FINAL

Moriah Truck Route Study

Prepared for the

Town of Moriah

October 6, 2020

Barton
&Loguidice

TABLE OF CONTENTS

Abbreviations:

HDM – New York State Department of Transportation Highway Design Manual
NCHRP – National Cooperative Highway Research Program
AASHTO – American Association of State Highway and Transportation Officials
MUTCD – National Manual on Uniform Traffic Control Devices
NYSDOT – New York State Department of Transportation

References

1. Essex County Real Property Tax Services - Parcel Viewer
2. NYSDOT Highway Design Manual
3. AASHTO A Policy on Geometric Design of Highways and Streets
4. National Cooperative Highway Research Program – Review of Truck Characteristics as Factors in Roadway Design

1 Introduction

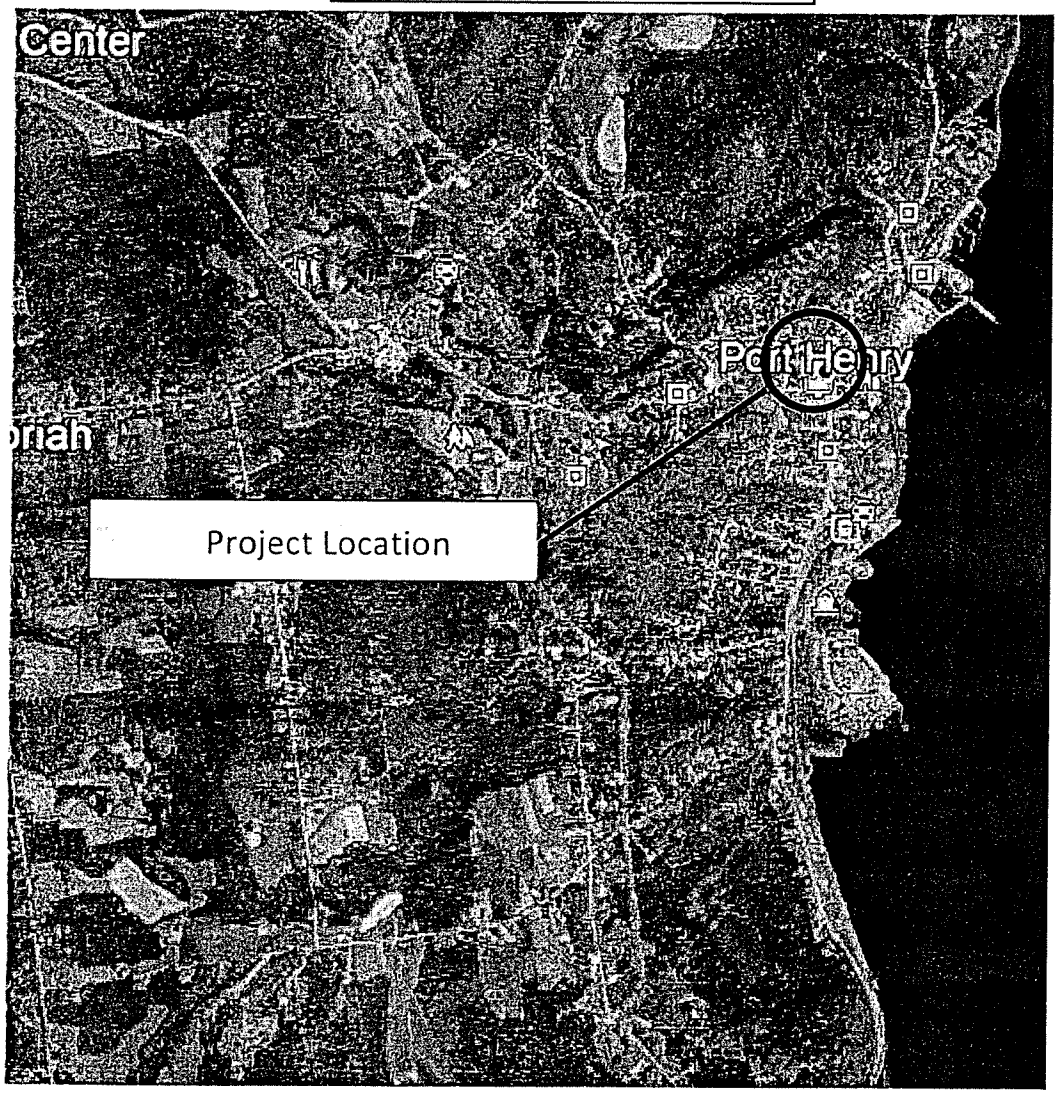
This study summarizes the results of a truck routing study for the Town of Moriah, Essex County. The project site is shown below in the project location map.

FIGURE 1.1 - PROJECT LOCATION MAP

Moriah Truck Route Study

Town of Moriah

Essex County, New York



1.1 Project Background

In the 1970's a truck detour was established in the Port Henry hamlet after a dump truck experienced brake failure on the eastbound downhill side of Broad Street and crashed into the storefront across the Route 9N/22 intersection, resulting in fatalities. The eastbound truck detour that was established by the then Village Board bypassed the Broad Street and Route 9N/22 intersection by utilizing the local roads of College and Grove Streets and continued as a signed route until 2017. Following public comment and a subsequent vote by the Town Board, the truck route signage was removed in 2017. Currently, formal signed truck route guidance is provided by a Truck Route Sign with an arrow plaque on Broad Street west of the College Street intersection, as well as a weight restricted sign for College Street at the Broad Street intersection.

1.2 Study Area

The study area for this analysis was determined based on a review of the surrounding roadway network and discussions with Town officials. The project area generally includes the Broad St., College St., Church St., and Route 9N/22 block. Within this block, the following intersections are included in the study area:

1. Broad Street and College Street
2. Broad Street and Main Street/Route 9N
3. College Street and Church Street
4. Church Street and Main Street

For the study area two alternative truck routes are being evaluated and are depicted in Figure 1.2.

