

Strafford Metropolitan Planning Organization Joint Meeting of the Technical Advisory & Policy Committee

Friday November 4, 2022 from 9:00am - 10:30am

Location: Conference Rm 1A, SRPC Office (Remote access via Zoom)

In accordance with RSA 91:A, the Commission requires a minimum of an in-person quorum. To organize this, the Commission staff will confirm the necessary in-person attendance. It is the preference of the Commission that others participate via Zoom, however, guests may attend the meeting at the SRPC Office. All participants, both in-person and virtual, can communicate contemporaneously. View the remote access information below.

Meeting Link:

<https://us02web.zoom.us/j/83483049101?pwd=RW9oK2xQRzJDdkdoYTVzVzZGNDNhZz09>

Meeting ID: 834 8304 9101

Telephone-only Access: +1 646 558 8656

These instructions have also been provided at www.trafford.org. If anybody is unable to access the

Agenda Item	Time	Pre-Meeting Task/Notes
Introductions	5 mins	
Convene Technical Advisory Committee		
Review designs and cost estimates for candidate projects and discuss project ranking. Action required: recommend a ranked order of candidate projects to Policy	45 mins	<ul style="list-style-type: none"> Review project design and cost estimate materials Project list must fit within regional allocation of \$5.8 million (plus one or two contingency projects)
Convene Policy Committee		
Review and discuss project list recommended by TAC Action required: vote on ranked order of projects recommended by TAC	20 mins	
Other Business	5 mins	
Citizen's Forum Adjourn		

Reasonable accommodations for people with disabilities are available upon request. Include a detailed description of the accommodation you will need along with your contact info. Please make your request as early as possible; allowing at least 5 days advance notice. Last minute requests will be accepted but may be impossible to fill. Please call (603) 994-3500 or email srpc@trafford.org.



RULES OF PROCEDURE

*Strafford Regional Planning Commission
Strafford Metropolitan Planning Organization, and
Strafford Economic Development District*

Meeting Etiquette

Be present at the scheduled start of the meeting.

Be respectful of the views of others.

Ensure that only one person talks at a time. Raising your hand to be recognized by the chair or facilitator is good practice.

Do not interrupt others or start talking before someone finishes.

Do not engage in cross talk.

Avoid individual discussions in small groups during the meeting. When one person speaks, others should listen.

Active participation is encouraged from all members.

When speaking, participants should adhere to topics of discussion directly related to agenda items.

When speaking, individuals should be brief and concise when speaking.

The Strafford Regional Planning Commission & Metropolitan Planning Organization holds both public meetings and public hearings.

For public meetings, guests are welcome to observe, but should follow proper meeting etiquette allowing the meeting to proceed uninterrupted. Members of the public who wish to be involved and heard should use venues such as Citizen Forum, Public Hearings, Public Comment Periods, outreach events, seminars, workshops, listening sessions, etc.



Somersworth priority project

SRPC Project Number: L16002

Location: Main St from John Parson's Drive to Indigo Hill Rd
From 43.262092, -70.863161 to 43.252538, -70.858395

[Google Maps Link](#)

Infrastructure Conditions

conditions on route are fair to poor ([LINK](#))

Traffic volumes

Main St volume in 2021: 2,938

Demographic Information

Go to the SRPC Data snapshot [HERE](#). Pages 16, 17, 25, 31, 32, 44, and 45

Scope: Project involves the replacement water and sewer lines, storm drainage improvements, new sidewalks, bike lanes and new surface pavement on Main Street from Indigo Hill Road to John Parsons Drive.

Purpose: The purpose of this project is to support increased non-motorized activity by addressing safety issues resulting from unsafe vehicle speeds and inadequate protections for pedestrians on Main Street. Improvements will result in reducing or eliminating water or sewer line breaks, improved access for all transportation modes, and address stormwater treatment and flow issues. This project is part of ongoing redevelopment efforts within the downtown.

Need: As part of the City of Somersworth's on-going efforts to revitalize and improve its historic downtown area, the City is underway reconstructing roadways for Main Street. This project will address the City's aging roadway, water, sewer, and stormwater infrastructure. Considering the age and condition of the other municipal infrastructure, the roadway surfaces and adjacent properties along the project corridors, we believe a full replacement of the water, sewer and stormwater system within the project area is needed. As part of the project, an overall assessment of the drainage system components will be conducted. System components will be reviewed for ability to perform as designed, issues that may be impeding the performance, the structural integrity of each system feature, the location, overall condition and anticipated design life to act as a baseline for system improvements. Opportunities for incorporating stormwater treatment practices will be evaluated and incorporated into the project design where feasible.

Additional Description and Notes:

Wright Pierce is working preliminary engineering which is 75% complete. Project is in Capital Improvement Program approved by City Council. The construction cost estimate was developed by Wright-Pierce. Includes a 30% contingency factor to account for design unknowns and an additional 10% contingency due to construction cost increases during COVID. Costs inflated 3% per year to FY2024:

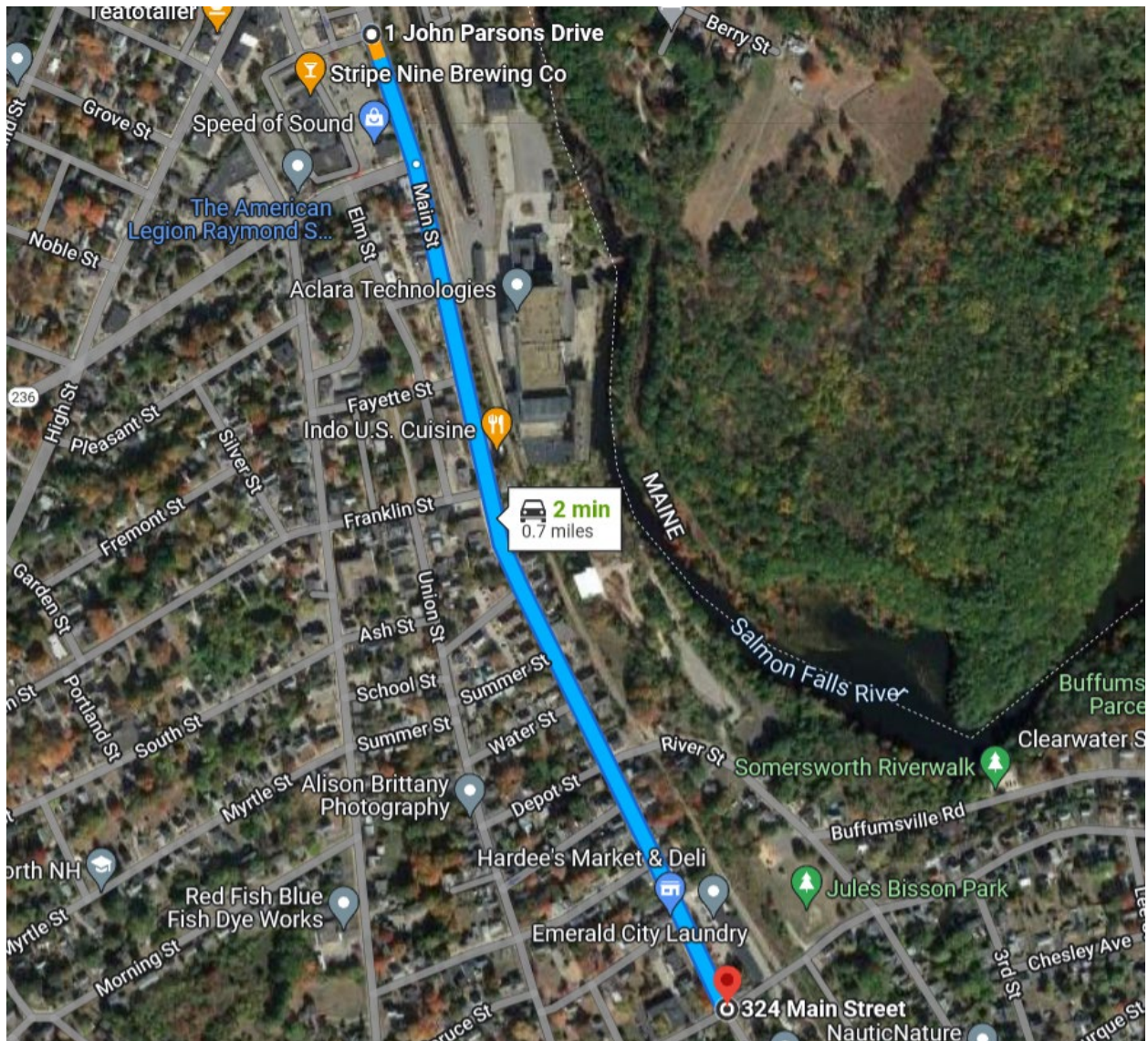
- Road, Drainage, Sidewalk \$3,662,560 (**Ten Year Plan funding can only be dedicated to this portion of the project**)
- Water System Improvements: \$1,408,660
- Sewer Line Replacement: \$1,972,190

- Total \$7,403,41

This project connects Main Street to High Street over the bridge to Berwick, Maine which is undergoing a revitalization project. The City of Somersworth recently adopted Form-Based codes to spur development within the downtown. There are a number of potential large and small multifamily development projects that will be located off Main Street which could add hundreds of housing units.

Large waterfront mill buildings previously occupied by Aclara Technologies are prospective for redevelopment/renovation as mixed-use. This project and adjacent improvements are connected to Somersworth's development with the local Indonesian community, including the recent opening of an Indonesian cultural center downtown.

Council-approved Capital Improvement Program ([LINK](#))



Project Title:	Main Street Construction - John Parsons Drive to Indigo Hill Road		
Department:	Submitted By:	Date:	Project Cost:
Complete Streets	Michael Bobinsky	August 10, 2021	\$7,043,410
Priority:	II		



1. General Project Description:
 Project involves the replacement water and sewer lines, storm drainage improvements, new sidewalks, bike lanes and new surface pavement on Main Street from Indigo Hill Road to John Parsons Drive. Design to compliment planning outcomes for the redevelopment of the Somersworth Plaza site. This segment was resurfaced with a mill-and-overlay treatment in fall 2018.

2. How will this expenditure improve service, productivity, or lower operating cost to the City of Somersworth?
 Improvements will result in reducing or eliminating water or sewer line breaks, improved access for all transportation modes, address drainage issues.

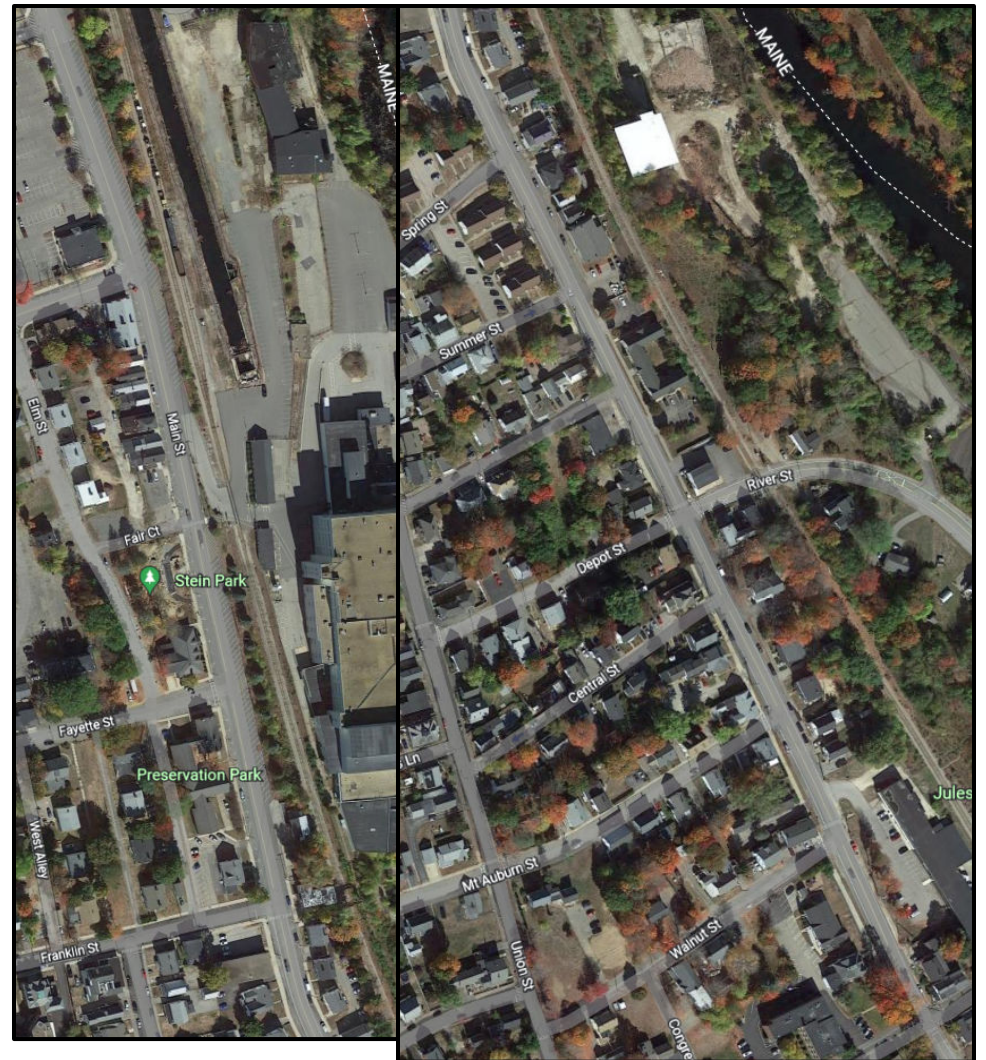
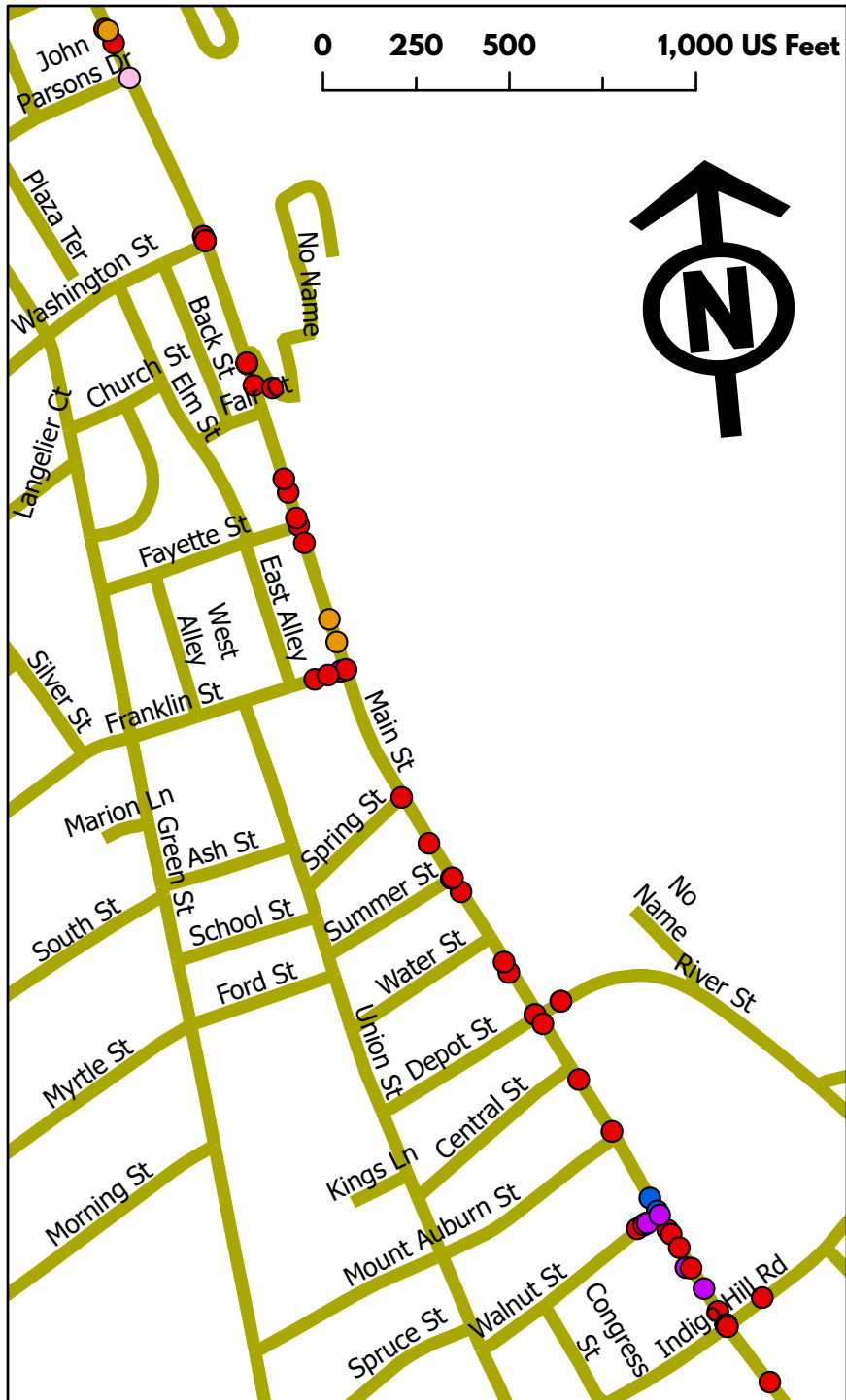
3. Is this a replacement item? Yes. New water and sewer lines, storm drainage, sidewalks and new surface pavement.

