

Berwick Downtown Vehicle, Bicycle, and Pedestrian Study

Berwick, Maine
4/30/19



Prepared for:
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MMI #6510-02

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1.0 EXECUTIVE SUMMARY

The Berwick Downtown Vehicle, Bicycle, and Pedestrian Study is a plan focused on the development of recommendations for the area surrounding the former Prime Tanning facility. This area encompassed Wilson Street, to School Street, to Saw Mill Hill, to Sullivan Street, and also included Eleanor Street, Rochester Street, and Bow Street in the vicinity of the Town Hall. Recommendations were made based on a Purpose and Need statement developed between Milone & MacBroom (MMI), the Town of Berwick, town staff and departments, and a stakeholder committee. There were four goals for the outcome of the study. These are:

GOAL #1: Improve Vehicular Traffic Circulation

GOAL #2: Increase Bikeability and Walkability

GOAL #3: Lower Vehicular Speeds

GOAL #4: Develop a Unified Downtown between Somersworth, NH and Berwick

MMI initially started with a review of the existing conditions. This entailed looking at previous studies of the area, gathering traffic data, analyzing traffic crashes, and observing how traffic uses the roadway network. This foundation, along with the stated goals in the project purpose and need section, outlined the types of recommendations that MMI would propose for the study area. Ultimately, Concept Alternative 1A was chosen as the one to move forward. Generally, the recommendations were made in two different areas. All alternatives shared a particular vision for the streets not surrounding the Berwick Town Hall. For the other road sections, such as Wilson Street, School Street, and Saw Mill Hill, MMI recommended adding sidewalks (to increase the connectivity of the pedestrian network), decreasing roadway width (to decrease vehicle speeds), and curb extensions (to increase safety by decreasing the street width for crossing.) The designs also shared a vision for reconfiguring the intersection of School Street with Saw Mill Hill. The intersection can be confusing for drivers, based on the through-street traffic having to make a hard turn, and the perception of pedestrians was that crossing at the intersection was not safe. The MMI proposed design squares the intersection and reduces the pedestrian crossing distance.

For the area surrounding Berwick Town Hall, a series of recommendations were made to reduce driver confusion. In Concept Alternative 1A, Sullivan Street, Eleanor Street, and Rochester Street were proposed to be changed from 1-way operation to 2-way. Rochester Street was essentially dead-ended for through traffic and drivers would be pushed to Sullivan Street to continue through the downtown. The area south of the Berwick Town Hall would become connected and allow for a pedestrian plaza.

Concept Alternative 1A meets the initial expected goals and outcomes of the study from the Purpose and Need Statements. Vehicular traffic circulation was improved by removing the confusion of the 1-way street network and improving circulation at the intersections of Sullivan St/Saw Mill Hill and School Street/ Saw Mill Hill. Bikeability and walkability were increased by proposals for safer crossings, shared lane markings on the roadways for bicycles, and increasing the extent of sidewalks. Lower vehicular speeds were encouraged by decreasing roadway widths and increasing intersection curb radiuses. The last goal, to develop a unified downtown with Somersworth, NH, was not as easy to define for this transportation planning study but can be achieved for certain infrastructure purposes in the design phase via synchronous materials and additional access at the bridge on the state line.

It is important for the town to consider that a plan should be put in place in advance of development of the Prime Tanning parcel, or the development may dictate the downtown palette.

2.0 PURPOSE AND NEED

1. *Improve Vehicular Traffic Circulation*
2. *Increase Bikeability and Walkability*
3. *Lower Vehicular Speeds*
4. *Develop a Unified Downtown between Somersworth, NH and Berwick*

The Purpose & Need Statement is intended to be the basis for decision making throughout the course of the Berwick Downtown Vehicle, Bicycle and Pedestrian Study. By clearly stating the overall mission of this study, this statement can aid in both the development of concept alternatives and the determination of the optimal choice for future projects.

This planning study is multifaceted and included several key steps. It is intended that the Purpose & Need Statement be considered as an influence and overarching guide throughout the entirety of the process. First, the vision and goals of the study area are recognized in order to gauge the performance of Berwick's current transportation system as it functions on a daily basis. Once this baseline has been determined, the deficiencies of the transportation facilities will be identified. Problems with the transportation system, both in conjunction with the deficiencies of the facilities as well as independent of it, must be recognized.

Once this understanding is built, it will be possible to clearly articulate the needs of the system. By developing an understanding of the specific problems currently preventing the Berwick Downtown transportation system and facilities from meeting the needs of present and future residents, the plan will aid the Town in implementing necessary improvements.

The "purpose" portion of the Purpose & Need Statement is intended to communicate the full range of elements which must be considered in the decision-making process employed throughout the development of the study. The fundamental purpose of this study will communicate the goals that Berwick town residents and officials have for the performance of their transportation system. Secondly, this portion of the statement can also complement the core purposes of the study.

The "need" portion of the Purpose & Need Statement will describe clearly the present deficiencies of the Berwick Downtown transportation system by identifying which parts of the system are not performing optimally. Overall, the Purpose & Need Statement for the Berwick Downtown Vehicle, Bicycle and Pedestrian Study will answer the following five questions:

1. **Why** is it necessary to study downtown Berwick?
2. **What** are we studying?
3. **Who** is the project intended to benefit?
4. **When** should Downtown Berwick's transportation deficiencies be determined?
5. **How** will the issues identified within this planning study be resolved?

A kickoff meeting for the Berwick Downtown Vehicle, Bicycle and Pedestrian Study was held on August 27th, 2018. During this meeting four key goals for the outcome of this study were identified and agreed upon by the committee. These goals were based on committee feedback following a discussion of system deficiencies and community needs. which were then paired with a central project goal in order to ensure each is addressed appropriately. The goals developed were:

GOAL #1: Improve Vehicular Traffic Circulation

- *System Deficiencies:* The circulation of vehicular traffic near the Berwick Town Hall is confusing. Additionally, the near signalized intersection of Sullivan Street and Saw Mill Hill is inefficient and confusing for drivers.
- *Community Needs:* Vehicular mobility and circulation must be improved and confusing traffic patterns should be altered to improve efficiency.

GOAL #2: Increase Bikeability and Walkability

- *System Deficiencies:* Many of the sidewalks in the downtown Berwick area are in bad condition, creating an inefficient and incomplete network for pedestrians. Additionally, bicycle infrastructure essentially does not exist at all in the community.
- *Community Needs:* Sidewalks in poor condition should be repaired and new sidewalks should be built for key pedestrian corridors. Bicycle infrastructure improvements should be implemented in the area.

GOAL #3: Lower Vehicular Speeds

- *System Deficiencies:* Vehicles in the downtown Berwick area regularly exceed the 25 MPH posted speed limit.
- *Community Needs:* To improve the safety and comfort of the downtown for all modes of travel, measures should be implemented to slow down vehicles.

GOAL #4: Develop a Unified Downtown between Somersworth, NH and Berwick, ME

- *System Deficiencies:* Businesses in downtown Berwick often appear to be isolated with the lack of a larger base of economic development and support. The bridge and river currently act as an infrastructural barrier making the possibility of a single downtown shared between Somersworth, New Hampshire and Berwick, Maine seem impossible.
- *Community Needs:* The sense of a single downtown with Somersworth, New Hampshire should be improved in concert with recent proposed improvements to the former Prime Tanning parcels in the center of the downtown.

Purpose and Need Statement

A vehicle, bicycle, and pedestrian study of downtown Berwick is needed because of:

- congestion and mobility problems on major streets and intersections;
- poor bicycle and pedestrian infrastructure and system connectivity;
- safety issues stemming from vehicle speeds; and
- lost economic development opportunities from the separation of other near downtown hubs.

The purpose of the study will be to:

- improve the congestion and mobility of the downtown streets and intersections;
- improve the ability of bicycles and pedestrians to travel through and within the downtown;
- reduce the speeds of vehicles in the downtown; and
- promote economic development with neighboring communities in concert with recent proposed improvements to the former Prime Tanning parcels.

The project outcomes should be attainable within five years, led by the town, in partnership with private development and the State of Maine.

3.0 EXISTING CONDITIONS

3.1 Community Engagement & Traffic Pattern Summaries

3.1.1 Downtown Berwick Vision Plan *Published February 2014*

Relevant Community Outreach / Engagement:

The community outreach for this project included both a community questionnaire, two charrette style public input sessions, and a series of awareness and educational meetings. The community questionnaire was conducted through the mail and online as part of this project in April, 2013. It garnered over 505 responses, which accounts for approximately 8% of the Town's total voting population.



The first charette style public input session was held on May 1st of 2013. This session included break out groups on key topics, Berwick walking tours, and interactive sessions organized around the development of priorities for developing village character and focus areas. During the months of May and June of 2013 a significant number of public awareness meetings and educational training sessions were held with the intention of promoting understanding of the plan and the public visioning process. The final charette style public meeting was held in two parts on June 22nd and 24th in 2013.

The results of all of these public engagement efforts were combined together in order to formulate the Downtown Berwick Vision Plan visioning process. The resulting Downtown Vision Committee (DVC) Vision Statement is *"Berwick is a rural, riverside town that appreciates the importance of a connected, actively engaged community and proudly cultivates its unique strengths and small-town character by: promoting small businesses and creative outlets where local talent, entrepreneurship, and agriculture flourish; fostering a healthy relationship with land and river through conservation, environmentally-minded development, substantial and functional green space, and responsible recreation; creating a safe, friendly downtown where youth, families, and community come together"*. Other key pieces of public input which are relevant to the Downtown Berwick area include:

- Provide connections to the water;
- Create a walkable pedestrian network with wide, interconnected sidewalks;
- Provide places for informal gathering;
- Implement complete streets practices;
- Encourage development of a higher density in the Village Center;
- Plant shade trees;
- Add ornamental lighting;
- Make the Village Center the true heart and focal point of the Town;
- Add pedestrian and vehicular scaled signage to highlight destinations; and

- Add street furniture and other amenities to public spaces and sidewalks.

Relevant Transportation Recommendations and Analysis:

Although not an in-depth traffic or vehicular study, this plan includes many pertinent recommendations concerning the Town's downtown streets. One of the key recommendations is to commission a comprehensive vehicular traffic and circulation plan with MaineDOT. This recommendation was satisfied by the Berwick Traffic Circulation Evaluation planning document which was published in November, 2015 and revised in January, 2016.

Additional recommendations revolve around the need for the Town's future transportation planning and engineering efforts to create a multimodal transportation environment which balances the needs of vehicular circulation with those of other modes like transit, bicyclists, and pedestrians. The plan recommends the implementation of some traffic calming strategies like bump-outs, travel lane or road 'diets', bike lanes, and speed tables to combat some of the downtown area's more vehicular-centric roadways. Additionally, it is recommended that new sidewalks and pedestrian crossings be added as the town presently has very little pedestrian connectivity presently.

3.1.2 Workforce Housing Design Charette in Berwick, Maine October 2015



Relevant Community Outreach / Engagement:

A workforce housing design charrette in Berwick, Maine was organized by the Workforce Housing Coalition of the Greater Seacoast on October 15th and 16th of the year 2015. This intensive planning meeting brought together designers, professional practitioners, property owners, municipal representatives, and other public stakeholders in order to develop a conceptual vision of a mixed-use development which would include affordable housing for people who work in the community. The leaders of the charette were housing professionals who volunteered their time.

The charette focused on a development site in the town center which includes the Prime Tanning facilities and the Estabrook School. This site is located near services, municipal offices, recreation fields, potential future job opportunities, and key residential areas. Charrette activities included a site walk, a community listening session, and then a design phase. A significant amount of feedback was collected during the site walk and community listening session. Some of the most relevant ideas expressed by community members concerning the downtown area and its transportation system. They include:

- Creating both indoor and outdoor spaces for community gatherings;
- Implementing transportation planning strategies which balance traffic congestion needs with increased connectivity via public transit, bicycling, and walking;
- Create walkable destinations downtown; and

- Develop open space in the town center.

3.1.3 Berwick Traffic Circulation Evaluation

Published November, 2015 (Revised January, 2016)

Relevant Community Outreach / Engagement:

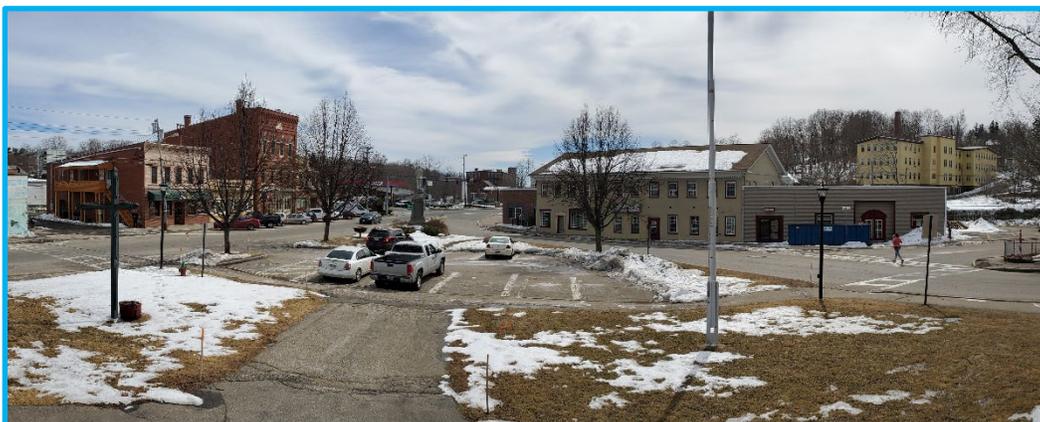
This study was implemented following the recommendation to commission a comprehensive vehicular traffic and circulation plan with MaineDOT within the 2014 Downtown Berwick Vision Plan. Concerning the collection of public input, this plan built directly off the year-long visioning process conducted as part of the 2014 Downtown Berwick Vision Plan. The information from this plan provided the Berwick Traffic Circulation Evaluation team with great insight into both the needs and the desires of the Berwick community. Although no other public meetings were deemed necessary, in order to continue to gain insight from key stakeholders the project team worked directly with town officials and the Downtown Vision Committee (DVC) throughout the course of this study. Four of these stakeholder meetings were held from September 2014 to September 2015.

