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Adaptive Traffic Signal Feasibility and Re-Evaluation of Phase I Improvements

January 2020

Mr. Mark Arienti, P.E.,
Windham Town Engineer
Town of Windham
8 School Road
Windham, ME 04062

Subject: North Windham, Route 302 – Adaptive Traffic Signal Feasibility and Re-Evaluation of Phase I Improvements

Hi Mark:

T.Y. Lin International (TYLI) is pleased to present the Town of Windham (Town) with this memorandum containing the summary of findings related to the feasibility evaluation of adaptive traffic signals and other modifications for the Route 302 corridor in North Windham as discussed at the August 6, 2019 meeting with the Town and TYLI. As discussed, the evaluation focused on items which have both mobility and complete streets benefits. As noted in our proposal our scope of work included the following:

- Evaluate feasibility of adaptive traffic signals for Route 302 from River Road to Whites Bridge Road, with the primary objective of alleviating traffic congestion. This effort will include:
  - Conceptual review of the corridor and other immediate intersections to evaluate implications of traffic signal adjustments on the overall traffic patterns in the area.
  - Coordination with a minimum of 1 vendor regarding the applicability of smart signals along the corridor.
  - Communication with Maine Department of Transportation to identify potential funding.
  - Develop an order of magnitude cost of smart signal implementation so that the Town may better weigh the cost/benefits and evaluate funding.
- Conceptual evaluation for identifying Phase I improvements which may include pedestrian crossings and localized sections of new and/or improved sidewalk. These improvements would be combined with the Signal Improvements.

FINDINGS

Evaluate feasibility of Adaptive Traffic signals for the Route 302 from River Road to Whites Bridge Road, with the primary objective of alleviating traffic congestion.

Conceptual review of the corridor and other immediate intersections to evaluate implications of traffic signal adjustments on the overall traffic patterns in the area.

An extensive study of the benefits of implementing an adaptive traffic signal system was conducted by the Virginia Department of Transportation and concluded the following:

ASCT generally improves mainline operations if the corridor (1) is not over capacity (2) does not have traffic or geometric characteristics that impair progressive flow, or (3) does not already operate at a good level of service. [While the corridor has capacity issues, Rhythm Engineering conducted before and after traffic modeling that determined reduced delays would result in the corridor]

Side street delays generally increase when ASCT is deployed, although there is usually a net reduction in overall corridor delay.

ASCT creates a statistically significant 17% reduction in total intersection crashes.

Factors that determine appropriateness:

ASCT is most beneficial at locations where some congestion is present but the corridor is not oversaturated for extended periods of the day.
[Appropriate for Route 302 and Rhythm documented modeling benefits]

ASCT is not likely to produce significant benefits when a road is substantially over capacity, especially when all approaches at major, high-volume intersections are oversaturated.
[May be an issue during heavy conditions but should not be an issue for most times]

If the mainline route is already operating well, ASCT is unlikely to create substantial further improvements in operations.
[Appropriate for Route 302]

Delays are likely to increase on side street approaches, so care should be taken if existing side street delays are already a concern.

ASCT is likely to be most effective at sites with variable traffic demands attributable to seasonal variations, school schedules, incidents, special events, etc.
[Appropriate for Route 302]

ASCT may not be as effective on routes with higher truck volumes.
[Appropriate for Route 302]

Long signal spacings will reduce the effectiveness of ASCT.
[Spacing is considered to be acceptable]

High-volume unsignalized access points on the corridor may limit the effectiveness of ASCT.
[None located in study area]

Communications must be reliable for the system to function properly.

The following table notes benefits measures at various sites following the installation of Adaptive Traffic Signals.

Location	Increase in Average Speed	Reduction in Stops	Reduction in Delay	Reduction in Travel Time	Reduction in Fuel Consumption	Reduction in Emissions
Columbia, Mo.	41%	90%	77%	29%	16%	25%
Evans, Ga.	93%	75%	78%	48%	32%	39%
Salinas, Calif.	84%	91%	89%	46%	x	x
Springdale, Ark.	73%	95%	86%	42%	26%	35%
Topeka, Kans.	96%	100%	78%	49%	36%	47%
Upper Merion, Pa.	35%	86%	76%	26%	28%	30%
Wichita, Kans.	78%	100%	89%	44%	28%	42%

Rhythm Engineering has conducted a travel time / delay study that included measuring current conditions and modeled actual mobility benefits following installation of an Adaptive Signal System. Overall delay reduction is expected.

