



Town of Lexington Pelham Road Property Access Study

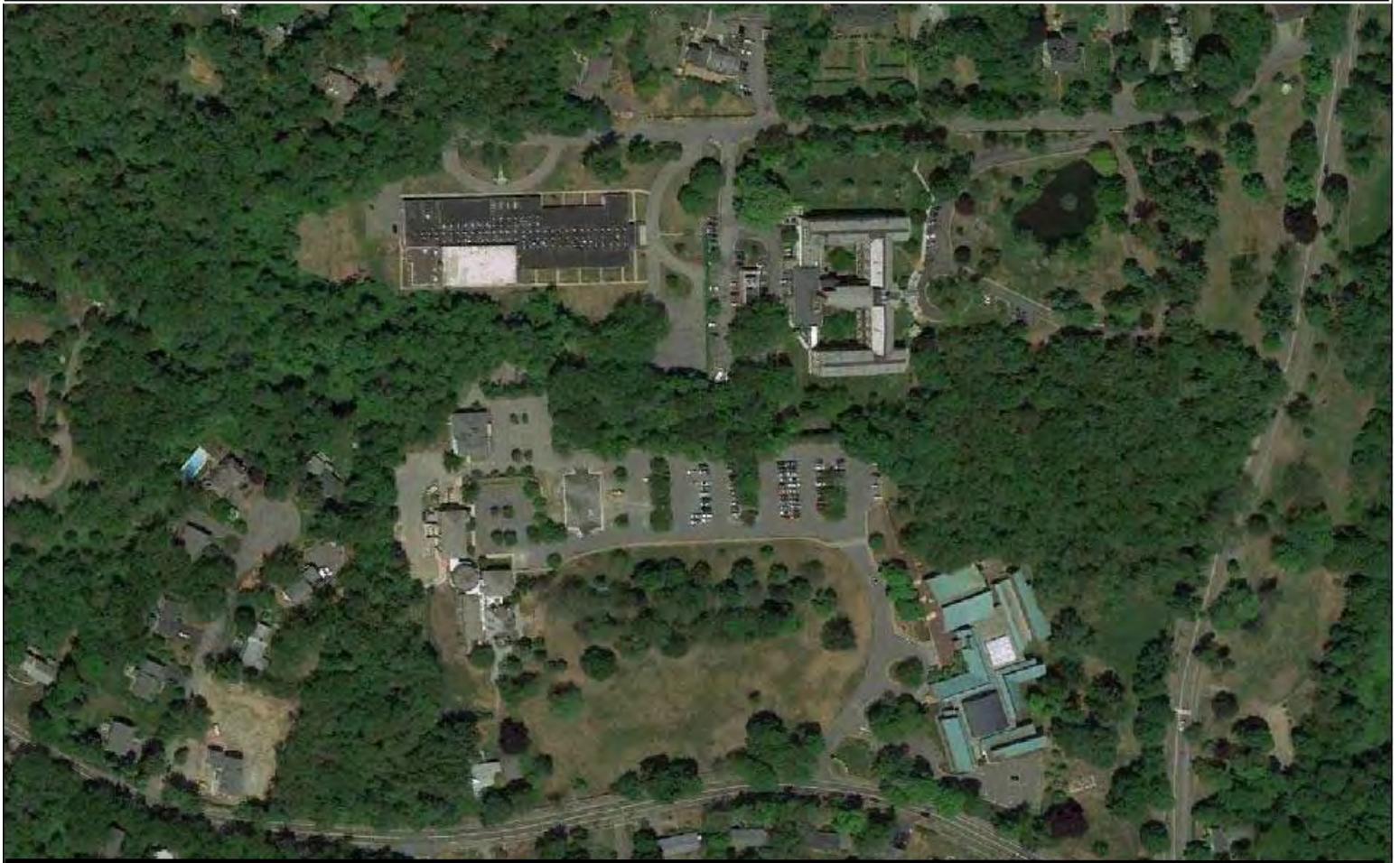




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1.0 Executive Summary

In June 2015, the Armenian Sisters' Academy on Pelham Road in Lexington, Massachusetts closed and the building is currently unoccupied. The property, measuring approximately 8.35 acres, is scheduled to be sold in the near future. When the school was operational, school drop-off / pick-up caused Pelham Road to become heavily congested with vehicular and pedestrian traffic. In addition, the intersection of Pelham Road and Massachusetts Avenue (Massachusetts State Route 4), the primary access to the site, is heavily travelled with poor sight distance for vehicles travelling on Pelham Road and Massachusetts Avenue. Pelham Road itself does not provide any pedestrian accommodations leading to the school property.

The Town of Lexington has expressed an interest in purchasing the school property, but needs to evaluate the surrounding roadway infrastructure to support the redevelopment of this facility. The intent is to improve traffic circulation, pedestrian connectivity, and overall user safety. WorldTech Engineering, LLC ("WorldTech") was retained by the Town of Lexington to develop and evaluate potential design alternatives including, an additional access road for bus access / egress to and from the school site, internal circulation improvements within the school property, and upgrades to the pedestrian network. Upgrades to pedestrian facilities examined as part of this study include a connection from Massachusetts Avenue to the school property, and a walkway from the school leading to the adjacent Lexington Community Center site. The final part of the study included an evaluation of geometric improvements at the Pelham Road / Massachusetts Avenue Intersection to enhance the overall safety of the intersection. Below is an outline of the various alternatives developed and evaluated as part this study.

Four access road alternatives were developed:

- Alternative 1 – Access Via East Side of School
- Alternative 2 – Access Via West Side of School
- Alternative 3 – Internal Traffic Circulation Improvements
- Alternative 4 – Access Via Tricorne Road

Four options for the reconfiguration at Pelham Road/Massachusetts Avenue were evaluated:

- Retain Existing Alignment of Pelham Road (No-Build)
- Realignment of Pelham Road
- Realignment of Massachusetts Avenue
- Right Turn Lane on Massachusetts Avenue

All alternatives were assessed based on vehicular and pedestrian safety, right-of-way impacts, utility impacts, environmental impacts, overall construction footprint and constructability, access for emergency vehicles, traffic control during construction, and project cost. One-way and two-way entrance and exit alternatives from the property were considered along with the use of cemented stone retaining walls to limit excavation and environmental impact through heavily wooded areas.



Due to significant impacts to private property and to a wetland resource area southwest of the school building, Alternatives 2 & 4 were not considered viable. Alternative 3, although viable, does not present a solution for traffic congestion on Pelham Road. Based on the evaluations conducted as part of this study, WorldTech recommends Alternative 1 – Access via East Side of School (One Way). This option provides a new vehicular circulation roadway, in conjunction with new pedestrian accommodations, to greatly enhance the safety for motorists and pedestrians alike. The alternative provides dedicated, separated space for all users of the facility. Direct impacts to environmental resource areas are avoided, and minimal property impacts are required.



2.0 Introduction

- **PURPOSE AND NEED**

WorldTech Engineering, LLC has been retained by the Town of Lexington to provide an access feasibility study to identify and evaluate potential vehicular and pedestrian connections to and from the former site of the Armenian Sisters' Academy school located at 20 Pelham Road in Lexington. In June 2015, the school closed due to enrollment issues and it was determined that the building would be sold. The Town of Lexington has shown interest in purchasing the property for the potential development of a new school or facility.

At the time the school was in operation, Pelham Road would be congested during morning drop-off and afternoon pick-up times due to the narrow width of the roadway and insufficient parking. In the building's current configuration, the only designated pick-up/drop-off area on the school property is a small circular driveway at the north entrance to the school adjacent to the end of the Pelham Road. The driveway is narrow and is only wide enough for one vehicle. Pedestrian access and egress to/from the school from Massachusetts Avenue is limited due to the lack of sidewalks on Pelham Road.

In addition to vehicular and pedestrian circulation deficiencies around the school site, the intersection of Pelham Road and Massachusetts Avenue needs to be evaluated. Reportedly, this location has a history of accidents due to poor sight distance directly related to the geometry of Massachusetts Avenue, overgrown vegetation, and a stone retaining wall along the southbound side of Massachusetts Avenue.

- **PROJECT GOALS**

- Improve Traffic Circulation / Access

The main goal of this study to develop and evaluate conceptual design alternatives for vehicular circulation and access / egress to and from the former school property. Given that the main access to the site is from Pelham Road, the study also provides conceptual design alternatives for improvements to the intersection of Pelham Road and Massachusetts Avenue (Massachusetts State Route 4) intersection to improve the overall safety and operation at this location.

- Pedestrian Safety and Connectivity

The secondary, although equally important, goal of the study is to develop conceptual design alternatives for providing pedestrian accommodations within the project area. These amenities include a sidewalk along the south side of Pelham road from Massachusetts Avenue to the school site, internal sidewalks and walking paths, and a pedestrian connection between the school site and the Lexington Community Center.



3.0 Existing Conditions

- **PROJECT AREA**

The project area, as shown in Figure 1 below encompasses Pelham Road from Massachusetts Avenue (Mass. Route 4) westerly to Bennington Road and the site of the former Armenian Sisters' Academy, southerly to the intersection of Marrett Road and Follen Road including the site of the Lexington Community Center, and Tricorne Road to the southwest of Pelham Road.



Figure 1: Project Area Aerial

Pelham Road is classified as a local road and extends approximately 1,550 feet westerly from Massachusetts Avenue to Bennington Road and terminates at the existing driveway to the Former Armenian Sisters' Academy. The width of Pelham Road varies between 16 feet and 24 feet with a typical width of approximately 22 feet. The edge of the roadway consists of bituminous concrete / asphalt curbing for the full length of Pelham Road. A narrow bituminous sidewalk is provided from the easterly entrance of Youville Place Assisted Living Residences and continues east towards Massachusetts Avenue. There is a small segment of bituminous sidewalk in front of #5 Pelham Road, however there are no adjoining sidewalks on the westerly side of Eliot Road. The easterly side of Eliot Road has a bituminous sidewalk present with a cement concrete sidewalk from the driveway curb cut at #3 Eliot Road to Pelham Road and terminates here. There are no handicapped accessible wheelchair ramps on Pelham Road nor at the intersection with Massachusetts Avenue.



Figure 2: Site Aerial with Traffic Circulation

The former Armenian Sisters' Academy ("site"), located at the northwestern corner of the project area, is the property in which this access study is based on. The site consists of a rectangular-shaped building with three (3) main entrance points. There are pedestrian walkways around the building which lead from the main entrance in the front of the building to the secondary entrances on the east and west sides of the building. The remainder of the property consists of open/green space with playground equipment located in the southwest corner.

In the building's current configuration, there are three entrance points for vehicles onto the site from Pelham Road. The east entrance is a bituminous concrete driveway approximately 20 feet in width with concrete curbing on either side. This entrance leads to the east entrance/drop off to the school. As shown on Figure 2 above, just beyond the east entrance to the school, the roadway becomes a one-way entrance to a bituminous parking lot. A raised grass island separates the entrance and exit driveways of the existing parking lot. The north entrance to the site, as shown in Figure 3, is a one-way circular driveway strictly used as a drop-off for the front entrance of the building. The existing curb-to-curb width varies from 14 feet to 16 feet and no parking is provided within the driveway. A cement concrete walkway from Pelham Road to the drop-off area meets a set of concrete stairs which lead pedestrians directly into the drop-off area. The front entrance of the building is not handicap accessible.



Figure 3: Drop-off Area at North Entrance



The west entrance is also accessed by the adjacent circular drop-off area. This entrance also appears to have been used for delivery, trash pickup, and other support services for the facility. The west driveway also provides access to a large playground/basketball court adjacent the school. This area may have been used as an overflow parking for events held at the school.

- **SURROUNDING LAND USE**

The project area is generally bounded by four streets, Pelham Road to the north, Tricorne Road to the west, Marrett Road to the south and Massachusetts Avenue to the east. Based on the June 2015 Zoning Map from the Town of Lexington, the majority of the project area is zoned for "RS-One Family Dwelling". To the east of the site, the property for the Youville Place Assisted Living Residences is zoned for "RD-Planned Residential". Massachusetts Avenue is zoned as a historic district.

To the north of Pelham Road is a moderately to heavily wooded residential neighborhood. To the east of the site is the Youville Place Assisted Living Residences which has two access drives, located east and west of the existing building respectively. To the south of the site is the Lexington Community Center which provides recreation and community programs to the residents of Lexington. To the southeast of the site is the Scottish Rite Masonic Museum & Library. To the south and west of the site is the residential cul-de-sac neighborhood of Tricorne Road. To the west of the site is Town of Lexington owned heavily wooded conservation land.



- **TOPOGRAPHY**

The topography of the area is generally rolling with an overall change in elevation of approximately 60 feet across the site, with the lowest point being the Pelham Road / Massachusetts Avenue intersection. The highest point on the site is the wooded area between Tricorne Road and the Lexington Community Center. A large stone masonry retaining wall is located adjacent to Marrett Road to retain the roadside embankment. A steep grade is located behind the stone retaining wall leading to an approximate thirty foot (30') elevation change from Marrett Road to the top of the hill behind the properties on Tricorne Road.