Relevant Transportation Recommendations and Analysis:

As a transportation focused report, this planning document contains an in-depth transportation analysis which focuses on existing conditions (including an analysis of present roadways, traffic volumes, and parking) as well as future conditions (including roadway configuration modifications and an operations analyses for the year 2025). Overall, it was found that the walkable community vision as was declared in the 2014 Downtown Berwick Vision Plan can be accommodated on the town's local roadway network. However, this is only possible if any proposed modifications to the town's roadway network are focused on actions that enhance the safety and use of many transportation modes, not just vehicles.

Additionally, the study suggests that the town's transformation into a more pedestrian friendly roadway network should be focused on the portion of Sullivan Street which runs from the Berwick Bridge to Wilson Street. Recommendations for the pedestrianization of this particular roadway include:

- The installation of roundabouts at the intersections of Sullivan Street/Berwick Bridge and Sullivan Street / Wilson Street;
- Implement six-foot-wide sidewalks with street trees, plantings, benches, and improved pedestrian scaled lighting; and
- Design and implement pedestrian bump-outs at crosswalks to shorten pedestrian crossing distances and define on-street parking spaces.



3.1.4 Sidewalk Inventory and Plan

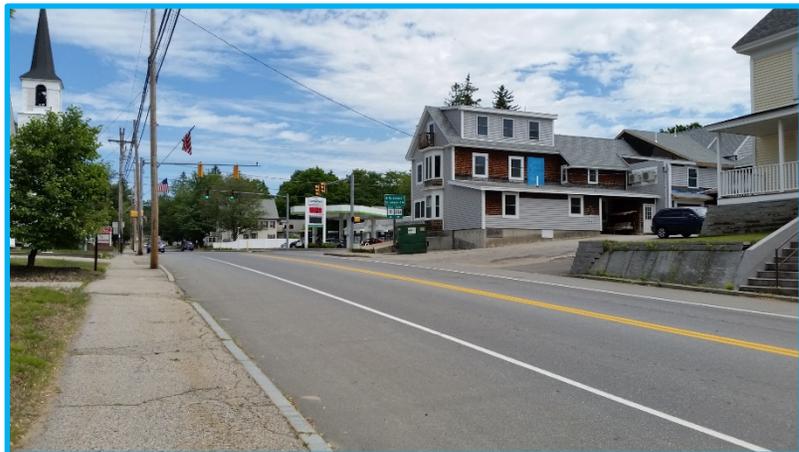
Published 2018

Relevant Community Outreach / Engagement:

Concerning the collection of public input, this plan built directly off the community goals' set in the 2004 Berwick Comprehensive Plan Update. Many of these goals revolved around walkability, the cultivation of community spaces and events, and environmental sustainability. All of these goals could be addressed through the implementation of complete streets design, something which is recommended within the Sidewalk Inventory and Plan document.

This plan also highlights the results of various means of community engagement initiatives employed by the Town of Berwick, the Downtown Vision Committee, and Berwick for a Lifetime and Rec Master Plan committee, although it does not detail the type or structure of the initiatives. It states that the goal of "improving and connecting sidewalks" has been a goal for the Town of Berwick for approximately thirty years, first appearing in the 1991 Comprehensive Plan. Here, it was specifically suggested that all subdivisions approved that have both public water and public sewer also have sidewalks and that a 10-year renovation and new sidewalk schedule be combined with all major sewer, water, and stormwater infrastructure projects on Town roads.

Additionally, the 2004 Comprehensive Plan Update is highlighted within the Sidewalk Inventory and Plan. The two goals listed here include providing sidewalks in the Village Center and other densely populated areas, as well as requiring that all subdivisions approved that have both public water and public sewer have both sidewalks and granite curbing.



Relevant Transportation Recommendations and Analysis:

Following an assessment of existing conditions, the Sidewalk Inventory and Plan names a Sidewalk Priority List which sorts street segments throughout Berwick into the categories of High Priority, Secondary Priority, and Future Considerations. The Sidewalk Priority List is as follows:

High Priority Sidewalks

Based on the existing pedestrian use, High priority sidewalks were identified by functionality, connectivity needs, and future uses. In total 2,725 feet of sidewalks are classified as high priority accounting for an estimated total cost of \$163,500 (at \$60 a lineal foot).

- Segment 1: Sullivan Street to Town Hall
- Segment 2 & 3: Town Hall and Subway
- Segment 4: Connecting Berwick/Somersworth Bridge to Great Falls Park
- Segment 5: Bridge along through to Bow Street

- Segment 6: Connecting Downtown to 71 Sullivan Street (potential future community center), Memorial Field & Estabrook Green

Secondary Priority Sidewalks

Secondary priority sidewalks are valued as connection pieces to complete a downtown Berwick sidewalk network. 6,300 feet of potential and existing sidewalk are considered to be secondary priority for a total estimate cost of \$378,000 (at \$60 a lineal foot)

- Segment 7: Connecting 71 Sullivan Street to existing sidewalk on Pine Hill Road
- Segment 8: Logan to Dobson
- Segment 9: Connecting Bell/Goodwin to Jordan and to Rochester Street
- Segment 10: Connecting Saw Mill Hill to Allen Street
- Segment 11: Dobson/Old Pine Hill Road North to Berwick Public Library
- Segment 12: Connecting Sullivan Street to the Berwick Public Library

Sidewalks for Future Consideration

Classification for these sidewalks were for needed access to a particular pedestrian attractor, or because of the difficulty in feasibility of adding sidewalks because of a lack of available right-of-way on the road. Approximately 9,100 possible feet of sidewalks have been classified in this category. The total cost of this infrastructure is approximately \$546,000 (at \$60 a lineal foot).

- Segment 13: Dobson/School Street to Old Pine Hill Road/School Street intersection
- Segment 14: School Street/OPHR to Dobson (heading toward library)
- Segment 15: School/Old Pine Hill road to Berwick Walk-in
- Segment 16: Berwick Road to Hussey School
- Segment 17: Merriam Street to GWRLT and Hussey



3.2 Crash History – Downtown Berwick

The following crash summaries were collected by Milone & MacBroom staff from the MaineDOT Traffic Engineering and Crash Records section. The data for the study area, collected from the MaineDOT Crash Records, was for 2015 to 2017, the last three full years of available data. MaineDOT Engineering and Crash Records classifies injuries which are a result of vehicular crashes in the following categories: Level K (Fatality), Level A (Incapacitating), Level B, (Non-incapacitating), Level C (Possible injury), or Property Damage Only.

3.2.1 Intersections:

Rochester Street/Saw Mill Hill/ Sullivan Street

There were six crashes at this intersection. These crashes resulted in property damage only with no injuries reported.

Saw Mill Hill/School Street

There were five crashes at the intersection. Two of these crashes produced C level injuries, and the remaining three crashes resulted in property damage only.

School Street/Lyman Street

There was only one crash at the intersection which resulted in property damage only.

School Street/Wilson Street/Allen Street (MaineDOT designated High Crash Location)

There were 17 crashes at the intersection. One crash resulted in B level injuries, four crashes had C level injuries, and the remaining twelve crashes were property damage only with no reported injuries.

Wilson Street/Sullivan Street/Jordan Street

There were five crashes at the intersection. One crash resulted in B level injuries, two crashes produced C level injuries and the remaining two crashes were property damage only with no reported injuries.

Sullivan Street/Eleanor's Street

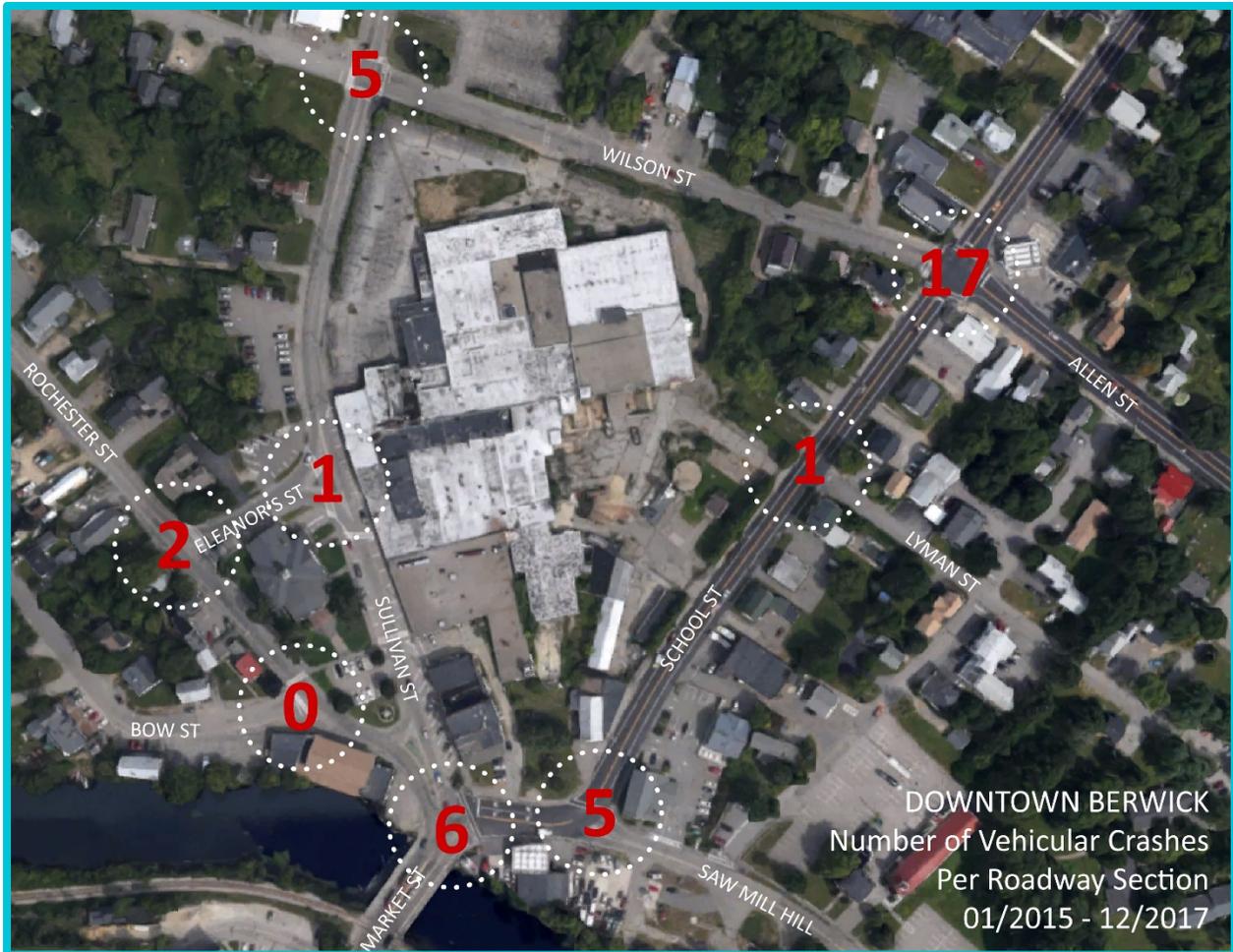
There was only one crash at the intersection, which resulted in an A level injury.

Rochester Street/Eleanor's Street

There were two crashes at the intersection. Both crashes produced C level injuries.

Rochester Street/Bow Street

There were no crashes at the intersection of Rochester Street and Bow Street.



3.2.2 Roadway Sections:

Market Street (On Bridge) – New Hampshire to Saw Mill Hill

There were no crashes within this section of roadway.

Saw Mill Hill – Sullivan Street to School Street

There was a single crash on this section of roadway which was property damage only.

School Street – Saw Mill Hill to Lyman Street

There were two crashes for this section of roadway which were property damage only.

School Street – Lyman Street to Wilson Street

There were two crashes for this section of roadway which were property damage only.

Wilson Street – Sullivan Street to School Street

There was a single crash on this section of roadway which was property damage only.

Sullivan Street – Wilson Street to Eleanor's Street

There were no crashes on this section of roadway.

Sullivan Street – Market Street to Eleanor’s Street

There were two crashes for this section of roadway which were property damage only.