4. List name of firm and price of quotes received.
 Opinion of construction cost developed by Wright-Pierce in 2018. Includes a 30% contingency factor to account for design unknowns and an additional 10% contingency due to construction cost increases during COVID. Costs inflated 3% per year to FY2024.

-Road, Drainage, Sidewalk	\$3,662,560
-Water System Improvements:	\$1,408,660
-Sewer Line Replacement:	\$1,972,190
Total	\$7,403,410

Note: The City may consider a phased approach to this project, for example complete an initial phase of the project from John Parsons to Fayette, and then completing the balance of the project

Total Project Funds:	FY23	FY24	FY25	FY26	FY27	FY28	Total
Sources:							\$0
General Fund		\$3,662,560					\$3,662,560
Bonds/Lease							\$0
Grant							\$0
Enterprise Fund		\$3,380,850					\$3,380,850
Other							\$0
Totals	\$0	\$7,043,410	\$0	\$0	\$0	\$0	\$7,043,410
Commence FY:	Prior Years' Funding						Total Project
							\$7,043,410



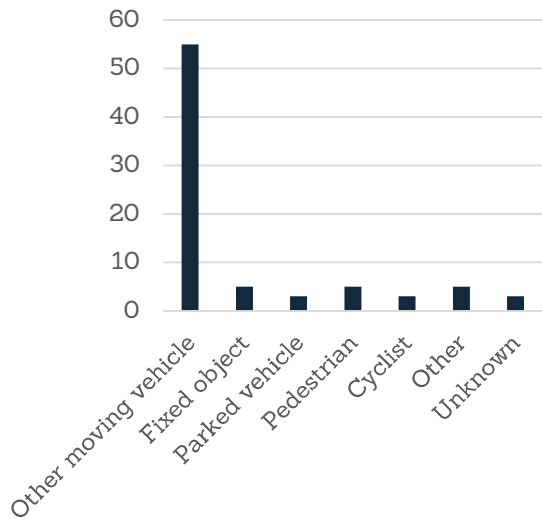
Somersworth Priority Project: Main Street

John Parsons Drive to Indigo Hill Road
(and assoc. roadways)

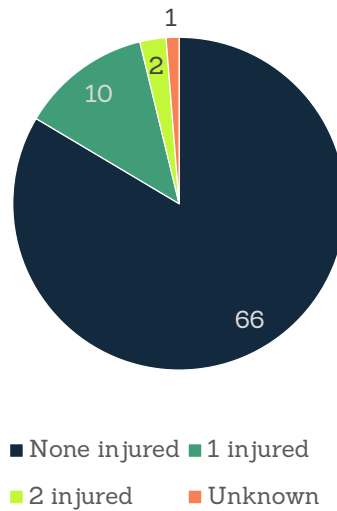
Incidents 2010-2020

- No apparent injury
- Non-incapacitating
- Possible serious injury
- Unknown
- Incident type not reported

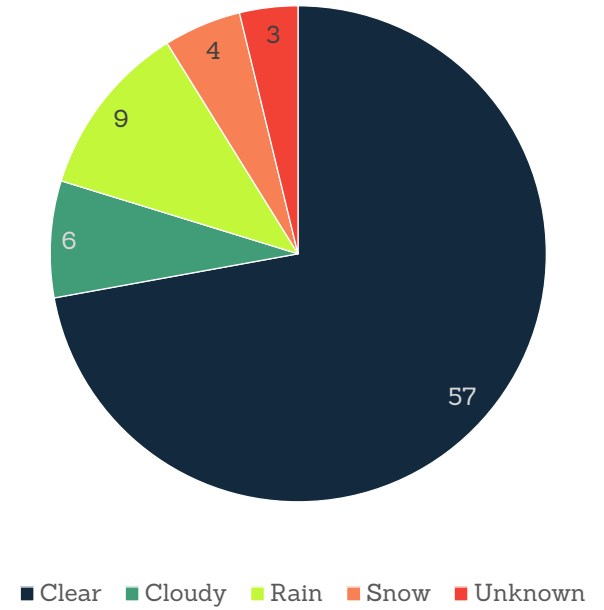
Crash Type



Injuries



Weather



Reported number of incidents

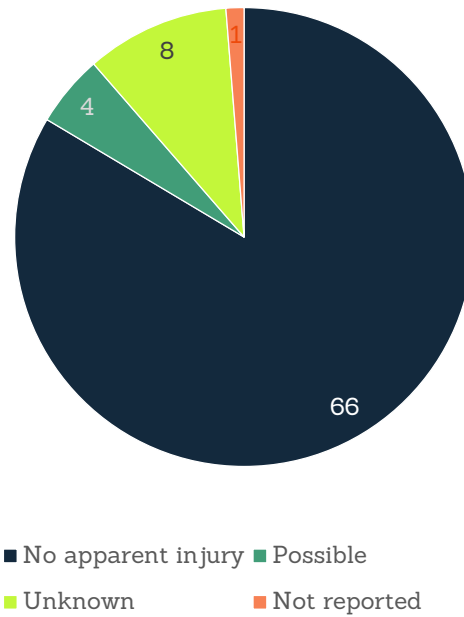
2010 - 2020

79

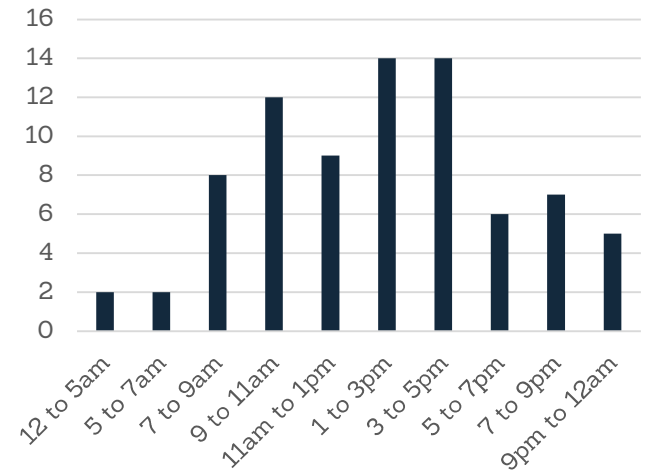
Jan	4
Feb	9
Mar	8
Apr	3
May	7
Jun	6
Jul	7
Aug	8
Sep	8
Oct	6
Nov	6
Dec	7

Mon	14
Tues	12
Wed	12
Thurs	9
Fri	12
Sat	10
Sun	10

Severity



Time of Day





Memorandum

To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning
Commission
150 Wakefield Street, STE 12,
Rochester, NH 03867

Date: November 2, 2022

Project #: 52935.01

From: Gregory L. Bakos, PE

Re: On-Call Engineering
Task # 2 – Durham: Durham Point Road

As requested, VHB has estimated the cost for completing a range of improvements on Durham Point Road in Durham. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, field review, conceptual designs and engineering judgement.

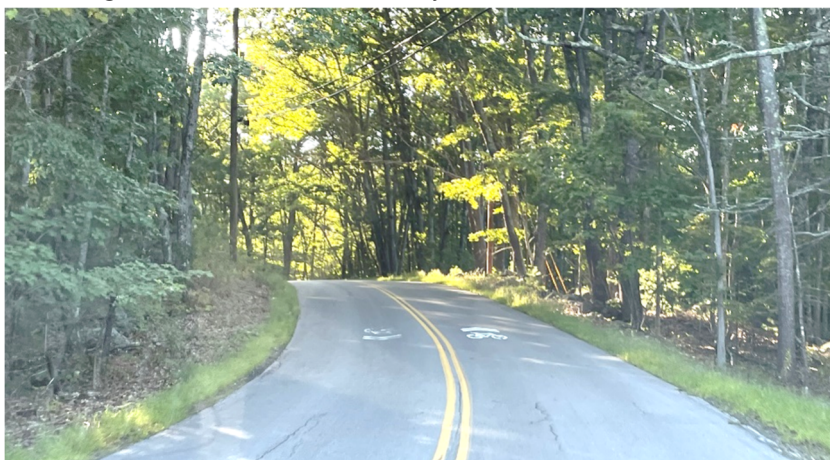
Project Purpose and Need

The Town’s stated purpose for this project is to: improve traffic and non-motorized safety at the same time as paving operations. The thought is that the pavement reconstruction will provide an opportunity to concurrently address safety and other ancillary concerns along the corridor.

Existing Conditions

Durham Point Road is a scenic Class V town road that provides important connectivity from the eastern side of town along Great Bay to the downtown and NH 108. The terrain is gently rolling, and the road alignment would be categorized as curvy. The road is mostly tree lined and stone walls are prevalent. Historic homes dot the corridor and a handful are very close to the road. The setting can be described as bucolic.

Travel speeds are observed to be relatively low because of the curvy nature of the roadway, the narrow (22-foot) pavement, the residential setting and the trees that line the edge of the road. All of these conditions also make the roadway very attractive to recreational and commuter bicyclists and local walkers and runners. The road is well marked with shared lane markings (“sharrows”) and there are periodic Share the Road signs. The Bicycle Level of Traffic Stress (BLTS) for Durham Point Road ranges from high to moderate to low traveling from west to east from Route 108 according to the SRPC BLTS inventory.



The very things that attract non-motorized users to Durham Point Road are also the things that raise safety concerns. The curvy and rolling road can make it difficult to pass bicyclists safely. VHB observed a motorist passing a cyclist at the crest of a curve where there was inadequate sight distance to do so safely. We imagine this is an ongoing concern at multiple locations along the road and it is at the core of the project purpose and need.

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110-6532
P 603.391.3900

It is noteworthy that this roadway experienced 71 reported "incidents" within a study period from 2010 to 2020. There were two fatalities in that period and the majority of crashes involved striking fixed objects, which we assume to be roadside trees.

Proposed Improvements

Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plans.

The Town has indicated that this roadway is a candidate for pavement rehabilitation / reconstruction in the next ten years. VHB observed that there are long sections with cracking and apparent subbase failure. The below photo shows one such area where the cracks have been sealed. Note that it is adjacent to a ledge outcrop with no ditch, which suggests that the roadway base is not properly drained.



Deep pavement reclamation is the likely solution, but drainage should also be addressed to help preserve the new pavement. This would include improving roadside ditches and adding underdrain where appropriate and feasible. The attached cost estimate assumes that the reclaimed base material would be improved through the addition of 3" of crushed stone for added strength and to protect the considerable investment of the new bituminous pavement.

There are also a few recommended improvements that will help address the safety concerns within the corridor.

- Spot Geometric Improvements

This would include adjusting the roadway profile or alignment, or both, to improve sight distances at critical locations. This would typically require full depth construction. An example of where this would be employed is at the site drive to the Town's transfer and recycling station where there are poor sight lines for vehicles exiting the drive. The attached cost estimate assumes three such locations within the corridor.

- Roadway Widening

Roadway widening would certainly help motorists coexist with bicyclists and walkers, but it would likely also have the effect of increasing vehicle speeds. The widening would result in impacts to trees, stone walls, and private property in areas that would be objectionable. Wholesale widening of the roadway is therefore not proposed.

What is proposed is widening is a few specific locations where the roadway geometry cannot be modified extensively. The recommended width is 28-feet since 14-foot lanes typically allow motorists to pass bicyclists without crossing into oncoming traffic. The widening should be done sparingly and in locations that are well vetted during the design. There needs to be a balance between roadway improvements that improve multimodal safety and keeping the road narrow to control speeds.

- Tree Clearing and Trimming

Trees contribute to the desirable look and feel along the corridor, but they also present sight distance concerns in many locations. It is recommended that limited tree clearing and trimming take place along with the other improvements such as defining roadside drainage ditches, to address specific sight line concerns.

Other improvements along the corridor would include repairing or replacing culverts, adding guardrail where warranted, and installing underdrain.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

It is anticipated that right-of-way impacts would be minor and temporary along the corridor. The main exceptions may be at the spot geometric improvements or roadway widening locations or at locations where the existing roadway is already against or outside the existing right-of-way.

Natural Resources

The environmental considerations within this project are expected to be mostly related to stormwater. The work would result in a large area of disturbance, and some of the culvert work may require wetland permits. Cultural resources will also be a consideration, given the historic nature of some of the homes and the extensive stone walls.

If federal funds are used the project will still need to complete National Environmental Policy Act (NEPA) documentation that will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans VHB developed program level estimate of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Costs

Major construction items are described as follows. The roadway widening and geometric improvement areas are assumed to require full depth pavement construction consisting of 4.5" of bituminous pavement over 18" of crushed stone base course. The majority of the 3.7-mile roadway will be reclaimed, and crushed stone will be added for strength. See the attached conceptual cost estimates for a detailed list of items and quantities.

Design and Permitting Costs

It is assumed that the project will be advanced as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This is significant since the process has cost implications. In determining the design phase costs VHB applied rule of thumb percentages adjusted for the anticipated permitting or other complexities as well as the scale of the project.