Near the southwest corner of the site, between the school building and Tricorne Road, a depression in the topography forms a bordering vegetated wetland area. An existing detention pond is located adjacent to this delineated wetland area, and appears to accept stormwater runoff from the paved parking lot located at the Lexington Community Center.

The land in the immediate vicinity of the existing school site is generally much flatter with minor slope change to the south. The driveway / main access off of Pelham Road is a steep slope as the school sits approximately 10 to 15 feet below the roadway elevation of Pelham Road.



Figure 4a: Retaining Wall Adjacent to Marrett Rd



Figure 4b: Flat Topography at School



Figure 4c: Pelham Road looking West from Massachusetts Ave.

At the intersection of Pelham Road and Massachusetts Avenue, heading west, Pelham Road is a reverse curve with a steep roadway grade in excess of 10 percent. Pelham Road begins to flatten out near the east driveway entrance to Youville Place/Eliot Road. Near the west driveway entrance to Youville Place there is a small crest curve in the roadway profile before leveling out between the east and west access driveways of the existing school site.



- RESOURCE AREAS**

There are two delineated resource areas within the project area. The first, more prominent resource area from a functions and values perspective, is located approximately two hundred and fifty feet (250') from the southwest corner of the school building in a heavily wooded area. This resource area extends to the north and west adjacent to the right-of-way for Pelham Street.

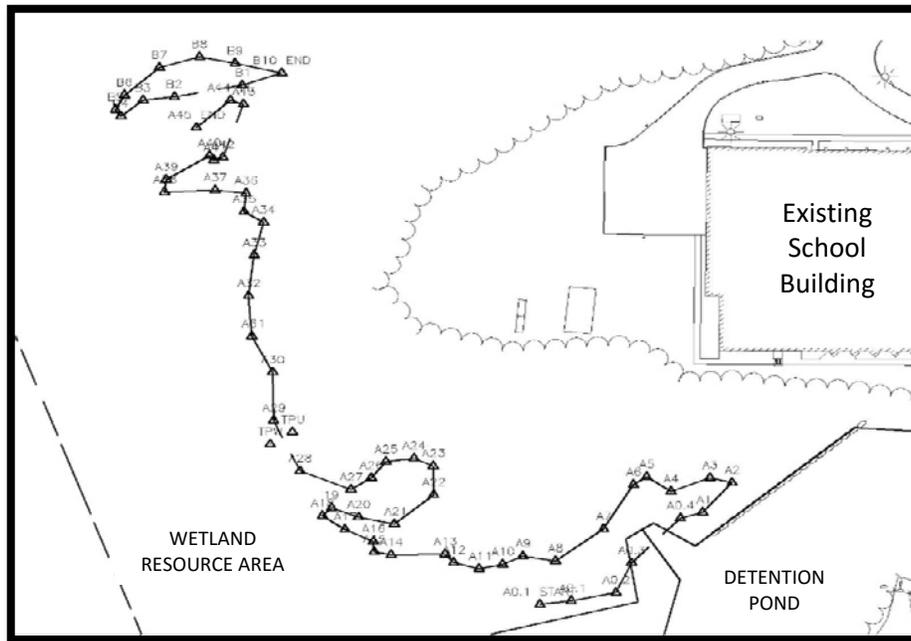


Figure 5a: Location of Resource Areas

The second resource area is adjacent to a small pond located between the Youville Place building and Massachusetts Avenue. The delineated resource area is adjacent to the southern side of Pelham Road. Catch basins at the corner of Eliot Road drain through a 12" reinforced concrete pipe (RCP) and outlet into the pond. This area is within a few feet of the recorded water level of the pond during the survey and is most likely the typical high water mark during high flow rainfall events.



Figure 5b: Resource Area Near Pond



4.0 Concept Alternatives

The following section, and supporting graphics, describes the alternatives that have been developed to meet the study goals and objectives.

- **ALTERNATIVE 1 (ACCESS VIA EAST SIDE OF SCHOOL)**

The proposed improvements along Pelham Road, as shown in Figures 1 & 1a at the end of this section, would consist of defining the travel way for vehicles traveling in the eastbound and westbound directions with the installation of new, reflective pavement markings, and the addition of a new ADA compliant sidewalk adjacent to southern edge of the roadway. The sidewalk would vary in width along a portion of Pelham Road to avoid impacts to the existing stone wall. The proposed sidewalk would extend from the intersection of Massachusetts Avenue to the eastern entrance of the school site. These improvements along Pelham Road are common to all of the access alternatives presented in this study as pedestrian accommodations are a crucial component to the success of the redevelopment of the project site.



Figure 6a: Proposed Location of Sidewalk Adjacent to Access Road



Figure 6b: Pelham Road Looking West

In this alternative, Pelham Road would remain a two-way roadway from Massachusetts Avenue to Bennington Road. The proposed access road under this Alternative would access the school on the East side of the existing building, and would accommodate two-way traffic to the existing parking lot located at the southeast corner of the building. This configuration would allow busses to drop students off on the same side as the entrance to the school and avoid any interaction with vehicular traffic. The proposed access road would then be a one-way roadway from this point, travelling behind the existing building, before turning south and continuing between the Lexington Community Center parking lot and the backyards of the residences on Tricorne Road. The access road would terminate on Marrett Road directly across from Follen Road.



Figure 6c: Proposed Access Drive Location



The one-way segment of the proposed access road will be restricted to authorized vehicles only including school buses and emergency vehicles. All other vehicular traffic accessing the school would need to circulate through the existing parking lot back on to Pelham Road.

A proposed sidewalk would be provided along the proposed access road in the vicinity of the school and would connect to the existing sidewalks surrounding the school. In addition, a new pedestrian connection would be provided adjacent to the existing school parking lot, extending through the existing wooded area behind this parking lot, and extending to the Community Center access drive. There are two proposed locations for connection to the Community Center parking lot. Each location would require cutting through an existing stone retaining wall (shown on right) and connecting to existing grass islands as shown in the photos (bottom right). One of the island contains a row of mature trees that ideally would remain. The other island contains granite bollards and a light pole and foundation. The latter is the recommended location given the ability to avoid the removal of the existing shade trees.

The addition of the proposed sidewalk network as described herein provides continuous pedestrian access from the bus stop at the intersection of Massachusetts Avenue / Pelham Road, through the proposed school site, to the Lexington Community Center.



Figure 7a: Existing Stone Retaining Wall



Figure 7b: Alternative Pedestrian Connection Locations



PREPARED FOR: TOWN OF LEFFINGTON, MA

TITLE: **Alternative 1: Access Road to Marrett Road (East Side of Building)**
Pelham Road Property Access Study

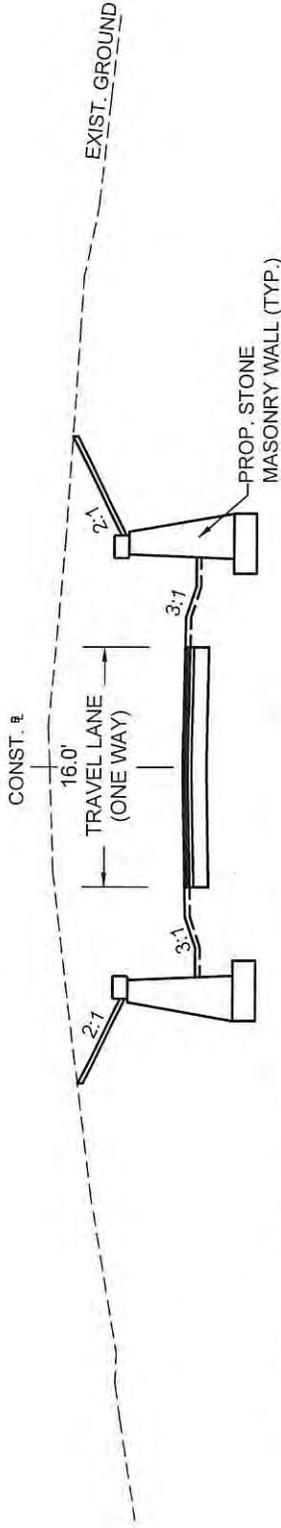
PREPARED BY: **WORLDTECH ENGINEERING**
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DATE: MARCH 2016

SCALE: 1" = 30'

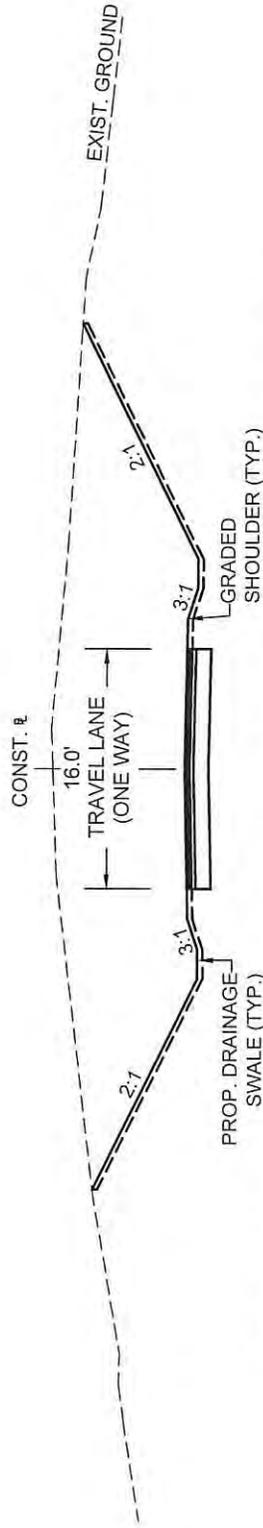
Figure 1a

Figure 1a - Alternative 1: Access Road to Marrett Road (East Side of Building) - Pelham Road Property Access Study - March 2016 - Prepared by WorldTech Engineering, Inc. (WTE) - 10/15/2016



TYPICAL SECTION - BUS / EMERGENCY ACCESS ROAD (MASONRY WALLS) - ONE WAY

SCALE 1" = 4'



TYPICAL SECTION B-B - BUS / EMERGENCY ACCESS ROAD (OPEN CUT) - ONE WAY

SCALE 1" = 4'



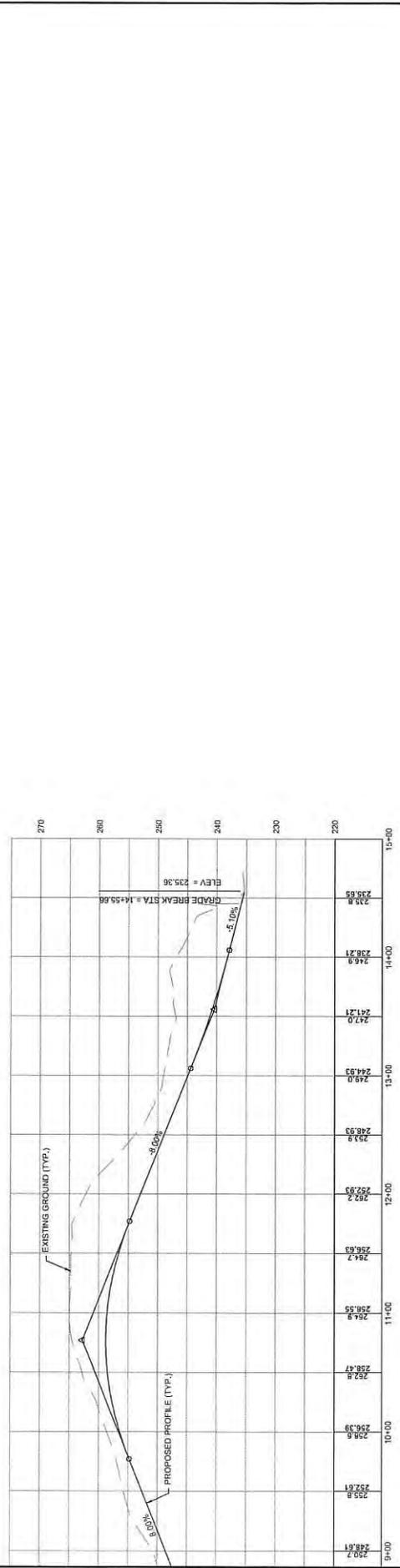
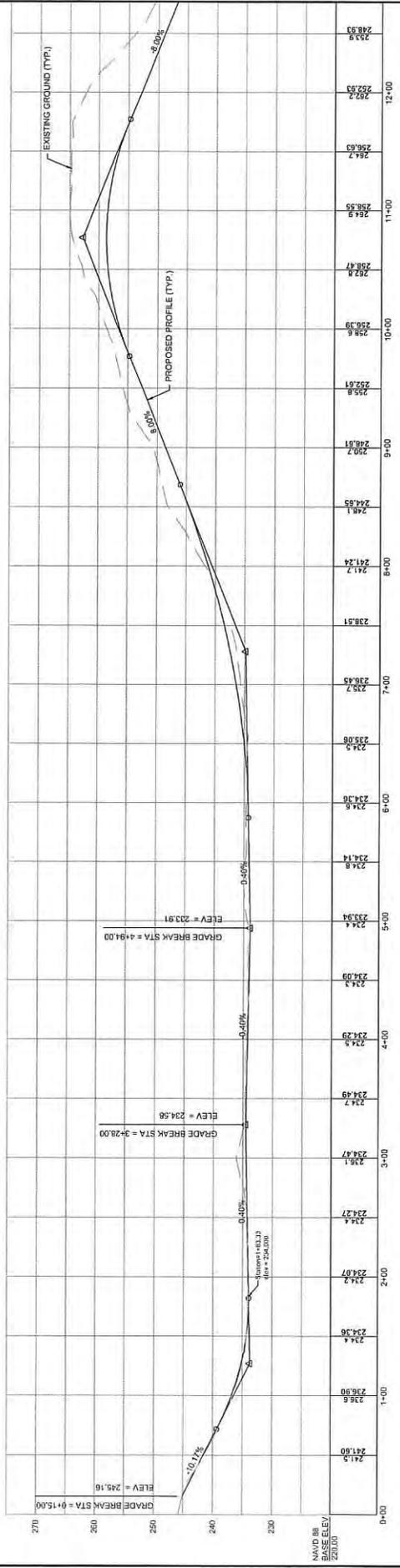
TOWN OF LEXINGTON, MA

