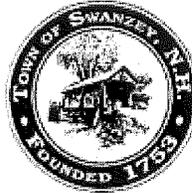


TOWN OF NEWMARKET NEW HAMPSHIRE



ENGINEERING STUDY *FOR* ROUTE 108 BIKE PATH CONSTRUCTION/SHOULDER WIDENING

April 2015 - DRAFT

Prepared by:



Portsmouth, New Hampshire
FILE NO. 1851

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EXECUTIVE SUMMARY

The Town of Newmarket plans to construct dedicated bicycle facilities along the Route 108 corridor between Bennett Way and Ash Swamp Road. The project will address traffic congestion and safety hazards related to shared use travel lanes for bicycle and vehicle travel. The project work is funded by the Congestion Mitigation Air Quality (CMAQ) Program and administered under the NHDOT Local Public Agency (LPA) process.

The purpose of the proposed project is to improve safety for bicyclists and commuters and to mitigate congestion associated with shared use of the roadway. The proposed action is necessary because shared use of the existing roadway presents conditions that may be considered unsafe changes or interrupt traffic flow and contributes to traffic congestion. The existing pavement width is not wide enough to accommodate both the existing traffic (17,000 VPD) and bicycles. The project goals are summarized as follows:

- Create a designated bike route for commuting and community access
- Provide for regional connection of established bike routes
- Address safety concerns for shared roadway use

Two Design Alternates were evaluated:

- Alternate No. 1 – Paved Bike Lane Shoulders - \$1,216,000
- Alternate No. 2 – Shared Bike Path Construction - \$1,114,000

Design Alternate No. **(TBD)** is recommended based on the following:

- TBD
- TBD
- TBD

1.0 INTRODUCTION

1.1 Background

The Route 108 Bike Path Construction/Shoulder Widening project has been in planning since 2006. The NHDOT has allocated project funds for municipally managed construction of shoulder widening and bike lanes along a segment of NH Route 108 under the Congestion Mitigation and Air Quality (CMAQ) program. CMAQ is administered under NHDOT's Local Public Agency (LPA) Program.

The NHDOT is also pursuing shoulder widening for bike path construction on Rte 108 north of the downtown area extending ~3.5 miles toward Durham. The result will be a 6.5 mile (approximate) bicycle corridor connecting the Towns of Newfields, Newmarket and Durham.

Since Route 108 is recognized as a state bicycle route, avid cyclists use the Rte 108 corridor for recreational and commuting purposes. The existing narrow shoulders require vehicles to alter speed and/or cross the centerline into oncoming traffic to avoid bicyclists. This condition and other movements related to shared travel lanes increases traffic congestion under heavy traffic volumes (17,000 VPD) and presents a safety hazard.

1.2 Project Description and Study Area

The original study area contemplated in the project planning stage extends approximately 1.8 miles along the north and south bound traffic lanes of Route 108 from the Newfields Town line to the southern limit of NHDOT Project 13107 (near Bennett Way). Since shoulder widening and/or bike path construction at the railroad bridge crossing between Ash Swamp Road and the Newfields Town line will not be feasible for the work under this project, the study area has been shortened and begins at Ash Swamp Road.

The project is intended to relieve congestion problems and hazards related to shared use of the roadway by vehicles and cyclists. In addition to physical improvements within the roadway, passive controls will be evaluated in the design to increase safety, improve public awareness of the bike route and to accommodate cycling within the Route 108 corridor.

1.3 Purpose and Need Statement - Project Goals

The following items were identified as project goals in the preliminary project meetings and are the basis for purpose and need:

- Create a designated bike route for commuting and community access
- Provide for regional connection of established bike routes
- Address safety concerns for shared roadway use

The purpose of the proposed project is to improve safety for bicyclists and commuters and to mitigate congestion associated with shared use of the roadway. The proposed action is necessary

because shared use of the existing roadway presents conditions that may be considered unsafe for cyclists, changes or interrupts traffic flow and contributes to traffic congestion. The existing pavement width is not wide enough to accommodate both the existing traffic (17,000 VPD) and bicycles.

2.0 EXISTING CONDITIONS

2.1 Route 108 – Exeter Road

The section of Route 108 within the project study area known as Exeter Road is a rural highway passing through scenic terrain consisting of natural physical features and manmade structures established with progression of community development. Generally, the roadway cross section provides 11' travel lanes with 2' shoulders for a total paved width up to 26'. Pavement widths may be wider at intersection approaches or where paved gutters were installed by NHDOT Division 6 Maintenance for stormwater runoff control.

There are no provisions for bicycle travel within the project area. Bicycles use the same travel lanes as vehicles. The existing roadway presents the following difficulties for cyclists:

- Limited Sight Distances
- Unbalanced Vehicle Speeds (relative to bike travel speed)
- Drainage/Utility Grates and Covers
- Poor Pavement Condition (shoulders)
- Insufficient Clear Space (vehicle lane and/or shoulder width)
- Lack of signs and pavement markings warning motorists of bicycles

A variation of paved swales, vegetated swales, gravel shoulders, stone walls and other features are also present along the corridor. Short segments of closed drainage and cross culverts are provided to manage stormwater where runoff concentration is significant and/or drainage courses converge.

2.2 Physical Features and Design Constraints

Certain physical features along the project corridor limit options for increased pavement widths within the NHDOT's Right of Way without additional ROW acquisitions or physical and environmental impacts. Physical design constraints include slopes, embankments, ledge out crops, utility poles, stone walls, guardrail and driveways. An existing conditions matrix summarizing physical features and design constraints for the project corridor is attached in Appendix A. A summary of limiting features that may influence project design are presented in the table below:

Table 1: Existing Conditions Summary

<i>Location</i>	<i>Description</i>	<i>Design Implication</i>
STA 50+50 to 55+25 STA 63+75 to 71+00 STA 78+50 to 88+50	Utility pole encroachment (13 locations total)	Pole relocation - coordination
STA 64+75 to 67+50	Steep embankment, slope and guardrail	Horizontal road alignment, retaining wall and/or grading impacts
STA 73+50 to 78+50	Steep embankment, slope, retaining structures and driveways	Grading impacts and tie-in
STA 78+50 to 84+00	Exposed ledge	Rock removal

2.3 Right of Way Limits

This segment of Exeter Road (Rte 108) is located within a variable width controlled access ROW. ROW widths vary from 50' to 66' widths (Figure 1A). NHDOT records indicate there are two traditional ROW layouts dating back to the 1800's for this route. One is a 3 Rod (50') width and one is 4 Rod (66') width. Although portions of the layout fit the physical layout of the current Route 108 corridor, the individual layouts as a whole correlate poorly with the actual road alignment and physical boundary evidence.

A preliminary ROW survey was conducted (see Figure 1B) to assess known versus unknown segments of the ROW along the project corridor. The resulting layout is based on a combination of deed research, site plan survey information, field observations and portions of the NHDOT layouts. Further ROW survey will be necessary during final design to ensure the proposed improvements are constructed within NHDOT jurisdiction. Anticipated acquisitions and/or easement areas are noted in the Section 3 under the Project Impact discussion for each design alternative.

3.0 ENGINEERING EVALUATION

3.1 Design Alternate No.1 – Paved Bike Lane Shoulders

Alternate No.1 consists of constructing a 5' wide paved shoulder on the north and south bound travel lanes of Route 108 to provide a dedicated bike lane for cyclists. A typical roadway cross section is shown on Figure 2. A schematic layout plan is provided as Figure 2A.

3.1.1 Description

The proposed alternative includes the following work:

- Construct 5’ bike lanes at edge of each north and south bound travel lane (typical)
- Minimum bike shoulder width will be 4’ at areas where physical constraints prevent 5’ bike lanes and where curbing does not exist
- Construct paved aprons at gravel driveways and extend driveway apron pavement beyond bike lanes to limit debris on bike lane and for uniform grading
- Provide bike lane symbol marking to designate preferential use by bicyclists
- Provide pavement and gravel depths similar to road section. A minimum of four (4) inches of pavement over twenty four (24) inches of gravel is included

3.1.2 Project Impacts

Anticipated project impacts such as grading and/or private property encroachments are provided in matrix format in Appendix B. A summary of notable impacts including anticipated easement/acquisition areas is provided below:

Table 2: Bike Lane Impact Summary

<i>Impacts</i>	<i>Anticipated Quantity</i>
ROW Acquisition/Easement Area	8 properties
Road Realignment	2 locations
Stone Wall Reconstruction	2 locations
Utility Pole Relocation	2 locations
Drainage Relocation	1 location (300 LF)
Guardrail Relocation	3 locations
Driveway Grading	1 location (650 LF)

3.1.3 Evaluation

A summary of advantages and disadvantages are below:

Table 3: Bike Lane Advantages and Disadvantages

<i>Advantages</i>	<i>Disadvantages</i>
<ul style="list-style-type: none"> • Preferred bike facility for commuting and community access • Bicycle travel is oriented in the same direction as vehicle travel which increases bicyclists’ visibility to motorists • Relieves traffic congestion related to 	<ul style="list-style-type: none"> • High capital cost • Widths may not be consistent (or may need shared lanes) • More drive crossings and intersections • Creates pavement joint at edge of roadway

<p>sharing travel lane. Bicyclists can operate at their preferred speed without impact to vehicle traffic speed</p> <ul style="list-style-type: none"> • Lower maintenance cost to Newmarket. NHDOT will maintain pavement surface (future overlays and plowing) • Provides safer crossings for bicyclists at roadway intersections and driveways • May be able to use existing gravel base in some areas • Matches intent of bike lanes north of Newmarket on Rte 108 	<ul style="list-style-type: none"> • Requires additional pavement marking maintenance • Vehicle speeds may increase • Cyclists passing maneuvers encroaches on vehicle traffic
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3.1.4 Opinion of Cost

An opinion of probable construction cost for Design Alternate No.1 is provided as follows:

Construction:	\$ 940,000
Engineering	\$ 244,000
<u>Land Acquisition and Easements</u>	<u>\$ 32,000</u>
TOTAL	\$ 1,216,000

Cost summaries are provided in Appendix C.

3.1.5 Assumptions

Actual cost will be impacted by the final excavation, gravel and pavement depth. Construction planning costs will be refined as the design is advanced and unknowns such as subsurface conditions are reduced. Design assumptions are included with the work summary alternates, Appendix B. Gravel and pavement depths should be consistent with the adjoining roadway and the design parameters should be reviewed by NHDOT – District 6. Design concepts were transmitted to District 6 on September 19, 2014. Correspondence is provided in Appendix G.

3.2 Design Alternate No.2 – Shared Bike Path Construction (Side Path)

Alternate No.2 consists of constructing a bike path separate from the roadway travel lanes. Both north and south bicycle travel will use the bike path as a single facility. Because the path would be separate from vehicle travel, other users may find this facility attractive. Other users may include tandem bicyclists, bicycles pulling trailers, child/youth cyclists, inline skaters, roller skaters, skate boarders, kick scooters and pedestrians. A typical roadway cross section is shown on Figure 2. A schematic layout plan is provided as Figure 2B.

3.2.1 Description

The proposed alternative includes the following work:

- Construct a bike path that is physically separated from motorized vehicle travel
- Where space is available the bike path will share the Rte 108 ROW. A separate ROW (easement) is anticipated from STA 26+00 to 39+00
- Provide two way traffic on an 8-foot wide paved surface (4' wide north and south)
- An adult bicyclist is the anticipated primary user and will serve as the Basis of Design
- Provide physical barriers at constraint areas – post and rail fence
- Provide striping for lanes and passing areas
- Provide 3 ½” pavement depth over 15” deep gravel base

3.2.2 Project Impacts

Anticipated project impacts such as grading and/or private property encroachments are provided in matrix format in Appendix B. A summary of notable impacts including anticipated easement/acquisition areas is provided below:

Table 4: Shared Bike Path Construction Impact Summary

<i>Impacts</i>	<i>Anticipated Quantity</i>
ROW Acquisition/Easement Area	18 properties
Road Realignment	0 locations
Stone Wall Reconstruction	3 locations
Utility Pole Relocation	12 locations
Drainage Relocation	0 locations
Guardrail Relocation	0 locations
Driveway Grading	5 locations

3.2.3 Evaluation

A summary of advantages and disadvantages are provided in the table below:

Table 5: Shared Bike Path Construction Advantages and Disadvantages

<i>Advantages</i>	<i>Disadvantages</i>
<ul style="list-style-type: none"> • The design can include passing zones for cyclists (e.g. experienced cyclists would want to pass slower users such as young cyclists, pedestrians, etc.) • Less demand for mental awareness for bicyclists since maneuvering within vehicle traffic flow is reduced • Accommodates children and youth cyclists • Broadens user base (more than bicycles) • Relieves traffic congestion related to sharing vehicle travel lanes • Median strip between road and bike path provides more opportunity for properly managed stormwater runoff • Lower capital cost • Longer design life (due to less vehicle loading) 	<ul style="list-style-type: none"> • ADA compliance increases grading impacts • Redundant – Bike lanes would still be appropriate for cyclists who may continue to use the Rte 108 vehicle travel lanes • Bike paths may not be considered substitution for bike shoulders • More easements and ROW acquisitions • Safety hazards for motorists at intersections (unexpected bike traffic approaches from the right at side streets and driveways) Side path may be blocked by vehicles waiting to turn at drives/intersections • Town will be required to maintain pavement surface • Higher maintenance cost for Town (since NHDOT District 6 would not participate in plowing or resurfacing) • Road crossings and/or potential for wrong way travel at end of path (project limits). • High variation in side path travel speeds (e.g. pedestrian vs. cyclist)

3.2.4 Opinion of Cost

An opinion of probable construction cost for Design Alternate No.2 is provided as follows:

Construction	\$ 786,000
Engineering	\$ 234,000
<u>Land Acquisition and Easements</u>	<u>\$ 94,000</u>
TOTAL	\$1,114,000

Cost summaries are provided in Appendix C.

3.2.5 Assumptions

Design assumptions are included with the work summary alternates, Appendix B.

3.3 Other Alternatives and Project Considerations

3.3.1 Combination Bike Lane and Bike Path

The possibility of combining Design Alternates No.1 and No.2 to provide a shared use bike path for the portion of the project corridor with minimal constraints and constructing bike lane shoulders in the remaining segment of the project corridor was identified. The Forbes Road intersection at Rte 108 was identified as a likely location to transition from a shared bike path to bike lane shoulders. This alternate was primarily considered for potential cost benefits and offers a small margin for cost savings. (See Appendix B and C).

3.3.2 Project Phasing

Phased project implementation is identified as an alternative to manage potential construction cost limitations depending on funding availability. For example, the project limits could begin at Ash Swamp Road or north of the Rockingham Country Club and project cost can be managed by including portions of the work as a bid additive alternate. Construction can then be extended if bids are favorable or should additional funding become available. It appears that some level of additional funding will be necessary based on the assumptions and Opinions of Cost provided within this report. The Town and NHDOT may consider a moderate funding increase of \$200,000 (see meeting notes, 10/23/14, Item 1.3, Appendix E).

Construction Phasing Plan Alternates and phasing cost are provided in Appendix F. The phasing plans are developed based on an overall budget increase of \$200,000 (from \$809,000 to \$1,009,000). Project Phasing will need to be evaluated further during final design and perhaps following bidding.

3.4 Baseline Markings and Way Finding

Independent of the design alternative selected, the project should incorporate signs that promote the dedicated bike route and provide directional queues to community destinations for cyclists using the corridor. Specific sign details and locations should be considered during final design.

3.5 Offsite Improvements – Forbes Road

Long range plans were developed for intersection improvements and pavement widening at the Forbes Road and Hershey Lane intersections as part of a private site development application. A conceptual layout is provided in Appendix D. Correspondence concerning future intersection improvements (SG Pernaw & Co. 1/20/15) is provided in Appendix G.

4.0 PROJECT DEVELOPMENT AND COORDINATION

4.1 Project Staff Meetings

A series of project staff meetings were conducted as part of the process to develop the design alternatives with the project stake holders. Input from meeting discussions was incorporated into the work. See Appendix E for Project Meeting Notes.

4.2 Public Information Meetings

Two public information meetings are identified as part of the LPA process. The outcome of each meeting is summarized below.

4.2.1 Local Concerns – Public Meeting No. 1

TBD

4.2.2 Presentation of Preferred Alternative – Public Meeting No. 2

TBD

5. CONCLUSIONS

The following conclusions are noted based on the information presented:

- Although Rte 108 is a state designated bike route, bicycle facilities do not exist within the project area
- The Rte 108 corridor within the Project Limits presents a variety of constraints for bicycle facility construction
 - Physical constraints include embankment slopes, utilities and structures
 - Boundary constraints include unknown ROW segments, easement/land acquisitions and permission for temporary construction on private property
- Bike shoulders will be constructed on Rte 108 north of the project area, from Newmarket to Durham
- Public and stakeholder feedback indicate a preference for Design Alternative No. ____
- Future intersection improvements at Forbes road and Hershey Lane will impact the location of bike lanes
- Bike lane shoulders (Alternate 1) are more desirable based on project conditions and design guidelines (see section 3.2.3 – Dis-Advantages)
- Additional ROW survey will be required where encroachments exist and/or existing ROW limits are not sufficient for ROW certification as required by the LPA program
- A separate bike path would require additional ROW acquisitions and easements due to slope and property constraints
- Although a separate bike path is generally less expensive to construct, physical constraints such as property and slope constraints could result in higher cost (land acquisition, easements and retaining walls)

- Additional funding is needed to adequately construct either Alternate 1 or 2..
- Final costs may be impacted by excavation, gravel and pavement limits, and bidding. Cost will need to be reviewed following the design/PS&E phase.

6. RECOMMENDATIONS

Based on project evaluations and community and stakeholder input, Design Alternate No. ___ is recommended.

