
7. BUS TRANSIT IMPROVEMENTS

7.1 TRANSIT PROBLEMS

Malden Transportation Center Area Accessibility Issues

Pedestrian and bicycle needs are important considerations for the Route 60 corridor because of the high density of destinations, such as transit services, supermarkets, restaurants, schools, residences, and other businesses, along Route 60 in Malden and Medford. The Malden Transportation Center is the main transportation hub in the area; it is served by the MBTA Orange Line rapid transit, commuter rail, and buses, making it a multimodal transportation center (see Figure 24). The Malden Transportation Center was recently updated as part of an accessibility improvement program.⁹ As part of the Center's accessibility improvement project, the MBTA constructed concrete wheelchair ramps on the west side of the station. The MBTA also replaced the existing sidewalk and wheelchair ramps at the ends of the crosswalks along the MBTA busway at the end of Pleasant Street, the two midblock crosswalks, and the entrance to the station on Centre Street.

The Malden Transportation Center has a commuter parking lot for riders; however, this lot is full (at capacity) early in the morning. The 2003 MBTA Program for Mass Transportation rated parking expansion at Malden Center as "low" in priority, primarily due to the lack of available land for at-grade parking.¹⁰ According to a 2005–2006 bicycle parking inventory conducted by MPO staff, the Malden Transportation Center provides 152 bicycle parking spaces, a 130 percent increase over the 66 spaces in a 1999–2002 inventory. However, the bicycle parking areas are outdoors and are not sheltered.¹¹ The 2005–2006 inventory indicated that only 9 percent of the bicycle parking spaces were utilized; the low utilization rate could be due, in part, to the fact that the parking is not sheltered. Another accessibility problem is that segments of the sidewalks in the vicinity of the Malden Transportation Center, including sidewalks on Centre Street, Florence Street, and Pleasant Street, need to be repaired.

In general, the majority of the crosswalks in the vicinity of the Malden Transportation Center are indicated with two parallel white solid lines at a right angle to the sidewalks, instead of the standard ladder-type crosswalks, which are more visible to motorists and pedestrians. Also, some of the pedestrian push buttons are not functioning well at the signalized intersections in the vicinity of the station. At the Centre Street and Commercial Street intersection, there are no pedestrian push buttons for activating the pedestrian signals, which creates problems for the pedestrians crossing Commercial Street since its pedestrian phase does not turn on concurrently with the two-way through traffic on Centre Street.

Presently, pedestrians cross Commercial Street by looking for sufficient gaps in the traffic and making sure there are no right-turning vehicles. This creates problems for pedestrians and bicyclists. In addition, right turns on red at traffic lights are allowed during the exclusive pedestrian phase at the intersections of

⁹ Malden Center Station Accessibility Improvements, Site Plan, MBTA Contract Number A32CN01.

¹⁰ Program for Mass Transportation, Prepared for the Massachusetts Bay Transportation Authority by the Central Transportation Planning Staff, May 2003, revised January 2004.

¹¹ Jared Fijalkowski and Justin Yaitanes, of the Central Transportation Planning Staff to the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization, December 20, 2007, technical memorandum, "2005–2006 Inventory of Bicycle Parking Spaces and Number of Parked Bicycles at MBTA Stations."



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FIGURE 24
Malden Transportation Center

*Route 60 Mobility Study:
 Malden and Medford*

Centre and Commercial streets, Centre and Pearl streets, and Centre and Main streets, creating vehicle-pedestrian conflicts. The “WATCH FOR TURNING VEHICLES ON WALK SIGNALS” signs that have been installed at the signalized intersections in the vicinity contradict the “YIELD TO PEDESTRIANS” signs found at most intersections in Massachusetts, which are sometimes accompanied by a sign stating that state law requires motor vehicles to stop for pedestrians who are in a crosswalk.

Another accessibility problem at the Malden Transportation Center is that during congested periods, buses exiting the east busway to Commercial Street southbound to proceed to Centre Street eastbound sometimes have difficulty finding a gap in traffic. Sometimes only a single bus exits per cycle. In addition, because the MBTA busway exit on Commercial Street is located close to the intersection (about 60 feet away), it is frequently blocked by traffic queues on the southbound approach.