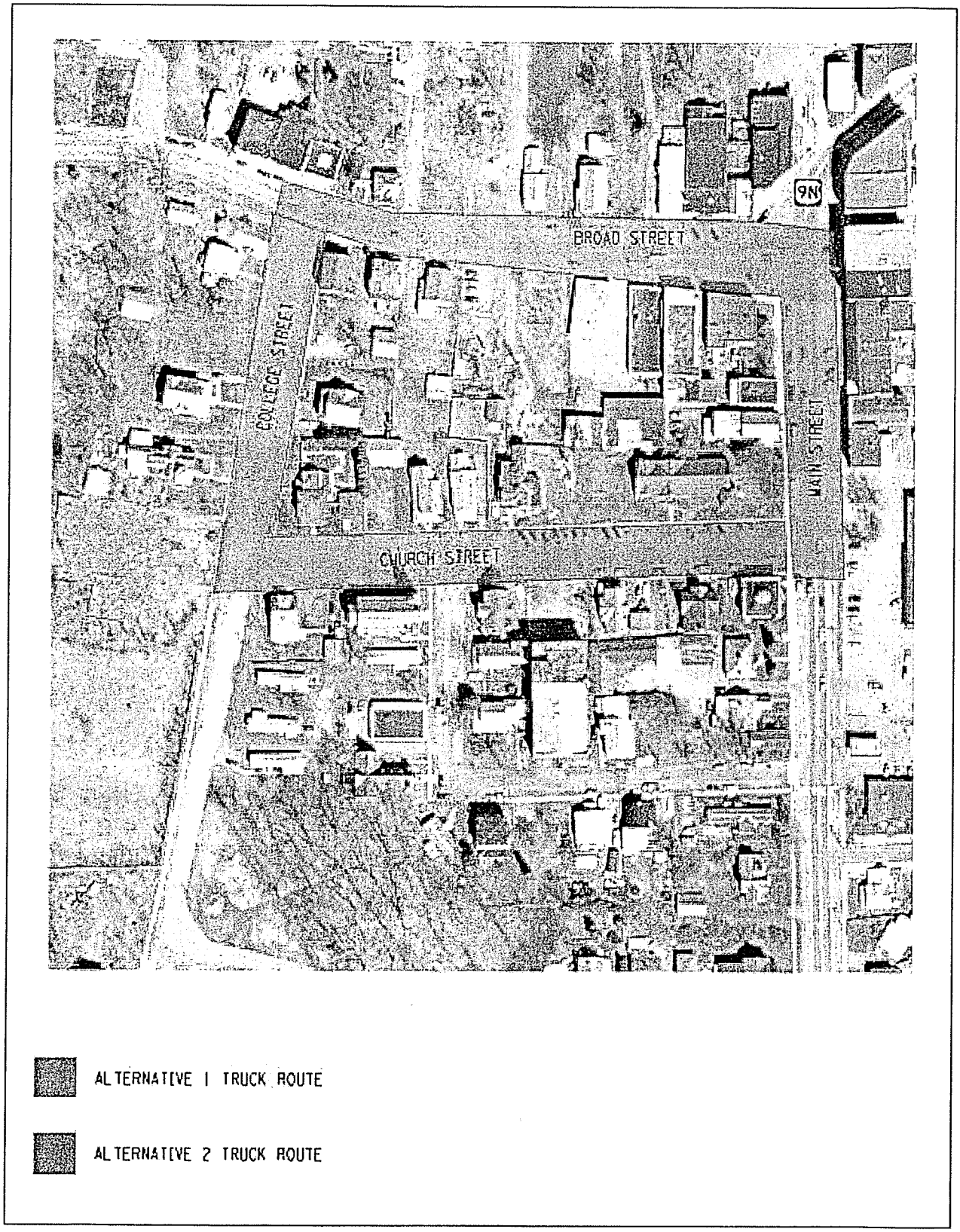


Figure 1.2 – Study Area Map

2 Alternative 1 – Broad St. and Main St./Route 9N/22

2.1 Broad Street – Broad Street is classified as a Rural Major Collector in the project corridor. Broad Street is owned and maintained by Essex County, posted for 30 mph, provides 11 ft. travel lanes in each direction and 4 ft. wide shoulders. Broad Street also provides 8 ft. parallel parking lanes as well as 18 ft. diagonal parking lanes within 500 ft. of the intersection with Main Street/Route 9N/22. The travel and parking lanes are delineated with pavement markings. Pedestrians are accommodated on the sidewalks on both sides of Broad Street. The corridor includes residential properties on the western end and transitions to commercial on the approach to the Main St/Route 9N/22 intersection.