PREPARED FOR:
Bus / Emergency Access Road Typical Sections (One Way): Alternative 1
 Pelham Road Property Access Study

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DATE: MARCH 2015
 SCALE: 1" = 8'

Figure B



PREPARED FOR: TITLE: **Bus/Emergency Access Road Conceptual Profile: Alternative 1**

PREPARED BY: **WORLDTECH ENGINEERING**
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DATE: MARCH 2016 SCALE: (VERT.) 1" = 8' (HORIZ.) 1" = 40'

FIGURE 1b



○ **ALTERNATIVE 1A (ACCESS VIA EAST SIDE OF THE SCHOOL – TWO WAY ACCESS ROAD)**

The two-way variation of Alternative 1, as shown in Figures 1d and 1e at the end of this section, would include all of the improvements mentioned above with the exception that the entire length of the access roadway would be two-way and provided to accommodate all traffic.



- LEGEND**
- PROPOSED HOT MIX ASPHALT ROADWAY
 - PROPOSED SIDEWALK/DRIVEWAY
 - PROPOSED GRASSLANDSCAPE AREA
 - LIMIT OF GRADING

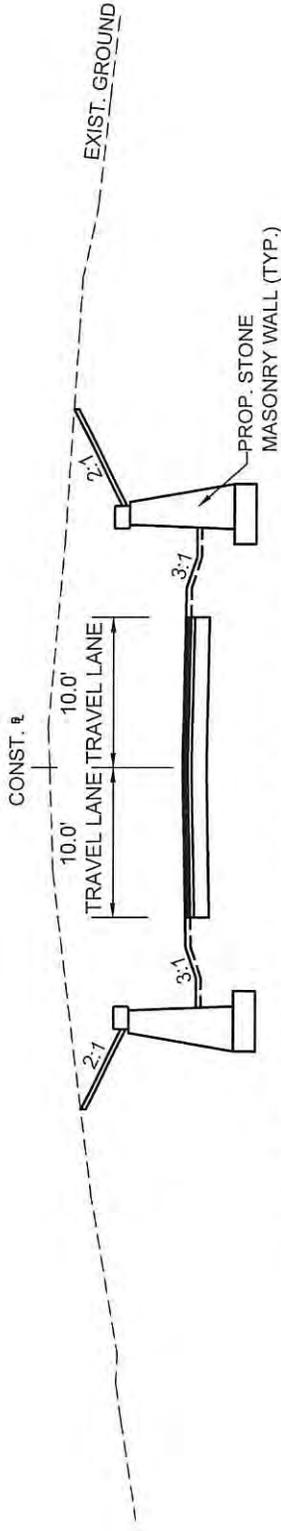
PREPARED FOR:  TOWN OF LENOX, MA

TITLE: **Two Way Access Road to Marrett Road (East Side of Building): Alternative 1a**
Pelham Road Property Access Study

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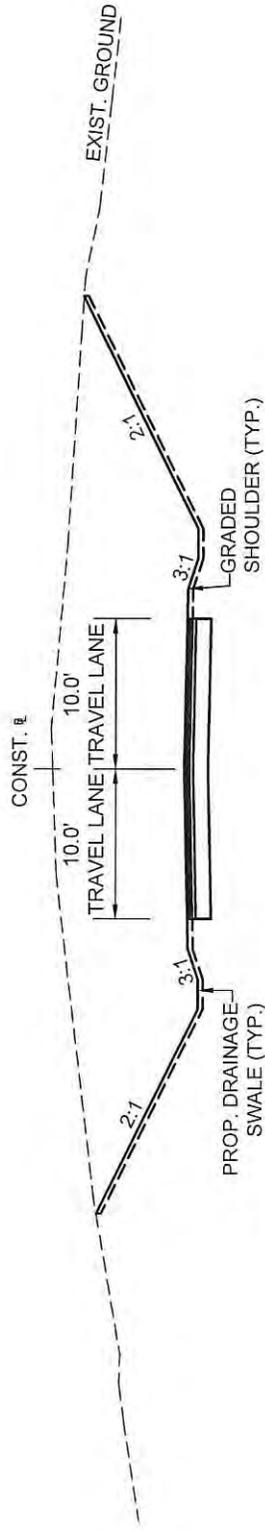
DATE: MARCH 2016
SCALE: 1" = 30'

Figure 1e



TYPICAL SECTION - ACCESS ROAD (MASONRY WALLS) - TWO WAY

SCALE 1" = 4'



TYPICAL SECTION C-C - ACCESS ROAD (OPEN CUT) - TWO WAY

SCALE 1" = 4'



TOWN OF LEXINGTON, MA

PREPARED FOR:
Access Road Typical Sections (Two Way): Alternative 2
 Pelham Road Property Access Study



PREPARED BY:
 DATE: MARCH 2016
 SCALE: 1" = 8'

Figure C



- **ALTERNATIVE 2 (ACCESS VIA WEST SIDE OF SCHOOL)**

The roadway / pedestrian improvements previously outlined along Pelham Road from Massachusetts Avenue to the subject property would be supplemented with a continuous sidewalk adjacent to the southern side of Pelham Road extending to Bennington Road. The additional sidewalk would extend from the western access drive to the limit of the existing stair case leading to the front entrance of the building. The existing stair case and associated walk would be rebuilt as part of this Alternative.

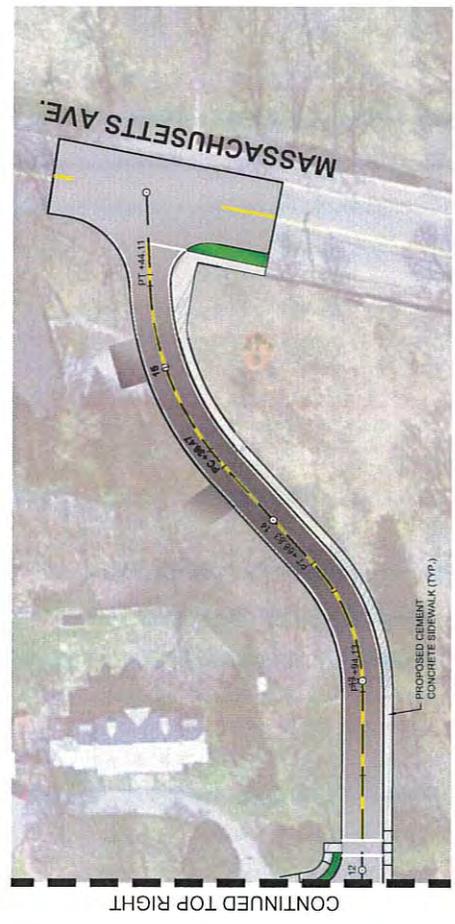
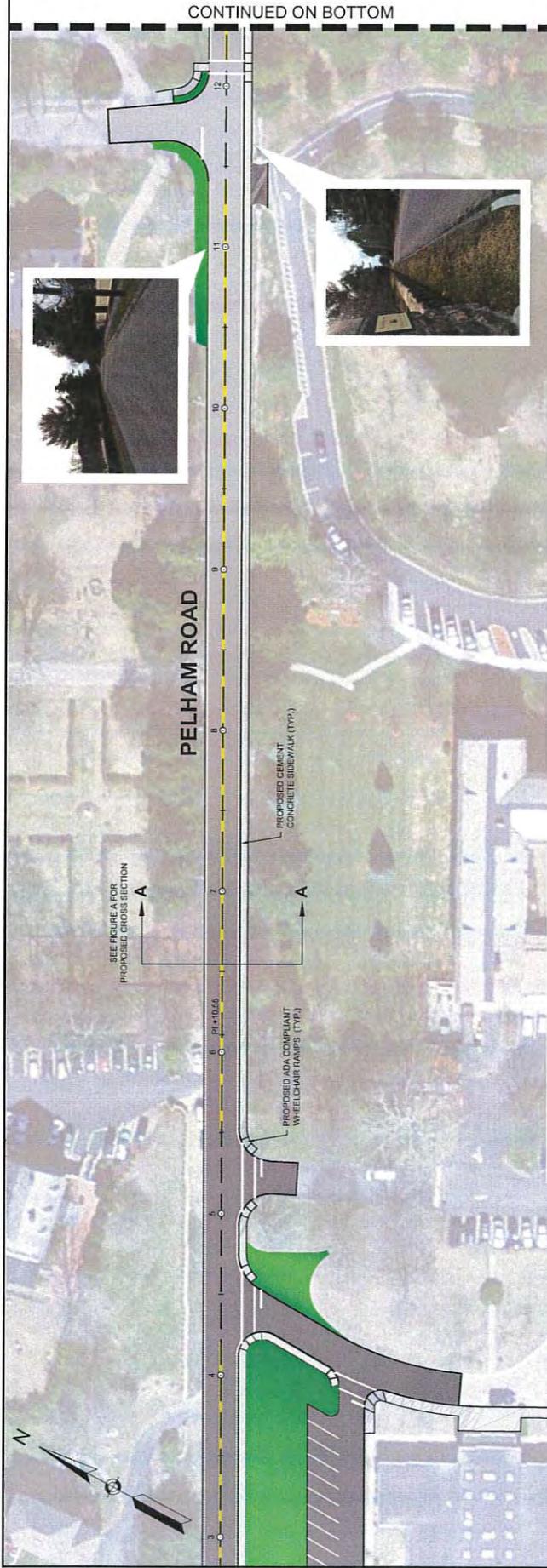
In this alternative, the proposed access road would be constructed to service the existing west entrance of the school as shown in Figures 2 & 2a at the end of this section. The proposed access road would run parallel to the existing building, extend south, and follow the same alignment as Alternative 1 from the Community Center parking lot to Marrett Road. In this alternative, the access road will be one-way for authorized vehicles beginning at Bennington Road. Two-way traffic will remain on Pelham Road from Massachusetts Avenue to Bennington Road.

The circular driveway at the front entrance of the school would be relocated under this Alternative. The entrance of the circular driveway would retain its current alignment from the eastern access drive to the front entrance of the building. At that point the driveway would run adjacent to the existing sidewalk terminating at the intersection of the access road on the eastern side of the building. The exit portion of the existing circular driveway would be converted to open / green space. The realignment of the driveway, along with the one-directional flow of traffic in the front of the buildings, creates an opportunity to provide visitor / short term angled parking spaces in front of the school.



Figure 8: Circular Driveway / West Entrance from Pelham Road

Under Alternative 2, the pedestrian improvements described under Alternative 1 will also be implemented providing the same beneficial accommodations.