Eleanor’s Street – Rochester Street to Sullivan Street

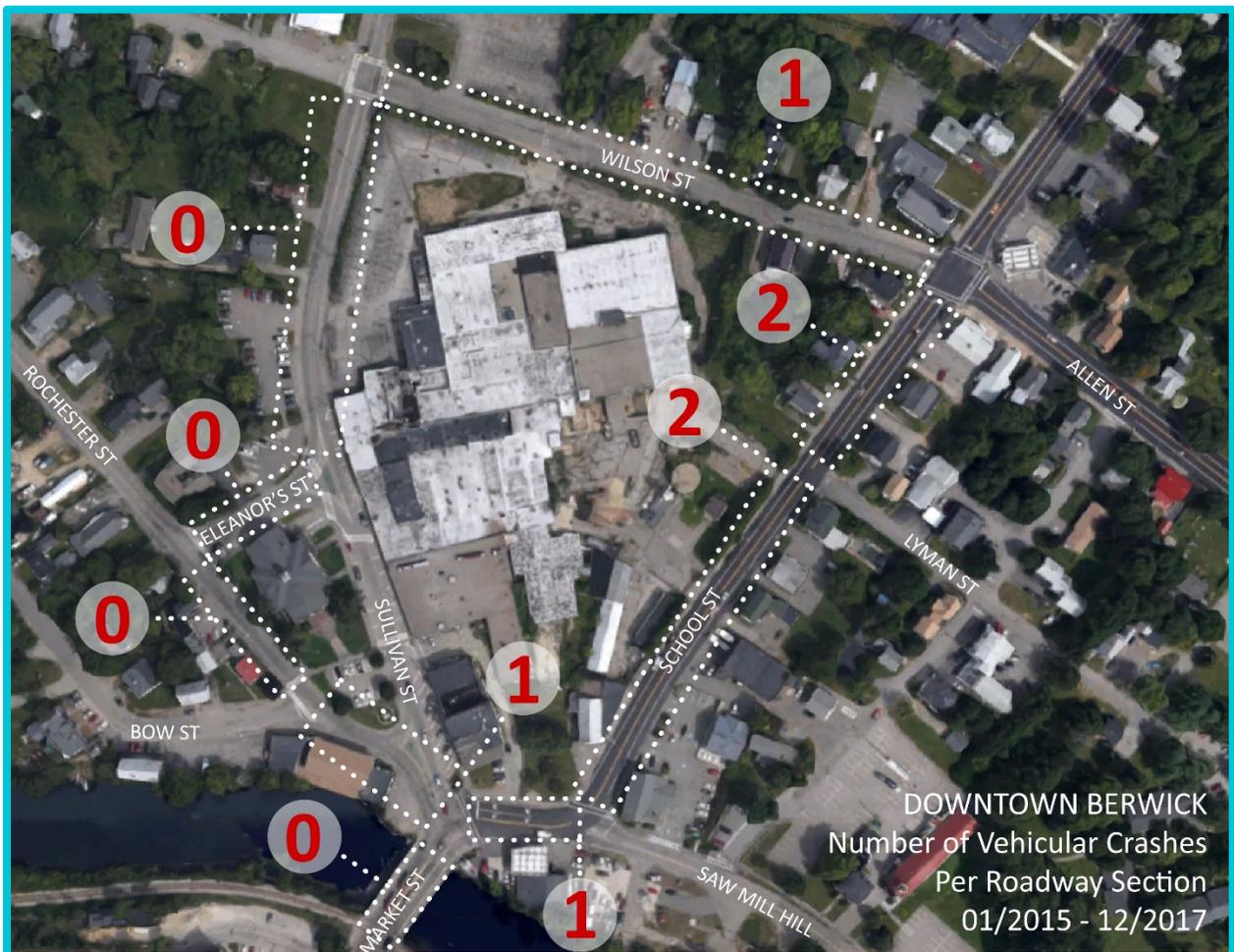
There were no crashes on this section of roadway.

Rochester Street – Eleanor’s Street to Bow Street

There were no crashes on this section of roadway.

Rochester Street – Bow Street to Market Street

There was a single crash on this section of roadway which was property damage only.



3.2.3 Crash Patterns

Three intersection locations in the study area stood out because of the number and relative severity of vehicular crashes which prompted the need for further analysis. These intersections are Saw Mill Hill/School Street (5 crashes), School Street/Wilson Street/Allen Street (17 crashes), and Wilson Street/Sullivan Street/Jordan Street (5 crashes).

School Street/ Wilson Street/Allen Street (17 crashes)

The intersection of School Street, Wilson Street, and Allen Street is designated as a High Crash Location (HCL) by the MaineDOT. HCL's are roads or intersections that have more than eight crashes in a three-year period and have a Critical Rate Factor (CRF) greater than 1.0. A CRF that is greater than 1.0 indicates statistically that the location has a higher number of crashes than would be expected of other similar locations.

- Ten crashes involved a driver running a red light.
- Three crashes involved typical stop-and-go driver operations with a rear-end collision at a signalized intersection.
- Three crashes involved driver inattention.
- One crash involved driver disregard for normal operations.

There is a clear pattern of drivers running red lights for this intersection. Fortunately, the percentage of crashes involving an injury was low, at 29.4%.

Saw Mill Hill/School Street (5 crashes)

Though there were a few crashes for this intersection, there did not appear to be a noticeable crash pattern or cause to relate them.

- Two crashes could be attributed to ice/snow winter conditions.
- One crash was a result of distracted driving.
- One crash involved driver inattention with a towed vehicle.



- One crash involved typical stop-and-go driver operations with a rear-end collision at a signalized intersection.

As there were two crashes with icy roads as a contributing factor, it is recommended that the MUTCD W8-13 sign "BRIDGE ICES BEFORE ROAD" sign be installed on each bridge approach to alert drivers of potentially hazardous conditions during winter driving operations.

Wilson Street/Sullivan Street/Jordan Street (5 crashes)

- All five crashes involved a driver failing to stop at a stop sign.

There is a clear pattern of crashes for this intersection with drivers failing to stop at the intersection. It is recommended that additional study be conducted for this intersection in order to improve driver compliance. Design-based improvements may involve geometric changes to slow vehicles down, additional high visibility signage, or auxiliary devices to bring attention to the all-way stop controlled intersection.



3.3 Bicycle and Pedestrian Crashes

In addition to the standard of collection and analysis of data from the latest complete three-year period (January 2015 through December 2017) which was conducted for motor vehicle crashes, Milone & MacBroom conducted a more in-depth analysis of crashes involving bicycles and pedestrians. As these events are more rare, additional data collection is necessary to help identify important patterns or areas of concern. It is also important to note that crashes involving bicycles and pedestrians tend to have a higher percentage of serious injuries. For this reason, bicycle and pedestrian crashes were reviewed for the 10 previous years.

3.3.1 **Bicycle Crashes**

There was a bicycle crash at the intersection of School Street and Saw Mill Hill in 2010. The police report attributes the crash as a failure on the part of the bicyclist to indicate a left turn, and a failure to look for conflicting traffic in making a left turn from the right shoulder from Saw Mill Hill to School Street. The police report indicates that the weather conditions were clear, in daylight, with a dry road.

3.3.2 **Pedestrian Crashes**

In 2016, a pedestrian was struck at the intersection of School Street and Saw Mill Hill. More specifically, the pedestrian was struck while in a marked crosswalk. The police report indicates that the weather conditions were clear, in a marked crosswalk. This crash was more concerning in that the driver of the vehicle was stationary for the stop sign and failed to see the pedestrian crossing. The police report indicates that the weather conditions were clear, in daylight, with a dry road. daylight, with a dry road.

In 2017, a pedestrian was struck at the intersection of Rochester Street and Eleanor's Street. Again, the pedestrian was struck while in

While the total number of events is not significant statistically, there are two patterns to be seen for these bicycle and pedestrian crashes:

- The geographic location at the intersection of Saw Mill Hill and School Street
- Drivers striking pedestrians in marked crosswalks

Recommendations to help reduce these issues could include design features to help slow traffic and make drivers more aware of the presence of multimodal transportation users and their obligation to share the road. High visibility crosswalks could be installed at intersections in conjunction with pedestrian crossing signage at all intersection approaches.

3.4 **Sidewalks**

Initial work on a town-wide sidewalk inventory was completed in 2018 with the development of a Sidewalk Inventory & Plan from the Berwick Planning Department. The goal of this study was to encourage the development of Complete Streets, which are defined by the town vision report as being streets which *"accommodates all modes of transportation including: walking, wheelchairs, biking, public transit and driving. The streets are designed to balance safety and convenience for all ages and abilities using the road. The design of complete streets has events, recreation, social gatherings and retail in mind. In a Complete Street, you will find ample sidewalks, street trees, bike lanes, frequent and safe crossing opportunities, accessible pedestrian signals, curb extensions, narrower travel lanes, circular intersections and more"*. This plan further emphasizes the importance of proper sidewalk construction and design with concrete sidewalks recommended for their durability, characterizing their use as the "Gold Standard" for what a sidewalk should be like.

For the Berwick Downtown Vehicle, Bicycle, and Pedestrian Study, an inventory of the sidewalks in the project area was conducted. Some information was provided by the town, but a systematic field inventory of the network was completed by MMI staff. The results of the inventory were then processed into Geographic Information Systems (GIS) files for easy and comprehensive data analysis.

3.4.1 **Sidewalk Condition**

The sidewalk inventory collected several key pieces of data for each area surveyed, including: street name, sidewalk material, and condition of sidewalk. The sidewalks' condition was categorized in four levels based on their suitability for walking: Excellent, Good, Fair, and Poor.

- A sidewalk in Excellent condition would be considered to be in new condition. While not necessarily recently built, the sidewalk would not have any deficiencies which would affect the use of the facility by a pedestrian.
- A sidewalk in Good condition may appear to have some faults, including cracking or rises in the level of the material. These deficiencies, though noticeable, would not have a significant effect on their use by a pedestrian.
- A sidewalk in Fair condition would have noticeable faults in the material. The deficiencies may include heavy cracking, rises in the level of the material which may trip pedestrians, and separation of the sidewalk material. The condition would impair the use of the sidewalk by a pedestrian.
- A sidewalk in Poor condition would have significant faults in its condition. Its attributes may include heavy cracking, sloping, and rises in material level that may promote tripping, and separation of the sidewalk material. Though a sidewalk might not exhibit all of these deficiencies, the extent of issues with some of them may significantly impact the use of the facility by a user.

3.4.2 **Sidewalk Inventory**

The results of this systematic inventory showed that the vast majority of sidewalks in the downtown Berwick study area are made of pavement, the exceptions being the one on the bridge that connects to Somersworth, NH on Market Street. These sidewalks were rated Excellent and Good (the deficiencies of the 'Good' sidewalk were early signs of wear, cracking, and minor rises in pavement level). These higher rated locations were also the only sidewalk facilities which appeared to be ADA compliant, with all other sidewalks missing some component of a detectable

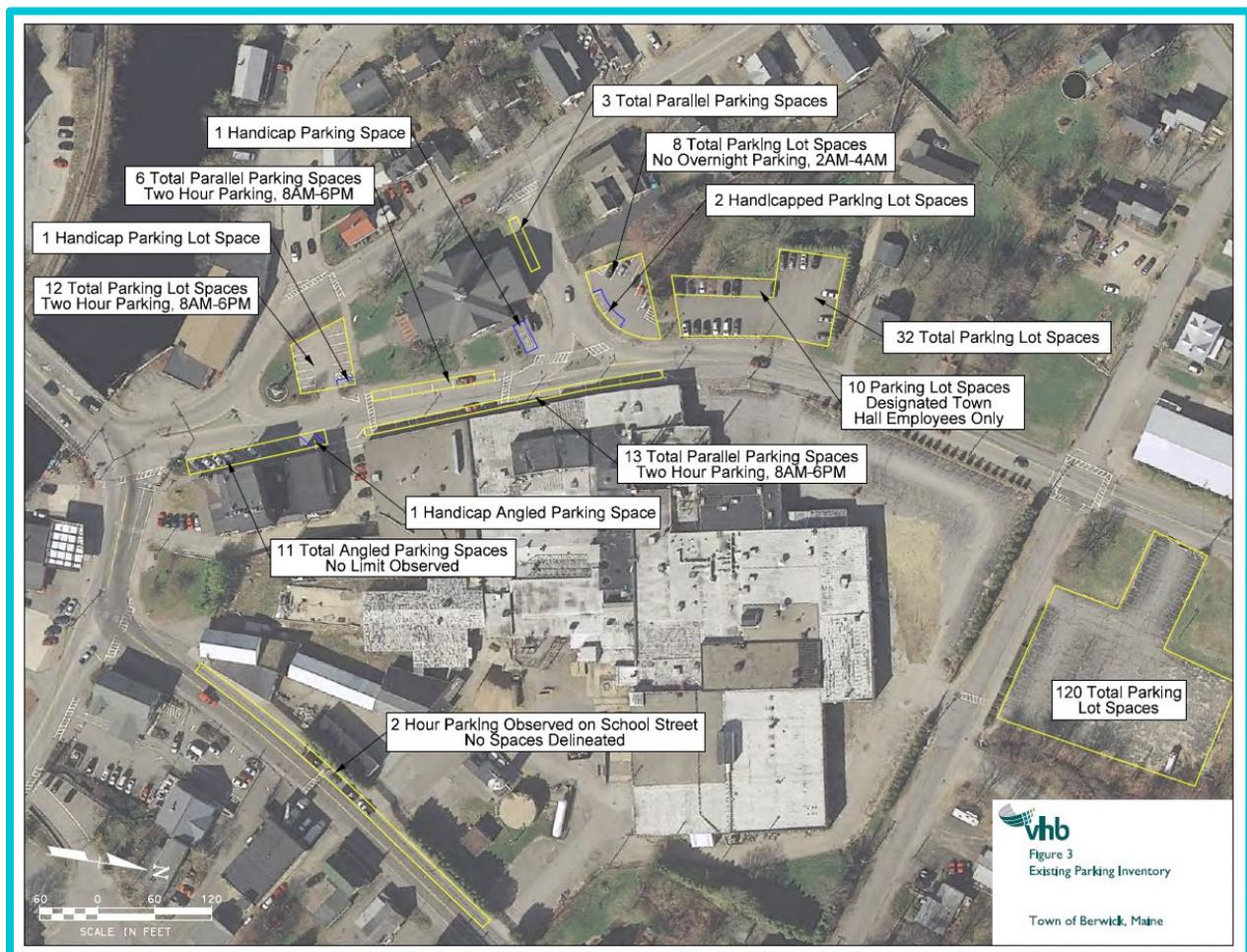
warning field, correct use of pedestrian buttons at signalized intersection, or in otherwise poor condition for use for all types of users. Generally, the sidewalk condition deteriorated the farther they were located from the bridge.



