May 29, 2025

Mr. Stephen Rolle
Transportation & Mobility Commissioner
City of Worcester
76 East Worcester Street
Worcester, MA 01604

RE: Worcester - Providence Street at Holcombe Street
Link to Site in Google Maps:
http://maps.google.com/maps?q=42.246068304366446,-71.79188900642326
All Way Stop Control (AWSC)
MassDOT District 3

Dear Mr. Rolle:

Greenman-Pedersen, Inc. (GPI), on behalf of MassDOT, has completed its review of the above-referenced intersection in Worcester, MA, for eligibility to convert to All-Way Stop Control (AWSC) for this project cycle. MassDOT is collaborating with communities to identify, investigate, and assist in converting municipally owned intersections from two-way stop control to all-way stop control, to address known safety issues. The intersection of Providence Street at Holcombe Street was identified as eligible for further assessment based on its crash history, a preliminary evaluation of the existing conditions, and community interest in participating in the program.

This evaluation found that the intersection of Providence Street at Holcombe Street is **recommended for moving forward with conversion to All-Way Stop Control.** The following provides a summary of the report's key findings and details regarding the logistics for implementing the AWSC conversion for locations that were deemed suitable.

GENERAL DESCRIPTION OF THE INTERSECTION

Providence Street at Holcombe Street consists of three (3) approaches, and recent crash statistics indicate nine (9) angle crashes that are susceptible to correction with AWSC, between January 1, 2019, and December 31, 2021. The crash history meets MUTCD warrant A (Crash Experience) for all-way stop control.

The intersection is located in an urban residential environment. Holcombe Street has a downward grade toward the intersection. Buffered sidewalks are present along Providence Street, and conventional sidewalks are along Holcombe Street. A crosswalk crosses Holcombe Street. On-street parking is permitted along both Holcombe Street and Providence Street; however, it is restricted on Holcombe Street at the intersection due to the presence of a bus stop. An overhead cobra head luminaire is present at the intersection. Recreation fields are present on the westerly side of Providence Street. A small monument and plaque for Gurwitz Square are located in the southeast quadrant. The signalized intersection of Winthrop Street and Providence Street is located approximately 900 feet north. Due to the grade difference between the roadway and the residences on the easterly side of Providence Street, retaining walls are present immediately behind the sidewalk.

Due to construction activities during the project's data collection phase, turn movement and speed data were not collected at the intersection. The City of Worcester provided GPI with StreetLight intersection traffic data for the traffic operations assessment.

Table 1 provides an overview of the observed conditions at the intersection.

Table 1 – Intersection Characteristics

Road	Speed Regulation Present	Speed Reg. or Posted Limit (mph)[a]	85th % (mph)	50th % (mph)	Statutory Speed (mph)[b]	Design Speed	Federal Functional Classification	ADT[c]
Providence Street[d]	No	N/A	35	30	25	35	Minor Arterial	10,435[e]
Holcombe Street	No	N/A	N/A	N/A	25	25	Local	N/A

[a] If Speed Regulation is not present, the posted speed limit value shown is from the MassDOT Road Inventory Speed Limit field, and the posting is not supported by a Regulation; N/A indicates data is not available
[b] Municipality has opted in for Chapter 90 Section 17C - (25mph Statutory Speed)
[c] Average daily traffic major approach only; see appendix for minor approach turning movement counts
[d] Major Street
[e] Estimate from StreetLight

General Speed Limit Considerations

All posted speed limits must be established by and conform to a Special Speed Regulation (SSR). It is recommended that for road segments with SSRs, the community should replace any non-compliant posted speed limit signs with appropriate signs in the correct locations so that the speed limits can be enforced, and citations adjudicated accordingly. If there is no SSR for the roadway segment, the statutory speed limit prevails, and any posted speed limit signs should be removed.

TRAFFIC OPERATIONS EVALUATION

A peak-hour operations analysis of unadjusted turning movement counts at the intersection was conducted for the morning and evening peak hours to determine the impacts of converting the intersection to an All-Way Stop Control. The operations analysis was conducted utilizing the methodologies outlined in the Highway Capacity Manual 7th Edition (HCM)[1] with analysis tools of Synchro[2] or Highway Capacity Software[3]. **Table 2** presents the worst case predicted Levels of Service (LOS) along the main line and side street approaches, as well as an overall intersection LOS. Raw traffic count data, along with the full traffic operations analysis outputs, are included in the appendix.

If the operations analysis indicates that LOS D or better occurs along all approaches, the intersection is rated as acceptable for AWSC operations. If LOS E is anticipated along the currently free-flowing major street approach, the intersection will require further assessments to determine if AWSC would be appropriate, and if any currently free-flowing major street approach operates at a LOS F (failing), it was determined that AWSC would not be an appropriate measure.

Table 2 - Level of Service Operations

OPERATIONS ANALYSIS SCENARIO	LOS RESULTS
Major Street: (Providence Street) Worst Case LOS:	B
Minor Street: (Holcombe Street) Worst Case LOS:	B
Overall Intersection Worst Case LOS:	B
Recommendation based on LOS:	**Pass**

[1] *Highway Capacity Manual 7th Edition* Transportation Research Board; Washington, D.C.; 2022
[2] *Synchro plus SimTraffic 11*; Trafficware Ltd.; Sugar Land, TX.; 2018
[3] *Highway Capacity Software 7; McTrans; Gainesville, Fl; 2022*

SITE ASSESSMENT

A desktop assessment was conducted for all locations that met the traffic operation evaluation criteria to determine whether the site conditions at the intersection are suitable for AWSC conversion. This assessment considered intersection and approach geometry, sight distance, existing access management, interaction with nearby intersections, and other important factors. **Table 3** provides a summary of some of the common assessment features considered at each location. It should be noted that the information listed in Table 3 is intended to help inform the recommendation for AWSC conversion; however, it is not an all-encompassing list.

A field assessment of the site was not conducted.

