99	1.04		0.06		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 60.2  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 48.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 76.4%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave



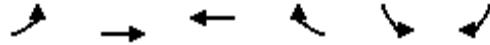


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Volume (veh/h)	774	46	164	823	12	89
Future Volume (Veh/h)	774	46	164	823	12	89
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	798	47	169	848	12	92
Pedestrians	10		10		10	
Lane Width (ft)	11.0		11.0		11.0	
Walking Speed (ft/s)	3.0		3.0		3.0	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked	0.44					
vC, conflicting volume	855					
vC1, stage 1 conf vol	2004					
vC2, stage 2 conf vol	808					
vCu, unblocked vol	855					
iC, single (s)	2633					
iC, 2 stage (s)	808					
tF (s)	4.1					
p0 queue free %	2.2					
cM capacity (veh/h)	3.5					
	78					
	0					
	76					
	777					
	9					
	377					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	798	47	169	848	104
Volume Left	0	0	169	0	12
Volume Right	0	47	0	0	92
cSH	1700	1700	777	1700	65
Volume to Capacity	0.47	0.03	0.22	0.50	1.60
Queue Length 95th (ft)	0	0	21	0	228
Control Delay (s)	0.0	0.0	10.9	0.0	434.2
Lane LOS			B	F	
Approach Delay (s)	0.0	1.8		434.2	
Approach LOS			F		

**Intersection Summary**

Average Delay	23.9				
Intersection Capacity Utilization	66.0%		ICU Level of Service	C	
Analysis Period (min)	15				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	133	534	436	100	112	187
Future Volume (Veh/h)	133	534	436	100	112	187
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	143	574	469	108	120	201
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	577				1383	523
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	577				1383	523
iC, single (s)	4.1				*6.2	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	86				19	64
cM capacity (veh/h)	996				148	554

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	717	577	321
Volume Left	143	0	120
Volume Right	0	108	201
cSH	996	1700	273
Volume to Capacity	0.14	0.34	1.18
Queue Length 95th (ft)	13	0	359
Control Delay (s)	3.4	0.0	150.1
Lane LOS	A		F
Approach Delay (s)	3.4	0.0	150.1
Approach LOS			F

Intersection Summary			
Average Delay		31.4	
Intersection Capacity Utilization		92.2%	ICU Level of Service
Analysis Period (min)		15	F

\* User Entered Value



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	107	83	161	237	86
Future Volume (Veh/h)	73	107	83	161	237	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	116	90	175	258	93
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					427	
pX, platoon unblocked						
vC, conflicting volume	660	304	351			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	304	351			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	84	93			
cM capacity (veh/h)	396	735	1208			
<b>Direction, Lane #</b>						
	EB 1	NB 1	SB 1			
Volume Total	195	265	351			
Volume Left	79	90	0			
Volume Right	116	0	93			
cSH	546	1208	1700			
Volume to Capacity	0.36	0.07	0.21			
Queue Length 95th (ft)	40	6	0			
Control Delay (s)	15.2	3.2	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.2	3.2	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay				4.7		
Intersection Capacity Utilization				51.4%	ICU Level of Service	A
Analysis Period (min)				15		



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Future Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Satd. Flow (prot)	0	1722	0	0	1759	0	0	1801	0	0	1801	0
Flt Permitted											0.999	
Satd. Flow (perm)	0	1777	0	0	1759	0	0	1801	0	0	1799	0
Satd. Flow (RTOR)		3			1							
Lane Group Flow (vph)	0	31	0	0	6	0	0	500	0	0	472	0
Turn Type	Perm	NA			NA			NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	16.0	16.0		16.0	16.0		36.0	36.0		36.0	36.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		7.2			6.9			38.5			38.5	
Actuated g/C Ratio		0.16			0.16			0.88			0.88	
v/c Ratio		0.11			0.02			0.32			0.30	
Control Delay		19.9			20.5			6.7			6.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		19.9			20.5			6.7			6.6	
LOS		B			C			A			A	
Approach Delay		19.9			20.5			6.7			6.6	
Approach LOS		B			C			A			A	
Queue Length 50th (ft)		5			1			0			0	
Queue Length 95th (ft)		36			13			291			270	
Internal Link Dist (ft)		155			218			904			594	
Turn Bay Length (ft)												
Base Capacity (vph)		444			439			1586			1584	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.07			0.01			0.32			0.30	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 43.7  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.32  
 Intersection Signal Delay: 7.2  
 Intersection Capacity Utilization 43.3%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 1: Paradise Rd & Ellis Rd

Ø2 16 s	Ø4 36 s	Ø9 23 s
Ø6 16 s	Ø8 36 s	

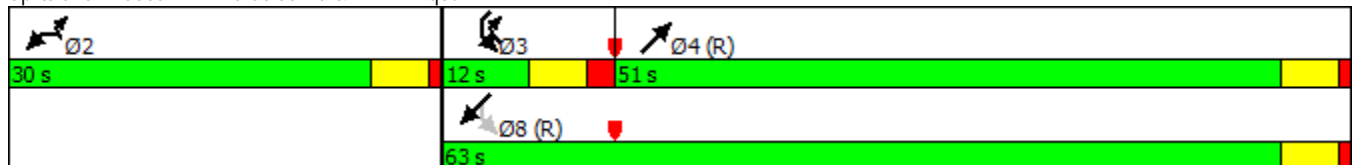


Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	84	195	654	14	182	664
Future Volume (vph)	84	195	654	14	182	664
Satd. Flow (prot)	1296	1160	1349	0	1296	1354
Flt Permitted	0.950				0.187	
Satd. Flow (perm)	1296	1160	1349	0	255	1354
Satd. Flow (RTOR)						
Lane Group Flow (vph)	88	203	696	0	190	692
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	30.0		51.0		12.0	63.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	17.8	34.5	48.5		64.2	65.2
Actuated g/C Ratio	0.19	0.37	0.52		0.69	0.70
v/c Ratio	0.36	0.47	0.99		0.64	0.73
Control Delay	35.0	25.8	56.6		21.1	16.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	35.0	25.8	56.6		21.1	16.1
LOS	C	C	E		C	B
Approach Delay	28.6		56.6			17.1
Approach LOS	C		E			B
Queue Length 50th (ft)	46	85	-448		35	210
Queue Length 95th (ft)	82	150	#662		#133	#548
Internal Link Dist (ft)	133		759			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	348	428	703		296	949
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.25	0.47	0.99		0.64	0.73

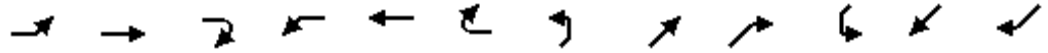
Intersection Summary

Cycle Length: 93  
 Actuated Cycle Length: 93  
 Offset: 78 (84%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 33.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 81.6%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr





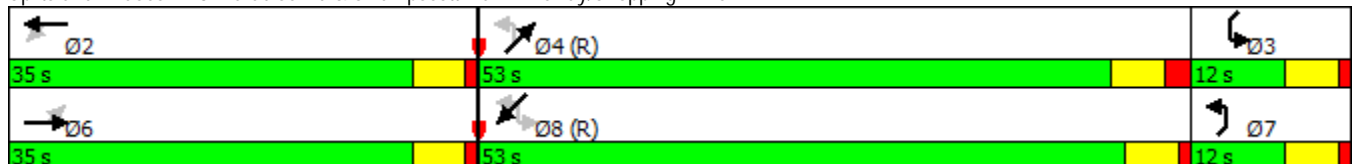


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Future Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Satd. Flow (prot)	1296	1185	0	1296	1313	0	1296	1336	0	1296	1365	1151
Flt Permitted	0.599			0.368			0.304			0.266		
Satd. Flow (perm)	817	1185	0	502	1313	0	415	1336	0	363	1365	1112
Satd. Flow (RTOR)												
Lane Group Flow (vph)	220	317	0	119	168	0	193	598	0	56	539	236
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	35.0	35.0		35.0	35.0		12.0	53.0		12.0	53.0	53.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	28.9	28.9		28.9	28.9		57.1	50.7		56.0	49.4	49.4
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.57	0.51		0.56	0.49	0.49
v/c Ratio	0.93	0.93		0.82	0.44		0.65	0.88		0.21	0.80	0.43
Control Delay	79.8	68.9		74.5	32.9		29.0	41.2		12.5	32.7	19.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	79.8	68.9		74.5	32.9		29.0	41.2		12.5	32.7	19.9
LOS	E	E		E	C		C	D		B	C	B
Approach Delay		73.4			50.1			38.2			27.7	
Approach LOS		E			D			D			C	
Queue Length 50th (ft)	133	191		69	85		54	354		14	285	96
Queue Length 95th (ft)	#275	#355		#172	148		#97	#588		30	#485	163
Internal Link Dist (ft)		1673			222			783			1014	
Turn Bay Length (ft)	150						500			150		150
Base Capacity (vph)	246	357		151	395		299	676		269	674	549
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.89	0.89		0.79	0.43		0.65	0.88		0.21	0.80	0.43

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 43.8 Intersection LOS: D  
 Intersection Capacity Utilization 99.2% ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive

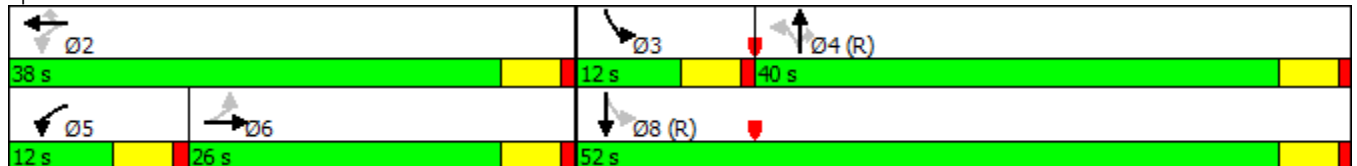


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Future Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Satd. Flow (prot)	1459	1476	0	1459	1523	1305	0	2891	1305	0	2856	0
Flt Permitted	0.533			0.165				0.849			0.732	
Satd. Flow (perm)	818	1476	0	253	1523	1305	0	2467	1305	0	2110	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	23	373	0	294	386	112	0	457	319	0	598	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	26.0	26.0		12.0	38.0	38.0	40.0	40.0	40.0	12.0	52.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	21.0	21.0		33.0	33.0	33.0		35.0	35.0		47.0	
Actuated g/C Ratio	0.23	0.23		0.37	0.37	0.37		0.39	0.39		0.52	
v/c Ratio	0.12	1.08		1.58	0.69	0.23		0.48	0.63		0.52	
Control Delay	20.5	87.8		303.1	26.1	16.8		22.7	29.0		18.8	
Queue Delay	0.0	0.0		0.0	5.3	0.0		0.0	0.0		0.0	
Total Delay	20.5	87.8		303.1	31.4	16.8		22.7	29.0		18.8	
LOS	C	F		F	C	B		C	C		B	
Approach Delay		83.9			130.2			25.3			18.8	
Approach LOS		F			F			C			B	
Queue Length 50th (ft)	12	~250		~196	165	40		100	144		103	
Queue Length 95th (ft)	m16	m#271		m#333	m258	m66		145	238		m158	
Internal Link Dist (ft)		529			213			344			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	190	344		186	558	478		959	507		1159	
Starvation Cap Reductn	0	0		0	116	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.12	1.08		1.58	0.87	0.23		0.48	0.63		0.52	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.58  
 Intersection Signal Delay: 65.3  
 Intersection LOS: E  
 Intersection Capacity Utilization 90.2%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 4: Paradise Rd & Vinnin St**





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	255	32	19	494	529	233
Future Volume (vph)	255	32	19	494	529	233
Satd. Flow (prot)	1286	1151	1296	1354	1365	1160
Flt Permitted	0.950		0.284			
Satd. Flow (perm)	1286	1128	388	1354	1365	1123
Satd. Flow (RTOR)						
Lane Group Flow (vph)	280	35	21	543	581	256
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	23.0	23.0	13.0	67.0	54.0	54.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	18.0	18.0	62.0	62.0	49.0	49.0
Actuated g/C Ratio	0.20	0.20	0.69	0.69	0.54	0.54
v/c Ratio	1.09	0.16	0.06	0.58	0.78	0.42
Control Delay	107.9	22.9	4.8	10.9	25.6	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	107.9	22.9	4.8	10.9	25.6	14.8
LOS	F	C	A	B	C	B
Approach Delay	98.4			10.6	22.3	
Approach LOS	F			B	C	
Queue Length 50th (ft)	-187	21	0	83	246	81
Queue Length 95th (ft)	m#317	m32	m0	115	#411	140
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	257	225	348	932	743	611
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.16	0.06	0.58	0.78	0.42

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 3 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 32.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 63.7%  
 ICU Level of Service B  
 Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave



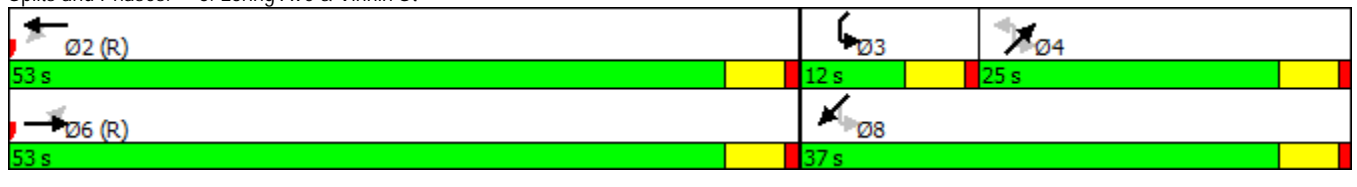


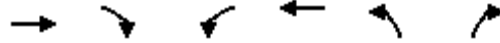
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Future Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Satd. Flow (prot)	0	1543	0	1296	1126	0	1296	1354	1160	1296	1347	0
Flt Permitted		0.968		0.751			0.596			0.356		
Satd. Flow (perm)	0	1517	0	1025	1126	0	813	1354	1123	486	1347	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	0	10	0	415	54	0	5	276	383	48	264	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	53.0	53.0		53.0	53.0		25.0	25.0	25.0	12.0	37.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		48.0		48.0	48.0		24.8	24.8	24.8	32.0	32.0	
Actuated g/C Ratio		0.53		0.53	0.53		0.28	0.28	0.28	0.36	0.36	
v/c Ratio		0.01		0.76	0.09		0.02	0.74	1.01	0.21	0.55	
Control Delay		10.0		15.7	3.3		28.0	46.4	75.8	21.6	24.7	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		10.0		15.7	3.3		28.0	46.4	75.8	21.6	24.7	
LOS		A		B	A		C	D	E	C	C	
Approach Delay		10.0			14.3			63.2			24.2	
Approach LOS		A			B			E			C	
Queue Length 50th (ft)		3		49	4		2	154	-215	12	69	
Queue Length 95th (ft)		10		#114	m7		11	#303	#392	35	133	
Internal Link Dist (ft)		69			529			965			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		809		546	600		224	372	381	235	478	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.76	0.09		0.02	0.74	1.01	0.20	0.55	

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 41 (46%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.01  
 Intersection Signal Delay: 38.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 72.3%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St





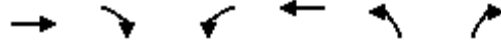
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	↗
Traffic Volume (vph)	505	183	146	527	185	96
Future Volume (vph)	505	183	146	527	185	96
Satd. Flow (prot)	1450	1232	0	2714	1447	1295
Flt Permitted				0.707	0.950	
Satd. Flow (perm)	1450	1193	0	1939	1419	1295
Satd. Flow (RTOR)						
Lane Group Flow (vph)	532	193	0	709	195	101
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	59.0	59.0	12.0	71.0	19.0	19.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	66.3	66.3		66.3	13.7	13.7
Actuated g/C Ratio	0.74	0.74		0.74	0.15	0.15
v/c Ratio	0.50	0.22		0.50	0.89	0.51
Control Delay	7.6	5.9		6.4	76.5	45.1
Queue Delay	2.6	0.8		0.0	0.0	0.0
Total Delay	10.2	6.7		6.4	76.5	45.1
LOS	B	A		A	E	D
Approach Delay	9.3			6.4	65.8	
Approach LOS	A			A	E	
Queue Length 50th (ft)	122	39		73	110	53
Queue Length 95th (ft)	m152	m59		107	#231	105
Internal Link Dist (ft)	213			175	1023	
Turn Bay Length (ft)						150
Base Capacity (vph)	1068	878		1428	225	201
Starvation Cap Reductn	400	437		0	0	0
Spillback Cap Reductn	0	0		45	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.80	0.44		0.51	0.87	0.50

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 50 (56%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 17.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 80.9%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



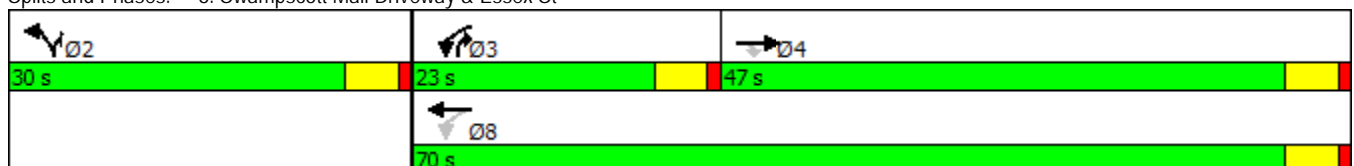


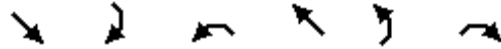
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	535	284	99	575	291	140
Future Volume (vph)	535	284	99	575	291	140
Satd. Flow (prot)	1365	1151	1296	1354	1296	1151
Flt Permitted			0.236		0.950	
Satd. Flow (perm)	1365	1112	322	1354	1296	1151
Satd. Flow (RTOR)						
Lane Group Flow (vph)	575	305	106	618	313	151
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	47.0	47.0	23.0	70.0	30.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	43.1	43.1	56.7	56.7	24.8	38.5
Actuated g/C Ratio	0.47	0.47	0.62	0.62	0.27	0.42
v/c Ratio	0.90	0.58	0.36	0.74	0.89	0.31
Control Delay	41.7	23.5	10.8	18.7	61.8	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	23.5	10.8	18.7	61.8	20.2
LOS	D	C	B	B	E	C
Approach Delay	35.4			17.5	48.3	
Approach LOS	D			B	D	
Queue Length 50th (ft)	294	124	23	229	171	56
Queue Length 95th (ft)	#532	221	44	369	#364	113
Internal Link Dist (ft)	1242			539	1673	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	642	523	391	962	354	590
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.58	0.27	0.64	0.88	0.26

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 91.6  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 32.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 78.2%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St





Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↑	↑	↑	↑		
Traffic Volume (vph)	700	120	37	826	10	15	
Future Volume (vph)	700	120	37	826	10	15	
Satd. Flow (prot)	1801	1531	1711	1801	1623	0	
Flt Permitted			0.284		0.980		
Satd. Flow (perm)	1801	1531	511	1801	1623	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	761	130	40	898	27	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	55.0	55.0	55.0	55.0	20.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	44.2	44.2	44.2	44.2	9.3		
Actuated g/C Ratio	0.85	0.85	0.85	0.85	0.18		
v/c Ratio	0.50	0.10	0.09	0.59	0.09		
Control Delay	7.9	5.0	6.4	9.9	28.8		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	7.9	5.0	6.4	9.9	28.8		
LOS	A	A	A	A	C		
Approach Delay	7.5			9.7	28.8		
Approach LOS	A			A	C		
Queue Length 50th (ft)	0	0	0	0	4		
Queue Length 95th (ft)	481	64	29	#718	40		
Internal Link Dist (ft)	486			296	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1575	1339	447	1575	539		
Starvation Cap Reductn	36	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.49	0.10	0.09	0.57	0.05		

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 52  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 8.9  
 Intersection LOS: A  
 Intersection Capacity Utilization 58.5%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave

Ø2 55 s	Ø4 20 s	Ø9 25 s
Ø6 55 s		

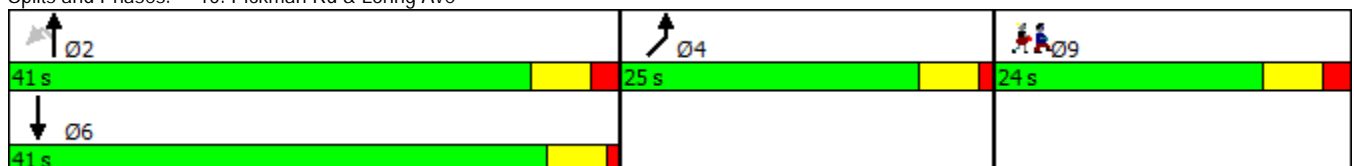


Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	10	826	800	30	35	20	
Future Volume (vph)	10	826	800	30	35	20	
Satd. Flow (prot)	0	1799	1792	0	1658	0	
Flt Permitted		0.988			0.969		
Satd. Flow (perm)	0	1779	1792	0	1658	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	909	903	0	60	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	41.0	41.0	41.0		25.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		45.1	45.7		7.8		
Actuated g/C Ratio		0.75	0.76		0.13		
v/c Ratio		0.68	0.66		0.28		
Control Delay		15.3	14.3		29.0		
Queue Delay		0.0	0.0		0.0		
Total Delay		15.3	14.3		29.0		
LOS		B	B		C		
Approach Delay		15.3	14.3		29.0		
Approach LOS		B	B		C		
Queue Length 50th (ft)		159	143		18		
Queue Length 95th (ft)		#786	#765		63		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1330	1358		563		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.68	0.66		0.11		

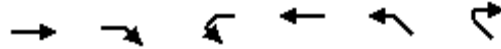
**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 60.3  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.68  
 Intersection Signal Delay: 15.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 65.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave



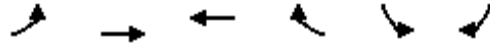




Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	722	23	79	642	16	123
Future Volume (Veh/h)	722	23	79	642	16	123
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	744	24	81	662	16	127
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked					0.79	
vC, conflicting volume			768		1568	744
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			768		1586	744
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		81	69
cM capacity (veh/h)			846		85	415

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	744	24	81	662	143
Volume Left	0	0	81	0	16
Volume Right	0	24	0	0	127
cSH	1700	1700	846	1700	289
Volume to Capacity	0.44	0.01	0.10	0.39	0.49
Queue Length 95th (ft)	0	0	8	0	64
Control Delay (s)	0.0	0.0	9.7	0.0	29.1
Lane LOS			A	D	
Approach Delay (s)	0.0	1.1		29.1	
Approach LOS					D

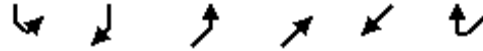
Intersection Summary					
Average Delay			3.0		
Intersection Capacity Utilization			60.9%	ICU Level of Service	B
Analysis Period (min)	15				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	454	620	80	75	51
Future Volume (Veh/h)	60	454	620	80	75	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	65	488	667	86	81	55
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	753				1328	710
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	753				1328	710
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				49	87
cM capacity (veh/h)	857				158	434

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	553	753	136
Volume Left	65	0	81
Volume Right	0	86	55
cSH	857	1700	213
Volume to Capacity	0.08	0.44	0.64
Queue Length 95th (ft)	6	0	95
Control Delay (s)	2.0	0.0	47.8
Lane LOS	A		E
Approach Delay (s)	2.0	0.0	47.8
Approach LOS			E

Intersection Summary			
Average Delay		5.3	
Intersection Capacity Utilization		82.0%	ICU Level of Service D
Analysis Period (min)		15	



Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	51	14	12	447	460	65
Future Volume (Veh/h)	51	14	12	447	460	65
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.93	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	54	15	13	471	484	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				674		
pX, platoon unblocked	0.89					
vC, conflicting volume	1015	518	552			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	956	518	552			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	97	99			
cM capacity (veh/h)	252	558	1018			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	69	484	552			
Volume Left	54	13	0			
Volume Right	15	0	68			
cSH	286	1018	1700			
Volume to Capacity	0.24	0.01	0.32			
Queue Length 95th (ft)	23	1	0			
Control Delay (s)	21.5	0.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	21.5	0.4	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.5			
Intersection Capacity Utilization			43.5%	ICU Level of Service	A	
Analysis Period (min)			15			



**Level of Service (LOS) Analysis  
Alternative 1**



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Future Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Satd. Flow (prot)	0	1759	0	0	1756	0	0	1795	0	0	1790	0
Flt Permitted		0.870			0.899			0.991			0.997	
Satd. Flow (perm)	0	1554	0	0	1596	0	0	1781	0	0	1784	0
Satd. Flow (RTOR)		3			6			2			4	
Lane Group Flow (vph)	0	82	0	0	76	0	0	496	0	0	802	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	12.0	12.0		12.0	12.0		40.0	40.0		40.0	40.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.5			6.5			37.1			37.1	
Actuated g/C Ratio		0.11			0.11			0.64			0.64	
v/c Ratio		0.47			0.41			0.43			0.70	
Control Delay		40.2			36.5			12.1			19.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		40.2			36.5			12.1			19.3	
LOS		D			D			B			B	
Approach Delay		40.2			36.5			12.1			19.3	
Approach LOS		D			D			B			B	
Queue Length 50th (ft)		23			20			57			121	
Queue Length 95th (ft)		#102			#88			264			#604	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		176			184			1130			1132	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.47			0.41			0.44			0.71	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 57.8  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 18.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.6%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Rd & Ellis Rd

12 s	40 s	23 s
12 s	40 s	

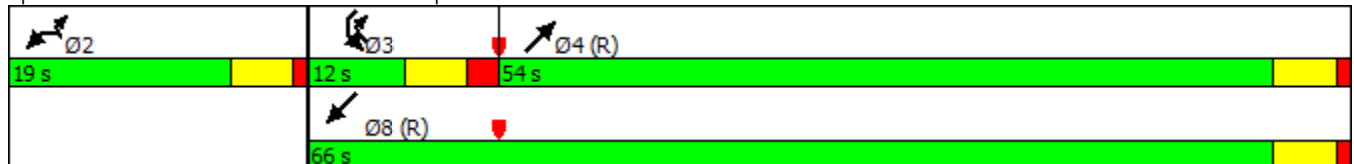


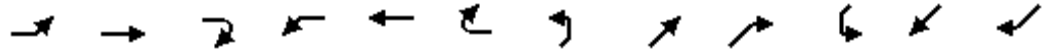
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	11	28	698	3	37	876
Future Volume (vph)	11	28	698	3	37	876
Satd. Flow (prot)	1496	1338	1510	0	1496	1511
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1450	1338	1510	0	1484	1511
Satd. Flow (RTOR)						
Lane Group Flow (vph)	12	30	759	0	40	948
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases						
Total Split (s)	19.0		54.0		12.0	66.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	14.0	26.0	53.8		6.0	61.0
Actuated g/C Ratio	0.16	0.31	0.63		0.07	0.72
v/c Ratio	0.05	0.07	0.79		0.38	0.87
Control Delay	30.7	21.7	21.6		38.8	14.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	30.7	21.7	21.6		38.8	14.5
LOS	C	C	C		D	B
Approach Delay	24.3		21.6			15.5
Approach LOS	C		C			B
Queue Length 50th (ft)	5	11	318		20	204
Queue Length 95th (ft)	20	31	#578		m26	m#651
Internal Link Dist (ft)	133		711			785
Turn Bay Length (ft)					150	
Base Capacity (vph)	246	409	955		105	1084
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.05	0.07	0.79		0.38	0.87

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 4 (5%), Referenced to phase 4:NET and 8:SWT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 18.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 73.8%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Future Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Satd. Flow (prot)	1496	1283	0	1496	1488	0	1496	1508	0	1496	1511	1338
Flt Permitted	0.719			0.692			0.202			0.339		
Satd. Flow (perm)	1083	1283	0	1045	1488	0	317	1508	0	532	1511	1297
Satd. Flow (RTOR)												
Lane Group Flow (vph)	75	100	0	63	59	0	80	696	0	24	864	159
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	14.0	14.0		14.0	14.0		11.0	60.0		11.0	60.0	60.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	8.7	8.7		8.7	8.7		64.3	60.9		62.1	57.5	57.5
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.76	0.72		0.73	0.68	0.68
v/c Ratio	0.68	0.76		0.59	0.39		0.25	0.64		0.05	0.85	0.18
Control Delay	68.0	73.3		60.2	43.4		4.4	8.6		2.6	21.9	6.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	68.0	73.3		60.2	43.4		4.4	8.6		2.6	21.9	6.4
LOS	E	E		E	D		A	A		A	C	A
Approach Delay		71.0			52.1			8.2			19.1	
Approach LOS		E			D			A			B	
Queue Length 50th (ft)	39	53		33	30		9	100		2	337	30
Queue Length 95th (ft)	#106	#133		#87	68		m18	m180		6	#644	56
Internal Link Dist (ft)		1622			228			785			1110	
Turn Bay Length (ft)	150						500			150		150
Base Capacity (vph)	114	135		110	157		322	1080		457	1021	877
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.66	0.74		0.57	0.38		0.25	0.64		0.05	0.85	0.18

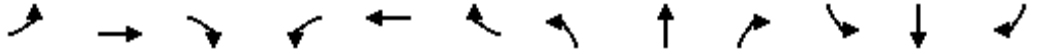
**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 21.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 76.2%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive**

Ø2	Ø3	Ø4 (R)	
14 s	11 s	60 s	
Ø6	Ø7	Ø8 (R)	
14 s	11 s	60 s	



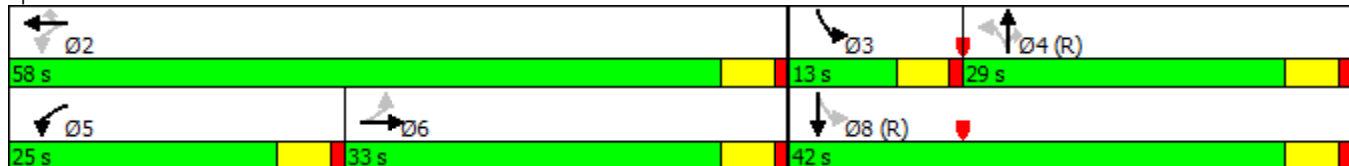


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Future Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Satd. Flow (prot)	1496	1535	0	1181	1243	1338	0	2979	1285	0	2936	0
Flt Permitted	0.506			0.206				0.874			0.685	
Satd. Flow (perm)	797	1535	0	256	1243	1300	0	2614	1248	0	2028	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	27	382	0	354	444	78	0	468	205	0	529	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	33.0	33.0		25.0	58.0	58.0	29.0	29.0	29.0	13.0	42.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	27.0	27.0		52.0	52.0	52.0		24.0	24.0		38.0	
Actuated g/C Ratio	0.27	0.27		0.52	0.52	0.52		0.24	0.24		0.38	
v/c Ratio	0.13	0.92		1.12	0.69	0.12		0.75	0.69		0.62	
Control Delay	17.8	51.7		103.2	24.6	14.9		43.6	47.9		21.9	
Queue Delay	0.0	1.2		0.5	24.1	0.0		0.0	0.0		0.0	
Total Delay	17.8	52.9		103.7	48.6	14.9		43.6	47.9		21.9	
LOS	B	D		F	D	B		D	D		C	
Approach Delay		50.6			67.9			44.9			21.9	
Approach LOS		D			E			D			C	
Queue Length 50th (ft)	15	254		-196	198	26		145	119		63	
Queue Length 95th (ft)	m14	m#388		m#328	m317	m41		205	#215		121	
Internal Link Dist (ft)		529			213			234			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	223	429		317	658	689		627	299		853	
Starvation Cap Reductn	0	0		13	218	0		0	0		0	
Spillback Cap Reductn	0	7		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.12	0.91		1.16	1.01	0.11		0.75	0.69		0.62	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.12  
 Intersection Signal Delay: 49.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 96.8%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Paradise Rd & Vinnin St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	263	25	9	499	456	198
Future Volume (vph)	263	25	9	499	456	198
Satd. Flow (prot)	1496	1338	1496	1574	1574	1338
Flt Permitted	0.950		0.249			
Satd. Flow (perm)	1496	1295	392	1574	1574	1269
Satd. Flow (RTOR)						
Lane Group Flow (vph)	285	27	10	540	494	214
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	31.0	31.0	23.0	69.0	46.0	46.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	22.7	22.7	67.3	67.3	41.0	41.0
Actuated g/C Ratio	0.23	0.23	0.67	0.67	0.41	0.41
v/c Ratio	0.84	0.09	0.02	0.51	0.77	0.41
Control Delay	33.7	21.7	7.8	19.2	34.8	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	21.7	7.8	19.2	34.8	24.0
LOS	C	C	A	B	C	C
Approach Delay	32.6			19.0	31.6	
Approach LOS	C			B	C	
Queue Length 50th (ft)	51	2	1	168	265	95
Queue Length 95th (ft)	m99	m10	m4	281	399	159
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	388	336	498	1058	645	520
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.08	0.02	0.51	0.77	0.41

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 89 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 27.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 56.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave



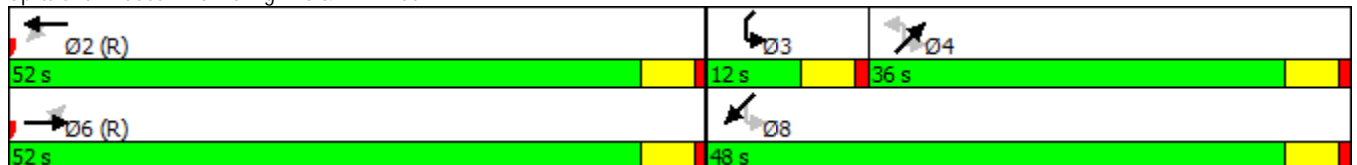


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Future Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Satd. Flow (prot)	0	1381	0	1481	1320	0	1481	1497	1326	1481	1494	0
Flt Permitted		0.961		0.753			0.601			0.237		
Satd. Flow (perm)	0	1355	0	1174	1320	0	937	1497	1326	370	1494	0
Satd. Flow (RTOR)									*200			
Lane Group Flow (vph)	0	7	0	570	28	0	3	389	428	18	256	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	52.0	52.0		52.0	52.0		36.0	36.0	36.0	12.0	48.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		55.4		55.4	55.4		29.9	29.9	29.9	34.6	34.6	
Actuated g/C Ratio		0.55		0.55	0.55		0.30	0.30	0.30	0.35	0.35	
v/c Ratio		0.01		0.88	0.04		0.01	0.87	0.80	0.09	0.50	
Control Delay		13.7		33.4	7.6		24.0	54.1	29.0	5.5	13.3	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		13.7		33.4	7.6		24.0	54.1	29.0	5.5	13.3	
LOS		B		C	A		C	D	C	A	B	
Approach Delay		13.7			32.2			40.9			12.8	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)		2		340	4		1	219	128	2	128	
Queue Length 95th (ft)		9		#518	m11		7	#311	209	m3	77	
Internal Link Dist (ft)		69			529			662			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		750		650	731		296	473	556	205	642	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.88	0.04		0.01	0.82	0.77	0.09	0.40	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 60 (60%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 33.2 Intersection LOS: C  
 Intersection Capacity Utilization 61.9% ICU Level of Service B  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St





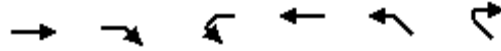
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↖	↗
Traffic Volume (vph)	423	151	63	654	145	68
Future Volume (vph)	423	151	63	654	145	68
Satd. Flow (prot)	1231	1046	0	1522	1192	1024
Flt Permitted				0.866	0.950	
Satd. Flow (perm)	1231	993	0	1323	1177	1024
Satd. Flow (RTOR)						
Lane Group Flow (vph)	458	163	0	776	157	74
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	58.0	58.0	13.0	71.0	29.0	29.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	72.1	72.1		72.1	17.9	17.9
Actuated g/C Ratio	0.72	0.72		0.72	0.18	0.18
v/c Ratio	0.52	0.23		0.81	0.74	0.40
Control Delay	2.6	1.4		20.0	58.0	41.3
Queue Delay	1.1	0.6		0.4	1.1	0.0
Total Delay	3.7	1.9		20.4	59.1	41.3
LOS	A	A		C	E	D
Approach Delay	3.3			20.4	53.4	
Approach LOS	A			C	D	
Queue Length 50th (ft)	7	3		153	95	42
Queue Length 95th (ft)	m19	m7		#357	156	81
Internal Link Dist (ft)	213			312	357	
Turn Bay Length (ft)						150
Base Capacity (vph)	887	715		953	286	245
Starvation Cap Reductn	223	292		0	0	0
Spillback Cap Reductn	0	0		21	31	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.69	0.39		0.83	0.62	0.30

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 75 (75%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 18.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 101.4%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



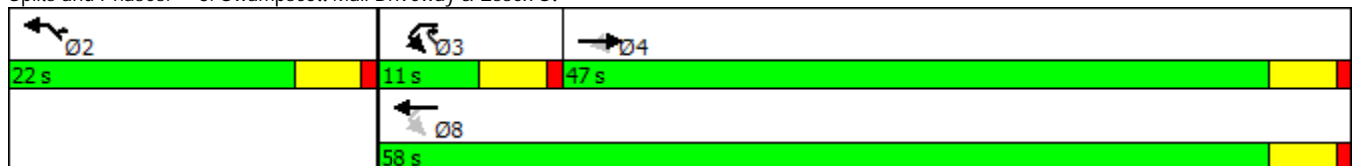


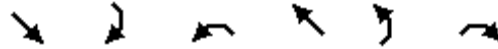
Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (vph)	621	149	44	666	203	22
Future Volume (vph)	621	149	44	666	203	22
Satd. Flow (prot)	1589	1297	1510	1526	1510	1351
Flt Permitted			0.200		0.950	
Satd. Flow (perm)	1589	1238	318	1526	1510	1351
Satd. Flow (RTOR)						
Lane Group Flow (vph)	679	163	48	728	222	24
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	47.0	47.0	11.0	58.0	22.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	33.5	33.5	38.9	38.9	14.4	26.6
Actuated g/C Ratio	0.52	0.52	0.60	0.60	0.22	0.41
v/c Ratio	0.82	0.25	0.15	0.79	0.66	0.04
Control Delay	24.5	11.2	5.8	16.5	37.8	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	11.2	5.8	16.5	37.8	17.4
LOS	C	B	A	B	D	B
Approach Delay	21.9			15.8	35.8	
Approach LOS	C			B	D	
Queue Length 50th (ft)	263	42	7	202	100	8
Queue Length 95th (ft)	#478	78	18	342	#197	24
Internal Link Dist (ft)	1242			517	1622	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	1100	857	316	1221	444	541
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.19	0.15	0.60	0.50	0.04

**Intersection Summary**

Cycle Length: 80  
 Actuated Cycle Length: 64.4  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 21.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 64.1%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St





Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↑	↑	↑	↑	↑	
Traffic Volume (vph)	680	120	37	900	15	15	
Future Volume (vph)	680	120	37	900	15	15	
Satd. Flow (prot)	1695	1501	1678	1695	1542	0	
Flt Permitted			0.277		0.976		
Satd. Flow (perm)	1695	1451	488	1695	1507	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	776	137	42	1027	34	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	50.0	50.0	50.0	50.0	15.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	52.7	52.7	52.7	52.7	9.0		
Actuated g/C Ratio	0.80	0.80	0.80	0.80	0.14		
v/c Ratio	0.57	0.12	0.11	0.76	0.16		
Control Delay	14.3	8.4	10.4	20.0	34.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	14.3	8.4	10.4	20.0	34.5		
LOS	B	A	B	C	C		
Approach Delay	13.4			19.6	34.5		
Approach LOS	B			B	C		
Queue Length 50th (ft)	0	0	0	0	9		
Queue Length 95th (ft)	#640	75	33	#956	47		
Internal Link Dist (ft)	497			268	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1359	1163	391	1359	254		
Starvation Cap Reductn	11	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.58	0.12	0.11	0.76	0.13		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 65.7  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 17.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 64.7%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave

Ø2 50 s	Ø4 15 s	Ø9 25 s
Ø6 50 s		



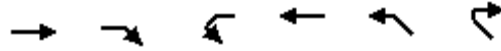
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	5	939	810	12	36	11	
Future Volume (vph)	5	939	810	12	36	11	
Satd. Flow (prot)	0	1731	1727	0	1613	0	
Flt Permitted		0.996			0.963		
Satd. Flow (perm)	0	1724	1727	0	1613	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	1078	938	0	54	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		19.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		57.7	58.3		6.8		
Actuated g/C Ratio		0.77	0.78		0.09		
v/c Ratio		0.81	0.70		0.37		
Control Delay		20.2	14.9		42.2		
Queue Delay		0.7	0.0		0.0		
Total Delay		20.9	14.9		42.2		
LOS		C	B		D		
Approach Delay		20.9	14.9		42.2		
Approach LOS		C	B		D		
Queue Length 50th (ft)		241	157		21		
Queue Length 95th (ft)		#900	#722		65		
Internal Link Dist (ft)		497	670		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1329	1345		152		
Starvation Cap Reductn		66	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.85	0.70		0.36		