3.5 Parking

A review and field verification of existing parking was conducted by Milone & MacBroom for the Downtown Berwick Bicycle and Pedestrian Study on September 14, 2018. Existing conditions for the parking inventory were based on the 2015 report by VHB, *Berwick Traffic Circulation and Parking*. The results of the fieldwork verified that present parking conditions still match those from the 2015 report.

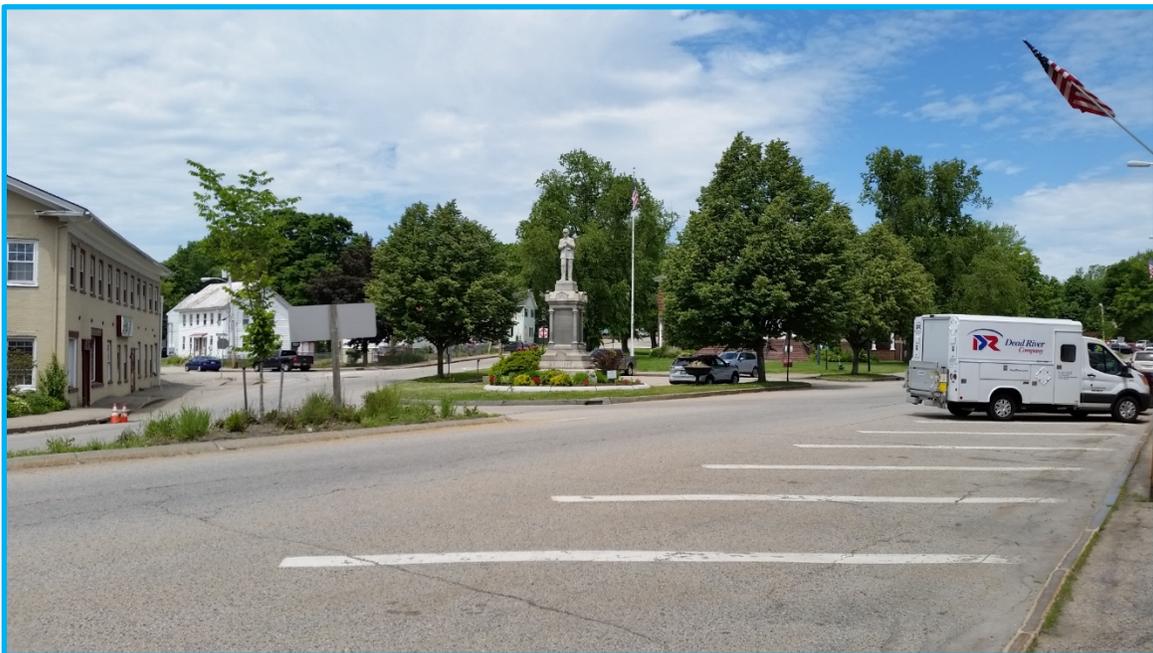
The parking supply in the downtown Berwick area features a mixture of on-street and off-street parking. On-street parking generally consisted of parallel spaces with some angled parking on Sullivan Street near Saw Mill Hill. Off-Street parking included standard parking lot configurations. Most parking spaces were limited to two hours parking time, with the exception of certain off-street lots which served as "park & ride" commuter parking facilities with prohibitions on overnight parking. A parking lot located at the northeast corner of the intersection at Sullivan Street/Wilson Street appears to have space for 120 vehicles but is currently underutilized with poor pavement conditions.



3.5.1 Existing Parking Supply - Berwick Traffic Circulation Evaluation - VHB - 2015

Several key observations for parking in the study area of downtown Berwick were noted by MMI, and recommendations were drafted to help improve conditions. Observations and recommendations include:

- Parking stalls in the vicinity of the town hall on Sullivan Street are located too close to crosswalks. Parking stalls should be located at least 25 feet away from crosswalks to maximize the visibility of waiting pedestrians.
- Parking stalls should be set back from road intersections and driveways 25 feet to ensure visibility of entering and exiting vehicles.
- Angled parking on Sullivan Street near the signalized intersection of Market Street/Saw Mill Hill should be re-evaluated for the safety of vehicles leaving their stalls.
- The 2-Hour time parking limits for many on-street parking facilities should be re-evaluated to determine if they are meeting city goals.
- The handicapped designated parking stall on the Town Hall property may not meet ADA standards because of the steep slope.



3.6 Utilities

MMI was tasked with determining the conditions of the utilities in the study area, including water, sewer, and the stormwater infrastructure. MMI used GIS records and conversations to conclude that there are no major issues with the infrastructure, and that future needs are being planned for by the respective districts or public works. The town of Berwick has an ongoing plan for upgrading its stormwater facilities in an MS4 plan. Discussions held with the Water and Sewer districts did not yield any significant issues, expansions, or concerns with their infrastructure.

ID	Owner	Cond	comments
0		Fair	
1	MS4 active	Fair	
2	MS4 active	Fair	
3	MS4 active	Fair	
4	MS4 active	Fair	
5	MS4 active	Fair	
6	MS4 active	Fair	
7	MS4 active	Fair	
8	MS4 active	Fair	
9	MS4 active	Fair	
10	MS4 active	Fair	
11	MS4 active	Fair	
12	MS4 active	Fair	
13	MS4 active	Fair	
14	MS4 active	Fair	
15	MS4 active	Fair	
16	MS4 active	Fair	
17	MS4 active	Fair	
18	MS4 active	Fair	
19	MS4 active	Fair	
20	MS4 active	Fair	
56	MS4 active	Fair	2 feet toilet
57	MS4 active		
58	MemoDOT		
59	MS4 active		
62	MS4 active	Fair	
64	MS4 active	Fair	
66	MS4 active		
68	MS4 active		
69	Private		
70	Private		
79	MS4 active	Fair	
82	MS4 active		
83	MemoDOT		
84	MemoDOT		
85	MemoDOT		
86	MemoDOT		
87	MemoDOT		
89	MemoDOT		
90	MemoDOT		
91	MemoDOT		
92	MemoDOT		
93	MemoDOT		
94	MemoDOT		
106	MemoDOT		
119	MS4 active	Fair	
120	MS4 active	Fair	
143	Private		
144	MS4 active	Fair	
154	MS4 active	Fair	
155	MS4 active	Fair	
168	MS4 active	Fair	need to check pipes
169	MS4 active		
172	MS4 active		by preplanning and S glets catch b
173	MS4 active		preplanning S yard catch bag
174	MS4 active		
178	MemoDOT	Fair	
179	MemoDOT		
180	MemoDOT	Fair	
181	MemoDOT		cb is 6 ft ne of point

Berwick Utilities in Study Area

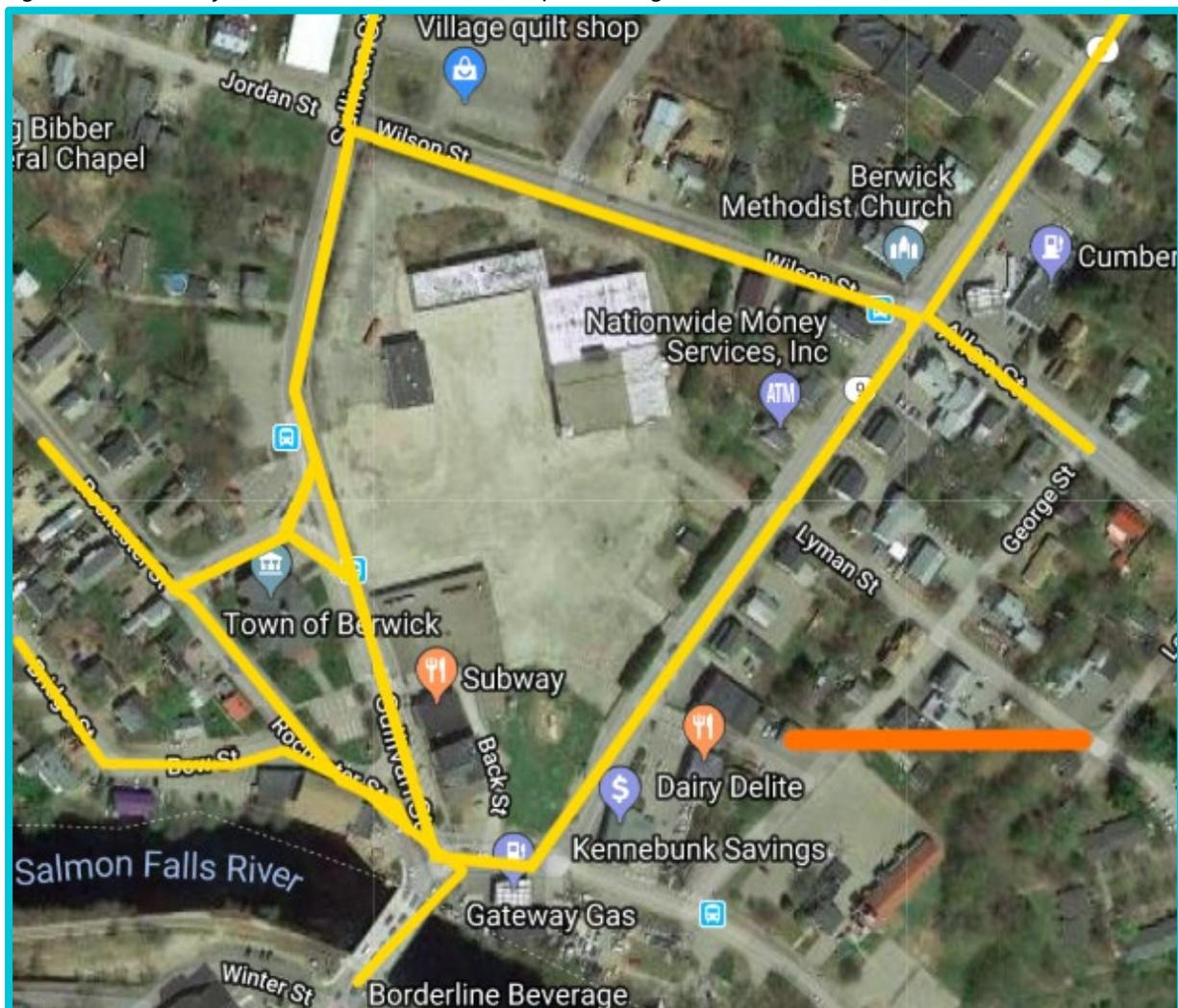


3.7 Bicycling

This report evaluates existing bicycling conditions on the streets surrounding the old tannery in the town of Berwick (see Figure 1). These conditions included both “shared lane” situations, as well as striped shoulder situations. No dedicated bicycle facilities currently exist in the study area.

The riding conditions along the roadways in the study area in Berwick, taken as a whole, were assessed as providing a D or “Moderately Low” Bicycle Level of Service (BLOS), based on a calculation which included road design, traffic volumes, conditions at the road’s edge, and an additional expert estimation value. The total score for the study area was on the low end of the Moderately-Low condition assessment, and even a small increase in traffic volume would likely move the conditions assessment into the Low category.

Figure 1. Streets in yellow are evaluated in this report, orange line indicates 400 feet



The streets evaluated in this report were:

- Allen Street
- Bow Street
- Bridge Street
- Eleanor's Street
- Market Street Bridge
- Rochester Street
- Saw Mill Hill Road
- School Street
- Sullivan Street
- Wilson Street

3.7.1 Method and Process

The assessment of bicycle conditions in this report is based upon field observations, MaineDOT data, and expert estimations of how serviceable conditions are for a typical "Interested but Concerned" rider.

The Reference Bicycle Rider

The *Interested but Concerned* bicycle rider is the "typical" reference standard informing this evaluation. This type of rider was first characterized in Roger Geller's now-famous bicycle rider typology, developed in Portland, Oregon in 2005.

Geller's typology breaks a community's population into four types of bicycle riders: *Strong and Fearless*; *Enthused and Confident*; *Interested but Concerned*; and *No How, No Way*. (see Figure 2). The Interested but Concerned Rider is the most common type of rider in the US, and may be assumed to constitute approximately 60% of the riders in any area.