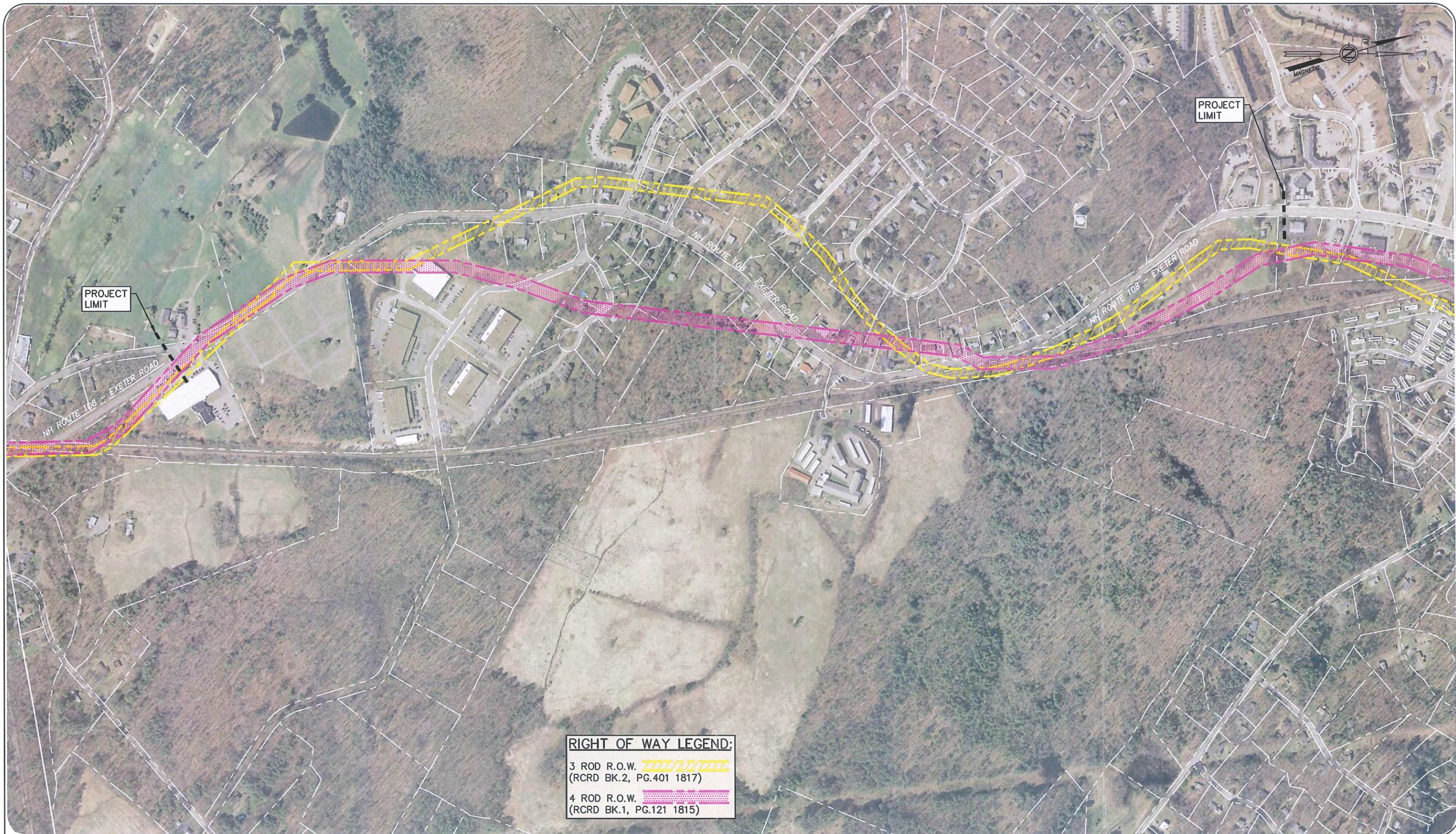
6.1 Short Term Recommendations

- Request additional funding for the project
- Solicit NHDOT Division 6 and Design Bureau comments concerning engineering design assumptions
- Initiate discussions with property owners concerning possible R-O-W acquisitions following review by NHDOT
- Conduct topographic and ROW surveys
- Conduct subsurface borings to determine existing gravel and pavement depths of adjoining roadway
- Prepare Preliminary Design and update cost following survey and subsurface investigations on pavement and gravel

6.2 Long Term Recommendations

- Coordinate future intersection improvements at Forbes Road and Hershey Lane with development of bike lanes
- Evaluate Hersey Lane as a future corridor for bicycle facility construction/extension
- Consider connectivity and/or improvements to depot station

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RIGHT OF WAY LEGEND:
 3 ROD R.O.W. 
 (RCRD BK.2, PG.401 1817)
 4 ROD R.O.W. 
 (RCRD BK.1, PG.121 1815)



DATE 02/4/15	 UNDERWOOD engineers 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	ROW LAYOUT PLAN NH ROUTE 108 - EXETER ROAD TOWN OF NEWMARKET NEWMARKET, NEW HAMPSHIRE	FIG. 1A
PROJECT 1851			



RIGHT OF WAY LEGEND:
 PROPERTY LINE/R.O.W.
 FROM TOWN GIS AND
 UE FIELD OBSERVATION
 PROPERTY LINE/R.O.W.
 FROM SURVEY AND
 DEED RESEARCH



DATE
02/4/15
PROJECT
1851



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Tel. 603-436-6192 Fax. 603-431-4733

PRELIMINARY ROW SURVEY PLAN
 NH ROUTE 108 - EXETER ROAD
 TOWN OF NEWMARKET
 NEWMARKET, NEW HAMPSHIRE

FIG.
1B
1 OF 2

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RIGHT OF WAY LEGEND:
PROPERTY LINE/R.O.W.
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UE FIELD OBSERVATION
PROPERTY LINE/R.O.W.
FROM SURVEY AND
DEED RESEARCH



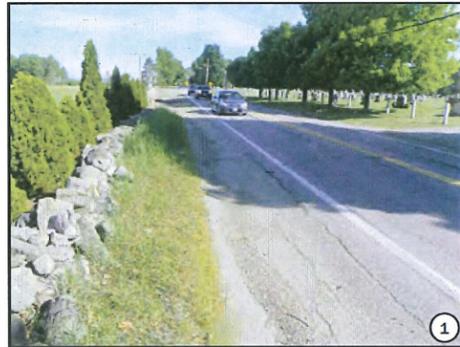
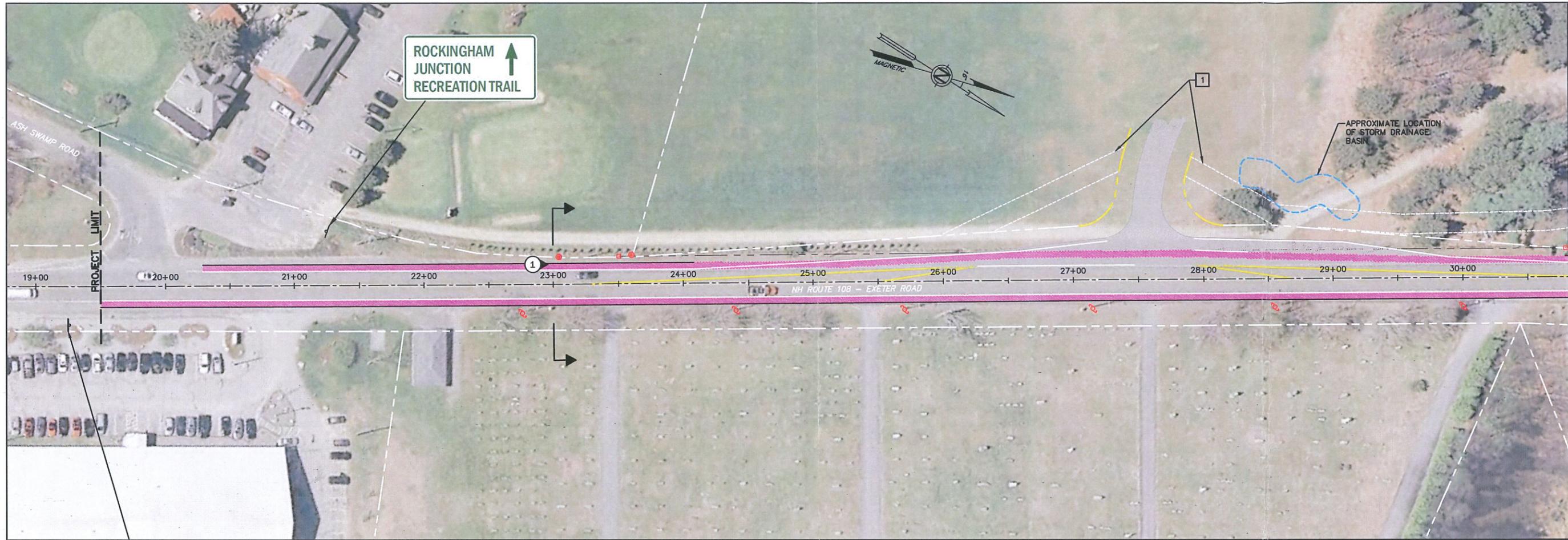
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PRELIMINARY ROW SURVEY PLAN
NH ROUTE 108 - EXETER ROAD
TOWN OF NEWMARKET
NEWMARKET, NEW HAMPSHIRE

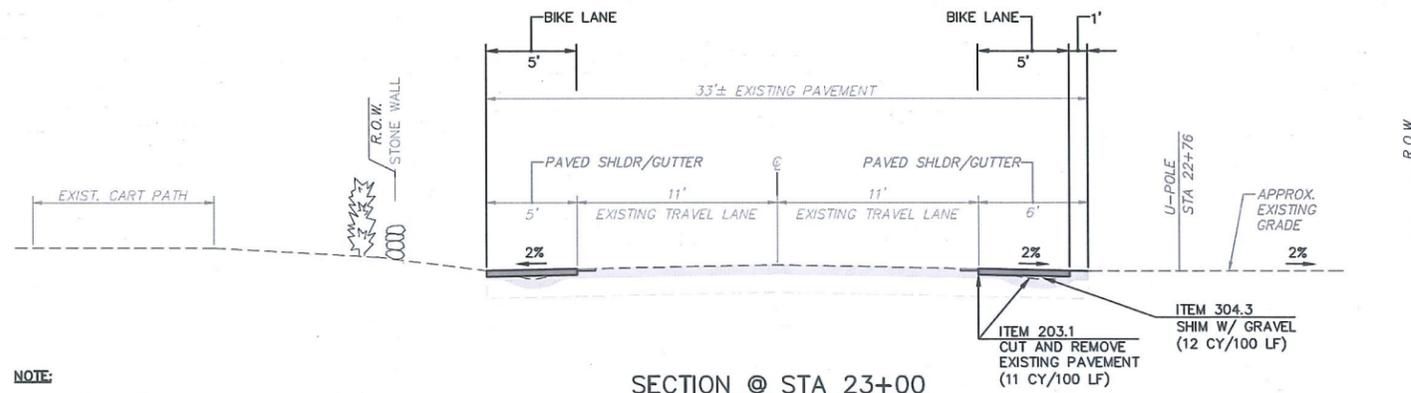
FIG.
1B
2 OF 2

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KEY NOTES:

- 1 15' WIDE EASEMENT PROVIDED, STA 26+00± TO STA 39+50±. REFERENCE PLAN ENTITLED "EASEMENT PLAN FOR ROCKINGHAM GOLF, LLC", SHEETS 1 AND 2, PREPARED BY DOUCET SURVEY, INC., DATED FEBRUARY 26, 2014.



NOTE:

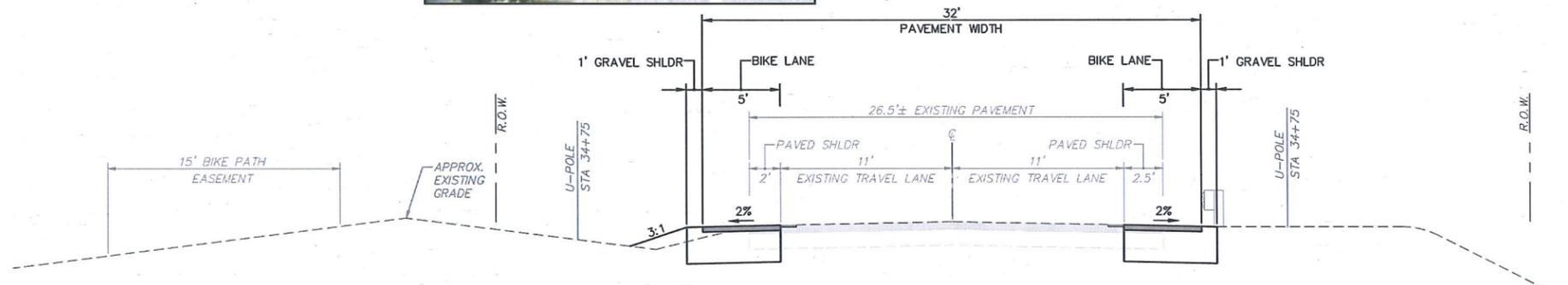
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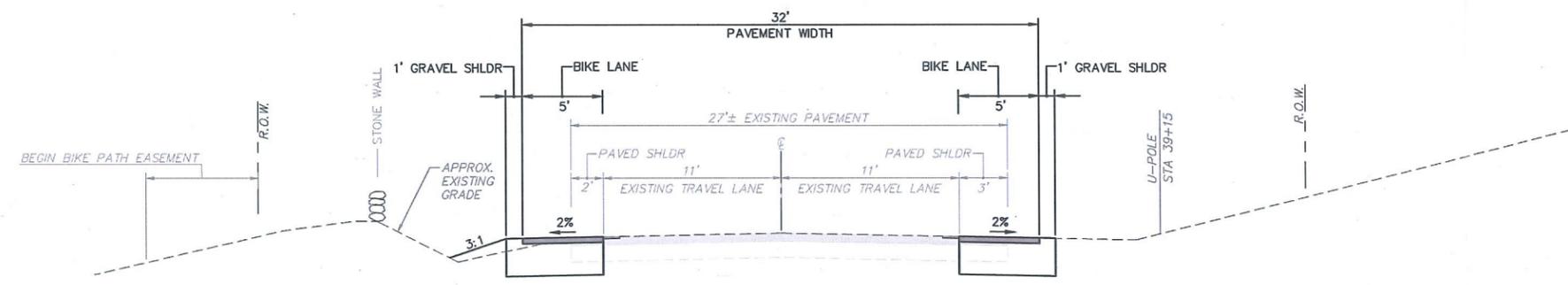


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ALT. 1 - LAYOUT PLAN
BIKE LANE SHOULDERS
NH ROUTE 108 - EXETER ROAD
NEWMARKET
NEW HAMPSHIRE



SECTION @ STA 34+50



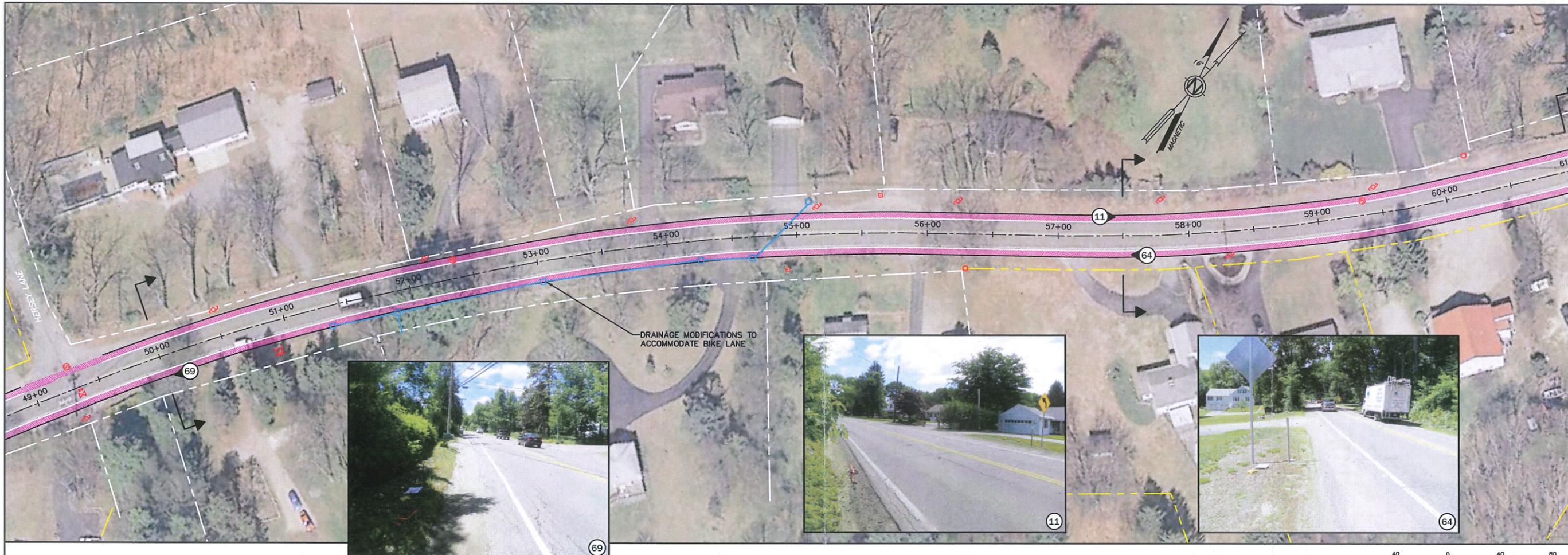
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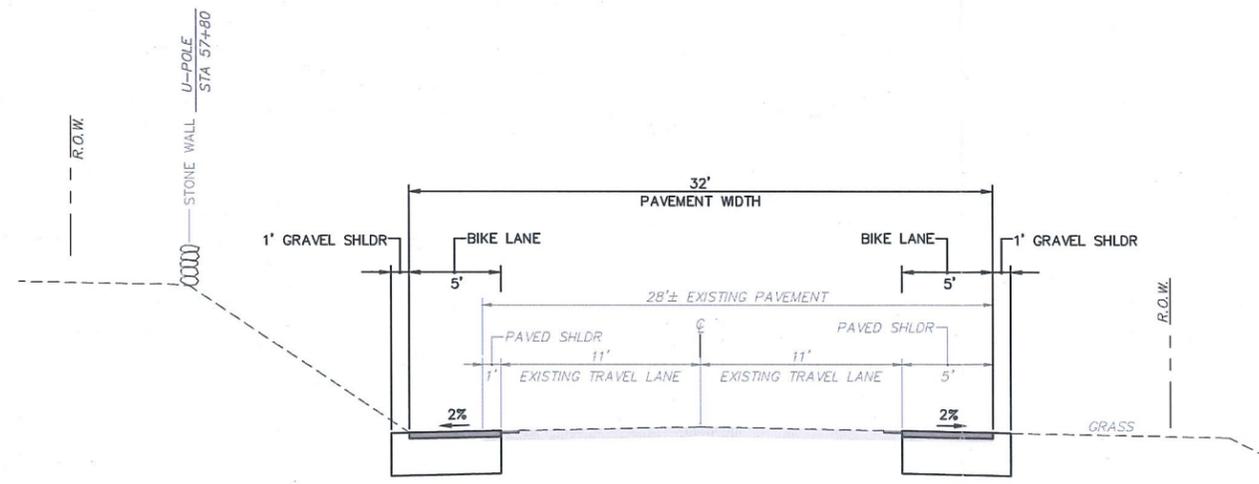
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ALT. 1 - LAYOUT PLAN BIKE LANE SHOULDERS	
NH ROUTE 108 - EXETER ROAD NEWMARKET NEW HAMPSHIRE	



DRAINAGE MODIFICATIONS TO ACCOMMODATE BIKE LANE



SECTION © STA 57+50

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engineers

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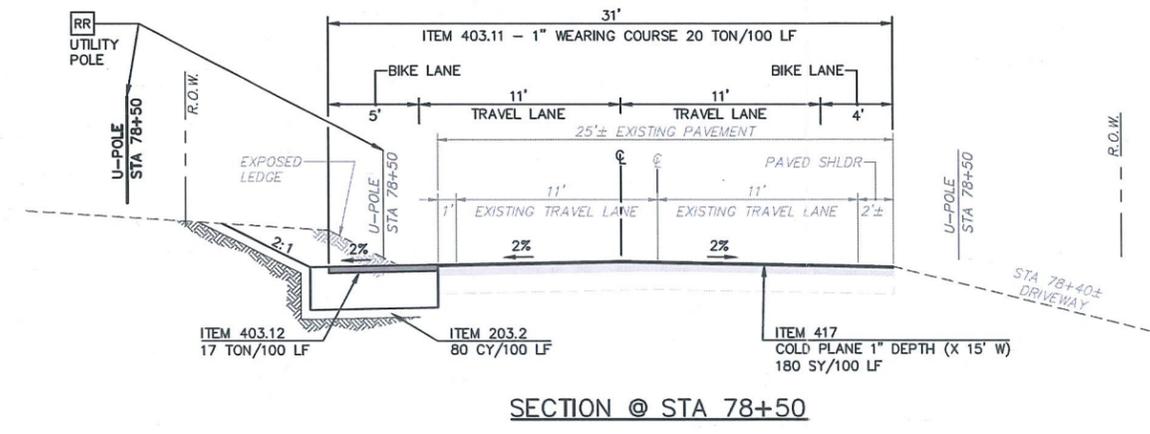
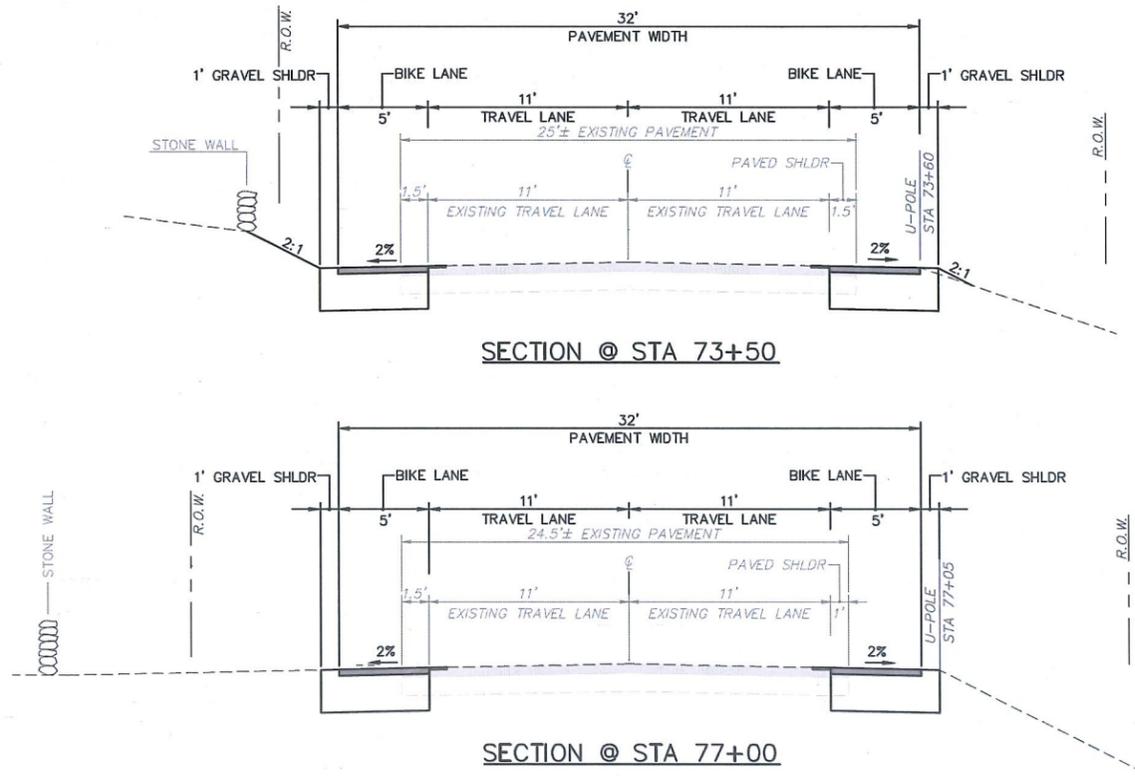
ALT. 1 - LAYOUT PLAN
BIKE LANE SHOULDERS