Table 3 – Site Assessment Summary

EVALUATION CONDITION	RESULT
Is there an intersection where spillback occurs? (Could be a result of AWSC queueing or adjacent intersection queues impacting AWSC location)	Yes
Is there an at-grade railroad crossing along any approaches to the intersection?	No
Is the minor road at an awkward skew or are there any other issues requiring widely separated STOP positions?	No
Does the placement of curb ramps impact STOP locations or operations?	No
Will the AWSC hinder any adjacent driveways or streets?	No
Are dedicated turn lanes provided on any approaches?	No
Are bike lanes provided on any approaches?	No
Is there any roadway superelevation? (Typically, may occur on higher speed/volume mainline approaches)	No
Are there any site conditions that could impact sign placement? (Limited ROW, physical obstructions, shaded area for LED, etc.)	Yes
Does the available sight distance approaching the intersection exceed the minimal stopping sight distance based on the Design Speed from Table 1? (Main Road > 250 ', Minor Road > 173 ')	Yes

AWSC CONVERSION RECOMMENDATION

Based on the engineering analysis and site visit, this intersection is **recommended for moving forward with conversion to All-Way Stop Control.**

Due to the limited Right-of-Way available, signage along Holcombe Street is anticipated to need to be installed within the front or back of the sidewalk. Stop bars shall be at least four feet from existing crosswalks.

The operational analysis indicates that the new stop condition on Providence Street southbound will experience minimal queuing during peak travel periods and will not impact the operations of the Winthrop Street and Providence Street intersection towards the north. Since the analysis was conducted utilizing StreetLight data, it is recommended that the City observe intersection operations after installation to confirm that operations are consistent with predictions.

It is recommended that the City consider, as a separate project, adding crosswalks and tip-down ramps crossing Providence Street at the intersection. The new stop condition on Providence Street creates an opportunity to provide a safe crossing location connecting the residential neighborhood towards the east with the recreational fields.

NEXT STEPS

For intersections recommended for AWSC conversion, a design package has been prepared and included in the appendix of this memorandum that provides the necessary details for the conversion. The design package includes an aerial plan, standard details, and a summary of materials that will be supplied by MassDOT. The aerial plan will indicate the Work Items required for AWSC conversion. The work items are divided into two categories:

- *Work Items supplied by MassDOT, installed by the community*,
- and *Work Items supplied and installed by the community*.

If the community agrees with the findings and recommendations in this memorandum, it must perform the necessary internal steps to gain approval for an intersection control and relay confirmation of that approval to GPI and MassDOT.

The standard AWSC conversion sign package includes LED stop signs on both the major and minor street intersection approaches. LED stop signs are an effective tool to improve intersection safety by gaining driver attention and increasing the intersection's conspicuity. However, LED stop signs require continuing maintenance to ensure effective operation, including battery and solar panel maintenance and routine vegetation clearing to ensure adequate sunlight for charging. The flashing lights along the LED stop sign border may also result in concerns from residents adjacent to the intersection. Traditional static STOP signs may be provided and installed as an alternative, if specifically requested by the municipality. **It is essential that communities review the LED STOP signs proposed in the AWSC conversion sign package to ensure site conditions have been considered and to determine if LED STOP signs are still preferred for this location.**

A Memorandum of Agreement (MOA) between Worcester and MassDOT will need to be executed. This MOA will establish the agreed-upon conditions under which the assets provided by MassDOT to Worcester will be installed, and agreement to complete the required community element tasks identified in the attached plan. Upon executing this MOA, MassDOT will fabricate and deliver the proposed signs and materials identified in this memorandum (see the **Appendix** for the list of proposed signs).

All improvements shown on the enclosed design plan, some of which will be provided by MassDOT and others by the community as indicated, are required for the AWSC conversion. Other optional treatments are described in the report that the community can choose to install at their cost to supplement the required elements. **If the community has any concerns or requests for changes to the proposed design, please bring them to our attention within 5 days of receipt of this report as this project is advancing on a tight timeline.**

The following is a summary of the Work Items included in this project. Please refer to the design package for detailed information on the **Work Items.**

Required Work Items:
The proposed signs and quantities to be provided by MassDOT for the municipality to install are shown in **Table 4.** All new STOP signs, either LED or standard, will be supplemented with red signpost reflectors. Note – the proposed sign locations indicated in the Design Plan (see appendix) are intended to conform to MUTCD guidance, but should be modified in the field as needed to optimize their visibility and to accommodate roadside features such as lawns, landscaping, driveways, building entrances, pedestrian ramps, and any other features that might be considered sensitive.

Table 4 – Quantities

TYPE OF SIGN	QUANTITY
LED Stop Sign (R1-1)	5
Stop Ahead Sign (W3-1)	5
All-Way Placard (R1-3P)	5
New Traffic Pattern Ahead (W23-2)	2
Total Number of Square Tube Signposts	12

Required Work Items supplied and installed by the Community:

- STOP bars are to be provided along each approach according to the Design Plan.
- Existing lane markings to be removed where needed to conform to new stop bar locations.
- Removal or relocation of existing signage as noted on the provided plans.

Optional Work Items:

Optional Work for consideration by the municipality includes:

- NEW plaques on STOP signs on new controlled approaches (W16-15p)
- Yellow signpost reflectors on STOP AHEAD signposts
- NEW TRAFFIC PATTERN AHEAD signs on minor approaches – recommend removal after 6 months
- Warning flags on STOP AHEAD signs on new control approaches
- Pavement Markings – install STOP and STOP AHEAD stencils
- Changeable message signs – install prior to conversion for advance notice to drivers
    - Recommended 2 weeks in advance and 2 weeks after installation
- Optical speed bars – install for speed management on intersection approaches
- Speed study – perform speed measurements after the acclimatization period to determine if a speed limit change on the new stopped approaches would be supported
- Refresh crosswalks and install a crosswalk across Providence Street.

Included in the memorandum appendix is an ***informational flyer that provides best practices and recommendations*** for changing an intersection control within a community as well as the traffic volume, LOS analysis and speed data collected for the intersection of Providence Street at Holcombe Street as part of the project. The municipality is strongly encouraged to notify the community of the upcoming change in traffic control prior to implementing the change.

Should you have any questions or concerns, please contact me directly at jdiaz@gpinet.com or at 978-570-2953.