PREPARED FOR:  TOWN OF LEXINGTON, MA	TITLE: Access to Marrett Road (West Side of Building): Alternative 2 Pelham Road Property Access Study		PREPARED BY: WORLDTECH ENGINEERING <small>100 TRADE CENTER DRIVE, SUITE 200 WOXBORO, MASSACHUSETTS 01581 PHONE: 781.333.4100</small>	DATE: MARCH 2016	Figure 2 SCALE: 1" = 30'
	LEGEND: PROPOSED HOT MIX ASPHALT ROADWAY PROPOSED SIDEWALK/DRIVEWAY PROPOSED GRASS/LANDSCAPE AREA LIMIT OF GRADING				

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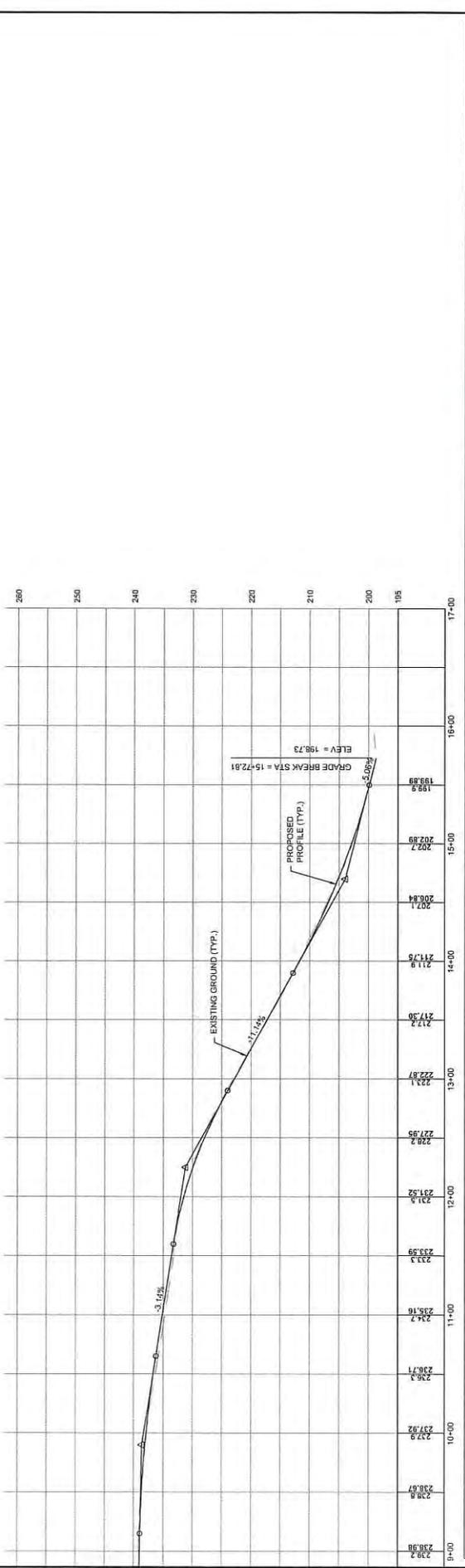
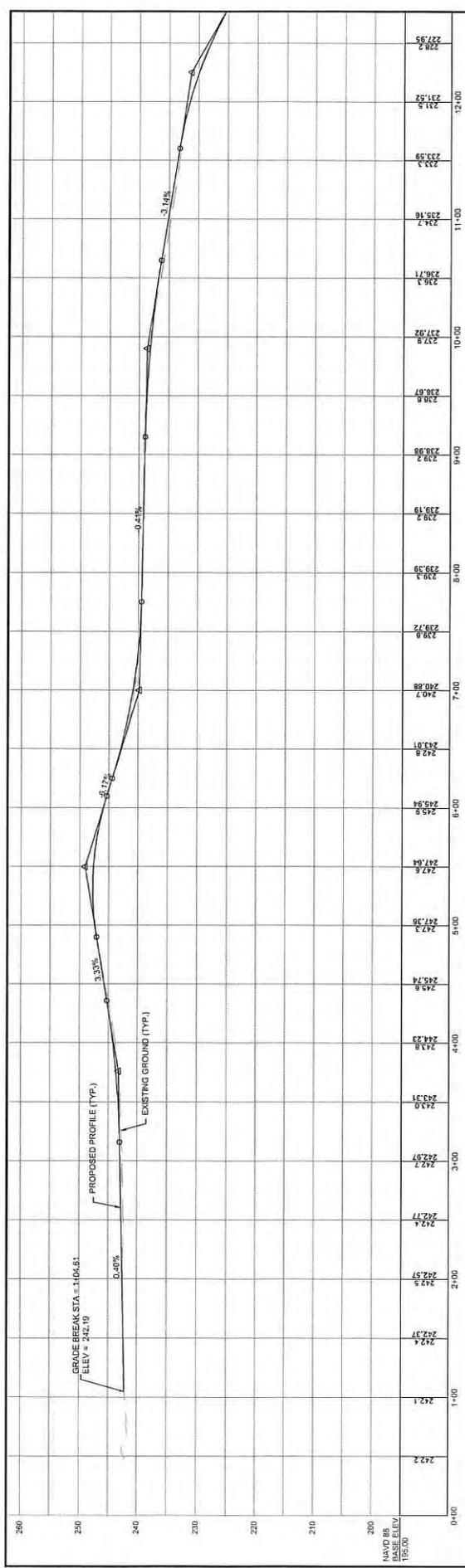
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TITLE: **Access to Marrett Road (West Side of Building): Alternative 2**
 Pelham Road Property Access Study

PREPARED FOR: 
 TOWN OF LEIGHTON, MA

Figure 2a



PREPARED FOR:  TOWN OF LEOMINSTER, MA

TITLE: **Pelham Road Conceptual Profile: Alternative 2**
Pelham Road Property Access Study

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DATE: MARCH 2016

SCALE: (VERT.) 1" = 8'
(HORIZ.) 1" = 40'

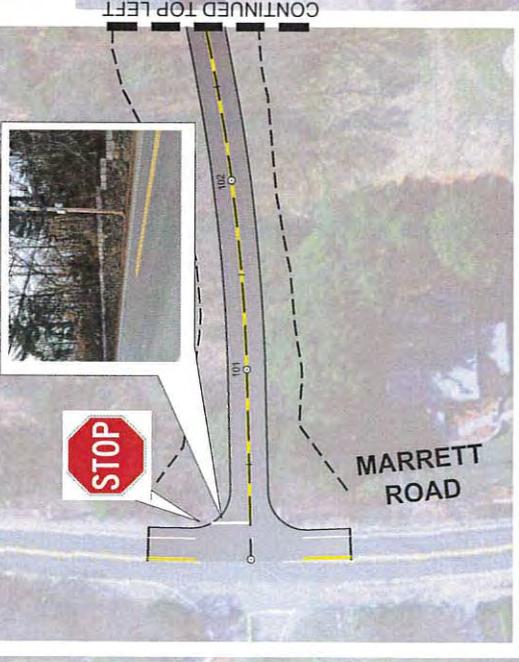
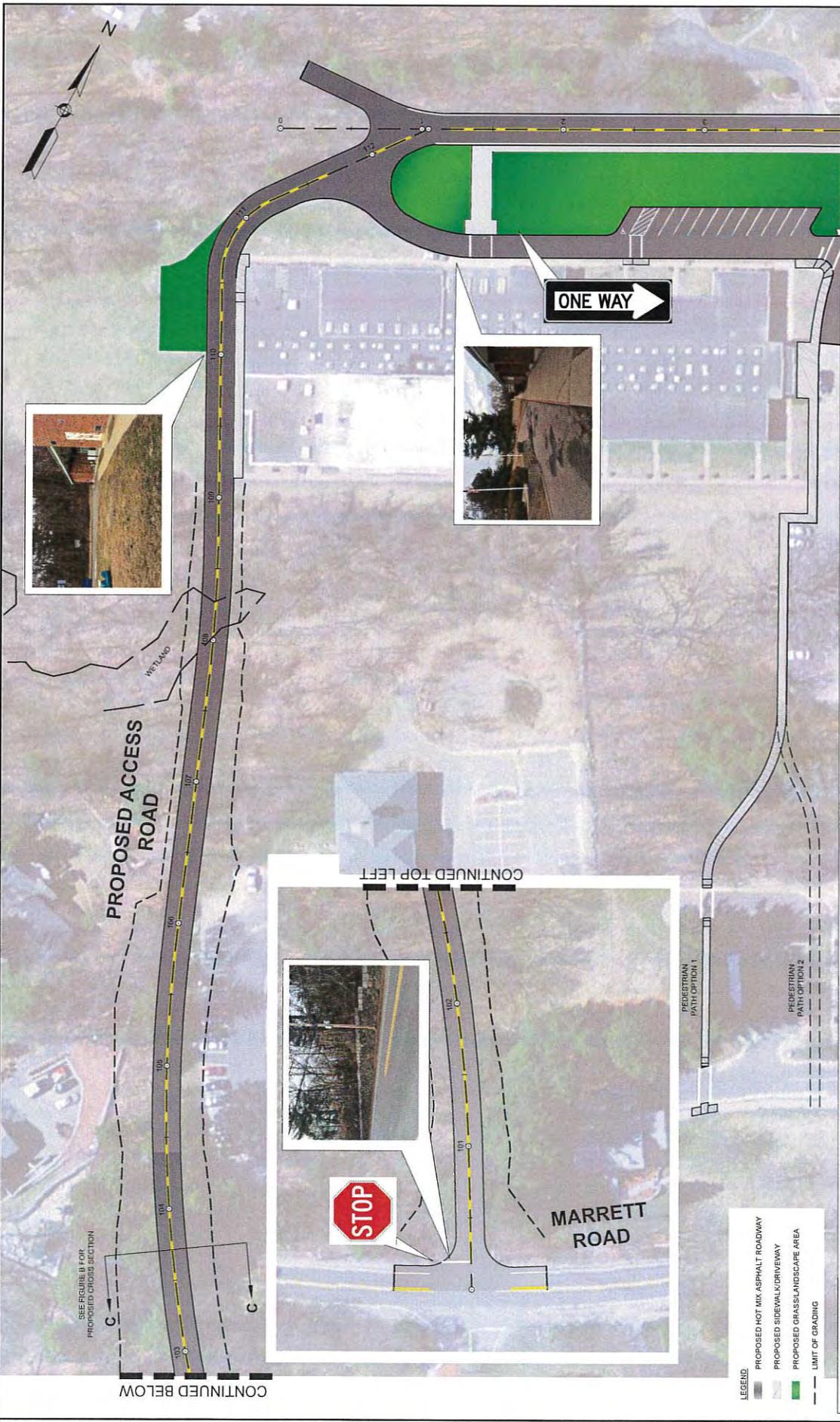
Figure 2c

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○ **ALTERNATIVE 2A (ACCESS VIA WEST SIDE OF THE SCHOOL – TWO WAY ACCESS ROAD)**

The two-way variation of Alternative 2, shown in Figures 2d and 2e at the end of this section, would consist of all of the improvements mentioned above with the exception of the two way traffic terminating at the location in which the access road and the circular driveway split. Under this Alternative two way traffic would be allowed to use the access road in its entirety.



	PREPARED FOR: TOWN OF LEXINGTON, MA	TITLE: Access Road to Marrett Road (West Side of Building) Two-Way: Alternative 2a Pelham Road Property Access Study	PREPARED BY: WORLDTECH ENGINEERING <small>300 TRADE CENTER, SUITE 5000 WOXBORO, MASSACHUSETTS 01581 TEL: 781.353.4000</small>	DATE: MARCH 2016	SCALE: 1" = 30'	Figure 2e
	LEGEND: ■ PROPOSED HOT MIX ASPHALT ROADWAY ■ PROPOSED SIDEWALK/DRIVEWAY ■ PROPOSED GRASS/LANDSCAPE AREA - - - LIMIT OF GRADING					

Figure 2e (Access Road to Marrett Road (West Side of Building) Two-Way: Alternative 2a) - Pelham Road Property Access Study - 03/16/2016 - 1" = 30' - 1 of 1



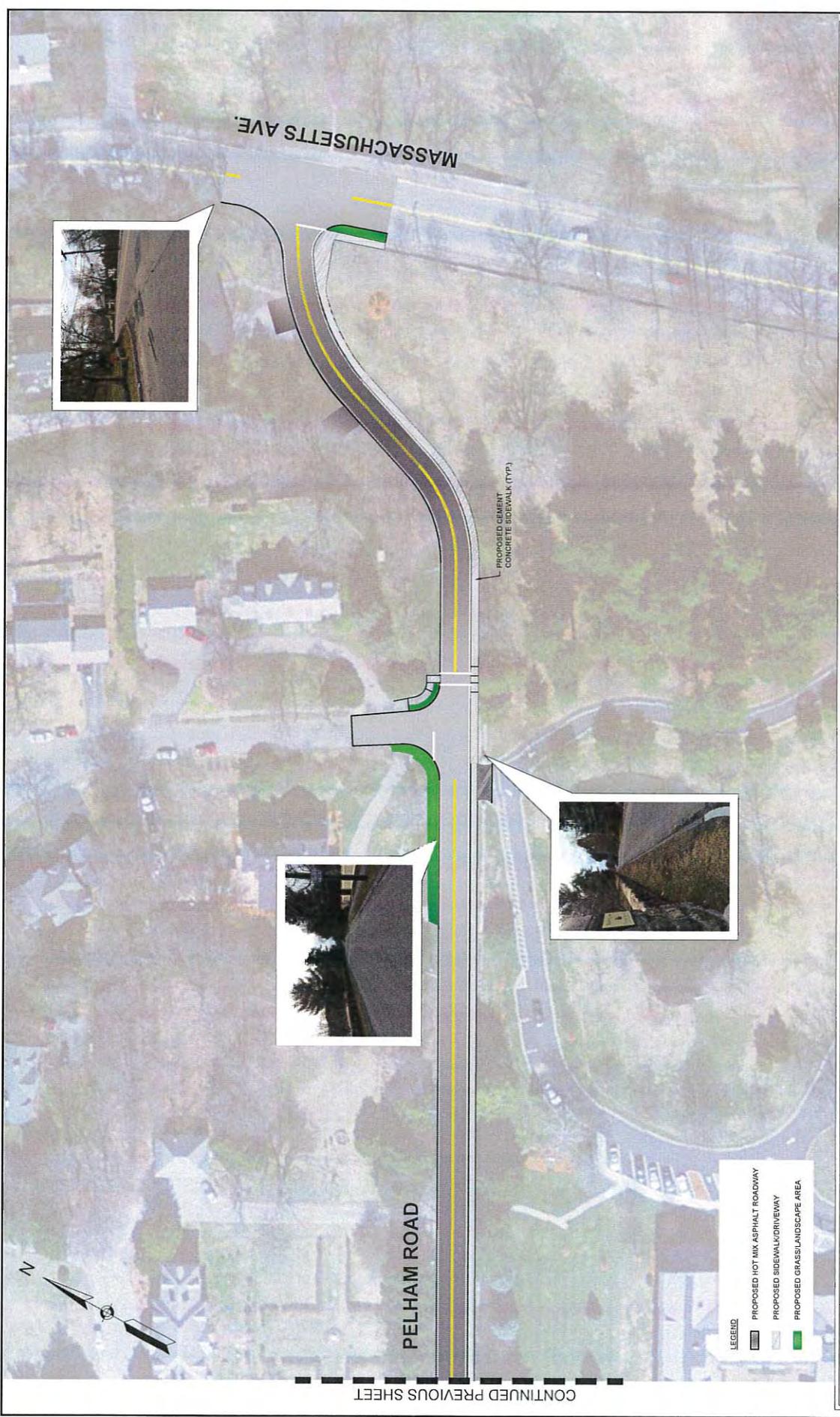
- **ALTERNATIVE 3 (INTERNAL TRAFFIC CIRCULATION)**

The roadway / pedestrian improvements previously described for Alternatives 1 and 2 along Pelham Road from Massachusetts Avenue to the subject property remain unchanged under this Alternative. Access to the front entrance of the school from Pelham Road will remain in place, but the exit condition will be reconfigured. Buses and vehicles will drop students off at the main entrance of the school on the north side of the building, similar to the current configuration.

