



July 5, 2016

Mr. Matthew J. Sokop, P.E.
City Engineer
City of Springfield
70 Tapley Street
Springfield, MA 01104

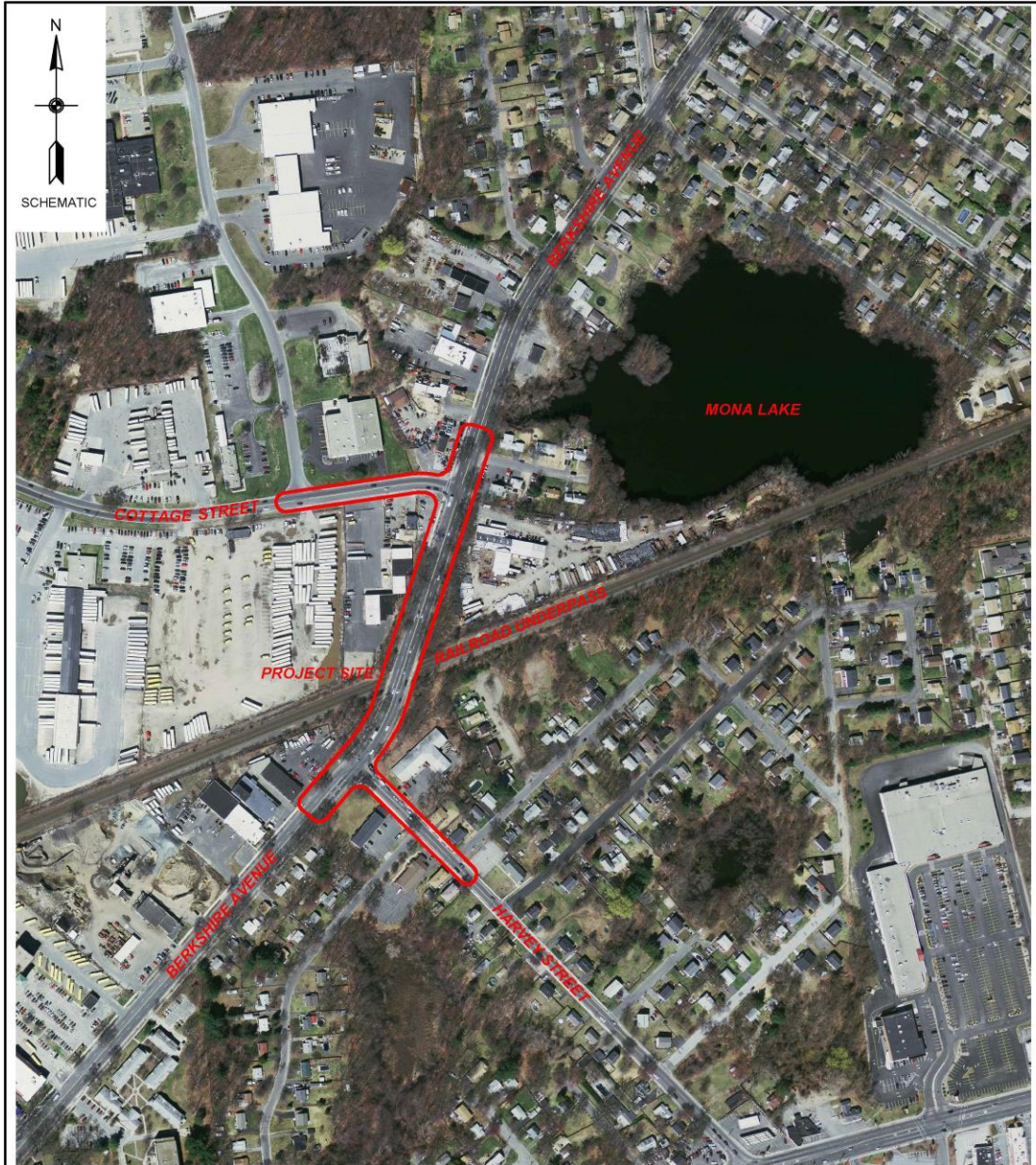
**RE: Cottage Street and Berkshire Avenue Traffic Planning and Intersection Improvements
Springfield, Massachusetts
MMI #4047-19-03**

Dear Mr. Sokop:

The City of Springfield has retained Milone & MacBroom, Inc. (MMI) to prepare a technical memorandum summarizing the concept plan for the above-mentioned subject. In order to produce a concept plan, data was collected within the study area that included turning movement counts (TMC), automatic traffic recorder counts (ATR), and crash records obtained from the City of Springfield Police Department. The counts and crashes were utilized to assess the traffic within the study area. MMI has provided a traffic assessment memorandum separately. Based on the results of the traffic assessment, MMI produced a concept plan for the study area that will improve the overall efficiency and safety for all modes of transportation in the project study area, including for bicyclists and pedestrians.