Bus Transit Service

Several bus transit routes run through the study corridor, but the majority of them have only a short segment on Route 60. The two bus routes that traverse a major portion of the corridor are bus Route 101 (Malden Center–Sullivan Square) and bus Route 325 (Elm Street, Medford–Haymarket Station). The MBTA has service standards that perform two important functions: (1) establish the minimum or maximum acceptable levels of service that the MBTA must provide to achieve its service objectives, and (2) provide a framework for measuring the performance of services as a part of its service evaluation process. The following are some of the standards used in evaluating bus service:

- Span of service refers to the hours during which service is accessible. The span-of-service standards define the minimum period of time that any given service will operate. This provides customers with the confidence that particular types of services will be available throughout the day. The minimum span of service for local routes are: weekdays 7:00 AM – 6:30 PM; and in high-density areas, Saturday 8:00 AM – 6:30 PM and Sunday 10:00 AM – 6:30 PM.
- Schedule adherence standards provide the tools for evaluating the on-time performance of individual MBTA routes. The schedule adherence standards vary, based on frequency of service; passengers using high-frequency services are generally more interested in regular, even headways than in strict adherence to published timetables, whereas passengers on less frequent services expect arrivals and departures to occur as published. The schedule adherence standard for bus service is that 75 percent of all time-points on the route over the entire service day must pass their on-time tests.
- The frequency-of-service standards establish the minimum frequency of service levels by time of day to maintain accessibility to the transportation network within a reasonable waiting period. On less heavily traveled services, these minimum levels dictate the frequency of service, regardless of customer demand. The minimum frequencies for local and community routes are: 30 minutes headway for AM and PM peak periods, 60 minutes headway for other periods, and 60 minutes headway for Saturday and Sunday. The MBTA also has a midday policy objective of 30 minutes headway in high-density areas.
- The vehicle load standards, which vary by mode and time of day, establish the average maximum number of passengers allowed per vehicle to provide a safe and comfortable ride. The vehicle load standards for buses is 140 percent for early AM, AM peak, midday school, and PM peak; 100 percent for other time periods.

Bus Route 101 operates between Malden Center Station and Sullivan Square Station, in Charlestown, via Medford Square and Winter Hill. The route serves communities along Centre and Pleasant streets in

Malden, and along Salem Street in Medford. According to the MBTA's 2008 Service Plan, Route 101 barely failed the loading standard when the standard was evaluated using 2005 ridecheck data.¹² However, current automated-passenger-count data confirm that while Route 101 is often filled to capacity, it very rarely violates the loading standard of 140 percent during peak periods. Route 101 also fails the frequency standard on weekends, which is 60 minutes.

Route 325 operates only on weekdays, from Elm Street at Fellsway West in Medford via Roosevelt Circle, Salem Street, and I-93 to Haymarket Station in Boston. Trips operating in the reverse peak direction (outbound in the morning and inbound in the afternoon) run express between Roosevelt Circle and Haymarket, while peak-direction trips (inbound in the morning and outbound in the afternoon) provide service along Fellsway West and Salem Streets between I-93 and Roosevelt Circle. A recent change, made in the spring of 2008, slightly decreased the frequency, but it addressed the failure to meet the span-of-service (time from the start of service in the morning to the end of service at night) standard on weekdays by moving the last outbound departure to 6:30 PM.

Figures 25 and 26 show the locations of the bus stops and the average weekday boarding and alighting counts at each stop for both inbound and outbound trips. An inventory of the amenities at the bus stops indicated that many of the stops had benches, and many had signs indicating which bus routes have a stop at that particular location. The bus stops do not have bus shelters or bus bays, except for the stop located in front of the Stop and Shop Supermarket on Centre Street in Malden. This bus stop also has a bus bay, which is separated from the travel lanes. At the rest of the bus stops, on-street parking is restricted to allow buses to use the shoulders for passenger boarding and alighting. The MBTA has a process for determining the placement of bus shelters; this process is described below under the section on bus shelters.

Travel Time

The main problem affecting bus transit service in the study corridor is traffic signal delay, which impacts the travel time of buses during peak periods. There are long traffic queues at some of the signalized intersections in the corridor during peak periods, and because buses receive no preferential treatment, it is difficult to achieve schedule adherence standards of 75 percent for all time-points on the route over the entire service day. According to the MBTA's 2008 Service Plan, Routes 101 and 325 fail the schedule adherence standard on weekdays, and Route 101 and Route 325 meet the schedule adherence standard only 60 percent and 43 percent of the time, respectively. About one half of this problem may be attributed to congestion in the Route 60 portion of these routes. Thus, traffic congestion in the Route 60 corridor appears to contribute to longer travel times and less reliable service for bus transit.