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 74.8  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 70.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave



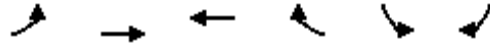


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	785	25	67	628	5	152
Future Volume (Veh/h)	785	25	67	628	5	152
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	859	27	73	687	5	166
Pedestrians	5		5		5	
Lane Width (ft)	11.0		11.0		11.0	
Walking Speed (ft/s)	3.0		3.0		3.0	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	914					
pX, platoon unblocked	0.76					
vC, conflicting volume	891 1702 869					
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	891 1765 869					
tC, single (s)	4.1 6.4 6.2					
tC, 2 stage (s)						
tF (s)	2.2 3.5 3.3					
p0 queue free %	90 92 52					
cM capacity (veh/h)	749 62 345					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	859	27	73	687	171
Volume Left	0	0	73	0	5
Volume Right	0	27	0	0	166
cSH	1700	1700	749	1700	304
Volume to Capacity	0.51	0.02	0.10	0.40	0.56
Queue Length 95th (ft)	0	0	8	0	81
Control Delay (s)	0.0	0.0	10.3	0.0	31.0
Lane LOS			B	D	
Approach Delay (s)	0.0		1.0	31.0	
Approach LOS				D	

Intersection Summary					
Average Delay	3.3				
Intersection Capacity Utilization	68.4%		ICU Level of Service		C
Analysis Period (min)	15				

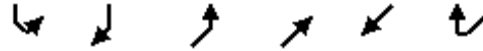




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	162	352	617	174	73	62
Future Volume (Veh/h)	162	352	617	174	73	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	187	406	712	201	84	72
Pedestrians		10	10		10	
Lane Width (ft)		11.0	11.0		11.0	
Walking Speed (ft/s)		3.0	3.0		3.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	923				1612	832
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	923				1612	832
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	74				0	80
cM capacity (veh/h)	724				82	358

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	593	913	156
Volume Left	187	0	84
Volume Right	0	201	72
cSH	724	1700	128
Volume to Capacity	0.26	0.54	1.22
Queue Length 95th (ft)	26	0	240
Control Delay (s)	6.4	0.0	216.6
Lane LOS	A		F
Approach Delay (s)	6.4	0.0	216.6
Approach LOS			F

Intersection Summary			
Average Delay		22.6	
Intersection Capacity Utilization		94.3%	ICU Level of Service
Analysis Period (min)		15	F



Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	88	28	23	428	666	145
Future Volume (Veh/h)	88	28	23	428	666	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	99	32	26	483	752	164
Pedestrians	30			30	30	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	3			3	3	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				706		
pX, platoon unblocked	0.85					
vC, conflicting volume	1429	894	946			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1417	894	946			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	15	90	96			
cM capacity (veh/h)	116	319	703			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	131	509	916			
Volume Left	99	26	0			
Volume Right	32	0	164			
cSH	138	703	1700			
Volume to Capacity	0.95	0.04	0.54			
Queue Length 95th (ft)	165	3	0			
Control Delay (s)	126.5	1.0	0.0			
Lane LOS	F	A				
Approach Delay (s)	126.5	1.0	0.0			
Approach LOS	F					
<b>Intersection Summary</b>						
Average Delay			11.0			
Intersection Capacity Utilization			64.4%	ICU Level of Service	C	
Analysis Period (min)			15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	63	193	212	189	52
Future Volume (Veh/h)	8	63	193	212	189	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	72	220	242	216	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						437
pX, platoon unblocked						
vC, conflicting volume	928	246	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928	246	275			
tC, single (s)	6.4	6.2	*6.4			
tC, 2 stage (s)						
tF (s)	3.5	3.3	*3.3			
p0 queue free %	96	91	71			
cM capacity (veh/h)	211	793	757			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	81	462	275			
Volume Left	9	220	0			
Volume Right	72	0	59			
cSH	607	757	1700			
Volume to Capacity	0.13	0.29	0.16			
Queue Length 95th (ft)	11	30	0			
Control Delay (s)	11.8	7.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.8	7.6	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			5.5			
Intersection Capacity Utilization			51.2%	ICU Level of Service	A	
Analysis Period (min)			15			
* User Entered Value						



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Future Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Satd. Flow (prot)	0	1743	0	0	1752	0	0	1795	0	0	1790	0
Flt Permitted		0.976			0.963			0.999			0.992	
Satd. Flow (perm)	0	1749	0	0	1694	0	0	1793	0	0	1777	0
Satd. Flow (RTOR)		2			2			2			3	
Lane Group Flow (vph)	0	57	0	0	12	0	0	723	0	0	497	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	12.0	12.0		12.0	12.0		40.0	40.0		40.0	40.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.4			6.4			36.1			36.1	
Actuated g/C Ratio		0.13			0.13			0.74			0.74	
v/c Ratio		0.24			0.05			0.54			0.38	
Control Delay		27.1			24.6			11.5			8.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.1			24.6			11.5			8.3	
LOS		C			C			B			A	
Approach Delay		27.1			24.6			11.5			8.3	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		14			3			101			57	
Queue Length 95th (ft)		60			20			#515			264	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		233			226			1345			1333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.24			0.05			0.54			0.37	

**Intersection Summary**

Cycle Length: 75  
 Actuated Cycle Length: 48.7  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.54  
 Intersection Signal Delay: 11.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 56.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Rd & Ellis Rd





Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	99	100	722	23	145	604
Future Volume (vph)	99	100	722	23	145	604
Satd. Flow (prot)	1540	1378	1274	0	1215	1279
Flt Permitted	0.950				0.188	
Satd. Flow (perm)	1540	1378	1274	0	241	1279
Satd. Flow (RTOR)						
Lane Group Flow (vph)	108	109	815	0	159	661
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	19.0		59.0		12.0	71.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	11.1	24.3	55.7		67.9	68.9
Actuated g/C Ratio	0.12	0.27	0.62		0.75	0.77
v/c Ratio	0.57	0.29	1.03		0.61	0.68
Control Delay	48.5	27.8	61.7		15.6	6.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.5	27.8	61.7		15.6	6.5
LOS	D	C	E		B	A
Approach Delay	38.1		61.7			8.2
Approach LOS	D		E			A
Queue Length 50th (ft)	58	48	-517		15	71
Queue Length 95th (ft)	108	92	#740		m40	m144
Internal Link Dist (ft)	133		711			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	239	349	788		260	979
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.45	0.31	1.03		0.61	0.68

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 70 (78%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 35.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 89.8%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr**



Route 1A-Vinnin Square Priority Corridor Study  
 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive

2040 Weekday PM Peak Hour - Alternative 1  
 11/24/2016 5:00 pm

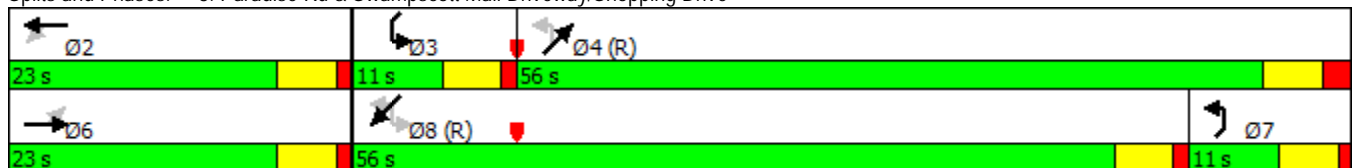


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Future Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Satd. Flow (prot)	1540	1389	0	1540	1552	0	1215	1234	0	1215	1254	1066
Flt Permitted	0.672			0.356			0.427			0.119		
Satd. Flow (perm)	1089	1389	0	577	1552	0	546	1234	0	152	1254	1018
Satd. Flow (RTOR)												
Lane Group Flow (vph)	212	262	0	97	121	0	196	817	0	42	535	156
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	23.0	23.0		23.0	23.0		11.0	56.0		11.0	56.0	56.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	18.0	18.0		18.0	18.0		55.4	54.4		51.0	51.0	51.0
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.62	0.60		0.57	0.57	0.57
v/c Ratio	0.98	0.95		0.84	0.39		0.52	1.10		0.27	0.75	0.27
Control Delay	94.2	79.8		88.3	35.6		8.7	70.0		13.2	23.2	11.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	94.2	79.8		88.3	35.6		8.7	70.0		13.2	23.2	11.5
LOS	F	E		F	D		A	E		B	C	B
Approach Delay		86.2			59.1			58.1			20.2	
Approach LOS		F			E			E			C	
Queue Length 50th (ft)	121	148		53	60		19	-563		10	214	42
Queue Length 95th (ft)	#261	#297		#145	113		m20	m#587		24	361	79
Internal Link Dist (ft)		1630			222			783			1143	
Turn Bay Length (ft)	150						500			150		150
Base Capacity (vph)	217	277		115	310		380	745		157	710	576
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.98	0.95		0.84	0.39		0.52	1.10		0.27	0.75	0.27

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.10  
 Intersection Signal Delay: 52.3 Intersection LOS: D  
 Intersection Capacity Utilization 104.5% ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive

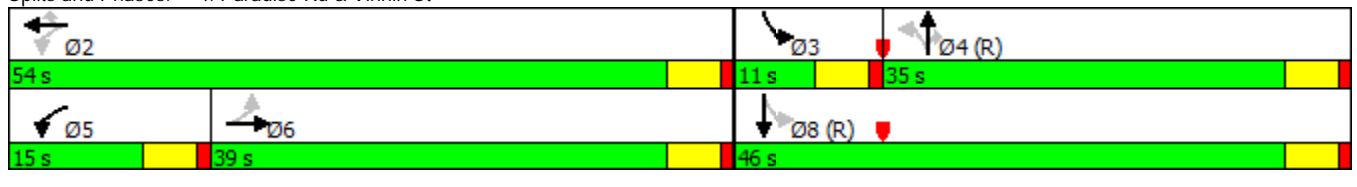


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Future Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Satd. Flow (prot)	1215	1251	0	1215	1279	1088	0	2424	1088	0	2398	0
Flt Permitted	0.555			0.187				0.884			0.601	
Satd. Flow (perm)	710	1251	0	239	1279	1073	0	2149	1069	0	1454	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	12	481	0	240	343	71	0	610	396	0	614	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	39.0	39.0		15.0	54.0	54.0	35.0	35.0	35.0	11.0	46.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	34.0	34.0		49.0	49.0	49.0		30.0	30.0		41.0	
Actuated g/C Ratio	0.34	0.34		0.49	0.49	0.49		0.30	0.30		0.41	
v/c Ratio	0.05	1.13		1.12	0.55	0.14		0.95	1.02		0.94	
Control Delay	9.6	96.3		122.2	18.7	13.9		60.0	77.4		47.2	
Queue Delay	0.0	0.3		0.0	3.3	0.0		0.0	0.7		0.0	
Total Delay	9.6	96.7		122.2	22.0	13.9		60.0	78.1		47.2	
LOS	A	F		F	C	B		E	E		D	
Approach Delay		94.5			57.9			67.2			47.2	
Approach LOS		F			E			E			D	
Queue Length 50th (ft)	3	~369		~116	108	19		199	~209		127	
Queue Length 95th (ft)	m3	m#420		#277	190	m46		#313	#406		m#193	
Internal Link Dist (ft)		529			213			193			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	241	425		214	626	525		644	390		652	
Starvation Cap Reductn	0	0		0	189	0		0	0		0	
Spillback Cap Reductn	0	14		0	0	0		0	1		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.05	1.17		1.12	0.78	0.14		0.95	1.02		0.94	

**Intersection Summary**

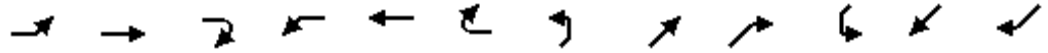
Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.13  
 Intersection Signal Delay: 65.4  
 Intersection LOS: E  
 Intersection Capacity Utilization 114.6%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 4: Paradise Rd & Vinnin St**









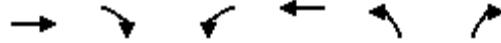
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	2	1	2	314	6	25	7	298	440	25	292	4
Future Volume (vph)	2	1	2	314	6	25	7	298	440	25	292	4
Satd. Flow (prot)	0	1445	0	1215	1060	0	1296	1337	1160	1296	1334	0
Flt Permitted		0.965		0.754			0.557			0.352		
Satd. Flow (perm)	0	1422	0	965	1060	0	760	1337	1105	480	1334	0
Satd. Flow (RTOR)									*200			
Lane Group Flow (vph)	0	5	0	358	36	0	8	340	502	29	338	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	48.0	48.0		48.0	48.0		41.0	41.0	41.0	11.0	52.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		47.7		47.7	47.7		35.7	35.7	35.7	42.3	42.3	
Actuated g/C Ratio		0.48		0.48	0.48		0.36	0.36	0.36	0.42	0.42	
v/c Ratio		0.01		0.78	0.07		0.03	0.71	0.96	0.12	0.60	
Control Delay		16.4		33.0	11.4		21.3	37.2	51.0	1.8	7.1	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		16.4		33.0	11.4		21.3	37.2	51.0	1.8	7.1	
LOS		B		C	B		C	D	D	A	A	
Approach Delay		16.4			31.0			45.2			6.7	
Approach LOS		B			C			D			A	
Queue Length 50th (ft)		2		245	15		3	184	208	1	10	
Queue Length 95th (ft)		9		m#371	m22		14	292	#432	m1	9	
Internal Link Dist (ft)		69			529			965			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		677		459	505		280	494	534	252	626	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.78	0.07		0.03	0.69	0.94	0.12	0.54	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 69 (69%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 32.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.3%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St

← Ø2 (R)	↙ Ø3	↗ Ø4
48 s	11 s	41 s
→ Ø5 (R)	↘ Ø8	
48 s	52 s	



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↖	↗
Traffic Volume (vph)	648	197	70	441	121	97
Future Volume (vph)	648	197	70	441	121	97
Satd. Flow (prot)	1588	1378	0	2414	1191	1088
Flt Permitted				0.771	0.950	
Satd. Flow (perm)	1588	1378	0	1874	1191	1088
Satd. Flow (RTOR)						
Lane Group Flow (vph)	716	218	0	564	134	107
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	65.0	65.0	11.0	76.0	24.0	24.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	74.6	74.6		74.6	15.4	15.4
Actuated g/C Ratio	0.75	0.75		0.75	0.15	0.15
v/c Ratio	0.60	0.21		0.40	0.73	0.64
Control Delay	2.7	1.3		6.1	62.5	56.5
Queue Delay	11.3	1.0		0.0	0.4	0.0
Total Delay	13.9	2.3		6.1	62.9	56.5
LOS	B	A		A	E	E
Approach Delay	11.2			6.1	60.0	
Approach LOS	B			A	E	
Queue Length 50th (ft)	44	6		60	81	64
Queue Length 95th (ft)	m83	m13		97	143	119
Internal Link Dist (ft)	213			175	347	
Turn Bay Length (ft)						150
Base Capacity (vph)	1184	1028		1398	226	206
Starvation Cap Reductn	444	586		0	0	0
Spillback Cap Reductn	0	0		0	7	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.97	0.49		0.40	0.61	0.52

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 76 (76%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 16.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 83.2%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



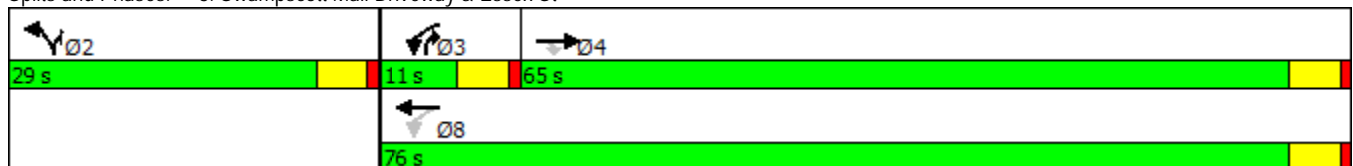














Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↘	↗
Traffic Volume (vph)	693	254	66	631	259	108
Future Volume (vph)	693	254	66	631	259	108
Satd. Flow (prot)	1459	1240	1540	1588	1540	1378
Flt Permitted			0.171		0.950	
Satd. Flow (perm)	1459	1240	277	1588	1540	1378
Satd. Flow (RTOR)						
Lane Group Flow (vph)	782	287	75	712	292	122
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	65.0	65.0	11.0	76.0	29.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	56.2	56.2	67.4	67.4	21.8	32.9
Actuated g/C Ratio	0.57	0.57	0.68	0.68	0.22	0.33
v/c Ratio	0.95	0.41	0.28	0.66	0.86	0.27
Control Delay	42.7	14.5	8.5	13.3	63.5	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	14.5	8.5	13.3	63.5	27.4
LOS	D	B	A	B	E	C
Approach Delay	35.1			12.9	52.9	
Approach LOS	D			B	D	
Queue Length 50th (ft)	457	101	15	251	188	59
Queue Length 95th (ft)	#743	163	30	377	#330	107
Internal Link Dist (ft)	1242			509	1630	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	893	759	265	1150	377	448
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.38	0.28	0.62	0.77	0.27

**Intersection Summary**

Cycle Length: 105  
 Actuated Cycle Length: 99.3  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 30.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 76.8%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St



							Ø9
Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	972	120	37	826	10	15	
Future Volume (vph)	972	120	37	826	10	15	
Satd. Flow (prot)	1493	1218	1621	1433	1622	0	
Flt Permitted			0.149		0.981		
Satd. Flow (perm)	1493	1183	254	1433	1622	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1109	137	42	943	28	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	62.0	62.0	62.0	62.0	13.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	62.5	62.5	62.5	62.5	8.3		
Actuated g/C Ratio	0.87	0.87	0.87	0.87	0.11		
v/c Ratio	0.86	0.13	0.19	0.76	0.15		
Control Delay	19.4	4.9	9.0	14.7	37.0		
Queue Delay	0.1	0.0	0.0	0.0	0.0		
Total Delay	19.5	4.9	9.0	14.7	37.0		
LOS	B	A	A	B	D		
Approach Delay	17.9			14.5	37.0		
Approach LOS	B			B	D		
Queue Length 50th (ft)	0	0	0	0	10		
Queue Length 95th (ft)	#1159	73	39	#951	45		
Internal Link Dist (ft)	486			296	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1293	1024	220	1241	186		
Starvation Cap Reductn	5	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.86	0.13	0.19	0.76	0.15		

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 72.2  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 16.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 71.7%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave



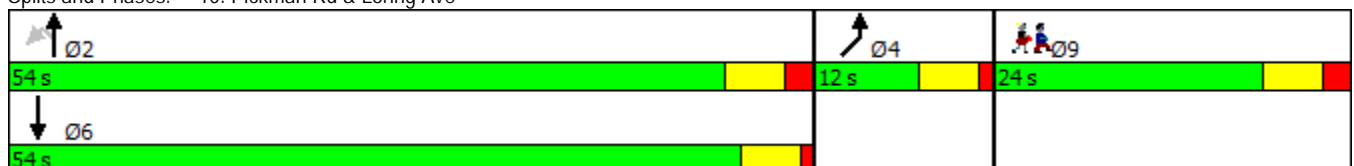


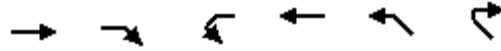
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	14	786	1044	25	22	11	
Future Volume (vph)	14	786	1044	25	22	11	
Satd. Flow (prot)	0	1511	1508	0	1663	0	
Flt Permitted		0.753			0.968		
Satd. Flow (perm)	0	1139	1508	0	1663	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	913	1221	0	38	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		54.0	54.3		6.8		
Actuated g/C Ratio		0.85	0.86		0.11		
v/c Ratio		0.94	0.94		0.21		
Control Delay		31.7	27.8		33.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		31.7	27.8		33.9		
LOS		C	C		C		
Approach Delay		31.7	27.8		33.9		
Approach LOS		C	C		C		
Queue Length 50th (ft)		0	0		11		
Queue Length 95th (ft)		#931	#1179		51		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		973	1296		191		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.94	0.94		0.20		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 63.2  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 29.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave





Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	774	46	164	823	12	89
Future Volume (Veh/h)	774	46	164	823	12	89
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	838	50	178	891	13	96
Pedestrians	10		10		10	
Lane Width (ft)	11.0		11.0		11.0	
Walking Speed (ft/s)	3.0		3.0		3.0	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked	0.40					
vC, conflicting volume	898					
vC1, stage 1 conf vol	2105					
vC2, stage 2 conf vol	848					
vCu, unblocked vol	898					
iC, single (s)	3026					
iC, 2 stage (s)	848					
tF (s)	4.1					
p0 queue free %	2.2					
cM capacity (veh/h)	*3.0					
	*3.0					
	76					
	0					
	76					
	748					
	6					
	403					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	838	50	178	891	109
Volume Left	0	0	178	0	13
Volume Right	0	50	0	0	96
cSH	1700	1700	748	1700	47
Volume to Capacity	0.49	0.03	0.24	0.52	2.31
Queue Length 95th (ft)	0	0	23	0	283
Control Delay (s)	0.0	0.0	11.3	0.0	781.6
Lane LOS			B	F	
Approach Delay (s)	0.0	1.9		781.6	
Approach LOS			F		F

Intersection Summary					
Average Delay			42.2		
Intersection Capacity Utilization			68.8%		ICU Level of Service
Analysis Period (min)			15		C

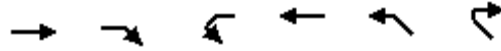
\* User Entered Value



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	133	534	436	100	112	187
Future Volume (Veh/h)	133	534	436	100	112	187
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	150	603	492	113	126	211
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	605				1452	548
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	605				1452	548
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				0	61
cM capacity (veh/h)	973				122	536

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	753	605	337
Volume Left	150	0	126
Volume Right	0	113	211
cSH	973	1700	236
Volume to Capacity	0.15	0.36	1.43
Queue Length 95th (ft)	14	0	481
Control Delay (s)	3.7	0.0	255.2
Lane LOS	A		F
Approach Delay (s)	3.7	0.0	255.2
Approach LOS			F

Intersection Summary			
Average Delay		52.4	
Intersection Capacity Utilization		96.3%	ICU Level of Service F
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	615	139	59	564	47	52
Future Volume (Veh/h)	615	139	59	564	47	52
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	694	157	67	637	53	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			851		1544	772
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			851		1544	772
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		54	85
cM capacity (veh/h)			788		116	399

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	851	704	112
Volume Left	0	67	53
Volume Right	157	0	59
cSH	1700	788	185
Volume to Capacity	0.50	0.09	0.61
Queue Length 95th (ft)	0	7	84
Control Delay (s)	0.0	2.2	50.6
Lane LOS		A	F
Approach Delay (s)	0.0	2.2	50.6
Approach LOS			F

Intersection Summary			
Average Delay		4.3	
Intersection Capacity Utilization		93.5%	ICU Level of Service F
Analysis Period (min)		15	





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	107	83	161	237	86
Future Volume (Veh/h)	73	107	83	161	237	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	122	95	184	270	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					427	
pX, platoon unblocked						
vC, conflicting volume	693	319	368			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	693	319	368			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	83	92			
cM capacity (veh/h)	377	722	1191			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	205	279	368			
Volume Left	83	95	0			
Volume Right	122	0	98			
cSH	526	1191	1700			
Volume to Capacity	0.39	0.08	0.22			
Queue Length 95th (ft)	46	6	0			
Control Delay (s)	16.1	3.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.1	3.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			5.0			
Intersection Capacity Utilization			53.5%	ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Future Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Satd. Flow (prot)	0	1720	0	0	1766	0	0	1801	0	0	1801	0
Flt Permitted											0.999	
Satd. Flow (perm)	0	1777	0	0	1766	0	0	1801	0	0	1799	0
Satd. Flow (RTOR)		3			1							
Lane Group Flow (vph)	0	32	0	0	7	0	0	525	0	0	495	0
Turn Type	Perm	NA			NA			NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	13.0	13.0		13.0	13.0		39.0	39.0		39.0	39.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.9			6.7			38.9			38.9	
Actuated g/C Ratio		0.16			0.15			0.89			0.89	
v/c Ratio		0.11			0.03			0.33			0.31	
Control Delay		21.1			21.6			6.2			6.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		21.1			21.6			6.2			6.0	
LOS		C			C			A			A	
Approach Delay		21.1			21.6			6.2			6.0	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		5			1			0			0	
Queue Length 95th (ft)		38			14			291			269	
Internal Link Dist (ft)		155			218			904			594	
Turn Bay Length (ft)												
Base Capacity (vph)		311			308			1478			1477	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.10			0.02			0.36			0.34	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 43.8  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.33  
 Intersection Signal Delay: 6.7  
 Intersection Capacity Utilization 44.0%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 1: Paradise Rd & Ellis Rd

13 s	39 s	23 s
13 s	39 s	

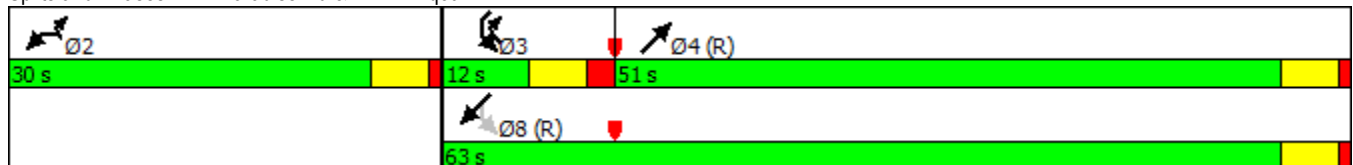


Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	84	195	654	14	182	664
Future Volume (vph)	84	195	654	14	182	664
Satd. Flow (prot)	1296	1160	1349	0	1296	1354
Flt Permitted	0.950				0.144	
Satd. Flow (perm)	1296	1160	1349	0	197	1354
Satd. Flow (RTOR)						
Lane Group Flow (vph)	92	213	730	0	199	726
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	30.0		51.0		12.0	63.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	18.0	36.8	46.2		64.0	65.0
Actuated g/C Ratio	0.19	0.40	0.50		0.69	0.70
v/c Ratio	0.37	0.47	1.09		0.70	0.77
Control Delay	35.0	24.9	86.7		27.7	18.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	35.0	24.9	86.7		27.7	18.1
LOS	C	C	F		C	B
Approach Delay	27.9		86.7			20.2
Approach LOS	C		F			C
Queue Length 50th (ft)	47	91	~490		38	239
Queue Length 95th (ft)	85	158	#708		#168	#593
Internal Link Dist (ft)	133		759			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	348	454	670		286	946
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.26	0.47	1.09		0.70	0.77

**Intersection Summary**

Cycle Length: 93  
 Actuated Cycle Length: 93  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 46.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 84.8%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

**Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr**



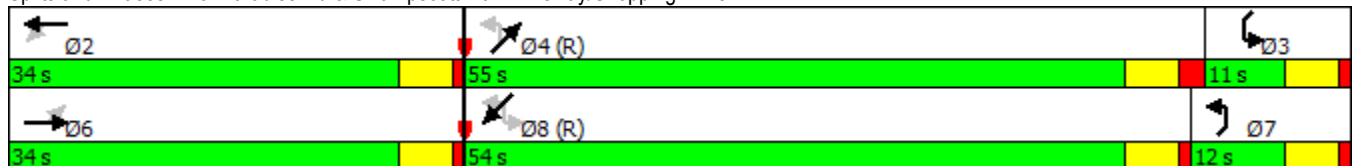


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Future Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Satd. Flow (prot)	1296	1186	0	1296	1313	0	1296	1336	0	1296	1365	1151
Flt Permitted	0.587			0.350			0.281			0.241		
Satd. Flow (perm)	801	1186	0	478	1313	0	383	1336	0	329	1365	1112
Satd. Flow (RTOR)												
Lane Group Flow (vph)	231	332	0	124	176	0	202	628	0	58	566	248
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		8
Total Split (s)	34.0	34.0		34.0	34.0		12.0	55.0		11.0	54.0	54.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	5.0
Act Effct Green (s)	29.3	29.3		29.3	29.3		57.5	51.1		54.8	49.0	49.0
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.58	0.51		0.55	0.49	0.49
v/c Ratio	0.99	0.96		0.89	0.46		0.72	0.92		0.25	0.85	0.46
Control Delay	93.6	75.6		89.1	33.7		34.5	45.1		13.1	36.3	20.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	93.6	75.6		89.1	33.7		34.5	45.1		13.1	36.3	20.2
LOS	F	E		F	C		C	D		B	D	C
Approach Delay		83.0			56.6			42.5			30.2	
Approach LOS		F			E			D			C	
Queue Length 50th (ft)	146	208		75	92		55	371		14	302	100
Queue Length 95th (ft)	#303	#386		#189	158		#113	#615		30	#516	169
Internal Link Dist (ft)		1673			222			783			1077	
Turn Bay Length (ft)	150						500			150		150
Base Capacity (vph)	234	346		139	384		285	682		238	668	544
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.99	0.96		0.89	0.46		0.71	0.92		0.24	0.85	0.46

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 48.9 Intersection LOS: D  
 Intersection Capacity Utilization 103.3% ICU Level of Service G  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive

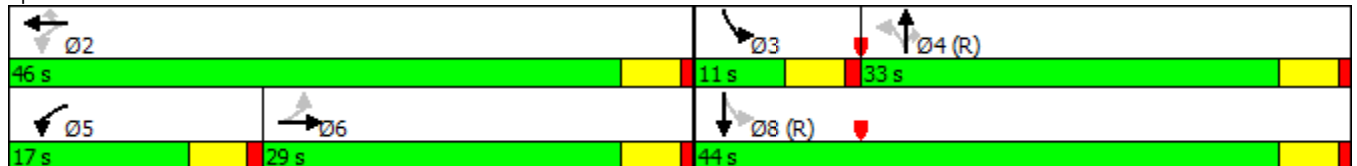


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Future Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Satd. Flow (prot)	1459	1476	0	1459	1523	1305	0	2891	1305	0	2856	0
Flt Permitted	0.524			0.194				0.838			0.672	
Satd. Flow (perm)	804	1476	0	298	1523	1305	0	2435	1305	0	1937	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	24	392	0	308	406	117	0	479	335	0	628	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	29.0	29.0		17.0	46.0	46.0	33.0	33.0	33.0	11.0	44.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	24.0	24.0		41.0	41.0	41.0		28.0	28.0		39.0	
Actuated g/C Ratio	0.27	0.27		0.46	0.46	0.46		0.31	0.31		0.43	
v/c Ratio	0.11	1.00		1.06	0.59	0.20		0.63	0.83		0.70	
Control Delay	20.4	65.4		92.4	25.3	19.2		31.1	47.6		12.3	
Queue Delay	0.0	0.0		10.9	5.9	0.0		0.0	0.0		0.1	
Total Delay	20.4	65.4		103.3	31.2	19.2		31.1	47.6		12.4	
LOS	C	E		F	C	B		C	D		B	
Approach Delay		62.8			56.2			37.9			12.4	
Approach LOS		E			E			D			B	
Queue Length 50th (ft)	12	242		~138	180	44		122	176		35	
Queue Length 95th (ft)	m16	m#297		#303	257	m80		176	#323		m65	
Internal Link Dist (ft)		529			213			261			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	214	393		290	693	594		757	406		900	
Starvation Cap Reductn	0	0		8	227	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	0		12	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.11	1.00		1.09	0.87	0.20		0.63	0.83		0.71	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.06  
 Intersection Signal Delay: 41.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 93.9%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 4: Paradise Rd & Vinnin St**





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	255	32	19	494	529	233
Future Volume (vph)	255	32	19	494	529	233
Satd. Flow (prot)	1286	1151	1296	1354	1365	1160
Flt Permitted	0.950		0.242			
Satd. Flow (perm)	1286	1128	330	1354	1365	1123
Satd. Flow (RTOR)						
Lane Group Flow (vph)	294	37	22	570	610	269
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	28.0	28.0	11.0	62.0	51.0	51.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	22.3	22.3	57.7	57.7	46.0	46.0
Actuated g/C Ratio	0.25	0.25	0.64	0.64	0.51	0.51
v/c Ratio	0.93	0.13	0.08	0.66	0.88	0.47
Control Delay	48.7	9.6	9.8	25.3	35.6	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	9.6	9.8	25.3	35.6	17.6
LOS	D	A	A	C	D	B
Approach Delay	44.3			24.8	30.1	
Approach LOS	D			C	C	
Queue Length 50th (ft)	109	4	5	227	291	93
Queue Length 95th (ft)	#294	m7	m12	332	#515	162
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	328	288	284	868	697	573
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.13	0.08	0.66	0.88	0.47

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 70 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 30.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 66.5%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave



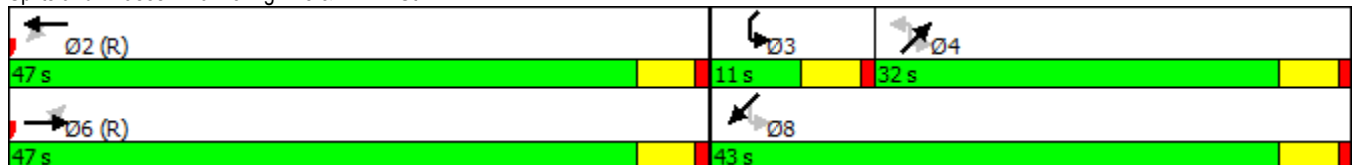


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Future Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Satd. Flow (prot)	0	1550	0	1296	1126	0	1296	1354	1160	1296	1347	0
Flt Permitted		0.969		0.750			0.590			0.384		
Satd. Flow (perm)	0	1522	0	1024	1126	0	805	1354	1123	524	1347	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	0	11	0	436	57	0	6	290	402	50	276	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	47.0	47.0		47.0	47.0		32.0	32.0	32.0	11.0	43.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		44.1		44.1	44.1		29.3	29.3	29.3	35.9	35.9	
Actuated g/C Ratio		0.49		0.49	0.49		0.33	0.33	0.33	0.40	0.40	
v/c Ratio		0.01		0.87	0.10		0.02	0.66	0.93	0.19	0.51	
Control Delay		13.1		26.9	4.4		22.7	35.6	54.0	7.3	11.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		13.1		26.9	4.4		22.7	35.6	54.0	7.3	11.6	
LOS		B		C	A		C	D	D	A	B	
Approach Delay		13.1			24.3			46.1			11.0	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)		3		215	6		2	146	180	5	27	
Queue Length 95th (ft)		12		#421	m11		11	#259	#374	m11	41	
Internal Link Dist (ft)		69			529			965			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		746		501	552		261	440	432	260	568	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.87	0.10		0.02	0.66	0.93	0.19	0.49	

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 42 (47%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 31.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.5%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St

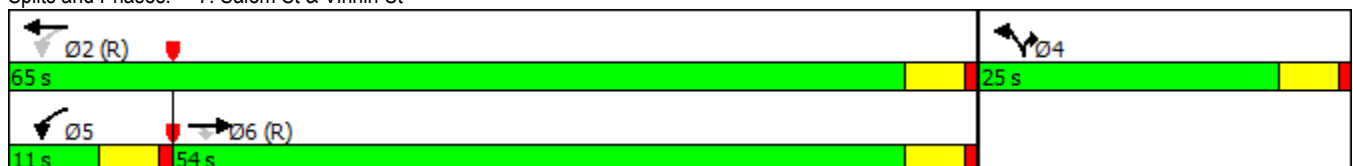


	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Traffic Volume (vph)	505	183	146	527	185	96
Future Volume (vph)	505	183	146	527	185	96
Satd. Flow (prot)	1450	1232	0	2714	1447	1295
Flt Permitted				0.682	0.950	
Satd. Flow (perm)	1450	1193	0	1871	1427	1295
Satd. Flow (RTOR)						
Lane Group Flow (vph)	558	202	0	743	204	106
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	54.0	54.0	11.0	65.0	25.0	25.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	63.3	63.3		63.3	16.7	16.7
Actuated g/C Ratio	0.70	0.70		0.70	0.19	0.19
v/c Ratio	0.55	0.24		0.57	0.76	0.44
Control Delay	4.4	2.4		9.3	52.6	37.6
Queue Delay	1.5	0.6		0.1	0.1	0.0
Total Delay	5.9	3.0		9.4	52.7	37.6
LOS	A	A		A	D	D
Approach Delay	5.1			9.4	47.5	
Approach LOS	A			A	D	
Queue Length 50th (ft)	91	18		98	109	53
Queue Length 95th (ft)	m164	m30		160	181	100
Internal Link Dist (ft)	213			175	1023	
Turn Bay Length (ft)						150
Base Capacity (vph)	1019	838		1315	321	287
Starvation Cap Reductn	274	350		0	0	0
Spillback Cap Reductn	0	0		48	3	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.75	0.41		0.59	0.64	0.37

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 82 (91%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 14.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 84.3%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



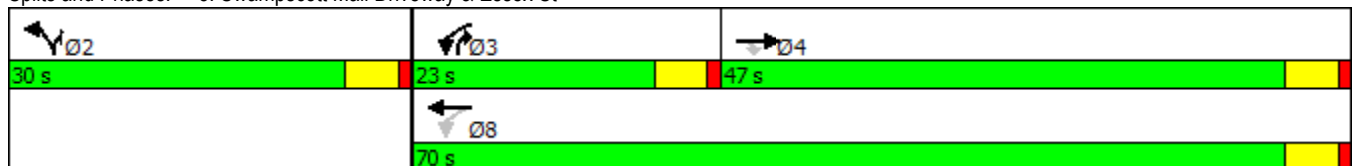














	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↙	↑	↖	↗
Traffic Volume (vph)	535	284	99	575	291	140
Future Volume (vph)	535	284	99	575	291	140
Satd. Flow (prot)	1365	1151	1296	1354	1296	1151
Flt Permitted			0.214		0.950	
Satd. Flow (perm)	1365	1112	292	1354	1296	1151
Satd. Flow (RTOR)						
Lane Group Flow (vph)	604	321	112	649	329	158
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	47.0	47.0	23.0	70.0	30.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	43.2	43.2	57.0	57.0	25.0	38.8
Actuated g/C Ratio	0.47	0.47	0.62	0.62	0.27	0.42
v/c Ratio	0.94	0.61	0.41	0.77	0.93	0.33
Control Delay	49.3	24.8	11.7	20.5	69.5	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	24.8	11.7	20.5	69.5	20.5
LOS	D	C	B	C	E	C
Approach Delay	40.8			19.2	53.6	
Approach LOS	D			B	D	
Queue Length 50th (ft)	322	134	25	251	183	59
Queue Length 95th (ft)	#576	238	46	406	#394	119
Internal Link Dist (ft)	1242			539	1673	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	640	522	377	957	352	600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.61	0.30	0.68	0.93	0.26

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 92.1  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 36.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 81.4%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St







							Ø9
Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	700	120	37	826	10	15	
Future Volume (vph)	700	120	37	826	10	15	
Satd. Flow (prot)	1801	1531	1711	1801	1622	0	
Flt Permitted			0.261		0.981		
Satd. Flow (perm)	1801	1531	470	1801	1622	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	799	137	42	943	28	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	62.0	62.0	62.0	62.0	13.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	43.5	43.5	43.5	43.5	10.5		
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.21		
v/c Ratio	0.52	0.10	0.10	0.61	0.08		
Control Delay	7.5	4.5	6.0	9.6	31.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	7.6	4.5	6.0	9.6	31.3		
LOS	A	A	A	A	C		
Approach Delay	7.1			9.4	31.3		
Approach LOS	A			A	C		
Queue Length 50th (ft)	0	0	0	0	6		
Queue Length 95th (ft)	502	64	29	#771	44		
Internal Link Dist (ft)	486			296	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1621	1378	423	1621	337		
Starvation Cap Reductn	51	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.51	0.10	0.10	0.58	0.08		

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 50.6  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 8.6  
 Intersection LOS: A  
 Intersection Capacity Utilization 60.6%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave

 Ø2	 Ø4	 Ø9
62 s	13 s	25 s
 Ø6		
62 s		



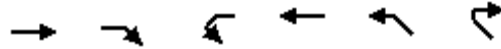
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	10	826	800	30	35	20	
Future Volume (vph)	10	826	800	30	35	20	
Satd. Flow (prot)	0	1799	1792	0	1659	0	
Flt Permitted		0.988			0.969		
Satd. Flow (perm)	0	1779	1792	0	1659	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	954	947	0	63	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		55.7	56.5		6.9		
Actuated g/C Ratio		0.75	0.76		0.09		
v/c Ratio		0.71	0.69		0.41		
Control Delay		13.8	12.7		41.7		
Queue Delay		0.4	0.0		0.0		
Total Delay		14.3	12.7		41.7		
LOS		B	B		D		
Approach Delay		14.3	12.7		41.7		
Approach LOS		B	B		D		
Queue Length 50th (ft)		172	154		24		
Queue Length 95th (ft)		#805	#779		#77		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1338	1367		158		
Starvation Cap Reductn		100	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.77	0.69		0.40		