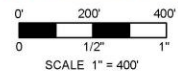
Study Area

The study area begins on Berkshire Avenue approximately 200' south of Harvey Street and continues 400' north of Cottage Street, approximately 1,330', and includes the intersections of Cottage Street and Harvey Street. Cottage Street is unsignalized, and Harvey Street is signalized. Both intersections are "T" type intersections. The study area will extend approximately 580' west of Berkshire Avenue along Cottage Street and approximately 430' east of Berkshire Avenue along Harvey Street. See Figure 1 on the next page. The land use in the immediate vicinity of the study area is primarily commercial and industrial with some residential mixed in. Berkshire Avenue serves many residential side streets within the study area including Babbin Street, which intersects Berkshire Avenue just north of Cottage Street. See Figure 1 on the next page.



LOCUS MAP

**Cottage and Harvey Streets at Berkshire Avenue
Springfield, Massachusetts**



Existing Conditions

Berkshire Avenue is considered an urban minor arterial with two lanes in each direction. It primarily runs in a north/south direction. It begins at State Street and continues northerly where it connects with Page Boulevard. The speed limit along Berkshire Avenue is 35 miles per hour (mph) for both directions. The land use within the study area along Berkshire Avenue is a mix of commercial, residential, and industrial. There are sidewalks on both sides with a grass strip (tree belt/snow shelf) between the roadway and sidewalk. There are numerous trees within the grass strip. The width of the roadway is approximately 54' and consistently carries a 1' shoulder on each side of the roadway. The lane widths average from 11' to 15'.

Cottage Street is considered an urban minor arterial with one lane in each direction. It primarily runs in an east/west direction. It begins at Berkshire Avenue and continues westerly where it connects with Roosevelt Avenue. The speed limit along Cottage Street is 30 mph for both directions. The land use is a mix of commercial and industrial. There are no sidewalks and/or pedestrian facilities along Cottage Street within the study area. The width of the roadway is approximately 38' and consistently carries a 1' shoulder on each side of the roadway. There is one lane in each direction that typically is 18' in width.

Cottage Street intersects with Berkshire Avenue from the west creating a three-legged "T" style intersection. The intersection is unsignalized, and Cottage Street is under "STOP" control. Cottage Street where it intersects with Berkshire Avenue is considerably larger than a single lane and acts as an exclusive left-turn lane and exclusive right-turn lane. Berkshire Avenue is two lanes in each direction providing a shared left-thru in the northbound direction and a shared thru-right in the southbound direction. A crosswalk is provided across Cottage Street at the intersection. There is a private driveway that enters on the east side of Berkshire Avenue at this location.

Harvey Street is considered a local road with one lane in each direction. It primarily runs in an east/west direction. It begins at Berkshire Avenue and continues easterly where it connects with Boston Road. The speed limit along Cottage Street is 30 mph for both directions. The land use is primarily residential with some commercial space. There are sidewalks on both sides with a grass strip (tree belt/snow shelf) between the roadway and sidewalk. The lane widths in each direction are 15' with no shoulders.

Harvey Street intersects with Berkshire Avenue from the east creating a three-legged "T" style intersection. The intersection is signalized and is semi-actuated where Harvey Street contains loop detection and Berkshire Avenue does not. The signal has a three-phase operation consisting of an advanced phase for the southbound movement on Berkshire Avenue, a permissive phase for the north and southbound directions, and the third phase is exclusively for Harvey Street. Harvey Street has two approach lanes, exclusive left- and right-turn lanes. Berkshire Avenue is two lanes in each direction providing a shared left-thru in the northbound direction and a shared thru-right in the southbound direction. The crosswalk along the Harvey Street approach is unsignalized.