Sincerely,

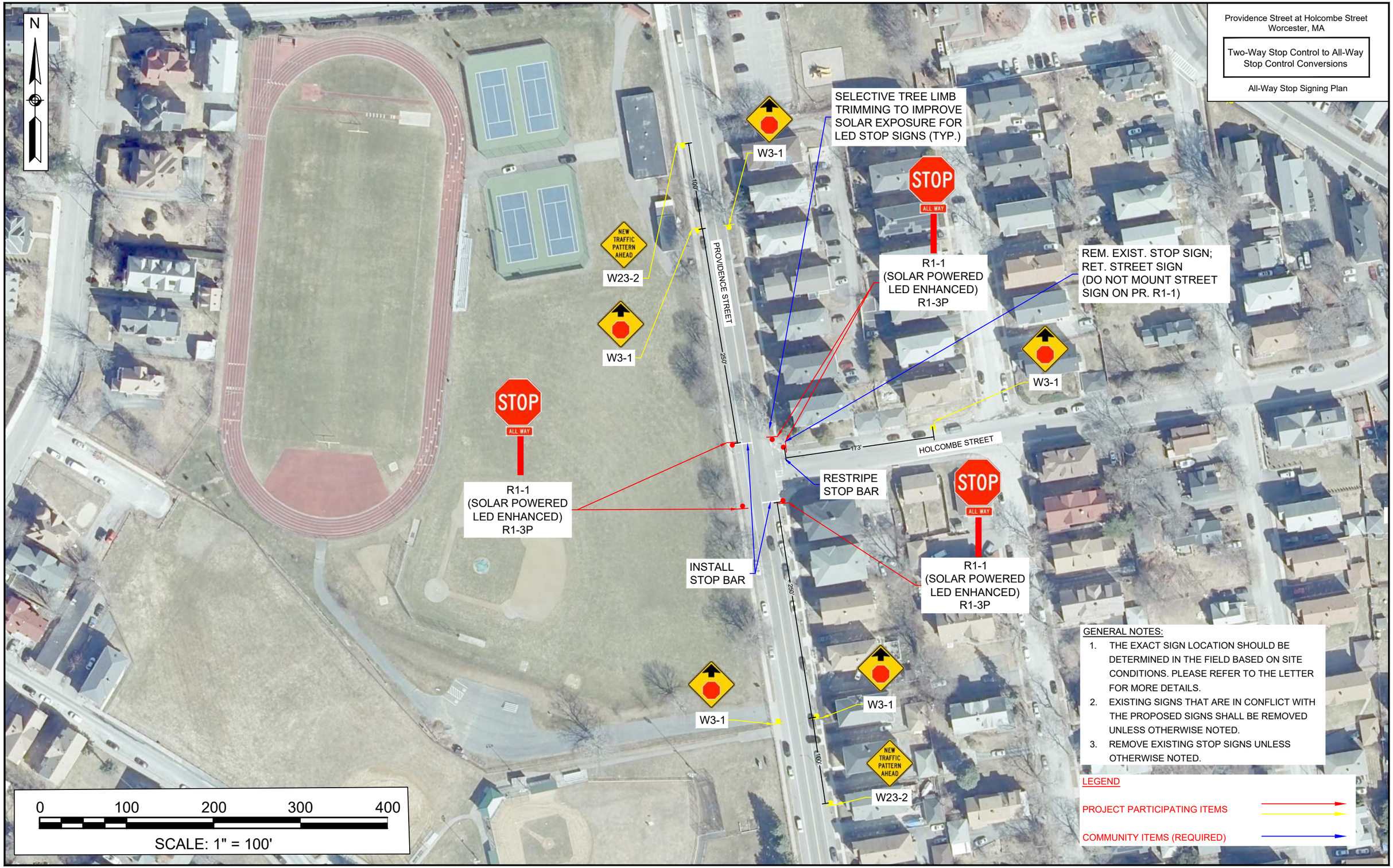
GREENMAN-PEDERSEN, INC.

John W. Diaz, PE, PTOE
Vice President / Director of Innovation
181 Ballardvale Street
Suite 202
Wilmington, MA 01887

enclosure(s)

cc: Bonnie Polin
Dakota DelSignore

DESIGN PLAN
&
SIGN SUMMARY


N
Providence Street at Holcombe Street
Worcester, MA
Two-Way Stop Control to All-Way Stop Control Conversions
All-Way Stop Signing Plan
SELECTIVE TREE LIMB TRIMMING TO IMPROVE SOLAR EXPOSURE FOR LED STOP SIGNS (TYP.)
W3-1
STOP
ALL WAY
R1-1
(SOLAR POWERED LED ENHANCED)
R1-3P
REM. EXIST. STOP SIGN; RET. STREET SIGN
(DO NOT MOUNT STREET SIGN ON PR. R1-1)
NEW TRAFFIC PATTERN AHEAD
W23-2
W3-1
100'
PROVIDENCE STREET
250'
W3-1
HOLCOMBE STREET
173'
RESTRIPE STOP BAR
STOP
ALL WAY
R1-1
(SOLAR POWERED LED ENHANCED)
R1-3P
STOP
ALL WAY
R1-1
(SOLAR POWERED LED ENHANCED)
R1-3P
INSTALL STOP BAR
250'
W3-1
W3-1
NEW TRAFFIC PATTERN AHEAD
W23-2
100'
0
100
200
300
400
SCALE: 1" = 100'
GENERAL NOTES:
1. THE EXACT SIGN LOCATION SHOULD BE DETERMINED IN THE FIELD BASED ON SITE CONDITIONS. PLEASE REFER TO THE LETTER FOR MORE DETAILS.
2. EXISTING SIGNS THAT ARE IN CONFLICT WITH THE PROPOSED SIGNS SHALL BE REMOVED UNLESS OTHERWISE NOTED.
3. REMOVE EXISTING STOP SIGNS UNLESS OTHERWISE NOTED.
LEGEND
PROJECT PARTICIPATING ITEMS
COMMUNITY ITEMS (REQUIRED)

Providence Street at Holcombe Street
Worcester, MA

Two-Way Stop Control to All-Way Stop Control Conversions

All-Way Stop Signing Plan

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER		
R1-1 (LED)	30"	30"		MUTCD STANDARD		5	RED	WHITE	WHITE	P5 (5 REQ'D)	6.25
R1-3P	18"	6"		MUTCD STANDARD		5	RED	WHITE	WHITE	5 MNT w/ R1-1	0.75
W3-1	30"	30"		MUTCD STANDARD		5	YELLOW	RED BLACK	BLACK	P5 (5 REQ'D)	6.25
W23-2	36"	36"		MUTCD STANDARD		2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	9.00