NH ROUTE 108 - EXETER ROAD
NEWMARKET
NEW HAMPSHIRE

FIG NO
2A

SHEET
4 OF 7

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engineers

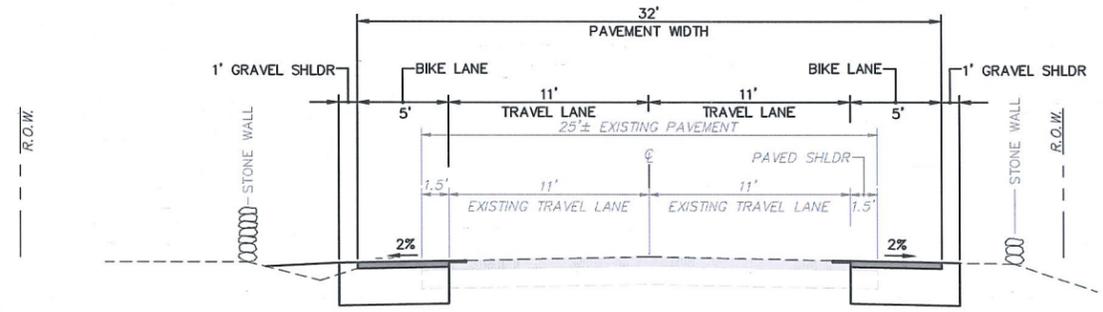
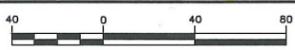
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

ALT. 1 - LAYOUT PLAN
BIKE LANE SHOULDERS

NH ROUTE 108 - EXETER ROAD
NEWMARKET
NEW HAMPSHIRE

FIG NO	SHEET
2A	6 OF 7

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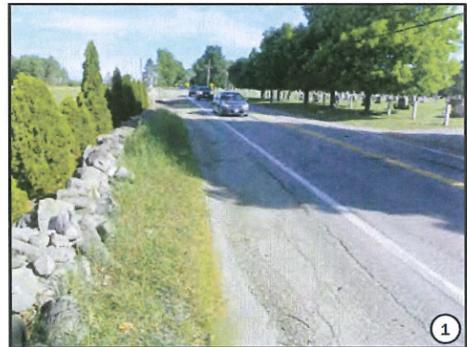
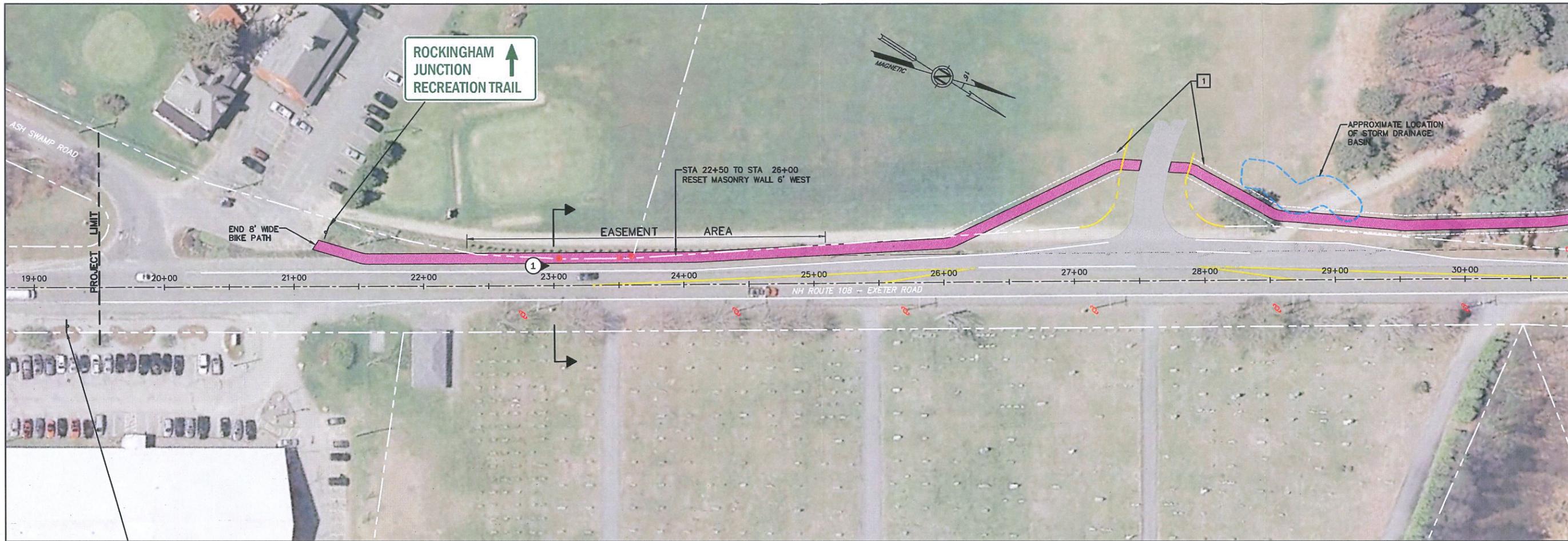


SECTION @ STA 82+50

UNDERWOOD engineers 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733		ALT. 1 - LAYOUT PLAN BIKE LANE SHOULDERS NH ROUTE 108 - EXETER ROAD NEWMARKET NEW HAMPSHIRE		FIG NO 2A	SHEET 7 OF 7
Drawn/Chk. - TJB Designed - BID/PM Checked - Approved - Date - 02/04/15 Book No. - Project No. 1851 Dwg. ID 1851_BASE Scale AS SHOWN		NO. REVISIONS APP'D		ISSUE FOR APPROVAL By - Date - CONSTRUCTION By - Date - RECORD DRAWING By - Date -	

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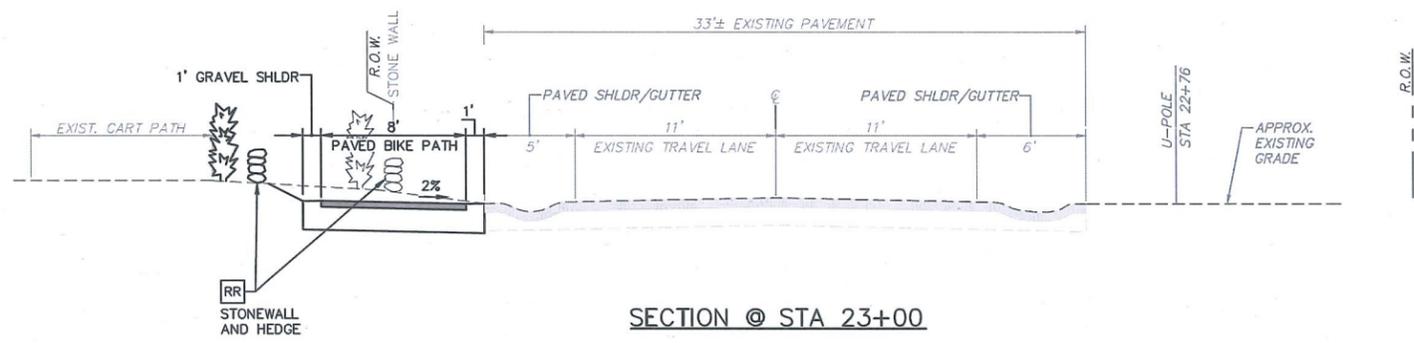
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STA 22+50 TO STA 26+00
RESET MASONRY WALL 6' WEST



KEY NOTES:
 1 15' WIDE EASEMENT PROVIDED, STA 26+00± TO STA 39+50±. REFERENCE PLAN ENTITLED "EASEMENT PLAN FOR ROCKINGHAM GOLF, LLC", SHEETS 1 AND 2, PREPARED BY DOUCET SURVEY, INC., DATED FEBRUARY 26, 2014.

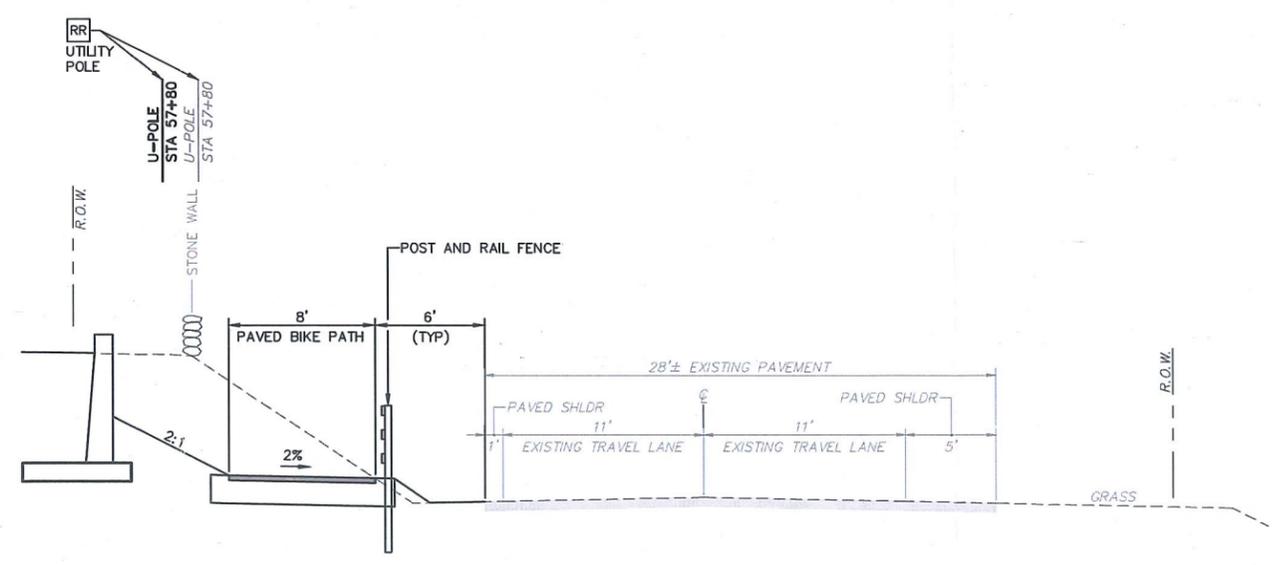
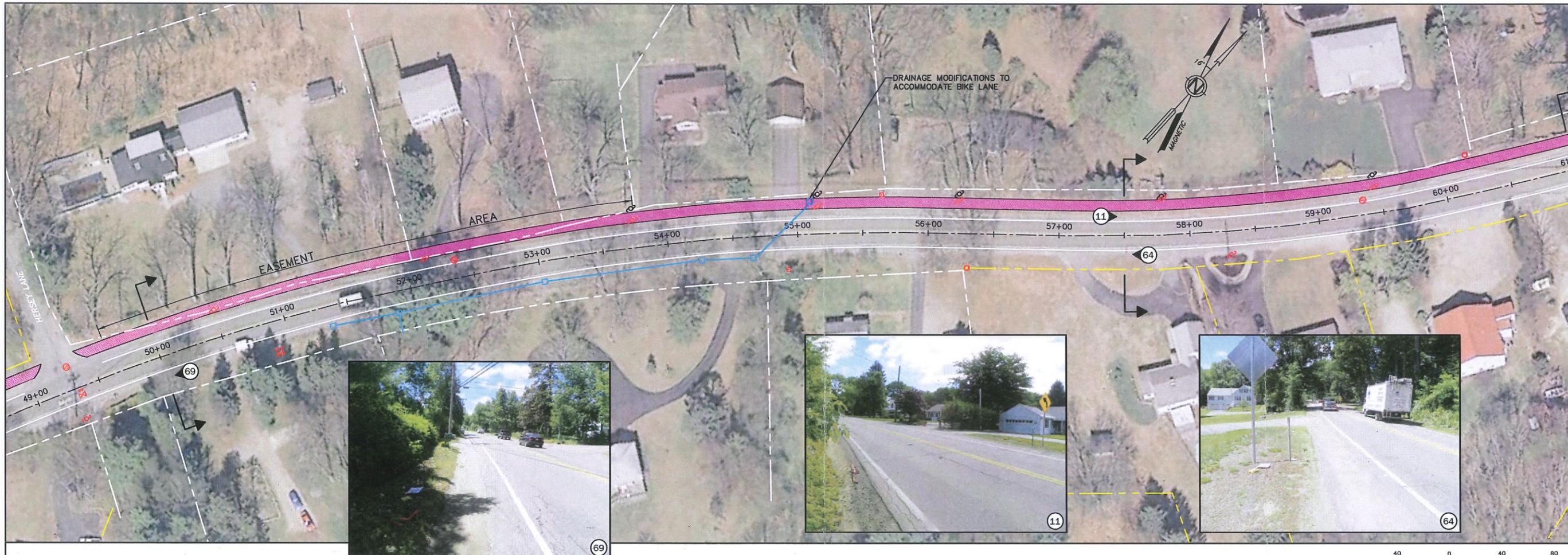


SECTION @ STA 23+00

Drawn/Chk. TJB	ISSUE FOR
Designed: BTD/PDM	APPROVAL
Checked: _____	By _____
Approved: _____	Date _____
Date: 02/06/19	CONSTRUCTION
Book No. _____	By _____
Project No. 1851	Date _____
Dwg. ID 1851_BASE	RECORD DRAWING
Scale: AS SHOWN	By _____
	Date _____
	NO. REVISIONS
	APPD

UNDERWOOD engineers	
25 Vaughan Mill, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	
ALT. 2 - LAYOUT PLAN SHARED USE BIKE PATH	
NH ROUTE 108 - EXETER ROAD	
NEWMARKET NEW HAMPSHIRE	
FIG NO 2B	SHEET 1 OF 7

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SECTION @ STA 57+50

ISSUE FOR		APPROVAL	By	Date
CONSTRUCTION		By	Date	
RECORD DRAWING		By	Date	
REVISIONS		NO.	REVISIONS	APP'D
Drawn/Chk.	TJB	Checked		
Designed	BTD/PM	Approved		
Date	02/04/15	Book No.		
Project No.	1651	Dwg. ID	1651-BASE	
Scale	AS SHOWN			

UNDERWOOD engineers	
25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	
ALT. 2 - LAYOUT PLAN SHARED USE BIKE PATH	
NH ROUTE 108 - EXETER ROAD NEWMARKET NEW HAMPSHIRE	
FIG NO	SHEET
2B	4 OF 7

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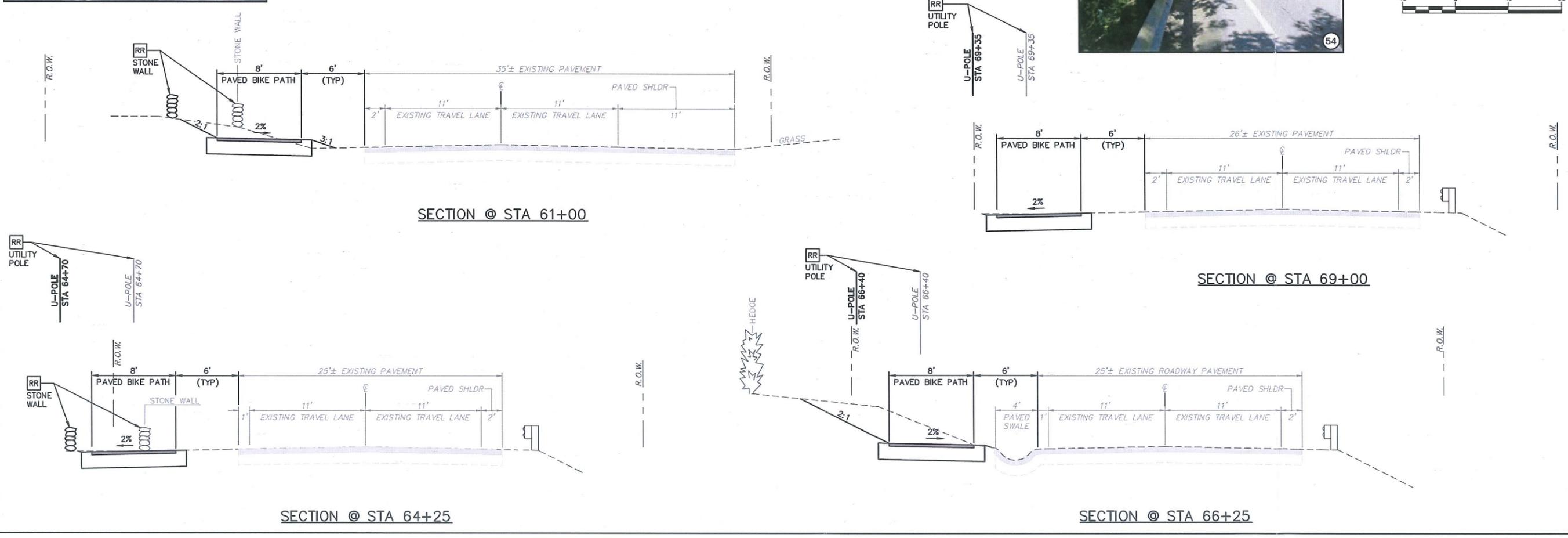


ISSUE FOR	APPROVAL	By	Date
DESIGNED	BY		
CHECKED	BY		
APPROVED	BY		
DATE	02/04/15		
BOOK NO.	1851		
PROJECT NO.	1851-EXETER		
DWG. ID	1851-EXETER		
SCALE	AS SHOWN		

Drawn/Chk. TB	NO.	REVISIONS
Designed		
Checked		
Approved		
Date		
Book No.		
Project No.		
Dwg. ID		
Scale		

UNDERWOOD
engineers

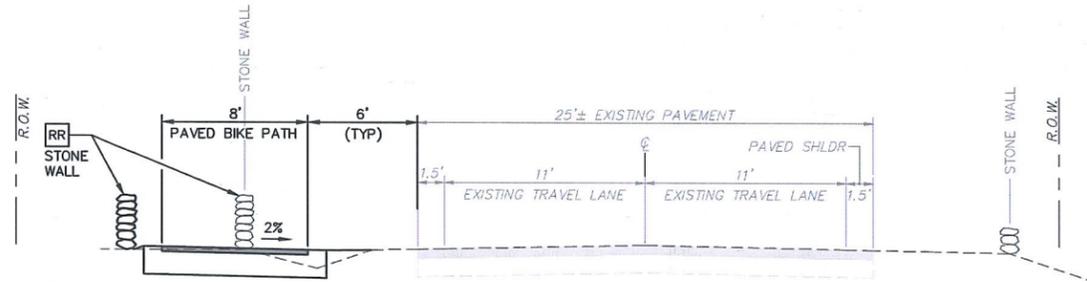
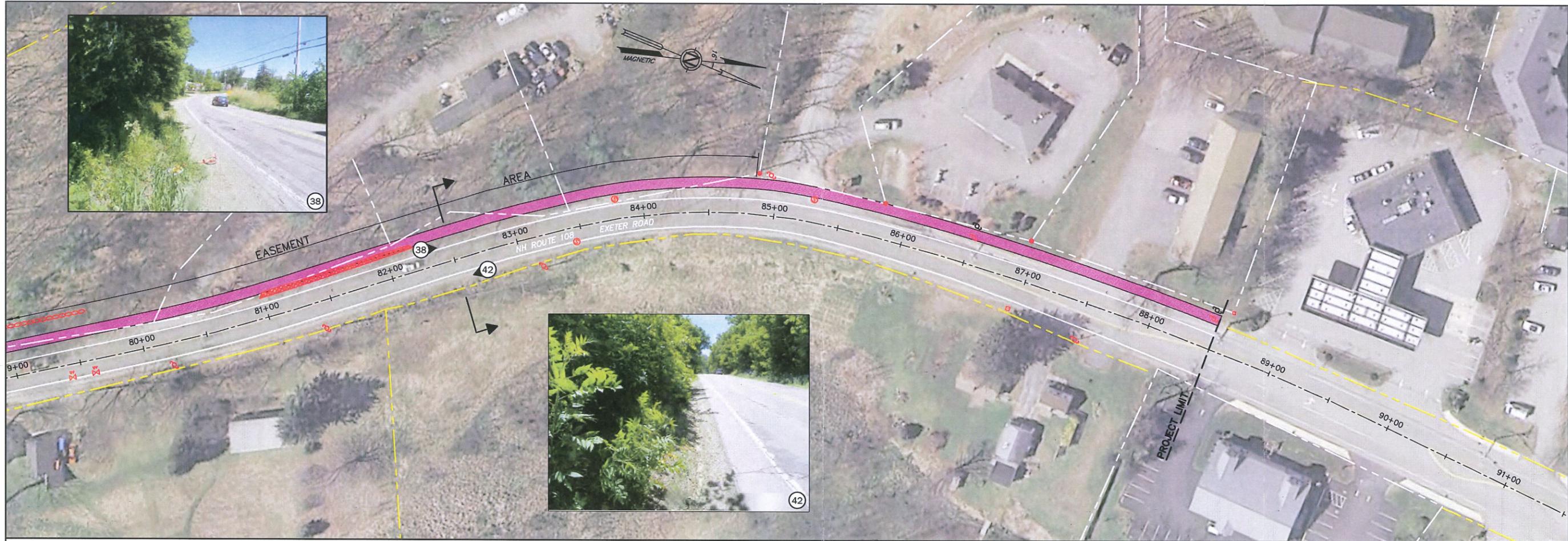
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733