Coordination with a minimum of 1 vendor regarding the applicability of Adaptive Traffic signals along the corridor.

We have coordinated this feasibility evaluation with Mike Stewart of Rhythm Engineering (Mike is based in Maine). Rhythm Engineering was founded in 2005 by a traffic engineer who worked in the public sector. Dr. Reggie Chandra was frustrated with the lack of tools and technology available to manage traffic flow. Armed with a few credit cards and a dream to synchronize every traffic signal in the U.S., he led a 3-year focused research to launch In|Sync. Since its launch, In|Sync has been installed in 31 states and by 140 public agencies. It is the most-deployed automated traffic signal optimization system in North America. In|Sync has been deployed by more agencies than all other similar systems combined. In Maine, the system has been installed at Dunstan Corner in Scarborough and is being installed on Washington Avenue in Portland. It will also be installed on County Road in Portland/Westbrook.

Communication with Maine Department of Transportation to identify potential funding.

I have contacted Steve Landry at MaineDOT. MaineDOT does not have traffic signal improvement or safety funds available specifically for this project. He does note that either Municipal Partnership or Business Partnership Funding Initiatives would be possible. I can provide details on these if desired.

Develop an order of magnitude cost of Adaptive Traffic signal implementation so that the Town may better weigh the cost/benefits and evaluate funding.

Assumptions for Cost:

Rhythm Engineering will be responsible for the following tasks:

1. Provide materials per the approved Quotation and subsequent Purchase Order. Material consists of In|Sync processors, radar detectors , equipment panel and power supply, RG cable, Ethernet patch cables, detector-cards (if needed), Pedestrian modules, and monitors/keyboards, and other materials as specified.

2. Provide specifications for materials to be supplied by Client – wires, connectors, and specialized installation tools as well as camera mounting hardware if needed.

3. Once VPN access is provided to the entire In|Sync system, provide on-site classroom and hands-on training to Client, or their designee, in installation procedures for the In|Sync equipment listed above. Provide on-site classroom and hands-on training to Client, or their designee, in installation procedures for the In|Sync equipment listed above. This includes at a minimum: desired camera views, drawing detection zones and segments, connection of Ethernet cables, mounting of In|Sync processor(s) and site equipment panel in the traffic cabinet, connection of cables, connection of the pedestrian intercept feature, placing and cabling of detector-cards in the detector card rack (if applicable), monitor mounting and connections, and local processor accessibility. Provide remote support to installer during the installation process. Provide training for Client traffic engineering staff in the system parameters configuration, maintenance and operation of In|Sync.

4. Consult with Client traffic engineering staff to define the operating parameters for initial system operation, including but not limited to: allowed movements, desired progression routes, travel times, phasing, amber times, all-red times, pedestrian walk and flashing don't walk times, traffic counts, traffic patterns, and any unique requirements that the Client may want to allow for during certain time of day scenarios, etc.

5. Provide camera placement guidance and documentation.

6. Perform the on-site integration of the In|Sync adaptive system, including verification of radar detector angles, working with the installer to make any adjustments needed and loading of the

predefined software image into the processor. The Rhythm Engineering team will work both on-site and remotely to bring online each In|Sync system. The adaptive system will work "out of the box", but Rhythm Engineering will take time to monitor and modify the adaptive parameters remotely over a period of approximately one to two weeks after the activation of the arterial in order to maximize the performance of In|Sync.

7. Project Manage the entire scope of Rhythm Engineering's responsibilities as listed above and provide updates to the Client as necessary throughout the duration of the project.