GENERAL NOTES:

1. RED SIGN POST REFLECTORS WILL BE PLACED ON EACH STOP SIGN POST FACING TRAFFIC
2. REFER TO INTERSECTION LAYOUT PLAN AND THE EVALUATION REPORT FOR COMPLETE LIST OF REQUIRED AND OPTIONAL ITEMS AND MEASURES TO BE DONE BY THE COMMUNITY.
3. NEW TRAFFIC PATTERN AHEAD SIGNS ARE TEMPORARY AND SHOULD STAY IN PLACE FOR APPROXIMATELY 6 MONTHS
4. SIGNS SHALL BE INSTALLED MINIMUM OF 6' FROM THE EDGE OF ROADWAY AND AT A MOUNTING HEIGHT OF 7' FROM THE BOTTOM EDGE OF THE SIGN TO THE ROADWAY SURFACE. SIGN POSITIONS SHALL CONFORM TO MUTCD FIGURES 2A-2 AND 2A-3.

INFORMATIONAL FLYER
&
SIGN INSTALLATION DETAILS

BEST PRACTICES WHEN CHANGING AN INTERSECTION CONTROL

When an existing two-way stop-controlled intersection has safety performance issues, changing the intersection control type to All-Way stop-controlled may be a cost-effective method to improve safety by reducing the potential for severe crashes. However, introducing a STOP sign on a roadway at an intersection that was previously uncontrolled can create new safety concerns if not implemented properly. This informational flyer is designed to provide communities with tools to help introduce the change in intersection control in a safe and effective manner. Many of these treatments are referenced in the memorandum, and the community would be responsible for supplying and implementing them, unless specifically noted otherwise. This toolbox consists of three categories to help perform this change:

- Actions to perform prior to changing the intersection control
- Permanent treatments for previously uncontrolled approaches
- Temporary treatments to implement after installation

GENERAL INFORMATION

The traffic control devices (signage and pavement markings) and changeable message boards referenced in this memorandum and flyers shall comply with the requirements outlined in the Manual on Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration and available as a free public document. The MUTCD can be accessed via the following link: https://mutcd.fhwa.dot.gov/. In addition to the traffic conspicuity treatments noted in this document, other treatments are cited in Section 2A.11 Enhanced conspicuity for standard signs in the MUTCD. MassDOT also has an amendment to the MUTCD that can be accessed via the following address: https://www.mass.gov/doc/massachusetts-amendments-to-the-mutcd-2022/download.

ACTIONS TO PERFORM PRIOR TO CHANGING THE INTERSECTION CONTROL

Advance warning and community outreach to inform of a change in traffic control is critical for the successful implementation of the control change. This gives road users the information necessary for them to change their expectations prior to the implementation of the traffic control change. The visual cues for transitioning from a two-way stop control to an all-way stop control are primarily limited to changes in signage and pavement markings, which can be easily overlooked by the driver when not anticipated. A comprehensive application of permanent and temporary treatments combined with a public outreach effort is needed to provide the groundwork for a smooth control transition. The following are messaging tools that can be conducted prior to implementing a control change.

- **CHANGEABLE MESSAGE BOARDS** – Changeable message boards can be installed along all approaches preceding the intersection, informing of the upcoming traffic change. It is recommended that the boards be installed at least two weeks prior to making the change to capture the majority of frequent commuters, and be left in place for one month after the conversion. For effective messaging, it's best that the message be limited to two phrases, with each phrase consisting of no more than three lines of text. Each phrase should be understood by itself, and the meaning of the entire message should be the same regardless of the sequence in which the phrases are read. An example of All-Way Stop Control messaging would be:

Message before conversion	Message after conversion
TRAFFIC	NEW
CHANGE	TRAFFIC
MM/DD	PATTERN
ALL	ALL
WAY	WAY
STOP	STOP

- **DIGITAL MEDIA OUTREACH -** Digital media is an effective tool for informing the public about up-coming changes and reaching community members. An announcement can be posted on the City/Town website and shared through social media platforms, including Facebook, X (Twitter), and Nextdoor. Email alerts can be used to notify residents through email lists or newsletters. Also, local news websites can be used to publicize press releases or announcements.

- **PHYSICAL AND PUBLIC SIGNAGE -** Flyers and posters can be posted or distributed at community centers, libraries, businesses, or other public places.

PERMANENT TREATMENTS ON PREVIOUSLY UNCONTROLLED APPROACHES

The following are treatments the community can undertake to increase the STOP control conspicuity and manage speeds approaching the intersection. An excerpt from MUTCD that provides images of some of these details is included on the final page of the document.

- **Vertical Retroreflective Strip on Signpost –** A strip of retroreflective material can be used on a sign support to increase the sign's conspicuity. It must be two inches in width and extend the full length of the support from the sign to within two feet above the near edge of the roadway. It should match the background color of the sign, except for YIELD and DO NOT ENTER signs, where the strip shall be red.

- **Red or Orange Flags –** One or more red or orange flags can be added above a regulatory or warning sign to help gain the driver's attention to the marked sign. They shall be oriented at 45 degrees to the vertical and can be either cloth or retroreflective sheeting.

- **Dual Signing –** Dual signing of a standard regulatory, warning, or guide sign can be conducted by adding a second identical sign on the left-hand side of the roadway, even with the standard right-hand side sign. Dual signing is an effective tool to improve drivers' recognition of a sign's message. It is also an effective tool to use on curvilinear roadways where the left-hand side of the road is visible first, allowing the driver to react earlier to the sign's message.

- **STOP and STOP AHEAD Pavement Markings –** Stenciled pavement markings can be installed in advance of the STOP and STOP AHEAD signs to supplement the traffic control device. Stenciled pavement markings can improve the recognition of a traffic control condition by having the intended messages directly within the driver's perceptual vision cone. See MUTCD Section 3B.21.

