



The LOUIS BERGER GROUP, Inc.

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November 13, 2002

Mr. Todd D. Ford, Director
Department of Planning & Community Development
Town of Winchester
Town Hall
71 Mount Vernon Street
Winchester, MA 01890

Re: Analysis of Intersection Designs on Cambridge Street and on Church Street

Dear Mr. Ford,

At the Town's request, The Louis Berger Group, Inc. (Berger) has evaluated the proposed intersection designs developed by the Town's Traffic Advisory Committee (TAC). We have compared the TAC's concepts with those developed by the Massachusetts Highway Department's (MHD's) Traffic Engineering Section. The four locations that Berger evaluated are:

1. Cambridge Street at Everett Avenue and Myopia Road
2. Cambridge Street at High Street and Church Street
3. Church Street at Fletcher Street and Bacon Street
4. Cambridge Street at Pond Street.

The TAC's proposal is to implement needed improvements at each of these locations but to try to limit the number of lanes and pavement area as much as possible. Therefore, Berger's approach was to study each location while taking into account MHD's minimum performance standards for State construction funding.

For each location, the analysis of future traffic conditions was the primary determinant of the number of required travel lanes as well as proposed lane usage (i.e., left-turn only, shared left/through, etc.). We analyzed the intersections with the new lane configurations recommended by the TAC and discussed at our meeting and site walk on October 31, 2002. Further, the ability to safely maneuver emergency equipment was tested from vehicle dimensions provided by Fire Chief John Nash.

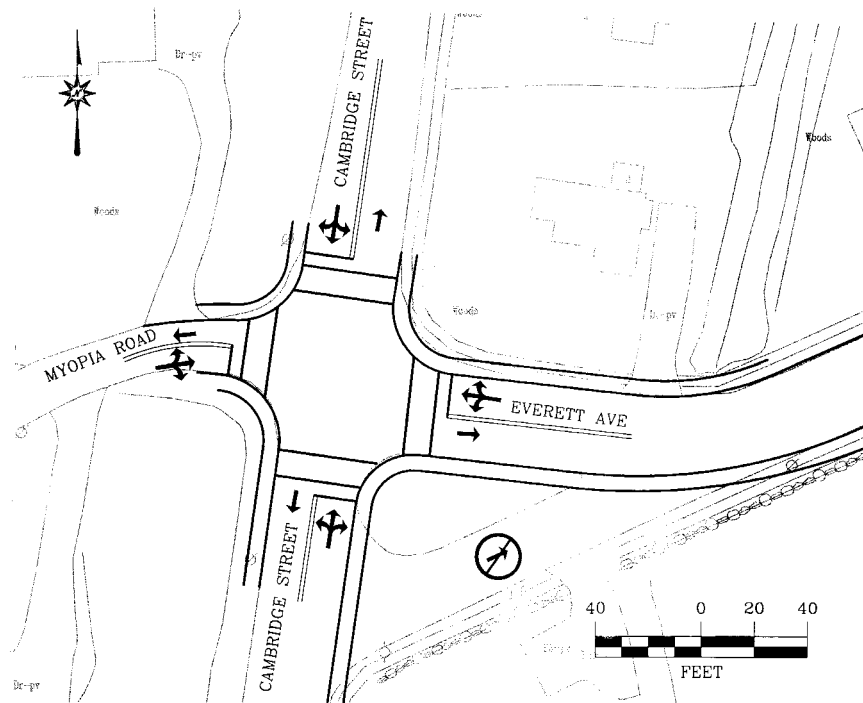
Figures have been provided for each of the TAC recommendations, which are conceptual. These are not detailed designs. These concepts can be further developed to include enhancements such as crosswalk treatments, decorative signal equipment, landscaping etc. Further, the arrows shown in these figures indicate the lane usage that we analyzed and are not proposed pavement markings.

Cambridge Street at Everett Avenue and Myopia Road

The 25 percent MHD concept provides one lane in each direction along Cambridge Street and two approach lanes and two receiving lanes for Everett Avenue. The lane configuration for Myopia remains unchanged. Sidewalks were proposed to be reconstructed along the easterly side of Cambridge Street.