A proposed extension of the existing driveway /sidewalk would run adjacent to the school, terminating at the intersection of the access road on the eastern side of the building as shown in Figure 3 at the end of this section. The existing vehicular exit in front of the school would be converted to greenspace. This adjustment in geometry will allow for additional storage for busses and vehicles to drop students off at the school during peak hours. Traffic circulation will be improved in the vicinity of the school due to the removal of a curb cut on Pelham Road and the realignment of the driveway exiting on to the eastern access road.



Figure 9: Location of Driveway Realignment



PREPARED FOR: TOWN OF LEVINGTON, MA

TITLE: Internal Traffic Circulation: Alternative 3
Pelham Road Property Access Study

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DATE: MARCH 2016
SCALE: 1" = 40'

Figure 3a

Figure 3a Internal Traffic Circulation: Alternative 3 Pelham Road Property Access Study - Project No. 15-003-01 Levington - Pelham Road Property Access Study.dwg (10/10/16) 2:44



- **ALTERNATIVE 4 (ACCESS VIA TRICORNE ROAD)**

Under this Alternative, the proposed access road is shown connecting Pelham Road to the cul-de-sac at Tricorne Road. This alternative, as shown in Figure 4 at the end of this section, maintains the existing roadway network and parking lots in the vicinity of the existing school, and adds a drop of location on the West side of the building. The access road would extend south, similar to Alternative 1, but meander to the West to connect with Tricorne Road.



Figure 10: West Side of School Building Looking North

The Access Road would connect to Tricorne Road between two properties at the cul-de-sac. The cul-de-sac would be removed and replaced with landscaping, and adjacent driveways would be reconfigured to meet the new alignment of Tricorne Road. Vehicles from the access road and neighboring houses would proceed south on Tricorne Road to the stop condition at Marrett Road.



Figure 11: Connection of Access Road to Tricorne Road



- **RECONFIGURATION OF PELHAM ROAD / MASSACHUSETTS AVENUE INTERSECTION**

In conjunction with the alternatives described above to provide improved access to and from the proposed school property site, WorldTech evaluated potential geometric improvements to the Pelham Road / Massachusetts Avenue intersection to increase the overall safety and operation of this intersection. The following alternatives were evaluated:

- **ALTERNATIVE 1: RETAIN EXISTING ALIGNMENT OF PELHAM ROAD (NO-BUILD)**

Under this alternative, as shown in Figure 5 at the end of this section, roadway improvements would consist of repaving the existing roadway, defining the travel way with the use of reflective pavement markings, and the addition of a sidewalk adjacent on the south side of Pelham Road.

At the intersection of Pelham Road and Eliot Road, small segments of sidewalk exist at the two quadrants of the T-intersection, with the western segment extending approximately 100' along the north side of Pelham Road. The proposed improvements under this alternative would eliminate the western segment of sidewalk as it creates an undesirable mid-block crossing. The eastern segment would be rebuilt to include an ADA compliant wheelchair ramp that would guide pedestrians to the continuous sidewalk along the southern side of Pelham Road via a painted crosswalk.



Figure 12: Pelham Road Mid-Block Crossing

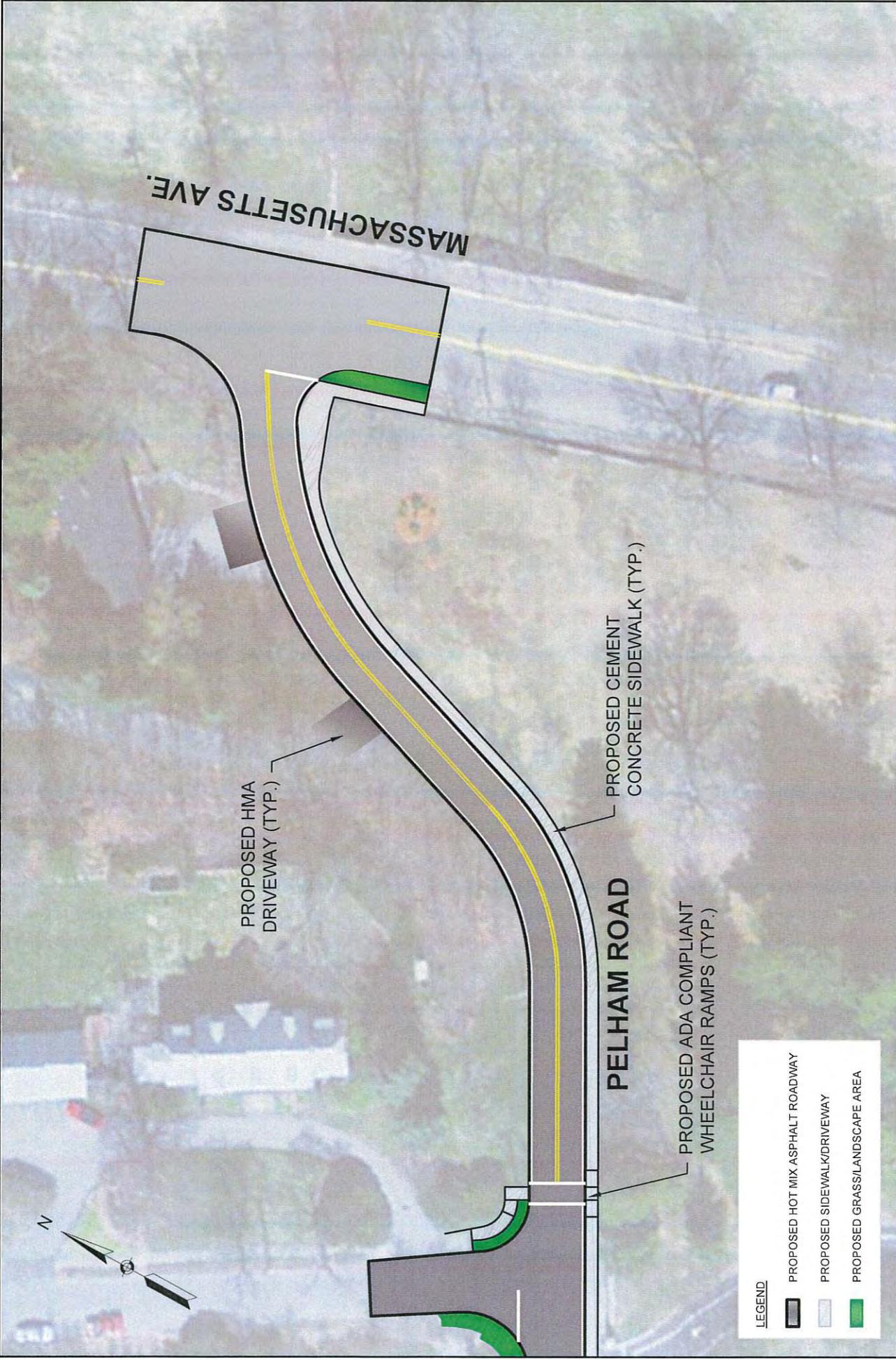


Figure 5

DATE: MARCH 2016
 SCALE: 1" = 50'

PREPARED BY:
WORLDTECH ENGINEERING
 300 TRADE CENTER, SUITE 5580
 WOBURN, MASSACHUSETTS 01801
 PHONE: 781.933.4800
 FAX: 781.933.4801

TITLE:
 Mass Ave. at Pelham Rd. (Alt 1) - Intersection Reconfiguration
 (Exist. Alignment/No-Build)
 Pelham Road Property Access Study

PREPARED FOR:

 TOWN OF LEXINGTON, MA



○ **ALTERNATIVE 2: REALIGNMENT OF PELHAM ROAD**

The pedestrian improvements in the vicinity of Eliot Road mimic those presented under the previous alternative.

This alternative, as shown in Figure 5a at the end of this section, includes the realignment of Pelham Road from Eliot Road to the intersection of Massachusetts Avenue. This reconfiguration would significantly improve the horizontal and vertical geometry of the roadway. Shifting the intersection to the south would improve the approach angle of Pelham Road in relation to Massachusetts Avenue and provide motorists additional sight distance to identify vehicles travelling southbound on Massachusetts Avenue.



Figure 13: Potential Location of Pelham Road Realignment

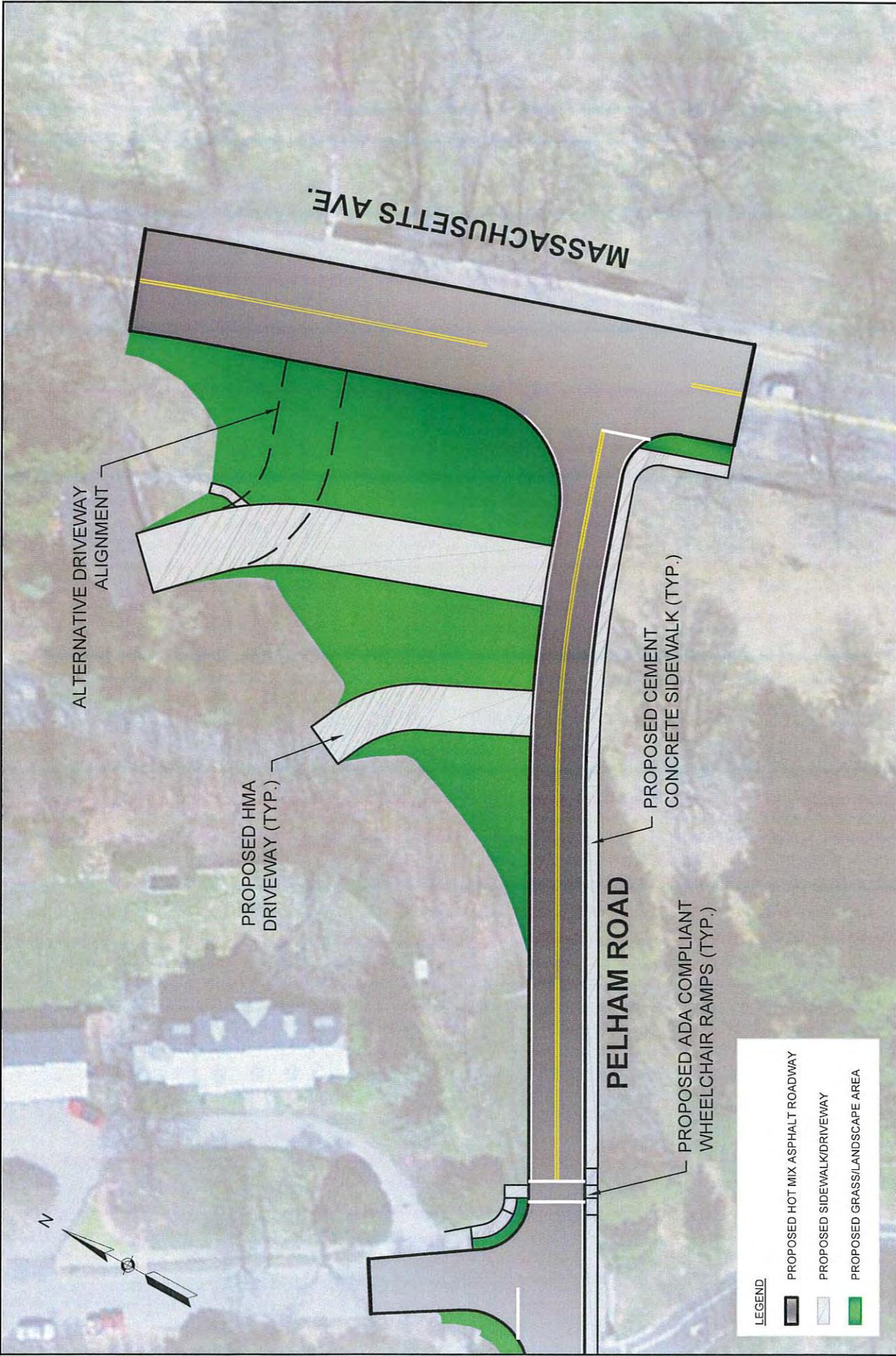


Figure 14: Pelham Road at Mass. Ave. Looking North

The two abutting driveways in the vicinity of the alignment shift would extend to meet the proposed edge of pavement on Pelham Road. The driveway at northeast corner of the intersection can alternately connect directly to Massachusetts Avenue in a similar location to the existing curb cut for Pelham Road.