- **Optical Speed Bars –** Optical speed bars, also referred to as Speed Reduction Markings, are transverse pavement markings placed with progressively reduced spacing on both sides of the travel way to create the perception of increased speed. This illusion encourages drivers to slow down as they pass the markings. These markings can be used in advance of the intersection to manage speeds on the approach to the stop condition. This treatment is suitable for locations where the uncontrolled approach operating speeds are generally higher and not in long tangent sections. See MUTCD Section 3B.28

- **Warning Beacon**—Flashing circular yellow warning beacons can be added to standard regulatory signs (other than STOP, DO NOT ENTER, Wrong Way, or Speed Limit Signs), warning signs, or guide signs to indicate to drivers to pay extra attention to the message contained thereon. The installation of warning beacons must adhere to the criteria outlined in the MUTCD Chapter 4S.

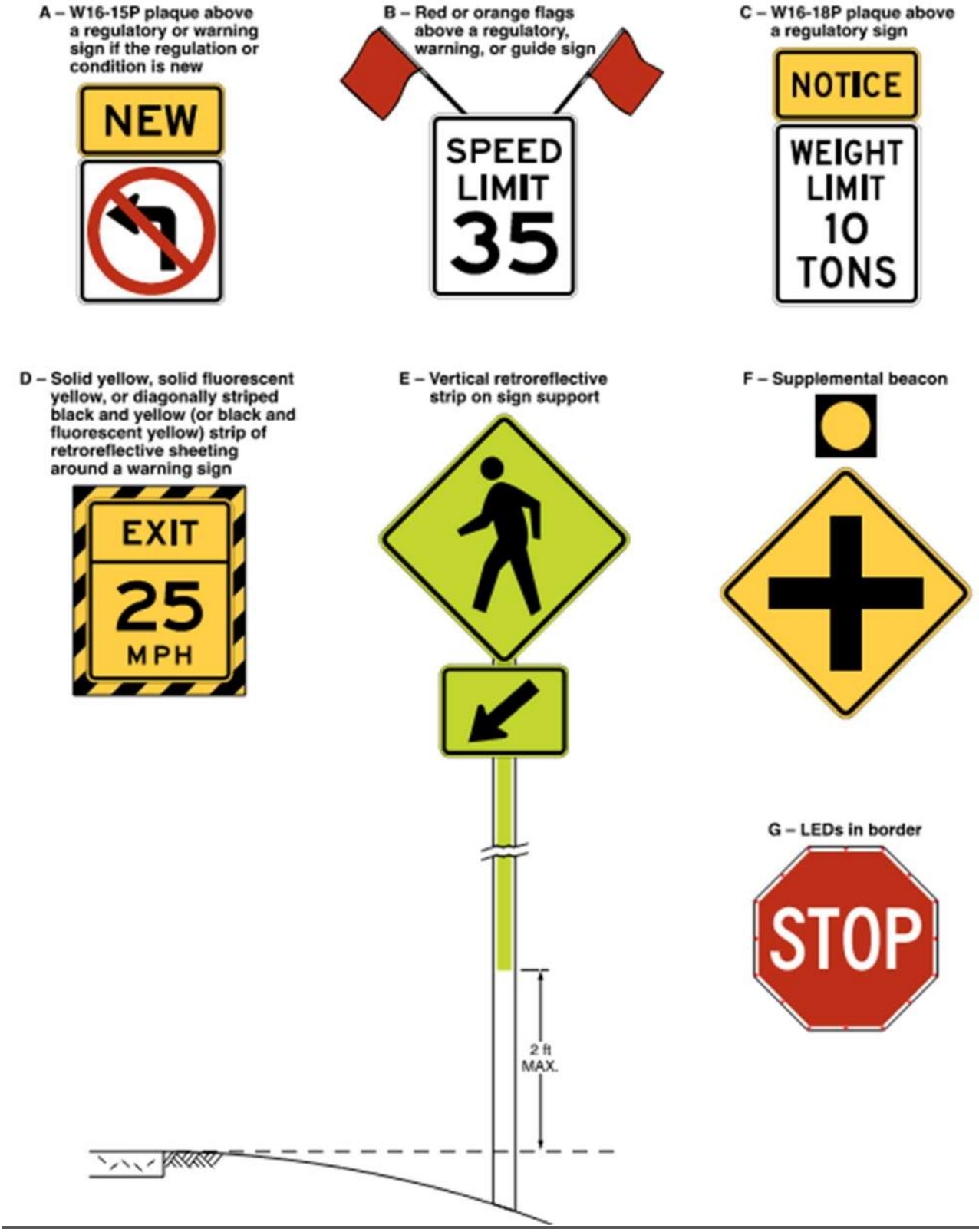
TEMPORARY TREATMENTS TO IMPLEMENT AFTER INSTALLATION

Once an intersection control change has been implemented, it is critical that the traffic control devices enforcing the change in traffic control are not only perceived by the driver, but also that the driver recognizes the change has occurred. The utilization of these temporary treatments is uniquely valuable for locations where all-way stop control is being implemented, as the change in control is not accompanied by a construction period or changes in roadway features that are typically associated with the installation of a signal or roundabout that would allow the occasional road user to easily recognize and prepare for the control change. Temporary treatments can be used to provide the driver with advanced warning of a change and identify new traffic control devices. **These treatments should be left in place for no longer than six months.**

- **NEW plaques (W16-15p)** – A NEW plaque can be mounted above a regulatory sign (STOP sign) when a new regulation takes effect to alert road users to the new traffic regulation. A NEW plaque may also be mounted above an advance warning sign (STOP AHEAD) to warn about a new traffic condition.

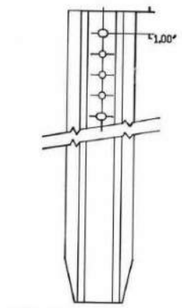
- **NEW TRAFFIC PATTERN AHEAD (W23-2)** – A NEW TRAFFIC PATTERN AHEAD sign may be used on the approach to an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such as changing an intersection control or a change in roadway geometry.