7.2 IMPROVEMENTS TO BUS TRANSIT

There are several performance measures that can be altered to improve quality of service. This study did not look at altering quality of service standards, such as service delivery, safety, security, and service availability, to improve service on those routes. The MBTA's Service Plan, updated every two years, deals with service delivery and availability changes. Every two years the MBTA Service Planning Department reviews the level of usage of bus services and reallocates services based on consumer demand. Service standards, as defined in the MBTA's Service Delivery Policy, are used to evaluate route performance. These standards measure ridership, loading, reliability, and other factors. The MBTA held a number of community workshops throughout the greater Boston area in May and June of 2007 to solicit suggestions from the public for the 2008 Service Plan. The MBTA also held community workshops to present the 2008 Service

¹² Final 2008 Service Plan: Bus, Rapid Transit, and Boat Service Changes and Service Delivery Policy Modifications, Massachusetts Bay Transportation Authority, Fall 2008.

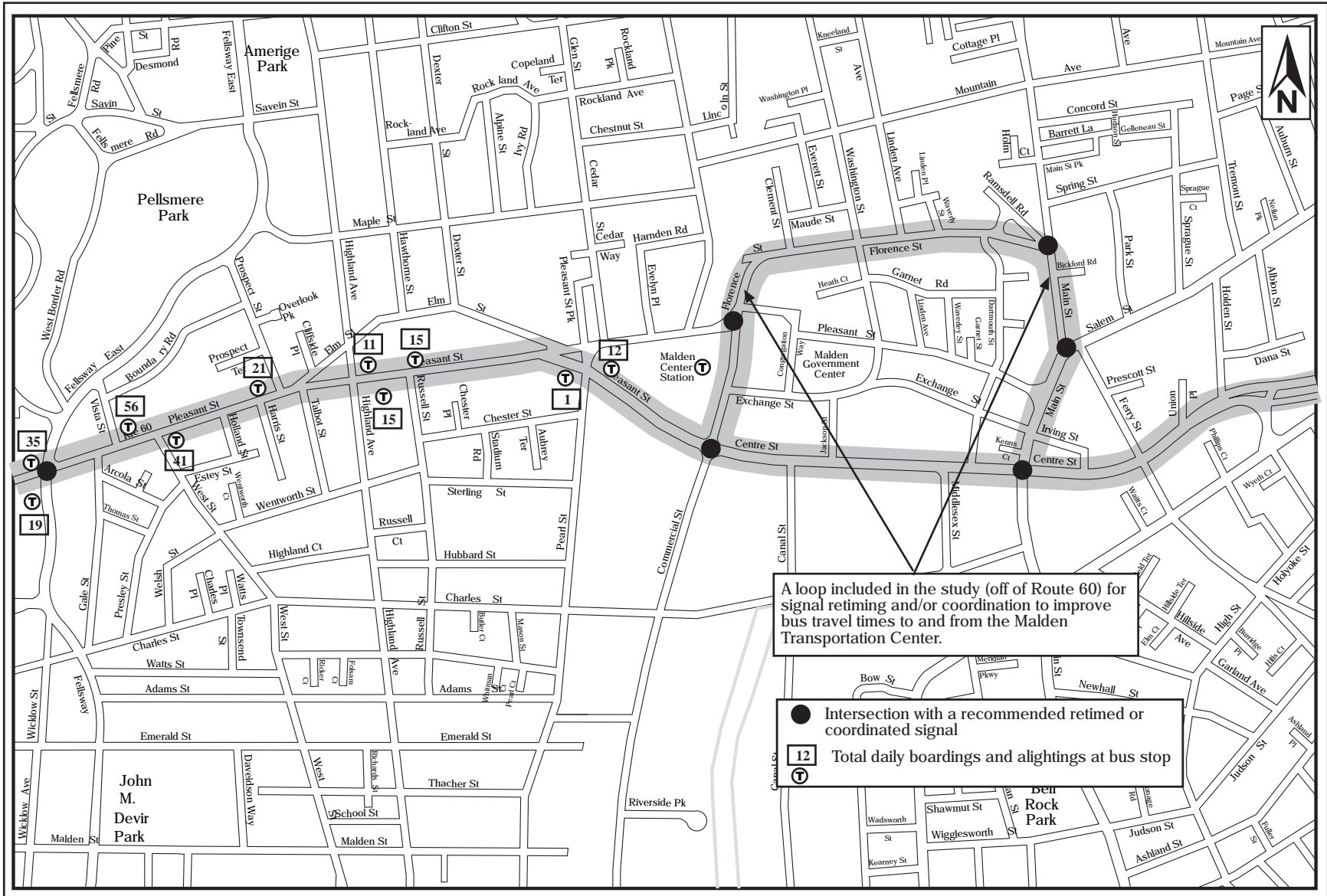


FIGURE 25
Daily Boardings and Alightings at Bus Stops on Route 60 in Malden

Plan and solicit feedback from the public regarding service changes that were proposed in the Plan. The Final 2008 Service Plan is located on the MBTA's website at www.mbta.com/uploadedfiles/About_the_T/T_Projects/T_Projects_List/Final_2008_Service_Plan.pdf.