<u>Proposed Improvements:</u>	<u>PE</u>	<u>ROW</u>	<u>Construction</u>	<u>Totals</u>
Durham Point Road Improvements	\$ 200,000	\$ 10,000	\$2,787,000	\$ 2,997,000

CONSTRUCTION COST ESTIMATE

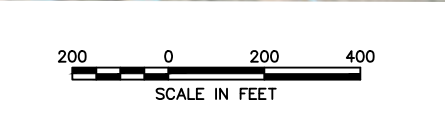
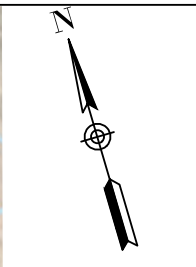
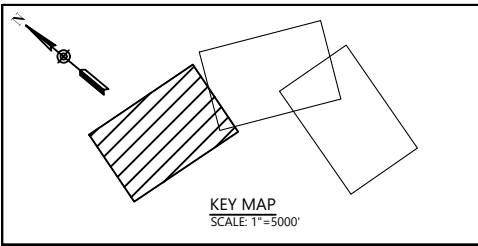
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **DURHAM - DURHAM POINT ROAD**

VHB PROJECT NO. 52935.01

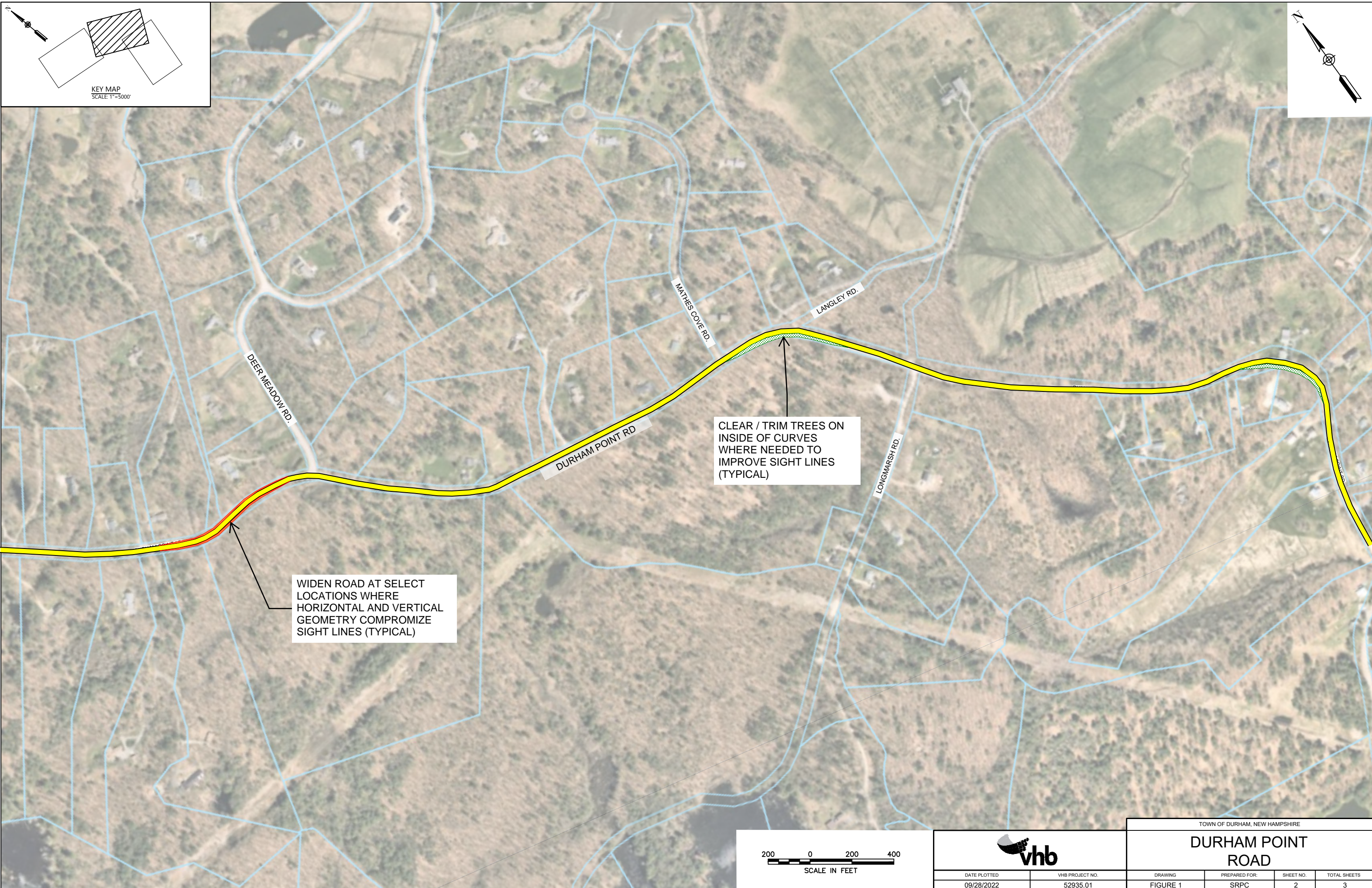
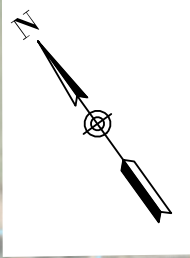
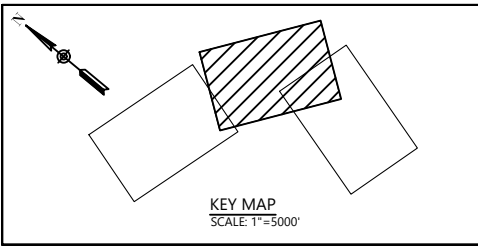
TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
201.1	CLEARING AND GRUBBING	AC	\$ 10,000.00	0.7	\$7,000
203.1	COMMON EXCAVATION	CY	\$ 15.00	3796	\$56,939
203.6	EMBANKMENT IN PLACE	CY	\$ 14.00	380	\$5,314
304.1	SAND	CY	\$ 30.00	1030	\$30,900
304.4	CRUSHED STONE (FINE GRADATION)(F)	CY	\$ 42.00	1030	\$43,260
304.5	CRUSHED STONE (COARSE GRADATION) (F)	CY	\$ 42.00	1030	\$43,260
306.112	RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 12 IN DEEP (F)	SY	\$ 3.00	42730	\$128,190
306.36	STONE FOR RECLAIMED STABILIZED BASE	TON	\$ 25.00	1780	\$44,500
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 100.00	10800	\$1,080,000
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	100	\$15,000
606.1254	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 3) (STEEL POST)	U	\$ 4,000.00	2	\$8,000
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	\$ 35.00	250	\$8,750
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	256	\$19,200
618.7	FLAGGERS	HR	\$ 40.00	2560	\$102,400
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 150,000.00	1	\$150,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	72	\$43,200
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	3800	\$19,000
692	MOBILIZATION	UNIT	\$ 200,000.00	1.00	\$200,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	10	\$18,000
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 25,000.00	1	\$25,000
700	STORMWATER IMPROVEMENTS INCL. UNDERDRAIN AND CULVERTS (ESTIMATE)	\$	\$ 150,000.00	1	\$150,000
SUBTOTAL					\$2,047,913
				MISCELLANEOUS ITEMS (10%)	\$204,791
				CONTINGENCIES (20%)	\$409,583
				SUBTOTAL:	\$2,662,287
				TOTAL ESTIMATED CONSTRUCTION COST	\$2,662,000
				ENGINEERING (PE)	\$200,000
				ROW	\$10,000
				CONSTRUCTION ENGINEERING, INSPECTION AND TESTING	\$125,000
				ESTIMATED PROJECT TOTAL:	\$2,997,000



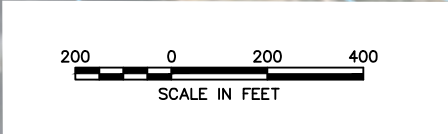
		DATE PLOTTED	VHB PROJECT NO.
		09/28/2022	52935.01

TOWN OF DURHAM, NEW HAMPSHIRE				
DURHAM POINT ROAD				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 1	SRPC	1	3	



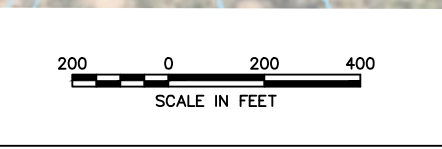
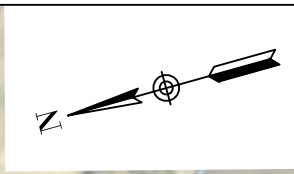
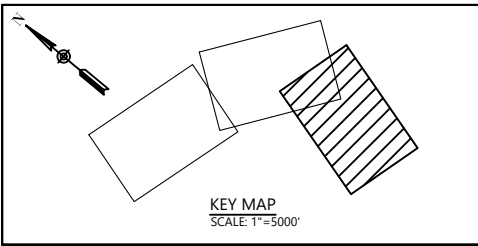
WIDEN ROAD AT SELECT LOCATIONS WHERE HORIZONTAL AND VERTICAL GEOMETRY COMPROMIZE SIGHT LINES (TYPICAL)

CLEAR / TRIM TREES ON INSIDE OF CURVES WHERE NEEDED TO IMPROVE SIGHT LINES (TYPICAL)



		DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
		09/28/2022	52935.01	FIGURE 1	SRPC	2	3

TOWN OF DURHAM, NEW HAMPSHIRE							
<h2>DURHAM POINT ROAD</h2>							
		DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
		09/28/2022	52935.01	FIGURE 1	SRPC	2	3



DATE PLOTTED: 09/28/2022
VHB PROJECT NO.: 52935.01

TOWN OF DURHAM, NEW HAMPSHIRE				
DURHAM POINT ROAD				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 1	SRPC	3	3	



To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12,
Rochester, NH 03867

Date: November 3, 2002

Memorandum

Project #: 52935.01

From: Gregory L. Bakos

Re: On-Call Engineering

Task # 1 – Durham: NH Route 155A (Mast Road) / Main Street Intersection

As requested, VHB has estimated the cost for completing safety related improvements on NH Route 155A (Mast Road) at the intersection with Main Street in Durham, New Hampshire. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, conceptual designs, and engineering judgement.

Project Purpose and Need

The Town of Durham's stated purpose for this project is: to improve safety at the intersection. Traffic is increasing due to continued development surrounding the University of New Hampshire (UNH) campus. Main Street is a primary route for local access to campus and downtown from the west. This project is proactive in maintaining safety and function of the intersection as traffic grows.

Existing Conditions

Main Street and Mast Road intersect to form a four-legged unsignalized intersection. Main Street is generally aligned in an east-west direction and Mast Road is aligned in a north-south direction. NH Route 155A travel along Main Street east of the intersection and along Mast Road south of the intersection. The Main Street eastbound and westbound approaches are free flow (i.e., no traffic control) and the Mast Road northbound and southbound approaches are under STOP-sign control. The Main Street eastbound and westbound approaches each consist of an exclusive left-turn lane and a shared through/right-turn lane. The Mast Road northbound approach includes a shared left-turn/through lane and an exclusive right-turn lane. A concern with this arrangement is that the stopped northbound vehicles can obstruct one another's sight lines, as can the vehicles in the center left turn lanes on Main Street. The Mast Road southbound approach consists of a single general purpose travel lane.

VHB observed that Main Street is very straight and level roadway, and that coming from the west there are few visual cues to encourage motorists to observe the posted 30 miles per hour (MPH) speed limit. In addition, some of the eastbound traffic enters Main Street from nearby NH Route 4 and may still be in a high-speed mindset as they approach the intersection.

There is an 8-foot-wide shared use path on the east side of the northbound Mast Road approach that wraps onto the south side of Main Street east of the intersection. There are no pedestrian facilities north of Main Street or west of Mast Road.

The Bicycle Level of Traffic Stress (BLTS) for the subject section of Main Street is listed as Low Stress according to the SRPC LTS inventory and the northbound Mast Road approach is listed as High Stress.

Traffic

SRPC provided VHB with tuning movement counts at the Main Street and Mast Road intersection for the weekday AM peak period (October 19, 2022 = 7:00-8:45 AM, and October 20, 2022 = 7:30-8:45 AM). In addition, SRPC supplied automatic traffic recorder (ATR) counts along Main Street east and west of Mast Road between October 18-20, 2022. To develop weekday PM peak hour traffic volumes, the October 20, 2022 ATR counts were compared for the weekday AM and PM peak hours and the resulting factor was applied to the weekday AM peak hour turning movement counts. VHB adjusted the weekday AM and PM traffic data to reflect 2042 design year average-month, pre-pandemic traffic volumes.

Under existing traffic volume conditions, the Mast Road southbound approach operates with long delays (LOS F) during the weekday AM peak hour. In addition, the Mast Road northbound shared left-turn/through lane and exclusive right-turn lane operate with long delays (LOS F) during the weekday PM peak hour. VHB subsequently evaluated whether a single lane roundabout would function adequately at this intersection, and the Highway Capacity Manual (HCM) results show that a Mast Road northbound right-turn slip lane would be required onto Main Street eastbound. With this additional lane, all lanes approaching the roundabout would operate at LOS D or better during the weekday AM and PM peak hours.

Proposed Improvements

There is an existing roundabout on Main Street approximately 1,600-feet east of the Mast Road intersection, and introducing a roundabout at Mast Road would further extend the traffic calming effect to the west toward NH Route 4. Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plans.

The proposed single lane roundabout is very similar in scale to the existing roundabout that is 1,600-feet to the east on Main Street. A key difference is that the northbound approach includes a slip lane for right turning traffic. Another difference is that the northbound approach is skewed and, therefore, the eastbound approach includes a slip lane to accommodate all right turning vehicles including large vehicles.

The proposed improvements include relocating the existing shared use path as shown. There may also be a need to relocate the existing bus shelter further east.

Drainage is a consideration for this project since the existing roadway runoff sheets off into roadside ditches. There does not appear to be a closed drainage system to tie into. There may be a need to limit the amount of curbing used around the outside of the roundabout so stormwater can continue to run off to the surrounding ground. There may be difficulty in the southwest quadrant to achieve this design, so creative collection and conveyance and/or infiltration practices will be needed.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

The proposed roundabout will have approximately 15,000 SF of permanent impacts. All of the impacts would be to open areas and are not projected to impact any structures.

Natural Resources

The environmental considerations within this project are expected to include direct wetland impacts in at least two of the four quadrants of the intersection. These impacts are due to the roundabout geometry and are unavoidable.

If federal funds are used, the project will still need to complete National Environmental Policy Act (NEPA) documentation which will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans, VHB developed program level estimates of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Costs

Major construction items are described as follows. The roadway widening areas are estimated to require full depth pavement construction consisting of 6 inches of bituminous pavement over 24 inches of crushed stone base course. The splitter islands and medians include a 4-inch concrete walk surface and 12 inches of a crushed stone base. The sidewalks include a 3-inch bituminous walk surface over 12 inches of a crushed stone base. The truck apron includes an 8-inch concrete surface over 24 inches of a crushed stone base. Drainage system costs are estimated based on a small number of catch basins and connecting pipe to connect to existing systems. See the attached conceptual cost estimates for a detailed list of items and quantities.