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 74.1  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 14.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave

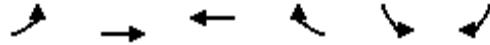




Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	722	23	79	642	16	123
Future Volume (Veh/h)	722	23	79	642	16	123
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	782	25	86	695	17	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked	0.75					
vC, conflicting volume	807					
vC1, stage 1 conf vol	1649					
vC2, stage 2 conf vol	782					
vCu, unblocked vol	807					
iC, single (s)	1697					
iC, 2 stage (s)	782					
tF (s)	4.1					
p0 queue free %	2.2					
cM capacity (veh/h)	3.5					
	3.3					
	89					
	75					
	66					
	818					
	69					
	394					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	782	25	86	695	150
Volume Left	0	0	86	0	17
Volume Right	0	25	0	0	133
cSH	1700	1700	818	1700	256
Volume to Capacity	0.46	0.01	0.11	0.41	0.59
Queue Length 95th (ft)	0	0	9	0	84
Control Delay (s)	0.0	0.0	9.9	0.0	37.1
Lane LOS			A	E	
Approach Delay (s)	0.0		1.1	37.1	
Approach LOS				E	

Intersection Summary					
Average Delay			3.7		
Intersection Capacity Utilization			63.4%	ICU Level of Service	B
Analysis Period (min)	15				



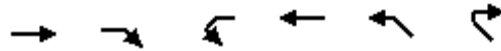
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	60	454	620	80	75	51
Future Volume (Veh/h)	60	454	620	80	75	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	68	513	700	90	85	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	790				1394	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790				1394	745
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				41	86
cM capacity (veh/h)	830				143	414

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	581	790	143
Volume Left	68	0	85
Volume Right	0	90	58
cSH	830	1700	195
Volume to Capacity	0.08	0.46	0.73
Queue Length 95th (ft)	7	0	119
Control Delay (s)	2.1	0.0	62.0
Lane LOS	A		F
Approach Delay (s)	2.1	0.0	62.0
Approach LOS			F

Intersection Summary			
Average Delay		6.7	
Intersection Capacity Utilization		85.6%	ICU Level of Service E
Analysis Period (min)		15	



Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	51	14	12	447	460	65
Future Volume (Veh/h)	51	14	12	447	460	65
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.93	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	56	16	13	494	508	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				674		
pX, platoon unblocked	0.88					
vC, conflicting volume	1064	544	580			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1005	544	580			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	97	99			
cM capacity (veh/h)	233	539	994			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	72	507	580			
Volume Left	56	13	0			
Volume Right	16	0	72			
cSH	266	994	1700			
Volume to Capacity	0.27	0.01	0.34			
Queue Length 95th (ft)	27	1	0			
Control Delay (s)	23.5	0.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	23.5	0.4	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			45.4%	ICU Level of Service	A	
Analysis Period (min)			15			



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	483	99	39	632	51	31
Future Volume (Veh/h)	483	99	39	632	51	31
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	545	112	44	714	58	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			657		1403	601
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			657		1403	601
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		60	93
cM capacity (veh/h)			931		147	500

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	657	758	93
Volume Left	0	44	58
Volume Right	112	0	35
cSH	1700	931	200
Volume to Capacity	0.39	0.05	0.47
Queue Length 95th (ft)	0	4	56
Control Delay (s)	0.0	1.2	37.8
Lane LOS		A	E
Approach Delay (s)	0.0	1.2	37.8
Approach LOS			E

Intersection Summary			
Average Delay		2.9	
Intersection Capacity Utilization		80.1%	ICU Level of Service D
Analysis Period (min)		15	

**Level of Service (LOS) Analysis  
Alternatives 2**



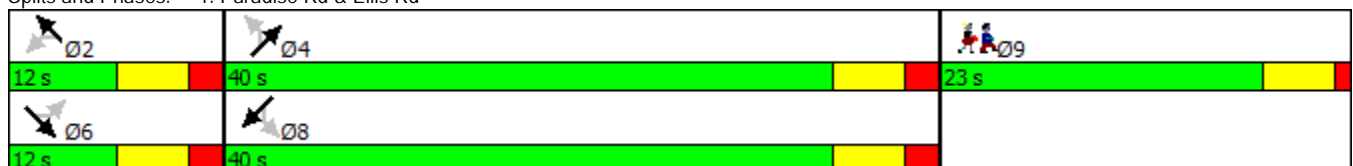













Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Future Volume (vph)	22	45	4	15	44	7	5	417	8	5	659	31
Satd. Flow (prot)	0	1759	0	0	1756	0	0	1795	0	0	1790	0
Flt Permitted		0.870			0.899			0.991			0.997	
Satd. Flow (perm)	0	1554	0	0	1596	0	0	1781	0	0	1784	0
Satd. Flow (RTOR)		3			6			2			4	
Lane Group Flow (vph)	0	82	0	0	76	0	0	496	0	0	802	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	12.0	12.0		12.0	12.0		40.0	40.0		40.0	40.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.5			6.5			37.1			37.1	
Actuated g/C Ratio		0.11			0.11			0.64			0.64	
v/c Ratio		0.47			0.41			0.43			0.70	
Control Delay		40.2			36.5			12.1			19.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		40.2			36.5			12.1			19.3	
LOS		D			D			B			B	
Approach Delay		40.2			36.5			12.1			19.3	
Approach LOS		D			D			B			B	
Queue Length 50th (ft)		23			20			57			121	
Queue Length 95th (ft)		#102			#88			264			#604	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		176			184			1130			1132	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.47			0.41			0.44			0.71	

**Intersection Summary**

Cycle Length: 75  
 Actuated Cycle Length: 57.8  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 18.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.6%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Rd & Ellis Rd

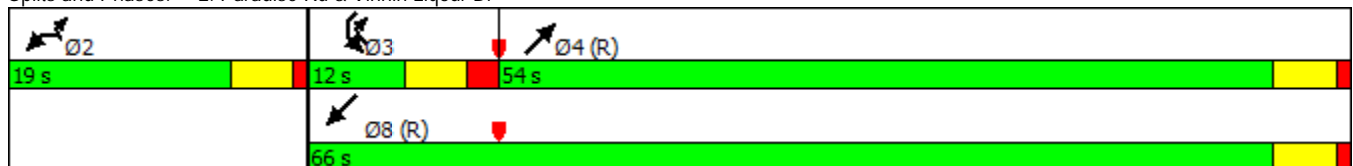


						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	11	28	698	3	37	876
Future Volume (vph)	11	28	698	3	37	876
Satd. Flow (prot)	1496	1338	1510	0	1496	2931
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1468	1338	1510	0	1484	2931
Satd. Flow (RTOR)						
Lane Group Flow (vph)	12	30	759	0	40	948
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases						
Total Split (s)	19.0		54.0		12.0	66.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	14.0	26.0	53.8		6.0	61.0
Actuated g/C Ratio	0.16	0.31	0.63		0.07	0.72
v/c Ratio	0.05	0.07	0.79		0.38	0.45
Control Delay	30.7	21.7	21.6		41.5	6.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	30.7	21.7	21.6		41.5	6.9
LOS	C	C	C		D	A
Approach Delay	24.3		21.6			8.3
Approach LOS	C		C			A
Queue Length 50th (ft)	5	11	318		21	74
Queue Length 95th (ft)	20	31	#578		m43	177
Internal Link Dist (ft)	133		351			785
Turn Bay Length (ft)					150	
Base Capacity (vph)	246	409	955		105	2103
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.05	0.07	0.79		0.38	0.45

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 69 (81%), Referenced to phase 4:NET and 8:SWT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 14.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 63.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr



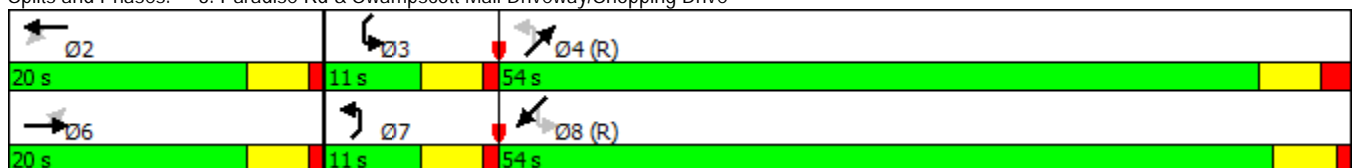


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Future Volume (vph)	68	15	75	57	41	13	72	622	8	22	782	144
Satd. Flow (prot)	1496	1338	0	1496	1505	0	1496	2924	0	1496	2850	0
Flt Permitted	0.719			0.692			0.227			0.387		
Satd. Flow (perm)	1114	1338	0	1073	1505	0	357	2924	0	608	2850	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	75	100	0	63	59	0	80	696	0	24	1023	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Total Split (s)	20.0	20.0		20.0	20.0		11.0	54.0		11.0	54.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	
Act Effct Green (s)	11.3	11.3		11.1	11.1		64.3	61.8		61.5	57.8	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.76	0.73		0.72	0.68	
v/c Ratio	0.51	0.56		0.45	0.30		0.23	0.33		0.05	0.53	
Control Delay	45.6	46.3		43.4	36.0		1.7	1.6		3.8	10.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	45.6	46.3		43.4	36.0		1.7	1.6		3.8	10.8	
LOS	D	D		D	D		A	A		A	B	
Approach Delay		46.0			39.8			1.6			10.7	
Approach LOS		D			D			A			B	
Queue Length 50th (ft)	38	51		31	29		2	11		3	159	
Queue Length 95th (ft)	78	96		68	62		m3	m20		9	236	
Internal Link Dist (ft)		1622			228			785			1423	
Turn Bay Length (ft)	150						500			150		
Base Capacity (vph)	196	236		189	265		356	2126		503	1938	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.38	0.42		0.33	0.22		0.22	0.33		0.05	0.53	

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 85  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 11.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 59.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive**



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Future Volume (vph)	25	303	50	327	410	72	32	400	189	76	388	25
Satd. Flow (prot)	1496	1535	0	1181	1243	1338	0	2979	1285	0	2936	0
Flt Permitted	0.506			0.197				0.873			0.656	
Satd. Flow (perm)	797	1535	0	245	1243	1300	0	2611	1248	0	1942	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	27	382	0	354	444	78	0	468	205	0	529	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	32.0	32.0		30.0	62.0	62.0	27.0	27.0	27.0	11.0	38.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	26.4	26.4		56.4	56.4	56.4		22.0	22.0		33.6	
Actuated g/C Ratio	0.26	0.26		0.56	0.56	0.56		0.22	0.22		0.34	
v/c Ratio	0.13	0.94		0.95	0.63	0.11		0.82	0.75		0.74	
Control Delay	27.9	62.7		49.5	15.0	8.5		49.9	54.8		21.2	
Queue Delay	0.0	0.0		1.7	6.1	0.0		0.0	0.0		0.0	
Total Delay	27.9	62.7		51.2	21.1	8.5		49.9	54.8		21.2	
LOS	C	E		D	C	A		D	D		C	
Approach Delay		60.4			32.2			51.4			21.2	
Approach LOS		E			C			D			C	
Queue Length 50th (ft)	16	255		147	135	16		150	123		41	
Queue Length 95th (ft)	m22	m#381		m#298	m223	m24		#229	#232		98	
Internal Link Dist (ft)		529			213			1423			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	215	414		372	708	741		574	274		718	
Starvation Cap Reductn	0	0		4	207	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.13	0.92		0.96	0.89	0.11		0.82	0.75		0.74	

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 39.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 96.8%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 4: Paradise Rd & Vinnin St**





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	263	25	9	499	456	198
Future Volume (vph)	263	25	9	499	456	198
Satd. Flow (prot)	1496	1338	1496	1574	1574	1338
Flt Permitted	0.950		0.249			
Satd. Flow (perm)	1496	1295	392	1574	1574	1269
Satd. Flow (RTOR)						
Lane Group Flow (vph)	285	27	10	540	494	214
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	31.0	31.0	23.0	69.0	46.0	46.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	22.7	22.7	67.3	67.3	41.0	41.0
Actuated g/C Ratio	0.23	0.23	0.67	0.67	0.41	0.41
v/c Ratio	0.84	0.09	0.02	0.51	0.77	0.41
Control Delay	22.0	5.0	13.0	24.8	34.8	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	5.0	13.0	24.8	34.8	24.0
LOS	C	A	B	C	C	C
Approach Delay	20.6			24.6	31.6	
Approach LOS	C			C	C	
Queue Length 50th (ft)	170	5	2	235	265	95
Queue Length 95th (ft)	m17	m2	m6	m328	399	159
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	388	336	498	1058	645	520
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.08	0.02	0.51	0.77	0.41

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 83 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 26.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 56.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave





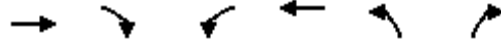
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Future Volume (vph)	2	1	2	440	5	17	2	300	330	14	195	2
Satd. Flow (prot)	0	1381	0	1481	1320	0	1481	1497	1326	1481	1494	0
Flt Permitted		0.961		0.753			0.601			0.242		
Satd. Flow (perm)	0	1355	0	1174	1320	0	937	1497	1326	377	1494	0
Satd. Flow (RTOR)									*200			
Lane Group Flow (vph)	0	7	0	570	28	0	3	389	428	18	256	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	57.0	57.0		57.0	57.0		32.0	32.0	32.0	11.0	43.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		55.3		55.3	55.3		30.3	30.3	30.3	34.7	34.7	
Actuated g/C Ratio		0.55		0.55	0.55		0.30	0.30	0.30	0.35	0.35	
v/c Ratio		0.01		0.88	0.04		0.01	0.86	0.79	0.09	0.49	
Control Delay		11.7		27.8	5.2		26.5	53.3	29.2	7.2	11.8	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		11.7		27.8	5.2		26.5	53.3	29.2	7.2	11.8	
LOS		B		C	A		C	D	C	A	B	
Approach Delay		11.7			26.7			40.6			11.5	
Approach LOS		B			C			D			B	
Queue Length 50th (ft)		2		331	4		1	209	122	2	31	
Queue Length 95th (ft)		8		#465	m6		8	#361	#232	m5	37	
Internal Link Dist (ft)		69			529			662			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		748		648	729		284	454	541	197	567	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.88	0.04		0.01	0.86	0.79	0.09	0.45	

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 43 (43%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 30.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.9%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 6: Loring Ave & Vinnin St**

← Ø2 (R)	↙ Ø3	↘ Ø4
57 s	11 s	32 s
→ Ø5 (R)	↙ Ø8	
57 s	43 s	



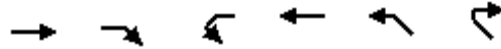
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	↗
Traffic Volume (vph)	423	151	63	654	145	68
Future Volume (vph)	423	151	63	654	145	68
Satd. Flow (prot)	1231	1046	0	1522	1192	1024
Flt Permitted				0.866	0.950	
Satd. Flow (perm)	1231	994	0	1322	1173	1024
Satd. Flow (RTOR)						
Lane Group Flow (vph)	458	163	0	776	157	74
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	65.0	65.0	11.0	76.0	24.0	24.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	73.3	73.3		73.3	16.7	16.7
Actuated g/C Ratio	0.73	0.73		0.73	0.17	0.17
v/c Ratio	0.51	0.22		0.80	0.79	0.44
Control Delay	7.4	4.6		17.7	66.8	44.9
Queue Delay	2.8	0.7		0.5	0.0	0.0
Total Delay	10.2	5.3		18.2	66.8	44.9
LOS	B	A		B	E	D
Approach Delay	8.9			18.2	59.8	
Approach LOS	A			B	E	
Queue Length 50th (ft)	148	41		156	95	42
Queue Length 95th (ft)	m177	m42		#288	#186	87
Internal Link Dist (ft)	213			312	357	
Turn Bay Length (ft)						150
Base Capacity (vph)	902	728		969	226	194
Starvation Cap Reductn	324	319		0	0	0
Spillback Cap Reductn	0	0		33	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.79	0.40		0.83	0.69	0.38

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 31 (31%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 20.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 101.4%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



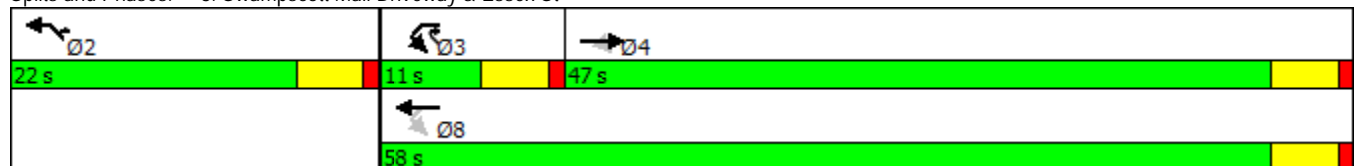


Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	621	149	44	666	203	22
Future Volume (vph)	621	149	44	666	203	22
Satd. Flow (prot)	1589	1297	1510	1526	1510	1351
Flt Permitted			0.200		0.950	
Satd. Flow (perm)	1589	1238	318	1526	1510	1351
Satd. Flow (RTOR)						
Lane Group Flow (vph)	679	163	48	728	222	24
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	47.0	47.0	11.0	58.0	22.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	33.5	33.5	38.9	38.9	14.4	26.6
Actuated g/C Ratio	0.52	0.52	0.60	0.60	0.22	0.41
v/c Ratio	0.82	0.25	0.15	0.79	0.66	0.04
Control Delay	24.5	11.2	5.8	16.5	37.8	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	11.2	5.8	16.5	37.8	17.4
LOS	C	B	A	B	D	B
Approach Delay	21.9			15.8	35.8	
Approach LOS	C			B	D	
Queue Length 50th (ft)	263	42	7	202	100	8
Queue Length 95th (ft)	#478	78	18	342	#197	24
Internal Link Dist (ft)	1242			517	1622	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	1100	857	316	1221	444	541
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.19	0.15	0.60	0.50	0.04

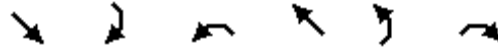
**Intersection Summary**

Cycle Length: 80  
 Actuated Cycle Length: 64.4  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 21.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 64.1%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St







Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↗	↖	↑	↘	↗	
Traffic Volume (vph)	680	120	37	900	15	15	
Future Volume (vph)	680	120	37	900	15	15	
Satd. Flow (prot)	1695	1501	1678	1695	1530	0	
Flt Permitted			0.282		0.976		
Satd. Flow (perm)	1695	1452	497	1695	1487	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	776	137	42	1027	34	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	52.0	52.0	52.0	52.0	13.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	54.4	54.4	54.4	54.4	8.6		
Actuated g/C Ratio	0.81	0.81	0.81	0.81	0.13		
v/c Ratio	0.57	0.12	0.10	0.75	0.17		
Control Delay	13.4	7.8	9.6	19.1	36.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	13.4	7.8	9.6	19.1	36.2		
LOS	B	A	A	B	D		
Approach Delay	12.6			18.8	36.2		
Approach LOS	B			B	D		
Queue Length 50th (ft)	0	0	0	0	9		
Queue Length 95th (ft)	#617	71	31	#934	48		
Internal Link Dist (ft)	497			268	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1371	1174	402	1371	195		
Starvation Cap Reductn	17	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.57	0.12	0.10	0.75	0.17		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 67.2  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.75  
 Intersection Signal Delay: 16.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 64.7%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave





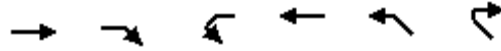
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	5	939	810	12	36	11	
Future Volume (vph)	5	939	810	12	36	11	
Satd. Flow (prot)	0	1731	1727	0	1613	0	
Flt Permitted		0.996			0.963		
Satd. Flow (perm)	0	1724	1727	0	1613	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	1078	938	0	54	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		19.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		57.7	58.3		6.8		
Actuated g/C Ratio		0.77	0.78		0.09		
v/c Ratio		0.81	0.70		0.37		
Control Delay		20.2	14.9		42.2		
Queue Delay		0.7	0.0		0.0		
Total Delay		20.9	14.9		42.2		
LOS		C	B		D		
Approach Delay		20.9	14.9		42.2		
Approach LOS		C	B		D		
Queue Length 50th (ft)		241	157		21		
Queue Length 95th (ft)		#900	#722		65		
Internal Link Dist (ft)		497	670		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1329	1345		152		
Starvation Cap Reductn		66	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.85	0.70		0.36		

**Intersection Summary**

Cycle Length: 85  
 Actuated Cycle Length: 74.8  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 70.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave





Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	785	25	67	628	5	152
Future Volume (Veh/h)	785	25	67	628	5	152
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	859	27	73	687	5	166
Pedestrians	5			5	5	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	914					
pX, platoon unblocked	0.77					
vC, conflicting volume	891			1702	869	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	891			1763	869	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	90			92	52	
cM capacity (veh/h)	749			63	345	

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	859	27	73	687	171
Volume Left	0	0	73	0	5
Volume Right	0	27	0	0	166
cSH	1700	1700	749	1700	305
Volume to Capacity	0.51	0.02	0.10	0.40	0.56
Queue Length 95th (ft)	0	0	8	0	80
Control Delay (s)	0.0	0.0	10.3	0.0	30.9
Lane LOS	B			D	
Approach Delay (s)	0.0			1.0	30.9
Approach LOS				D	

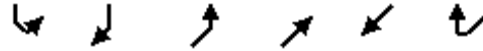
Intersection Summary					
Average Delay	3.3				
Intersection Capacity Utilization	68.4%			ICU Level of Service	C
Analysis Period (min)	15				



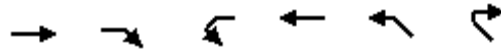
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	162	352	617	174	73	62
Future Volume (Veh/h)	162	352	617	174	73	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	187	406	712	201	84	72
Pedestrians		10	10		10	
Lane Width (ft)		11.0	11.0		11.0	
Walking Speed (ft/s)		3.0	3.0		3.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	923				1612	832
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	923				1612	832
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	74				0	80
cM capacity (veh/h)	724				82	358

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	593	913	156
Volume Left	187	0	84
Volume Right	0	201	72
cSH	724	1700	128
Volume to Capacity	0.26	0.54	1.22
Queue Length 95th (ft)	26	0	240
Control Delay (s)	6.4	0.0	216.6
Lane LOS	A		F
Approach Delay (s)	6.4	0.0	216.6
Approach LOS			F

Intersection Summary			
Average Delay		22.6	
Intersection Capacity Utilization		94.3%	ICU Level of Service F
Analysis Period (min)		15	



Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	88	28	23	428	666	145
Future Volume (Veh/h)	88	28	23	428	666	145
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	99	32	26	483	752	164
Pedestrians	30			30	30	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	3			3	3	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				706		
pX, platoon unblocked	0.85					
vC, conflicting volume	1429	894	946			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1417	894	946			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	15	90	96			
cM capacity (veh/h)	116	319	703			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	131	509	916			
Volume Left	99	26	0			
Volume Right	32	0	164			
cSH	138	703	1700			
Volume to Capacity	0.95	0.04	0.54			
Queue Length 95th (ft)	165	3	0			
Control Delay (s)	126.5	1.0	0.0			
Lane LOS	F	A				
Approach Delay (s)	126.5	1.0	0.0			
Approach LOS	F					
<b>Intersection Summary</b>						
Average Delay			11.0			
Intersection Capacity Utilization			64.4%	ICU Level of Service	C	
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	438	77	32	647	73	76
Future Volume (Veh/h)	438	77	32	647	73	76
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	505	89	37	747	84	88
Pedestrians	10			10	10	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	3.0			3.0	3.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			604		1390	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			604		1390	570
tC, single (s)			*6.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			*3.3		3.5	3.3
p0 queue free %			93		41	83
cM capacity (veh/h)			497		142	511

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	594	784	172
Volume Left	0	37	84
Volume Right	89	0	88
cSH	1700	497	225
Volume to Capacity	0.35	0.07	0.76
Queue Length 95th (ft)	0	6	134
Control Delay (s)	0.0	2.2	58.9
Lane LOS		A	F
Approach Delay (s)	0.0	2.2	58.9
Approach LOS			F

Intersection Summary			
Average Delay		7.7	
Intersection Capacity Utilization		80.5%	ICU Level of Service D
Analysis Period (min)		15	

\* User Entered Value



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	63	193	212	189	52
Future Volume (Veh/h)	8	63	193	212	189	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	72	220	242	216	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					437	
pX, platoon unblocked						
vC, conflicting volume	928	246	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928	246	275			
tC, single (s)	6.4	6.2	*6.4			
tC, 2 stage (s)						
tF (s)	3.5	3.3	*3.3			
p0 queue free %	96	91	71			
cM capacity (veh/h)	211	793	757			
<b>Direction, Lane #</b>						
	EB 1	NB 1	SB 1			
Volume Total	81	462	275			
Volume Left	9	220	0			
Volume Right	72	0	59			
cSH	607	757	1700			
Volume to Capacity	0.13	0.29	0.16			
Queue Length 95th (ft)	11	30	0			
Control Delay (s)	11.8	7.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.8	7.6	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay				5.5		
Intersection Capacity Utilization				51.2%	ICU Level of Service	A
Analysis Period (min)				15		
* User Entered Value						



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Future Volume (vph)	28	20	2	1	8	2	2	625	13	5	420	15
Satd. Flow (prot)	0	1743	0	0	1752	0	0	1795	0	0	1790	0
Flt Permitted		0.976			0.963			0.999			0.992	
Satd. Flow (perm)	0	1749	0	0	1694	0	0	1793	0	0	1777	0
Satd. Flow (RTOR)		2			2			2			3	
Lane Group Flow (vph)	0	57	0	0	12	0	0	723	0	0	497	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	12.0	12.0		12.0	12.0		40.0	40.0		40.0	40.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.4			6.4			36.1			36.1	
Actuated g/C Ratio		0.13			0.13			0.74			0.74	
v/c Ratio		0.24			0.05			0.54			0.38	
Control Delay		27.1			24.6			11.5			8.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.1			24.6			11.5			8.3	
LOS		C			C			B			A	
Approach Delay		27.1			24.6			11.5			8.3	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		14			3			101			57	
Queue Length 95th (ft)		60			20			#515			264	
Internal Link Dist (ft)		155			218			904			626	
Turn Bay Length (ft)												
Base Capacity (vph)		233			226			1345			1333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.24			0.05			0.54			0.37	












**Intersection Summary**

Cycle Length: 75  
 Actuated Cycle Length: 48.7  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.54  
 Intersection Signal Delay: 11.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 56.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Paradise Rd & Ellis Rd



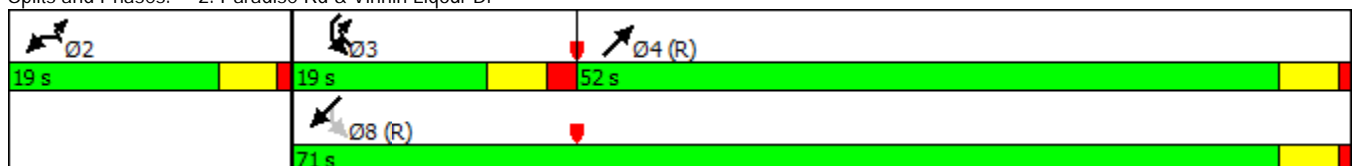


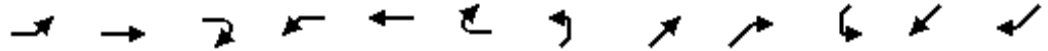
						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	99	100	722	23	145	604
Future Volume (vph)	99	100	722	23	145	604
Satd. Flow (prot)	1540	1378	2419	0	1215	2431
Flt Permitted	0.950				0.273	
Satd. Flow (perm)	1540	1378	2419	0	349	2431
Satd. Flow (RTOR)						
Lane Group Flow (vph)	108	109	815	0	159	661
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	19.0		52.0		19.0	71.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	11.1	26.2	53.8		67.9	68.9
Actuated g/C Ratio	0.12	0.29	0.60		0.75	0.77
v/c Ratio	0.57	0.27	0.56		0.45	0.36
Control Delay	48.5	24.9	13.9		5.5	0.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.5	24.9	13.9		5.5	0.5
LOS	D	C	B		A	A
Approach Delay	36.7		13.9			1.5
Approach LOS	D		B			A
Queue Length 50th (ft)	58	47	137		1	1
Queue Length 95th (ft)	108	82	226		m15	1
Internal Link Dist (ft)	133		258			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	239	437	1446		388	1861
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.45	0.25	0.56		0.41	0.36

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 84 (93%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.57  
 Intersection Signal Delay: 11.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.2%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Paradise Rd & Vinnin Liquor Dr



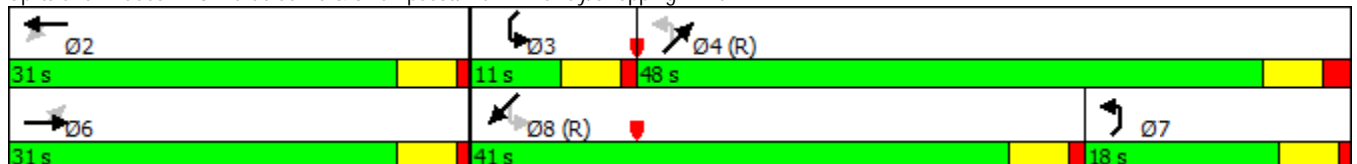


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Future Volume (vph)	196	60	182	90	87	25	181	695	60	39	494	144
Satd. Flow (prot)	1540	1409	0	1540	1558	0	1215	2369	0	1215	2301	0
Flt Permitted	0.679			0.413			0.389			0.224		
Satd. Flow (perm)	1100	1409	0	669	1558	0	498	2369	0	287	2301	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	212	262	0	97	121	0	196	817	0	42	691	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Total Split (s)	31.0	31.0		31.0	31.0		18.0	48.0		11.0	41.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	
Act Effct Green (s)	21.6	21.6		21.6	21.6		51.5	50.5		40.4	40.4	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.57	0.56		0.45	0.45	
v/c Ratio	0.80	0.78		0.61	0.32		0.51	0.61		0.22	0.67	
Control Delay	54.3	47.3		45.8	29.2		15.8	11.3		19.1	24.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	54.3	47.3		45.8	29.2		15.8	11.3		19.1	24.7	
LOS	D	D		D	C		B	B		B	C	
Approach Delay		50.4			36.6			12.1			24.4	
Approach LOS		D			D			B			C	
Queue Length 50th (ft)	111	136		48	55		35	82		14	164	
Queue Length 95th (ft)	#201	215		98	99		56	104		36	244	
Internal Link Dist (ft)		1630			222			783			1420	
Turn Bay Length (ft)	150						500			150		
Base Capacity (vph)	317	407		193	450		388	1330		193	1032	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.67	0.64		0.50	0.27		0.51	0.61		0.22	0.67	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 25.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 82.0%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

**Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive**

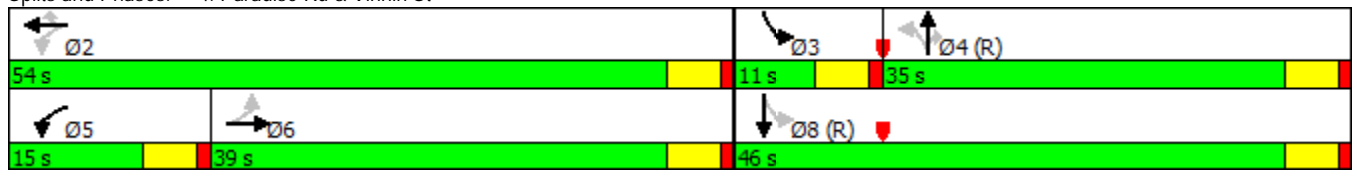


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Future Volume (vph)	11	376	59	217	310	64	32	520	358	99	441	16
Satd. Flow (prot)	1215	1251	0	1215	1279	1088	0	3070	1378	0	3037	0
Flt Permitted	0.555			0.187				0.884			0.601	
Satd. Flow (perm)	710	1251	0	239	1279	1073	0	2722	1354	0	1842	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	12	481	0	240	343	71	0	610	396	0	614	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	39.0	39.0		15.0	54.0	54.0	35.0	35.0	35.0	11.0	46.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	34.0	34.0		49.0	49.0	49.0		30.0	30.0		41.0	
Actuated g/C Ratio	0.34	0.34		0.49	0.49	0.49		0.30	0.30		0.41	
v/c Ratio	0.05	1.13		1.12	0.55	0.14		0.75	0.83		0.74	
Control Delay	9.6	96.3		122.2	18.7	13.9		38.3	40.9		30.8	
Queue Delay	0.0	0.3		0.0	3.3	0.0		0.0	0.1		0.0	
Total Delay	9.6	96.6		122.2	22.0	13.9		38.3	41.0		30.8	
LOS	A	F		F	C	B		D	D		C	
Approach Delay		94.5			57.9			39.4			30.8	
Approach LOS		F			E			D			C	
Queue Length 50th (ft)	3	~369		~116	108	19		184	180		120	
Queue Length 95th (ft)	m3	m#420		#277	190	m46		251	#346		m163	
Internal Link Dist (ft)		529			213			1420			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	241	425		214	626	525		816	476		826	
Starvation Cap Reductn	0	0		0	189	0		0	0		0	
Spillback Cap Reductn	0	13		0	0	0		0	1		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.05	1.17		1.12	0.78	0.14		0.75	0.83		0.74	

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.13  
 Intersection Signal Delay: 51.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 105.0%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 \* User Entered Value  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 4: Paradise Rd & Vinnin St**





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	287	24	15	573	521	289
Future Volume (vph)	287	24	15	573	521	289
Satd. Flow (prot)	1191	1378	1540	1588	1588	1350
Flt Permitted	0.950		0.196			
Satd. Flow (perm)	1191	1338	318	1588	1588	1286
Satd. Flow (RTOR)						
Lane Group Flow (vph)	331	28	17	661	601	333
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Total Split (s)	39.0	39.0	11.0	61.0	50.0	50.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	30.9	30.9	59.1	59.1	45.0	45.0
Actuated g/C Ratio	0.31	0.31	0.59	0.59	0.45	0.45
v/c Ratio	0.90	0.07	0.06	0.70	0.84	0.58
Control Delay	36.2	5.2	3.4	19.1	37.1	25.3
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	36.2	5.2	3.4	19.2	37.1	25.3
LOS	D	A	A	B	D	C
Approach Delay	33.7			18.8	32.9	
Approach LOS	C			B	C	
Queue Length 50th (ft)	19	1	1	169	329	153
Queue Length 95th (ft)	#338	m2	m2	226	#536	246
Internal Link Dist (ft)	691			571	296	
Turn Bay Length (ft)		150				
Base Capacity (vph)	404	454	299	938	714	578
Starvation Cap Reductn	0	0	0	20	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.06	0.06	0.72	0.84	0.58

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 99 (99%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 28.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 67.0%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Paradise Rd & Loring Ave





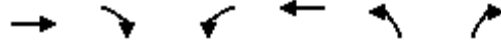
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	2	1	2	314	6	25	7	298	440	25	292	4
Future Volume (vph)	2	1	2	314	6	25	7	298	440	25	292	4
Satd. Flow (prot)	0	1445	0	1215	1060	0	1296	1337	1160	1296	1334	0
Flt Permitted		0.965		0.754			0.557			0.352		
Satd. Flow (perm)	0	1422	0	965	1060	0	760	1337	1105	480	1334	0
Satd. Flow (RTOR)									*200			
Lane Group Flow (vph)	0	5	0	358	36	0	8	340	502	29	338	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	48.0	48.0		48.0	48.0		41.0	41.0	41.0	11.0	52.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		47.7		47.7	47.7		35.7	35.7	35.7	42.3	42.3	
Actuated g/C Ratio		0.48		0.48	0.48		0.36	0.36	0.36	0.42	0.42	
v/c Ratio		0.01		0.78	0.07		0.03	0.71	0.96	0.12	0.60	
Control Delay		16.4		33.3	11.5		21.3	37.2	51.0	1.8	7.1	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		16.4		33.3	11.5		21.3	37.2	51.0	1.8	7.1	
LOS		B		C	B		C	D	D	A	A	
Approach Delay		16.4			31.3			45.2			6.7	
Approach LOS		B			C			D			A	
Queue Length 50th (ft)		2		244	14		3	184	208	1	10	
Queue Length 95th (ft)		9		m#390	m23		14	292	#432	m1	9	
Internal Link Dist (ft)		69			529			965			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		677		459	505		280	494	534	252	626	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.78	0.07		0.03	0.69	0.94	0.12	0.54	

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 69 (69%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 32.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.3%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St

← Ø2 (R) 48 s	↙ Ø3 11 s	↗ Ø4 41 s
→ Ø5 (R) 48 s	↘ Ø8 52 s	



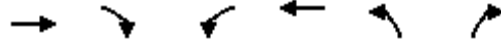
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↘	↗
Traffic Volume (vph)	648	197	70	441	121	97
Future Volume (vph)	648	197	70	441	121	97
Satd. Flow (prot)	1588	1378	0	2414	1191	1088
Flt Permitted				0.771	0.950	
Satd. Flow (perm)	1588	1378	0	1874	1191	1088
Satd. Flow (RTOR)						
Lane Group Flow (vph)	716	218	0	564	134	107
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	65.0	65.0	11.0	76.0	24.0	24.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	74.6	74.6		74.6	15.4	15.4
Actuated g/C Ratio	0.75	0.75		0.75	0.15	0.15
v/c Ratio	0.60	0.21		0.40	0.73	0.64
Control Delay	3.0	1.3		6.1	62.5	56.5
Queue Delay	3.3	0.9		0.0	0.4	0.0
Total Delay	6.3	2.1		6.1	62.9	56.5
LOS	A	A		A	E	E
Approach Delay	5.3			6.1	60.0	
Approach LOS	A			A	E	
Queue Length 50th (ft)	36	5		60	81	64
Queue Length 95th (ft)	m105	m14		97	143	119
Internal Link Dist (ft)	213			175	347	
Turn Bay Length (ft)						150
Base Capacity (vph)	1184	1028		1398	226	206
Starvation Cap Reductn	359	559		0	0	0
Spillback Cap Reductn	0	0		0	7	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.87	0.46		0.40	0.61	0.52

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 76 (76%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 13.2  
 Intersection LOS: B  
 Intersection Capacity Utilization 83.2%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St



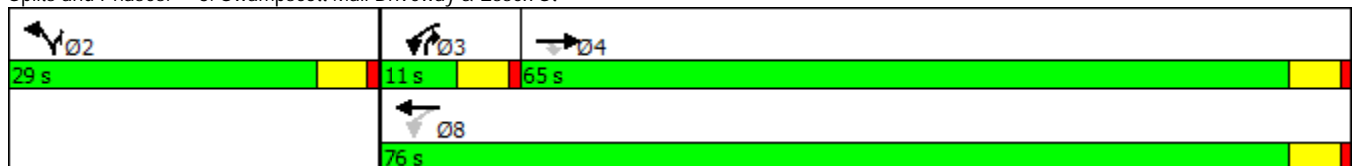


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	693	254	66	631	259	108
Future Volume (vph)	693	254	66	631	259	108
Satd. Flow (prot)	1459	1240	1540	1588	1540	1378
Flt Permitted			0.171		0.950	
Satd. Flow (perm)	1459	1240	277	1588	1540	1378
Satd. Flow (RTOR)						
Lane Group Flow (vph)	782	287	75	712	292	122
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	65.0	65.0	11.0	76.0	29.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	56.2	56.2	67.4	67.4	21.8	32.9
Actuated g/C Ratio	0.57	0.57	0.68	0.68	0.22	0.33
v/c Ratio	0.95	0.41	0.28	0.66	0.86	0.27
Control Delay	42.7	14.5	8.5	13.3	63.5	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	14.5	8.5	13.3	63.5	27.4
LOS	D	B	A	B	E	C
Approach Delay	35.1			12.9	52.9	
Approach LOS	D			B	D	
Queue Length 50th (ft)	457	101	15	251	188	59
Queue Length 95th (ft)	#743	163	30	377	#330	107
Internal Link Dist (ft)	1242			509	1630	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	893	759	265	1150	377	448
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.38	0.28	0.62	0.77	0.27

**Intersection Summary**

Cycle Length: 105  
 Actuated Cycle Length: 99.3  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 30.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 76.8%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St