Installer/Contractor will be responsible for the following tasks:

1. Ethernet Cable and wires, connectors, and specialized installation tools as well as mounting hardware (if applicable) per Rhythm Engineering specifications. Suitable brands include Belden 7953A or Primus Cable C6CMXE-5365BK or similar. Must use shielded RJ45 connectors suitable for larger diameter cable with 23 AWG wires. Cut-sheets to be provided by Rhythm Engineering at the appropriate time upon request.

2. Perform installation work consisting of: pulling & terminating the required Ethernet Cat 6 cables (shielded/outdoor rated) from the controller cabinet to the Rhythm Engineering pre-approved mounting location, installation of detector mounting hardware to mast arms, mounting of the detectors, connecting wires to detectors per Rhythm Engineering specifications and training, detector aiming and configuring.

3. Perform traffic cabinet installation work consisting of: installing the site equipment panel, mounting and connecting the In|Sync processor to the Ethernet switch and installing In|Sync's detector input connection type. Wiring and the connection of the In|Sync® system to the Ethernet network provided via the communications system provided by the Client or communications installer.

4. Ensure that remote VPN access is established to the entire In|Sync system deployment to allow Rhythm Engineering to provide remote assistance in aligning proper views of each camera and radar unit. Once VPN access is confirmed, Rhythm Engineering can schedule a Rhythm Engineering technician to assist on site for final placement of In|Sync into detector mode.

5. Installer shall not connect Rhythm equipment to power prior to receiving authorization from Rhythm Engineering.

6. During installation, installer shall not place the In|Sync system into detector or adaptive mode without written authorization from Rhythm Engineering.

7. Return to site as needed during system integration to adjust cameras or troubleshoot any cabling or other issues arising from faulty installation.

Town of Windham will be responsible for the following tasks:

1. Provide an Ethernet network with TCP/IP connectivity between signals.

2. Reserve and provide Rhythm Engineering with Internet Protocol (IP) Addresses for each intersection's equipment. Rhythm Engineering requires that ten (10) Local Area Network (LAN) IP addresses be reserved per intersection. Client is responsible for providing the listing of addresses for each intersection to Rhythm Engineering.

3. Establish Simple Mail Transfer Protocol (SMTP) and Network Time Protocol (NTP) server connection, as well as access to the intersections via a Virtual Private Network (VPN) connection or other remote connectivity for support and monitoring purposes during the warranty/support period.

Product	Product Description	Quantity	Price	Total Price
Cable, Category 6 Ethernet (1000 ft)	Category 6 Ethernet Cable: Direct Burial, shielded, 4x twisted pair, 23 AWG solid copper	6	$1,450	$8,700
Cable, Dual Serial IM / SDLC		6	$150	$900
Cable, SDLC power		6	$25	$150
Cable, SDLC to BIU (1)		6	$60	$360
Hawkeye Detection - Context Camera	Visual context camera for Hawkeye Detection system. Includes 1 context camera	24	$300	$7,200
Hawkeye Equipment Panel, up to 4 sensors	Hawkeye Equipment Panel for intersections with up to 4 sensors	6	$1,250	$7,500
Hawkeye Junction Box	Required per each radar detector.	24	$350	$8,400
Hawkeye/Camera Dual Mounting Bracket	Custom Mounting Hardware for Radar/Camera Combo. Bracket comes standard with surge protector and 3 axis configuration capability.	24	$600	$14,400
InSync:Hawkeye In|	In|Sync System with Radar based detection	6	$35,000	$210,000

Product	Product Description	Quantity	Price	Total Price
	and queue analysis. ATSPM Module included			
Keyboard & Monitor Kit	Perixx 505 plus Keyboard Lilliput 10.1 Monitor	1	$700	$700
On Site Deployment Services	On-Site Services Provided by Rhythm	1	$5,000	$5,000
Pedestrian Integration	Integrates Pedestrian Operations. Includes hardware (Intercept Module) for SDLC integration.	5	$5,000	$25,000
SDLC Module	SDLC Module	6	$650	$3,900
Shipping & Handling	FOB Lenexa	6	$150	$900
Spare In|Sync:Hawkeye System	1 In|Sync Processor 1 Equipment Panel 2 Hawkeye:Radar/Camera Combo Units 2 Junction Boxes Cabinet Cabling	1	$20,000	$20,000
Total	Sub-Total $313,110 Contractor Installation Cost: $120,000 TYLI Support: $10,000 **Total $443,110**			

Conceptual evaluation for identifying Phase I improvements which may include pedestrian crossings and localized sections of new and/or improved sidewalk. These improvements would be combined with the Signal Improvements.