2008 Service Plan (Recommendations for Routes 101 and 325)

The 2008 Service Plan had the following recommendations for bus Routes 101 and 325.

1. Route 101 technically fails the load standard on weekdays and the frequency of service standard on Saturday and Sunday, as buses operate every 65 minutes rather than every 60 minutes. Route 101 meets the schedule adherence standard 60 percent of the time instead of 75 percent of the time. According to the 2008 Service Plan, no change is recommended for this route for the following reasons:
 - a. Although the bus is often filled to capacity, it very rarely violates the load standards. The MBTA will monitor ridership closely.
 - b. Tightening the headway would require adding a bus to the route on weekends, but ridership levels at those times do not warrant this additional expense.
2. According to the 2008 Service Plan, Route 325 meets the schedule adherence standard on weekdays 43 percent of the time instead of 75 percent of the time, and technically fails the weekday span-of-service standard, which is service from 7:00 AM to 6:30 PM. According to the 2008 Service Plan, the following changes have already been implemented:
 - a. The changes to the route in the spring of 2008 addressed the failure of the span-of-service standard by moving the last outbound departure from 6:29 PM to 6:30 PM. The changes also eliminated the failure of the cost standard.
 - b. Run times were modified for the summer 2008 schedules to create more accurate arrival times on the schedule, allowing customers to better plan their travel.

Bus Shelters

The MBTA Operations department is responsible for evaluating bus shelter placement requests and ensuring compliance with the federal Title VI regulations. The first step in the evaluation process is a determination of whether or not the bus stop conforms to shelter eligibility standards (see Appendix A). The number of boardings at a bus stop is a major determinant of eligibility for having a bus shelter. A number of other criteria are also considered. To standardize the process, the criteria have been given numeric values. A site must receive a total of 70 points to be considered eligible for a shelter under this policy. The second step in the evaluation process is the site suitability test; there are physical and practical requirements that must be met before a shelter can be placed. These include: property ownership, abutter approval, compliance with the Americans with Disabilities Act requirements, adequate physical space and clearances, close proximity to an existing bus stop, and community approval.

As Figures 25 and 26 show, some of the bus stops in the study corridor may be eligible for a shelter based on the number of boardings described in the first step of the evaluation process. Such bus stops in the Medford section include #5282 Salem Street, at Grant Avenue, and #5287 Salem Street, at Allen Court, for the inbound direction. However, site suitability tests in the second step of the evaluation process may prove challenging because of lack of space on the sidewalks and other issues. Bus shelters would significantly decrease the width of sidewalks and therefore might create problems for pedestrians and bicycles. Therefore, no recommendation is made in this report about installing bus shelters.

Bicycle Parking

The 2005–2006 bicycle-parking inventory indicated that only 9 percent of the bicycle parking spaces at the Malden Transportation Center Station were utilized. However, the utilization rate is expected to increase when high gas prices result in ridership increases on the MBTA system. Improvements suggested for bicycle parking include adding a roof or other shelter over each bicycle rack. This should be easiest at locations closest to the station building. Adding lights to illuminate bicycle racks would increase safety and security.

Station Access

Pedestrian safety and access improvements were developed for the signalized intersections on Route 60 in the Malden section of this report; they include the intersections of Centre Street at Commercial Street and Centre Street at Main Street in the vicinity of the Malden Transportation Center (see Chapter 4 for more details). In addition to these two intersections, the streets of the loop formed by Centre Street, Main Street, Florence Street, and Commercial Street were evaluated for pedestrian and accessibility improvements in a previous study.¹³ In that study, staff recommended the following improvements to increase ease of access to the Malden Transportation Center for all pedestrians and bicyclists in the area, as well as for all transit users, including bicyclists and pedestrians.

- Repair and maintain the sidewalks on Centre Street, Pleasant Street, and Florence Street to increase safety for pedestrians, wheelchair users, and stroller users.
- Add exclusive pedestrian phases and “NO TURN ON RED” signs at the intersection of Centre Street and Commercial Street to increase safety and reduce vehicle-pedestrian conflicts.

An alternative to an exclusive pedestrian phase and “NO TURN ON RED” signs at Centre Street and Commercial Street would be to have concurrent crossings and add “YIELD TO PEDESTRIANS” signs. This would reduce delay for all users. This could also allow for the elimination of all pedestrian-activated push buttons. However, this would not reduce vehicle-pedestrian conflicts; hence it would not provide the same level of safety as an exclusive pedestrian phase.