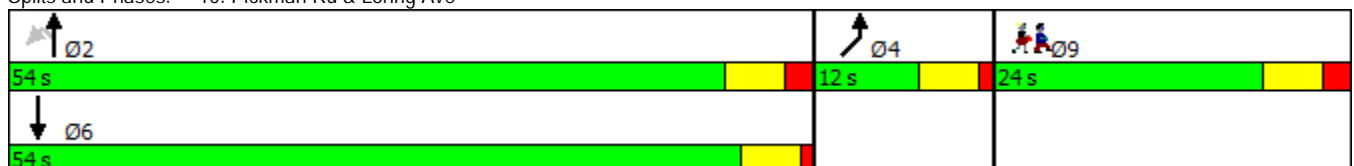


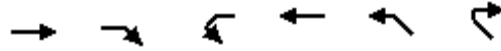
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	14	786	1044	25	22	11	
Future Volume (vph)	14	786	1044	25	22	11	
Satd. Flow (prot)	0	1511	1508	0	1663	0	
Flt Permitted		0.753			0.968		
Satd. Flow (perm)	0	1139	1508	0	1663	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	913	1221	0	38	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		54.0	54.3		6.8		
Actuated g/C Ratio		0.85	0.86		0.11		
v/c Ratio		0.94	0.94		0.21		
Control Delay		31.7	27.8		33.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		31.7	27.8		33.9		
LOS		C	C		C		
Approach Delay		31.7	27.8		33.9		
Approach LOS		C	C		C		
Queue Length 50th (ft)		0	0		11		
Queue Length 95th (ft)		#931	#1179		51		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		973	1296		191		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.94	0.94		0.20		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 63.2  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 29.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave



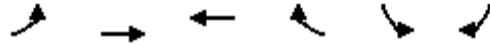


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Volume (veh/h)	774	46	164	823	12	89
Future Volume (Veh/h)	774	46	164	823	12	89
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	838	50	178	891	13	96
Pedestrians	10		10		10	
Lane Width (ft)	11.0		11.0		11.0	
Walking Speed (ft/s)	3.0		3.0		3.0	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked	0.40					
vC, conflicting volume	898					
vC1, stage 1 conf vol	2105					
vC2, stage 2 conf vol	848					
vCu, unblocked vol	898					
iC, single (s)	3026					
iC, 2 stage (s)	848					
tF (s)	4.1					
p0 queue free %	2.2					
cM capacity (veh/h)	*3.0					
	*3.0					
	76					
	0					
	76					
	748					
	6					
	403					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	838	50	178	891	109
Volume Left	0	0	178	0	13
Volume Right	0	50	0	0	96
cSH	1700	1700	748	1700	47
Volume to Capacity	0.49	0.03	0.24	0.52	2.31
Queue Length 95th (ft)	0	0	23	0	283
Control Delay (s)	0.0	0.0	11.3	0.0	781.6
Lane LOS			B	F	
Approach Delay (s)	0.0	1.9		781.6	
Approach LOS			F		F

Intersection Summary					
Average Delay			42.2		
Intersection Capacity Utilization			68.8%		ICU Level of Service
Analysis Period (min)			15		C

\* User Entered Value

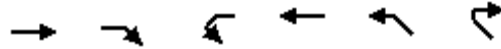


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	133	534	436	100	112	187
Future Volume (Veh/h)	133	534	436	100	112	187
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	150	603	492	113	126	211
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	605				1452	548
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	605				1452	548
iC, single (s)	4.1				*6.2	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				5	61
cM capacity (veh/h)	973				133	536

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	753	605	337
Volume Left	150	0	126
Volume Right	0	113	211
cSH	973	1700	251
Volume to Capacity	0.15	0.36	1.34
Queue Length 95th (ft)	14	0	445
Control Delay (s)	3.7	0.0	216.7
Lane LOS	A		F
Approach Delay (s)	3.7	0.0	216.7
Approach LOS			F

Intersection Summary			
Average Delay		44.7	
Intersection Capacity Utilization		96.3%	ICU Level of Service F
Analysis Period (min)		15	

\* User Entered Value



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	615	139	59	564	47	52
Future Volume (Veh/h)	615	139	59	564	47	52
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	694	157	67	637	53	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			851		1544	772
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			851		1544	772
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		54	85
cM capacity (veh/h)			788		116	399

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	851	704	112
Volume Left	0	67	53
Volume Right	157	0	59
cSH	1700	788	185
Volume to Capacity	0.50	0.09	0.61
Queue Length 95th (ft)	0	7	84
Control Delay (s)	0.0	2.2	50.6
Lane LOS		A	F
Approach Delay (s)	0.0	2.2	50.6
Approach LOS			F

Intersection Summary			
Average Delay		4.3	
Intersection Capacity Utilization		93.5%	ICU Level of Service F
Analysis Period (min)		15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	107	83	161	237	86
Future Volume (Veh/h)	73	107	83	161	237	86
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	122	95	184	270	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					427	
pX, platoon unblocked						
vC, conflicting volume	693	319	368			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	693	319	368			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	83	92			
cM capacity (veh/h)	377	722	1191			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	205	279	368			
Volume Left	83	95	0			
Volume Right	122	0	98			
cSH	526	1191	1700			
Volume to Capacity	0.39	0.08	0.22			
Queue Length 95th (ft)	46	6	0			
Control Delay (s)	16.1	3.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.1	3.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			5.0			
Intersection Capacity Utilization			53.5%	ICU Level of Service		A
Analysis Period (min)			15			

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Future Volume (vph)	19	7	3	0	5	1	0	465	0	1	437	1
Satd. Flow (prot)	0	1720	0	0	1766	0	0	1801	0	0	1801	0
Flt Permitted											0.999	
Satd. Flow (perm)	0	1777	0	0	1766	0	0	1801	0	0	1799	0
Satd. Flow (RTOR)		3			1							
Lane Group Flow (vph)	0	32	0	0	7	0	0	525	0	0	495	0
Turn Type	Perm	NA			NA			NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	13.0	13.0		13.0	13.0		39.0	39.0		39.0	39.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Act Effct Green (s)		6.9			6.7			38.9			38.9	
Actuated g/C Ratio		0.16			0.15			0.89			0.89	
v/c Ratio		0.11			0.03			0.33			0.31	
Control Delay		21.1			21.6			6.2			6.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		21.1			21.6			6.2			6.0	
LOS		C			C			A			A	
Approach Delay		21.1			21.6			6.2			6.0	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		5			1			0			0	
Queue Length 95th (ft)		38			14			291			269	
Internal Link Dist (ft)		155			218			904			594	
Turn Bay Length (ft)												
Base Capacity (vph)		311			308			1478			1477	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.10			0.02			0.36			0.34	

Intersection Summary

Cycle Length: 75  
 Actuated Cycle Length: 43.8  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.33  
 Intersection Signal Delay: 6.7  
 Intersection Capacity Utilization 44.0%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 1: Paradise Rd & Ellis Rd

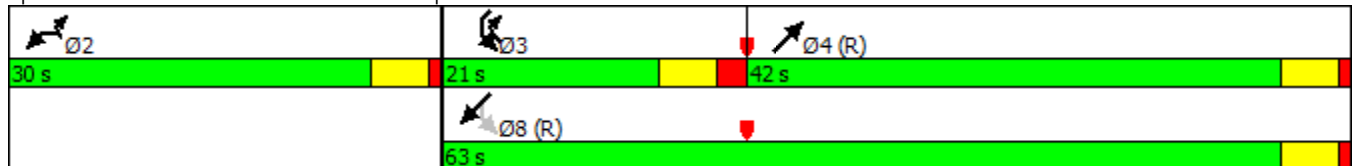
Ø2 13 s	Ø4 39 s	Ø9 23 s
Ø6 13 s	Ø8 39 s	

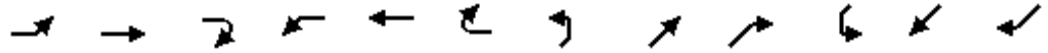
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	84	195	654	14	182	664
Future Volume (vph)	84	195	654	14	182	664
Satd. Flow (prot)	1296	1160	2573	0	1296	2583
Flt Permitted	0.950				0.280	
Satd. Flow (perm)	1296	1160	2573	0	382	2583
Satd. Flow (RTOR)						
Lane Group Flow (vph)	92	213	730	0	199	726
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	2	2 3	4		3	8
Permitted Phases					8	
Total Split (s)	30.0		42.0		21.0	63.0
Total Lost Time (s)	5.0		5.0		6.0	5.0
Act Effct Green (s)	18.7	35.8	47.2		63.3	64.3
Actuated g/C Ratio	0.20	0.38	0.51		0.68	0.69
v/c Ratio	0.35	0.48	0.56		0.54	0.41
Control Delay	34.2	23.9	19.6		12.3	7.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	34.2	23.9	19.6		12.3	7.7
LOS	C	C	B		B	A
Approach Delay	27.0		19.6			8.7
Approach LOS	C		B			A
Queue Length 50th (ft)	47	93	149		39	85
Queue Length 95th (ft)	85	129	255		85	146
Internal Link Dist (ft)	133		173			783
Turn Bay Length (ft)					150	
Base Capacity (vph)	348	492	1306		407	1784
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.26	0.43	0.56		0.49	0.41

**Intersection Summary**

Cycle Length: 93  
 Actuated Cycle Length: 93  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 15.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.6%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 2: Paradise Rd & Vinnin Liqour Dr



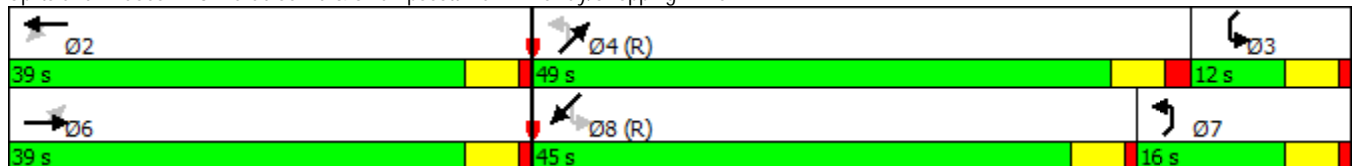


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Future Volume (vph)	213	95	212	115	136	27	187	537	43	54	523	229
Satd. Flow (prot)	1296	1197	0	1296	1316	0	1296	2548	0	1296	2448	0
Flt Permitted	0.595			0.370			0.253			0.359		
Satd. Flow (perm)	812	1197	0	505	1316	0	345	2548	0	490	2448	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	231	332	0	124	176	0	202	628	0	58	814	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Total Split (s)	39.0	39.0		39.0	39.0		16.0	49.0		12.0	45.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	6.0		5.0	5.0	
Act Effct Green (s)	31.1	31.1		31.1	31.1		58.1	48.7		50.6	44.3	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.58	0.49		0.51	0.44	
v/c Ratio	0.92	0.89		0.79	0.43		0.69	0.51		0.19	0.75	
Control Delay	72.6	59.5		65.3	30.2		36.5	21.0		13.5	30.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.6	59.5		65.3	30.2		36.5	21.0		13.5	30.2	
LOS	E	E		E	C		D	C		B	C	
Approach Delay		64.9			44.7			24.8			29.1	
Approach LOS		E			D			C			C	
Queue Length 50th (ft)	133	189		68	84		64	155		16	240	
Queue Length 95th (ft)	#273	#344		#167	146		#117	212		35	#330	
Internal Link Dist (ft)		1673			222			783			1428	
Turn Bay Length (ft)	150						500			150		
Base Capacity (vph)	277	408		172	449		309	1240		307	1084	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.83	0.81		0.72	0.39		0.65	0.51		0.19	0.75	

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 4:NETL and 8:SWTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 37.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 95.5%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

**Splits and Phases: 3: Paradise Rd & Swampscott Mall Driveway/Shopping Drive**



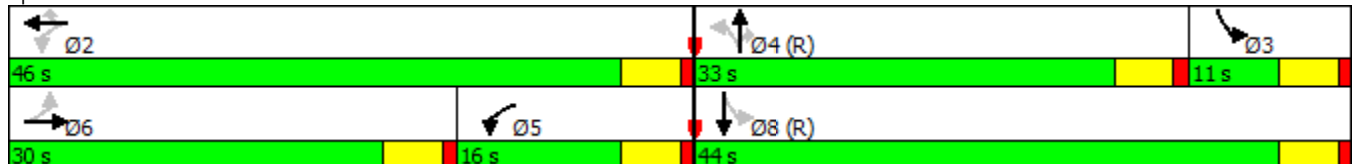


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Future Volume (vph)	22	282	72	279	367	106	42	392	303	101	438	29
Satd. Flow (prot)	1459	1476	0	1459	1523	1305	0	2891	1305	0	2856	0
Flt Permitted	0.329			0.298				0.825			0.725	
Satd. Flow (perm)	505	1476	0	458	1523	1305	0	2397	1305	0	2090	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	24	392	0	308	406	117	0	479	335	0	628	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		6		5	2			4		3	8	
Permitted Phases	6			2		2	4		4	8		
Total Split (s)	30.0	30.0		16.0	46.0	46.0	33.0	33.0	33.0	11.0	44.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	
Act Effct Green (s)	24.9	24.9		41.0	41.0	41.0		28.0	28.0		39.0	
Actuated g/C Ratio	0.28	0.28		0.46	0.46	0.46		0.31	0.31		0.43	
v/c Ratio	0.17	0.96		0.93	0.59	0.20		0.64	0.83		0.66	
Control Delay	9.6	43.1		59.5	20.5	15.5		31.4	47.6		13.8	
Queue Delay	0.0	0.8		0.0	6.1	0.0		0.0	0.0		0.0	
Total Delay	9.6	43.9		59.5	26.6	15.5		31.4	47.6		13.8	
LOS	A	D		E	C	B		C	D		B	
Approach Delay		41.9			37.2			38.1			13.8	
Approach LOS		D			D			D			B	
Queue Length 50th (ft)	3	164		83	124	31		122	176		45	
Queue Length 95th (ft)	m4	m#282		#288	251	m67		177	#323		m75	
Internal Link Dist (ft)		529			213			1428			571	
Turn Bay Length (ft)	150								150			
Base Capacity (vph)	140	410		331	693	594		745	406		956	
Starvation Cap Reductn	0	0		0	229	0		0	0		0	
Spillback Cap Reductn	0	2		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.17	0.96		0.93	0.88	0.20		0.64	0.83		0.66	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 32.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 93.9%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Paradise Rd & Vinnin St





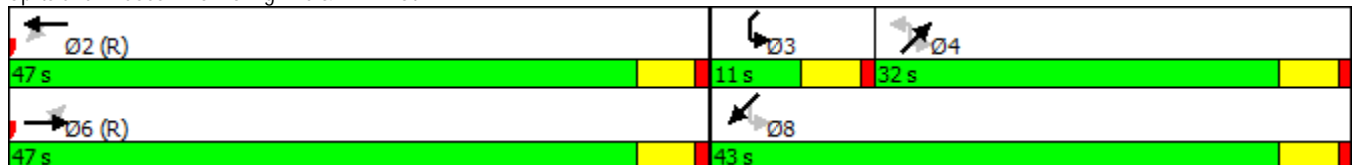


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Future Volume (vph)	3	5	2	382	3	47	5	254	352	44	236	6
Satd. Flow (prot)	0	1550	0	1296	1126	0	1296	1354	1160	1296	1347	0
Flt Permitted		0.969		0.750			0.590			0.384		
Satd. Flow (perm)	0	1522	0	1024	1126	0	805	1354	1123	524	1347	0
Satd. Flow (RTOR)									*100			
Lane Group Flow (vph)	0	11	0	436	57	0	6	290	402	50	276	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2			4		4	8		
Total Split (s)	47.0	47.0		47.0	47.0		32.0	32.0	32.0	11.0	43.0	
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)		44.1		44.1	44.1		29.3	29.3	29.3	35.9	35.9	
Actuated g/C Ratio		0.49		0.49	0.49		0.33	0.33	0.33	0.40	0.40	
v/c Ratio		0.01		0.87	0.10		0.02	0.66	0.93	0.19	0.51	
Control Delay		13.1		28.5	5.3		22.7	35.6	54.0	6.1	10.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		13.1		28.5	5.3		22.7	35.6	54.0	6.1	10.6	
LOS		B		C	A		C	D	D	A	B	
Approach Delay		13.1			25.8			46.1			9.9	
Approach LOS		B			C			D			A	
Queue Length 50th (ft)		3		201	6		2	146	180	3	20	
Queue Length 95th (ft)		12		#419	m10		11	#259	#374	m8	49	
Internal Link Dist (ft)		69			529			965			691	
Turn Bay Length (ft)				150			100		150	150		
Base Capacity (vph)		746		501	552		261	440	432	260	568	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.01		0.87	0.10		0.02	0.66	0.93	0.19	0.49	

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 57 (63%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 31.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.5%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 \* User Entered Value  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Loring Ave & Vinnin St



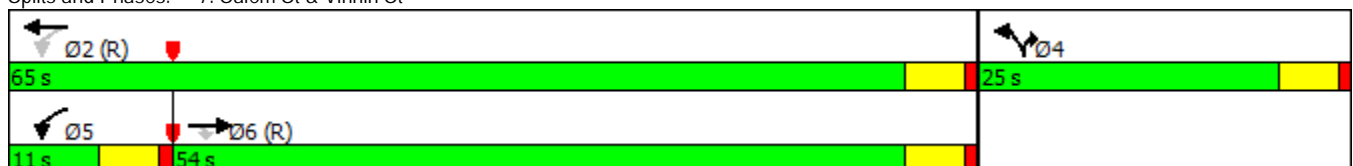


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↖	↗
Traffic Volume (vph)	505	183	146	527	185	96
Future Volume (vph)	505	183	146	527	185	96
Satd. Flow (prot)	1450	1232	0	2714	1447	1295
Flt Permitted				0.682	0.950	
Satd. Flow (perm)	1450	1193	0	1871	1427	1295
Satd. Flow (RTOR)						
Lane Group Flow (vph)	558	202	0	743	204	106
Turn Type	NA	Perm	pm+pt	NA	Prot	Prot
Protected Phases	6		5	2	4	4
Permitted Phases		6	2			
Total Split (s)	54.0	54.0	11.0	65.0	25.0	25.0
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	63.3	63.3		63.3	16.7	16.7
Actuated g/C Ratio	0.70	0.70		0.70	0.19	0.19
v/c Ratio	0.55	0.24		0.57	0.76	0.44
Control Delay	5.6	3.3		9.3	52.6	37.6
Queue Delay	1.7	0.6		0.0	1.0	0.0
Total Delay	7.3	3.9		9.3	53.6	37.6
LOS	A	A		A	D	D
Approach Delay	6.4			9.3	48.1	
Approach LOS	A			A	D	
Queue Length 50th (ft)	123	24		98	109	53
Queue Length 95th (ft)	m179	m36		160	181	100
Internal Link Dist (ft)	213			175	1023	
Turn Bay Length (ft)						150
Base Capacity (vph)	1019	838		1315	321	287
Starvation Cap Reductn	291	351		0	0	0
Spillback Cap Reductn	0	0		9	24	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.77	0.41		0.57	0.69	0.37

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 76 (84%), Referenced to phase 2:WBTL and 6:EBT, Start of Green  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 14.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 84.3%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Salem St & Vinnin St

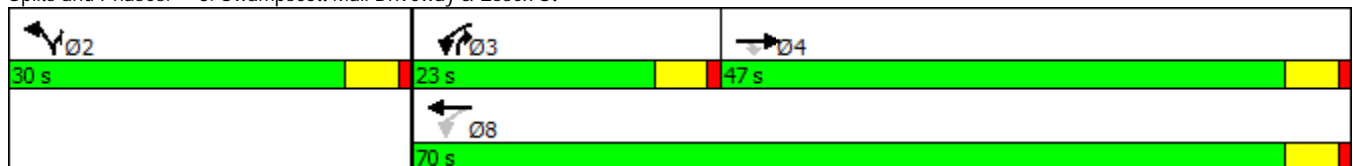


	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↙	↑	↖	↗
Traffic Volume (vph)	535	284	99	575	291	140
Future Volume (vph)	535	284	99	575	291	140
Satd. Flow (prot)	1365	1151	1296	1354	1296	1151
Flt Permitted			0.214		0.950	
Satd. Flow (perm)	1365	1112	292	1354	1296	1151
Satd. Flow (RTOR)						
Lane Group Flow (vph)	604	321	112	649	329	158
Turn Type	NA	Perm	pm+pt	NA	Prot	pt+ov
Protected Phases	4		3	8	2	2 3
Permitted Phases		4	8			
Total Split (s)	47.0	47.0	23.0	70.0	30.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Act Effct Green (s)	43.2	43.2	57.0	57.0	25.0	38.8
Actuated g/C Ratio	0.47	0.47	0.62	0.62	0.27	0.42
v/c Ratio	0.94	0.61	0.41	0.77	0.93	0.33
Control Delay	49.3	24.8	11.7	20.5	69.5	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	24.8	11.7	20.5	69.5	20.5
LOS	D	C	B	C	E	C
Approach Delay	40.8			19.2	53.6	
Approach LOS	D			B	D	
Queue Length 50th (ft)	322	134	25	251	183	59
Queue Length 95th (ft)	#576	238	46	406	#394	119
Internal Link Dist (ft)	1242			539	1673	
Turn Bay Length (ft)		200	100			150
Base Capacity (vph)	640	522	377	957	352	600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.61	0.30	0.68	0.93	0.26