Design and Permitting Costs

The project will be assumed to advance as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This process is significant since there are cost implications. In determining the design phase costs, VHB applied 'rule-of-thumb' percentages adjusted for the anticipated permitting or other complexities as well as the scale of the project.

<u>Proposed Improvements:</u>	<u>PE</u>	<u>ROW</u>	<u>Construction</u>	<u>Totals</u>
Roundabout with slip lanes	\$180,000	\$30,000	\$1,212,000	\$1,422,000

CONSTRUCTION COST ESTIMATE

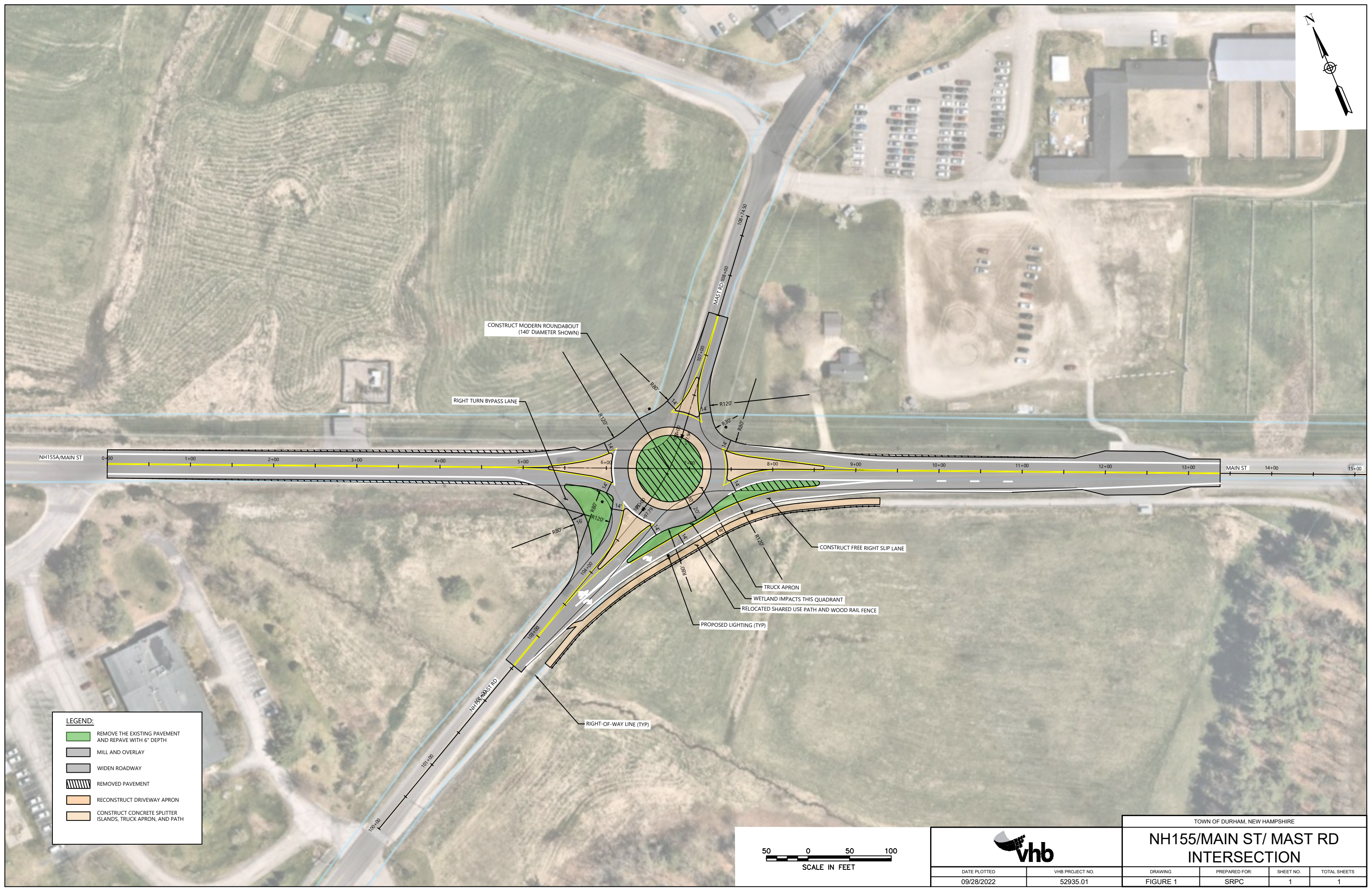
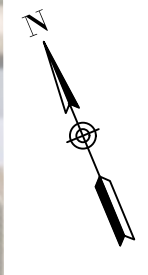
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **DURHAM NH 155A/MAIN STREET/MAST ROAD INTERSECTION**

VHB PROJECT NO. 52935.01

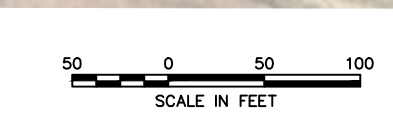
TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	1754	\$31,572
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	314	\$12,560
304.5	CRUSHED STONE (COURSE GRADATION) (F)	CY	\$ 40.00	1440	\$57,600
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	1077	\$129,198
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	20	\$3,000
403.99	TEMPORARY BITUMINOUS PAVEMENT	TON	\$ 110.00	50	\$5,500
417	COLD PLANING BITUMINOUS SURFACES	SY	\$ 5.00	4593	\$22,966
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	100	\$8,000
604.0007	POLYETHELENE LINER	EA	\$ 350.00	4	\$1,400
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	4	\$16,000
604.324	DRAINAGE MANHOLES, 4 FT DIAMETER	U	\$ 4,000.00	2	\$8,000
607.5340	WOOD FENCE (SPLIT RAIL), 4'-0" HIGH	LF	\$ 25.00	457	\$11,425
608.13	3" BITUMINOUS SIDEWALK (F)	SY	\$ 70.00	417	\$29,221
608.24	4" CONCRETE SIDEWALK (F)	SY	\$ 80.00	523	\$41,849
608.38	8" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 220.00	314	\$69,129
608.54	DETECTABLE WARNING DEVICES, CAST IRON	SY	\$ 500.00	2	\$1,000
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	1796	\$80,820
609.01123	STRAIGHT GRANITE CURB, 12" HIGH WITH 3"X3" MOUNTABLE BEVELED EDGE	LF	\$ 70.00	314	\$21,980
611.90001	ADJUSTING WATER GATES AND SHUTOFFS SET BY OTHERS	EA	\$ 250.00	4	\$1,000
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	100	\$9,000
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	320	\$24,000
618.7	FLAGGERS	HR	\$ 40.00	1280	\$51,200
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 50,000.00	1	\$50,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	96	\$57,600
625.525	STREET LIGHTS INCLUDING POLES, FOUNDATIONS AND LUMINAIRES	EA	\$ 8,000.00	5	\$40,000
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	600	\$2,400
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	1200	\$6,000
650.2	LANDSCAPING	U	\$ 20,000.00	1	\$20,000
692	MOBILIZATION	UNIT	\$ 50,000.00	1	\$50,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	6	\$10,800
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 5,000.00	1	\$5,000
SUBTOTAL					\$878,220
					MISCELLANEOUS ITEMS (10%) \$87,822
					CONTINGENCIES (20%) \$175,644
					SUBTOTAL: \$1,141,685
					TOTAL ESTIMATED CONSTRUCTION COST \$1,142,000
					ENGINEERING (PE) \$180,000
					ROW \$30,000
					CONSTRUCTION ENGINEERING, INSPECTION AND TESTING \$70,000
					ESTIMATED PROJECT TOTAL: \$1,422,000



LEGEND:

	REMOVE THE EXISTING PAVEMENT AND REPAVE WITH 6" DEPTH
	MILL AND OVERLAY
	WIDEN ROADWAY
	REMOVED PAVEMENT
	RECONSTRUCT DRIVEWAY APRON
	CONSTRUCT CONCRETE SPLITTER ISLANDS, TRUCK APRON, AND PATH



DATE PLOTTED	VHB PROJECT NO.
09/28/2022	52935.01

TOWN OF DURHAM, NEW HAMPSHIRE				
NH155/MAIN ST/ MAST RD INTERSECTION				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 1	SRPC	1	1	



To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12,
Rochester, NH 03867

Date: November 3, 2002

Memorandum

Project #: 52935.01

From: Gregory L. Bakos

Re: On-Call Engineering
Task # 4 – Lee: NH Route 155 / George Bennett Road / Lee Hook Road
Intersections

As requested, VHB has estimated the cost for completing safety related improvements at three intersections within that generally create a triangular roadway system in Lee, New Hampshire. The northern location includes the NH Route 155 (Mast Road) intersection with West Mill Pond Road, the southeastern location includes the NH Route 155 (Mast Road and North River Road) intersection with George Bennett Road and Lee Hook Road and the southwestern location includes the George Bennett Road intersection with West Mill Pond Road and Lee Hill Road. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, site review, conceptual designs, and engineering judgement.

Project Purpose and Need

The Town of Lee's stated purpose for this project is to increase safety at the intersection and consolidate redundant connections. This intersection is outdated and overly complex, creating a significant safety hazard. Future Town development and accessibility will be hindered without addressing the intersection.

Existing Conditions

In the area, NH Route 155 is the major traffic roadway and is generally aligned in a north-south direction. VHB observed that traffic on NH Route 155 at West Mill Pond Road and at George Bennett Road/Lee Hook Road is free flowing (no traffic control) and the side street approaches, being stop controlled, have to wait for gaps to enter the NH Route 155 traffic stream, which is the higher volume roadway. A similar condition exists on George Bennett Road which is free flow as it crosses West Mill Pond Road and Lee Hill Road. The safety concerns within the project limits are primarily related to the horizontal and vertical geometries in relation to the impacts on limiting sight distances. NH Route 155 passes through the project partially on a curve, and the George Bennett Road eastbound approach is on a severe skew. Similar conditions exist at the NH Route 155 and West Mill Pond Road intersection. There are currently no sidewalks within the project limits, but the Town of Lee is proposing a shared-use path along the west side of NH Route 155 that would extend almost to this intersection under a separate project.

The Bicycle Level of Traffic Stress (BLTS) within the project limits is moderate stress on NH Route 155 and low stress on the minor approaches according to the SRPC LTS inventory.

Traffic

SRPC provided VHB with preliminary alternatives developed by University of New Hampshire (UNH) students under the supervision of NHDOT officials. As a result of that preliminary evaluation, two alternatives were deemed to be the most viable: (1) three T-junction unsignalized intersections and (2) a four-way unsignalized intersection and a T-type unsignalized intersection. For the UNH three T-junction unsignalized intersections alternative:

- › The West Pond Road connection between NH Route 155 and George Bennett Road would be eliminated, and
- › The following three unsignalized intersections would be created:
 - George Bennett Road and Lee Hill Road with the Lee Hill Road northbound approach under STOP-sign control,
 - George Bennett Road and NH Route 155 with the NH Route 155 southbound approach under STOP-sign control, and
 - NH Route 155 and Lee Hook Road with the Lee Hook Road westbound approach under STOP-sign control.

For the UNH four-way unsignalized intersection and a T-type unsignalized intersection:

- › The NH Route 155 connection between West Mill Pond Road and George Bennett Road/Lee Hook Road would be eliminated with vehicles redistributed to West Mill Pond Road,
- › The George Bennett Road intersection with West Mill Pond Road and Lee Hill Road would remain with the West Mill Pond Road southbound and Lee Hill Road northbound approaches staying under STOP-sign control, and
- › NH Route 155, George Bennett Road, and Lee Hook Road would meet at an All-Way Stop-Control (AWSC), T-type unsignalized intersection.

SRPC also provided VHB with October 2022 tuning movement counts in the area for the weekday AM and PM peak periods (7-9 AM and 3-5 PM). VHB adjusted the traffic counts to reflect 2042 design year average-month, pre-pandemic traffic volumes. VHB evaluated intersection analyses under these two UNH alternatives. The Highway Capacity Manual (HCM) operational results of these alternatives indicated the following:

- › The UNH three T-junction unsignalized intersections alternative would result in long delays along the NH Route 155 southbound approach to the George Bennett Road intersection (weekday AM peak hour = LOS E, weekday PM peak hour = LOS F),
- › The UNH a four-way unsignalized intersection and a T-type unsignalized intersection alternative would result in long delays on the NH Route 155 southbound approach to George Bennett Road and Lee Hook Road intersection (weekday AM and PM peak hours = LOS F)

These long delays are not unexpected as NH Route 155 is the major roadway in the area and carries a heavier vehicular demand than the other roadways. To help improve safety and vehicle progression, the following additional alternatives were evaluated for consideration:

- › Option 1: a three-way intersection at George Bennett Road and Lee Hill Rd and a four-way intersection at NH Route 155, George Bennett Road, and Lee Hook Road:
 - Since NH Route 155 is the major roadway, this alternative is similar to UNH three-way unsignalized intersection and a T-type unsignalized intersection alternative but removes the West Mill Pond Road connection between NH Route 155 and George Bennett Road/Lee Hill Road,
 - George Bennett Road and Lee Hill Road would meet at a T-type intersection with the Lee Hill Road northbound approach under STOP-sign control, and
 - NH Route 155, George Bennett Road, and Lee Hook Road would meet at a four-way unsignalized intersection.
- › Option 2: a roundabout constructed at the NH Route 155 and George Bennett Road intersection and two T-type unsignalized intersections:

- Similar to the previous alternative, the West Mill Pond Road connection would be removed between NH Route 155 and George Bennett Road/Lee Hill Road,
- NH Route 155 and George Bennett Road would intersect at a single lane roundabout,
- George Bennett Road and Lee Hill Road would meet at a T-type intersection with the Lee Hill Road northbound approach under STOP-sign control and with left turns restricted from Lee Hill Road onto George Bennett Road westbound, and
- NH Route 155 and Lee Hook Road would meet at a T-type intersection with the Lee Hook Road westbound approach under STOP-sign control.

The HCM results suggest that Option 1 would result in LOS A/B operations during the weekday AM and PM peak hours with the NH Route 155, George Bennett Road, and Lee Hook Road intersection placed under AWSC (i.e., all approaches under STOP-sign control). Similarly, Option 2 would result in LOS A/B operations during the weekday AM and PM peak hours.

Proposed Improvements

Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plans. Two alternatives were considered as follows.

OPTION-1: Eliminate the West Mill Pond Road Connection

The proposed improvements include eliminating the West Mill Pond Road vehicular connection between NH Route 155 and George Bennett Road. Traffic that would use this connection would be diverted to the NH Route 155 / George Bennett Road / Lee Hook Road intersection, which would be converted to 4-way stop control.

The removal of the West Mill Pond Road connection would provide an opportunity to easily include a sidewalk in place of the roadway. This would help extend pedestrian access from the Town's future shred-use path that will end at the Library. The amount of construction required under this alternative is relatively minor.

OPTION-2: Single Lane Roundabout

The single lane roundabout alternative provides a higher level of safety improvement for motorists since the design would slow vehicle speeds and address existing sight line and skewed geometry concerns. The roundabout also has the potential to become a recognizable and easy to use landmark for the Town.

The single lane roundabout option would be considerably more costly than Option 1 and there are grading concerns that would need to be addressed during the design phase. Specifically, NH Route 155 is higher than George Bennett Road and the roundabout would therefore be tilted to one side. Roundabouts may be constructed on grades of up to 4 percent but the concern is identified here since there could be added cost to construct the roundabout within more desirable parameters.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

Neither option appears to result in permanent property impacts.