- Install pedestrian-crossing signals that have a countdown display at the following intersections: Centre Street at Commercial Street, and Pleasant Street at Commercial Street/Florence Street.
- Fix the malfunctioning pedestrian-activated push buttons and install the missing pedestrian crossing signals at the intersections of Centre Street at Commercial Street and of Centre Street at Pearl Street that had been removed.
- Install “YIELD TO PEDESTRIANS” signs at all traffic approaches at intersections with concurrent pedestrian phases in the vicinity of the Malden Transportation Center. Replace “WATCH FOR TURNING VEHICLES ON WALK SIGNALS” signs with “YIELD TO PEDESTRIANS” signs, which place an emphasis on motorists yielding for pedestrians in crosswalks, which is required by state law.
- Paint the crosswalks at the intersections in the vicinity of the Malden Transportation Center that have only two white parallel stripes with ladder-style stripes, which are more visible to both motorists and pedestrians (at Centre Street and Commercial Street, and at Pleasant Street and Florence Street/Commercial Street).

¹³ Improving Pedestrian and Bicycle Access to Selected Transit Stations, a report produced by the Central Transportation Planning Staff for the Massachusetts Highway Department and the Massachusetts Bay Transportation Authority, September 2005.

- Implement transit signal priority at this intersection to reduce delay for buses trying to exit the east busway to Commercial Street southbound to get to Centre Street eastbound. Implementing a transit signal priority at this intersection would require a signal system upgrade to enable it handle a request from buses, and buses would need to be equipped with technology to submit a request. For transit signal priority to operate efficiently, the east busway exit might have to be signalized and tied to the main signal at the intersection of Centre Street and Commercial Street, or some form of signage might have to be installed at the east busway exit, to prevent Commercial Street southbound vehicles from blocking the busway exit when a bus request is submitted.

Travel-Time Improvements

Because the 2008 Service Plan dealt with service span, frequency, load, and cost failures, efforts in this study were concentrated on improving travel times in the study corridor to improve schedule adherence to the on-time standard. To improve bus transit operations in the corridor, particularly bus circulation to and from Malden Transportation Center and in the Route 60 study corridor, staff recommend signal retiming and coordination for the following eight signalized intersections.

1. Pleasant Street (Route 60) and Fellsway East in Malden
2. Centre Street (Route 60) and Commercial Street in Malden
3. Centre Street and Main Street in Malden
4. Salem Street and Park Street in Medford
5. Salem Street and Fellsway West in Medford
6. Pleasant Street and Commercial/Florence Street in Malden
7. Main Street and Florence Street in Malden
8. Main Street, Salem Street, and Ferry Street in Malden

Traffic signal coordination is suggested for the abovementioned signals except for the intersection Salem Street and Park Street in Medford, which is an isolated signalized intersection. The first five signalized intersections were already part of the list of study intersections suggested by municipal officials as locations with pedestrian and vehicular safety and operations problems. The last three intersections were added to the study later on to improve bus circulation at the station area, particularly in the loop consisting of Centre Street, Main Street, Florence Street, and Commercial Street (see Figure 25). Figures 27 through 29 show the traffic volumes and pedestrian counts for the three intersections in the loop, where upgrades can be made cost-effectively. The traffic volumes and pedestrian counts were conducted during the peak travel periods, 7:00–9:00 AM and 4:00–6:00 PM.

Tables 11 and 12 show that signal retiming and coordination could improve travel time in the study corridor by approximately 5 to 7 percent in the peak direction of travel (inbound in the AM peak period and outbound in the PM peak period). The results also show that travel time in the study corridor could be improved by approximately 11 to 14 percent in the off-peak direction (outbound in the AM peak period and inbound in the PM peak period). Thus, traffic signal retiming and coordination improvements should reduce congestion and delays for all roadway users, including bus riders.

7.3 SUMMARY OF IMPROVEMENTS

Table 13 summarizes the recommended improvements for bus transit in the corridor. Successful implementation of the projects advancing from this study is dependent on coordination between the City of Malden and the Massachusetts Bay Transportation Authority, and on securing funding for the projects.