Figure 2A-1. Examples of Enhanced Conspicuity for Signs



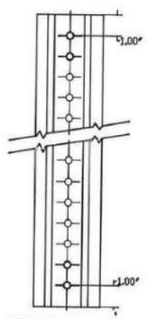
ALL-WAY STOP CONTROL PROGRAM

STANDARD SIGN INSTALLATION DETAILS



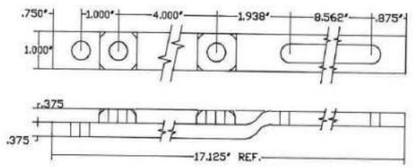
EZE-ERECT BASE POST

3/8' Dia. Holes on 1.00' Center, Execpt First and Fifth are 3/8' x 1/2' slots
Punched 18 Holes
Bottom Pointed
Available in 2.5,3.0 & 4.0 lb/ft
Lenght -3'6' and 4'0'



EZE-ERECT SIGN POST

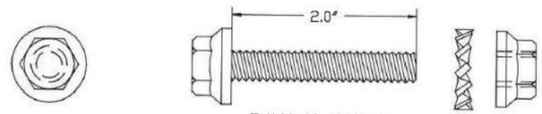
3/8' Dia. Holes on 1.00' Centers
Punched Full Length Available
in 2.0, 2.25, 2.5, 3.0 & 4.0 (lb/ft
Length -6'0', 7'0',8'0', 9'0',
10'0',11'0', and 12'0'



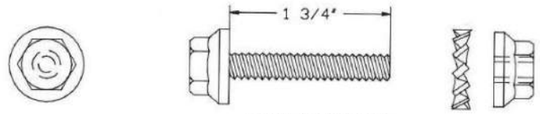
RETAINER-SPACER STRAP

For All Weights of Sign Posts
Material-Mild Steel
Finish-Hot Dip Galvanize Per ASTM A-123

HEX HEAD-INTEGRAL FLANGE BOLT, NUT AND LOCKWASHER



5/16'-18 UNC-BD



5/16'-18 UNC-BC

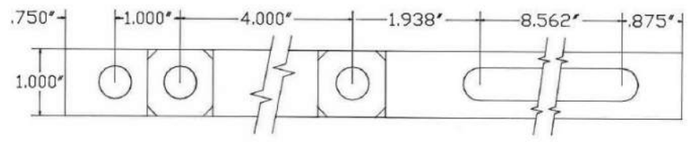
5/16'-18 UNC x 2.0' Long (for 4.0 lb. posts) or 5/16'-18 UNC x 1 3/4' (for 2.0, 2.25, 2.5 & 3.0 lb. posts)
Bolt per ASTM A354, Grade BD or Grade BC
Nut per ASTM A563, Grade DH
Lockwasher is heavy duty external toothed.
Finish-Cadmium plated per ASTM A165-80, Type DS, except using clear chromate

SIGN SIZE	CHANNEL POST POST-WITH STRAP (EZE-ERECT)
5 S.F. AND UNDER	1-2 LB./FT.
OVER 5 S.F. UP TO 10 S.F.	1-2.25 LB./FT.
* OVER 10 S.F. UP TO 20 S.F.	2-2.25 LB./FT.

* NOTE: Signs with a width of 4' and over shall require 2 posts.

GALVANIZING FINISH

Galvanizing Shall Conform with ASTM Specification A123-73. It Shall Be Galzanized After All Fabrication and Punching, Has Been Completed.



RETAINER-SPACER STRAP

For 2.5 and 4.0 lb/ft Sign Posts
Material-Mild Steel
Finish-Hot Dip Galvanize Per ASTM A-123

NOTES:

DETAILS PROVIDED ARE FROM THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, 1990 ED.

ALL-WAY STOP CONTROL PROGRAM

STANDARD SIGN INSTALLATION DETAILS

GROUND INSTALLATION

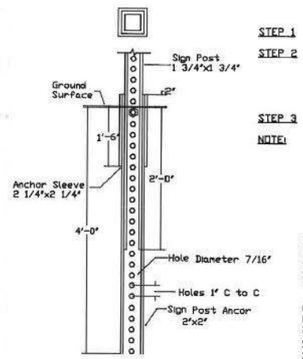
METHOD OF INSTALLATION

STEP 1 Drive Sign Post Anchor To Within 3 Or 4' Of Surface.

STEP 2 Pre-cut Anchor Sleeve So That The Holes Will Match And Still Be Flush With Top Of Sign Post Anchor, Drive Anchor Sleeve Until Holes Match As Noted Above, Then Drive Both The Sign Post Anchor And Anchor Sleeve Until One Hole Is Exposed Above Ground For Bolt Connection.

STEP 3 Insert Sign Post And Bolt In Place.

NOTE: Driving Caps Must Be Used To Drive Posts. Retain 4'-0" Depth To Reach Theoretical Frost Line.



P-5 TELESCOPIC POST

GENERAL NOTES

BREAKAWAY SIGN SUPPORTS SHALL BE FABRICATED FROM STEEL AND SHALL CONFORM TO THE BREAKAWAY DESIGN SHOWN ON THIS SHEET OR "GROUND MOUNTED SIGN SUPPORTS BREAKAWAY DESIGN FOR SIGNS WITH AREA 20 SQ. FT. AND BELOW" AND THE MASS. DEPT. OF PUBLIC WORKS "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES".

THE STEEL POSTS SHALL CONFORM TO ASTM-A366. THE CROSS SECTION OF THE POST SHALL BE SQUARE TUBE FORMED OF 12 GAUGE (.105" U.S.S. GAUGE) COLD-ROLLED CARBON STEEL SHEETS WHICH HAVE BEEN ZINC COATED (1.25 oz.) CONFORMING TO ASTM-A525, CAREFULLY ROLLED TO SIZE AND WELDED DIRECTLY IN THE CORNER BY HIGH FREQUENCY RESISTANCE WELDING OR EQUAL AND EXTERNALLY SCARFED TO AGREE WITH CORNER RADI. STANDARD OUTSIDE CORNER CORNER RADIUS SHALL BE 5/32" PLUS OR MINUS 1/64".

ALL BOLTS SHALL CONFORM TO ASTM-A307, CLASS A. ALL BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED AS PER ASTM-A153.