ALT. 2 - LAYOUT PLAN
SHARED USE BIKE PATH

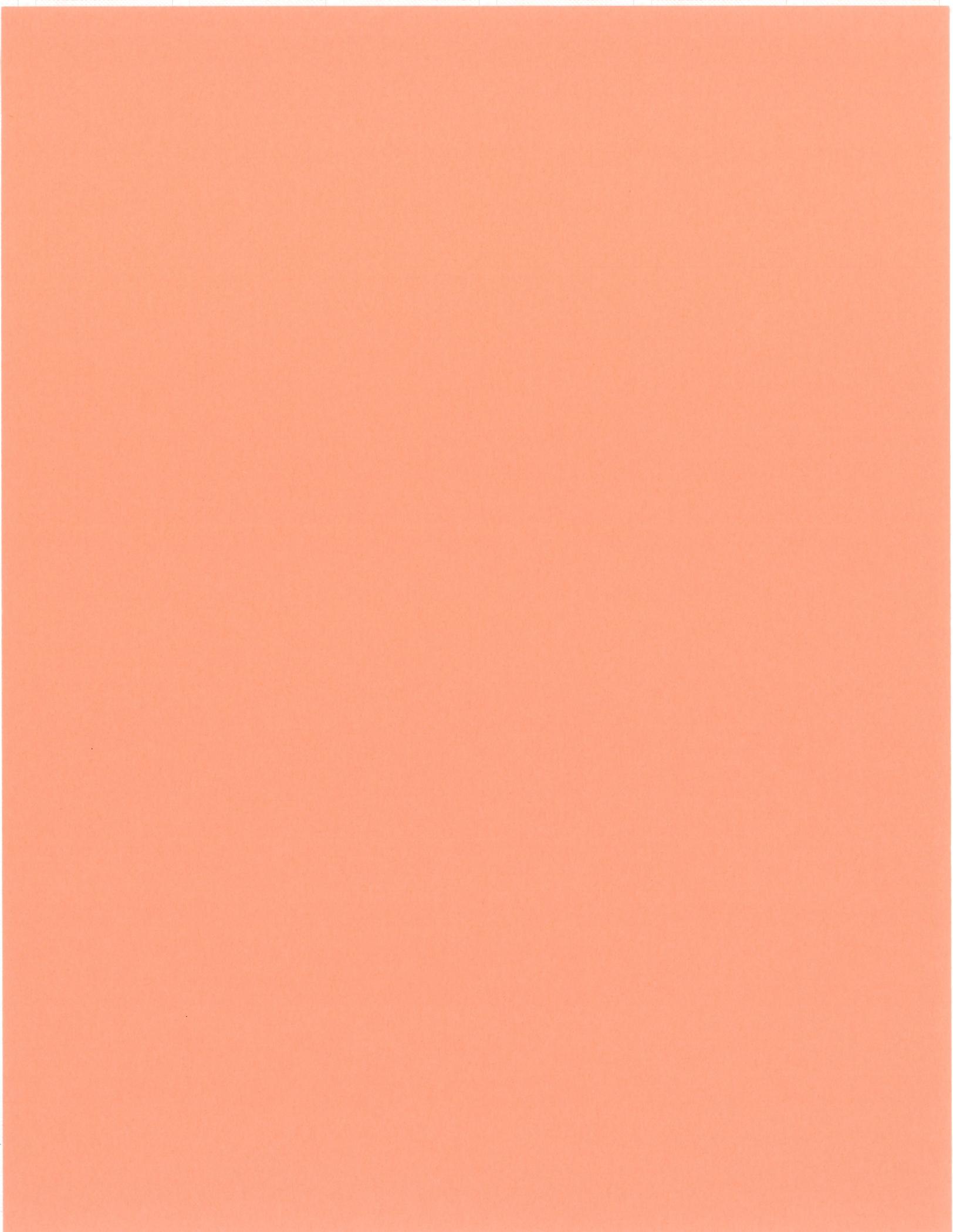
NH ROUTE 108 - EXETER ROAD
NEWMARKET
NEW HAMPSHIRE

FIG NO 2B SHEET 5 OF 7



SECTION @ STA 82+50

FIG NO 2B		SHEET 7 OF 7	
ALT. 2 - LAYOUT PLAN SHARED USE BIKE PATH			
NH ROUTE 108 - EXETER ROAD NEWMARKET NEW HAMPSHIRE			
UNDERWOOD engineers 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733			
Drawn/Chk. TB Designed: BTD/PDM Checked: _____ Approved: _____ Date: 02/04/15		Project No. 1851 Dwg. ID 1851_BASE Scale AS SHOWN	
ISSUE FOR APPROVAL By _____ Date _____		CONSTRUCTION By _____ Date _____	
RECORD DRAWING By _____ Date _____		APPD By _____ Date _____	
NO. REVISIONS		NO.	



APPENDIX A
EXISTING CONDITIONS MATRIX

EXISTING CONDITIONS - MATRIX

Project: NH Route 108 Shoulder Widening/Bike Path
 Location Newmarket, NH
 Last Revised: 3-Dec-14

Location	Pavement Widths			Apparent ROW			Utility Poles		Landscape		Guard Rail		Slope Condition		Drainage		Sewer/ Water		Notes Ref. #	
	Sta.	Left	Right	Total	LT	RT	Type	Total	LT	RT	Type	LT	RT	Type	LT	RT	Type	LT		RT
22+76		17	17					22												
23+60	16	17	33	21	IP (fnd)	22	56													
24+40	19	17.5	36.5	25	35		60	21												
25+70	30	18	48	33	35		68	22												
27+15	30	18	48	43	35		78	22												
28+55	15	17.5	32.5	41	35		76	22												
30+00	13	18	31	29	35		64	22												
30+50	13	12.5	25.5	24	35		59													
31+95	12.5	13	25.5	21	42		63	23												
32+40	12.5	13	25.5						21	18" pine										
32+60									22	12" pine										
33+10											begins	16								
33+25	12.5	13.5	26	25	wall		67	24	24		16									
34+00	12.5	13.5	26																	
34+75	12	13.5	25.5	28	wall 22		65	24	22											
36+24	12	13.5	25.5					21			16									
36+24				27	wall 22	41	68													
37+05	12.5	13	25.5	29	wall 33	38	67				ends	15.5								
37+65	13	13	26	30	wall 33	36	66													
38+75				32	IP (fnd)	33	65													
39+15	13	13.5	26.5	32	wall 33	32	64	24												
40+50	13	16	29	37	34		71	23												
40+95																				
41+00				39	IP (fnd)	40	76													
41+07								33												
41+75	13	16	29	40	44	IP (fnd)	84													
42+03	13	17	30					27												
42+60																				
43+40	13	20	33					28												
43+80	13	22	35	30	28	IP (fnd)	58	27												
43+98																				
44+23																				
45+00	13	21	34	31	wall 33	27	58	28	23											
46+50																				
46+70	13	18.5	31.5		27	oc. use 25	27	23												
47+95	13	17	30	33	28	wall 21.5	61	28	20											
49+30	13	14	27					24												
49+34																				
50+50	13	12.5	25.5	21	oc. use 27	32	oc. use 23	53	21											
50+90				0																
51+35	12.5	13	25.5																	
51+87																				
52+15	12.5	13	25.5	21	oc. use 27.5	30		20												
52+37																				
53+02	12.5	12.5	25	22	wall 26.5	32														
53+75	13	12.5	25.5	29	wall 27	33	wall 23	62	21											

Location	Pavement Widths			Apparent ROW			Utility Poles		Landscape		Guard Rail		Slope Condition			Drainage		Sewer/ Water		Notes Ref. #	
	Sta.	Left	Right	Total	LT	RT	Type	Total	LT	RT	Type	LT	RT	LT	RT	Type	LT	RT	Type		LT
54+25	12.5	12.5	25	29		34	wall 22										15	cb			
54+65	12.5	12.5	25														16	cb			
55+10																	18	3:1 fore			
55+16	12.5	13.5	26					21													
56+23	12.5	13.5	26	33		28	wall 24.5	25													
57+80	12.5	12.5	25					27.5													
58+30								18													
59+35						25	oc. use 27	55											11	smh	
59+45	12.5	13	25.5	29		25	wall 26	20													
60+20	13	12.5	25.5	29		25	IP (fnd) 30	54													
61+00	12	21	33	43		25	wall 27	68													
61+30																					
61+77																					
61+90	12.5	12.5	25	39		27	wall 25	66													
62+05						27	IR (fnd) 27	64													
62+80	12.5	12.5	25	37		27	wall 26														
63+10	12	12.5	24.5	37		26	wall 25	63				23									
63+25	12	12	24	34		26	G.Bnd. 28	60				begins	14.5								
63+35																					
63+70	12	12	24	23		26	2'H. wall 17														
64+70	12	13	25	22		28	2.5'H. wall 25	50													
65+00																					
65+88																					
65+98																					
66+40	12	13	25	29		26		55													
67+85	19	12.5	31.5					24													
68+25																					
69+35	12.5	12.5	25	29		26		55													
69+45																					
70+52																					
70+65																					
70+90	16.5	12.5	29	27		27	IP (fnd) 34.5	54													
70+90																					
70+90																					
71+30																					
71+50																					
71+66	12.5	12.5	25																		
72+00																					
72+50	12	12.5	24.5						18												
72+92																					
73+60	12.5	12.5	25						16												
74+00																					
74+10																					
74+25																					
74+62																					
74+70																					
75+00																					
75+07	12	12.5	24.5						20												
75+35						16	Gr. Bnd	42													
75+65						16	IR (fnd) 28	42													
75+90																					
76+12																					

Location Sta.	Pavement Widths			Apparent ROW			Utility Poles			Landscape			Guard Rail			Slope Condition			Drainage			Sewer/ Water			Notes Ref. #	
	Left	Right	Total	LT	RT	Type	Total	LT	RT	Type	LT	RT	Type	LT	RT	Type	LT	RT	Type	LT	RT	Type	LT	RT		Type
76+25																										
77+05	12.5	12	24.5						17		Fence															
77+80	12.5	12	24.5	31	IP (fnd)	39	27																			
78+50	12	12	24					15??			Exp. Ldg.															
79+42																										
79+60																										
80+20	20	12	32						17																	
80+50																										
81+00																										
81+40	12	12.5	24.5	21		22	2'H Wall	26		16	Exp. Ldg.															
82+20	12.5	12.5	25						21	16	Exp. Ldg.															
82+50	12.5	12.5	25	35		23	Wall	20		18	Exp. Ldg.															
83+15	12.5	12.5	25	17					23																	
83+45																										
83+80										35	Exp. Ldg.															
84+95	12.5	12.5	25						31																	
85+28																										
85+34																										
85+64																										
86+52	12.5	17	29.5	29	oc. use	27	24		21																	
86+93				31		26	GBnd	23																		
87+50	20	21	41						29																	
87+70				31		32																				
88+10				32		32	GBnd	26																		
88+45	21	27	48	33	GBnd	30			63	24																

APPENDIX B

PROJECT IMPACT SUMMARY AND WORK SUMMARY ALTERNATES

PROJECT IMPACT SUMMARY

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 4, 2014

ALTERNATE 1 (Paved Lane)

Location	Possible R-O-W		Other Potential Impacts					
	R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:	3,6		2,5			1		4
20+00 to 50+50							X	
1 50+50 to 55+50						X		
55+50 to 63+50								
2 63+50 to 70+50			X	X	1			
3 70+50 to 74+00	X							
3,4 74+00 to 77+00	X	X						X
5 77+00 to 80+00			X		1			X
6 80+00 to 88+50	X			X				

Alternate 1 Notes:

- 1 Existing drainage may need adjustment and/or replacement due to road widening and elimination of gutter
- 2 Center line shift (2 left) is needed to mitigate slope & gaurdrail impacts from Sta. 63+50 to Sta. 70+50
- 3 R-O-W determination is needed between Sta. 73+00 and Sta.76+00
- 4 Low side driveway at Sta. 74+10, driveway grade approx. 15% down at 13'RT.
- 5 Center line shift (2 left) is needed between Sta. 77+00 and Sta. 80+00 due to low side driveway at Sta. 78+50
- 6 R-O-W determination is needed at Sta. 80+60 and between Sta. 83+00 and Sta.85+00

ALTERNATE 2 (Bike Path)

Location	R-O-W Impacts		Other Potential Impacts					
	R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:	1,3,5,6	4,5						2,4
1 20+00 to 26+00	X			X				
2 26+00 to 46+50								X
3 46+50 to 54+00	X				3			
54+00 to 57+00					1			
4 57+00 to 63+50		X			1			X
4,5 63+50 to 66+00	X	X		X	1			X
4 66+00 to 73+00		X			4			X
4,6 73+00 to 88+50	X	X		X	2			X

Alternate 2 Notes:

- 1 R-O-W acquisition may be needed between Sta. 22+00 and Sta.26+00
- 2 Low side driveways at Sta. 42+03 and Sta 42+60, driveway grades approx. 15% down at 16'RT.
- 3 R-O-W determination is needed between Sta. 47+00 and Sta.54+00
- 4 Steep slopes and driveways along west side of roadway
- 5 R-O-W determination is needed between Sta. 63+00 and Sta.66+00
- 6 R-O-W determination is needed between Sta. 73+00 and Sta.85+00

PROJECT IMPACT SUMMARY

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 4, 2014

ALTERNATE 1 (Paved Lane)

Location	Possible R-O-W		Other Potential Impacts					
	R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:	3,6		2,5			1		4
20+00 to 50+50								
1 50+50 to 55+50						X		
55+50 to 63+50								
2 63+50 to 70+50			X	X	1			
3 70+50 to 74+00	X							
3,4 74+00 to 77+00	X	X					X	X
5 77+00 to 80+00			X		1			X
6 80+00 to 88+50	X			X				

Alternate 1 Notes:

- 1 Existing drainage may need adjustment and/or replacement due to road widening and elimination of gutter
- 2 Center line shift (2 left) is needed to mitigate slope & gaurdrail impacts from Sta. 63+50 to Sta. 70+50
- 3 R-O-W determination is needed between Sta. 73+00 and Sta.76+00
- 4 Low side driveway at Sta. 74+10, driveway grade approx. 15% down at 13'RT.
- 5 Center line shift (2 left) is needed between Sta. 77+00 and Sta. 80+00 due to low side driveway at Sta. 78+50
- 6 R-O-W determination is needed at Sta. 80+60 and between Sta. 83+00 and Sta.85+00

ALTERNATE 2 (Bike Path)

Location	R-O-W Impacts		Other Potential Impacts					
	R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:	1,3,5,6	4,5						2,4
1 20+00 to 26+00	X			X				
2 26+00 to 46+50								X
3 46+50 to 54+00	X				3			
54+00 to 57+00					1			
4 57+00 to 63+50		X			1			X
4,5 63+50 to 66+00	X	X		X	1			X
4 66+00 to 73+00		X			4			X
4,6 73+00 to 88+50	X	X		X	2			X

Alternate 2 Notes:

- 1 R-O-W acquisition may be needed between Sta. 22+00 and Sta.26+00
- 2 Low side driveways at Sta. 42+03 and Sta 42+60, driveway grades approx. 15% down at 16'RT.
- 3 R-O-W determination is needed between Sta. 47+00 and Sta.54+00
- 4 Steep slopes and driveways along west side of roadway
- 5 R-O-W determination is needed between Sta. 63+00 and Sta.66+00
- 6 R-O-W determination is needed between Sta. 73+00 and Sta.85+00

PROJECT IMPACT SUMMARY

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 4, 2014

ALTERNATE 1 (Bike Lane)

	Location	Possible R-O-W		Other Potential Impacts					
		R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:		3,6		2,5			1		4
	20+00 to 50+50								
1	50+50 to 55+50						X		
	55+50 to 63+50								
2	63+50 to 70+50			X	X	1			
3	70+50 to 74+00	X							
3,4	74+00 to 77+00	X	X					X	X
5	77+00 to 80+00			X		1			X
6	80+00 to 88+50	X			X				

Alternate 1 Notes:

- 1 Existing drainage may need adjustment and/or replacement due to road widening and elimination of gutter
- 2 Center line shift (2 left) is needed to mitigate slope & gaurdrail impacts from Sta. 63+50 to Sta. 70+50
- 3 R-O-W determination is needed between Sta. 73+00 and Sta.76+00
- 4 Low side driveway at Sta. 74+10, driveway grade approx. 15% down at 13'RT.
- 5 Center line shift (2 left) is needed between Sta. 77+00 and Sta. 80+00 due to low side driveway at Sta. 78+50
- 6 R-O-W determination is needed at Sta. 80+60 and between Sta. 83+00 and Sta.85+00

ALTERNATE 2 (Bike Path)

	Location	R-O-W Impacts		Other Potential Impacts					
		R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:		1,3,5,6	4,5						2,4
1	20+00 to 26+00	X			X				
2	26+00 to 46+50								X
3	46+50 to 54+00	X				3			
	54+00 to 57+00					1			
4	57+00 to 63+50		X			1			X
4,5	63+50 to 66+00	X	X		X	1			X
4	66+00 to 73+00		X			4			X
4,6	73+00 to 88+50	X	X		X	2			X

Alternate 2 Notes:

- 1 R-O-W acquisition may be needed between Sta. 22+00 and Sta.26+00
- 2 Low side driveways at Sta. 42+03 and Sta 42+60, driveway grades approx. 15% down at 16'RT.
- 3 R-O-W determination is needed between Sta. 47+00 and Sta.54+00
- 4 Steep slopes and driveways along west side of roadway
- 5 R-O-W determination is needed between Sta. 63+00 and Sta.66+00
- 6 R-O-W determination is needed between Sta. 73+00 and Sta.85+00

PROJECT IMPACT SUMMARY

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 4, 2014

ALTERNATE 3 (Bike Path/Lane Combination)

	Location	R-O-W Impacts		Other Potential Impacts					
		R-O-W Width	Slope Easements	Roadway Alignment	Stone Walls	Utility Pole Relocation	Drainage	Gaurdrail Re-location	Driveways
Notes:		1,5,8	5,8	4,7			3		2,6
1	20+00 to 26+00	X			X				
2	26+00 to 46+50								X
3	46+50 to 54+00						X		
	54+00 to 57+00			X		1			
4	57+00 to 63+50								
4,5	63+50 to 66+00				X				
4	66+00 to 73+00			X		1			
4,6	73+00 to 88+50	X	X		X				X

Alternate 3 Notes:

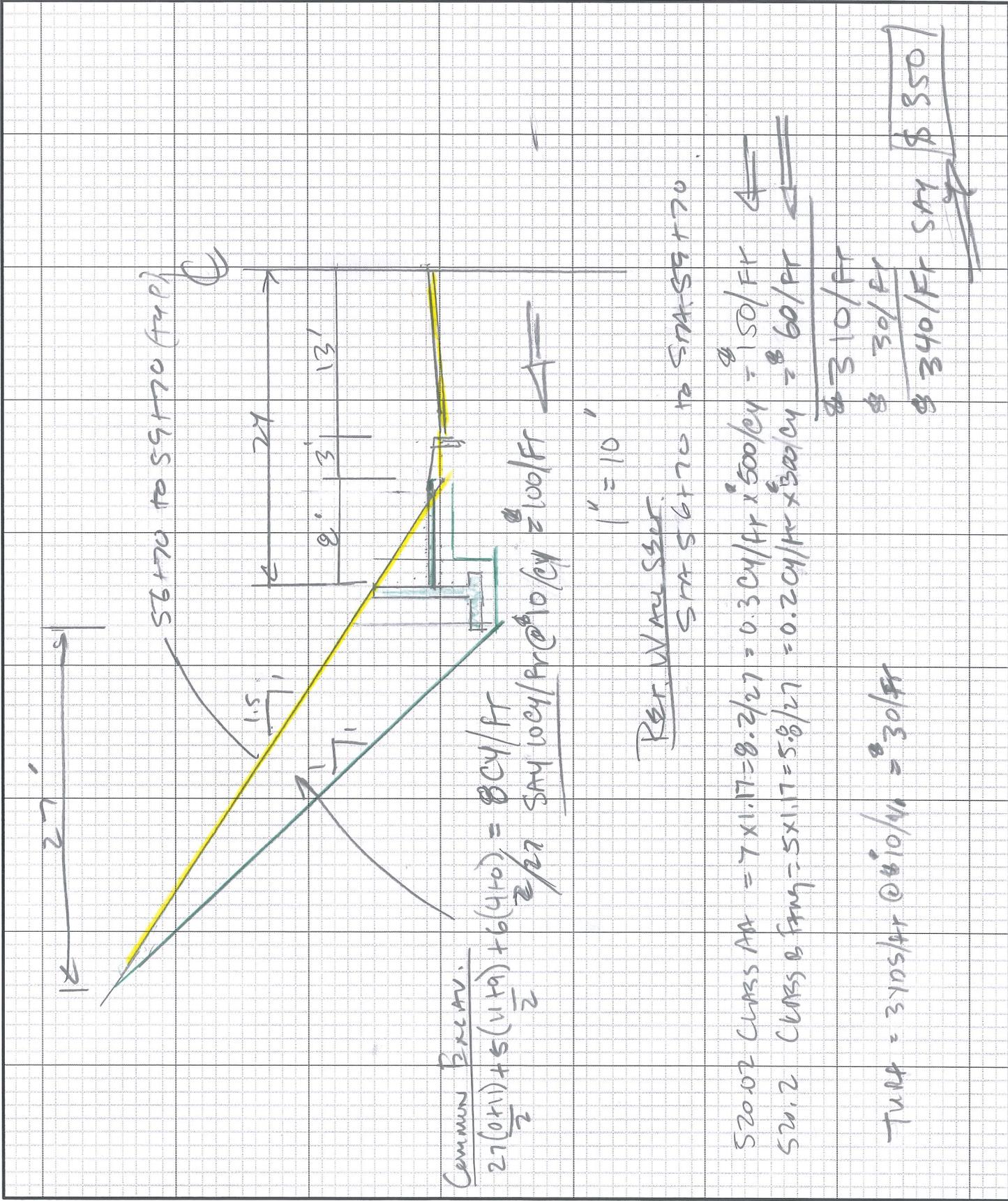
- 1 R-O-W acquisition may be needed between Sta. 22+00 and Sta.26+00
- 2 Low side driveways at Sta. 42+03 and Sta 42+60, driveway grades approx. 15% down at 16'RT.
- 3 Existing drainage may need adjustment and/or replacement due to road widening and elimination of gutter
- 4 Center line shift (2 left) is needed to mitigate slope & gaurdrail impacts from Sta. 63+50 to Sta. 70+50
- 5 R-O-W determination is needed between Sta. 73+00 and Sta.76+00
- 6 Low side driveway at Sta. 74+10, driveway grade approx. 15% down at 13'RT.
- 7 Center line shift (2 left) is needed between Sta. 77+00 and Sta. 80+00 due to low side driveway at Sta. 78+50
- 8 R-O-W determination is needed at Sta. 80+60 and between Sta. 83+00 and Sta.85+00

UNDERWOOD ENGINEERS, INC.