Natural Resources

The environmental considerations within this project are expected to be minimal since the area appears to be free of regulated natural resource areas. Cultural resources may be a concern since the adjacent properties may be considered historic and there is a possibility that the center of the existing triangle has historic significance, although there is no obvious evidence of such.

If federal funds are used, the project will still need to complete National Environmental Policy Act (NEPA) documentation which will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans, VHB developed program level estimates of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Costs

Major construction items are described as follows. The Option 2 roundabout construction will require full depth pavement construction, truck apron construction, granite curbing, landscaping, and earthwork. The pavement construction consisting of 6 inches of bituminous pavement over 24 inches of crushed stone base course. The medians include a 4-inch concrete walk surface and 12 inches of a crushed stone base. The truck apron includes an 8-inch concrete surface over 24 inches of a crushed stone base. Drainage system costs are estimated based on the number of catch basins and connecting pipe to connect to existing systems. See the attached conceptual cost estimates for a detailed list of items and quantities. Option 1 by contrast will primarily include pavement excavation, loam and seeding, and sidewalk construction.

Design and Permitting Costs

The project will be assumed to advance as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This process is significant since there are cost implications. In determining the design phase costs, VHB applied 'rule-of-thumb' percentages adjusted for the anticipated permitting or other complexities as well as the scale of the project. Smaller projects such as Option 1 typically have much higher design costs as a percentage of the construction costs.

Proposed Improvements:	PE	ROW	Construction	Totals
Option 1: Eliminate W. Mill Pond Rd	\$50,000	\$ 0	\$154,000	\$214,000
Option 2: Roundabout	\$180,000	\$20,000	\$909,000	\$1,109,000

CONSTRUCTION COST ESTIMATE

PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **LEE NH 155A/MAIN STREET/MAST ROAD INTERSECTION - ALTERNATIVE 3B**

VHB PROJECT NO. 52935.01

TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	220	\$3,960
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	70	\$2,806
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	25	\$3,000
608.13	3" BITUMINOUS SIDEWALK (F)	SY	\$ 70.00	210	\$14,731
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	50	\$2,250
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	40	\$3,600
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	160	\$12,000
618.7	FLAGGERS	HR	\$ 40.00	200	\$8,000
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 10,000.00	1	\$10,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	48	\$28,800
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	300	\$1,200
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	600	\$3,000
692	MOBILIZATION	UNIT	\$ 20,000.00	1	\$20,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	0	\$0
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 1,000.00	1	\$1,000
SUBTOTAL					\$114,347
MISCELLANEOUS ITEMS (15%)					\$17,152
CONTINGENCIES (20%)					\$22,869
SUBTOTAL:					\$154,369
TOTAL ESTIMATED CONSTRUCTION COST					\$154,000
ENGINEERING (PE)					\$50,000
ROW					\$0
CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$10,000
ESTIMATED PROJECT TOTAL:					\$214,000

CONSTRUCTION COST ESTIMATE

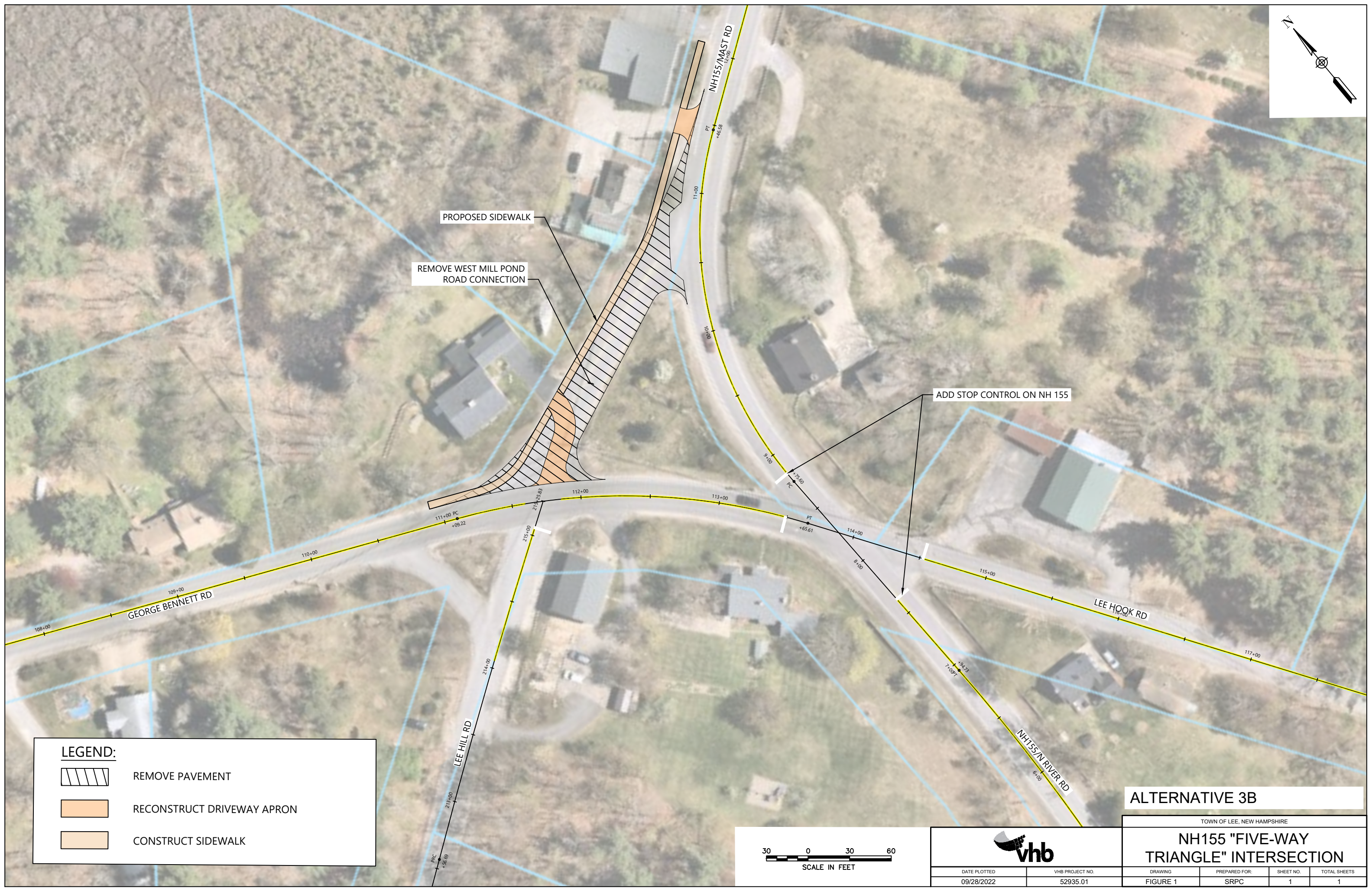
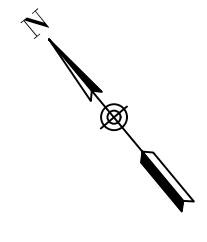
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : LEE NH 155A/MAIN STREET/MAST ROAD INTERSECTION - ALTERNATIVE 3D

VHB PROJECT NO. 52935.01

TYPE: Program Level Conceptual Estimate

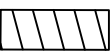
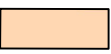

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	660	\$11,880
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	160	\$6,400
304.5	CRUSHED STONE (COURSE GRADATION) (F)	CY	\$ 40.00	500	\$20,000
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	550	\$66,000
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	50	\$7,500
403.99	TEMPORARY BITUMINOUS PAVEMENT	TON	\$ 110.00	50	\$5,500
417	COLD PLANING BITUMINOUS SURFACES	SY	\$ 5.00	2200	\$11,000
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	400	\$32,000
604.0007	POLYETHELENE LINER	EA	\$ 350.00	4	\$1,400
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	4	\$16,000
604.4	RECONSTRUCTING/ADJUSTING CATCH BASIN & DROP INLET	LF	\$ 400.00		\$0
604.324	DRAINAGE MANHOLES, 4 FT DIAMETER	U	\$ 4,000.00	2	\$8,000
607.5140	WOOD FENCE (STOCKADE), 4'-0" HIGH	LF	\$ 50.00	20	\$1,000
608.24	4" CONCRETE SIDEWALK (F)	SY	\$ 80.00	480	\$38,400
608.38	8" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 220.00	330	\$72,600
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	840	\$37,800
609.01123	STRAIGHT GRANITE CURB, 12" HIGH WITH 3"X3" MOUNTABLE BEVELED EDGE	LF	\$ 70.00	330	\$23,100
609.02	CURVED GRANITE CURB	LF	\$ 50.00	20	\$1,000
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	100	\$9,000
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	320	\$24,000
618.7	FLAGGERS	HR	\$ 40.00	1280	\$51,200
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 50,000.00	1	\$50,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	48	\$28,800
625.525	STREET LIGHTS INCLUDING POLES, FOUNDATIONS AND LUMINAIRES	EA	\$ 8,000.00	6	\$48,000
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	1920	\$7,680
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	840	\$4,200
650.2	LANDSCAPING	U	\$ 20,000.00	1	\$20,000
692	MOBILIZATION	UNIT	\$ 30,000.00	1	\$30,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	6	\$10,800
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 2,000.00	1	\$2,000
SUBTOTAL					\$645,260
MISCELLANEOUS ITEMS (10%)					\$64,526
CONTINGENCIES (20%)					\$129,052
SUBTOTAL:					\$838,838
TOTAL ESTIMATED CONSTRUCTION COST					\$839,000
ENGINEERING (PE)					\$180,000
ROW					\$20,000
CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$70,000
ESTIMATED PROJECT TOTAL:					\$1,109,000

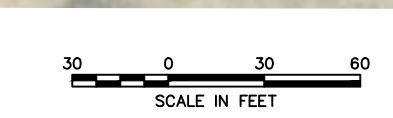


PROPOSED SIDEWALK
REMOVE WEST MILL POND
ROAD CONNECTION

ADD STOP CONTROL ON NH 155

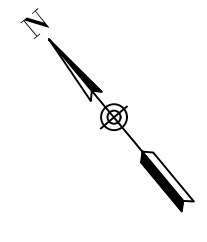
LEGEND:

-  REMOVE PAVEMENT
-  RECONSTRUCT DRIVEWAY APRON
-  CONSTRUCT SIDEWALK









ALTERNATIVE 3B				
<small>TOWN OF LEE, NEW HAMPSHIRE</small>				
NH155 "FIVE-WAY TRIANGLE" INTERSECTION				
<small>DRAWING</small> FIGURE 1	<small>PREPARED FOR:</small> SRPC	<small>SHEET NO.</small> 1	<small>TOTAL SHEETS</small> 1	



LEGEND:

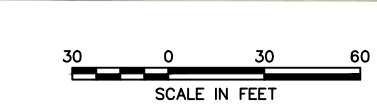
-  REMOVE PAVEMENT
-  RECONSTRUCT DRIVEWAY APRON
-  CONCRETE SPLITTER ISLANDS AND TRUCK APRON
-  MILL AND OVERLAY
-  WIDEN ROADWAY
-  GRASS



ALTERNATIVE 3D

TOWN OF LEE, NEW HAMPSHIRE

NH155 "FIVE-WAY TRIANGLE" INTERSECTION



DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
09/28/2022	52935.01	FIGURE 1	SRPC	1	1



To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12,
Rochester, NH 03867

Date: November 3, 2002

Memorandum

Project #: 52935.01

From: Gregory L. Bakos

Re: On-Call Engineering
Task # 5 – Lee: NH155 Town Center Shared Use Path

As requested, VHB has estimated the cost for completing pedestrian related improvements along an in-town segment of NH155 (Mast Road) in Lee. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, conceptual designs and engineering judgement.

Project Purpose and Need

The Town's stated purpose for this project is to create a dedicated non-motorized path connecting destinations concentrated in the town center. A dedicated non-motorized facility is needed to connect major destinations in the town center. Town hall and library complex is being renovated and the proposed path route connects to Mast Way Elementary School. Students regularly visit the town library. The full proposed path would connect to recreation sites and transfer station on Recycling Center Rd.

The town reports that there have been four vehicle crashes within the project limits from 2010 to 2020 and none of those included incapacitating injuries. Accident history aside, there are eight active driveways on the north side of Mast Road within the approximately 2,000-foot-long project limits. Each of these represent potential conflict points between motor vehicles and bikes or pedestrians.

The Bicycle Level of Traffic Stress (BLTS) for the subject section of Mast Road is listed as LTS 3 – Moderate Stress according to the SRPC LTS inventory. This means the project area is suitable for those who ride regularly. School children do not fit this description. Mast Road is approximately 26-feet wide within the project limits including narrow striped shoulders, which means bicyclists share the road with motor vehicles and pedestrians typically walk off to the side in the gravel or grass shoulders. Traffic volumes are relatively low at 1,226 per NHDOT's Roads and projects website. The posted speed is 30 MPH and 20 MPH within the school zone when signs are flashing.

Please Refer to Lee's project proposal which includes additional documentation on the Purpose and Need and the benefits that these improvements will bring to the community.

Existing Conditions

Construct a 10-foot-wide separated shared-use path along the northwest side of NH155 between the Town hall and library site and a point east of Recycling Center Road at the Town Garage. The total length of improvements will be approximately 2,000 feet.

Proposed Improvements

Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plans.

Shared Use Path

The proposed 10-foot-wide paved path will be offset from the existing roadway by a minimum of 5-feet where attainable. This separation provides recovery room for bicyclists that go off the path and it also provides recovery room for errant motor vehicles. The buffer will also provide space for winter snow storage, a place for roadside signs, and it will be vegetated. It is assumed that the path will not be curbed.

Stormwater

Stormwater is a significant consideration for this project since roadway runoff currently sheets off the roadway and into the grass, wooded or paved areas adjacent to the road. It is not desirable to allow roadway runoff to run over the proposed paved path since it could introduce sediment onto the path in the summer and icing conditions in the winter. It is therefore preferred to collect the runoff within the grass buffer and distribute it to discharge points. One thing that is working against this approach is that the roadway appears to be very flat within the project limits. This makes it more difficult to convey the collected water over appreciable distances in any one direction. Another factor is that there do not appear to be low areas adjacent to the roadway in convenient locations. Lastly, some discharge points would likely fall on private property.

The accompanying concept plans show one potential stormwater discharge point on Lee Congregational Church property. The attached cost estimate includes costs for drop inlets and drainage pipe to convey water to that area. It may alternatively be possible to construct gravel wetlands and/or infiltration areas in the vegetated areas between the path and the road or outside the path. Stormwater collection, treatment and disposal will require further study during preliminary engineering to determine where the drainage outfalls will be, whether it is possible to construct systems that will convey the water the required distances, and what feasible alternatives may be available. As a result of the uncertainty about the stormwater design solutions the cost estimate for this project includes assumptions and a stormwater allowance.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

It is difficult to say with certainty, given that the existing right-of-way is GIS based, whether there will be significant permanent right-of-way impacts to accommodate the path, but it appears that the majority of the proposed work will fit within the existing Town right-of-way. An exception may be stormwater discharge and treatment features that would require drainage easements. Temporary construction easements may also be required for grading and to provide the contractor access to the work. A nominal cost is carried in the cost estimate for right-of-way. If large stormwater features are required outside of the public right-of-way on private property the costs may increase.