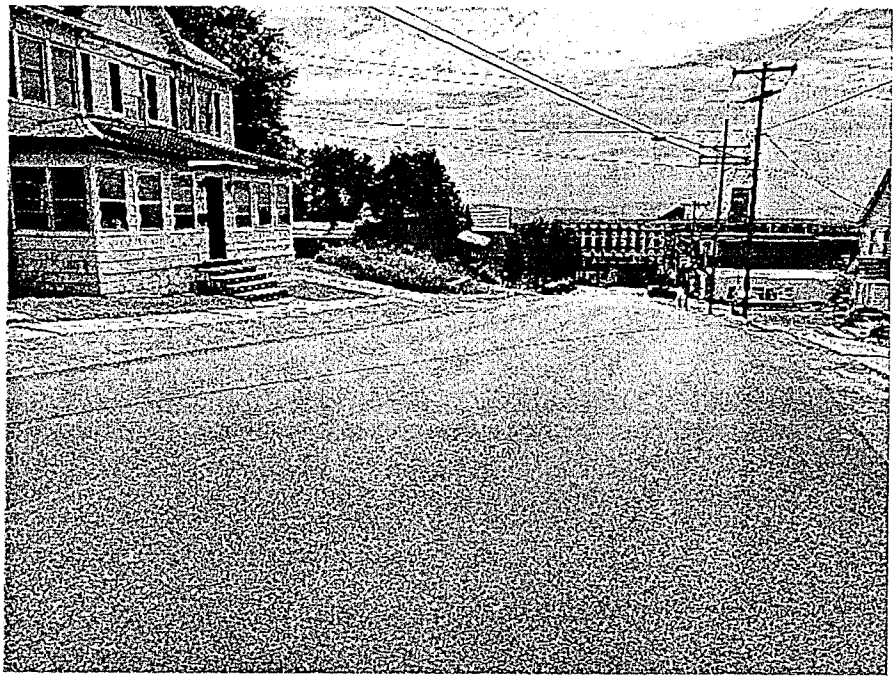


Figure 2.1-1 - Broad Street looking east

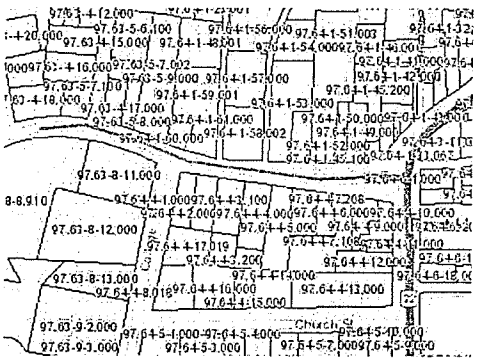


Figure 2.1-2 - Broad Street Profile Segment

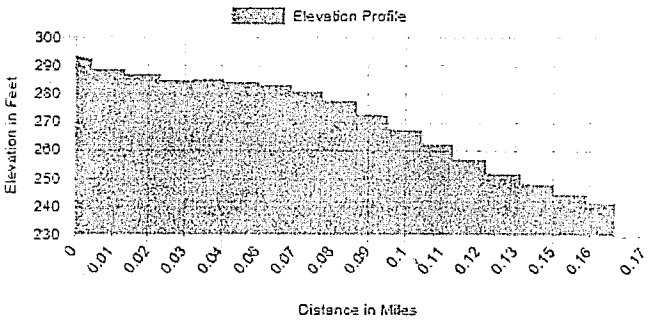


Figure 2.1-3 – Broad Street Elevation Profile

Exhibit 2.1 Critical Design Elements for Broad Street						
Functional Class:		Rural Major Collector	**NHS**	☐	**Non-NHS**	☑
			Terrain:		Rolling	
Truck Access or Qualifying Highway (QH)?		Yes	**If not a QH, is project within 1 mi of a QH?**		N/A	
Element		**Standard**	**Existing Condition**			
1	Design Speed	35 mph (min.) 50 mph (max.) HDM Section 2.7.3.3	30 mph posted			
2	Lane Width	11 ft. (min) HDM Section 2.7.3.3	11 ft.			
3	Shoulder Width	0 ft. (min) 4 ft. (des) HDM section 2.7.3.3	4 ft.			
4	Stopping Sight Distance (Horizontal and Vertical)	215 ft. Min. AASHTO Section 3.2.2 Table 3-2	300 ft.			
5	Maximum Grade	11% HDM Section 2.7.3.3	10%			

The Standard and Existing critical roadway design elements for Broad St. are included in Exhibit 2.1. The standard values are derived from the NYSDOT Highway Design Manual and are based on the functional classification of the roadway, speed, and terrain. The existing conditions of Broadway meet or exceed the design standard values.

2.2 Main St./Route 9N/22 – Main Street is designated as a principal arterial in the project corridor and is posted at 30 mph. Main Street is owned and maintained by NYSDOT. Main Street provides a 16 ft. travel lane in each direction marked for shared bicycle use, 10 ft. wide parking lane on the west side, and 16 ft. wide diagonal parking stalls on the east side of the street. There are sidewalks on both sides of Main Street. Parking and travel lanes are delineated with pavement markings throughout.

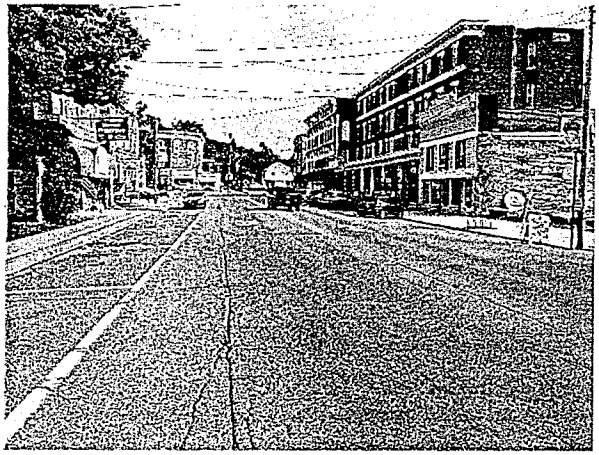


Figure 2.2-1 – Main St./Route 9N/22 looking north

Exhibit 2.2
Critical Design Elements for Main Street / Route 9N

Functional Class:		Principal Arterial	**NHS**	☑	**Non-NHS**	☐
			Terrain:		Rolling	
Truck Access or Qualifying Highway (QH)?		Yes	**If not a QH, is project within 1 mi of a QH?**		N/A	
Element		**Standard**		**Existing Condition Proposed Condition[2]**		
1	Design Speed	35 mph (min.) 55 mph (max.) HDM Section 2.7.2.4		30 mph posted		
2	Lane Width	10 ft. (min) HDM Section 2.7.2.4		16 ft.		
3	Shoulder Width	0 ft. (min) 4 ft. (des) HDM section 2.7.2.4		Varies		
4	Stopping Sight Distance (Horizontal and Vertical)	200 ft. Min. HDM Section 2.7.2.4		210 ft.		
5	Maximum Grade	9% HDM Section 2.7.2.4		1%		

The Standard and Existing critical roadway design elements for Main St./Route 9N/22 are included in Exhibit 2.4. The standard values are derived from the NYSDOT Highway Design Manual and are based on the functional classification of the roadway, speed, and terrain. All roadway elements of Main St./Route 9N/22 within the project area meet or exceed the standard design criteria.