Interested but Concerned riders have a desire to use bicycles more for recreation and transportation, but also have concerns about safety that prevents them from riding more often. This rider is generally not very comfortable on non-residential roadways without any bicycle facilities. Such a rider often has:

- limited bicycle handling skills and experience,
- limited experience and confidence with traffic situations,
- limited physical abilities, and
- a perception that they would ride more if they didn't have to share the road with motor vehicle traffic.

For this report, the category may also be assumed to include competent child riders over the age of 10 who may have good handling skills and physical abilities, but less traffic experience and judgment than adults.

If Complete Street principles are to be followed, bicycling conditions should be assessed, and new facilities designed, in terms of how this type of rider is served. As Geller notes in his paper,

"If cycling is to be universally adopted as a means of transportation, then the concerns of the majority must be addressed. In this typology, that majority is the 'interested but concerned.'"

THE 4 TYPES OF BICYCLISTS

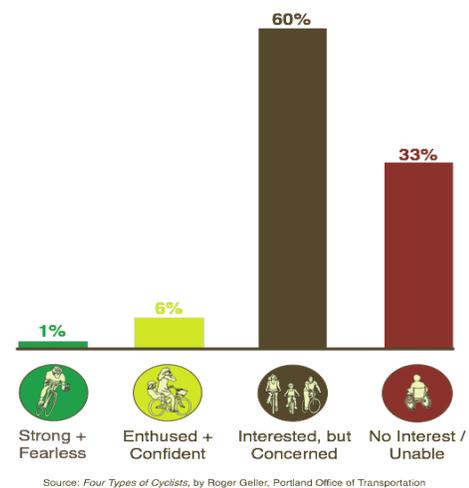


Figure 2: The Geller Typology of Bicycle Riders

Interested but Concerned riders are average people: parents, kids, seniors and other people who would be willing to ride more if the roadway conditions were more encouraging and safer. Such a rider is likely to be influenced by the presence (or absence) of bicycle facilities that provide guidance or separation from traffic. The *Interested but Concerned* rider is the type of rider whose experience should be considered when assessing--or designing--bicycle facilities. *Interested but Concerned* riders are the group this evaluation of Berwick conditions has in mind.

As might be expected, riders of the uppermost two categories of the Geller typology, *Strong and Fearless* and *Enthusied and Confident*, are more tolerant of Low BLOS conditions than the less skilled *Interested but Concerned* riders. But because strong and confident riders are the smallest segment of a community, they are not the group to guide assessment or design.

3.7.2 Objective Measures, Expert Estimation

During the Berwick study fieldwork conducted on October 10, 2018, the assessor rode a bicycle on all of the roads in the study area and performed measurements of lane and shoulder width. Additional observations on the presence of parking, pavement condition, and the complexity of the traffic situations were also collected at this time. The assessor also made some expert individual estimations about bicycle level of service for a typical *Interested but Concerned* bicycle rider.

Average Annual Daily Traffic (AADT) and speed limit data was obtained from the MaineDOT at the Public Map Viewer site:

<https://www.maine.gov/mdot/mapviewer>

In the assessment system used in this report, each road segment's conditions were assigned values for lane width, shoulder width, AADT, pavement condition, posted speed, presence of parking, and complexity of traffic situation. See Figure 3.

Figure 3 Conditions Scoring Matrix

Approx. Lane Width	Value	Shoulder Width	Value	AADT	Value	Pavement Condition	Value	Posted Speed	Value	Parking	Value	Road Complexity	Value	Expert Estimation	Value
14-15	3	≥6	4	≤2000	5	New	3	≤25	3	No	2	Simple	2	Extremely High	5
12 to 13	2	5	3	2000-3400	4	Good	2	30-35	2	Yes	0	Moderate	1	High	4
10 to 11	1	4	2	3500-4400	3	Fair	1	40-45	1			Complex	0	Mod. High	3
≤10	0	3	1	4500-6400	2	Poor	0	≥50	0					Mod Low	2
		0-2	0	6500-8400	1									Low	1
				8500+	0									Very low	0

The final value in the matrix, based on Bicycle Level of Service, permits an Expert Estimation input that accounts for the experience of the assessor and attempts to gauge other, less objective factors such as the comfort or stress an *Interested but Concerned* bicycle rider (described above) might experience.

The assigned values for each segment are summed and divided by 6 to generate a score for each street segment. The average score of all the road segments provides the total score for the study area.

The score each roadway segment received was based on these calculations; a roadway segment could receive any of the following assessments of its Bicycle Level of Service (BLOS).

Average Score	Grade	Description of BLOS
≥3.5	A	Extremely High
3.49-3.00	B	High
2.9-2.5	C	Moderately High
2.49-2.00	D	Moderately Low
1.9-1.5	E	Low
≤1.49	F	Extremely Low

3.7.3 A Proven Approach

This system, blending measurement, observation, MaineDOT data, and expert judgement was developed from two principal sources:

- the Bicycle Level of Service (BLOS) 2.0 model developed by Sprinkle Consulting in 2007 (http://nacto.org/docs/usdg/bicylce_level_of_service_model_sprinkle_consulting.pdf)
- an evaluation system used by Wilbur Smith to assess bicycle conditions on Mount Desert Island in 2002 (Wilbur Smith Associates with Coplon Associates, *Mount Desert Island Bikeway Plan Final Report*, 3/08/02).

The system used in this report has also yielded reliable results in Gorham Maine, as well as in multiple communities on over 100 roadway segments in Washington County, Maine during the development of the Bold Coast Bikeway in 2016-2017.

3.7.4 Overview of Study Area

The Sullivan, Wilson, School Street Trapezoid

The core of the study area is the rough trapezoid of streets around the old Prime Tanning Incorporated plant at the intersection of Maine Route 9 and the New Hampshire border at Salmon Farms River. Across the river is the NH town of Somersworth.

The trapezoid consists of Sullivan Street on the west, Wilson Street on the north, and School Street on the east. A small segment of Saw Mill Hill connects School and Sullivan Streets on the south. The study area also includes Eleanor Lane, short segments of Allen, Bow, and Rochester Streets, as well as the bridge over the Salmon Falls River.

The area is characterized in general by large expanses of asphalt without any bike specific markings or facilities. There are no dedicated bicycle facilities on any of the roads within the study area. The necessity of riding in a shared lane with moderately high traffic volumes make all roadways moderately uncomfortable for riders without considerable experience.

All streets are 2-way, except for Sullivan and Rochester, which are 1-way northbound and southbound, respectively, in the first 600 or so feet from the intersection with Saw Mill Hill Road and the bridge.

School Street has striped 9-foot shoulders that provide good bicycle access, but parking is permitted on the road, and these shoulders disappear as the road meets Saw Mill Hill Road. The Market Street Bridge has 4-foot shoulders that disappear at the intersection with Saw Mill Hill Road. Rochester Street has narrow, 2-foot shoulders. Allen Street has wide 11-foot shoulders that provide good bicycle conditions, but parking is permitted in the shoulders.

All other roads in the study area offer only shared lanes for bicycle access without a painted shoulder stripe or fog line.

The average grade for the Bicycle Level of Service (BLOS) for the study area is a D, Moderately-Low, rating. It is generally neither an inviting nor supportive context for bicycle riding.

Berwick Study Area Bicycle Level of Service Map



Street by Street Assessment

Allen Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Allen Street	Busy connector /residential street, large shoulders, parking permitted.	10.5	11	4343	Good	30	East bound yes; west bound no	Simple	C Moderately High

Bow Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Bow Street	Short, quiet connector street, not aesthetically pleasant to ride on	15	0	449 Est.	Fair	25	Yes	Moderate/simple	C Moderately High

Bridge Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Bridge Street	Quiet residential street, moderately high BLOS conditions	11	0	450	Fair	25	Yes	Simple	C Moderately High

Eleanor's Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Eleanor Street	Short, busy connector street, not pleasant	16	0	5865	good	25	Yes	Moderate-single lane becomes two	D Moderately Low

Market Street Bridge

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Market Street Bridge	Busy bridge, approaches are not bike friendly--shared lanes, high volume	12	4, tapers to less than 2 ft on Maine side	15499	New	25	No	Moderate due to approaches	D Moderately Low

Rochester Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Rochester Street--1-way segment	Basically, an oversized slip lane, unpleasant for bicycling	15	0	5878	Fair	25	No	complex	E Low
Rochester Street--2-way section	Busy residential street, narrow shoulder has a lip in it	13	0	5878	Fair/good	25	No	simple	C Moderately High

Saw Mill Hill Road

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Saw Mill Hill	Nightmarish expanse of traffic-filled asphalt moving chaotically	18/12/12	Less than 2	9786	Good	25	No	complex	E Low

School Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
School Street	Wide, busy road with good shoulders that end at Saw Mill Road.	11.5	9	7450	Good	30/25	Yes	Moderate	D Moderately Low

Sullivan Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Sullivan Street (Saw Mill to just beyond Rochester)	Busy wide 1-way, confusing as to whether it is one lane or two, somewhat confusing context, urban, unpleasant, angled in parking	15+	0	5826	Good		Yes, front angled	Complex	E Low
Sullivan Street (to Eleanor)	Busy wide 1-way, confusing as to whether it is one lane or two, somewhat confusing context with 1-way turning to 2-way, urban, unpleasant riding, parallel parking	20.5,	0	5393	Good	25	Yes, parallel	Moderate	E Low
Sullivan Street (to Rollins)	Busy 2-way residential street, moderately high conditions	15/13	0	6237	Good	25	Yes	Simple	C Moderately High

Wilson Street

Street Name	Description	Lane Width	Shoulder Width	AADT	Pavement	Posted Speed	Parking	Road Complexity	BLOS Grade
Wilson Street (to George St)	Busy 2-way connector/residential street, decently wide lanes, moderately high BLOS	12.5	0	3525	Good	25	Yes	Simple	C Moderately High

3.8 Traffic Modeling

In order to determine existing traffic delays in the downtown Berwick area, a traffic model utilizing *Synchro* and *SimTraffic* software was created. The traffic volumes utilized were taken from the 2015 report by VHB, *Berwick Traffic Circulation and Parking*. To calibrate the model from model year 2015 to 2018, the traffic volumes were increased to match expected traffic growth recommended by MaineDOT. The MaineDOT area transportation models advise an increase of 0.5% traffic volume growth per year, which in our case would be an increase of 1.5% total.

For the two signalized intersections in the study area, School Street at Wilson Street and Sullivan Street at Market Street, the signal timing data was collected on September 14th, 2018 which was programmed into the traffic model. The projected 2018 volumes are shown in the graphic below for the AM and PM peak hours.



Study area AM Traffic Volumes brought to 2018



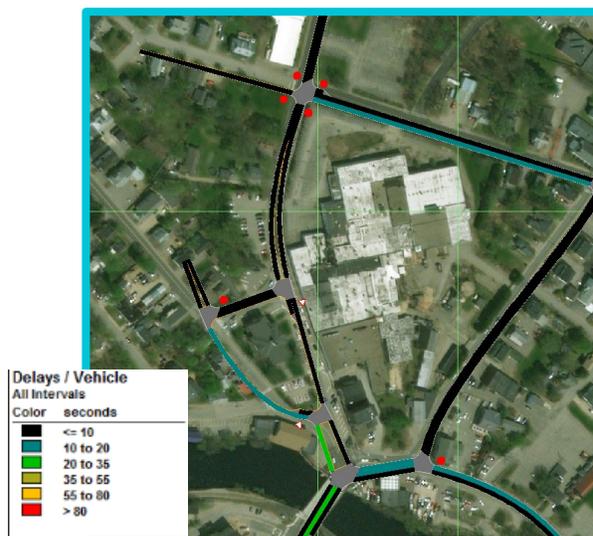
Study area PM Traffic Volumes brought to 2018

The micro-simulation software model was then used to determine existing traffic delays. The resulting modeled traffic delay, shown below in table form, was minimal. Observations during site visits to the study area confirmed the apparent delays. While there was a clear difference in vehicle delay and queuing during peak hour traffic times in the AM and PM, the intersections were able to process vehicles smoothly at both the signalized and unsignalized intersections.

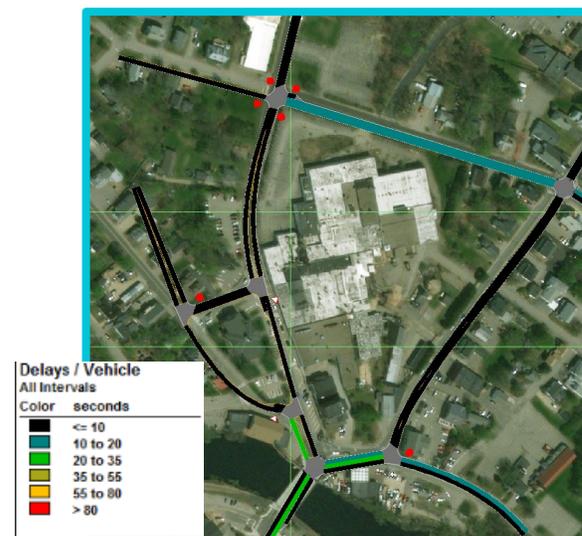
The table below displays a traffic analysis of the existing traffic delay for certain major intersections in the study area:

Predevelopment AM		
Intersection	Overall Delay (s)	LOS
Market/Sullivan/Saw Mill Hill	18.6	B
School/Wilson/Allen	9.7	A
Sullivan/Wilson/Jordan	6.8	A
School/Saw Mill Hill	3.1	A

Predevelopment PM		
Intersection	Overall Delay (s)	LOS
Market/Sullivan/Saw Mill Hill	18.8	B
School/Wilson/Allen	12.3	B
Sullivan/Wilson/Jordan	8.7	A
School/Saw Mill Hill	2.1	A



Study area existing AM vehicle delay



Study area existing PM vehicle delay

While some intersection approaches may individually have higher delay with queuing, mostly due to peak hour commuter traffic volumes, the overall delay for the intersections is quite low. The lower existing delay will allow for future concept plans, which may necessitate an increase in vehicular delays in order to balance the road and intersection needs of non-vehicular transportation system users, such as pedestrians and bicycles. The proposed concepts will take into consideration the increasing system-wide vehicular volumes in the future.