Natural Resources

The environmental considerations within this segment will be mostly centered around stormwater outfalls and/or any slope impacts in wetlands. The area appears relatively free of potential regulated natural resource areas.

If federal funds are used the project will need to complete NEPA documentation that will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans, VHB developed program level estimates of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Shared Use Path Costs

The paved path construction is assumed to be relatively straight forward. The primary costs will be for clearing, grading, compacting and applying the crushed stone base, and paving the 10-foot wide path. The work will also include standard erosion control measures along its length. The cost estimate includes a cost for pedestrian scale street lighting along the path.

The path construction will likely necessitate the installation of drainage infrastructure as noted above. The cost estimate includes an estimated number of drainage structures and pipe and associated outfalls.

Design and Permitting Costs

It is assumed that the project will be advanced as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This is significant since the process has cost implications. In determining the design phase costs VHB applied rule of thumb percentages adjusted for the anticipated permitting or other complexities such as stormwater analysis and design.

<u>Proposed Improvements:</u>	<u>PE</u>	<u>ROW</u>	<u>Construction</u>	<u>Totals</u>
Shared Use Path along NH 155	\$90,000	\$10,000	\$479,000	\$579,000

CONSTRUCTION COST ESTIMATE

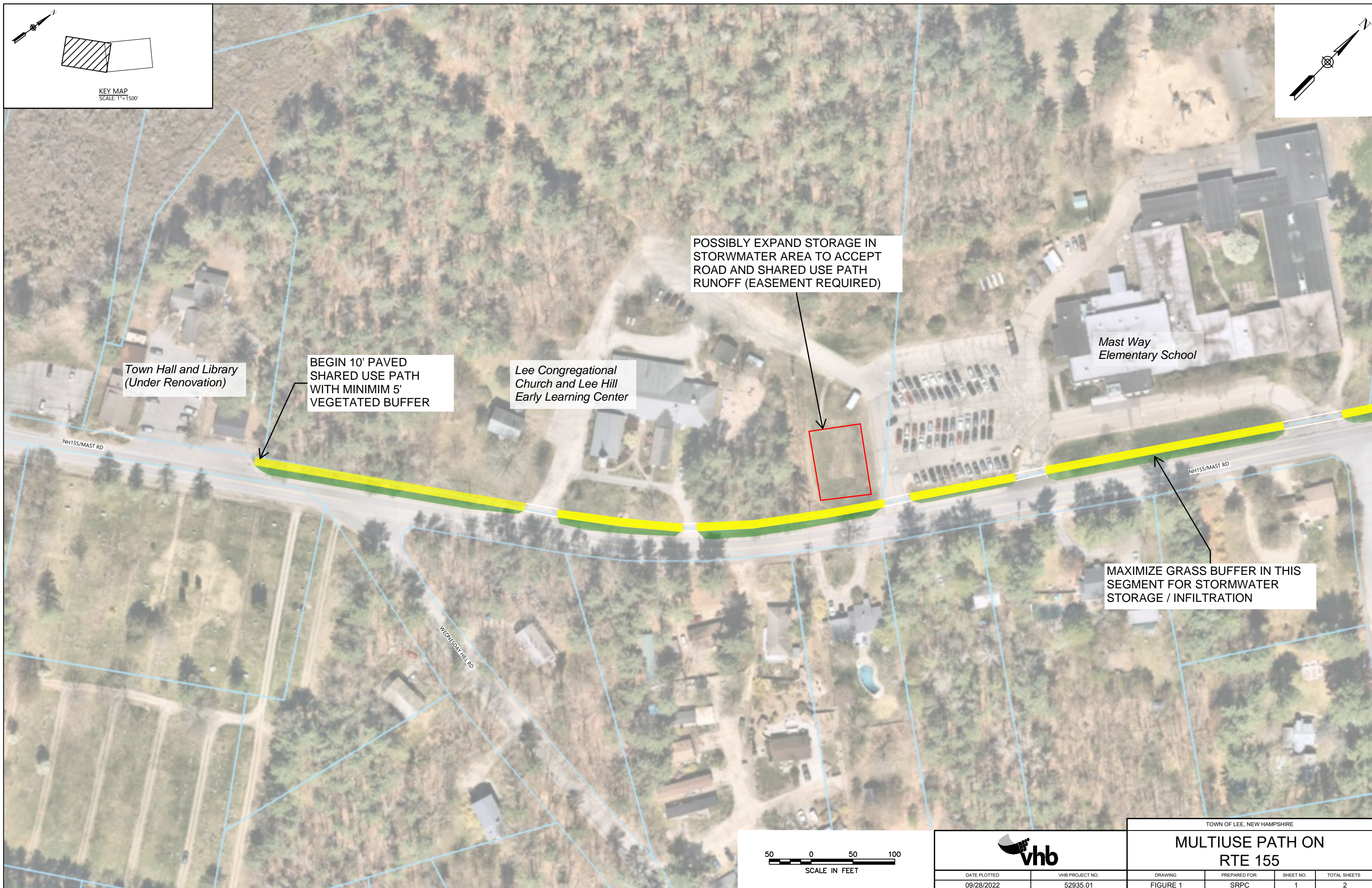
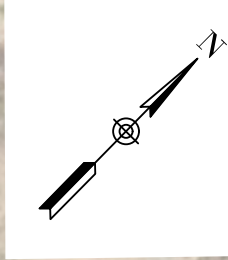
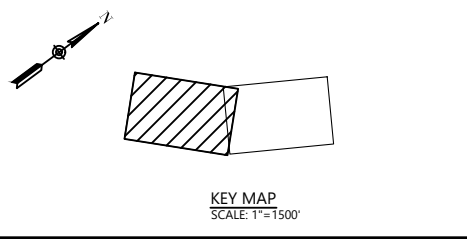
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : LEE - NH155 SHARED USE PATH

VHB PROJECT NO. 52935.01

TYPE: Program Level Conceptual Estimate

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
201.1	CLEARING AND GRUBBING	AC	\$ 10,000.00	0.1	\$1,000
203.1	COMMON EXCAVATION	CY	\$ 15.00	730	\$10,950
203.6	EMBANKMENT IN PLACE	CY	\$ 14.00	70	\$980
304.4	CRUSHED STONE (FINE GRADATION)(F)	CY	\$ 42.00	325	\$13,650
304.5	CRUSHED STONE (COARSE GRADATION) (F)	CY	\$ 42.00	650	\$27,300
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 100.00	330	\$33,000
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	10	\$1,500
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	1000	\$80,000
604.0007	POLYETHELENE LINER	EA	\$ 350.00	4	\$1,400
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	4	\$16,000
608.24	4" CONCRETE SIDEWALK (F)	SY	\$ 80.00	20	\$1,600
608.54	DETECTABLE WARNING DEVICES, CAST IRON	SY	\$ 500.00	9	\$4,500
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	24	\$1,800
618.7	FLAGGERS	HR	\$ 40.00	80	\$3,200
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 5,000.00	1	\$5,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	16	\$9,600
625.525	STREET LIGHTS INCLUDING POLES, FOUNDATIONS AND LUMINAIRES	EA	\$ 8,000.00	12	\$96,000
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00		\$0
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	2000	\$10,000
692	MOBILIZATION	UNIT	\$ 15,000.00	1.00	\$15,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	0	\$0
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 5,000.00	1	\$5,000
700	STORMWATER IMPROVEMENTS INCL. INFILTRATION AREAS (ESTIMATE)	\$	\$ 50,000.00	1	\$50,000
SUBTOTAL					\$337,480
				MISCELLANEOUS ITEMS (10%)	\$33,748
				CONTINGENCIES (20%)	\$67,496
				SUBTOTAL:	\$438,724
TOTAL ESTIMATED CONSTRUCTION COST					\$439,000
				ENGINEERING (PE)	\$90,000
				ROW	\$10,000
				CONSTRUCTION ENGINEERING, INSPECTION AND TESTING	\$40,000
ESTIMATED PROJECT TOTAL:					\$579,000



Town Hall and Library
(Under Renovation)

BEGIN 10' PAVED
SHARED USE PATH
WITH MINIMUM 5'
VEGETATED BUFFER

Lee Congregational
Church and Lee Hill
Early Learning Center

POSSIBLY EXPAND STORAGE IN
STORWMATER AREA TO ACCEPT
ROAD AND SHARED USE PATH
RUNOFF (EASEMENT REQUIRED)

Mast Way
Elementary School

MAXIMIZE GRASS BUFFER IN THIS
SEGMENT FOR STORMWATER
STORAGE / INFILTRATION



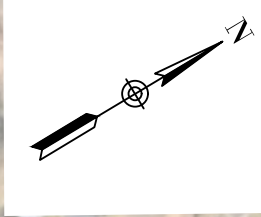
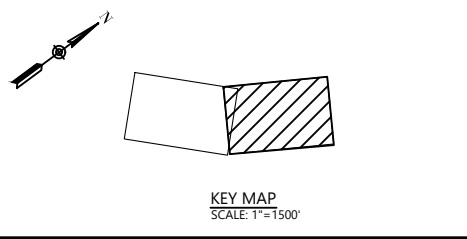
SCALE IN FEET



TOWN OF LEE, NEW HAMPSHIRE

MULTIUSE PATH ON
RTE 155

DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
09/28/2022	52935.01	FIGURE 1	SRPC	1	2



POTENTIAL STORMWATER
TREATMENT AREAS TO ACCEPT
ROAD AND SHARED USE PATH
RUNOFF

END 10' PAVED SHARED
USE PATH WITH MINIMUM
5' VEGETATED BUFFER

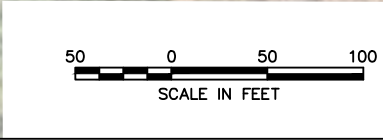
Garage

RECYCLING CENTER RD

NH155/MAST RD

NH155/MAST RD

ALENS AVE



		DATE PLOTTED		VHB PROJECT NO.	
		09/28/2022		52935.01	

TOWN OF LEE, NEW HAMPSHIRE					
MULTIUSE PATH ON RTE 155					
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS		
FIGURE 1	SRPC	2	2		



To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12,
Rochester, NH 03867

Date: November 3, 2002

Memorandum

Project #: 52935.01

From: Gregory L. Bakos

Re: On-Call Engineering
Task # 3 – Newmarket: NH Route 108 / NH Route 152 Intersection

As requested, VHB has estimated the cost for completing safety related improvements for the intersection of NH Route 108 (Exeter Road) at the intersection with NH Route 152 (South Main Street) in Newmarket, New Hampshire. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, site review, conceptual designs, and engineering judgement.

Project Purpose and Need

The Town of Newmarket's stated purpose for this project is to improve safety at the intersection of NH Route 108 and NH Route 152 in the dense downtown core. This centralized intersection has a history of reported crashes and near misses. This intersection is at the southern end of the core downtown and future land development will be extending south. Improved safety and circulation will be essential for sustainable development and transportation safety.

Existing Conditions

VHB's observation is that the safety concerns at the NH Route 108 and NH Route 152 intersection are largely due to the influence of the horizontal and vertical roadway geometries that limit sight lines within the intersection. Sight lines are further impacted by the existing buildings on the western corner.

NH Route 108 is free flow (i.e., no traffic control) through the intersection and NH Route 152 is stop controlled. As NH Route 152 eastbound vehicles stop and look for gaps in the NH Route 108 traffic stream, motorists have to look hard right and down to see NH Route 108 eastbound approaching vehicles. They also need to wait for westbound NH Route 108 vehicles are remaining on NH Route 108 or turning into NH Route 152 westbound. This situating leads to longer delay on the NH Route 152 eastbound approach and likely results in minor street motorists taking risks (i.e., accepting less than desirable gaps) when pulling into the mainline traffic stream.

Gerry Avenue is a two-lane connector roadway between NH Route 108 and NH Route 152. The Garry Avenue approaches at both ends is under stop controlled and the southern end at NH Route 108 provides exclusive left- and right-turn lanes.

Traffic

SRPC provided VHB with October 2022 tuning movements for the weekday AM and PM peak periods (7-9 AM and 4-6 PM) at the following intersections:

- > NH Route 108 and NH Route 152
- > NH Route 152 and Gerry Avenue
- > NH Route 108 and Gerry Avenue

VHB adjusted the traffic counts to reflect 2042 design year average-month, pre-pandemic traffic volumes. VHB then conducted a preliminary investigation into whether the NH Route 108 and NH Route 152 intersection should be placed under traffic signal control. Concerns were raised with respect to heavy vehicles and commuting traffic stopped at a red signal indication during the winter months due to the steep grade along NH Route 108 south of the intersection. Therefore, the following alternative was determined to be a viable option in accommodating traffic volumes and improving vehicle and pedestrian safety.

- › Maintain the two-way vehicle flow along NH Route 152 between Gerry Avenue and South Street.
- › Convert NH Route 152 between South Street and NH Route 108 into one-way westbound flow (i.e., departing the NH Route 108 intersection).
- › At the NH Route 152 and Gerry Avenue intersection:
 - The Gerry Avenue northbound approach would remain under STOP-sign control.
 - The NH Route 152 eastbound and westbound movements would operate without traffic control (i.e., free-flow).
 - Directional signage would be posted on the NH Route 152 eastbound approach to direct motorists to use Gerry Avenue for access on NH Route 108.
- › At the NH 152 and South Street intersection:
 - NH Route 152 eastbound vehicles would only be able to turn left onto South Street (no through movements to connect with NH Route 108).
 - NH Route 152 westbound vehicles would continue through to the Gerry Avenue intersection or turn right onto South Street.
 - South Street southbound vehicles would only turn right onto NH Route 152 westbound.
 - Traffic control signs would be posted on the NH Route 152 eastbound and South Street approaches to reinforce the one-way directional travel east of the intersection.
- › At the NH Route 152, NH Route 108, and Creighton Street intersection:
 - The NH Route 152 leg and the Creighton Street leg would be one-way roadways departing the intersection.
 - The NH Route 108 northbound and southbound approaches would operate without traffic control (i.e., free-flow).
- › At the NH Route 108 and Gerry Avenue intersection:
 - The intersection would be placed under traffic signal control.
 - Due to the close proximity, the new signal would be connected with the railroad crossing signal to help control vehicles traveling southbound toward that location.
 - The Gerry Avenue southbound approach would be widened to provide an exclusive left-turn lane and an exclusive right-turn lane.
 - The NH Route 108 northbound approach would maintain the two-lane approach (exclusive left-turn lane and through lane), and the left-turn lane would need be extended to accommodate the vehicle demand when faced with a red traffic signal indication.
 - The driveways across from Gerry Avenue (33 Exeter Road) would be placed under signal control since they are within the influence area of the new traffic signal.
 - The southern driveway would be signed as an entrance (departing the intersection)

- The northern driveway would be signed as an exit (entering the intersection).

Based on the Highway Capacity Manual (HCM) results, the Gerry Avenue northbound approach to NH Route 152 is projected to operate at LOS D or better during the weekday AM and PM peak hours. In addition, this preliminary assessment shows that the NH Route 108 and Gerry Avenue signalized intersection would operate at LOS B with all lane groups at LOS C or better during the weekday AM and PM peak hours.