25 Vaughan Mall, Unit 1
 Portsmouth, NH 03801-4012
 Tel: (603) 436-6192
 Fax: (603) 431-4733

99 North State Street
 Concord, NH 03301-4334
 Tel: (603) 230-9898
 Fax: (603) 230-9899

JOB 1851.08
 SHEET NO. _____ OF _____
 CALCULATED BY PDM DATE 12/3/14
 CHECKED BY _____ DATE _____
 SCALE _____



Common Excav.

$$\frac{27(0+1) + 5(1+9) + 6(4+0)}{2} = 8 \text{ cy/ft}$$
 2/27 SAY 100cy/pr @ 10/cy = 200/ft

Ret. Wall Surf.
 SMA S6+70 to SMA S9+70

S20.02 CURBS AA = $7 \times 1.17 = 8.2/27 = 0.3 \text{ cy/ft} \times 500/\text{cy} = 150/\text{ft}$
 S20.2 CURBS B FFmg = $5 \times 1.17 = 5.8/27 = 0.2 \text{ cy/ft} \times 300/\text{cy} = 60/\text{ft}$

~~310/ft~~
~~30/ft~~
 340/ft SAY \$ 550

TURN = $3105/\text{ft} @ 410/41 = 30/\text{ft}$

WORK SUMMARY - ALTERNATE 1 (Paved Shoulder)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 3, 2014 **DRAFT**

Assumptions /Notes:

- 1 5' Wide Paved Shoulder (each side, see typical section)
- 2 Excavation = 104 CY/100 lf, see Typical Section
- 3 Gravel = 2' Depth (90 CY/100 lf, see Typical Section)
- 4 Pavement Depth = 4 inches (27.6 Tons/100lf, see Typical)
- 5 Edge Striping (both sides)
- 6 Center line shift, 2' left from Sta. 63+50 to Sta. 70+50, See Section 64+25
- 7 Center line shift, 2' left from Sta. 77+00 to Sta. 80+00, See Section 64+25
- 8 Rock Excav. Sta 78+00 to Sta.81+00 (~80cy/100ft.)
- 9 Drainage improvements anticipated Sta. 51+00 to Sta. 55+00
- 10 Retain existing shoulder Sta. 40+50 to Sta. 48+00
- 11 Cut & Remove existing paved swale, supplement existing gravel & re-pave shoulder to uniform cross slope. See Section B-B, typical Sta. 20+00 to Sta. 30+00

Notes:	Location	Item Numbers												
		628.2 Saw Pvmnt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Ton)	403.12 HBP (handl) (Ton)	417 C. Plane (SY)	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 Catch Bas. (U)	609.21 Sl. Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G.Rail (LF)
1, 4, 5, 11	Sta. 20+00 to 30+00	2000	220		240		276	220						
1 to 5	30+00 to 40+50	2100	1092		945		290	230						
10	40+50 to 48+00	750	390		338		104	80						
1 to 5	48+00 to 63+50	3100	1008		806		428	340	600	8	1200	3100		
6	63+50 to 70+50	700	455		364	140	105	1260				1400		
1 to 5	70+50 to 77+00	1300	676		585		179	140				1300		
7	77+00 to 80+00	300	52	240	156	60	45	540				600		
1 to 5	80+00 to 88+50	1700	884	60	765		235	190				1700		
	to													
	SUBTOTALS:	11950	4777	300	4199	200	1661	3000	300	600	8	13700	0	
	ROUNDING:	1050	523	100	501	200	239	200	200	200	2	1300	200	
	TOTALS:	13000	5300	400	4700	400	1900	3200	500	800	10	15000	200	

WORK SUMMARY - ALTERNATE 2 (Bike Path)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 3, 2014 **DRAFT**

Assumptions /Notes:

- 1 8' Wide Bike Path (*west side, see typical section*)
- 2 Excavation = 56 CY/100 lf; see Typical Section
- 3 Gravel = 1.25' Depth (47 CY/100 lf; see Typical Section)
- 4 Pavement Depth = 3.25 inches (16.7 Tons/100lf; see Typical)
- 5 Center Striping (single line or dashed)
- 6 2'H MRM Ret Wall Sta 22+50 to Sta. 26+00
- 7 4'H Rein. Conc. Wall Sta 56+70 to Sta. 59+70 (**\$350/Ft.**)
- 8 2'H to 3'H MRM Ret Wall from Sta. 60+00 to Sta. 66+00
- 9 2'H MRM Ret Wall Sta 72+80 to Sta. 75+90
- 10 Drainage Improvements will be limited to cross pipes
- 11 Rock Excav. Sta 78+50 to Sta.83+00 (~1cy/ft.)
- 12 Driveway Modifications

Notes:	Location	Length (feet)	628.2 Saw Pvmnt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Mach.) (Ton)	403.12 HBP (hand) (Ton)	520 RC Wall \$	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 CB (U)	609.21 S.Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G.Rail (LF)	
																Item Numbers
1 to 6	Sta. 20+00 to 46+50	2650		1484												
1 to 5	46+50 to 56+00	950		532		1246	443	30		700				2650		
1 to 5, 7	56+00 to 60+00	400		224		447	159	10						950		
1 to 5, 8, 9	60+00 to 76+00	1600		896		188	67	10	\$105,000					400		
1 to 5, 11	76+00 to 88+50	1250		700	450	752	267	50		2200				1600		
	to					588	209	10						1250		
SUBTOTALS:		6850	0	3836	450	3220	1144	110	\$105,000	2900	0	0	0	6850	0	0
ROUNDING:			500	664	150	480	156	40	\$5,000	600	200	3	200	150	500	
TOTALS:			500	4500	600	3700	1300	150	\$110,000	3500	200	3	200	7000	500	

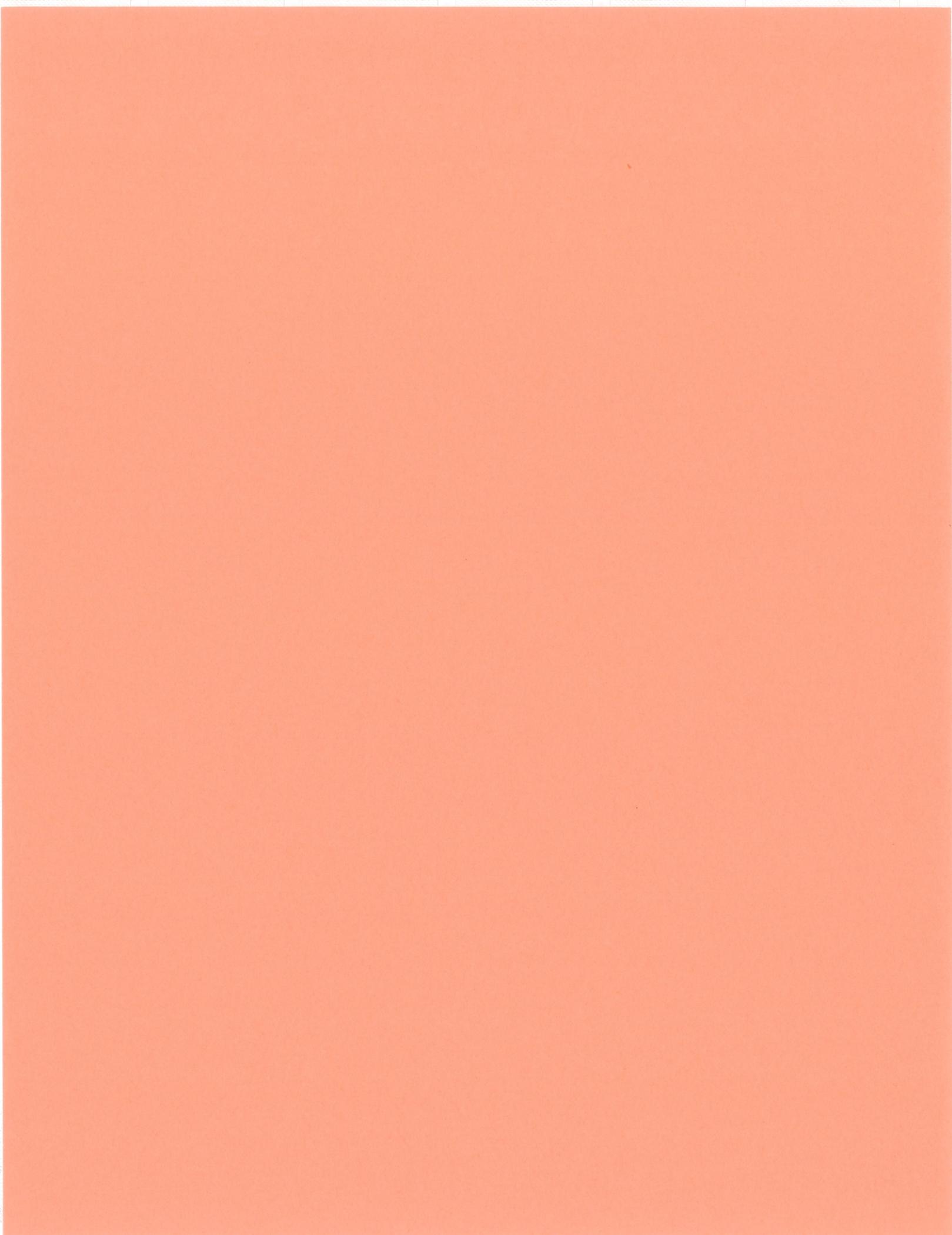
WORK SUMMARY - ALTERNATE 3 (Bike Path/Shoulder Comb.)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: December 3, 2014 **DRAFT**

Assumptions /Notes:

- 1 8' Wide Bike Path (*west side, see typical section*)
- 2 Excavation = 47 CY/100 lf, see Typical Section
- 3 Gravel = 1.25' Depth (47 CY/100 lf, see Typical Section)
- 4 Pavement Depth = 3.25 inches (16.7 Tons/100lf, see Typical)
- 5 Center Striping (single line or dashed)
- 6 2'H MRM Ret Wall Sta 22+50 to Sta. 26+00
- 7 5' Wide Paved Shoulder (*each side, see typical section*)
- 8 Retain existing shoulder Sta. 40+50 to Sta. 48+00
- 9 Excavation = 104 CY/100 lf, see Typical Section
- 10 Gravel = 2' Depth (90 CY/100 lf, see Typical Section)
- 11 Pavement Depth = 4 inches (27.6 Tons/100lf, see Typical)
- 12 Edge Striping (both sides)
- 13 Center line shift, 2' left from Sta. 63+50 to Sta. 70+50, See Section 64+25
- 14 Center line shift, 2' left from Sta. 77+00 to Sta. 80+00, See Section 64+25
- 15 Drainage improvements anticipated Sta. 51+00 to Sta. 55+00

Location	Item Numbers													
	Length (feet)	628.2 Saw Pvmt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Mach.) (Ton)	403.12 HBP (hand) (Ton)	417 C. Plane (SY)	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 CB (U)	609.21 S.Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G.Rail (LF)
Notes:														
Sta. 20+00 to 46+50	2650		2, 8	11	3, 10	13, 14	8, 11	7	6	10	10		5	
7, 8 46+50 to 48+00	150	1484			1246	443	30		700				2650	
7, 9-12, 15 48+00 to 63+50	1550	78	1612		68		21	20					300	
13 63+50 to 70+50	700	455			1395	140	428	170		600	8	1200	3100	
7, 9-12 70+50 to 77+00	650	676			364		105	1260	300				1400	
14 77+00 to 80+00	300	195	240		585	60	179	70					1300	
7, 9-12 80+00 to 88+50	850	884	60		156		45	14400					600	
to					765		235	90					1700	
SUBTOTALS:	6850	7250	5384	300	4578	643	1043		1000	600	8	1200	11050	0
ROUNDING:		750	616	100	422	157	157		200	200	2	0	150	200
TOTALS:		8000	6000	400	5000	800	1200		1200	800	10	1200	11200	200



APPENDIX C
OPINION OF COST

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - SUMMARY OF COST

ITEM	<u>ALTERNATE 1</u> (PAVED BIKE LANE)	<u>ALTERNATE 2</u> (8' WIDE BIKE PATH)	<u>ALTERNATE 3</u> (BIKE PATH/ SHOULDER
SCHEDULE 1 - DRAINAGE			
Relocate & Replace Structures	\$84,700	\$19,500	\$84,700
SCHEDULE 2 - SHOULDER & ROADWAY			
5' Wide pavement (2 sides)	\$524,600		
8' Wide pavement (1 side)		\$291,600	
Bike Path/Shoulder Comb.			\$473,100
Tree Removal	\$10,000	\$19,000	\$12,000
Rock Excavation	\$24,000	\$36,000	\$24,000
Retaining Walls, Guardrail & Curbing	\$42,500	\$235,000	\$60,400
Pavement Markings & Signs	\$26,100	\$27,800	\$27,600
TOTAL SCHEDULE 2	\$627,200	\$609,400	\$597,100
SUBTOTAL SCHEDULES 1 & 2	\$711,900	\$628,900	\$681,800
SCHEDULE 3 - COMMON/INCIDENTAL			
Police, Flaggers & Maintenance of Traffic	\$85,500	\$31,500	\$61,500
Mobilization	\$71,200	\$62,900	\$68,200
Contingency	\$71,200	\$62,900	\$68,200
TOTAL SCHEDULE 3	\$227,900	\$157,300	\$197,900
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)	\$939,800	\$786,200	\$879,700
Engineering, R-O-W, Surveying & Planning	\$244,400	\$234,100	\$231,200
Land Acquisition & Easements	\$32,000	\$94,000	\$39,500
TOTAL PROJECT COST	\$1,216,000	\$1,114,000	\$1,150,000

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 1
 Engineers Opinion of Probable Costs

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	500	LF	\$15.00	\$7,500
202.5	Removal of existing drain manholes and catch basins	10	EA	\$300.00	\$3,000
206.2	Rock Structure Excavation	10	CY	\$120.00	\$1,200
603.82215	15" polyethylene pipe (smooth interior)	800	LF	\$60.00	\$48,000
604.124	Catch basin type B - 4' Dia	10	U	\$2,500.00	\$25,000
TOTAL SCHEDULE 1					\$84,700
SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	20	EA	\$300.00	\$6,000
201.22	Removing large trees	4	EA	\$1,000.00	\$4,000
203.1	Common Excavation	5,300	CY	\$12.00	\$63,600
203.2	Rock Excavation	400	CY	\$60.00	\$24,000
304.3	Crushed gravel	4,700	CY	\$30.00	\$141,000
403.11	Bituminous Pavement, Machine Method	400	TON	\$85.00	\$34,000
403.12	Bituminous Pavement, Hand Method	1,900	TON	\$120.00	\$228,000
417	Cold planing bituminous surface	3,200	SY	\$10.00	\$32,000
592.1	Mech. Stabilized Ret. Wall	500	SY	\$32.00	\$16,000
606.12	Beam Guard Rail	200	LF	\$20.00	\$4,000
609.21	Straight granite slope curb	1,500	LF	\$15.00	\$22,500
615.03	Traffic Signs, Type C	100	Sq. Ft.	\$50.00	\$5,000
628.2	Sawed Bit. Pavement	13,000	LF	\$2.00	\$26,000
632.0104	Pavement Markings - 4" line	12,500	LF	\$0.25	\$3,100
632.32	Pavement Markings - Symbols	3,000	Sq. Ft.	\$6.00	\$18,000.00
TOTAL SCHEDULE 2					\$627,200
SUBTOTAL SCHEDULES 1 & 2					\$711,900

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 1
Engineers Opinion of Probable Costs

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (<i>% of Subtotal</i>)	4%	Allow	\$28,500	\$28,500
618.7	Uniformed Flagger (<i>% of Subtotal</i>)	4%	Allow	\$28,500	\$28,500
619.1	Maintenance of traffic (<i>% of Subtotal</i>)	4%	Allow	\$28,500	\$28,500
692	Mobilization (<i>% of Subtotal</i>)	10%	Allow	\$71,200	\$71,200
	Construction Contingency (<i>% of Subtotal</i>)	10%	Allow	\$71,200	\$71,200
TOTAL SCHEDULE 3					\$227,900
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					
					\$939,800

ENGINEERING, R-O-W, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE					
R-O-W	4.0%				\$37,600
PS&E	2.0%				\$18,800
CONSTRUCTION	8.0%				\$75,200
	12.0%				\$112,800
TOTAL ENGINEERING					\$244,400

LAND ACQUISITION & SLOPE EASEMENTS					
R-O-W Acquisitions	4.00	Each		\$7,500	\$30,000
Slope easements	1.00	Each		\$2,000	\$2,000
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$32,000

TOTAL PROJECT COST

\$1,216,000

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 2
Engineers Opinion of Probable Costs

ALTERNATE 2: 8' WIDE BIKE PATH (West Side Only)

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	0	LF	\$15.00	\$0
202.5	Removal of existing drain manholes and catch basins	0	EA	\$300.00	\$0
206.2	Rock Structure Excavation	0	CY	\$120.00	\$0
603.82215	15" polyethylene pipe (smooth interior)	200	LF	\$60.00	\$12,000
604.124	Catch basin type B - 4' Dia	3	U	\$2,500.00	\$7,500
TOTAL SCHEDULE 1					\$19,500
SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	30	EA	\$300.00	\$9,000
201.22	Removing large trees	10	EA	\$1,000.00	\$10,000
203.1	Common Excavation	4,500	CY	\$12.00	\$54,000
203.2	Rock Excavation	600	CY	\$60.00	\$36,000
304.3	Crushed gravel	3,700	CY	\$30.00	\$111,000
403.11	Bituminous Pavement, Machine Method	1,300	TON	\$82.00	\$106,600
403.12	Bituminous Pavement, Hand Method	150	TON	\$120.00	\$18,000
417	Cold planing bituminous surface	100	SY	\$10.00	\$1,000
520	Conc Wall, Class A on Class B Footing (Incl. excavation & Rein. Steel)	1	LS	\$110,000.00	\$110,000
592.1	Mech. Stabilized Ret. Wall	3,500	SY	\$32.00	\$112,000
606.12	Beam Guard Rail	500	LF	\$20.00	\$10,000
609.21	Straight granite slope curb	200	LF	\$15.00	\$3,000
615.03	Traffic Signs, Type C	400	Sq. Ft.	\$50.00	\$20,000
628.2	Sawed Bit. Pavement	500	LF	\$2.00	\$1,000
632.0104	Pavement Markings - 4" line	7,000	LF	\$0.25	\$1,800
632.32	Pavement Markings - Symbols	1,000	Sq. Ft.	\$6.00	\$6,000.00
TOTAL SCHEDULE 2					\$609,400
SUBTOTAL SCHEDULES 1 & 2					\$628,900

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 2
 Engineers Opinion of Probable Costs

ALTERNATE 2: 8' WIDE BIKE PATH (West Side Only)

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (% of Subtotal)	1%	Allow	\$6,300	\$6,300
618.7	Uniformed Flagger (% of Subtotal)	2%	Allow	\$12,600	\$12,600
619.1	Maintenance of traffic (% of Subtotal)	2%	Allow	\$12,600	\$12,600
692	Mobilization (10% of Subtotal)	10%	Allow	\$62,900	\$62,900
	Construction Contingency (% of Subtotal)	10%	Allow	\$62,900	\$62,900
TOTAL SCHEDULE 3					\$157,300
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					
					\$786,200

ENGINEERING, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE		4.8%			\$37,600
R-O-W		5.0%			\$39,300
PS&E		8.0%			\$62,900
CONSTRUCTION		12.0%			\$94,300
TOTAL ENGINEERING					\$234,100

LAND ACQUISITION & SLOPE EASEMENTS					
R-O-W Acquisitions	12.00	Each		\$7,500	\$90,000
Slope easements	2.00	Each		\$2,000	\$4,000
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$94,000

TOTAL PROJECT COST **\$1,114,000**

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 3
 Engineers Opinion of Probable Costs

ALTERNATE 3: 8' WIDE BIKE PATH/SHOULDER COMB.