The first step in the evaluation of pedestrian improvements was the review of the proposed 21st Century Plan. The goal was to identify items that could be packaged into small manageable projects that could reasonably be designed and funded in the near future and which would enhance the existing infrastructure.

The evaluation identified three focus areas (see attached graphics).

I. A new crosswalk and associated pedestrian signal equipment across Route 302 on the north side of the Route 302/ River Road intersection.

   Favorable attributes:

   i. Increased Connectivity – this would connect the newly constructed sidewalk along River Road to the existing sidewalk along the east side of Route 302. There is currently no crossing across Route 302 at this location. The sidewalk on the west side of Route 302 does not extend north beyond this intersection. Extending the sidewalk to the northwest of the intersection is feasible, however, utility pole conflicts, available ROW, grading challenges and drainage implications are a few of the elements would add time and cost and therefore may not be preferable in the short term. This sidewalk is not included.
   ii. Limited ROW impacts – could be constructed within the existing ROW.

II. New sidewalk along the west side of Route 302 from Boody's Corner to Shaw's Drive

   Favorable attributes:

   i. Agreeable topography – sidewalk could be constructed with minimal earthwork and slope impacts.
   ii. Limited ROW impacts – extent of construction is expected to be relatively confined therefore limiting ROW impacts.
   iii. Limited Feature Conflicts – there are few existing features (signs, utility poles, utility boxes etc.) which would need to be moved and/or navigated around, this saves time during design and construction.

III. New crosswalk and associated pedestrian signals for the Route 35 leg of the Boody's Corner intersection.

   Favorable attributes:

   i. Connectivity – would connect the new Route 35 north side sidewalk project (currently being designed) to the existing Route 302 sidewalk at the southwest corner of Boody's Corner.
   ii. Increases safety – allows pedestrians to cross Route 35.

In conjunction with the coordination with Town staff we have accounted the following design assumptions:

i. Design standards
    a. Width - the new sidewalk is proposed to be 5' wide within the core corridor (between Boody's Corner and Franklin Drive).
    b. Material – currently the proposed sidewalk is bituminous pavement.
ii. Lighting – Not included but for future consideration.
iii. Landscaping – Not included but for future consideration.
iv. Other – benches, and/or other features and removal of the overhand lane assignment signs not included but for future consideration.

IV. Cost. The total cost for the pedestrian improvements is **$200,000** (see attached estimate).

Replacement of Traffic Signal Supports to Mast Arm at the Route 302 intersections with River Road, Shaw's, Landing Road and Franklin Drive.

Adaptive Traffic Control Systems are very detection dependent. These systems need accurate and reliable vehicle detection to work properly. It is highly recommended to install mast arms for a stable mounting structure for the overhead detection system. The mast arms will provide a rigid mounting structure to reduce vibrations and movement of the detection system for the most reliable detection. The mast arms will also provide an optimal mounting location for the overhead video (or radar) detection system. Overhead detection systems work best when mounted high on a mast arm across from the approach of interest and looking directly at that approach. Best location and aiming is between the left turn lane and left most thru traffic lane. Span Wire poles are typically on the corners of the intersection, and when overhead detectors are mounted on span pole locations are sub-optimal. Mounting locations are chosen based on the lesser of two evils, with good detection on a critical movement chosen allowing sacrifices to other detection locations. Span poles, especially wood poles, are subject to constant vibrations and movement due to wind effects on signals and signs on the span wire. This movement can be transmitted to the detection system producing unreliable detection.

The cost estimate assumes use of existing equipment and not full replacement of all items.
The total cost for mast arm installation is **$1,030,000.00** (see attached estimate).