Proposed Improvements

Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plan.

The primary alteration is that NH Route 152 will be converted to one-way from NH Route 108 to South Street. This change will reroute all eastbound traffic on NH Route 152 to NH Route 108 by way of Gerry Avenue. This change will greatly uncomplicate the NH Route 108/NH Route 152 intersection and will alleviate the primary sight line related safety concern.

Moving traffic onto Gerry Avenue will require expansion of the Gerry Avenue approach to NH Route 108 to provide longer turn lanes than currently exist. A traffic signal is proposed to control that intersection due to the additional traffic demand from the redistribution of vehicles.

The proposed one-way section of NH Route 152 will provide an opportunity to add curbed sidewalk and on-street parallel parking. There would also be bumpouts for crosswalks and to constrain the travel way and calm incoming traffic from NH Route 108. These changes would aim to improve the South Main Street pedestrian accommodations and appearance.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

Minor property impacts may result from widening Gerry Avenue to accommodate the extended left-turn lane at NH Route 108.

Natural Resources

The environmental considerations within this project are expected to be minimal since the area appears to be free of regulated natural resource areas. Cultural resources may be a concern since the adjacent properties may be considered historic and there is a possibility that the Gerry Avenue widening will impact property.

If federal funds are used, the project will still need to complete National Environmental Policy Act (NEPA) documentation which will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans, VHB developed a program level estimate of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Costs

The construction for this project is relatively minor in nature, consisting of roadway widening and sidewalk reconstruction on Gerry Avenue and adding curbing and sidewalks and bumpouts on NH Route 152 in the new one-way section. A major cost item will be the new traffic signal at the NH Route 108 and Gerry Avenue intersection, including coordination with the nearby railroad signals. See the attached conceptual cost estimates for a detailed list of items and quantities.

Design and Permitting Costs

The project will be assumed to advance as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This process is significant since there are cost implications. In determining the design phase costs, VHB applied 'rule-of-thumb' percentages adjusted for the anticipated permitting or other complexities as well as the scale of the project. Smaller projects such as this typically have much higher design costs as a percentage of the construction costs.

<u>Proposed Improvements:</u>	<u>PE</u>	<u>ROW</u>	<u>Construction</u>	<u>Totals</u>
NH108/NH152/Gerry Ave	\$100,000	\$10,000	\$659,000	\$769,000

CONSTRUCTION COST ESTIMATE

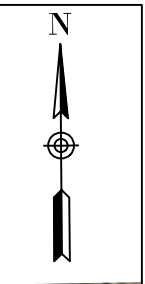
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **NEWMARKET NH 108 / NH 152 INTERSECTION**

VHB PROJECT NO. 52935.01

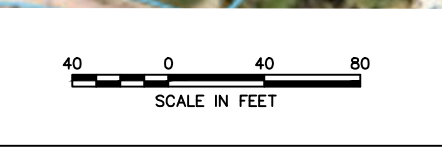
TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	64	\$1,152
203.2	ROCK EXCAVATION	CY	\$ 75.00	5	\$347
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	37	\$1,480
304.5	CRUSHED STONE (COURSE GRADATION) (F)	CY	\$ 40.00	27	\$1,080
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	65	\$7,800
417	COLD PLANING BITUMINOUS SURFACES	SY	\$ 5.00	600	\$3,000
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	155	\$12,400
604.0007	POLYETHELENE LINER	EA	\$ 350.00	2	\$700
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	2	\$8,000
608.13	3" BITUMINOUS SIDEWALK (F)	SY	\$ 70.00	111	\$7,770
608.36	6" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 100.00	2	\$200
608.54	DETECTABLE WARNING DEVICES, CAST IRON	SY	\$ 500.00	1	\$500
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	255	\$11,475
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	50	\$4,500
616.101	TRAFFIC SIGNAL	U	\$ 250,000.00	1	\$250,000
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	128	\$9,600
618.7	FLAGGERS	HR	\$ 40.00	640	\$25,600
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 50,000.00	1	\$50,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	46	\$27,600
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	255	\$1,020
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	94	\$472
692	MOBILIZATION	UNIT	\$ 20,000.00	1	\$20,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	4	\$7,200
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 1,000.00	1	\$1,000
SUBTOTAL					\$452,897
MISCELLANEOUS ITEMS (10%)					\$45,290
CONTINGENCIES (20%)					\$90,579
SUBTOTAL:					\$588,766
TOTAL ESTIMATED CONSTRUCTION COST					\$589,000
ENGINEERING (PE)					\$100,000
ROW					\$10,000
CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$70,000
ESTIMATED PROJECT TOTAL:					\$769,000



TOWN OF NEWMARKET, NEW HAMPSHIRE

NH108/NH152 INTERSECTION



	DATE PLOTTED	VHB PROJECT NO.
	09/28/2022	52935.01

DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
FIGURE 1	SRPC	1	1



To: Colin Lentz – Sr. Transportation Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12,
Rochester, NH 03867

Date: November 3, 2002

Memorandum

Project #: 52935.01

From: Gregory L. Bakos

Re: On-Call Engineering

Task # 6 – Somersworth: W High St, Maple St, and Sunset Dr Intersection

As requested, VHB has estimated the cost for completing safety related improvements on NH Route 236 (West High Street) at its intersection with Maple Street and Sunset Drive in Somersworth, New Hampshire. The cost estimate is provided for the SRPC to consider the project for inclusion in the Ten-Year-Plan (TYP). VHB based the costs on the materials provided by the community as well as online data gathering, conceptual designs, and engineering judgement.

Project Purpose and Need

The City of Somersworth's stated purpose for this project is to address safety concerns for motorists, pedestrians, and cyclists within the intersection.

The City further states that: this intersection is unsafe due to the close proximity of two adjacent roadways (Maple Street and Sunset Drive) immediately next to each other connecting to the north side of West High Street, along with opposite (south) leg of Maple Street. As a result of the current layout, it is difficult for motorists, pedestrians, or cyclists to adequately view traffic approaching from the west or east on West High Street. This intersection also experiences a steady volume of pedestrians from the residential areas of Maple Street and Sunset Drive. St. Martin Church is located on the south side of West High Street east of Maple Street, and generates traffic particularly during church services. Over the past several years, there has been one 'serious' crash, several minor incidents, and countless near misses. The serious collision resulted in a fatality very near the intersection in 2019.

Please also refer to Somersworth's project proposal which includes additional documentation on the Purpose and Need and the benefits that these improvements will bring to the community.

Existing Conditions

VHB's observed that West High Street is very straight and level roadway, and there are few visual cues to encourage motorists to observe the posted 30 miles per hour (MPH) speed limit. VHB concurs that the unusual split geometry of the Maple Street/ Sunset Drive approaches creates confusion, conflict, and limited sight lines. A related safety consideration is that serious side-impact crashes might be expected at this location as drivers on these two side streets vie to enter the higher speed mainline roadway (West High Street).

The long diagonal crosswalk pedestrian crosswalk that crosses through the middle of the intersection from the southeast corner of the intersection to between Maple Street and Sunset Drive also raises some concerns. The crossing length is approximately 65 feet and there is no sidewalk or pedestrian landing on the north side between Maple Street and Sunset Drive.

The Bicycle Level of Traffic Stress (BLTS) for the subject section of West High Street is listed as LTS 3 – Moderate Stress according to the SRPC LTS inventory. This result means the project area is suitable for those who ride regularly along this section of the West High Street. School children do not fit this description. West High Street is approximately 28-foot wide within the project limits including 2-foot striped shoulders, which means bicyclists mostly share the travel

lanes with motor vehicles. Pedestrians typically walk off to the side in the gravel or grass shoulders where there are no sidewalks. Traffic volumes are moderate at 3,619 per NHDOT's Roads and Projects website.

Traffic

SRPC provided VHB with September 2022 tuning movements at the intersection for the weekday AM and PM peak periods (7-9 AM and 4-6 PM). VHB adjusted the traffic counts to reflect 2042 design year average-month, pre-pandemic traffic volumes. VHB then conducted a warrant analysis to determine whether the projected traffic volumes satisfy the Manual on Uniform Traffic Control Devices (MUTCD) thresholds for the consideration of a traffic signal to address the vehicular (five approaches to the unsignalized intersection) and/or pedestrian (extensive pedestrian crossing through the intersection) safety concerns. The results of the analysis indicated that the four hours of available traffic volumes do not meet the MUTCD volume-based traffic signal warrants during the 2042 design year. See the attached traffic documentation.

VHB subsequently evaluated whether a single lane roundabout would function adequately at this intersection, and the Highway Capacity Manual (HCM) results show that all approaches would operate at optimal levels. These findings are not unexpected given the relatively low traffic volumes. The roundabout would be considered for safety purposes in controlling conflicts and accommodating pedestrian crossings since delays and queues do not appear to be concerns at this intersection.

Proposed Improvements

Following is a description of the proposed improvements that are the basis for the included cost estimate. Also see the attached schematic plans. Two alternatives were considered as follows.

OPTION-1: Traffic Calming and Pedestrian Crossing Improvements:

The improvements included with this alternative are expected to enhance pedestrian and motor vehicle safety in the following ways:

- › Raised medians:
 - Two 6-foot-wide raised medians are proposed. The eastern median would include a pedestrian cut-through where a crosswalk would be located. The median effectively divides the crossing distance in half and also increases the visibility of the crossing. Both medians are expected to provide a measure of traffic calming, draw attention to the intersection, and require motorists to negotiate around the medians. The western median is depicted with a section of flush cobblestone (or similar) pavers to accommodate large vehicles turning right from Sunset Drive.
- › Geometric Improvements
 - The concept plan includes minor geometric modifications that include angling the Sunset Drive approach slightly away from the Maple Street approach so the nose between the two could be lengthened and a sidewalk could be added with a pedestrian landing. There is currently no pedestrian landing between the two approaches even though there is a crosswalk leading to the nose area.
 - West High Street would also be widened several feet on both sides to provide space for the raised medians.
- › Sidewalks

- The plan includes adding sidewalks on the north side of West High Street to accept the pedestrians crossing at the crosswalk. In addition, the concept includes a sidewalk between Maple Street and Sunset Drive that extends up Sunset Drive a short distance to remove pedestrians from the intersection area. Additional sidewalks could be added, however, the only existing sidewalks are within the southeast quadrant along Maple Street and West High Street.
- › Rectangular Rapid Flashing Beacons (RRFBs)
- Pedestrian actuated RRFBs are proposed at the pedestrian crossing on the ends of the crosswalk and within the median refuge island. The City noted that this location is a high pedestrian crossing area and the RRFBs would enhance driver awareness of pedestrians attempting to cross.

OPTION-2: Single Lane Roundabout:

The single lane roundabout alternative provides a higher level of safety improvement for motorists since it would slow vehicle speeds and, more importantly, address the Maple Street / Sunset Drive approach issues. The roundabout would also provide improved pedestrian safety since there would be three raised medians providing refuge and shorter crossing distances.

The roundabout option provides significant motorist and pedestrian safety improvements, but this concept comes at a considerably higher cost with greater property impacts.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

Option-1 would have minimal permanent property impacts, estimated to be approximately 200 square feet (SF), and Option-2 would impact all five corners of the intersection and result in approximately 7,500 SF of permanent impacts. All of the impacts would be to yard areas and are not projected to impact any buildings.

Natural Resources

The environmental considerations within this project are expected to be minimal since the area appears to be free of regulated natural resource areas.

If federal funds are used, the project will still need to complete National Environmental Policy Act (NEPA) documentation which will include a wide range of natural and cultural resource documentation.

Estimated Project Costs

Based on the above discussions and the attached concept plans, VHB developed program level estimates of probable cost broken out by primary components as shown on the attached spreadsheets.

Estimated Costs

Major construction items are described as follows. The roadway widening areas are estimated to require full depth pavement construction consisting of 6 inches of bituminous pavement over 24 inches of crushed stone base course. The medians include a 4 inch concrete walk surface and 12 inches of a crushed stone base. The sidewalks include a 3 inch bituminous walk surface over 12 inches of a crushed stone base. The truck apron includes an 8 inch concrete surface over 24 inches of a crushed stone base. Drainage system costs are estimated based on the number of catch basins and connecting pipe to connect to existing systems. See the attached conceptual cost estimates for a detailed list of items and quantities.

Design and Permitting Costs

The project will be assumed to advance as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This process is significant since there are cost implications. In determining the design phase costs, VHB applied 'rule-of-thumb' percentages adjusted for the anticipated permitting or other complexities as well as the scale of the project. Smaller projects typically have higher design costs as a percentage of the construction costs.

<u>Proposed Improvements:</u>	<u>PE</u>	<u>ROW</u>	<u>Construction</u>	<u>Totals</u>
Option 1: Traffic Calming / Sidewalks	\$80,000	\$10,000	\$477,000	\$567,000
Option 2: Roundabout	\$180,000	\$10,000	\$996,000	\$1,186,000

CONSTRUCTION COST ESTIMATE

PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **DURHAM NH 155A/MAIN STREET/MAST ROAD INTERSECTION**

VHB PROJECT NO. 52935.01

TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	281	\$5,057
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	80	\$3,217
304.5	CRUSHED STONE (COURSE GRADATION) (F)	CY	\$ 40.00	201	\$8,021
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	316	\$37,908
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	20	\$3,000
403.99	TEMPORARY BITUMINOUS PAVEMENT	TON	\$ 110.00	20	\$2,200
417	COLD PLANING BITUMINOUS SURFACES	SY	\$ 5.00	2558	\$12,788
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	80	\$6,400
604.0007	POLYETHELENE LINER	EA	\$ 350.00	4	\$1,400
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	4	\$16,000
604.324	DRAINAGE MANHOLES, 4 FT DIAMETER	U	\$ 4,000.00	1	\$4,000
608.13	3" BITUMINOUS SIDEWALK (F)	SY	\$ 70.00	200	\$14,000
608.36	6" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 100.00	41	\$4,128
608.54	DETECTABLE WARNING DEVICES, CAST IRON	SY	\$ 500.00	6	\$3,000
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	460	\$20,700
609.02	CURVED GRANITE CURB	LF	\$ 50.00	70	\$3,500
611.90001	ADJUSTING WATER GATES AND SHUTOFFS SET BY OTHERS	EA	\$ 250.00	3	\$750
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	40	\$3,600
616.26101	RECTANGULAR RAPID FLASHING BEACON	U	\$ 35,000.00	1	\$35,000
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	320	\$24,000
618.7	FLAGGERS	HR	\$ 40.00	640	\$25,600
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 25,000.00	1	\$25,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	24	\$14,400
625.525	STREET LIGHTS INCLUDING POLES, FOUNDATIONS AND LUMINAIRES	EA	\$ 8,000.00	2	\$16,000
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	330	\$1,320
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	1000	\$5,000
650.2	LANDSCAPING	U	\$ -	0	\$0
692	MOBILIZATION	UNIT	\$ 20,000.00	1	\$20,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	6	\$10,800
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 2,000.00	1	\$2,000
SUBTOTAL					\$328,788
MISCELLANEOUS ITEMS (10%)					\$32,879
CONTINGENCIES (20%)					\$65,758
SUBTOTAL:					\$427,424
TOTAL ESTIMATED CONSTRUCTION COST					\$427,000
ENGINEERING (PE)					\$80,000
ROW					\$10,000
CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$50,000
ESTIMATED PROJECT TOTAL:					\$567,000