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	500	LF	\$15.00	\$7,500
202.5	Removal of existing drain manholes and catch basins	10	EA	\$300.00	\$3,000
206.2	Rock Structure Excavation	10	CY	\$120.00	\$1,200
603.82215	15" polyethylene pipe (smooth interior)	800	LF	\$60.00	\$48,000
604.124	Catch basin type B - 4' Dia	10	U	\$2,500.00	\$25,000
TOTAL SCHEDULE 1					\$84,700
SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	20	EA	\$300.00	\$6,000
201.22	Removing large trees	6	EA	\$1,000.00	\$6,000
203.1	Common Excavation	6,000	CY	\$12.00	\$72,000
203.2	Rock Excavation	400	CY	\$60.00	\$24,000
304.3	Crushed gravel	5,000	CY	\$30.00	\$150,000
403.11	Bituminous Pavement, Machine Method	800	TON	\$84.00	\$67,200
403.12	Bituminous Pavement, Hand Method	1,200	TON	\$120.00	\$143,900
417	Cold planing bituminous surface	2,400	SY	\$10.00	\$24,000
592.1	Mech. Stabilized Ret. Wall	1,200	SY	\$32.00	\$38,400
606.12	Beam Guard Rail	200	LF	\$20.00	\$4,000
609.21	Straight granite slope curb	1,200	LF	\$15.00	\$18,000
615.03	Traffic Signs, Type C	250	Sq. Ft.	\$50.00	\$12,500
628.2	Sawed Bit. Pavement	8,000	LF	\$2.00	\$16,000
632.0104	Pavement Markings - 4" line	12,500	LF	\$0.25	\$3,100
632.32	Pavement Markings - Symbols	2,000	Sq. Ft.	\$6.00	\$12,000.00
TOTAL SCHEDULE 2					\$597,100
SUBTOTAL SCHEDULES 1 & 2					\$681,800

NH ROUTE 108 SHOULDER WIDENING/BIKEPATHS - ALTERNATE 3
 Engineers Opinion of Probable Costs

ALTERNATE 3: 8' WIDE BIKE PATH/SHOULDER COMB.

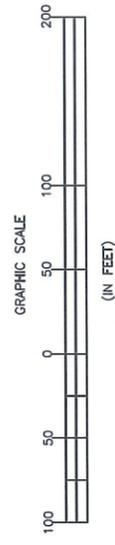
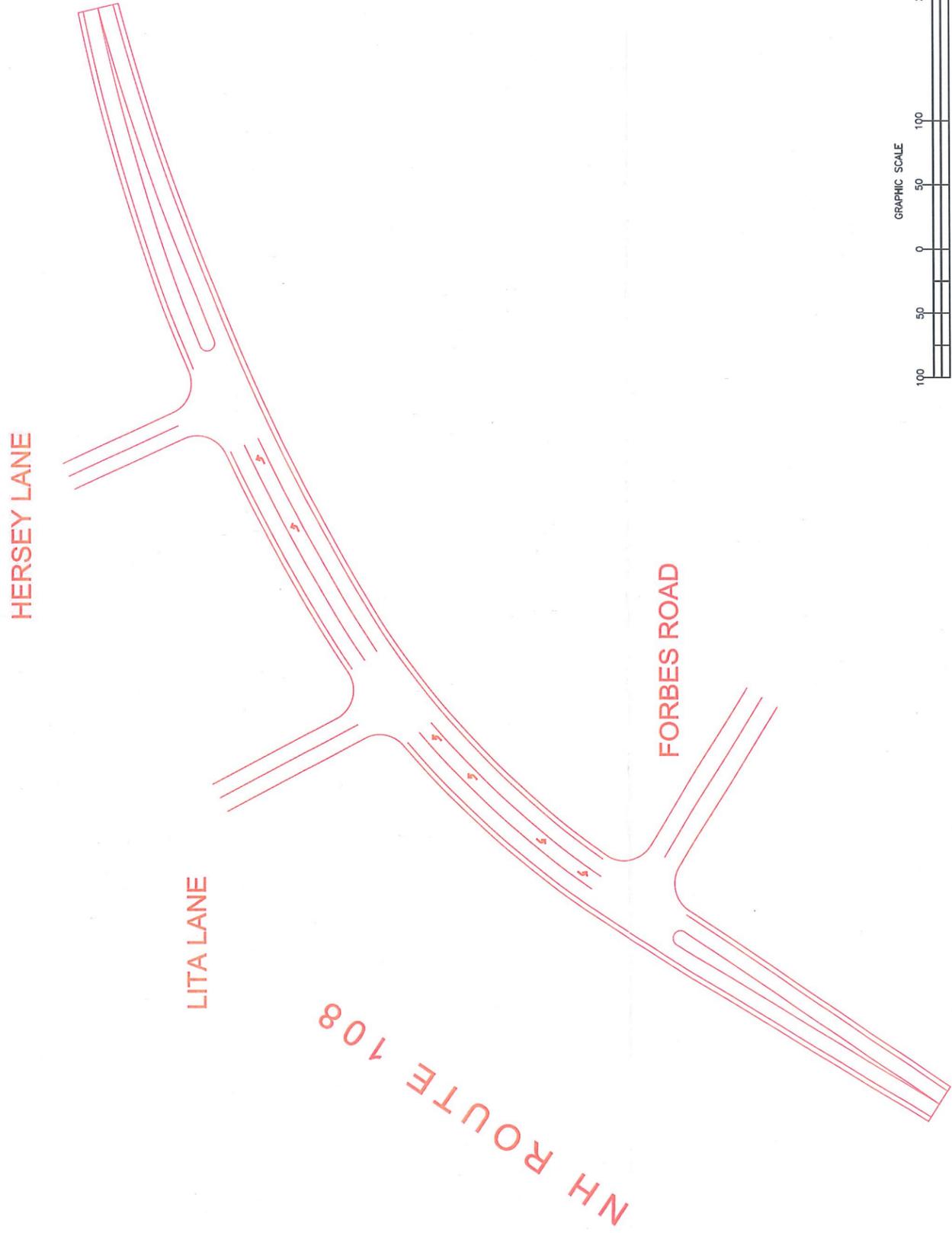
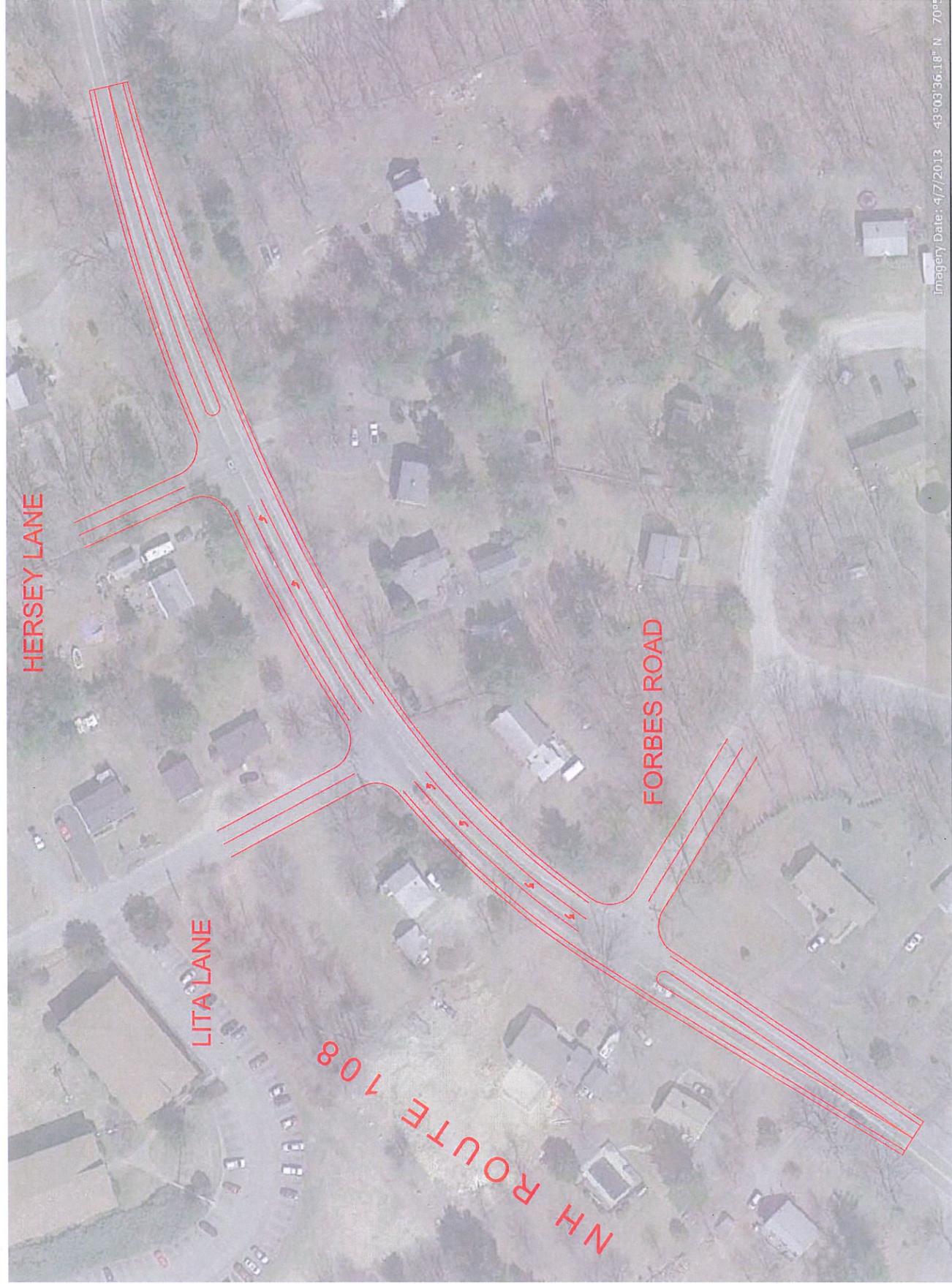
Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (<i>% of Subtotal</i>)	3%	Allow	\$20,500	\$20,500
618.7	Uniformed Flagger (<i>% of Subtotal</i>)	3%	Allow	\$20,500	\$20,500
619.1	Maintenance of traffic (<i>% of Subtotal</i>)	3%	Allow	\$20,500	\$20,500
692	Mobilization (<i>10% of Subtotal</i>)	10%	Allow	\$68,200	\$68,200
	Construction Contingency (<i>% of Subtotal</i>)	10%	Allow	\$68,200	\$68,200
TOTAL SCHEDULE 3					\$197,900
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					\$879,700

ENGINEERING, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE	4.3%	Each			\$37,600
R-O-W	2.0%	Each			\$17,600
PS&E	8.0%	Each			\$70,400
CONSTRUCTION	12.0%	Each			\$105,600
TOTAL ENGINEERING					\$231,200

LAND ACQUISITION & SLOPE EASEMENTS					
R-O-W Acquisitions	5.00	Each		\$7,500	\$37,500
Slope easements	1.00	Each		\$2,000	\$2,000
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$39,500

TOTAL PROJECT COST **\$1,150,000**

APPENDIX D
OFF SITE IMPROVEMENTS
ROUTE 108 INTERSECTION IMPROVEMENTS
AT FORBES ROAD AND HERSEY LANE



REVISIONS	
NUMBER	DESCRIPTION

**CONCEPTUAL LONG RANGE PLAN
NH ROUTE 108 / FORBES ROAD
NEWMARKET, NEW HAMPSHIRE**

Prepared For
SHEARWATER INVESTMENT CORP.

DRAWN: CAP	DESIGNED: SGP	CHECKED: SGP
SCALES: SEE GRAPHIC SCALE	JOB NO.: 1511A	DATE: 10/20/14



Stephen G. Pernaw & Co. Inc.
P.O. Box 1171, Concord, NH 03302
Phone: (603) 228-5750, Fax: (603) 923-6094

Anticipated Schedule

Newmarket, NH
Shoulder Widening & Bike Path, NHDOT (CMAQ) Project #13878
July 10, 2014 (Revised 7.30.14)

	November 2013	December 2013	Jan - April 2014	May 2014	June 2014	July 2014	August 2014	September 2014	October 2014	November 2015	December 2014	January 2015	February 2015	March 2015	April 2015	May 2015	December 2015
Consultant QBS Selection Approval by NHDOT																	
I GE Review, Scope & Fee Approved & Auth. to Proceed																	
TASK 1 - Engineering Study and Report Phase																	
Kick-Off Meeting																	
Alignment, Design Alternatives & Preliminary Cost																	
Work Plan - Schematic Layout																	
Public/Neighborhood Informational Meeting																	
Design Report Submittal																	
NHDOT Review/Approval of Preliminary Design & Cost																	
I GE Review, Scope & Fee Approved & Auth. to Proceed (TASKS 2-4)																	
TASK 2 - Topographic Survey & ROW Determination																	
TASK 3 - Environmental Review Documentation - Submittal <i>(incl. meetings with DHR, NHDOT and FHWA)</i>																	
NHDOT & FHWA approval of Environmental Documentation																	
TASK 4 - Design Phase/PS&E																	
60% Design Submission <i>(incl. Opinions of Cost)</i>																	
NHDOT Review/Approval of 60% Design & Cost																	
95% Design Submission <i>(incl. Opinions of Cost)</i>																	
NHDOT Review/Approval of 95% Design & Cost																	
ROW & Easement Acquisition/ROW Certificate																	
100% Final Design Documents & Approval to Bid																	
TASK 5 - Bidding																	
TASK 6 - Construction Begins																	
Project Closeout																	

Estimated Time to Complete
 Float Range for Meetings, Design Reviews & Approval
 Milestone for Submittal, Completion or Target date

MEETING No.2 - NOTES

PROJECT STATUS AND WORK SESSION

**NH Rte 108 Shoulder Widening and Bike Path Construction (SOUTH)
Town of Newmarket**

Town Council Chambers
186 Main Street, Newmarket NH
October 23, 2014 at 10:00 AM

Project Personnel

Diane Hardy, Town Planner
Steve Fournier, Town Administrator
Mike Hoffman, Code Enforcement
Rick Malasky, Public Works
Phil MacDonald, P.E., Project Manager
Ben Dreyer, P.E., Project Engineer
Steve Michaud, Vice President
Tom Jameson, Project Manager
James Hewitt, Utilities Engineer
Tom Brown

Representing

Town of Newmarket
Town of Newmarket
Town of Newmarket
Town of Newmarket
Underwood Engineers
Underwood Engineers
Doucet Surveying
NHDOT Community Assistance
NHDOT District 6
SRPC

1.0 Introductions

Introductions were made and a brief overview of the project was provided.

1.1 Meeting Purpose and Goals

The following goals were identified:

- Evaluate Route Alternatives and Discuss/Feedback
- Review Project Impacts
- Discuss Project Costs and Budget
- Next Steps

1.2 Project Alternatives

1.2.1 Project Design Alternatives:

Two Design Alternatives have been developed for review:

<u>Description</u>	<u>Cost</u>	<u>Impacts</u>
Alt. 1- Bike Lanes (5') Combined w. Shoulder Each Side	\$1,930,000	8 Properties
Alt. 2- Bike Lanes (8') Separated From Roadway	\$1,328,000	8 Properties

1.2.2 Alternate No. 1 Discussion:

- Right of Way limitations were identified and Doucet provided a basis for the preliminary layout shown on the work plan drawings as summarized below:
 - Boundary information along this section of the Route 108 corridor is limited
 - Site plans and deed references were researched and incorporated
 - There are up to three historic layouts from NHDOT but certain segments conflict with each other (for example, Forbes Road area)
 - The layouts were oriented to create a best fit based on the information available
- The property impact tables provided in the project submission to NHDOT (9/19/14) were reviewed
- NHDOT asked if discussions had been initiated with the impacted property owners. They have not. The following was noted:
 - Eminent Domain proceedings for bike path construction won't be supported
 - If the impact areas can be acquired for less than \$10,000 the LPA/NHDOT process can be applied
 - Once a preferred alternative is identified, planning for property acquisition may begin
- NHDOT District 6 noted the following regarding the center turn lane shown at the Forbes Road intersection:
 - Requirements for the center turn lane are still being confirmed by District and should not be assumed in the bike path design. A final decision by NHDOT is pending.
 - A traffic report prepared by S.G. Pernaw (ref UE Letter 9/19/14) was identified and it was noted that traffic conditions at Hersey Lane are also a driver for center turn lane warrants in the Forbes Road area.
 - Not constructing the center turn lane improvements would extend related deficiencies to bike traffic once the bike lanes were constructed
 - The Town and Developer will have to negotiate on levels of participation on these improvements
 - The cost impacts of the turn lanes on the project funding constraints was noted.
 - If retaining walls will be used, ROW (or easement) space behind the wall will be required to facilitate maintenance.
- Improvements proposed between STA 50+00 and 60+00 were discussed:
 - Impacts to the drainage system are anticipated in this area and any existing problems could be addressed during the project.
 - NHDOT expressed that any problems would be driven by age/design life of the drainage system infrastructure and not function.
 - Drain lines for this system are primarily CMP and may be rusted out
 - Options for accommodating existing drainage paths in the context of extending the pavement width were discussed.
 - Funding participation on drainage will consider the basis for improvement/replacement. If a connection/extension of existing piping cannot be made due to age/condition, District 6 will be participate with funding. If modifications are project driven (e.g. larger pipes are required due to increased impervious area or structures have to be moved because of the wider roadway), those improvements would be included under the project funds. NHDOT suggested there may be additional CMAQ funds if the basis can be supported.