2.3 Broad Street & Main Street/Route 9N/22 Intersection - This is a three-leg intersection located in the commercial center of the hamlet that operates under yield control on the Broad Street approach. Each approach provides a single lane for shared movements. There are sidewalks on all sides of the intersection. Along the Broad Street approach there is a circle planter in the middle of the travel lane, approximately 8 ft. in diameter.

Figure 2.3-1 - Broad Street & Main Street/Route 9N/22 Intersection

A turning movement analysis was conducted at the intersection of Broad Street and Main Street. As shown in Figure 2.14 trucks travelling eastbound on Broad Street are able to make the turn without crossing over the center line. Although in order to stay within the southbound Main St./Route 9N/22 lane with on-coming traffic, the trailer overhang intrudes on the northern-most parking space on the west side of main street (shown in the red shaded area).

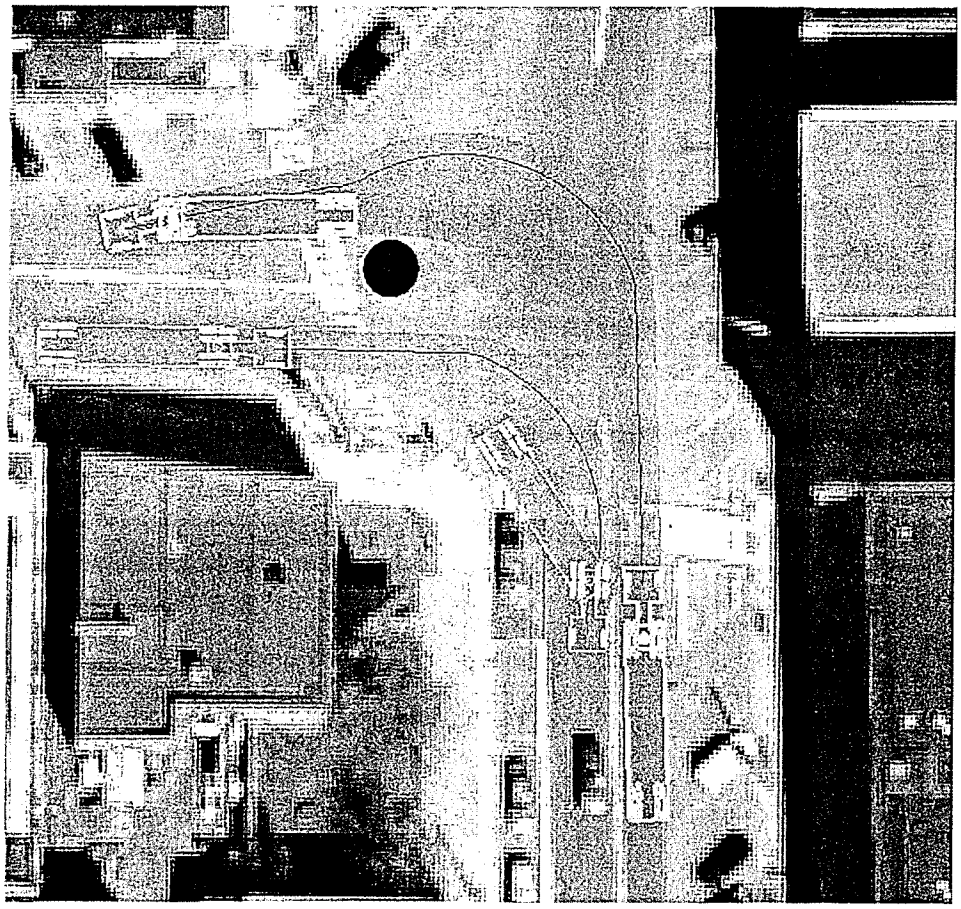


Figure 2.3-2 – Broad and Main Street Turning Movements

3 Alternative 2 – College St. and Church St.

3.1 College St. – College St. is designated as a local rural road in the project corridor and is posted for 30 mph. College Street is owned and maintained by the Town of Moriah. College Street has a paved width of approximately 52 ft. including two travel lanes, two parking lanes, and paved swales/gutter adjacent to the 5 ft. sidewalks. There are no pavement markings on College Street, travel lanes and parking are not delineated. College Street descends to the south away from the intersection with Broad St. Through a review of Essex County the vertical grade of College Street is 6% between the Broad and Church Street intersections and includes a 50 ft. segment at the Broad St. intersection with a maximum 15% grade.