CONSTRUCTION COST ESTIMATE

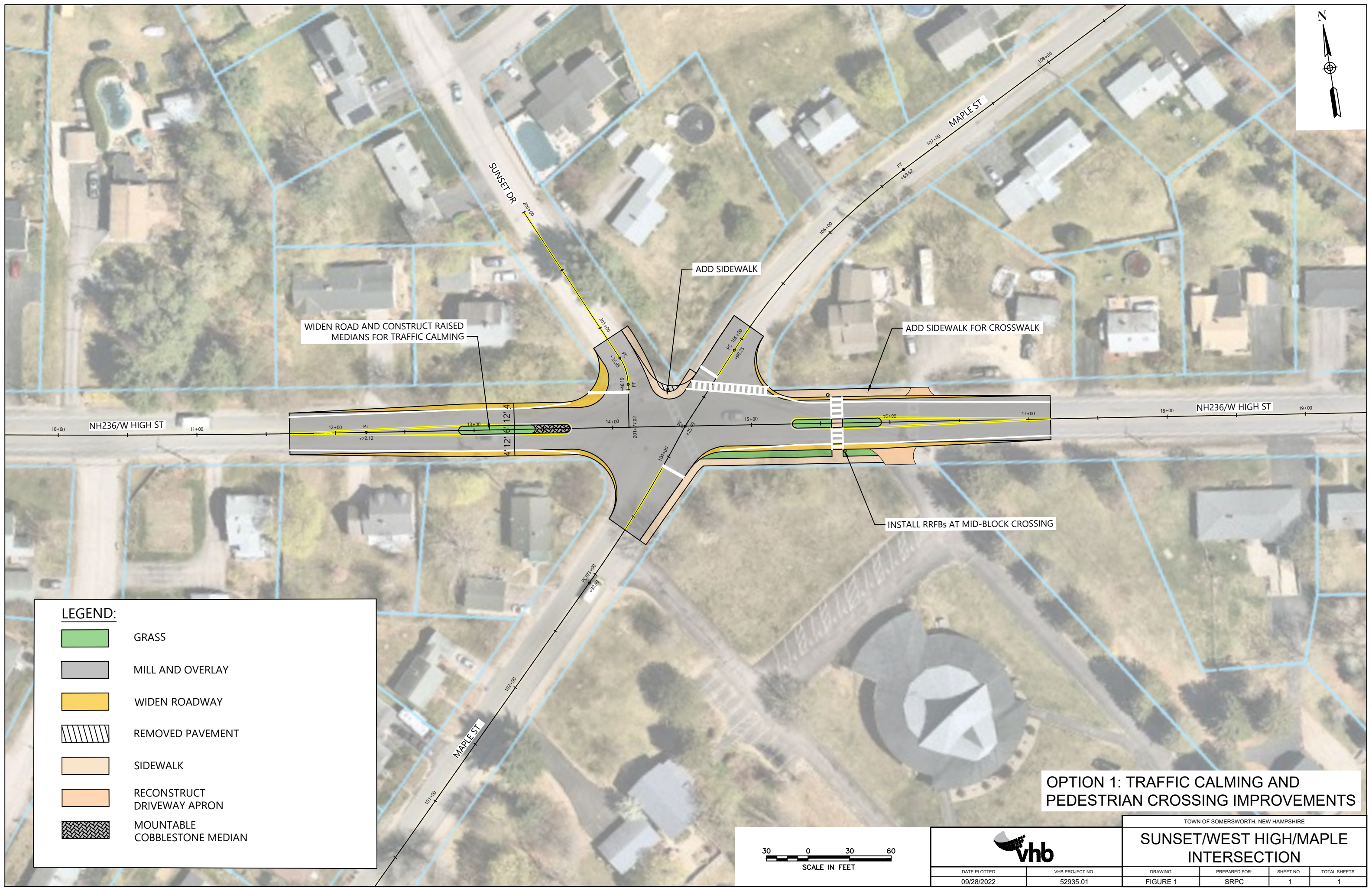
PROJECT : Strafford Regional Planning Commission TYP Project Candidates

LOCATION : **DURHAM NH 155A/MAIN STREET/MAST ROAD INTERSECTION**








VHB PROJECT NO. 52935.01

TYPE: **Program Level Conceptual Estimate**

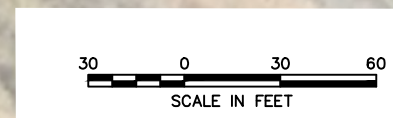
	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
203.1	COMMON EXCAVATION	CY	\$ 18.00	1300	\$23,400
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	300	\$12,000
304.5	CRUSHED STONE (COURSE GRADATION) (F)	CY	\$ 40.00	920	\$36,800
403.11	HOT BITUMINOUS PAVEMENT - MACHINE METHOD	TON	\$ 120.00	680	\$81,600
403.12	HOT BITUMINOUS PAVEMENT - HAND METHOD	TON	\$ 150.00	20	\$3,000
403.99	TEMPORARY BITUMINOUS PAVEMENT	TON	\$ 110.00	50	\$5,500
417	COLD PLANING BITUMINOUS SURFACES	SY	\$ 5.00	2000	\$10,000
603.00215	15" R.C. PIPE, 2000D	LF	\$ 80.00	200	\$16,000
604.0007	POLYETHELENE LINER	EA	\$ 350.00	4	\$1,400
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	UNIT	\$ 4,000.00	4	\$16,000
604.324	DRAINAGE MANHOLES, 4 FT DIAMETER	U	\$ 4,000.00	2	\$8,000
608.13	3" BITUMINOUS SIDEWALK (F)	SY	\$ 70.00	390	\$27,300
608.24	4" CONCRETE SIDEWALK (F)	SY	\$ 80.00	450	\$36,000
608.36	6" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 100.00	60	\$6,000
608.38	8" REINFORCED CONCRETE SIDEWALK (F)	SY	\$ 220.00	400	\$88,000
608.54	DETECTABLE WARNING DEVICES, CAST IRON	SY	\$ 500.00	12	\$6,000
609.01	STRAIGHT GRANITE CURB	LF	\$ 45.00	1130	\$50,850
609.01123	STRAIGHT GRANITE CURB, 12" HIGH WITH 3"X3" MOUNTABLE BEVELED EDGE	LF	\$ 70.00	280	\$19,600
609.02	CURVED GRANITE CURB	LF	\$ 50.00	60	\$3,000
611.90001	ADJUSTING WATER GATES AND SHUTOFFS SET BY OTHERS	EA	\$ 250.00	3	\$750
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	80	\$7,200
618.61	UNIFORMED OFFICERS W/ VEHICLE	HR	\$ 75.00	400	\$30,000
618.7	FLAGGERS	HR	\$ 40.00	1000	\$40,000
619.1	MAINTENANCE OF TRAFFIC	UNIT	\$ 40,000.00	1	\$40,000
619.253	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK)	UWK	\$ 600.00	36	\$21,600
625.525	STREET LIGHTS INCLUDING POLES, FOUNDATIONS AND LUMINAIRES	EA	\$ 8,000.00	5	\$40,000
628.2	SAWED BITUMINOUS PAVEMENT	LF	\$ 4.00	1200	\$4,800
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	160	\$800
650.2	LANDSCAPING	U	\$ 20,000.00	1	\$20,000
692	MOBILIZATION	UNIT	\$ 40,000.00	1	\$40,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	8	\$14,400
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 2,000.00	1	\$2,000
SUBTOTAL					\$712,000
MISCELLANEOUS ITEMS (10%)					\$71,200
CONTINGENCIES (20%)					\$142,400
SUBTOTAL:					\$925,600
TOTAL ESTIMATED CONSTRUCTION COST					\$926,000
ENGINEERING (PE)					\$180,000
ROW					\$10,000
CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$70,000
ESTIMATED PROJECT TOTAL:					\$1,186,000



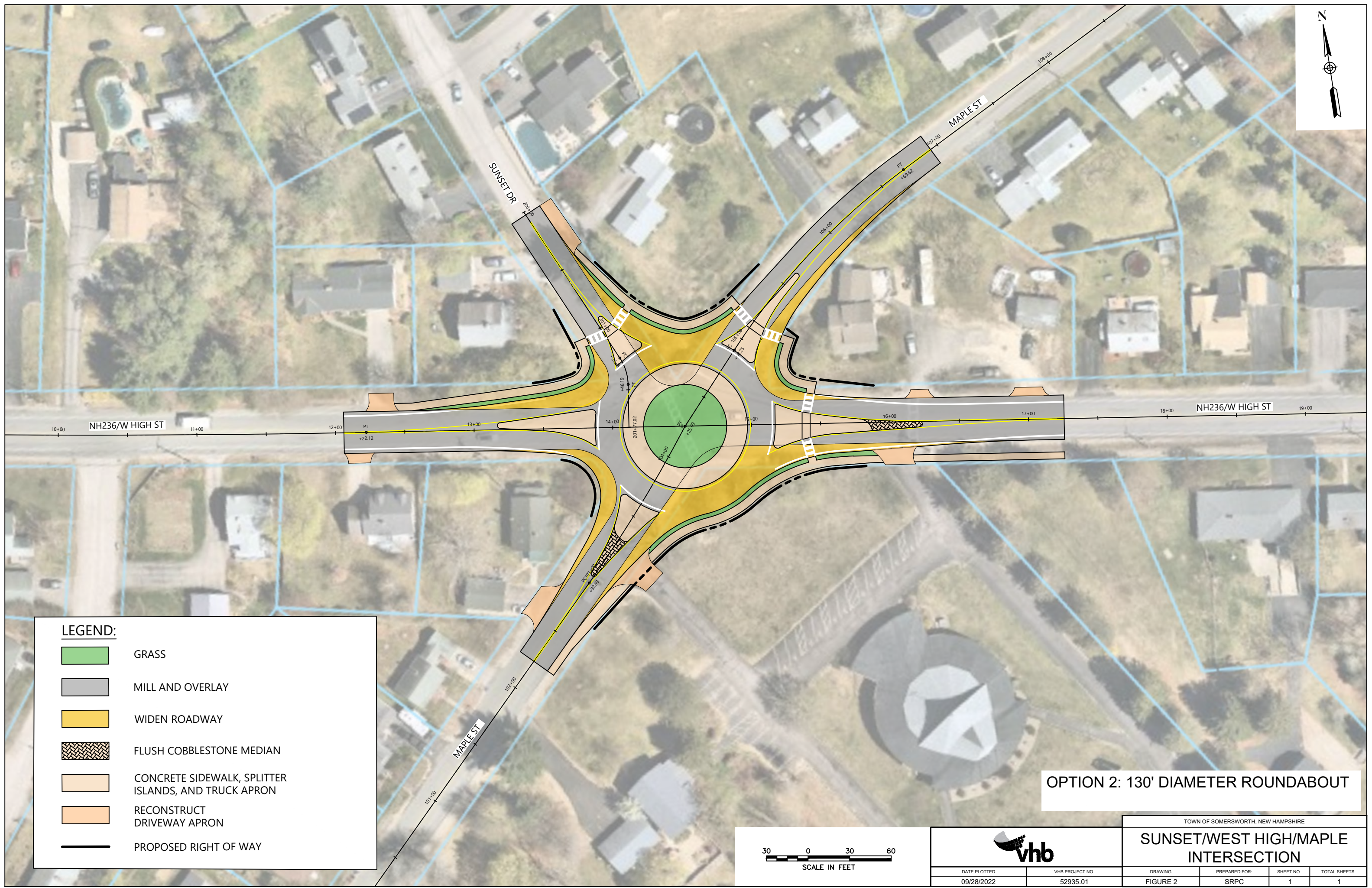
LEGEND:

-  GRASS
-  MILL AND OVERLAY
-  WIDEN ROADWAY
-  REMOVED PAVEMENT
-  SIDEWALK
-  RECONSTRUCT DRIVEWAY APRON
-  MOUNTABLE COBBLESTONE MEDIAN






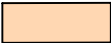

OPTION 1: TRAFFIC CALMING AND PEDESTRIAN CROSSING IMPROVEMENTS



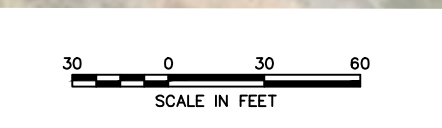
TOWN OF SOMERSWORTH, NEW HAMPSHIRE		SUNSET/WEST HIGH/MAPLE INTERSECTION			
DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
09/28/2022	52935.01	FIGURE 1	SRPC	1	1



LEGEND:

-  GRASS
-  MILL AND OVERLAY
-  WIDEN ROADWAY
-  FLUSH COBBLESTONE MEDIAN
-  CONCRETE SIDEWALK, SPLITTER ISLANDS, AND TRUCK APRON
-  RECONSTRUCT DRIVEWAY APRON
-  PROPOSED RIGHT OF WAY

OPTION 2: 130' DIAMETER ROUNDABOUT



vhb

DATE PLOTTED	VHB PROJECT NO.
09/28/2022	52935.01

TOWN OF SOMERSWORTH, NEW HAMPSHIRE				
SUNSET/WEST HIGH/MAPLE INTERSECTION				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 2	SRPC	1	1	

Project Scores and Estimates REVISED to add Infation

Municipality	Project Score	Location/Road	Scope	Engineering Cost	ROW Cost	Construction Cost	Total	Inflated
SOM A	5.5	Main St	Complete Streets improvements	NA	NA	NA	\$3,662,560	\$4,827,429
NKT A	4.9	NH152/NH108/Gerry Ave	Safety Improvements	\$100,000	\$10,000	\$659,000	\$769,000	\$1,013,579
LEE A1	4.6	NH155/George Bennett/Lee Hook Rd (option 1)	Eliminate the West Mill Pond Road Connection	\$50,000	\$0	\$154,000	\$214,000	\$282,062
LEE A2	4.6	NH155/George Bennett/Lee Hook Rd (option 2)	Single Lane Roundabout	\$180,000	\$20,000	\$909,000	\$1,109,000	\$1,461,715
LEE B	4.4	NH155	Shared Use Path along NH 155	\$90,000	\$10,000	\$479,000	\$579,000	\$763,150
SOM B	4.3	West High St/Maple St/Sunset Dr (option 1)	Traffic Calming and Pedestrian Crossing	\$80,000	\$10,000	\$477,000	\$567,000	\$747,333
SOM B2	4.3	West High St/Maple St/Sunset Dr (option 2)	Single Lane Roundabout	\$180,000	\$10,000	\$996,000	\$1,186,000	\$1,563,205
DUR A	3.7	NH155/Main St	Roundabout with slip lanes	\$180,000	\$30,000	\$1,212,000	\$1,422,000	\$1,874,264
DUR B	3.2	Durham Point Rd	Road Improvements	\$200,000	\$10,000	\$2,787,000	\$2,997,000	\$3,950,189
							Regional Allocation	5846797
	SOM	Somersworth						
	LEE	Lee						
	NKT	Newmarket						
	DUR	Durham						