○ **ALTERNATIVE 3: REALIGNMENT OF MASSACHUSETTS AVENUE**

Similar to Alternative 2 presented above, the pedestrian improvements within this stretch of Pelham Road would mimic those presented under the No-Build Alternative. In this Alternative, as shown in Figure 5b at the end of this section, the reconstruction of Pelham Road would occur within the existing roadway footprint and the geometric improvements would be limited to the Massachusetts Avenue corridor. To address the issue of limited sight distance at the Pelham Road intersection, the alignment of Massachusetts Avenue would shift to the east. Shifting the roadway to the east ensures the retaining wall adjacent to the roadway on the west side of Massachusetts Avenue will remain. The shifting of the roadway and subsequent clearing of roadside growth would create a “sight shelf” for motorists to improve sight distance and improve the overall safety at this location.



DATE: MARCH 2016
 SCALE: 1" = 50'

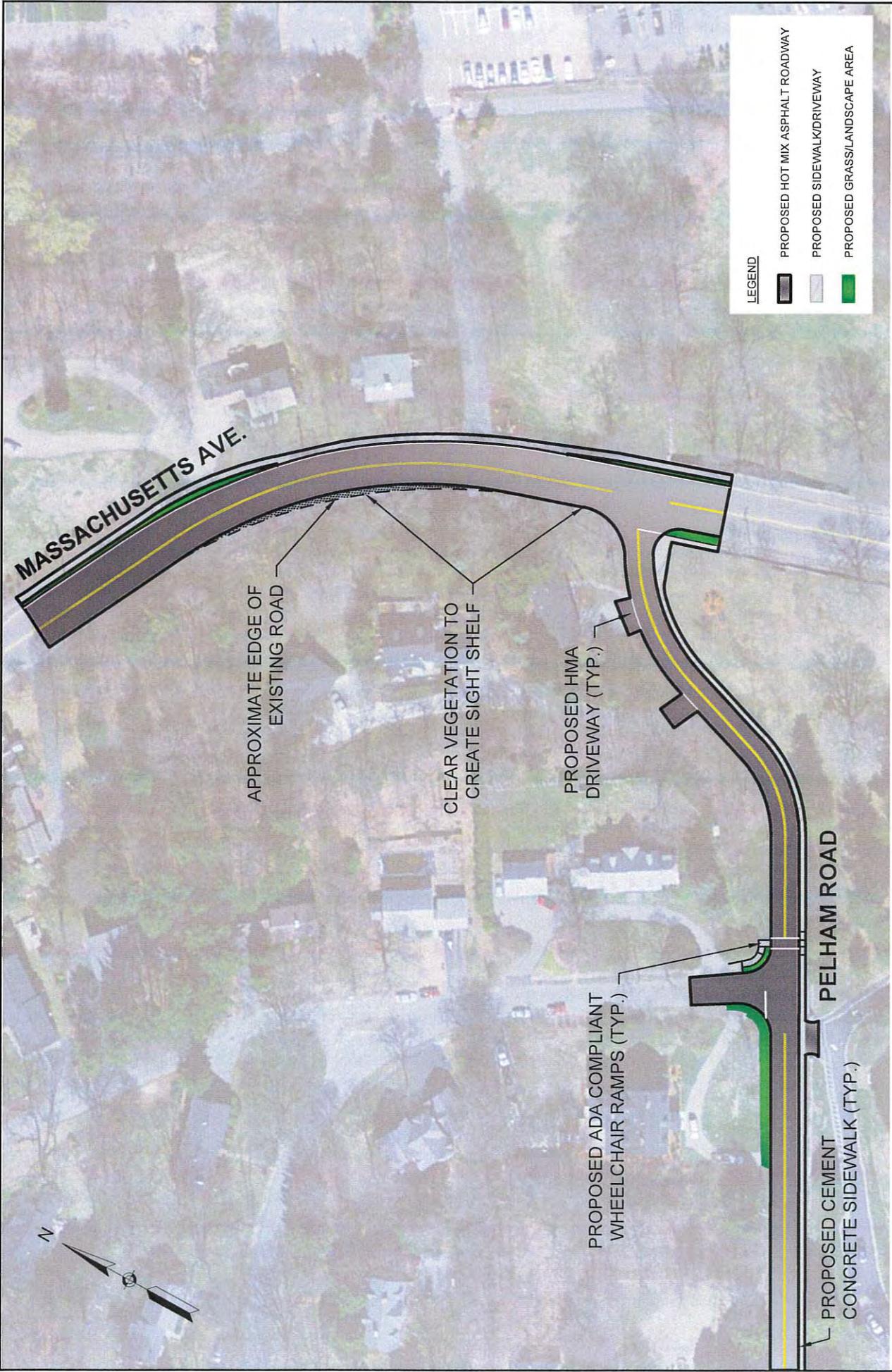
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TITLE:
 Mass Ave. at Pelham Rd. (Alt 2) - Intersection Reconfiguration (Realign Pelham Rd.)
 Pelham Road Property Access Study

PREPARED FOR:

 TOWN OF LEXINGTON, MA

Figure 5a



DATE: MARCH 2016
 SCALE: 1" = 100'

PREPARED BY:
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TITLE:
 Mass Ave. at Pelham Rd. (Alt 3) - Intersection Reconfiguration (Realign Mass Ave.)
 Pelham Road Property Access Study

PREPARED FOR:

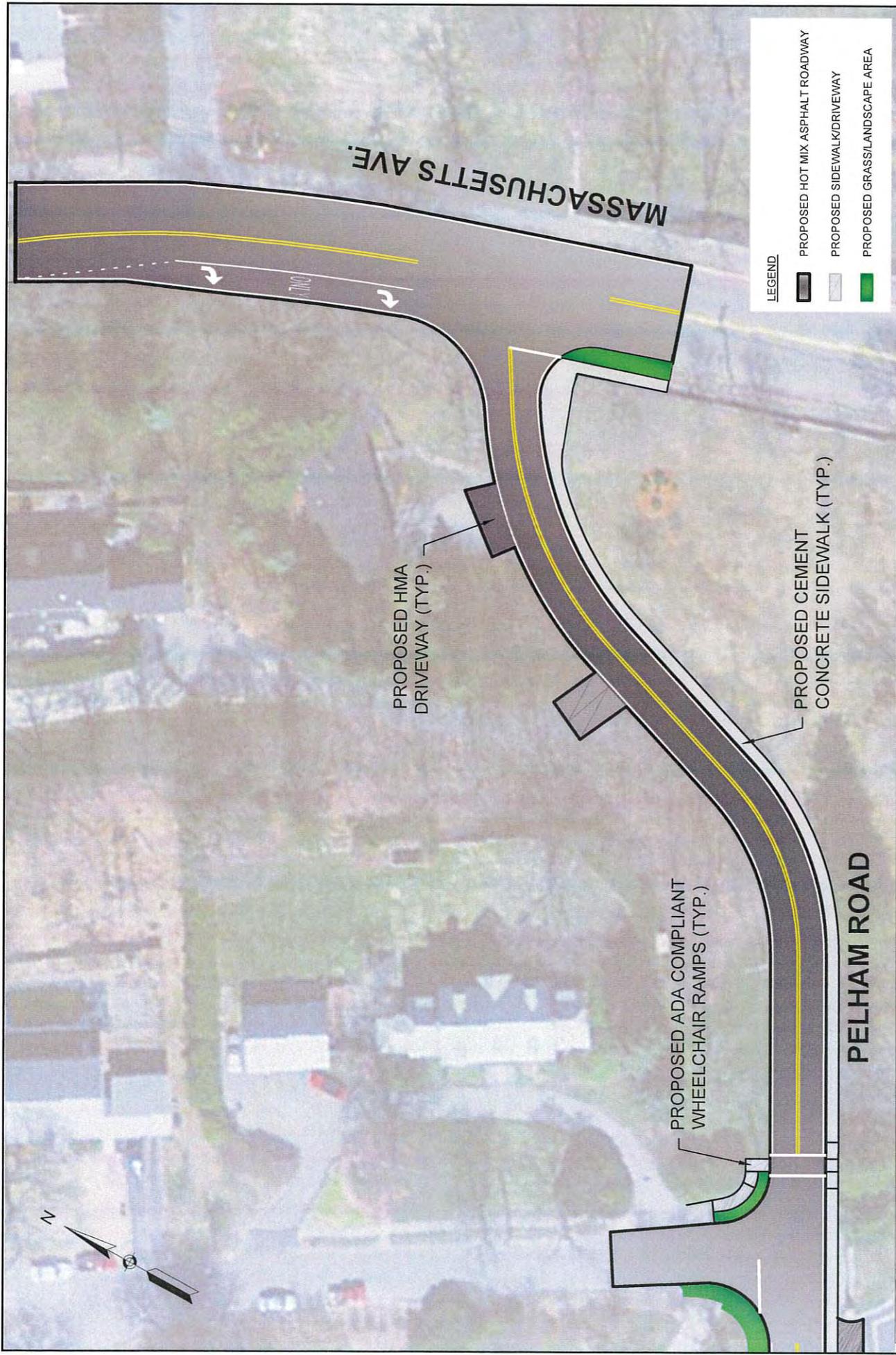
 TOWN OF LEXINGTON, MA

Figure 5b



○ **ALTERNATIVE 4: RIGHT TURN LANE ON MASSACHUSETTS AVENUE**

Pedestrian improvements under this alternative, as shown in Figure 5c at the end of this section, would follow the enhancements previously described in Alternatives 1 thru 3. Similar to the *Realignment of Massachusetts Avenue Alternative*, the reconstruction of Pelham Road would occur within the existing roadway footprint and the geometric improvements would be limited to the Massachusetts Avenue corridor. The alignment of Massachusetts Avenue would slightly shift to the east to accommodate the addition of a dedicated right-turn lane on to Pelham Road. The dedicated right turn lane and associated lane shift would provide a deceleration lane for vehicles looking to turn on to Pelham Road and reduce the likelihood of rear end collisions.



PREPARED FOR:  TOWN OF LEXINGTON, MA	TITLE: Mass Ave. at Pelham Rd. (Alt 4) - Intersection Reconfiguration (Right Turn Lane) Pelham Road Property Access Study		PREPARED BY:  WORLDTECH ENGINEERING 300 TRADE CENTER, SUITE 5580 WOBURN, MASSACHUSETTS 01801 PHONE: 781.933.4600 FAX: 781.933.4601	DATE: MARCH 2016	SCALE: 1" = 50'	Figure 5c
	LEGEND [Dark Grey Box] PROPOSED HOT MIX ASPHALT ROADWAY [Light Grey Box] PROPOSED SIDEWALK/DRIVEWAY [Green Box] PROPOSED GRASS/LANDSCAPE AREA					



5.0 Alternatives Analysis

- **ALTERNATIVE 1 (ACCESS VIA EAST SIDE OF SCHOOL)**

- **SAFETY**

This design provides a new access and egress for vehicles along the east entrance of the school. Passenger cars will be able to drop-off children along a newly constructed sidewalk then proceed into the existing parking lot and circulate around the raised grass island as the exit back onto Pelham Road. Also, the existing north (Main) entrance drop-off area would still be in use and provide some relief of using the newly constructed access road during peak drop-off times. Buses would be able to drop-off and pick-up children in front of the east entrance of the building and exit along the dedicated bus/emergency access road and enter back into traffic at the intersection of Marrett Road and Follen Road. This configuration provides a continuous traffic circulation pattern and avoids the congestion that would likely be created on Pelham Road during drop off / pick up times.

Pedestrian accommodation will also be greatly enhanced. A new sidewalk will connect to the existing sidewalk on the southbound side of Massachusetts Avenue and provide safe passage for pedestrians. The sidewalk will continue along the stone retaining wall along the right-of-way of Youville Place, crossing both the east and west driveway of Youville Place. The sidewalk will continue along the west side of the new access road and connect to the existing school walkway network. Also, a new sidewalk would be constructed along the west side of the existing parking lot through a wooded area and across the parking lot of the Lexington Community Center to connect to an existing sidewalk.