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 92.1  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 36.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 81.4%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Swampscott Mall Driveway & Essex St





Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø9
Lane Configurations	↑	↑	↑	↑	↑		
Traffic Volume (vph)	700	120	37	826	10	15	
Future Volume (vph)	700	120	37	826	10	15	
Satd. Flow (prot)	1801	1531	1711	1801	1622	0	
Flt Permitted			0.261		0.981		
Satd. Flow (perm)	1801	1531	470	1801	1622	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	799	137	42	943	28	0	
Turn Type	NA	Perm	Perm	NA	Prot		
Protected Phases	6			2	4		9
Permitted Phases		6	2				
Total Split (s)	62.0	62.0	62.0	62.0	13.0		25.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	43.5	43.5	43.5	43.5	10.5		
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.21		
v/c Ratio	0.52	0.10	0.10	0.61	0.08		
Control Delay	7.5	4.5	6.0	9.6	31.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	7.6	4.5	6.0	9.6	31.3		
LOS	A	A	A	A	C		
Approach Delay	7.1			9.4	31.3		
Approach LOS	A			A	C		
Queue Length 50th (ft)	0	0	0	0	6		
Queue Length 95th (ft)	502	64	29	#771	44		
Internal Link Dist (ft)	486			296	259		
Turn Bay Length (ft)		150	150				
Base Capacity (vph)	1621	1378	423	1621	337		
Starvation Cap Reductn	51	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.51	0.10	0.10	0.58	0.08		

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 50.6  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 8.6  
 Intersection LOS: A  
 Intersection Capacity Utilization 60.6%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Harrison Rd & Loring Ave



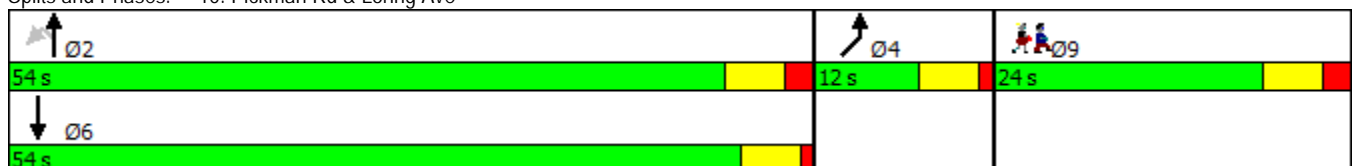


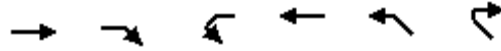
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations		↕	↕		↕		
Traffic Volume (vph)	10	826	800	30	35	20	
Future Volume (vph)	10	826	800	30	35	20	
Satd. Flow (prot)	0	1799	1792	0	1659	0	
Flt Permitted		0.988			0.969		
Satd. Flow (perm)	0	1779	1792	0	1659	0	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	0	954	947	0	63	0	
Turn Type	Perm	NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases	2						
Total Split (s)	54.0	54.0	54.0		12.0		24.0
Total Lost Time (s)		6.0	5.0		5.0		
Act Effct Green (s)		55.6	56.4		6.9		
Actuated g/C Ratio		0.75	0.76		0.09		
v/c Ratio		0.71	0.69		0.41		
Control Delay		13.9	12.7		41.6		
Queue Delay		0.5	0.0		0.0		
Total Delay		14.3	12.7		41.6		
LOS		B	B		D		
Approach Delay		14.3	12.7		41.6		
Approach LOS		B	B		D		
Queue Length 50th (ft)		172	154		24		
Queue Length 95th (ft)		#805	#779		#77		
Internal Link Dist (ft)		486	689		323		
Turn Bay Length (ft)							
Base Capacity (vph)		1337	1366		159		
Starvation Cap Reductn		100	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.77	0.69		0.40		

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 73.9  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 14.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Pickman Rd & Loring Ave



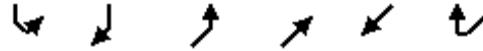


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	722	23	79	642	16	123
Future Volume (Veh/h)	722	23	79	642	16	123
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	782	25	86	695	17	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	922					
pX, platoon unblocked	0.75					
vC, conflicting volume	807					
vC1, stage 1 conf vol	1649					
vC2, stage 2 conf vol	782					
vCu, unblocked vol	807					
iC, single (s)	1697					
iC, 2 stage (s)	782					
tF (s)	4.1					
p0 queue free %	2.2					
cM capacity (veh/h)	3.5					
	3.3					
	89					
	75					
	66					
	818					
	69					
	394					

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	782	25	86	695	150
Volume Left	0	0	86	0	17
Volume Right	0	25	0	0	133
cSH	1700	1700	818	1700	256
Volume to Capacity	0.46	0.01	0.11	0.41	0.59
Queue Length 95th (ft)	0	0	9	0	84
Control Delay (s)	0.0	0.0	9.9	0.0	37.1
Lane LOS			A	E	
Approach Delay (s)	0.0	1.1		37.1	
Approach LOS			E		

Intersection Summary					
Average Delay			3.7		
Intersection Capacity Utilization			63.4%	ICU Level of Service	B
Analysis Period (min)	15				

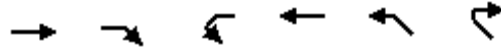




Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	51	14	12	447	460	65
Future Volume (Veh/h)	51	14	12	447	460	65
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.93	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	56	16	13	494	508	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				674		
pX, platoon unblocked	0.88					
vC, conflicting volume	1064	544	580			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1005	544	580			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	97	99			
cM capacity (veh/h)	233	539	994			
<b>Direction, Lane #</b>	<b>SB 1</b>	<b>NE 1</b>	<b>SW 1</b>			
Volume Total	72	507	580			
Volume Left	56	13	0			
Volume Right	16	0	72			
cSH	266	994	1700			
Volume to Capacity	0.27	0.01	0.34			
Queue Length 95th (ft)	27	1	0			
Control Delay (s)	23.5	0.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	23.5	0.4	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			45.4%	ICU Level of Service	A	
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	60	454	620	80	75	51
Future Volume (Veh/h)	60	454	620	80	75	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	68	513	700	90	85	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	790				1394	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790				1394	745
iC, single (s)	4.1				6.4	6.2
iC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				41	86
cM capacity (veh/h)	830				143	414
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	581	790	143			
Volume Left	68	0	85			
Volume Right	0	90	58			
cSH	830	1700	195			
Volume to Capacity	0.08	0.46	0.73			
Queue Length 95th (ft)	7	0	119			
Control Delay (s)	2.1	0.0	62.0			
Lane LOS	A		F			
Approach Delay (s)	2.1	0.0	62.0			
Approach LOS			F			
<b>Intersection Summary</b>						
Average Delay			6.7			
Intersection Capacity Utilization			85.6%	ICU Level of Service		E
Analysis Period (min)			15			



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	483	99	39	632	51	31
Future Volume (Veh/h)	483	99	39	632	51	31
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	545	112	44	714	58	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			657		1403	601
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			657		1403	601
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		60	93
cM capacity (veh/h)			931		147	500

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	657	758	93
Volume Left	0	44	58
Volume Right	112	0	35
cSH	1700	931	200
Volume to Capacity	0.39	0.05	0.47
Queue Length 95th (ft)	0	4	56
Control Delay (s)	0.0	1.2	37.8
Lane LOS		A	E
Approach Delay (s)	0.0	1.2	37.8
Approach LOS			E

Intersection Summary			
Average Delay		2.9	
Intersection Capacity Utilization		80.1%	ICU Level of Service D
Analysis Period (min)		15	

Warrants Summary												
<b>Information</b>												
Analyst	Seth Asante					Intersection	Tedesco St and Leggs Hill Rd					
Agency/Co	CTPS					Jurisdiction	Marblehead					
Date Performed	10/21/2016					Units	U.S. Customary					
Project ID	Route 1A-Vinnin Square					Time Period Analyzed	PM					
East/West Street	Tedesco Street					North/South Street	Leggs Hill Rd					
File Name	Warrants Analysis Tedesco_Leggs Hill					Major Street	East-West					
Project Description <i>Route 1A-Vinnin Square Priorit</i>												
<b>General</b>						<b>Roadway Network</b>						
Major Street Speed (mph)	35	<input checked="" type="checkbox"/>	Population < 10,000				Two Major Routes			<input type="checkbox"/>		
Nearest Signal (ft)	1000	<input type="checkbox"/>	Coordinated Signal System				Weekend Count			<input type="checkbox"/>		
Crashes (per year)	3	<input type="checkbox"/>	Adequate Trials of Alternatives				5-yr Growth Factor			1		
<b>Geometry and Traffic</b>	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	1	0	0	1	0	0	0	0	0	1	0
Lane usage	LTR			LTR						LTR		
Vehicle Volume Averages (vph)	0	556	0	0	541	0	0	0	0	0	142	0
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	24.5 / 1.4	--
<b>Warrant 1: Eight-Hour Vehicular Volume</b>												<input checked="" type="checkbox"/>
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--												<input checked="" type="checkbox"/>
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--												<input checked="" type="checkbox"/>
1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)												<input checked="" type="checkbox"/>
<b>Warrant 2: Four-Hour Vehicular Volume</b>												<input checked="" type="checkbox"/>
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)												<input checked="" type="checkbox"/>
<b>Warrant 3: Peak Hour</b>												<input checked="" type="checkbox"/>
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume ) --or--												<input checked="" type="checkbox"/>
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)												<input checked="" type="checkbox"/>
<b>Warrant 4: Pedestrian Volume</b>												<input type="checkbox"/>
4 A. Four Hour Volumes --or--												<input type="checkbox"/>
4 B. One-Hour Volumes												<input type="checkbox"/>
<b>Warrant 5: School Crossing</b>												<input type="checkbox"/>
5. Student Volumes --and--												<input type="checkbox"/>
5. Gaps Same Period												<input type="checkbox"/>
<b>Warrant 6: Coordinated Signal System</b>												<input type="checkbox"/>
6. Degree of Platooning (Predominant direction or both directions)												<input type="checkbox"/>
<b>Warrant 7: Crash Experience</b>												<input type="checkbox"/>
7 A. Adequate trials of alternatives, observance and enforcement failed --and--												<input type="checkbox"/>
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--												<input type="checkbox"/>

7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	<input checked="" type="checkbox"/>
<b>Warrant 8: Roadway Network</b>	<input type="checkbox"/>
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	<input type="checkbox"/>
8 B. Weekend Volume (Five hours total)	<input type="checkbox"/>
<b>Warrant 9: Grade Crossing</b>	<input type="checkbox"/>
9 A. Grade Crossing within 140 ft --and--	<input type="checkbox"/>
9 B. Peak-Hour Vehicular Volumes	<input type="checkbox"/>

# **APPENDIX G**

**MassDOT Highway Division  
Project Development Process**

## Overview of the Project Development Process

Transportation decision-making is complex and can be influenced by legislative mandates, environmental regulations, financial limitations, agency programmatic commitments, and partnering opportunities. Decision-makers and reviewing agencies, when consulted early and often throughout the project development process, can ensure that all participants understand the potential impact these factors can have on project implementation. Project development is the process that takes a transportation improvement from concept through construction.

The MassDOT Highway Division has developed a comprehensive project development process which is contained in Chapter 2 of the *MassDOT Highway Division's Project Development and Design Guide*. The eight-step process covers a range of activities extending from identification of a project need, through completion of a set of finished contract plans, to construction of the project. The sequence of decisions made through the project development process progressively narrows the project focus and, ultimately, leads to a project that addresses the identified needs. The descriptions provided below are focused on the process for a highway project, but the same basic process will need to be followed for non-highway projects as well.

### **1. Needs Identification**

For each of the locations at which an improvement is to be implemented, MassDOT leads an effort to define the problem, establishes project goals and objectives, and defines the scope of the planning needed for implementation. To that end, it has to complete a Project Need Form (PNF), which states in general terms the deficiencies or needs related to the transportation facility or location. The PNF documents the problems and explains why corrective action is needed. For this study, the information defining the need for the project will be drawn primarily, perhaps exclusively, from the present report. Also, at this point in the process, MassDOT meets with potential participants, such as the Metropolitan Planning Organization (MPO) and community members, to allow for an informal review of the project.

The PNF is reviewed by the MassDOT Highway Division district office whose jurisdiction includes the location of the proposed project. MassDOT also sends the PNF to the MPO, for informational purposes. The outcome of this step determines whether the project requires further planning, whether it is already well supported by prior planning studies, and, therefore, whether it is ready to move forward into the design phase, or whether it should be dismissed from further consideration.

### **2. Planning**

This phase will likely not be required for the implementation of the improvements proposed in this planning study, as this planning report should constitute the outcome of this step. However, in general, the purpose of this implementation step is for the project proponent to identify issues, impacts, and approvals that may need to be obtained, so that the subsequent design and permitting processes are understood.

The level of planning needed will vary widely, based on the complexity of the project. Typical tasks include: define the existing context, confirm project need, establish goals and objectives, initiate public outreach, define the project, collect data, develop and analyze alternatives, make recommendations, and provide documentation. Likely outcomes include consensus on the project definition to enable it to move forward into environmental documentation (if needed) and design, or a recommendation to delay the project or dismiss it from further consideration.

### **3. Project Initiation**

At this point in the process, the proponent, MassDOT Highway Division, fills out a Project Initiation Form (PIF) for each improvement, which is reviewed by its Project Review Committee (PRC) and the MPO. The PRC is composed of the Chief Engineer, each District Highway Director, and representatives of the Project Management, Environmental, Planning, Right-of-Way, Traffic, and Bridge departments, and the MassDOT Federal Aid Program Office (FAPO). The PIF documents the project type and description, summarizes the project planning process, identifies likely funding and project management responsibility, and defines a plan for interagency and public participation. First the PRC reviews and evaluates the proposed project based on the MassDOT's statewide priorities and criteria. If the result is positive, MassDOT Highway Division moves the project forward to the design phase, and to programming review by the MPO. The PRC may provide a Project Management Plan to define roles and responsibilities for subsequent steps. The MPO review includes project evaluation based on the MPO's regional priorities and criteria. The MPO may assign project evaluation criteria score, a Transportation Improvement Program (TIP) year, a tentative project category, and a tentative funding category.

### **4. Environmental Permitting, Design, and Right-of-Way Process**

This step has four distinct but closely integrated elements: public outreach, environmental documentation and permitting (if required), design, and right-of-way acquisition (if required). The outcome of this step is a fully designed and permitted project ready for construction. However, a project does not have to be fully designed in order for the MPO to program it in the TIP. The sections below provide more detailed information on the four elements of this step of the project development process.

#### **Public Outreach**

Continued public outreach in the design and environmental process is essential to maintain public support for the project and to seek meaningful input on the design elements. The public outreach is often in the form of required public hearings, but can also include less formal dialogues with those interested in and affected by a proposed project.

#### **Environmental Documentation and Permitting**

The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. This includes determining the appropriate project category for both the Massachusetts Environmental Protection Act (MEPA) and the National Environmental Protection Act (NEPA). Environmental documentation and permitting is often completed in conjunction with the **Preliminary Design** phase described below.

#### **Design**

There are three major phases of design. The first is **Preliminary Design**, which is also referred to as the 25-percent submission. The major components of this phase include full survey of the project area, preparation of base plans, development of basic geometric layout, development of preliminary cost estimates, and submission of a functional design report. Preliminary Design, although not required to, is often completed in conjunction with the Environmental Documentation and Permitting. The next phase is **Final Design**, which is also referred to as the 75-percent and 100-percent submission. The major components of this phase include preparation of a subsurface exploratory plan (if required), coordination of utility relocations, development of traffic management plans through construction zones, development of final cost estimates, and refinement and finalization of the construction plans. Once Final Design is complete, a full set of **Plans, Specifications, and Estimates (PS&E)** is developed for the project.



## Right-of-Way Acquisition

A separate set of Right-of-Way plans are required for any project that requires land acquisition or easements. The plans must identify the existing and proposed layout lines, easements, property lines, names of property owners, and the dimensions and areas of estimated takings and easements.

### **5. Programming (Identification of Funding)**

Programming, which typically begins during the design phase, can actually occur at any time during the process, from planning to design. In this step, which is distinct from project initiation, the proponent requests that the MPO place the project in the region's Transportation Improvement Program (TIP). The proponent requesting the project's listing on the TIP can be the community or it can be one of the MPO member agencies (the Regional Planning Agency, MassDOT, and the Regional Transit Authority). The MPO then considers the project in terms of state and regional needs, evaluation criteria, and compliance with the regional Transportation Plan and decides whether to place it in the draft TIP for public review and then in the final TIP.

### **6. Procurement**

Following project design and programming of a highway project, the MassDOT Highway Division publishes a request for proposals. It then reviews the bids and awards the contract to the qualified bidder with the lowest bid.

### **7. Construction**

After a construction contract is awarded, MassDOT Highway Division and the contractor develop a public participation plan and a management plan for the construction process.

### **8. Project Assessment**

The purpose of this step is to receive constituents' comments on the project development process and the project's design elements. MassDOT Highway Division can apply what is learned in this process to future projects.

## Project Development Schematic Timetable

Description	Schedule Influence	Typical Duration
<p><b>Step I: Problem/Need/Opportunity Identification</b> The proponent completes a Project Need Form (PNF). This form is then reviewed by the MassDOT District office which provides guidance to the proponent on the subsequent steps of the process.</p>	<p>The Project Need Form has been developed so that it can be prepared quickly by the proponent, including any supporting data that is readily available. The District office shall return comments to the proponent within one month of PNF submission.</p>	<p>1 to 3 months</p>
<p><b>Step II: Planning</b> Project planning can range from agreement that the problem should be addressed through a clear solution to a detailed analysis of alternatives and their impacts.</p>	<p>For some projects, no planning beyond preparation of the Project Need Form is required. Some projects require a planning study centered on specific project issues associated with the proposed solution or a narrow family of alternatives. More complex projects will likely require a detailed alternatives analysis.</p>	<p>Project Planning Report: 3 to 24+ months</p>
<p><b>Step III: Project Initiation</b> The proponent prepares and submits a Project Initiation Form (PIF) and a Transportation Evaluation Criteria (TEC) form in this step. The PIF and TEC are informally reviewed by the Metropolitan Planning Organization (MPO) and MassDOT District office, and formally reviewed by the PRC.</p>	<p>The PIF includes refinement of the preliminary information contained in the PNF. Additional information summarizing the results of the planning process, such as the Project Planning Report, are included with the PIF and TEC. The schedule is determined by PRC staff review (dependent on project complexity) and meeting schedule.</p>	<p>1 to 4 months</p>
<p><b>Step IV: Design, Environmental, and Right of Way</b> The proponent completes the project design. Concurrently, the proponent completes necessary environmental permitting analyses and files applications for permits. Any right of way needed for the project is identified and the acquisition process begins.</p>	<p>The schedule for this step is dependent upon the size of the project and the complexity of the design, permitting, and right-of-way issues. Design review by the MassDOT district and appropriate sections is completed in this step.</p>	<p>3 to 48+ months</p>
<p><b>Step V: Programming</b> The MPO considers the project in terms of its regional priorities and determines whether or not to include the project in the draft Regional Transportation Improvement Program (TIP) which is then made available for public comment. The TIP includes a project description and funding source.</p>	<p>The schedule for this step is subject to each MPO's programming cycle and meeting schedule. It is also possible that the MPO will not include a project in its Draft TIP based on its review and approval procedures.</p>	<p>3 to 12+ months</p>
<p><b>Step VI: Procurement</b> The project is advertised for construction and a contract awarded.</p>	<p>Administration of competing projects can influence the advertising schedule.</p>	<p>1 to 12 months</p>
<p><b>Step VII: Construction</b> The construction process is initiated including public notification and any anticipated public involvement. Construction continues to project completion.</p>	<p>The duration for this step is entirely dependent upon project complexity and phasing.</p>	<p>3 to 60+ months</p>
<p><b>Step VIII: Project Assessment</b> The construction period is complete and project elements and processes are evaluated on a voluntary basis.</p>	<p>The duration for this step is dependent upon the proponent's approach to this step and any follow-up required.</p>	<p>1 month</p>

Source: MassDOT Highway Division Project Development and Design Guide