The TAC's proposal reduces the Everett Avenue approach to one lane in each direction. Further, the proposal calls for closure of the ancillary lane from Cambridge Street northbound to Everett Avenue thus bringing all four streets into a consolidated location. Sidewalks can be provided as shown on all four quadrants without requiring right-of-way takings. The corner radii have been reduced, which will serve to slow traffic and increase green space. A test of large-vehicle-turning radii indicates that a box truck can make all the turns without lane encroachment. A fire truck will have a minor encroachment on the oncoming lanes. If no sidewalk is installed along the westerly side of Cambridge Street, Berger recommends that overgrowth in the right-of-way on the northwest quadrant of this intersection be cleared to improve sight distance along Cambridge Street.

Figure 1
Cambridge Street at Everett Avenue and Myopia Road



The TAC concept was analyzed with 2020 peak hourly volumes (PHV) as a three-phase fully actuated traffic signal, including a dedicated pedestrian phase (for this analysis it was assumed that the pedestrian phase would be called every third/fourth cycle). The results show that the intersection will operate at LOS B during both a.m. and p.m. peak periods, and all four approaches are at LOS C or better.

This configuration will serve to calm traffic given the reduced pavement area and reduced corner radii and elimination of the ancillary lane. We believe that this lane closure will reduce the volume of through traffic entering Everett Avenue. Additionally the signal phase controlling traffic exiting Everett Avenue can have a time delay programmed in to discourage cut thru traffic.

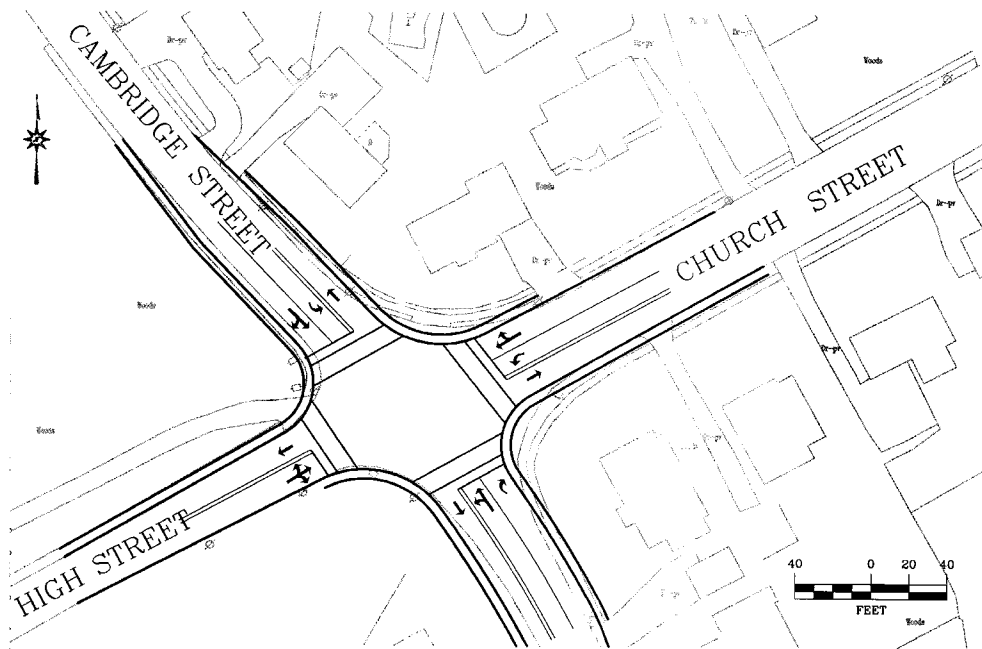
Cambridge Street at High Street and Church Street

The MassHighway design provides exclusive turning lanes into Church Street from Cambridge Street (an exclusive left turn lane southbound and an exclusive right turn lane northbound). This results in a nearly 90-foot crosswalk on Church Street. A 300-foot painted median has been shown on the northbound Cambridge Street approach. The lane configuration on High Street remains unchanged with one lane in each direction.

The TAC concept narrows Church Street to two westbound lanes and one eastbound lane combining the through and right turns into one lane. The corner radii have been reduced and the painted median eliminated, which will decrease the length of the crosswalks. In particular the Crosswalk at Church Street has been reduced to approximately 45 feet. This concept is shown in Figure 2. A fire truck and a 50-foot semi trailer will have some minor encroachment on the oncoming lanes. A fire truck will be able to exit Church Street onto Cambridge Street with no encroachments.