4.0 CONCEPT ALTERNATIVES

Three concept alternatives were created by the Milone & MacBroom team for the Downtown Berwick Study. These recommendations were formed using both the original purpose and need statement, and in response to meetings with stakeholder groups, area businesses, community forums, and online surveys with the general public. A fourth alternative, No-Build, where no improvements were made to the area while background growth continued was also considered in the analysis. Improvements were proposed for the entire study area, but the differences between the alternatives are only found in the area in the vicinity around the Berwick Town Hall.

Of the recommendations that are shared among all alternatives (except the no-build alternative), converting Eleanor Street to a 2-way traffic street will provide two distinct advantages for the area. The first advantage will be the ability to move the east-west through traffic further from the downtown. The second advantage will accommodate a future driveway to the central development property.

Other recommendations used for all concepts include filling the missing gaps in sidewalks (sidewalks on both sides of the road are recommended for almost all streets in the study area), changing Sullivan Street between Eleanor Street and Rochester Street to 2-way traffic, reducing westbound lanes on Saw Mill Hill at the signalized intersection to one lane, and reconfiguring the intersection of Saw Mill Hill with School Street to a more formal "T" intersection. This last recommendation will reduce the confusion that is currently occurring at the School Street/Saw Mill Hill intersection, will allow more efficient through movement of vehicles, and reduce the distance for pedestrians who need to cross the street.

The streetscape design is intended to match the look of Somersworth, with concrete sidewalks and street trees. The following are further descriptions of the three concepts, as well as line drawings of their distinctive differences.



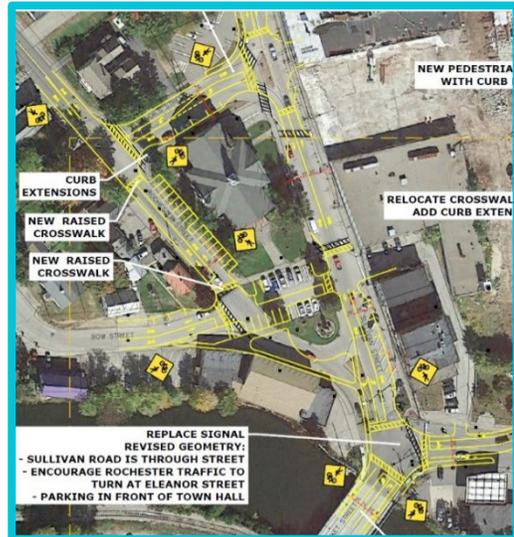
Berwick Sub-Area, where the majority of substantial concept alternatives differ.

4.1 Concept Alternatives

Concept 1 – Pedestrian Center – Rochester Street is converted from a through-street for the downtown into a stop-controlled intersection at Bow Street. This subset of the intersections features narrower streets with raised crosswalks. The area would be focused more on pedestrian movements with wide sidewalks and plaza areas. The assumption would be that a majority of traffic would use Eleanor Street, now converted to 2-way traffic, on to Sullivan Street. It is assumed that traffic will be discouraged from using Rochester Street from Eleanor Street to Sullivan Street due to the traffic calming measures. Additional parking would be provided on the streets around the town office.



Concept 2 – Rochester Street (1) – Instead of both Sullivan Street and Rochester Street converging as separate streets into the signalized intersection with Saw Mill Hill, Rochester Street becomes the only southbound approach. Sullivan Street abuts into Rochester Street southeast of Bow Street, and left turns are prohibited from Rochester Street to Sullivan Street. The area above Saw Mill Hill, currently open space and an off-street parking lot, will be converted to additional off-street parking with a driveway entrance opposite of the new intersection with Saw Mill Hill. It is assumed that traffic will shift away from Sullivan Street and onto Rochester Street in the area.



Concept 3 – Rochester Street (2) – Similar to Concept 2, Concept 3 differs in that it allows left turns from Rochester Street to Sullivan Street at their intersection above the signalized intersection of Sullivan Street with Saw Mill Hill, but does not add certain on-street and off-street parking for the downtown.



4.2 Traffic Analysis Results

Analysis for the future scenario alternatives, in what will be called post-development (meaning after proposed street network changes are made), was performed on each concept using *Synchro* and *SimTraffic* traffic modeling software in both the AM and PM peak hours. Traffic delay for the intersections are summarized using two metrics; overall delay to the intersection measured in seconds, and the corresponding Level-of-Service (LOS) represented as letter grades from A to F. Also represented graphically are the LOS grades for each approach. The complete report analysis is included in the Appendix.

Level of Service (LOS)	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10-20 sec	10-15 sec
C	20-35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	≥80 sec	≥50 sec

Delays / Vehicle All Intervals

Color seconds



≤ 10



10 to 20



20 to 35



35 to 55



55 to 80



> 80

4.2.1 Concept 1

For this scenario, Concept 1 was implemented, and all volumes were increased by 10%, which is MaineDOT’s projection for the 20-year increase for design traffic volumes. Traffic signal timing was optimized at both signalized intersections. It was assumed that a certain portion of the traffic would use the new city street section that is bisected by Bow Street. Through traffic was diverted away from Rochester Street to model driver’s reaction to the traffic calming modifications for the area. Modeling shows that there may be an increase of delay to vehicles from Market Street to Sullivan Street in the AM and PM, and additional delay to Saw Mill Hill on to School Street in the PM due to the elimination of a lane westbound at the Sullivan Street/Market Street signalized intersection.

Future AM – Concept 1		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	21.0	C
School/Wilson/Allen	11.2	B
Sullivan/Wilson/Jordan*	7.3	A
School/Saw Mill Hill*	5.5	A
Rochester/Bow*	4.6	A

*Unsignalized

Future PM – Concept 1		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	27.9	C
School/Wilson/Allen	12.6	B
Sullivan/Wilson/Jordan*	10.0	B
School/Saw Mill Hill*	5.3	A
Rochester/Bow*	3.7	A

*Unsignalized



Concept 1 – Future AM



Concept 1 – Future PM

4.2.2 Concept 2

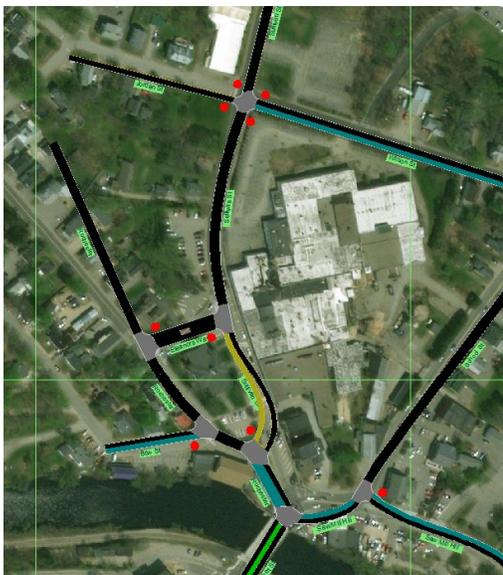
For this scenario, Concept 2 was implemented, and all traffic volumes were increased by 10%, which is MaineDOT's projection for the 20-year increase for design traffic volumes. Traffic signal timing was optimized at both signalized intersections. It was assumed that drivers would favor using Rochester Street over Sullivan Street in the modeling that sets Rochester Street as the through street and adds traffic calming measures on Sullivan Street. Modeling shows that there may be some amount of delay for Sullivan Street traffic on to Rochester Street in the AM. The delay may be reduced as drivers divert to Rochester Street via Eleanor Street, moving and averaging the delay between the approaches.

Future AM – Concept 2		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	17.3	B
School/Wilson/Allen	11.2	B
Sullivan/Wilson/Jordan*	7.2	A
School/Saw Mill Hill*	4.7	A
Rochester/Sullivan*	9.6	A

*Unsignalized

Future PM – Concept 2		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	20.2	C
School/Wilson/Allen	14.3	B
Sullivan/Wilson/Jordan*	9.4	A
School/Saw Mill Hill*	4.1	A
Rochester/Sullivan*	4.2	A

*Unsignalized



Concept 2 – Future AM



Concept 2 – Future PM

4.2.3 Concept 3

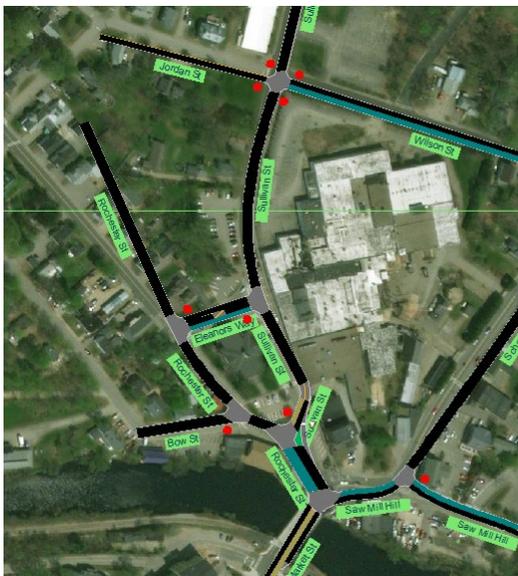
For this scenario, Concept 3 was implemented, and all volumes were increased by 10%, which is MaineDOT’s projection for the 20-year increase for design traffic volumes. Traffic signal timing was optimized at both signalized intersections. It was assumed that drivers would favor using Rochester Street over Sullivan Street in the modeling because of the design, which sets Rochester Street as the through street and adds traffic calming measures on Sullivan Street. Modeling shows that there may be an increase of delay to vehicles from Market Street to Sullivan Street in the AM.

Future AM – Concept 3		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	17.5	B
School/Wilson/Allen	11.2	B
Sullivan/Wilson/Jordan*	7.2	A
School/Saw Mill Hill*	3.7	A
Rochester/Sullivan	7.3	A

*Unsignalized

Future PM – Concept 3		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	20.0	C
School/Wilson/Allen	13.5	B
Sullivan/Wilson/Jordan*	9.4	A
School/Saw Mill Hill*	8.1	A
Rochester/Sullivan	3.0	A

*Unsignalized



Concept 3 – Future AM



Concept 3 – Future PM

4.2.4 No Build

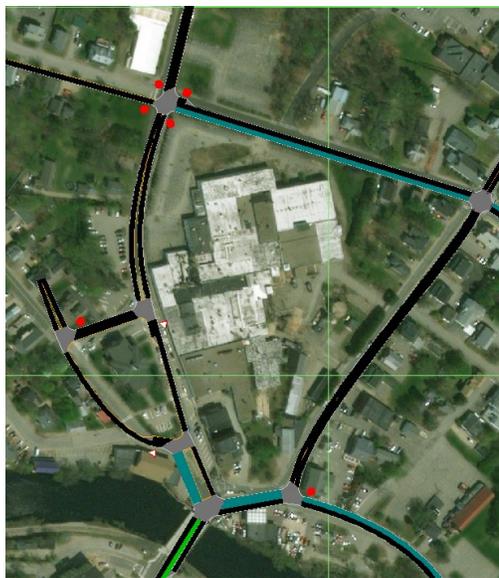
For this scenario, *no changes* were made to the street network, and all volumes were increased by 10%, which is MaineDOT’s projection for the 20-year increase for design traffic volumes. Traffic signal timing was optimized at both signalized intersections. Modeling shows that there may be an increase of delay to vehicles from Market Street to Sullivan Street in the AM.

Future AM – No Build		
Intersection	Overall Delay (s)	LOS
Market/Sullivan/Saw Mill Hill	18.8	B
School/Wilson/Allen	10.5	B
Sullivan/Wilson/Jordan*	7.2	A
School/Saw Mill Hill*	5.6	A

*Unsignalized

Future PM – No Build		
Intersection	Overall Delay (s)	LOS
Market/Sullivan/Saw Mill Hill	23.4	C
School/Wilson/Allen	14.3	B
Sullivan/Wilson/Jordan*	9.8	A
School/Saw Mill Hill*	3.0	A

*Unsignalized



No Build – Future AM



No Build – Future PM

4.2.5 Concept 1A

For this scenario all volumes were increased by 10%, which is MaineDOT’s projection for the 20-year increase for design traffic volumes. Traffic signal timing and phasing was optimized at both signalized intersections. In addition to the changes proposed in Concept 1, this scenario removes access via the ‘Bow Street Extension’ and diverts all through traffic vehicles to Sullivan Street via Eleanor’s Street.