Total Cost

The total cost to implement adaptive signal control, pedestrian improvements and installing mast arms is **$1,673,110.00**.

If you have any questions, please contact me.

Best regards,

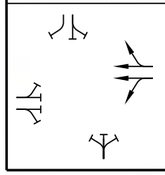
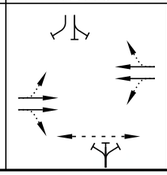
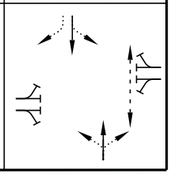
T.Y. LIN INTERNATIONAL

Thomas Errico, P.E.
Senior Associate/Project Manager

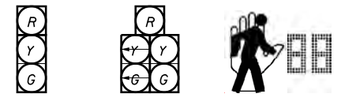

NEW CROSSWALK AND PEDESTRIAN SIGNALS
BEGIN NEW SIDEWALK
END NEW SIDEWALK
BOODY'S CORNER
ROUTE 35
ROUTE 302
ROUTE 115
SHAWS DRIVE
WINDHAM CROSSING
CROSSING
IRVING
THE LANDING
TD BANK
MAINE PAWN & JEWELRY
AUTO ZONE
GORHAM SAVINGS BANK
RICH PLAZA
SEBAGO LAKES REGION CHAMBER OF COMMERCE
CUMBERLAND FARMS
DAIRY QUEEN
KFC/ TACO BELL
PET QUARTERS
NORTH WINDHAM SHOPPING CENTER
AT&T
US CELLULAR
RADIO SHACK
CHINA TASTE
AMERICA'S MATTRESS & FURNITURE
SEARS
VERIZON WIRELESS
BUSY BEE LAUNDRY
SUBWAY
BULL MOOSE MUSIC
AUBUCHON HARDWARE
NORTH WINDHAM SHOPPING PLAZA
CROSS INSURANCE

Filename: ...\HIGHWAY\MSTA\xxx_HDPlan_01.dgn Division: HIGHWAY Username: Date:6/2/2016

TRAFFIC SIGNAL PHASING

ø1+ø6	ø2+ø6	ø4+ø8
		

TRAFFIC AND PEDESTRIAN SIGNAL HEADS



ALL NEW VEHICULAR SIGNAL HEADS CONTAIN 12" L.E.D. BALLS WITH BACK PLATES.

ACCESSIBLE PEDESTRIAN SIGNALS (APS)

CAMBELL COMPANY ADVISOR APS A912 OR APPROVED EQUAL

EQUIPMENT SCHEDULE	
ITEM	QUANTITY
PEDESTAL POLES	3
5-SECTION SIGNAL HEAD	1
3-SECTION SIGNAL HEAD	7
PEDESTRIAN SIGNAL HEAD	4
PUSH BUTTON	4
PRECAST CONCRETE JUNCTION BOX	3
VIDEO DETECTION	1
CONTROLLER CABINET AND FOUNDATION	1
PREEMPTION SYSTEM	1
MAST ARM POLE WITH 20' AND 50' MAST ARMS	1
MAST ARM POLE WITH 30' MAST ARM	1

CURVE DATA #1
PI = 30+00.00
D = 0°59'59.7"
Δ = 2°13'45.0" Rt.
R = 5730.00'
L = 222.93'
T = 111.48'
E = 1.08'

PLAN

25 0 25 50
Scale of Feet

LEGEND

- PROPOSED TREE
- PROPOSED LIGHT
- PROPOSED PHASING
- EXISTING SIDEWALK (REBUILT)
- PROPOSED NEW SIDEWALK
- NEW SIDEWALK (CONSTRUCTED AS PART OF RTE 35 PROJECT)
- PROPOSED CROSS WALK
- 5 PROPOSED PHASE NUMBER

TOWN OF WINDHAM, MAINE

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED		
CHECKED-REVIEWED		
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