- Improvements proposed between STA 60+00 and 70+00 were discussed:
 - Physical and Boundary constraints for this segment were noted
 - The railroad corridor running parallel to the roadway has steep slopes and retaining walls
 - The idea of shifting the roadway alignment away from the rail road was presented
 - The implications of shifting the roadway crown were discussed and it was noted the road may be super elevated in this area
 - This may be an area where 4' (vs. 5' desirable) bike lane widths may be warranted
 - NHDOT noted a preference for 4' bike lanes as a standard to match work being done to the north in Durham
 - The Town prefers 5' bike lanes
 - Land acquisition at STA 65+00 was noted and its benefit to the Town was recognized
- Improvements proposed between STA 70+00 and 80+00 were discussed:
 - The NHDOT land acquisition process was discussed in further detail
 - Properties to be acquired would have to be assessed
 - Although NHDOT does employ assessors for this type of work, current backlogs would prevent assistance from the State's assessor being feasible for this project

1.2.3 Alternate No.2 Discussion:

- ROW impacts for Alternate No.2 were noted in comparison to Alternate No.1. Permanent easements for the bike path would be acceptable instead of land acquisition.
- The alignment of the bike path at the intersection with the new subdivision road at the golf course should be modified so the crossing occurs closer to Rte 108 (as shown, the bike path would be a special crossing functioning independently from the road intersection at Rte 108)
- The curving alignment (as shown along the golf course frontage) will be acceptable but ADA guidelines will need to be considered
- Similar examples of current bike path projects were identified in Newcastle and Pease
- Maintenance considerations were discussed:
 - The Town would be required to maintain the bike path where NHDOT would likely maintain bike shoulders shown under Alternate No.1 since they would be part of the road.
 - NHDOT noted not maintaining the bike path would not be acceptable to FHWA and could result in loss of project funds
- The need to define crossing locations was discussed and connectivity to the heavily used Rockingham Junction rail trail network was noted. Crossings require NHDOT approval.
- Cost benefits of the bike path alternative were noted including simple construction, less road box, no increase to NHDOT road paving surface area on Rte 108, increases use by amateur/family cyclists and/or pedestrians (multi-use path), more options for handling drainage (e.g. swale between path and edge for roadway) and reduced traffic control.
- Avid cyclists may continue to use Route 108 and not the bike path
- The magnitude of property and land impacts for Alternative No.2 are comparable to Alternative No.1
- The bike path would not be impacted by potential traffic lane improvements at Forbes Road (whether constructed or not)

1.3 Project Budget

The project budget for each alternative was reviewed:

	<u>Alternate 1</u>		<u>Alternate 2</u>
Original Project Budget:	\$ 809,000		\$ 809,000
<u>Current Proposed Budget:</u>	<u>\$1,328,000</u>	to	<u>\$1,930,000</u>
Over/Delta:	\$ 519,000	to	\$1,121,000
Additional Funding:	\$ 200,000		\$ 200,000
Reduced Project Scope:	\$ TBD		TBD

Discussion:

- NHDOT noted the proposed project budgets are beyond the current funding level and are not likely to be supported by NHDOT
- Considering the time frame from when the original budget was set and current construction costs, NHDOT anticipates some flexibility with the budget. A total project cost around \$1M may be acceptable.
- The Town would be required to demonstrate their ability to provide 20% matching funds for any amount over the original budget
- Since traffic lane improvements at Forbes Road would be considered independently from project work the costs can be reduced accordingly
- Other considerations discussed for managing cost limitations included bid alternate scenarios and project phasing

1.4 Next Steps

The following next steps were identified:

- Topographic Survey
- Boundary Survey and Land Acquisitions (or easements?)
- Informational Meetings
- Design Phase – Preliminary
- Bureau of Environment and NEPA project review (evaluation for stone walls under Section 106 is anticipated)

1.5 Project Schedule

The following considerations for the project schedule were noted:

- The current project completion status in relation to the contemplated completion date was reviewed. The lead time on securing easements and land rights may warrant extending the completion date to reflect project construction in 2016. The schedule change would require written request by the Town to modify their contract agreement with NHDOT.
- The environmental review process (NEPA) must be complete before negotiations for land acquisition can start

1.6 Action Items

- Town to confirm available funds for 20% match required to increase project budget to ~\$1M
- UE to complete engineering study based on feedback from this project status meeting
- Town and UE to make specific invitation to public meeting for impacted land owners

Anticipated Schedule

Newmarket, NH
Shoulder Widening & Bike Path, NHDOT (CMAQ) Project #13878
October 31, 2014

	November 2013	December 2013	Jan - April 2014	May 2014	June 2014	July 2014	August 2014	September 2014	October 2014	November 2014	December 2014	January 2015	February 2015	SPRING 2015	SUMMER 2015	FALL 2015	WINTER 2016	SPRING 2016	SUMMER 2016	FALL 2016	December 2016	
Consultant QBS Selection Approval by NHDOT		X																				
IGE Review, Scope & Fee Approved & Auth. to Proceed				X																		
TASK 1 - Engineering Study and Report Phase																						
Kick-Off Meeting						X																
Alignment, Design Alternatives & Preliminary Cost									X													
Work Plan - Schematic Layout									X													
Public/Neighborhood Informational Meeting												X		X								
Design Report Submittal														X								
NHDOT Review/Approval of Preliminary Design & Cost									X		X											
IGE Review, Scope & Fee Approved & Auth. to Proceed (TASKS 2-4)														X								
TASK 2 - Topographic Survey & ROW Determination																						
TASK 3 - Environmental Review Documentation - Submittal <i>(incl. meetings with DHR, NHDOT and FHWA)</i>																						
NHDOT & FHWA approval of Environmental Documentation															X							
TASK 4 - Design Phase/PS&E																						
60% Design Submission <i>(incl. Opinions of Cost)</i>																				X		
NHDOT Review/Approval of 60% Design & Cost																	X					
95% Design Submission <i>(incl. Opinions of Cost)</i>																				X		
NHDOT Review/Approval of 95% Design & Cost																				X		
ROW & Easement Acquisition/ROW Certificate																				X		
100% Final Design Documents & Approval to Bid																				X		
TASK 5 - Bidding																				X		
TASK 6 - Construction Begins																				X		
Project Closeout																					X	

Estimated Time to Complete
 Float Range for Meetings, Design Reviews & Approval
 Milestone for Submittal, Completion or Target date

APPENDIX E
PROJECT MEETING NOTES

PROJECT KICKOFF MEETING (No. 1)
NH Rte 108 Shoulder Widening/Bike Path Construction (SOUTH)
Newmarket, New Hampshire
July 10, 2014

1. Introductions and Meeting Attendance

Introductions were made around the table with the following in attendance:

<u>NAME</u>	<u>REPRESENTING</u>	<u>CONTACT INFORMATION</u>
Steve Fournier	Town Administrator	sfournier@newmarket.gov
Diane Hardy	Town Planner	dhardy@newmarket.gov
Rick Malasky	Public Works	rmalasky@newmarket.gov
Michael Hoffman	Building Safety	mhoffman@newmarket.gov
Cynthia Copeland	Strafford RPC	cjc@strafford.org
Rob Graham	Shearwater Investments	rgraham@comcast.net
Claudie Marston Grout	Town Citizen	claudilmgrout@yahoo.com
Phil MacDonald	Underwood Engineers	pmac@underwoodengineers.com
Ben Dreyer	Underwood Engineers	bdreyer@underwoodengineers.com

2. Project Contacts and Lines of Communication

Underwood Engineers:

Project Manager:	Phil MacDonald
Project Engineer:	Ben Dreyer

Town of Newmarket:

Town Planner:	Diane Hardy
Public Works:	Rick Malasky
Town Administrator:	Steve Fournier

Strafford County Regional Planning Commission:

Executive Director:	Cynthia Copeland
---------------------	------------------

NHDOT (not in attendance):

Administrator of Comm. Asst:	Bill Watson
Project Manager:	Tom Jameson
District 6 Engineer:	Doug DePorter
Dist. 6 Utility Engineer:	Jim Hewitt

3. Schedule and Project Milestones

The project schedule was reviewed. Modifications based on meeting discussions are reflected on the attached schedule. In general the schedule reflects completion of the report phase this fall with design through the winter months in preparation of bidding and construction in the spring/summer of 2015. The current completion deadline for construction is December 2015.



PROJECT KICKOFF MEETING (No. 1)
NH Rte 108 Shoulder Widening/Bike Path Construction (SOUTH)
Newmarket, New Hampshire
July 10, 2014

Notes and Next Steps:

- The 1st public meeting will be targeted for the end of August
- A minimum 2-3 week lead time should be allowed for notification.
- Suggested public meeting attendees/invites include the following:
 - NHDOT
 - B&M Railroad
 - COAST
 - SABR
 - Local Businesses
 - Cemetery Trustees
 - Rails to Trails
 - Chinburg (Rockingham Golf Course)

4. Project Work Plan – Thoughts and Ideas

- Existing conditions and project constraints shown on the Project Work Plan were reviewed:
 - ROW limitations
 - Slopes and embankments
 - Overhead utilities
 - Underground utilities
- Future planning considerations were identified
 - Rockingham Country Club – Changes in use
 - Forbes Rd Site Development – Center turn lane on Route 108
 - NHDOT overlay within Project Limits - 2014
 - Alt 1: Extend shoulders for bike lanes adjacent to travel lane on each side of Route 108
 - Alt 2: Separate bike lanes from Route 108 traveled way (one side only)
 - NHDOT shoulder/bike lane project to the north
 - NHDOT Bridge Project south of R.C.C. – will provide 3' shoulders
 - Need for sewer interceptor on Rte 108 – Town to TV sewer line for problem areas?
- Design Alternatives :
 - Responses to concept for bike lanes on one side of Rte 108 corridor were favorable
 - Town staff anticipates the public and local citizens will prefer bike lanes on one side also
 - Project costs and possible phasing will need to be considered
 - The merits of using the golf cart path along the R.C.C frontage was discussed
 - Gravel depths for stand alone bike lanes vs. bike lanes connected to NHDOT roadway was considered.
- Maintenance of bike lanes was discussed:
 - NHDOT would maintain bike lane shoulder areas extending from the travel lanes on Rte 108 as part of current operations
 - NHDOT maintenance of stand alone bike lanes may follow a similar approach for sidewalk areas leaving this task to the Town
 - The option for not maintaining the bike lanes in the winter was identified
 - Advantages and Disadvantages including cost considerations will be evaluated in the report
- SRPC noted that state site appraisers may offer assistance to the Town for property assessment required for land/easement acquisition.



PROJECT KICKOFF MEETING (No. 1)
NH Rte 108 Shoulder Widening/Bike Path Construction (SOUTH)
Newmarket, New Hampshire
July 10, 2014

- SRPC also noted that Route 108 is recognized as a State Bike Route and recently included on Scenic Byways list with NHDOT.
- Discussions on traffic lane improvements at Forbes Road and Hersey Lane considered shared center turn lane concept. Rob Graham representing Shearwater Investments concurred with initial concept and requested a copy when available.
- The potential for pedestrians to use bike lanes also for travel initiated an aside discussion on potential for multi-use trail. Since this would exceed the scope of this project, the concept was not discussed further.
- Discussing “public readiness” and appropriate considerations for promotion, outreach and media for building public project support
- Purpose and Need Statement
 - Designated bike route
 - Regional effort to link routes
 - Address safety concerns for shared roadway use
 - Commuting and community access
 - Traffic calming and speed control
 - Promote safe and manage travel speed
 - Town/Local concerns

5. Action Items and Next Steps

- Schedule first public meeting
- Advance ROW layout and work plan for design alternatives



APPENDIX F
CONSTRUCTION PHASING PLAN ALTERNATIVES

PART 2B
BIKE PATH CONSTRUCTION
COST = \$93K
CONSTRUCTION: \$77K
ENGINEERING: \$16K

PART 1B
SHOULDER WIDENING
COST = \$871K
CONSTRUCTION: \$683K
ENG. & ROW: \$188K

PART 1
SHOULDER WIDENING
COST = \$45K
ENGINEERING, ROW, &
ADMINISTRATION ONLY.
CONSTRUCTION DEPENDANT
UPON FINAL DESIGN, BIDDING,
AND/OR FUTURE FUNDING

CONSTRUCTION PHASING - ALT. A
TOTAL BUDGET: \$1,009,000

PROJECT LIMIT

PROJECT LIMIT

1650'

5200'



DATE
02/25/15
PROJECT
1851

UNDERWOOD
engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

PROJECT AREA - ALT. PHASING A
ROUTE 108 BIKE PATH CONSTRUCTION/
SHOULDER WIDENING
TOWN OF NEWMARKET
NEWMARKET, NEW HAMPSHIRE

FIG.
A

PART 2B
BIKE PATH CONSTRUCTION
COST = \$93K
CONSTRUCTION: \$77K
ENGINEERING: \$16K

PART 2
SHOULDER WIDENING
COST = \$41K
ENGINEERING & ROW ONLY.
CONSTRUCTION DEPENDANT
UPON FINAL DESIGN, BIDDING,
AND/OR FUTURE FUNDING.

PART 1C
SHOULDER WIDENING
COST = \$875K
CONSTRUCTION: \$660K
ENG. & ROW: \$183K
ADMIN. & LEGAL: \$32K

CONSTRUCTION PHASING - ALT. B
TOTAL BUDGET: \$1,009,000

PROJECT LIMIT

PROJECT LIMIT

4050'

2800'



DATE
02/25/15
PROJECT
1851



25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

PROJECT AREA - ALT. PHASING B
ROUTE 108 BIKE PATH CONSTRUCTION/
SHOULDER WIDENING
TOWN OF NEWMARKET
NEWMARKET, NEW HAMPSHIRE

FIG.
B

WORK SUMMARY - ALTERNATE 1B (Paved Shoulder, Sta. 20+00 to Sta. 72+00)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: February 24, 2014 **DRAFT**

SEE FIGURE A

Assumptions /Notes:

- 1 5' Wide Paved Shoulder (each side, see typical section)
- 2 Excavation = 104 CY/100 lf, see Typical Section
- 3 Gravel = 2' Depth (90 CY/100 lf, see Typical Section)
- 4 Pavement Depth = 4 inches (27.6 Tons/100lf, see Typical)
- 5 Edge Striping (both sides)
- 6 Center line shift, 2' left from Sta. 63+50 to Sta. 70+50, See Section 64+25
- 7 Center line shift, 2' left from Sta. 77+00 to Sta. 80+00, See Section 64+25
- 8 Rock Excav. Sta 78+00 to Sta.81+00 (~80cy/100ft.)
- 9 Drainage Improvements anticipated Sta. 51+00 to Sta. 55+00
- 10 Retain existing shoulder Sta. 40+50 to Sta. 48+00
- 11 Cut & Remove existing paved swale, supplement existing gravel & re-pave shoulder to uniform cross slope. See Section B-B, typical Sta. 20+00 to Sta. 30+00

Notes:	Location	Item Numbers													
		Length (feet)	628.2 Saw Pvmt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Ton)	403.12 HBP (hand) (Ton)	417 C. Plane (SY)	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 Catch Bas. (U)	609.21 Sl. Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G. Rail (LF)
1, 4, 5, 11	Sta. 20+00 to 30+00	1000	2000	220		240		220							
1 to 5	30+00 to 40+50	1050	2100	1092		945	290	230						2100	
10	40+50 to 48+00	750	750	390		338	104	80						1500	
1 to 5	48+00 to 63+50	1550	3100	1008		806	428	340		600	8	1200		3100	
6	63+50 to 70+50	700	700	455		364	105	1260	300					1400	
1 to 5	70+50 to 72+00	150	300	156		135	41	30						300	
	to														
	SUBTOTALS:	5200	8950	3321	0	2828	140	1244	2160	300	8	1200		10400	0
	ROUNDING:		650	279	20	272	60	156	140	100	2	300		1000	200
	TOTALS:		9600	3600	20	3100	200	1400	2300	400	10	1500		11400	200

NH ROUTE 108 SHOULDER WIDENING, **ALTERNATE 1B - Sta. 20+00 to Sta. 72+00**
 Engineers Opinion of Probable Costs \$871,000
DRAFT -02/24/14

L = 5,200 Ft
 Construction ~ \$131/Ft
 Total Cost ~ \$677,000

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	500	LF	\$15.00	\$7,500
202.5	Removal of existing drain manholes and catch basins	10	EA	\$300.00	\$3,000
206.2	Rock Structure Excavation	10	CY	\$120.00	\$1,200
603.82215	15" polyethylene pipe (smooth interior)	800	LF	\$60.00	\$48,000
604.124	Catch basin type B - 4' Dia	10	U	\$2,500.00	\$25,000
TOTAL SCHEDULE 1					\$84,700
SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	15	EA	\$300.00	\$4,500
201.22	Removing large trees	3	EA	\$1,000.00	\$3,000
203.1	Common Excavation	3,600	CY	\$12.00	\$43,200
203.2	Rock Excavation	20	CY	\$60.00	\$1,200
304.3	Crushed gravel	3,100	CY	\$30.00	\$93,000
403.11	Bituminous Pavement, Machine Method	200	TON	\$85.00	\$17,000
403.12	Bituminous Pavement, Hand Method	1,400	TON	\$120.00	\$167,900
417	Cold planing bituminous surface	2,300	SY	\$10.00	\$23,000
592.1	Mech. Stabilized Ret. Wall	400	SY	\$32.00	\$12,800
606.12	Beam Guard Rail	200	LF	\$20.00	\$4,000
609.21	Straight granite slope curb	1,500	LF	\$15.00	\$22,500
615.03	Traffic Signs, Type C	75	Sq. Ft.	\$50.00	\$3,800
628.2	Sawed Bit. Pavement	9,600	LF	\$2.00	\$19,200
632.0104	Pavement Markings - 4" line	11,400	LF	\$0.25	\$2,900
632.32	Pavement Markings - Symbols	2,500	Sq. Ft.	\$6.00	\$15,000.00
TOTAL SCHEDULE 2					\$433,000
SUBTOTAL SCHEDULES 1 & 2					\$517,700

NH ROUTE 108 SHOULDER WIDENING, **ALTERNATE 1B - Sta. 20+00 to Sta. 72+00**
 Engineers Opinion of Probable Costs
DRAFT -02/24/14

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (<i>% of Subtotal</i>)	4%	Allow	\$20,700	\$20,700
618.7	Uniformed Flagger (<i>% of Subtotal</i>)	4%	Allow	\$20,700	\$20,700
619.1	Maintenance of traffic (<i>% of Subtotal</i>)	4%	Allow	\$20,700	\$20,700
692	Mobilization (<i>% of Subtotal</i>)	10%	Allow	\$51,800	\$51,800
	Construction Contingency (<i>% of Subtotal</i>)	10%	Allow	\$51,800	\$51,800
TOTAL SCHEDULE 3					\$165,700
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					\$683,400

ENGINEERING, R-O-W, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE					
R-O-W	5.5%				\$37,680
PS&E	2.0%				\$13,700
CONSTRUCTION	8.0%				\$54,700
	12.0%				\$82,000
TOTAL ENGINEERING					\$188,000

LAND ACQUISITION & SLOPE EASEMENTS					
R-O-W Acquisitions	0.00	Each		\$7,500	\$0
Slope easements	0.00	Each		\$2,000	\$0
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$0

TOTAL PROJECT COST \$871,000

WORK SUMMARY - ALTERNATE 1C (Paved Shoulder, Sta. 48+00 to Sta. 88+50)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: February 24, 2015 **DRAFT**

SEE FIGURE B

Assumptions /Notes:

- 1 5' Wide Paved Shoulder (each side, see typical section)
- 2 Excavation = 104 CY/100 lf; see Typical Section
- 3 Gravel = 2' Depth (90 CY/100 lf; see Typical Section)
- 4 Pavement Depth = 4 inches (27.6 Tons/100lf; see Typical)
- 5 Edge Striping (both sides)
- 6 Center line shift, 2' left from Sta. 63+50 to Sta. 70+50, See Section 64+25
- 7 Center line shift, 2' left from Sta. 77+00 to Sta. 80+00, See Section 64+25
- 8 Rock Excav. Sta 78+00 to Sta.81+00 (~80cy/100ft.)
- 9 Drainage improvements anticipated Sta. 51+00 to Sta. 55+00
- 10 Retain existing shoulder Sta. 40+50 to Sta. 48+00
- 11 Cut & Remove existing paved swale, supplement existing gravel & re-pave shoulder to uniform cross slope. See Section B-B, typical Sta. 20+00 to Sta. 30+00

Notes:	Location	Item Numbers												
		628.2 Saw Pvmt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Ton)	403.12 HBP (hand) (Ton)	417 C. Plane (SY)	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 Catch Bas. (U)	609.21 Sl. Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G.Rail (LF)
1, 4, 5, 11	Sta.	0	0	0	0	0	0	0	0	0	0	0	0	0
1 to 5		0	0	0	0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0	0	0	0
1 to 5	48+00 to 63+50	3100	1008		806	428	340		600	8	1200	3100		
6	63+50 to 70+50	700	455		364	105	1260	300				1400		
1 to 5	70+50 to 77+00	1300	676		585	179	140					1300		
7	77+00 to 80+00	300	52	240	156	45	540					600		
1 to 5	80+00 to 88+50	1700	884	60	765	235	190					1700		
	to													
	SUBTOTALS:	7100	3075	300	2676	200	992	2470	300	600	8	1200	8100	0
	ROUNDING:	600	325	80	274	120	108	130	100	200	2	300	800	200
	TOTALS:	7700	3400	380	2950	320	1100	2600	400	800	10	1500	8900	200