This intersection was analyzed with 2020 PHV with a five-phase fully actuated traffic signal including an exclusive pedestrian phase (for this analysis it was assumed that the pedestrian phase would be called every third/fourth cycle). The intersection is at LOS D and C during the a.m. and p.m. peak periods, respectively. Church Street will operate at a LOS C in both the am and pm peaks. The High Street eastbound approach is at LOS E during the a.m. peak and at LOS D during the p.m. peak. With the High Street approach forecast to operate at LOS E, the Town will need to further discuss the future operations with MHD because LOS E is an unacceptable future condition. However, since High Street is a Town road, MHD may accept the expected deficiency as long as Cambridge Street, a state road, operates at an acceptable LOS.

Figure 2
Cambridge Street at High Street and Church Street



Church Street at Fletcher Street & Bacon Street

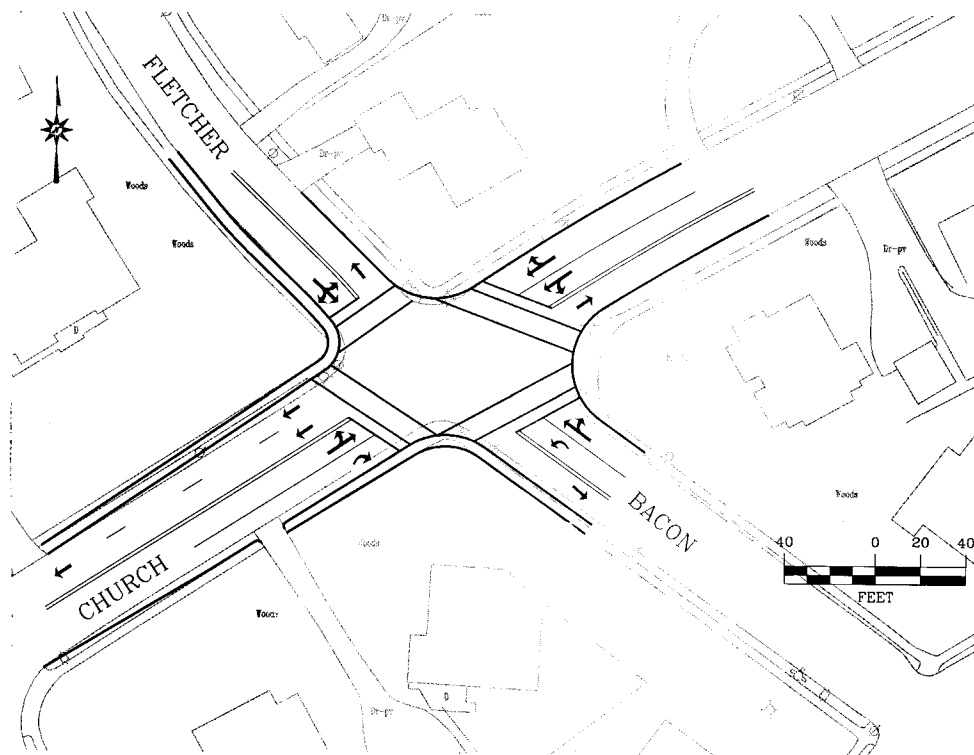
MHD's concept shows two eastbound lanes on Church Street with an exclusive left-turn lane and a shared through/right lane. Westbound on Church Street, a 350-foot painted median is shown with two dual-use approach lanes. Exclusive left turn lanes have been proposed on both the Fletcher and Bacon Street approaches.

The TAC's concept eliminates the exclusive left-turn lane on Fletcher and reconfigures the eastbound Church Street approach into a left/through lane and an exclusive right-turn lane. This eliminates the need for a painted median.

The LOS analysis shows a five-phase fully actuated signal, including one exclusive pedestrian phase (for this analysis it was assumed that the pedestrian phase would be called every third/fourth cycle). The intersection is at LOS D and B during the a.m. and p.m. peak periods, respectively and all four approaches are at LOS D or better during both peak periods.

It should be noted that combining the eastbound left-turning and through traffic into one lane will occasionally result in very long queues (95th percentile in excess of 700 feet), which could limit access to the right-turn only lane. But the MHD design also showed long queues for the combined right-through lane (95th percentile of 490 feet).