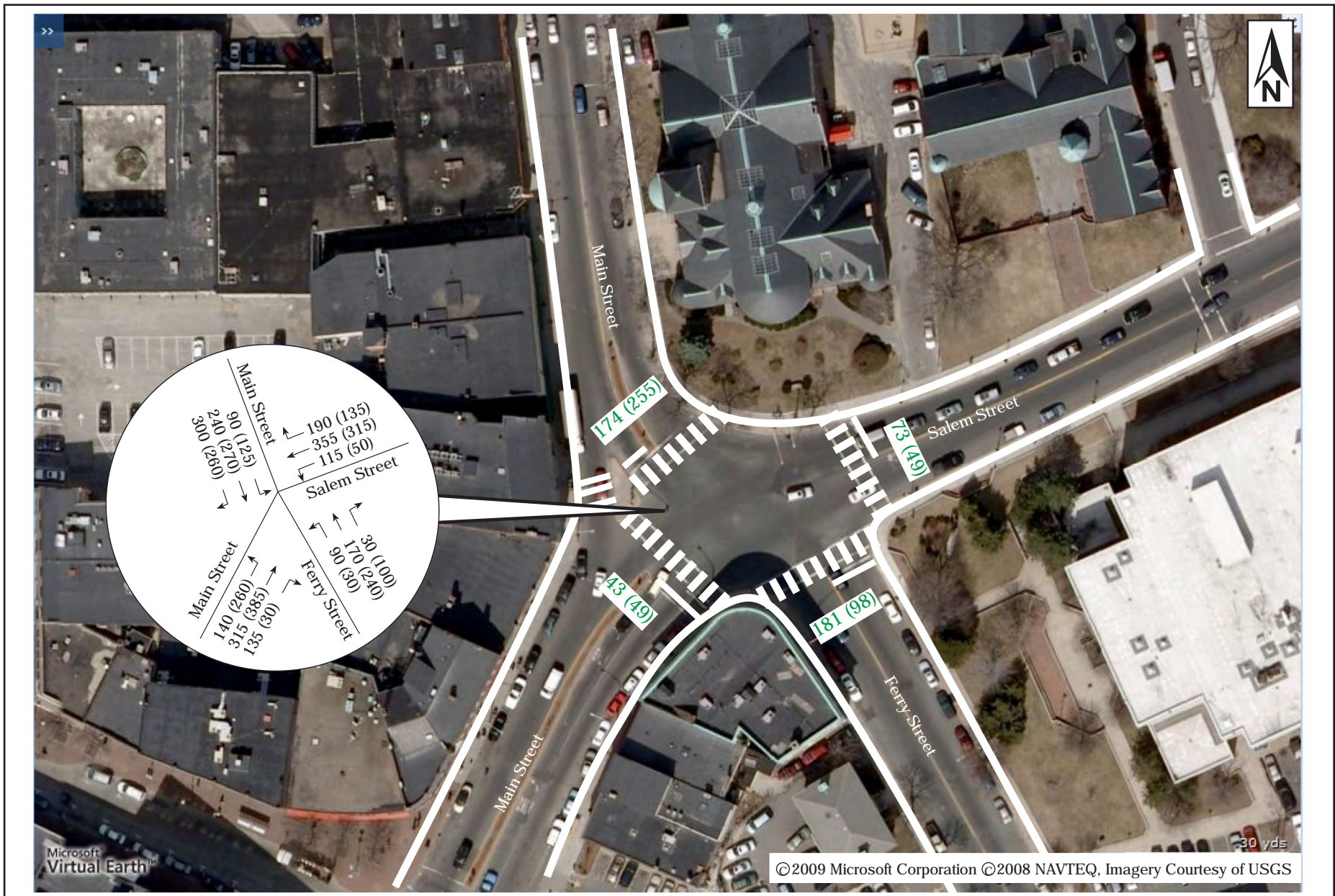


FIGURE 27
 Pedestrian and Vehicular Volumes at the
 Main Street, Salem Street, and Ferry Street Intersection in Malden