NH ROUTE 108 SHOULDER WIDENING, **ALTERNATE 1C - Sta. 48+00 to Sta. 88+50**

Engineers Opinion of Probable Costs **\$875,000**

DRAFT -02/24/15

*L = 4,050 ft
Construction ~ \$163/ft
TOTAL COST ~ \$216/ft*

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	500	LF	\$15.00	\$7,500
202.5	Removal of existing drain manholes and catch basins	10	EA	\$300.00	\$3,000
206.2	Rock Structure Excavation	10	CY	\$120.00	\$1,200
603.82215	15" polyethylene pipe (smooth interior)	800	LF	\$60.00	\$48,000
604.124	Catch basin type B - 4' Dia	10	U	\$2,500.00	\$25,000
TOTAL SCHEDULE 1					\$84,700
SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	15	EA	\$300.00	\$4,500
201.22	Removing large trees	3	EA	\$1,000.00	\$3,000
203.1	Common Excavation	3,400	CY	\$12.00	\$40,800
203.2	Rock Excavation	380	CY	\$60.00	\$22,800
304.3	Crushed gravel	2,950	CY	\$30.00	\$88,500
403.11	Bituminous Pavement, Machine Method	320	TON	\$85.00	\$27,200
403.12	Bituminous Pavement, Hand Method	1,100	TON	\$120.00	\$132,000
417	Cold planing bituminous surface	2,600	SY	\$10.00	\$26,000
592.1	Mech. Stabilized Ret. Wall	400	SY	\$32.00	\$12,800
606.12	Beam Guard Rail	200	LF	\$20.00	\$4,000
609.21	Straight granite slope curb	1,500	LF	\$15.00	\$22,500
615.03	Traffic Signs, Type C	60	Sq. Ft.	\$50.00	\$3,000
628.2	Sawed Bit. Pavement	7,700	LF	\$2.00	\$15,400
632.0104	Pavement Markings - 4" line	8,900	LF	\$0.25	\$2,200
632.32	Pavement Markings - Symbols	1,800	Sq. Ft.	\$6.00	\$10,800.00
TOTAL SCHEDULE 2					\$415,500
SUBTOTAL SCHEDULES 1 & 2					\$500,200

NH ROUTE 108 SHOULDER WIDENING, **ALTERNATE 1C - Sta. 48+00 to Sta. 88+50**
 Engineers Opinion of Probable Costs
DRAFT -02/24/15

ALTERNATE 1: 11' WIDE TRAVEL LANES w/4' to 5' WIDE PAVED BIKE LANE

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (<i>% of Subtotal</i>)	4%	Allow	\$20,000	\$20,000
618.7	Uniformed Flagger (<i>% of Subtotal</i>)	4%	Allow	\$20,000	\$20,000
619.1	Maintenance of traffic (<i>% of Subtotal</i>)	4%	Allow	\$20,000	\$20,000
692	Mobilization (<i>% of Subtotal</i>)	10%	Allow	\$50,000	\$50,000
	Construction Contingency (<i>% of Subtotal</i>)	10%	Allow	\$50,000	\$50,000
TOTAL SCHEDULE 3					\$160,000
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					
					\$660,200

ENGINEERING, R-O-W, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE					
R-O-W	5.7%		Each	\$37,600	
PS&E	2.0%		Each	\$13,200	
CONSTRUCTION	8.0%		Each	\$52,800	
	12.0%		Each	\$79,200	
TOTAL ENGINEERING					\$182,800

LAND ACQUISITION & SLOPE EASEMENTS					
R-O-W Acquisitions	4.00		Each	\$7,500	\$30,000
Slope easements	1.00		Each	\$2,000	\$2,000
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$32,000

TOTAL PROJECT COST \$875,000

WORK SUMMARY - ALTERNATE 2B (Bike Path Sta. 28+00 to Sta. 40+00)

Project: NH Route 108 Shoulder Widening/Bike Path
 Location: Newmarket, NH
 Last revised: February 24, 2015 **DRAFT**

Figures A & B

Assumptions /Notes:

- 1 8' Wide Bike Path (west side, see typical section)
- 2 Excavation = 56 CY/100 lf, see Typical Section
- 3 Gravel = 1.25' Depth (47 CY/100 lf, see Typical Section)
- 4 Pavement Depth = 3.25 inches (16.7 Tons/100lf, see Typical)
- 5 Center Striping (single line or dashed)
- 6 2'H MRM Ret Wall Sta 22+50 to Sta. 26+00
- 7 4'H Rein. Conc. Wall Sta 56+70 to Sta. 59+70 (\$350/Ft.)
- 8 2'H to 3'H MRM Ret Wall from Sta. 60+00 to Sta. 66+00
- 9 2'H MRM Ret Wall Sta 72+80 to Sta. 75+90
- 10 Drainage Improvements will be limited to cross pipes
- 11 Rock Excav. Sta 78+50 to Sta.83+00 (~1cy/ft.)
- 12 Driveway Modifications

Location	Item Numbers												
	628.2 Saw Pvmt. (LF)	203.1 Excav. (CY)	203.2 Rock Excav. (CY)	304.3 Cr. Grav. (CY)	403.11 HBP (Mach.) (Ton)	403.12 HBP (hand) (Ton)	520 RC Wall \$	592.1 Ret. Wall (SF)	603.8 Dr. Pipe (LF)	604.12 CB (U)	609.21 S.Gr. Curb (LF)	632.0104 4" Line (LF)	606.12 G.Rail (LF)
Notes:													
Sta. 1 to 6													
Sta. 28+00 to 40+00		672		564	200	10		0				1200	
to													
SUBTOTALS:	0	672	0	564	200	10	\$0	0	0	0	0	1200	0
ROUNDING:	20	128	0	86	20	40	\$0	0	0	0	0	100	0
TOTALS:	20	800	0	650	220	50	\$0	0	0	0	0	1300	0

NH ROUTE 108 BIKEPATH, **ALTERNATE 2B - Sta. 28+00 to Sta. 40+00**
 Engineers Opinion of Probable Costs \$ 93,000
DRAFT - 02/24/14

L = 1,200 ft
 Construction ~ \$64/ft
 Total Cost ~ \$77/ft

ALTERNATE 2: 8' WIDE BIKE PATH (West Side Only, Sta 28+00 to Sta. 40+00)

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 1 - DRAINAGE					
202.41	Removal of existing drain pipe	0	LF	\$15.00	\$0
202.5	Removal of existing drain manholes and catch basins	0	EA	\$300.00	\$0
206.2	Rock Structure Excavation	0	CY	\$120.00	\$0
603.82215	15" polyethylene pipe (smooth interior)	0	LF	\$60.00	\$0
604.124	Catch basin type B - 4' Dia	0	U	\$2,500.00	\$0
TOTAL SCHEDULE 1					\$0

SCHEDULE 2 - SHOULDER & ROADWAY					
201.21	Removing small trees	10	EA	\$300.00	\$3,000
201.22	Removing large trees	1	EA	\$1,000.00	\$1,000
203.1	Common Excavation	800	CY	\$12.00	\$9,600
203.2	Rock Excavation	0	CY	\$60.00	\$0
304.3	Crushed gravel	650	CY	\$30.00	\$19,500
403.11	Bituminous Pavement, Machine Method	220	TON	\$82.00	\$18,100
403.12	Bituminous Pavement, Hand Method	50	TON	\$120.00	\$6,000
417	Cold planing bituminous surface	100	SY	\$10.00	\$1,000
520	Conc Wall, Class A on Class B Footing (Incl. excavation & Rein. Steel)	1	LS	\$0.00	\$0
592.1	Mech. Stabilized Ret. Wall	0	SY	\$32.00	\$0
606.12	Beam Guard Rail	0	LF	\$20.00	\$0
609.21	Straight granite slope curb	0	LF	\$15.00	\$0
615.03	Traffic Signs, Type C	40	Sq. Ft.	\$50.00	\$2,000
628.2	Sawed Bit. Pavement	20	LF	\$2.00	\$0
632.0104	Pavement Markings - 4" line	1,300	LF	\$0.25	\$300
632.32	Pavement Markings - Symbols	200	Sq. Ft.	\$6.00	\$1,200.00
TOTAL SCHEDULE 2					\$61,700

SUBTOTAL SCHEDULES 1 & 2					\$61,700
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NH ROUTE 108 BIKEPATH, **ALTERNATE 2B - Sta. 28+00 to Sta. 40+00**
 Engineers Opinion of Probable Costs
DRAFT - 02/24/14

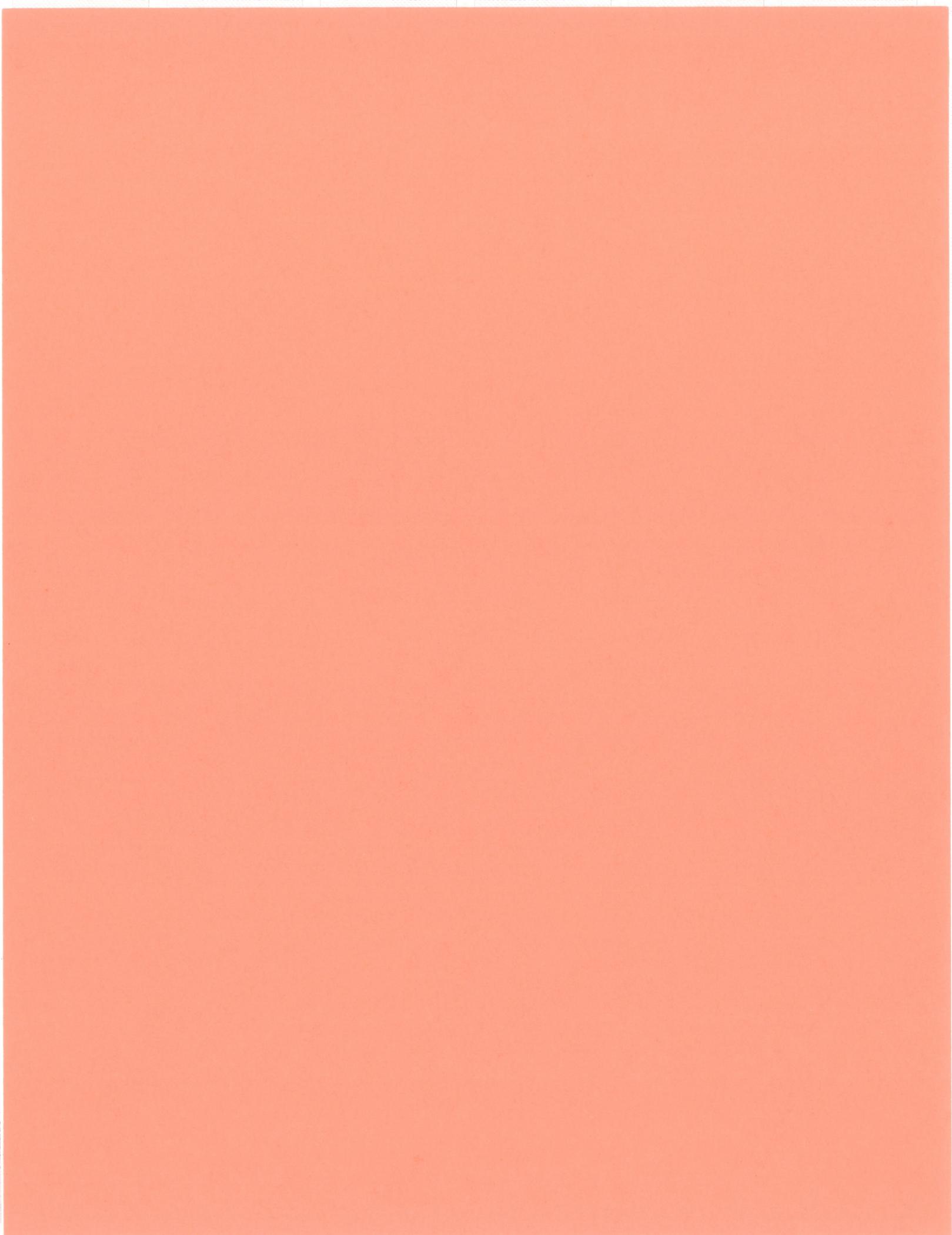
ALTERNATE 2: 8' WIDE BIKE PATH (West Side Only, Sta 28+00 to Sta. 40+00)

Item	Description	Quant.	Unit	Unit Price	Amount
SCHEDULE 3 - COMMON IMPROVEMENTS					
618.6	Uniformed Officer (<i>% of Subtotal</i>)	1%	Allow	\$600	\$600
618.7	Uniformed Flagger (<i>% of Subtotal</i>)	2%	Allow	\$1,200	\$1,200
619.1	Maintenance of traffic (<i>% of Subtotal</i>)	2%	Allow	\$1,200	\$1,200
692	Mobilization (<i>10% of Subtotal</i>)	10%	Allow	\$6,200	\$6,200
	Construction Contingency (<i>% of Subtotal</i>)	10%	Allow	\$6,200	\$6,200
TOTAL SCHEDULE 3					\$15,400
TOTAL CONSTRUCTION (SCHEDULES 1, 2 & 3)					
					\$77,100

ENGINEERING, SURVEYING & PLANNING COST					
STUDY & REPORT PHASE					
	R-O-W	0.0%	Each	\$0	\$0
	PS&E	0.0%	Each	\$6,200	\$6,200
	CONSTRUCTION	8.0%	Each	\$9,300	\$9,300
		12.0%			
TOTAL ENGINEERING					\$15,500

LAND ACQUISITION & SLOPE EASEMENTS					
	R-O-W Acquisitions	0.00	Each	\$7,500	\$0
	Slope easements	0.00	Each	\$2,000	\$0
TOTAL LAND ACQUISITION & SLOPE EASEMENTS					\$0

TOTAL PROJECT COST **\$93,000**



APPENDIX G
CORRESPONDANCE



**Stephen G. Pernaw
& Company, Inc.**

P.O. Box 1721 • Concord, NH 03302
tel: (603) 228-5750 • fax: (866) 929-6094 • sgp@lr.net

Transportation: Engineering • Planning • Design

January 20, 2015

Diane Hardy, Town Planner / Zoning Administrator
Town of Newmarket
186 Main Street
Newmarket, NH 03857

James A. Hewitt, P.E.
NHDOT – District Six
271 Main Street
Durham, NH 03824

RE: Proposed Traffic Mitigation - 2 Forbes Road
Newmarket, NH

Dear Diane and Jim:

As you know, we have met multiple times over the last several months regarding the Site Plan Application to construct a 24,000 sf building expansion at 2 Forbes Road. It has been previously established that the Driveway Permit Application to cover the change in use of the NH108/Forbes Road intersection is between the Town and the State, and not Shearwater Investment Corp.

To date Shearwater Investment Corp. has completed the following items as part of the traffic investigation for the project:

1. We supplied the Town and District Six with a trip generation analysis (dated 2/20/14) that was prepared by Pernaw & Company, Inc. on our behalf. This document demonstrates that the proposed building expansion is not a significant traffic generator.
2. We provided the Town and District with 2014 intersection turning movement and vehicle classification data for both the weekday AM and PM peak hour periods.
3. As a result of a site meeting with all parties concerned, we authorized our traffic consultant to prepare an auxiliary turn lane warrants analysis for the subject intersection (dated 5/30/14), although the outcome was already known. This study demonstrated that the warrants for left-turn treatment are currently satisfied based on the existing AM peak hour volumes. Stated another way, our development is not creating the need for improvements to this intersection.
4. Subsequently, we provided the Town and District with a "Conceptual Long Range Plan" (dated 10/20/14) for this section of NH108 showing the implications of providing a center turn lane on NH108. From this we all learned that this conceptual design is not compatible with the planned bicycle lane project on NH108, and that there is insufficient right-of-way to construct both a center turn lane and bicycle lanes.



5. At the request of District Six, we commissioned a physical survey of existing conditions on NH108 extending several hundred feet in each direction. This is considered to be valuable information for the Town and District in planning future improvements along the corridor.
6. We provided a sight distance evaluation exhibit (prepared by Tighe & Bond, dated 1/8/15) to document the implications of a 400-foot sight line looking in both directions from the Forbes Road approach to NH108. From this we learned that the sight line looking right encroaches on to private property due to the horizontal curvature of the highway. Unfortunately, Shearwater Investment Corp has no control over the abutter's private property. Research of crash data revealed that this intersection is not a high accident location.
7. We had Tighe & Bond, Inc. prepare truck turning templates to demonstrate how turning vehicles currently negotiate this intersection. This was done for a single-unit truck, a WB-50 and WB-62 design vehicles. The proposed building addition will likely add a few single-unit truck trips to the intersection which do not require modification of the intersection.

As a result of these on-going discussions, Shearwater Investment Corp. proposes the following additional items as a traffic mitigation package for the proposed building expansion:

8. Shearwater Investment Corp. is committed to construct the corner radius improvements (northeast corner of the subject intersection) that were discussed at our meeting with District Six on 1/12/15, whenever the necessary right-of-way becomes available. Although not required for the single-unit trucks anticipated for this project, these improvements will help accommodate larger truck (WB-50, WB-62, etc.) turning movements.
9. Shearwater Investment Corp. is willing to provide additional right of way width along NH108 per discussions with Newmarket and the NHDOT. These discussions indicated there might be a need for a small increase in ROW width for future plans and this would need clarification.

We believe that these additional items, along with the information previously provided, more than adequately mitigates the 5 to 23 additional peak hour trips that will be generated by the proposed building addition. We believe that Items 8 and 9 can be handled as conditions of approval of the site plan. We also believe that the Driveway Permit is a matter between the Town and NHDOT District Six, and that it should not delay the site plan application any further.

Respectfully Submitted,

Stephen G. Pernaw, P.E., PTOE

On behalf of: Shearwater Investment Corp.

1851.51

September 19, 2014

Mr. Douglas M. DePorter, P.E., District Engineer
NHDOT Division 6
PO Box 740, 271 Main Street
Durham NH, 03824

Re: NHDOT Project #13878
FHWA Project #X-A000 (78)

Dear Mr. DePorter,

For District 6 review, we have attached the following documents (**DRAFT**):

- Concept study level plans for the referenced project (Alternate I)
- Existing conditions matrix including design parameters within the project limits
- Work summary for Alternate I
- Impact summary, Alternate 1
- Engineers Opinion or Probable Cost - Alternate 1 (*preliminary*)
- Traffic Memorandum from SG Pernaw, dated May 30, 2014

Alternate 1 involves the construction of 5' wide paved shoulders extending from Rockingham Country Club to the southerly limits of the Newmarket Main Street – Phase I Project, completed in 2005.

This Alternate 1 design concept includes the following assumption as noted:

1. 11 foot travel lanes and 5' bike lanes two length of the project.
2. 2-foot gravel depth and 4 inches of pavement at all locations where pavement will be extended. *Please review Alternate 1 – Typical cross section for proposed pavement extension detail.*
3. Drainage improvements will be necessary to facilitate shoulder widening. Based on initial investigations we find that drainage problems exist. *We would appreciate Division 6 comments concerning additional problem areas identified by District 6 maintenance.* We have located pipe and structures that were identified onto the Work Plan Alternate 1.
4. Road Widening for Lane at Forbes Road. The attached memorandum (SG Pernaw, 5/30/14) identifies the need for left turn treatment at the Forbes Road intersection. Similar left turn treatment appears to be necessary at Hershey Lane, to the north. It should be noted that vehicles will continuously encroach onto the road shoulder/bike path unless center turn lanes are provided. We suggest that the need for center through lanes

Douglas M. DePorter
NHDOT Division 6
September 19, 2014

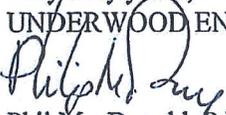
Page 2

also be reviewed by the Bureau of Traffic and Highway Design. The added cost will also need to be reviewed, and will be subject to NHDOT and/or FHWA approval.

5. Alternate 1 also considers a center lane shift from STA 61+00 to STA 85+50 (2,450'). This center lane shift is intended to address the following design constraints:
- a. Railroad, guard rail and embankments from Sta. 64+50 RT to Sta. 70+100 RT.
 - b. Steep driveway constraint at Sta. 74+10
 - c. Steep slope constraints at Sta. 77+00 RT to Sta. 85+00 RT.
 - d. Steep Driveway, STA 78+50 RT
 - e. Lane shift right may also be desirable to facilitate future road improvements (i.e. center turn lane) that may be necessary within the foreseeable future along this section of the NH Route 108 corridor.

Following your initial review, we suggest that we meet so that we may incorporate District 6 comments, where applicable. We will develop similar information for NHDOT review for an alternate design (*Alternate 2*) separating vehicle traffic from bike traffic in the upcoming week. The Town will coordinate a joint meeting between stakeholders, we hope that you or a District 6 representative will attend. We would appreciate District 6 review comments before we submit our report. This will enable us to move ahead towards the PS&E phase of the project.

Please call at your earliest convenience, so that we may schedule an initial consultation.
Thank you for your considerations

Very truly yours,
UNDERWOOD ENGINEERS

Phil MacDonal, P.E.
Project Manager

PDM/vff

Encl.

cc: Diane Hardy, Newmarket Town Planner
Steve Fournier, Town Manager
Rick Malasky, DPW Director