The addition of this new vehicular circulation roadway, in conjunction with the new pedestrian accommodations, greatly enhance the safety for motorists and pedestrians alike by providing dedicated, separated space for all users of the facility.

- **RIGHT OF WAY IMPACTS**

For Alternative 1, right-of-way impacts should be only temporary in nature. The proposed access road would be constructed on the school property or the Community Center property, which is owned by the Town. Retaining walls may need to be built along the pinch point between the Community Center parking lot and a private abutter on Tricorne Road, but the impacts would be temporary for construction of the wall and minor grading modifications. No permanent easements are anticipated as the wall would be on town-owned property. This alternative would however result in the potential loss of approximately six to eight parking spaces in the rear of the Community Center due to grading requirements of the roadway. Temporary “rights of entry” would be needed at driveways adjacent to Pelham Road for driveway blending and minor grading.



○ UTILITIES / LIGHTING

New or adjusted drainage structures will be provided within the project limits along Pelham Road and the access road where curbing is proposed. Where no curbing is proposed, the roadway runoff will be directed into a grass lined drainage ditch on either side of the access road. Roadway lighting will be provided along the bus/emergency access road. The relocation of utility poles will be required for the construction of the sidewalk on Pelham Road. The existing edge of road may be adjusted slightly to the north to allow for the installation of an ADA compliant sidewalk on the south side of the roadway.

○ ENVIRONMENTAL IMPACTS

Clearing of some heavily wooded areas would be required for the construction of the new access road. The preliminary engineers estimate suggests approximately 1.0 acres of wooded area would need to be cleared for the path of the new access road. However, new plantings in the flatter areas could offset some of the trees removed as part of this project.

There would be no direct wetland impacts associated with this Alternative as the proposed alignment seeks to avoid the delineated resource areas. Work would be required in the “buffer zone” and would require coordination with the Lexington Conservation Commission.

○ OVERALL PROJECT FOOTPRINT / CONSTRUCTABILITY

The reconstruction of Pelham Road would keep the proposed roadway within the approximate limits of the existing Right of Way. There would be minor vertical grade changes made along Pelham Road, but will not greatly impact any adjacent properties. As the access road passes the school, the road is designed to provide ADA-compliant walks at the entrance to the school, which are not currently ADA-compliant. As the access road shifts behind the school, the topography is generally flat, and minimal impacts to the surrounding area are anticipated.

From approximately STA 7+00 to the end of the access road at Marrett Road, construction will be more difficult (see Figures 1 & 1a). To provide a safe roadway profile for buses from STA 7+00 to Marrett Road, the American Association of State Highway and Transportation Officials (AASHTO) “*A Policy on Geometric Design of Highways and Streets, 6th Edition*” (Green Book) guidelines states the maximum roadway profile grade for a 30 mph design speed to be 8%. This results in a maximum cut / excavation of approximately ten (10) feet which can make construction difficult. Much of the excavated material will need to be stored on-site or have to be taken away daily through Pelham Road. Although very costly, the construction of retaining walls is an alternative to avoid the impacts that are associated with the large excavation sections.



A sidewalk could be added to the access road to connect the existing sidewalk at Marrett Road to the school. However, this would increase the overall project footprint of the project and increases the costs significantly in the excavation sections of the roadway.

○ **MAINTENANCE OF TRAFFIC**

Only local traffic for residents will be allowed when construction is underway on Pelham Road. All traffic for residents on Bennington Road and Eliot Road may be detoured to Percy Road until reconstruction of Pelham Road is substantially complete. Since the school will be closed during construction of the access road, only construction personnel will be allowed on the school property. Construction fencing should be placed around the school site for pedestrian safety. A detailed Maintenance of Traffic plan would need to be developed as the project progresses.

○ **EMERGENCY ACCESS**

Emergency vehicles would be allowed to enter the access road from Marrett Road counter flow to the typical egress of buses from the site during an emergency. Emergency vehicles could enter the driveway from Pelham Road and be able to enter the school building through the east or north entrances respectively.

○ **EVALUATION OF PROJECT COST**

The Preliminary Engineers Estimate for Alternative 1 is currently estimated at \$1.63 million assuming all existing drainage on Pelham Road will be upgraded with new structures. Also, a 25% contingency is assumed for the project cost since the design is at a conceptual level. The project cost was also evaluated using cemented stone masonry walls in the large excavation sections near the Community Center to Marrett Road. The cost of these walls is an additional \$1.07 million, yielding a total cost of Alternative 1 with walls of \$2.69 million.

ALTERNATIVE 1 OPTIONS	COST
ALTERNATIVE 1 W/O WALLS	\$1,630,000
ALTERNATIVE 1 W/ WALLS	\$2,690,000



- **ALTERNATIVE 1A (ACCESS VIA EAST SIDE OF SCHOOL – TWO WAY ACCESS ROAD)**

WorldTech also evaluated a two-way access road from Pelham Road to Marrett Road through the school property for the entire length (see Figures 1d & 1e). The minimum proposed roadway cross section to accommodate two-way traffic would be twenty (20) feet wide, instead of sixteen (16) feet wide with the one-way option. This would allow for all vehicles, emergency and non-emergency, to enter the school property from either Pelham Road or Marrett Road.

From a safety point of view, Alternative 1a will cause more traffic onto Marrett Road and traffic volume counts and trip generation analysis should be performed at the access road/Marrett Road/Follen Road intersection to determine if additional intersection upgrades are required at this location.

Right-of-way will also be impacted as easements may be necessary for the private property at 11 Tricorne Road for grading purposes. Similar to Alternative 1, this alternative would also impact the rear parking lot of the Community Center. To avoid additional impacts on residential property, this alternative would like result in the loss of a dozen parking spaces in the rea parking lot of the Community Center, due to grading requirements of the roadway.

A retaining wall will also be needed to provide the required sight distance approaching Marrett Road, which will likely require temporary easements.

With a wider road, there will be more environmental impacts and constructability concerns as the overall project footprint grows. Approximately 1.5 acres of land would need to be cleared, most of which is heavily wooded. There would be still no direct impacts on the existing resource area adjacent to the school, however slope work would be adjacent to the limits of the wetland and within the resource area buffer zones.

Projected preliminary total cost of Alternative 1a is currently \$1.97 million without retaining walls south of the community center and \$3.11 million with retaining walls.

ALTERNATIVE	COST
ALTERNATIVE 1A W/O WALLS	\$1,970,000
ALTERNATIVE 1A W/ WALLS	\$3,110,000



- **ALTERNATIVE 2 (ACCESS VIA WEST SIDE OF SCHOOL)**

- **SAFETY**

This design provides a new access road to the west side of the school for buses along with a reconfigured north driveway for either buses or passenger car pick-up and drop-off. An additional parking area has been added to the front of the building for visitors and/or vehicles waiting for afternoon pick-up. A newly designated van accessible handicapped parking stall has been added with adjacent crosswalk and ADA-compliant wheelchair accessible ramp.

The separated bus drop-off on the west side of the building is convenient, however, children would need to cross in front of the bus to enter the school which is less than ideal for safety. Buses would then exit the school property through the access road and onto Marrett Road. Although buses could drop-off and pick-up at the north entrance to the school, proceed along the reconfigured driveway to the east driveway and exit onto Pelham Road, this is not ideal due to the heavy traffic on Pelham Road during peak school hours, and the existing alignment of Pelham Road and Massachusetts Avenue.

Pedestrian access to and around the school would be greatly improved. New sidewalks would be added on the south side of Pelham Road and continue past the east driveway of the school to a reconstructed front stairway at the north entrance. An additional sidewalk would be added along the east driveway connecting the sidewalks in front of the school to the proposed walk along the east entrance to the building. As with Alternative 1, a new walkway would be constructed along the parking lot through the wooded area to the community center to the south.

- **RIGHT OF WAY IMPACTS**

For Alternative 2, temporary easements for construction of a retaining wall would be needed for the property at 11 Tricorne Road. Impacts to the Community Center parking lot, as described previously, would also be required. As with Alternative 1, temporary rights of entry would be needed at driveways adjacent to Pelham Road for driveway blending.

- **UTILITIES / LIGHTING**

As with Alternative 1, new or adjusted drainage structures will be provided on Pelham Road. A closed drainage system will be partially needed on the access road in the area of the wetlands since the outlet will be within the resource area. Storm water treatment catch basins will be required near the outlet to separate sediment, trash, oil and other pollutants from being outlet into the wetland. Roadway lighting will be provided along the bus/emergency access road.

- **ENVIRONMENTAL IMPACTS**

There are moderate impacts to the wetland resource area to the southwest of the school. Based on the Preliminary Engineers Estimate approximately 300 square yards of wetland replication would be needed. Also, approximately 1.5 acres of clearing would need to be completed.



○ **OVERALL PROJECT FOOTPRINT / CONSTRUCTABILITY**

As with Alternative 1, the reconstruction of Pelham Road would have minimal changes on the existing topography of the area. The access road and reconfigured driveway is designed to provide ADA-compliant walks to the north and west entrances to the school. Also, similar to Alternative 1, constructability will be quite difficult once the access road passes the west side of the school due to the steep existing topography.

○ **MAINTENANCE OF TRAFFIC**

Similar to Alternative 1, local traffic will only be allowed on Pelham Road during construction. The school will be closed while the access road is completed and the school site should be temporarily fenced off during construction for pedestrian safety.

○ **EMERGENCY ACCESS**

Similar to Alternative 1, emergency vehicles would be allowed to enter the access road from Marrett Road counter flow to the typical egress along with the north and east entrances.

○ **EVALUATION OF PROJECT COST**

The Preliminary Engineers Estimate for Alternative 2 is currently estimated at \$2.39 million assuming all new existing drainage on Pelham Road will be upgraded with new structures similar to Alternative 1. As with Alternative 1, a 25% contingency is assumed for the project cost since the design is at a conceptual design stage.

The project cost was also evaluated using cemented stone masonry walls through the larger cut sections adjacent to the community center to Marrett Road. The cost of these walls is an additional \$1.33 million giving a total cost of Alternative 2 with walls of \$3.72 million.

ALTERNATIVE	COST
ALTERNATIVE 2 W/O WALLS	\$2,040,000
ALTERNATIVE 2 W/ WALLS	\$3,370,000



- **ALTERNATIVE 2A (ACCESS VIA WEST SIDE OF SCHOOL – TWO WAY ACCESS ROAD)**

Similar to Alternative 1, WorldTech also evaluated an optional Alternative 2 where the access road from Pelham Road to Marrett Road through the school property is two-way for the entire length of the access road (see Figure 2a) widening the road from 16' to 20'. Right-of-way will be greatly impacted as larger easements would be needed from the resident of 11 Tricorne Road. With a wider road, there will be more environmental impacts and constructability concerns as the overall project footprint grows. An additional 0.25 acre of land would need to be cleared and approximately 100 more square yards of wetland replication would be needed.

Projected preliminary total cost of Alternative 2A is currently \$2.39 million without retaining walls south of the community center and \$3.72 million with retaining walls.

ALTERNATIVE	COST
ALTERNATIVE 2A W/O WALLS	\$2,390,000
ALTERNATIVE 2A W/ WALLS	\$3,720,000



- **ALTERNATIVE 3 (INTERNAL TRAFFIC CIRCULATION)**

- **SAFETY**

The reconfiguration of the circular driveway adjacent to the main entrance of the school would promote a more efficient traffic circulation pattern in and around the school property. Repositioning the exit of the circular access drive on to the eastern access road will eliminate a curb cut on Pelham Road. The elimination of the curb cut “downstream” of the eastern access road intersection will allow vehicles to access Pelham Road with less disruption from oncoming vehicles.

A new sidewalk will connect to the existing sidewalk on the southbound side of Massachusetts Avenue and provide safe passage for pedestrians to the school property. The sidewalk will continue along the stone retaining wall adjacent to Youville Place crossing both the east and west driveways of the property to the limit of the existing staircase adjacent to the main entrance of the school.

The sidewalk will also continue along the west side of the school access road and connect to the existing school walkways. Also, a new sidewalk would be constructed along the west side of the existing parking lot through a wooded area and across the parking lot of the Lexington Community Center to connect to an existing sidewalk.

- **RIGHT OF WAY IMPACTS**

Under this alternative, right-of-way impacts should be limited to temporary easements. The reconstruction of Pelham Road, the realignment of the circular driveway, and the addition of sidewalk to the Community Center all fall within property owned by the Town. Temporary rights of entry would be needed for work on private property on Pelham Road. This work would be limited to driveway regrading and minor landscaping improvements.

- **UTILITIES / LIGHTING**

Drainage improvements would be provided along Pelham Road within the limits of the project. The addition of granite curbing on the north side of Pelham Road will require additional drainage structures, as this would now be a closed drainage system. Additional drainage structures would also be required along the realignment of the circular driveway. Existing drainage features within the portion of the circular driveway subject to demolition would be removed as part of this alternative. Lighting could be provided in the front of the school in the vicinity of the proposed parking area.