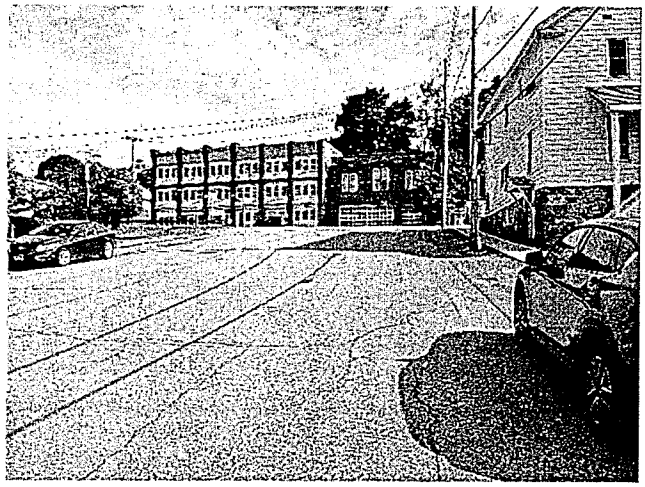


Figure 3.1-1 - College Street looking north

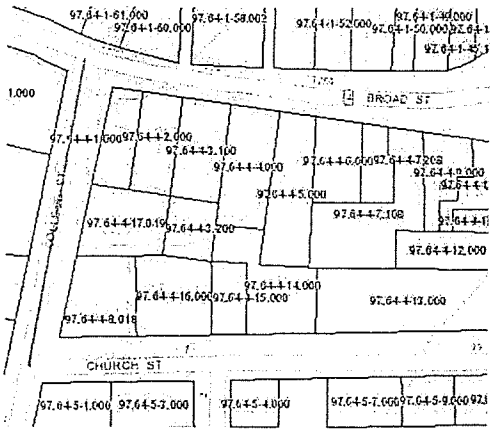


Figure 3.1-2 – College Street Profile Segment

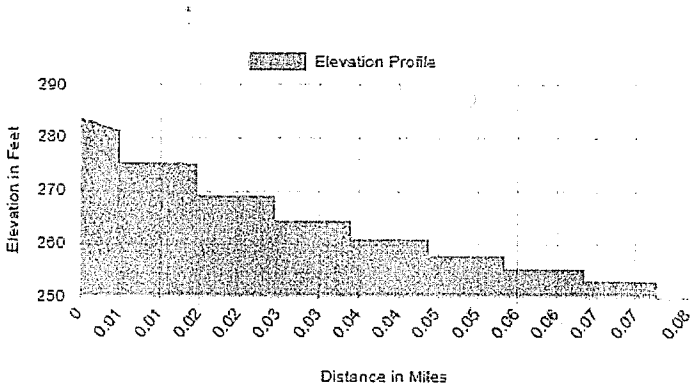


Figure 3.1-3 – College Street Elevation Profile

Exhibit 3.1 Critical Design Elements for College Street						
Functional Class:		Rural Local Road	**NHS**	☐	**Non-NHS**	☑
If not a QH, is project within 1 mi of a QH?		Yes	**Terrain:**		Rolling	
Element		**Standard**	**Existing Conditions**			
1	Design Speed	20 mph (min.) 30 mph (max.) HDM Section 2.7.4.3	30 mph posted			
2	Lane Width	10 ft. (min) HDM Section 2.7.4.3	20 ft.			
3	Shoulder Width	0 ft. (min) 1-2 ft. (des) HDM section 2.7.4.3	Varies			
4	Stopping Sight Distance (Horizontal and Vertical)	215 ft. Min. AASHTO Section 3.2.2 Table 3-2	350 ft.			
5	Maximum Grade	Residential: 15% Commercial / Industrial: 8% HDM Section 2.7.4.3	15%			

The Standard and Existing critical roadway design elements for College St. are included in Exhibit 2.2. The standard values are derived from the NYSDOT Highway Design Manual and are based on the functional classification of the roadway, speed, and terrain. The standard vertical grade for College Street is 15% max in residential areas and 8% max in Commercial/Industrial areas. College Street is considered residential although for the purposes of evaluating the street for heavy vehicle traffic a maximum grade for Commercial/Industrial roadways of 8% should be utilized. The existing grade of College Street is 15% and is greater than the standard maximum grade of 8%.

3.2 Church St. – Church Street is designated as a local urban road in the project corridor and is posted for 30 mph. Church Street is owned and maintained by the Town of Moriah. Church Street provides 8 ft. parallel parking lanes as well as 18 ft. diagonal parking lanes. Church Street has a paved width of approximately 52 ft. including two travel lanes and two parking lanes adjacent to the pedestrian sidewalks. The parking areas are delineated with pavement marking and the travel lanes are not marked.