*Route 60 Mobility Study:
 Malden and Medford*

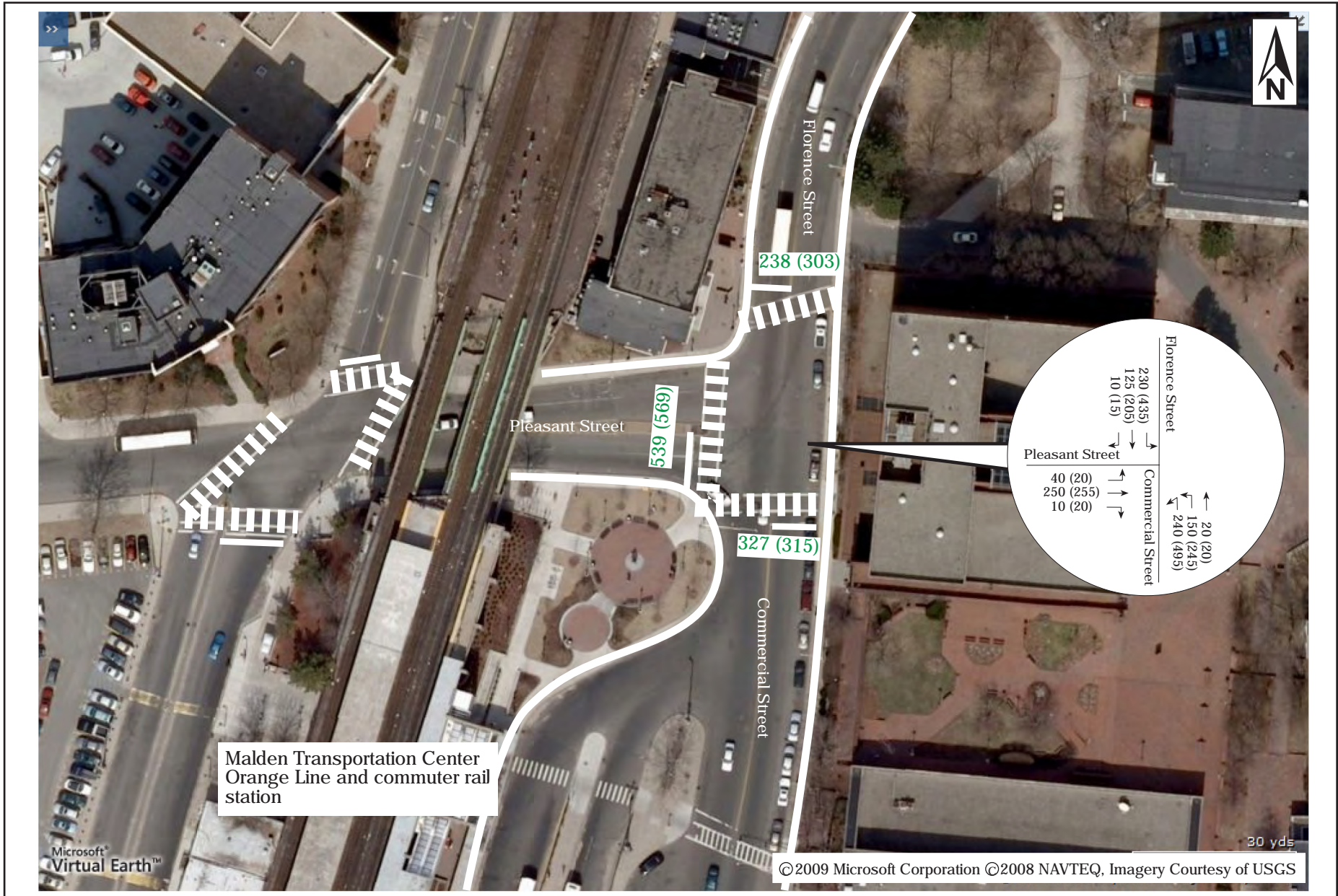


FIGURE 28
 Pedestrian and Vehicular Volumes at the
 Pleasant Street and Commercial/Florence Street Intersection in Malden

*Route 60 Mobility Study:
 Malden and Medford*



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FIGURE 29
 Pedestrian and Vehicular Volumes at the
 Main Street and Florence Street Intersection in Malden

*Route 60 Mobility Study:
 Malden and Medford*

TABLE 11
Results of Signal Retiming and Coordination:
AM Peak Hour

AM Peak Hour (Inbound)						
Arterial Segment	City	Distance	Travel Time (seconds)		Arterial Speed (mph)	
			Optimized	Existing	Optimized	Existing
<i>Commercial Street</i> From Florence Street to Centre Street	Malden	0.10	47.4	38.8	11	11
<i>Centre Street</i> From Commercial Street to Pearl Street	Malden	0.15	36.8	34.8	13	13
<i>Pleasant Street</i> From Pearl Street to Mary Street	Malden	0.65	207.0	245.0	12	10
<i>Salem Street</i> From Mary Street to Medford City Hall	Medford	1.05	434.0	450.0	11	12
Total		1.95	725.2	768.6	11	11
			Difference = 43.4 sec (5.7%)		Difference = 0	
AM Peak Hour (Outbound)						
Including the loop on Main Street and Florence Street						
<i>Salem Street</i> From Medford City Hall to Mary Street	Medford	1.05	229.0	232.0	15	15
<i>Pleasant Street</i> From Mary Street to Pearl Street	Malden	0.65	152.3	156.7	16	15
<i>Centre Street</i> From Pearl Street to Main Street	Malden	0.40	76.5	92.3	19	17
<i>Main Street</i> From Centre Street to Florence Street	Malden	0.30	103.2	182.0	10	6
<i>Florence Street</i> From Main Street to Pleasant Street	Malden	0.40	66.4	66.9	20	20
Total		2.80	627.4	729.9	16	14
			Difference = 102.5 sec (14%)		Difference = 2 mph (12%)	