Field Observations

Upon a recent field visit, the following observations were made in the study area:

- The existing pavement width on Berkshire Avenue is approximately 54'. The lane configuration could be adjusted to handle four 11' travel lanes, two in each direction, and 5' shoulders on both sides to accommodate bicycles.
- The sidewalks on both sides of Berkshire Avenue should to be reconstructed, and temporary construction easements will be required for this work.
- There are numerous large trees within the grass strip (treebelt) between the curb and the sidewalk along both sides of Berkshire Avenue that are too large for the strip and will need to be removed for the construction of sidewalk or resetting of curb. When five or more trees with a diameter of 14 inches or greater are removed, it trips a Massachusetts Environmental Policy Act review.
- There are seven driveways within close proximity to the intersection of Cottage Street and Berkshire Avenue as well as Babbin Street's immediacy.
- There are overhead utilities exist on the east side of Berkshire Avenue, both power and communication, some poles contain street lighting.
- Street lighting is provided on the west side of Berkshire Avenue.
- Overhead utilities are along Cottage Street, which contain power, including Primary and communication. Overhead utilities are along Harvey Street, which contain power and communication.
- The pavement within the study area, on all roadways, is in fair condition and contains surface cracking, which includes longitudinal and transverse cracking as well as some alligator cracking in some locations.
- If any widening is required within the northeast quadrant of Harvey Street and Berkshire Avenue, a retaining wall may be required due to the steep embankment in this area.
- Berkshire Avenue travels over the railroad between Cottage and Harvey Streets supported by an existing bridge structure. The proposed construction for the bridge will be revised stripping only.
- Improved radii at the corners of Cottage Street and Harvey Street along Berkshire Avenue will improve maneuverability for large trucks and buses.

Concept Plan

Geometric Roadway Improvements

Utilizing the data collected, traffic assessment, and field observations, a concept plan was created and is attached to this memorandum. This concept was not the only alternative that was considered. As part of any potential Massachusetts Department of Transportation project, a roundabout should be looked at when contemplating installing a new signal at a location. Upon sketching out a two-lane roundabout at the intersection of Cottage Street and Berkshire Avenue, there would be a significant amount of land acquisition required. Additional challenges include seven driveways within close proximity of the existing intersection of Cottage Street and Berkshire Avenue. The intersection of Babbin Street and

Berkshire Avenue would have to be relocated and possibly line up across from Cottage Street; additional acquisitions would be deemed necessary. Based on the information provided, this option is not feasible.

Other alternatives included adding an auxiliary lane, a left-turn only, for the Berkshire Avenue northbound approach at the intersection of Cottage Street. Two thru lanes would remain for the Berkshire Avenue northbound approach. The challenge with this alternative would be that the storage length required for a single left-turn-only storage lane would be considerably long, and the geometry required to construct it would have potential impacts to the existing bridge structure as well as additional right-of-way. This option is dismissed so that no work will be required on the existing structure.

In order to avoid any changes to the existing structure, the existing roadway width of 54' from curb to curb the entire length of the project along Berkshire Avenue shall remain. The pavement markings within these limits shall change to provide two 11' lanes in each direction as well as a 5' shoulder in each direction for bicyclists. The existing lane configuration on Berkshire Avenue within the project limits consistently carries 1' shoulders in each direction with travel lanes ranging from 11' to 15'. The sidewalks will be reconstructed on both sides of the roadway within the project limits.

Cottage Street will be widened to create an 11' left-turn lane and 11' right-turn lane. These will be separated by a 5' bike lane as well as a 2' shoulder at the approach. The entrance lane will consist of a 5' shoulder to accommodate bicyclists and a 12' travel lane. Sidewalks will be provided along both sides of the roadway within the project limits. The radii at the corners will be increased to 35'. New Americans with Disabilities Act (ADA) compliant ramps will be provided to cross Cottage Street as well as Berkshire Avenue both north and south of Cottage Street.

Harvey Street will be widened to create an 11' left-turn lane and 11' right-turn lane. These will be separated by a 5' bike lane as well as a 2' shoulder at the approach. The entrance lane will consist of a 5' shoulder to accommodate bicyclists and an 11' travel lane. Sidewalks will be reconstructed along both sides of the roadway within the project limits. The radii at the corners will be increased to 35'. New ADA ramps will be provided to cross Harvey Street as well as Berkshire Avenue both north and south of Harvey Street.

The proposed geometric changes to both Cottage Street and Harvey Street as well as sidewalk reconstruction along Berkshire Avenue will generate both temporary construction easements. The widening along Harvey Street will generate takings and/or permanent easements.

Box widening would occur for the widening along Cottage and Harvey Streets, and the entire project will be milled and overlaid with the exception of the bridge section. New signing and pavement markings will be applied and constructed.