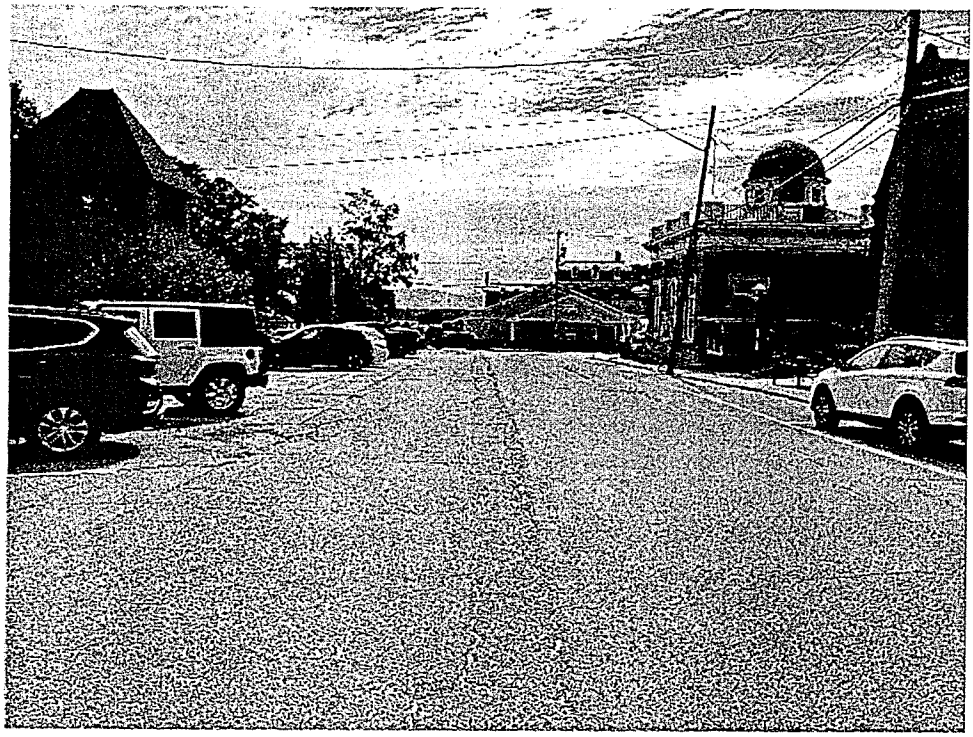


Figure 3.2-1 - Church Street looking east

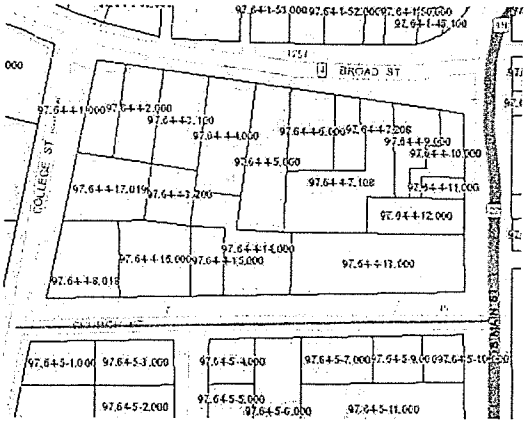


Figure 3.2-2 – Church Street Profile Segment

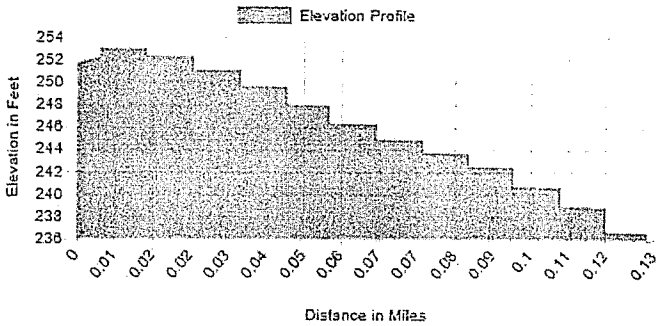


Figure 3.2-3 – Church Street Elevation Profile

Exhibit 2.3 Critical Design Elements for Church Street						
Functional Class:		Rural Local Road	**NHS**	☐	**Non-NHS**	☑
If not a QH, is project within 1 mi of a QH?		Yes	**Terrain:**		Rolling	
Element		**Standard**	**Existing Conditions**			
1	Design Speed	20 mph (min.) 30 mph (max.) HDM Section 2.7.4.3	30 mph posted			
2	Lane Width	10 ft. (min) HDM Section 2.7.4.3	20 ft.			
3	Shoulder Width	0 ft. (min) 1-2 ft. (des) HDM section 2.7.4.3	Varies			
6	Stopping Sight Distance (Horizontal and Vertical)	205 ft. Min. AASHTO Section 3.2.2 Table 3-2	550 ft.			
7	Maximum Grade	Residential: 15% Commercial / Industrial: 8% HDM Section 2.7.4.3	4%			

The Standard and Existing critical roadway design elements for Church St. are included in Exhibit 2.3. The standard values are derived from the NYSDOT Highway Design Manual and are based on the functional classification of the roadway, speed, and terrain. College Street is considered residential although for the purposes of evaluating the street for heavy vehicle traffic a maximum grade for Commercial/Industrial roadways of 8% should be utilized. Church Street is relatively flat with an existing grade of 4% which is lower than the standard maximum value of 8%.

3.3 Broad St. & College St. Intersection - This is a three-leg intersection that operates under stop sign control on the College Street approach. Each approach provides a single lane for shared movements. There are sidewalks on both sides of the intersection. The intersection is positioned just east of a sharp horizontal curve on Broad St. and is also located along a 10% vertical grade segment of Broad St. with a 15% vertical grade approach on College St.

Figure 3.3-1 – Broad Street and College Street Intersection

A turning movement analysis was conducted at the intersection of Broad Street and College t. This analysis was completed to display the feasibility of trucks completing the turning movements without obstruction. As shown in Figure 2.12 heavy vehicles are able to maintain their eastbound lane position and make the right hand turn, but they encroach into the opposing northbound travel lane on College St. Experienced drivers will minimize the northbound lane encroachment by starting the turning motion when positioned more in the westbound lane of Broad St. if there are no on-coming vehicles present.

Figure 3.3-2 – Broad Street and College Street Auto-Turn Movements

3.4 College Street & Church Street Intersection - This is a three-leg intersection that operates uncontrolled on all approaches. Each approach provides a single lane for shared movements. There are sidewalks on both sides of the intersection

Figure 3.4-1– College Street and Church Street Intersection

A turning movement analysis was conducted at the intersection of College Street and Church Street. As shown in Figure 2.16, due to the width of both roadways, trucks are able to make the turning movement onto Church Street without any obstructions.

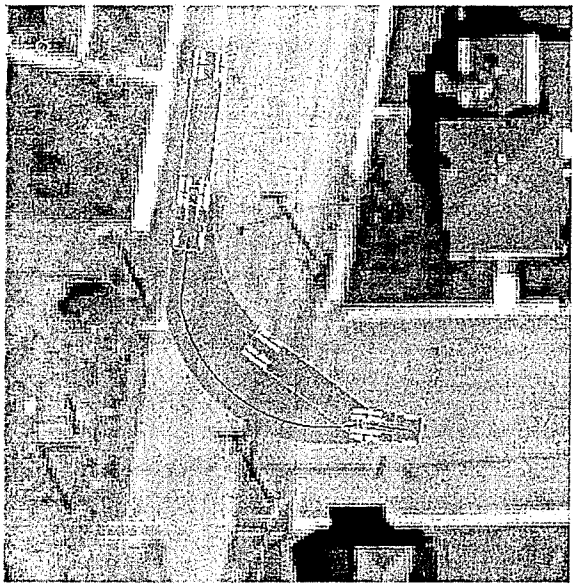


Figure 3.4-2 – College and Church Street Turning Movements

3.5 Church St. and Main St./Route 9N/22 - This is a three-leg intersection that operates under stop sign control on the Church Street approach. Each approach provides a single lane for shared movements, sidewalks, and on-street parking. Across the intersection from Church St. is a recently completed Stewart's Gas Station and Convenience Store that has its main entrance just south of the intersection.