EZE-ERECT SIGN POST INSTALLATION *

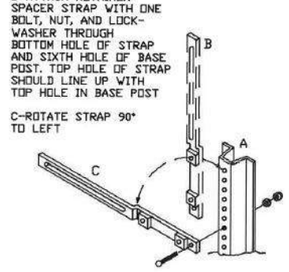
BOLTS: 5/16"-18 UNC x 2", GRBD, FOR 4.0 LB POSTS
5/16"-18 UNC x 1 3/4", GRBC, FOR 2.0, 2.25, 2.5 & 3.0 LB. POSTS

DO NOT USE 5/16" GRBC BOLTS ON 4.0 LB POSTS

1 A-DRIVE BASE POST TO WITHIN 12 IN. OF GROUND LEVEL

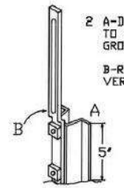
B-ATTACH RETAINER-SPACER STRAP WITH ONE BOLT, NUT, AND LOCK-WASHER THROUGH BOTTOM HOLE OF STRAP AND SIXTH HOLE OF BASE POST. TOP HOLE OF STRAP SHOULD LINE UP WITH TOP HOLE IN BASE POST

C-ROTATE STRAP 90° TO LEFT

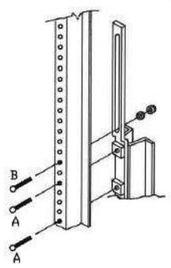


2 A-DRIVE BASE POST TO 4 IN. ABOVE GROUND

B-ROTATE STRAP TO VERTICAL POSITION

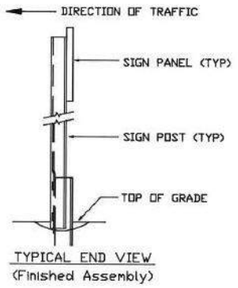


* Notwithstanding references to the availability of 3 and 4 (lb./linear ft. posts, the sign size vs. post weight table on page 50 shall govern.



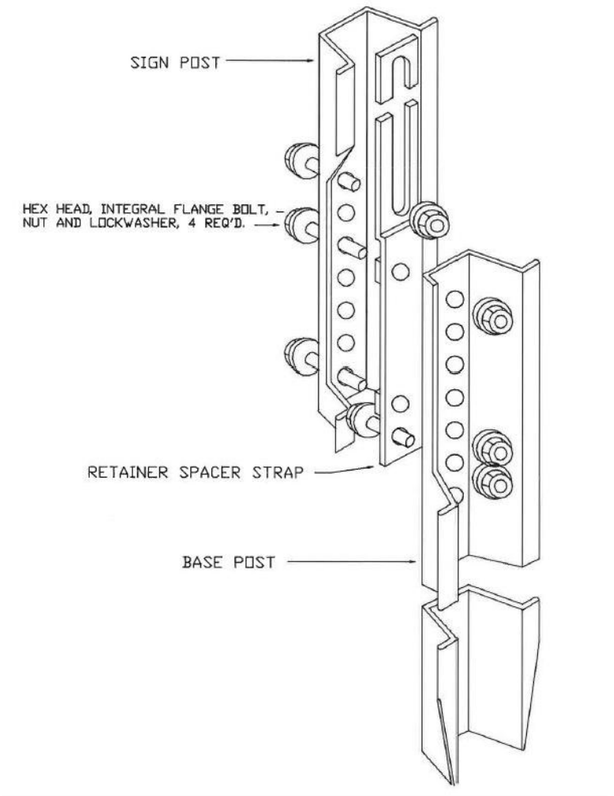
3 A-ATTACH SIGN POST WITH TWO BOLTS, NUTS, AND LOCKWASHERS IN BOTTOM AND FIFTH HOLES. (THESE CORRESPOND WITH SMALL HOLES IN STRAP)

B-INSERT ONE BOLT THROUGH SIGN POST AND BOTTOM OF LONG SLOT IN STRAP, TIGHTEN ALL NUTS SNUGLY BEFORE COMPLETE-LY TIGHTENING ASSEMBLY.

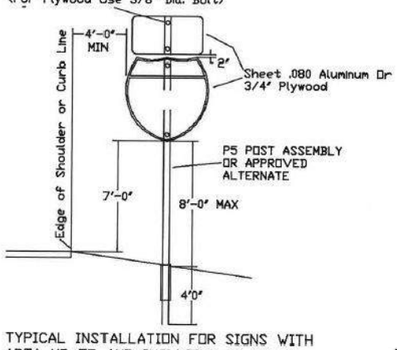


TYPICAL END VIEW
(Finished Assembly)

ATTACHMENT OF SIGN POST TO BASE POST

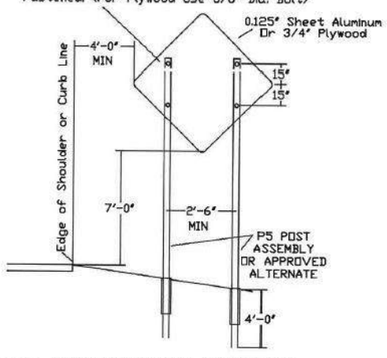


Use 5/16" Dia. Hot Dipped Galvanized Button Head Bolt With A Slot In Head And Nut With Lockwasher, With A Minimum Of 1/4" Of Threads Beyond Nuts On All Signs After They Are Securely Fastened. (For Plywood Use 3/8" Dia. Bolt)



TYPICAL INSTALLATION FOR SIGNS WITH AREA UP TO AND INCLUDING 10 SQ. FT. SIGNS WITH A WIDTH OF 4' AND OVER SHALL REQUIRE TWO POSTS.

Use 3/8" Dia. Hot Dipped Galvanized Button Head With A Slot In Head And Nut With Lockwasher, With A Minimum Of 1/4" Of Threads Beyond Nuts On All Signs After They Are Securely Fastened. (For Plywood Use 3/8" Dia. Bolt)



TYPICAL INSTALLATION FOR SIGNS WITH AREA OVER 10 SQ. FT. UP TO AND INCLUDING 20 SQ. FT.

TYPICAL INSTALLATION FOR SMALL SIGNS (UP TO 20 SQ.FT.)

NOTES:

DETAILS PROVIDED ARE FROM THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, 1990 ED.