- **ENVIRONMENTAL IMPACTS**

The improvements under this alternative fall within the existing footprint of developed land, impacts to the environment would be minimal. Drainage improvements mentioned above would collect and treat storm water runoff prior to discharge.



o **OVERALL PROJECT FOOTPRINT / CONSTRUCTABILITY**

The reconstruction of Pelham Road would keep the proposed improvements within the approximate limits of the existing roadway. There would be minor vertical grade changes made along Pelham Road, but will not result in significant impacts to adjacent properties. The majority of the improvements on the school property are within the existing roadway footprint. The realignment of the circular driveway is currently a landscape area, with access from the driveway itself and the adjacent access road. Construction equipment would have the ability to work within the school property, as the site is currently unoccupied. Overall this alternative would have the lowest overall project footprint compared to the other alternatives investigated as part of the study.

o **MAINTENANCE OF TRAFFIC**

Traffic will be restricted to residents during Pelham Road construction. All traffic for residents on Bennington Road and Eliot Road may be detoured to Percy Road until reconstruction of Pelham Road is substantially complete. Since the school will be closed during construction, only construction personnel will be allowed on the school property. Construction fencing should be placed around the school site for pedestrian safety. A detailed Maintenance of Traffic plan would need to be developed as the project progresses.

o **EMERGENCY ACCESS**

Emergency access would mimic that of the present day configuration. Vehicles would access / egress the school site from Massachusetts Avenue. The reconfiguration of curb lines within the school property will allow for increased maneuverability for emergency vehicles. Emergency vehicles would have access to the three main entrances of the school building similar to the present day scenario.

o **EVALUATION OF PROJECT COST**

The Preliminary Engineers Estimate for Alternative 3 is currently estimated at \$1.38 million assuming all existing drainage on Pelham Road will be upgraded with new structures. Also, a 25% contingency is assumed for the project cost since the design is at a preliminary stage.



- **ALTERNATIVE 4 (ACCESS VIA TRICORNE ROAD)**

- **SAFETY**

This design alternative provides a new one-way egress for buses only along the west entrance of the school. The access road would be connected to the existing circular drop-off area at the front of the school and would drop children off at reconstructed sidewalk at the west entrance. Passenger cars would still drop-off children at the circular driveway at the north entrance. Buses would then travel along the access road and enter a reconfigured Tricorne Road cul-de-sac ending at Marrett Road.

Drop-off at the west entrance of the school is less than ideal when compared to the drop-off at the east entrance. Children will have to cross in front of the school bus to enter the building. Also, the conflict point at the passenger car drop-off area and bus drop-off area adjacent to Pelham Road would still exist. This merging area could create traffic congestion on Pelham Road during peak hours.

- **RIGHT OF WAY IMPACTS**

There are major right-of-way impacts associated with this Alternative as the proposed road would be built on two separate residential parcels on Tricorne Road. Approximately, 7,000 square feet of land taking would be needed from the two parcels along with additional temporary easements outside of the access road for construction purposes.

- **UTILITIES / LIGHTING**

A closed drainage system would be needed throughout the access road since the outlet will be within the resource area. Catch basins specifically designed for storm water treatment will be required near the outlet to separate sediment, trash, oil and other pollutants from being introduced into the wetland. Roadway lighting will be provided along the bus/emergency access road.

- **ENVIRONMENTAL IMPACTS**

There are major impacts to the environment resources in this Alternative. Approximately 2,500 square yards of wetland will be filled and need to be replicated in accordance with State Regulations. Approximately three-quarters (0.75) of an acre of heavily wooded areas would need to be cleared.

- **OVERALL PROJECT FOOTPRINT / CONSTRUCTABILITY**

In comparison to the other three (3) Alternatives, the length of this access road is considerably shorter due to the connection at Tricorne Road. Construction time should be the shortest when compared to the other Alternatives. However, due to the major right-of-way and environmental impacts of this Alternative, constructability will be difficult.



○ **MAINTENANCE OF TRAFFIC**

During construction, all residential traffic on Tricorne Road would need to be accommodated throughout construction, including maintaining driveway access for residents. All equipment will need to be brought on-site from Pelham Road to minimize construction traffic in the Tricorne Road area. Since the majority of the construction is on the school property, there will be only minor disruption to the Pelham Road neighborhood.

○ **EMERGENCY ACCESS**

Emergency vehicles would be allowed to enter the access road from Tricorne Road counter flow to the typical bus egress during an emergency. The road could not be any wider than 16' without significant impacts to the adjacent driveways at 10 & 11 Tricorne Road.

○ **EVALUATION OF PROJECT COST**

The Preliminary Engineers Estimate for Alternative 4 is currently estimated at \$920,000. This option is the lowest in total cost however, this option does not include any roadway work on Pelham Road, as the limits for this Alternative are from the existing circular driveway on the north side of the school to Tricorne Road.



- **RECONFIGURATION OF PELHAM ROAD / MASSACHUSETTS AVENUE INTERSECTION**

- **ALTERNATIVE 1: RETAIN EXISTING ALIGNMENT OF PELHAM ROAD (NO-BUILD)**

Retaining the existing alignment of Pelham Road would do little in terms of increasing vehicular safety. The poor sight distance at the intersection of Massachusetts Avenue in combination with the steep grades and reverse horizontal curves on Pelham Road contribute to poor driving conditions. In accordance with the American Association of State Highway and Transportation Officials (AASHTO) *“A Policy on Geometric Design of Highways and Streets, 6th Edition”* (Green Book), the required intersection sight distance is approximately 500’ for a right turn on to Massachusetts Avenue from Pelham Road. As the existing roadway geometry remains unchanged with this alternative, the intersection sight distance for a right turn is approximately 150’, significantly less than the design requirements.

The Pedestrians would benefit from the addition of sidewalk along Pelham Road and the relocation of the midblock crossing west of Eliot Road.

Right-of-way impacts on Pelham Road would be limited to temporary rights of entry for work on private property. This work would consist of driveway regrading and minor landscaping improvements incidental to the roadway reconstruction.

The improvements under this alternative fall within the existing footprint of developed land, thus impacts to the environment would be minimal. The reconstruction of Pelham Road would keep the proposed improvements within the approximate limits of the existing roadway Right of Way. There would be minor vertical grade changes made along Pelham Road, but will not result in significant impacts to adjacent properties.

- **ALTERNATIVE 2: REALIGNMENT OF PELHAM ROAD**

The realignment of Pelham Road would improve the overall safety and operation of this segment of Pelham Road. Shifting the intersection to the south would improve the approach angle of Pelham Road in relation to Massachusetts Avenue. The roadway shift would provide motorists additional sight distance to identify vehicles travelling southbound on Massachusetts Avenue. Based on the alignment shift of Pelham Road to the south, the intersection sight distance for a right turn would be approximately 250’-300’. Although the sight distance is significantly less than the design requirement stated above, it is greater than the sight distance available under the present day configuration.

Improvements related to pedestrian safety would mimic those presented in the No-Build Alternative. Abutting driveways would extend to the proposed edge of Pelham Road. The alternative developed for this configuration has an option to outlet the



driveway at the corner of the intersection, directly on to Pelham Road. The driveway location would mimic the existing curb cut of Pelham Road.

Significant right-of-way impacts would result from the realignment of Pelham Road. Permanent easements would have to be secured from abutters for the layout of the proposed roadway. Currently the Town of Lexington has a water easement in the location of the proposed roadway realignment. Upon review of the documents associated with the easement, it states that the parcel shall only be used for the purpose of installing and maintaining a water line. Abutters and the Town of Lexington could further discuss the appropriation of the newly formed greenspace created by the realignment of Pelham Road.

In conjunction with the permanent easements, temporary rights of entry would be needed for work on private property on Pelham Road. This work would consist of driveway regrading and minor landscaping improvements.

Environmental impacts associated with this alignment would include the removal of existing trees and the disturbance of grassed areas adjacent to Pelham Road. Constructability of the proposed improvements at this intersection will be challenging based on the interaction with Massachusetts Avenue, the steep grade of Pelham Road in this area, and the abutters directly impacted by the realignment.

○ **ALTERNATIVE 3: REALIGNMENT OF MASSACHUSETTS AVENUE**

The realignment of Massachusetts Avenue to the east, and clearing of roadside growth in the vicinity of Pelham Road, would provide a “sight shelf” for motorists to help identify oncoming traffic. As discussed with the Town of Lexington, this intersection has a history of traffic accidents related to poor sight distance. With the addition of the sight self, and the slight shift of Massachusetts Avenue to the east, the intersection sight distance for a right turn would be approximately 150’-200’. Although an improvement in sight distance compared to the present day layout, the sight distance would be significantly less than the design requirements.

Improvements related to pedestrian safety would mimic those presented in the No-Build Alternative.

The majority of this alternative falls within the existing footprint of Massachusetts Avenue. To create the aforementioned sight shelf, minor widening will occur on the eastern side of Massachusetts Avenue. Based on our desktop survey of this area, rights of entry would be required for incidental grading along the east side of Massachusetts Avenue, excluding the property owned by the Town of Lexington.

The improvements under this alternative fall within the existing footprint of developed land, and impacts to the environment would be minimal. Traffic management and construction phasing would be a crucial part of this alternative due to the heavy traffic volumes on Massachusetts Avenue.



○ **ALTERNATIVE 4: RIGHT TURN LANE ON MASSACHUSETTS AVENUE**

The reconstruction of Pelham Road would occur within the existing roadway footprint and the geometric improvements would be limited to the Massachusetts Avenue corridor. The alignment of Massachusetts Avenue would slightly shift to the east to accommodate a dedicated right turn lane on to Pelham Road. With the slight shift of Massachusetts Avenue to the east, the intersection sight distance for a right turn would be approximately 150'-175'. Although an improvement in sight distance compared to the present day layout, the sight distance would be significantly less than the published requirements.

Pedestrian improvements mentioned in the previous alternatives hold true under this configuration.

As the majority of the work associated with this configuration is within the existing roadway footprint, right-of-way measures would be limited to rights of entry on privately owned abutting properties. The land due east of the intersection of Pelham Road / Massachusetts Avenue is owned by the Town of Lexington. The rights of entry would be for the reconfiguration of driveways, and any site grading related to the slight shift in roadway geometry on private property.

Similar to the Realignment of Massachusetts Avenue Alternative, environmental impacts associated with this option would be minimal as the improvements are within the footprint of Massachusetts Avenue. Traffic management and construction phasing would be a crucial part of this alternative due to the heavy traffic volumes on Massachusetts Avenue.



6.0 Conclusions / Recommendations

The recommendation for the access road alternative was based on a review of the major categories identified in the beginning of this report. They included safety, functionality, right-of-way impacts, environmental impacts, utilities, and constructability and cost. A summary of these impacts, as well as Order of Magnitude constructions costs are presented below.

- **RIGHT-OF-WAY IMPACTS**

Alternatives 1 and 3 would have no permanent impacts on the properties at Tricorne Road. Alternative 2 would have approximately 3,000 square feet of impact to the property at 11 Tricorne Road and Alternative 4 would have approximately 7,000 square feet of impacts to the properties at 10 & 11 Tricorne Road. Based on the right-of-way impacts to private residences, Alternatives 2 and 4 cannot be considered viable.

- **ENVIRONMENTAL IMPACTS**

Alternatives 1 and 3 would have no impacts to the wetland resource area to the south and west of the school building. Alternative 2 would have approximately 300 square yards of impact to the wetland resource area and although could be considered viable, is not an ideal situation. Alternative 4 would have 2,500 square yard of impact to the wetland resource area and thus cannot be considered viable.

- **CONSTRUCTION COST ANALYSIS**

All alternatives with stone walls reduce the amount of excavated material, environmental impacts, and clearing of heavily wooded areas, however these alternatives increase the cost of the access road due to the high cost per foot of wall construction. Although Alternative 1 was not the least expensive per foot of roadway, it ideally addressed the overall traffic and safety objectives that this study was based upon, did not require costly easements, and avoided environmental resource area impacts.

Below a chart of all the alternatives and their associated order of magnitude cost. The totals shown below do not include fees associated with easements or takings on private property.

ALTERNATIVE	COST	LENGTH (FT)	COST/FOOT
ALTERNATIVE 1 W/O WALLS	\$1,630,000	2600	\$627
ALTERNATIVE 1 W/ WALLS	\$2,690,000	2600	\$1,035
ALTERNATIVE 1A W/O WALLS	\$1,970,000	2600	\$758
ALTERNATIVE 1A W/ WALLS	\$3,110,000	2600	\$1,196
ALTERNATIVE 2 W/O WALLS	\$2,040,000	3330	\$613
ALTERNATIVE 2 W/ WALLS	\$3,370,000	3330	\$1,012
ALTERNATIVE 2A W/O WALLS	\$2,390,000	3330	\$718
ALTERNATIVE 2A W/ WALLS	\$3,720,000	3330	\$1,117
ALTERNATIVE 3	\$1,380,000	2180	\$633
ALTERNATIVE 4	\$920,000	780	\$1,179



- **RECOMMENDATIONS**

Due to the magnitude of right-of-way impacts, avoidance of wetland resource areas, and addressing the traffic circulation and pedestrian safety objectives this study founded on, Alternative 1 (One-way) is recommended alternative.