Figure 2.17 – Church Street and Main Street/Route 9N intersection

A turning movement analysis was conducted at the intersection of Church Street and Main Street. As shown in Figure 2.18 in order for heavy vehicles to make the right turn from Church St. to Main St. without tracking into the opposite lane the trailer will drive over the sidewalk and first parking space. What typically happens in this location to avoid the sidewalk and parking space is the driver will swing to the north and make a sharper right turn onto Route 9N/22 but they will veer over the yellow center line and into the northbound travel lane.

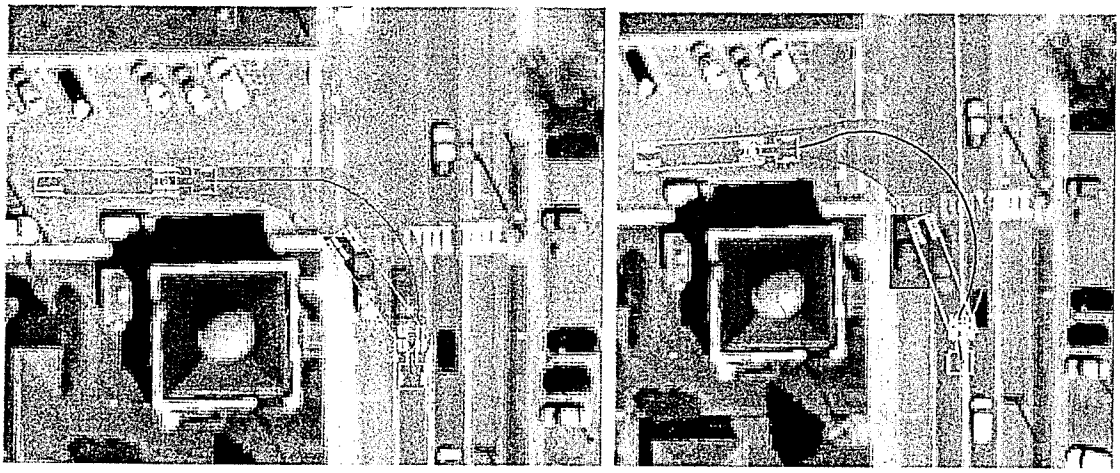


Figure 2.18 – Church and Main Street Turning Movements

4 Crash Analysis

A crash analysis was performed for the project area, in accordance with the NYSDOT Highway Design Manual (HDM) Chapter 5, for a four (4) year period from September 2016 to August 2019. During this period a total of thirty (30) crashes were reported within the study limits. Within the study area, eight (8) of the crashes occurred at intersections within the segments of the roadways. The table below summarizes the crashes in the study area.

Year	Fatality	Personal Injury	Property Damage Only	Non-Reportable	Total
2016	0	0	4	0	4
2017	0	2	8	2	12
2018	0	1	5	3	9
2019	0	1	3	1	5
Grand Total	**0**	**4**	**20**	**6**	**30**

Table 4.1 – Crash Summary

An intersection crash analysis was also performed for the intersections included in the Traffic Impact Study area. There were five (5) total crashs that occurred at the study area intersections, the tables below summarize the severity and types of crashs.

Intersection	Fatality	Personal Injury	Property Damage Only	Non-Reportable	Total
Broad Street and College Street	0	0	0	0	0
Broad Street and Main Street/Route 9N	0	0	2	1	3
College Street and Church Street	0	0	0	0	0
Church Street and Main Street/Route 9N	0	1	1	0	2
Totals	0	1	3	1	5

Table 4.2 – Intersection Crash Severity

Two (2) of the thirty (30) total crashes involved heavy vehicles. These crashes occurred in 2017 and 2019 and were located outside of the project limits at the Main Street and Henry Street and Main Street and Beaver Lane intersections.

5 Conclusions and Recommendations

5.1 Conclusions

1) Broad Street – The existing roadway conditions meet or exceed the design standard values for this roadway classification.
2) College Street – The maximum grade at college street 50 ft. from the Broad Street intersection is 15%, which is the maximum allowable grade for the roadway classification in a residential setting although this is greater than the 8% maximum grade for commercial/industrial locations which reflect greater heavy vehicle use.
3) Church Street – The existing roadway conditions meet or exceed the design standard values for this roadway classification.
4) Route 9N/22 – The existing roadway conditions meet or exceed the design standard values for this roadway classification.
5) Broad St. & College St. intersection - is positioned just east of a sharp horizontal curve on Broad St. and is also located along a 10% vertical grade segment of Broad St. with a 15% vertical grade approach on College Street. Also, trucks are not able to make the right hand turn onto College St. without encroaching into the opposite travel lanes.
6) Broad St. & Main St./Route 9N intersection - trucks travelling eastbound on Broad Street are able to make the turn without crossing over the center line. Although the northern most parking space on the west side of Main St./Route 9N/22 should be removed to help facilitate an easier turning movement.
7) College St. & Church St. intersection - trucks are able to make the turning movement onto Church Street without any obstructions.
8) Church St. & Main St./Route 9N/22 intersection - in order for heavy vehicles to make the right turn from Church St. to Main St. they will either impact the sidewalk and parking space or they are forced to overtrack into the opposite travel lanes to try and avoid these two features.
9) There were only 2 crashes involving heavy vehicles over the past 5 years. The crashes were not within the project area.