Future AM – Concept 1A		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	11.6	B
School/Wilson/Allen	11.0	B
Sullivan/Wilson/Jordan*	7.2	A
School/Saw Mill Hill*	2.7	A
Sullivan/Eleanor	5.3	A

*Unsignalized

Future PM – Concept 1A		
Intersection	Overall Delay (s)	LOS
Market/Rochester/Saw Mill Hill	15.5	B
School/Wilson/Allen	13.6	B
Sullivan/Wilson/Jordan*	10.3	B
School/Saw Mill Hill*	3.3	A
Sullivan/Eleanor	5.0	A

*Unsignalized



Concept 1A – Future AM



Concept 1A – Future PM

4.3 Summary

After meeting with the town and stakeholder group, comments were received on the proposed design alternatives. Concepts 2 and 3 were rejected and unanimous support was given to Concept 1. Some members wanted to additionally preserve the central portion of the downtown area—the area near the town hall and Civil War monument. Three additional concepts were then provided to the town. These three designs were to include cutting off the parking access from Sullivan Street, or cutting off parking access from Rochester Street, or eliminating the on-street parking entirely in favor of an expanded park area. For all scenarios the traffic modeling would remain the same with all traffic being routed to Sullivan Street as opposed to the previous Concept 1 which allowed some amount of traffic to filter through the area.

The Concept 1A traffic model appears to function well with the projected 20-year horizon of a 10% increase in traffic volume. Study goals favored slowing traffic down and allowing additional area vehicle delay (in favor of increased safety), mainly due to the general perception that there is little existing delay. Peak hour delays for certain approaches may be increased in the concept scenarios, but they are not seen as major increases over the no-build scenario.

Later discussions with town staff in public safety and public works departments brought up concerns over certain access and maintenance issues associated with Concept Alternative 1A, namely that the increased radiuses for the curb extensions and the narrower roads may increase the time of emergency response and snow removal. MMI reminded the town staff that the proposals and recommendations of Concept Alternative 1A were not a design and were for planning purposes only. When a project is moved forward in the future a stricter design process will be followed, which may include features such as mountable curbs. MMI reminded the town that the design elements were originated from the original purpose and need statement and comments received from the public and the committee formed by the town. It is important for the town to consider that a plan should be put in place in advance of development of the Prime Tanning parcel, or the development may dictate the downtown palette.

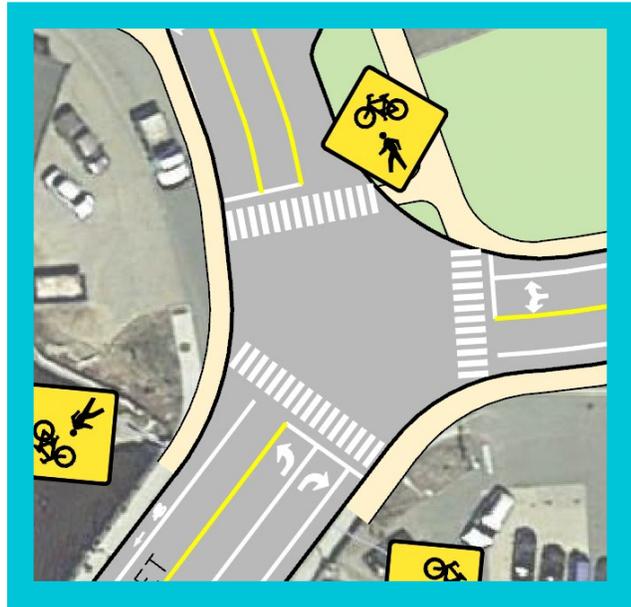


5.0 RECOMMENDATIONS – CONCEPT ALTERNATIVE 1A

5.1.1 Intersections:

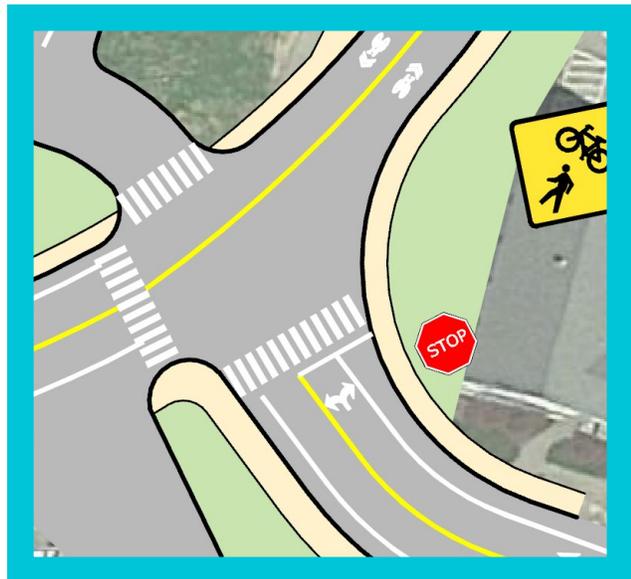
Rochester Street/Saw Mill Hill/Sullivan Street

Improvements include a removal of the westbound right turn lane, which then converts the existing left turn lane into a left and right turn lane. The extra space taken from the right turn lane will allow additional greenspace at the intersection. A crosswalk is added to the northside of the intersection across Sullivan Street. A diagonal parking space closest to the intersection is removed on Sullivan Street to allow safer backouts for vehicles. The approach lanes have been narrowed to discourage higher vehicle speeds. Bicycle lanes have been continued from Somersworth. ADA improvements would be made where necessary.



Saw Mill Hill/School Street

Improvements include a total geometric reconfiguration of the intersection. Saw Mill Hill is brought to a "T" at the intersection with School Street. This will allow a safer crossing with vehicles approaching School Street at 90 degrees. The crosswalks will all be a shorter crossing distance. Bicycle lanes from Somersworth terminate at this intersection where shared lane markings begin. The approach lanes have been narrowed to discourage higher vehicle speeds. Back Street, with additional parking, has been moved to be opposite of Saw Mill Hill for safety. ADA improvements would be made where necessary.



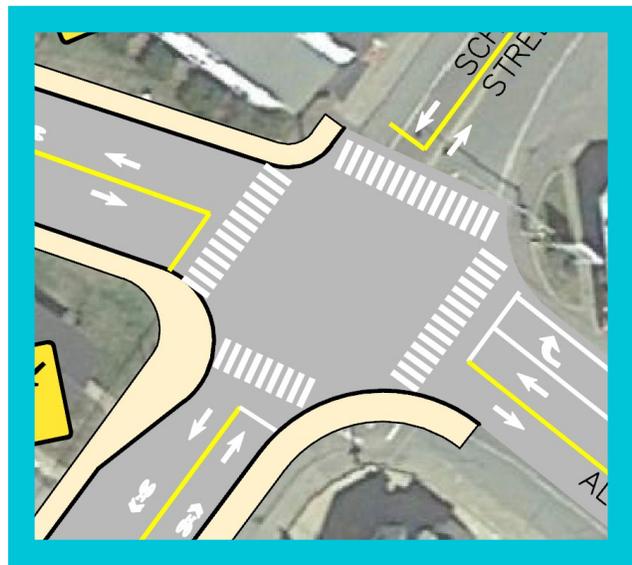
School Street/Lyman Street

Improvements include a new crosswalk and curb extensions (aka pedestrian bump-outs), to decrease the crossing distance on School Street. The intersection has been reconfigured to provide access to a future internal road on the former Prime Tanning parcel. Parking spaces are eliminated in the immediate vicinity to further increase the sight distance for pedestrians. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



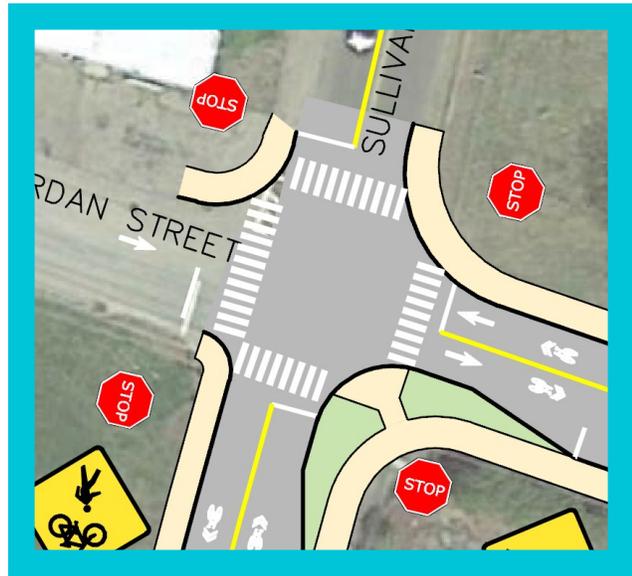
School Street/Wilson Street Allen Street (MaineDOT designated High Crash Location)

Improvements include the replacement of the traffic signal hardware. The traffic controller and other traffic signal equipment is old and does not run optimally. Other improvements include curb extensions to reduce pedestrian crossing distances for safety. Due to the intersection being designated a High Crash Location from MaineDOT, additional safety improvements should be considered. For bicycles, shared lane markings have been added. ADA improvements would be made where necessary.



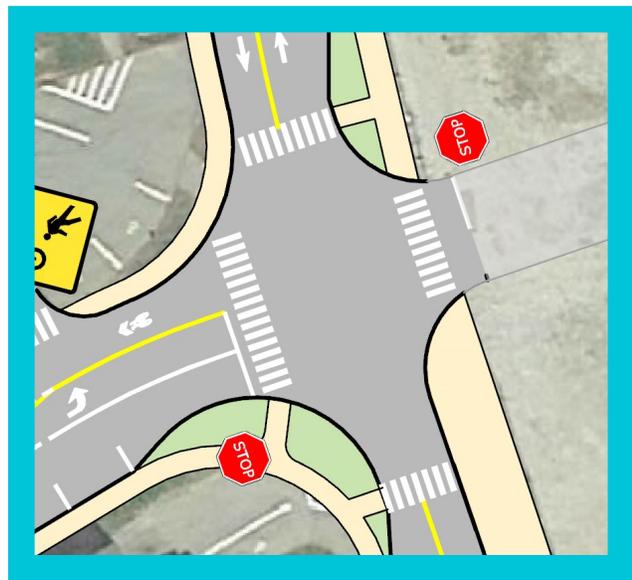
Wilson Street/ Sullivan Street/Jordan Street

Improvements include adding curb extensions to reduce the crossing distance for pedestrians to improve safety. Also proposed is a landing area for pedestrian crossing to and from the northwest corner of the intersection which is currently at grade with the road. Sidewalks would be continued through the area. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



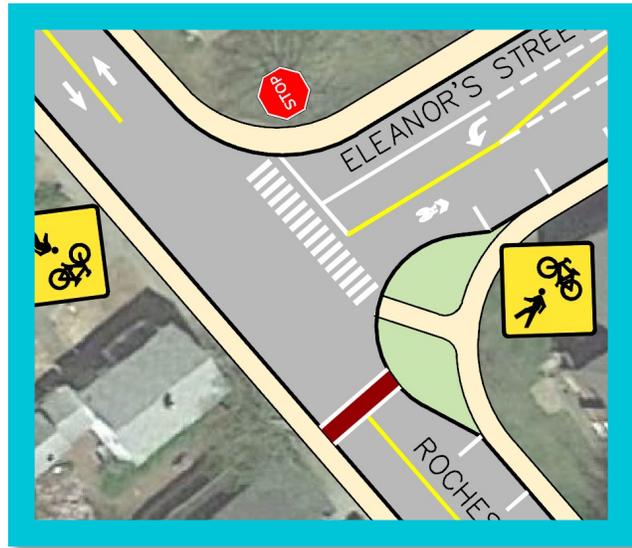
Sullivan Street/Eleanor's Street

Improvements include a new crosswalk and curb extensions. The intersection has been reconfigured to provide access to a future internal road on the former Prime Tanning parcel. Parking spaces are eliminated in the immediate vicinity to further increase the sight distance for pedestrians. The intersection now allows for 2-way vehicle travel on both Eleanor Street and Sullivan Street below Eleanor Street. A handicapped accessible parking spot has been designated for the nearest on-street parking stall. This intersection may be signalized with any significant development in the former Prime Tanning parcel. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



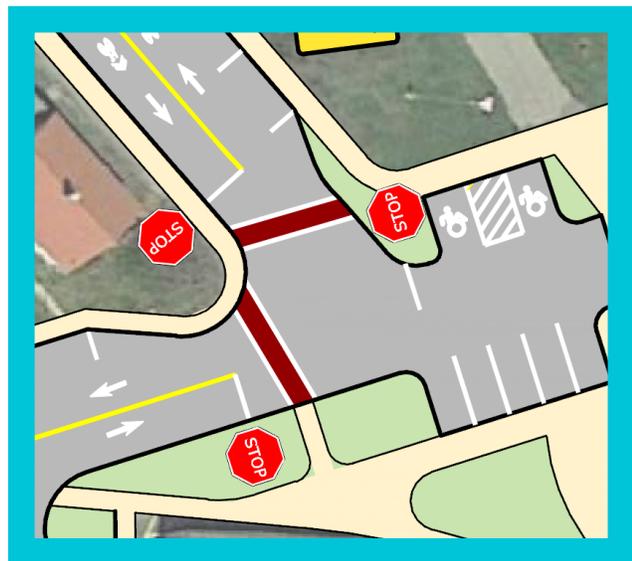
Rochester Street/Eleanor's Street

Improvements include curb extensions and a raised crosswalk. The raised crosswalk should discourage higher vehicle speeds. Vehicle travel is now 2-way on both Eleanor's Street and Rochester Street below Eleanor's Street. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



Rochester Street/Bow Street

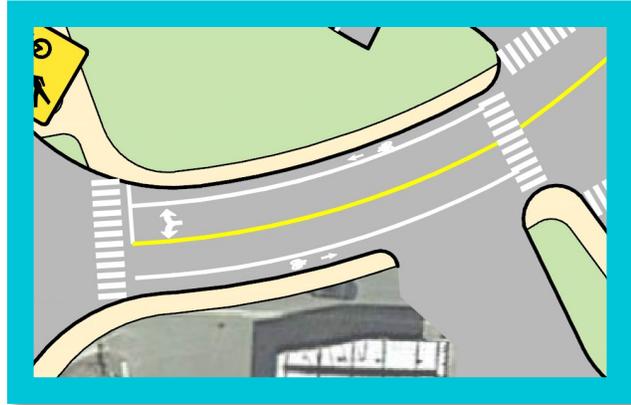
Improvements include curb extensions and a raised crosswalk. The raised crosswalk for the Bow Street and Rochester Street approaches should discourage higher vehicle speeds. Access to the parking lot is now made from Rochester Street instead of Sullivan Street. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



5.1.2 Roadway Sections:

Saw Mill Hill – Sullivan Street to School Street

Improvements include the removal of the westbound right turn lane, which will allow for additional greenspace, a bike lane, and pedestrian amenities without adding significant vehicle delay. The lanes are marked at 11-feet wide which should discourage higher vehicle speeds. The road has been realigned to the north to be consistent with the proposed improvements at the School Street/Saw Mill Hill intersection. ADA improvements would be made where necessary.