Figure 3
Church Street at Fletcher Street & Bacon Street



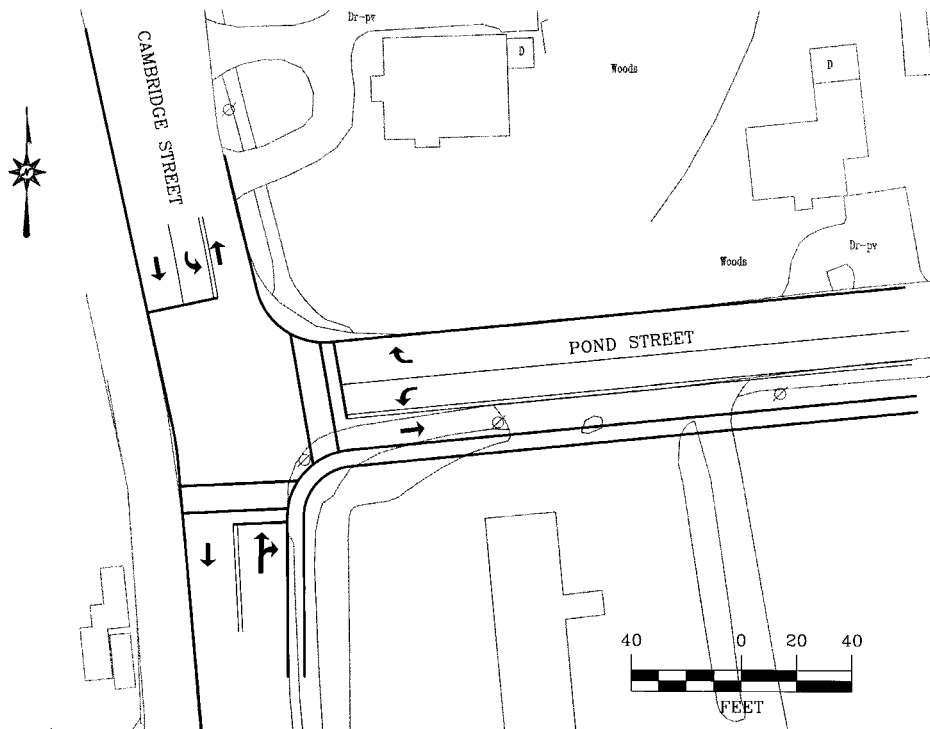
Cambridge Street at Pond Street

MHD's design proposes an exclusive left turn lane on the Cambridge Street southbound approach, two approach lanes on Pond Street and one approach lane on Cambridge Street. This proposal includes a painted median approximately 275 feet long along the Cambridge street north bound approach. In order to accomplish the widening on Pond Street within the existing right-of-way, several shade trees would need to be removed.

The TAC concept reduced the number of lanes on Pond Street from three to two. Berger's analysis indicates that the lane configuration proposed by MassHighway is needed for orderly traffic flow. Therefore, Berger has developed a concept that has realigned Cambridge Street eliminating the need for the painted median. To preserve the shade trees, Berger's concept shifts the Pond Street widening to the south. This will require right-of-way takings against a single property.

This intersection was analyzed with 2020 peak hourly volumes (PHV) with a four phase fully actuated traffic signal including an exclusive pedestrian phase (for this analysis it was assumed that the pedestrian phase would be called every third/fourth cycle). The intersection will operate at LOS B during both the a.m. and p.m. peak periods. All three approaches will operate at LOS C or better.

Figure 4
Cambridge Street at Pond Street



In summary, the Cambridge Street at Everett Avenue and Myopia Road intersection can be modified as proposed by the TAC. The Cambridge Street at High Street and Church Street intersection will require further discussion with MHD regarding the LOS on High Street. The Church Street at Fletcher Street and Bacon Street intersection can be modified as proposed but with some significant queues likely on Church Street eastbound. Finally, the Cambridge Street at Pond Street intersection will require the same number of lanes as proposed by MHD but can be configured differently so as to protect some street trees at the expense of right-of-way taking.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

THE LOUIS BERGER GROUP, INC.

David Cannon, PE
Project Manager