TABLE 12
Results of Signal Retiming and Coordination:
PM Peak Hour

PM Peak Hour (Inbound)						
Arterial Segment	City	Distance	Travel Time (seconds)		Arterial Speed (mph)	
			Optimized	Existing	Optimized	Existing
<i>Commercial Street</i> From Florence Street to Centre Street	Malden	0.10	37.5	37.7	11	11
<i>Centre Street</i> From Commercial Street to Pearl Street	Malden	0.15	25.6	40.7	17	11
<i>Pleasant Street</i> From Pearl Street to Mary Street	Malden	0.65	172.3	196.7	15	14
<i>Salem Street</i> From Mary Street to Medford City Hall	Medford	1.05	566.2	627.0	12	11
Total		1.95	801.6	902.1	13	12
			Difference = 100 sec (11%)		Difference = 1 mph (8.3%)	
PM Peak Hour (Outbound)						
Including the loop on Main Street and Florence Street						
<i>Salem Street</i> From Medford City Hall to Mary Street	Medford	1.05	458.4	467.9	14	12
<i>Pleasant Street</i> From Mary Street to Pearl Street	Malden	0.65	307.0	345.0	10	9
<i>Centre Street</i> From Pearl Street to Main Street	Malden	0.40	112.6	113.0	14	14
<i>Main Street</i> From Centre Street to Florence Street	Malden	0.30	128.6	141.9	8	7
<i>Florence Street</i> From Main Street to Pleasant Street	Malden	0.40	56.6	71.6	23	18
Total		2.80	1063.2	1139.4	14	13
			Difference = 76.0 sec (6.6%)		Difference = 1 mph (7.7%)	

TABLE 13
Summary of Improvements Related to Bus Transit

Location	Improvement	Expected Benefits	Costs	Implementing Agency
Centre Street and Commercial Street	Add exclusive pedestrian phase and “NO TURN ON RED” signs. Fix malfunctioning pedestrian-activated push buttons and install missing pedestrian crossing signals.	Increase safety and reduce vehicle-pedestrian conflicts.	See footnote ¹⁴	City of Malden/ MBTA
	Install countdown pedestrian signals.	Increase pedestrian safety by giving useful information to pedestrians.		
	Implement transit signal priority.	Reduce waiting times for buses to exit from the east busway.		
	Paint the crosswalks with ladder-style stripes.	Make crosswalks safer for pedestrians by making them more visible to both motorists and pedestrians.		
Pleasant Street and Commercial Street/Florence Street	Install countdown pedestrian signals.	Increase pedestrian safety by giving useful information to pedestrians.	\$20,000	City of Malden
	Paint the crosswalks with ladder-style stripes.	Make crosswalks safer for pedestrians by making them more visible to both motorists and pedestrians.		
	Install “YIELD TO PEDESTRIANS” signs.	Increase motorists’ awareness of pedestrians.		
Centre Street and Pearl Street	Fix the malfunctioning pedestrian-activated push buttons and install missing pedestrian crossing signals.	Increase pedestrian safety by providing better equipments.	\$50,000	City of Malden
	Install “YIELD TO PEDESTRIANS” signs	Increase motorists’ awareness of pedestrians.		
	Align wheelchair ramps, curb cuts, and crosswalks in the direction of pedestrian flow, parallel to Centre Street.	Increase pedestrian safety by providing better equipments		
Centre Street, Pleasant Street, Commercial Street, and Florence Street in the vicinity of the Malden Transportation Center Station	Repair and maintain sidewalks.	Make sidewalks safer and help prevent injuries caused by defective sidewalks to users of wheelchairs and strollers, pedestrians, and bicyclists.	\$50,000	City of Malden/ MBTA
	Paint the crosswalks with ladder-style stripes.	Make crosswalks safer for pedestrians by making them more visible to both motorists and pedestrians.		
Malden Center Station	Add a roof/shelter over the bike racks Add lights to illuminate bicycle racks at night.	Improve safety and quality of service for bicyclists.		MBTA
Centre Street, Main Street, Florence Street, and Commercial Street	Retime and/or coordinate the traffic signals along the loop.	Assist bus operations, particularly circulation to and from Malden Center Station. Improve bus transit schedule adherence and on-time performance.	\$100,000	City of Malden

¹⁴ Already accounted for in the summary of improvements for Malden in Table 5.