Proposed Traffic Control Modifications

Signal reconstruction will be implemented at Harvey Street and Berkshire Avenue as mentioned previously in the document, and new signal construction will occur at Cottage Street and Berkshire Avenue, which both shall include the following:

- Install new fully actuated traffic signal assemblies with the appropriate timing and phasing for peak-hour volume requirements, 110 and 150 second cycle lengths for the a.m. peak and p.m. peak periods, respectively.
- Provide signal heads for vehicles exiting the private driveway at the intersection of Cottage Street and Berkshire Avenue.
- New mast arms including far-side signal heads
- Video detection to detect vehicles and bicycles
- Optical emergency preemption
- Transit signal priority capabilities
- Countdown pedestrian signal heads
- 12" LED signal heads with 5" louvered retroreflective backplates
- Bicycle detection on all approaches and bike boxes at signalized intersections
- Accessible pedestrian signal (APS) push buttons
- Upgrade signs and pavement markings
- New ADA/Architectural Access Board (AAB) ramps
- Coordination via radio communications or hardwire
- Battery backup at each location
- Exclusive pedestrian phasing

Signal Phasing

Harvey Street at Berkshire Avenue

The phasing will be sequential phasing that will include four phases. The first phase will include an advance for the southbound traffic providing a protective movement for left turns onto Harvey Street. This phase will also include right-turn overlap for the vehicles turning right onto Berkshire Avenue from Harvey Street. The second phase will allow for the northbound and southbound traffic to go; the left turn (southbound) onto Harvey Street will be permissive. The third phase will allow the traffic on Harvey Street to go against no other movements, a protected phase. The final phase will be an exclusive pedestrian phase for pedestrians to cross both Harvey Street and Berkshire Avenue.

Cottage Street at Berkshire Avenue

The phasing will be sequential phasing that will include four phases. The first phase will allow for the northbound and southbound traffic to go; the left turn (northbound) onto Cottage Street will be permissive. The second phase will include an advance for the northbound traffic providing a protective movement for left turns onto Cottage Street. This phase will also include right-turn overlap for the

vehicles turning right onto Berkshire Avenue from Cottage Street. The third phase will allow the traffic on Cottage Street to go, and at the same time, the driveway directly across will have the ability to exit, a permissive phase. The final phase will be an exclusive pedestrian phase for pedestrians to cross both Cottage Street and Berkshire Avenue.

Safety Enhancements

The concept consists of numerous safety enhancements, which will help reduce the severity and the number of crashes throughout the project. The following is a list of proposed safety enhancements:

- A new signal shall be installed at the intersection of Cottage and Harvey Streets.
- A "signal ahead" warning system shall be provided for both approaches along Berkshire Avenue between Cottage and Harvey Streets.
- New sidewalks along Berkshire Avenue between Cottage and Harvey Streets
- Provide new crosswalks at the signalized intersection in addition to upgrading the pedestrian ramps to be ADA/AAB compliant.
- Include optical preemption at all signal locations.
- Improved signing and striping
- Far-side LED signal heads for each direction with retroreflective backplates
- Countdown pedestrian signal heads
- Provide the width for 5' bike lanes on all approaches.
- Battery backup at each signal controller

Bicycle and Pedestrian Accommodations

The following improvements will be provided for pedestrians at each of the signalized intersections:

- Provide new crosswalks at the signalized intersections on all legs in addition to upgrading the pedestrian ramps to be ADA/AAB compliant.
- Provide exclusive pedestrian phasing.
- Provide APS push buttons.
- Provide countdown pedestrian signal heads.

Bicycle accommodations will consist of providing a 5' bike lane along Berkshire Avenue, Cottage Street, and Harvey Street within the entire project limits. In addition to the revised lane arrangements mentioned, the following additional improvements will be included:

- Provide bike boxes at the signalized intersections at each approach; painted green would be advantageous.
- Signage will be provided at the signalized intersections for bicycle accommodations.
- Provide bicycle detection and pavement markings at each stop bar utilizing the video cameras.

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Cost Estimate

A preliminary cost estimate was generated based on the design and current construction season. The estimate is also based on that the only improvements to the existing bridge structure over the railroad would consist of new pavement markings only. The total estimated preliminary participating costs are \$1,925,000. An estimate is attached with this document. This estimate does not include design costs, which would also require survey and geotechnical services for borings. The estimate does not include any costs associated with rights-of-way such as temporary construction easements, permanent easements, and takings.

Conclusion

The proposed improvements to the study area mentioned in this document will provide a safer and more efficient locale for all modes of transportation without impacting the existing structure between the two roadways. Additional information is provided in the Functional Design Report, Road Safety Audit, and Traffic Assessment Memorandum. We hope this information is useful in assessing the traffic implications related to this study. If you have any questions or need further information, please do not hesitate to contact me.

Very truly yours,

MILONE & MACBROOM, INC.



Van Kacoyannakis, P.E.
Senior Project Specialist, Transportation Engineering

Enclosures

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