5.2 Recommendations

Taking the existing conditions, applicable design criteria, and roadway characteristics into consideration, the recommended truck route is Alternative 1. The recommended mitigation measures for the application of this route include:

1) Installing a new (W7-1 and W7-2P) – Steep Grade Ahead warning sign approximately 250 ft. west of the College Street/Broad Street intersection, in accordance with the *MUTCD Section 2C.16 - The sign and additional plaque should be used in advance of a downgrade where the length, percent of grade, horizontal curvature and/or other physical features require special precautions on the part of road users.* The installation of these new warning signs will provide an additional alert to the truck drivers to reduce their speed as the travel around the horizontal curve on Broad Street and will allow for a slower approach to the Broad Street/Route 9N/22 intersection.
2) Installing two (2) new R14-1 – Truck Route signs. One west of the College/Broad street intersection (or maintain the existing) and one east of the intersection, in accordance with MUTCD Section 2B.60. The truck route sign (R14-1) should be used to mark a route that has been designated to allow truck traffic. The installation of a truck route sign would reassure truck drivers that they are on the designated truck route.
3) To help facilitate the Broad Street to NY Route 9N/22 turning movement the first parking space at the intersection on the west side should be removed.

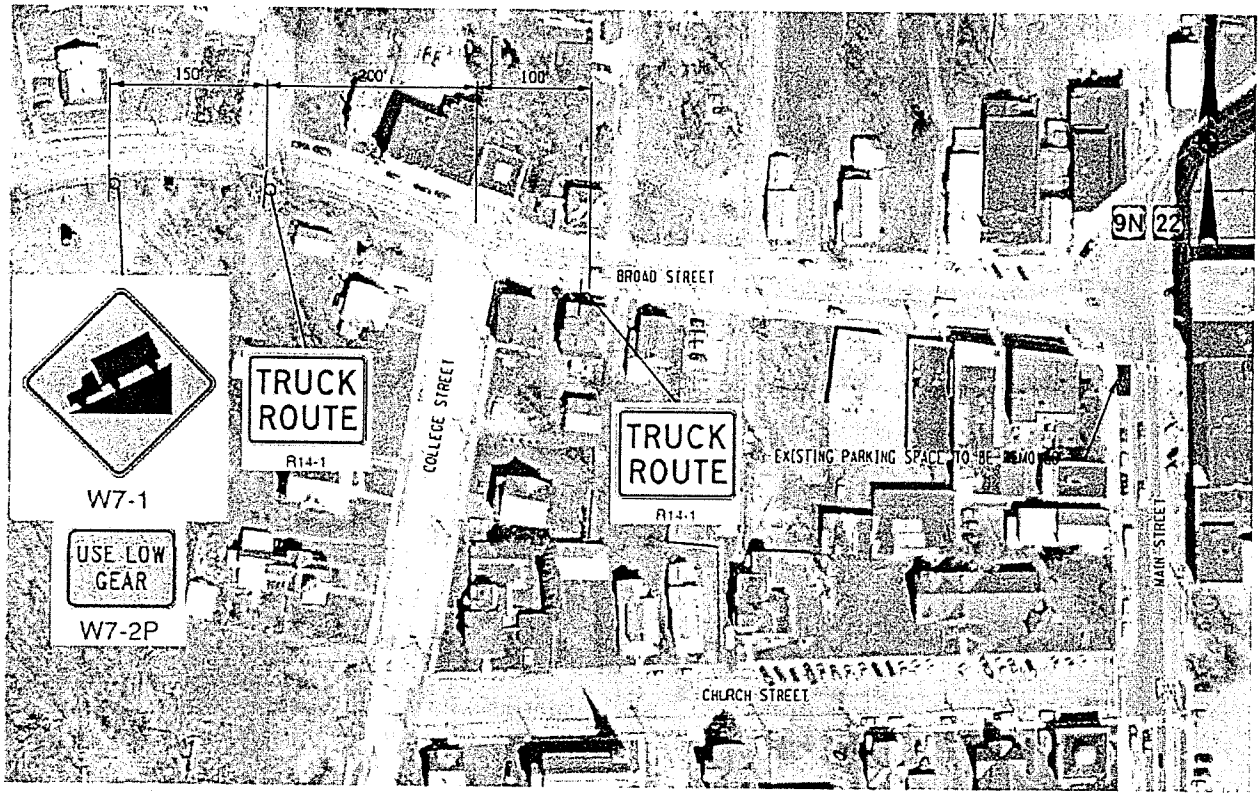


Figure 5.2-1 – Recommendation Plan

5.3 Optional Mitigation

Optional mitigation measures observed by the project team that would enhance the application of the truck route and could be considered by the Town include:

1) Installing Yield line striping prior to the crosswalk on the Broad St. approach to the Main St./Route 9N/22 intersection. Also, the MUTCD standard application for this scenario requires that the parking spot between the yield markings and crosswalk would need to be removed. The Yield line striping would be an additional visual cue to drivers that they are approaching a crosswalk and a Yield controlled intersection.
2) Investigate the installation of Stop Control at the Broad St. & Main St./Route 9N/22 Intersection. Stop control would force drivers to stop before the crosswalk and take an extra moment to observe pedestrians in the crosswalk as well as north and southbound traffic on Route 9N/22.

3) Relocation or enhancement with striping and reflectors of the intersection circular monument to help facilitate smoother turning movements and reduce out of town driver confusion.
4) Install flashing beacons on the Steep Grade Ahead Sign to provide additional attention to the sign.
5) Study the parking on Broad St. and Main St./Route 9N/22 to not only maximize the space available but also to review the interaction of diagonal spaces with the vehicle and truck through movements.

The experience to
listen
The power to
solve℠

Barton
&Loguidice

www.bartonandloguidice.com