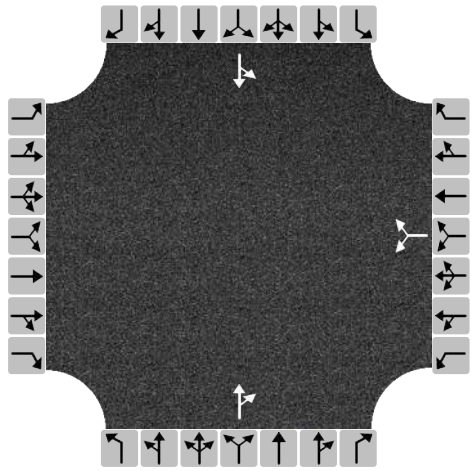
OPERATIONS ANALYSIS

HCS All-Way Stop Control Report

General and Site Information

Analyst	BEL
Agency/Co.	GPI
Date Performed	5/19/2025
Analysis Year	2025
Analysis Time Period (hrs)	1.00
Time Analyzed	7:45 AM - 8:45 AM
Project Description	AWSC to TWSC
Intersection	Providence Street at Holcombe Street
Jurisdiction	Worcester
East/West Street	Holcombe Street
North/South Street	Providence Street
Peak Hour Factor	0.84

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)				51		28		326	95	24	164	
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration				LR			TR			LT		
Flow Rate, v (veh/h)				94			501			224		
Percent Heavy Vehicles				2			2			2		
Initial Departure Headway, h_d (s)				3.20			3.20			3.20		
Initial Degree of Utilization, x				0.084			0.446			0.199		
Final Departure Headway, h_d (s)				5.46			4.34			4.77		
Final Degree of Utilization, x				0.143			0.604			0.296		
Move-Up Time, m (s)				2.0			2.0			2.0		
Service Time, t_s (s)				3.46			2.34			2.77		

Capacity, Delay and Level of Service

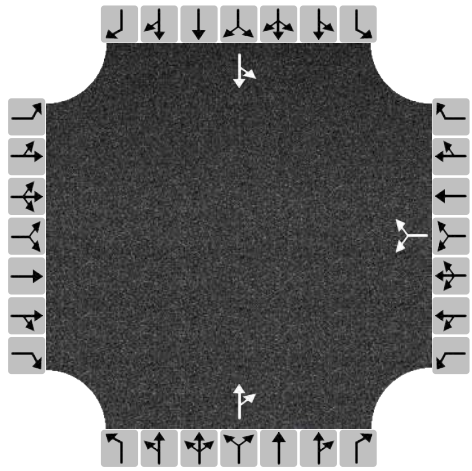
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration				LR			TR			LT		
Flow Rate, v (veh/h)				94			501			224		
Capacity (veh/h)				660			830			755		
95% Queue Length, Q_{95} (veh)				0.5			4.4			1.3		
Control Delay (s/veh)				9.4			13.9			9.8		
Level of Service, LOS				A			B			A		
Approach Delay (s/veh) | LOS				9.4		A	13.9		B	9.8		A
Intersection Delay (s/veh) | LOS	12.2						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	BEL
Agency/Co.	GPI
Date Performed	5/19/2025
Analysis Year	2025
Analysis Time Period (hrs)	1.00
Time Analyzed	4:45 PM - 5:45 PM
Project Description	AWSC to TWSC
Intersection	Providence Street at Holcombe Street
Jurisdiction	Worcester
East/West Street	Holcombe Street
North/South Street	Providence Street
Peak Hour Factor	0.92

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)				81		27		256	113	41	340	
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration				LR			TR			LT		
Flow Rate, v (veh/h)				117			401			414		
Percent Heavy Vehicles				2			2			2		
Initial Departure Headway, h_d (s)				3.20			3.20			3.20		
Initial Degree of Utilization, x				0.104			0.357			0.368		
Final Departure Headway, h_d (s)				5.78			4.61			4.78		
Final Degree of Utilization, x				0.188			0.513			0.550		
Move-Up Time, m (s)				2.0			2.0			2.0		
Service Time, t_s (s)				3.78			2.61			2.78		

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration				LR			TR			LT		
Flow Rate, v (veh/h)				117			401			414		
Capacity (veh/h)				623			782			753		
95% Queue Length, Q_{95} (veh)				0.7			3.1			3.6		
Control Delay (s/veh)				10.1			12.4			13.6		
Level of Service, LOS				B			B			B		
Approach Delay (s/veh) | LOS				10.1		B	12.4		B	13.6		B
Intersection Delay (s/veh) | LOS	12.7						B					

TRAFFIC DATA

Weekday, Peak AM, Providence at Holcombe

	Providence S (Northbound)		Providence N (Southbound)		Holcombe E (Westbound)			
	Thru	Right	Left	Thru	Left	Right	Total	Total %
7:45am	70	21	8	36	11	7	162	0.2244
8:00am	77	25	5	43	13	8	179	0.2479
8:15am	96	25	6	42	12	6	196	0.2715
8:30am	83	24	5	43	15	7	185	0.2562
Hourly Tot	326	95	24	164	51	28	722	1
PHF	0.85	0.95	0.75	0.95	0.85	0.88	0.84	

Weekday, Peak PM, Providence at Holcombe

	Providence S (Northbound)		Providence N (Southbound)		Holcombe E (Westbound)			
	Thru	Right	Left	Thru	Left	Right	Total	Total %
4:45pm	61	30	9	85	20	6	222	0.2478
5:00pm	66	28	11	86	22	7	230	0.2567
5:15pm	64	29	11	82	20	7	221	0.2467
5:30pm	65	26	10	87	19	7	223	0.2489
Hourly Tot	256	113	41	340	81	27	896	1
PHF	0.97	0.94	0.93	0.98	0.92	0.96	0.92	

SPEED DATA

Data Periods	Mode of T	Zone ID	Zone Name	Zone Is Pa	Zone Direc	Zone is Bi-	Day Type	Day Part	Average D	Avg Spot S	Free Flow	Free Flow	85th Speed Percentile
Mar 01, 2024 - May 31, 2024; Sep 01, 2024 - Nov 30, 2(	All Vehicles - StL	All V	Holcombe Street (WB vols)	yes	261	no	1: Weekda	00: All Day	1502	12	18.581	0.634	18
Mar 01, 2024 - May 31, 2024; Sep 01, 2024 - Nov 30, 2(	All Vehicles - StL	All V	Providence Street north link (SB vols)	yes	168	no	1: Weekda	00: All Day	4853	26	32.832	0.801	33
Mar 01, 2024 - May 31, 2024; Sep 01, 2024 - Nov 30, 2(	All Vehicles - StL	All V	Providence Street South link (NB vols)	yes	350	no	1: Weekda	00: All Day	5582	28	33.505	0.826	34