School Street – Saw Mill Hill to Lyman Street

Improvements include narrowing of the lanes to 11 feet and delineating the parking on the west side of the road. Gaps in the sidewalk are filled. A crosswalk with a rectangular-rapid-flashing-beacon (RRFB) is proposed at Bernier Street. For bicycles, shared lane markings have been added. While not in the proposed improvements, MMI has identified areas near the bank and fire station where curb cuts could be eliminated to increase safety for all users. Removing access at the fire station would be contingent on whether the department was moved to a new location. ADA improvements would be made where necessary.



School Street – Lyman Street to Wilson Street

Improvements include narrowing of the lanes to 11 feet and delineating the parking on the west side of the road. Gaps in the sidewalk are filled on the northeast side of the section. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



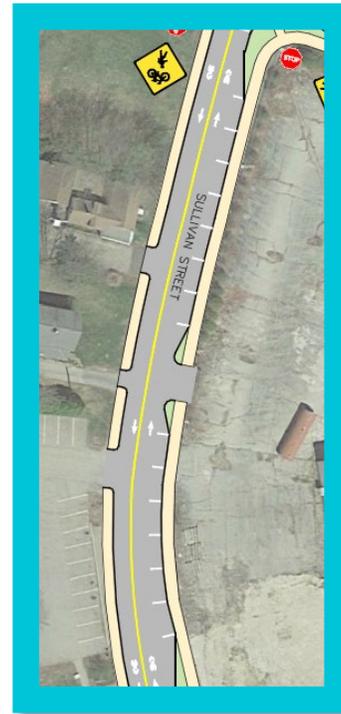
Wilson Street – Sullivan Street to School Street

Improvements include narrowing of the lanes to 11 feet and delineating the parking on each side of the road. A crosswalk with a rectangular-rapid-flashing-beacon (RRFB) is proposed at the driveway to the Police Station. Curb extensions were also added at the crosswalk to reduce pedestrian walking distances. Shared lane markings have been added for bicycles. ADA improvements would be made where necessary.



Sullivan Street – Wilson Street to Eleanor’s Street

Improvements include narrowing of the lanes to 11 feet and delineating the parking on the east side of the road. Gaps in the sidewalk are filled on the west side of this section. For bicycles, shared lane markings have been added. Curb extensions have been added at the driveway to the central parcel. ADA improvements would be made where necessary.



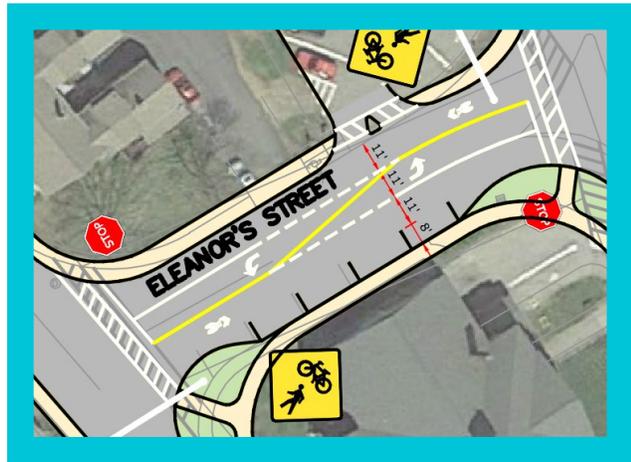
Sullivan Street – Market Street to Eleanor’s Street

Improvements include narrowing of the lanes to 11 feet and curb extensions at Back Street, to reduce the distance of pedestrians crossing the street. Two-way parking has been reintroduced. Diagonal parking has been retained near Saw Mill Hill. This was not the MMI’s first choice, which preferred parallel parking and the addition of a much wider sidewalk. For bicycles, shared lane markings have been added. ADA improvements would be made where necessary.



Eleanor's Street – Rochester Street to Sullivan Street

Improvements include narrowing of the lanes to 11 feet and allowing 2-way traffic. Left turn lanes have been added to facilitate vehicle movements for the increase in traffic from the termination of Rochester Street. For bicycles, shared lane markings have been added. ADA improvements would be made where necessary.



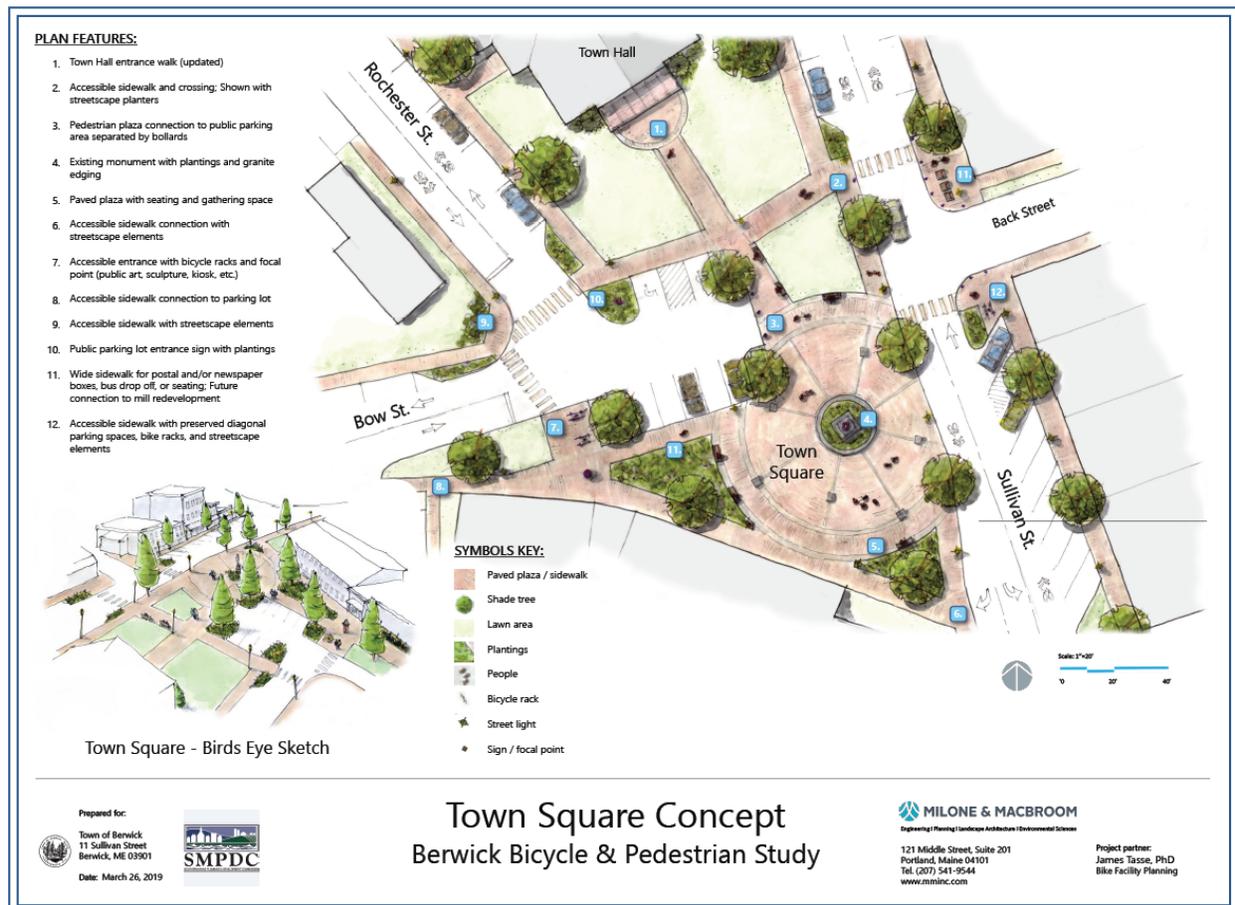
Rochester Street – Eleanor's Street to Bow Street

Improvements include narrowing of the lanes to 12 feet and allowing 2-way traffic. Rochester Street is essentially dead-ended at Bow Street, forcing through traffic to turn on to Eleanor's Street. Parallel parking spaces have been added to the east side of the road, but MMI created these as an offset to parking spaces lost elsewhere in the vicinity. The preference would be to eliminate the parking, add narrow shoulders, and increase the size of the sidewalk. For bicycles, shared lane markings have been added. ADA improvements would be made where necessary.



Pedestrian Plaza

A pedestrian plaza is proposed for the area surrounding the Civil War monument south of the Berwick Town Hall. The area would be a mix of pavers, grass, and hardscaping. Trees would also be added in certain locations. The Parking lot has been retained, but MMI left this as an offset to parking spaces lost elsewhere in the vicinity. The preference would be to eliminate the parking, and increase the plaza area for continuity, preserving a space in the downtown free from vehicle conflicts and allowing town community events.



Concept Alternatives 1B and 1C

In addition to concept alternative 1A, alternatives 1B and 1C were created to give options to the design of the pedestrian plaza. The Option 1B layout features a total removal of parking from the pedestrian plaza area. This layout was most favored by MMI. The Option 1C layout features the original parking lot with access from Sullivan Street. This layout was not recommended by MMI.

5.2 Planning Level Cost Estimates – Concept 1A

Planning level cost estimates were created for Concept Alternative 1A. A planning level cost estimate is differentiated from cost estimated derived from a design concept in that the numbers are known to be a much less exact estimate. The estimate is based on the recommendations of the study and are enumerated from MaineDOT published average quantity rates. Other portions of the cost estimate, such as landscaping costs, are based on assumed levels and are merely placeholders waiting for the final design.

The cost estimate was further divided into phases. The phases were arranged to allot all the projects proposed from the recommendations into manageable portions, in both a financial sense and construction scheduling for the area. Additionally, there are certain unknowns for the cost estimates that cannot be taken into account until the project is brought forward to design with survey and preliminary design beyond the concept phase. MMI's cost estimate is factoring an increase into the estimated project costs with a contingency for both the unknown components and the increase in construction costs of a project that will not be put out to bid for several years.

Listed below are the cost estimates for the project by location and as grouped together for the phasing of the projects.



Proposed Phases of Construction

Cost Estimate and Phasing of Alternative 1A

Phase 1	
Sullivan at Wilson/Jordan	\$ 276,000
Wilson Street	\$ 669,000
School at Wilson/Allen	\$ 46,500
<i>Design and Inspection</i>	\$ 247,875
Total	\$ 1,239,375

Phase 2	
School at Saw Mill Hill	\$ 94,500
School Street - Wilson to Saw Mill Hill	\$ 693,000
<i>Design and Inspection</i>	\$ 196,875
Total	\$ 984,375

Phase 3	
Sullivan at Saw Mill Hill/Market	\$ 289,500
School Street - Saw Mill Hill to Sullivan	\$ 239,000
<i>Design and Inspection</i>	\$ 132,125
Total	\$ 660,625

Phase 4	
Sullivan at Eleanor	\$ 31,500
Rochester at Eleanor	\$ 19,500
Rochester at Bow	\$ 26,000
Sullivan - Saw Mill Hill to Eleanor	\$ 116,000
Eleanor Street	\$ 72,000
Rochester Street	\$ 129,000
Bow Street	\$ 93,000
Pedestrian Plaza	\$ 310,000
Sullivan - Eleanor to Wilson	\$ 209,000
<i>Design and Inspection</i>	\$ 251,500
Total	\$ 1,257,500

Grand Total

\$ 4,141,875

6.0 APPENDICES

- A. Meeting Notes
- B. Traffic Modeling
- C. Crash History
- D. Bicycle Recommendations Report
- E. Concept Alternative 1, 2, 3
- F. Concept Alternatives 1A, 1B, 1C

A. Meeting Notes

B. Traffic Modeling

C. Crash History

D. Bicycle Recommendations Report

E. Concept Alternatives 1, 2, 3

F. Concept Alternatives 1A, 2A, 3A