21ST CENTURY MASTER PLAN
PRELIMINARY PLANS

PLAN

SHEET NUMBER 3 OF 21

T·Y·LIN INTERNATIONAL

Windham Smart Signal Evaluation & Pedestrian Improvements

Windham, Maine

PROJECT CONCEPTUAL ESTIMATE

Concept Plan

Bid Item Description	*Unit*	*EST QTY*	*Unit Cost*	*TOTAL Cost*
CIVIL				
REMOVING SINGLE TREE TOP ONLY	EA	1	$850.00	$850.00
REMOVING STUMP	EA	1	$500.00	$500.00
COMMON EXCAVATION	CY	300	$35.00	$10,500.00
AGGREGATE SUBBASE COURSE - GRAVEL	CY	175	$45.00	$7,875.00
HOT MIX ASPHALT, 12.5 MM SURFACE	T	17	$150.00	$2,550.00
HOT MIX ASPHALT, 9.5 MM NOMINAL MAXIMUM SIZE (SIDEWALKS, DRIVES, & INCIDENTALS)	T	60	$170.00	$10,200.00
HOT MIX ASPHALT, 12.5 MM NOMINAL MAXIMUM SIZE (BASE AND INTERMEDIATE BASE COURSE)	T	17	$175.00	$2,975.00
BITUMINOUS TACK COAT, APPLIED	G	4	$35.00	$140.00
CURB RAMP DETECTABLE WARNING FIELD	SF	50	$102.00	$5,100.00
VERTICAL CURB TYPE 1	LF	380	$45.00	$17,100.00
LOAM	CY	50	$67.00	$3,350.00
SEEDING METHOD NUMBER 1	UN	5	$74.00	$370.00
MULCH	UN	5	$44.00	$220.00
BARK MULCH	CY	3	$64.00	$192.00
12" SOLID WHITE PAVEMENT MARKING LINE	SF	64	$2.12	$135.68
4" WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE	LF	444	$1.00	$444.00
WHITE OR YELLOW PAVEMENT & CURB MARKING	SF	140	$3.00	$420.00
HAND LABOR, STRAIGHT TIME	HR	4	$50.00	$200.00
ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	HR	4	$155.00	$620.00
TRUCK-LARGE (INCLUDING OPERATOR)	HR	4	$90.00	$360.00
CHAIN SAW RENTAL (INCLUDING OPERATOR)	HR	2	$75.00	$150.00
STUMP CHIPPER RENTAL (INCLUDING OPERATOR)	HR	2	$157.00	$314.00
TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LS	1	$4,000.00	$4,000.00
TEST PIT	EA	3	$600.00	$1,800.00
			SIDEWALK AND ROADWAY IMPROVEMENTS SUBTOTAL	$70,365.68
TRAFFIC & PEDESTRIAN SIGNALS				
PEDESTAL POLE	EA	4	$3,000.00	$12,000.00
PEDESTRIAN BUTTON AND FOUNDATION	EA	4	$2,000.00	$8,000.00
COUNTDOWN PEDESTRIAN HEADS	EA	4	$1,500.00	$6,000.00
			TRAFFIC & PEDESTRIAN SIGNALS SUBTOTAL	$26,000.00
LIGHTING				
Per 10/15/19 email from Windham to TYLI, direction was to "Forgo landscaping and lighting for future construction".				
			LIGHTING SUBTOTAL	$0.00
LANDSCAPING				
Per 10/15/19 email from Windham to TYLI, direction was to "Forgo landscaping and lighting for future construction".				
			LANDSCAPING SUBTOTAL	$0.00

Windham Smart Signal Evaluation & Pedestrian Improvements
Windham, Maine
PROJECT CONCEPTUAL ESTIMATE
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		SUBTOTAL	$96,365.68
TRAFFIC CONTROL	15%		$14,454.85
		SUBTOTAL 2	$110,820.53
MOBILIZATION (% OF QUANTITY COSTS INCLUDING TRAFFIC CONTROL)	10%		$11,082.05
		SUBTOTAL 3	$121,902.59
PE(15%) AND CE(15%) (% OF ALL COSTS)	30%		$36,570.78
		SUBTOTAL 4	$158,473.36
CONTINGENCY (% OF ALL COSTS)	25%		$39,618.34
		SUBTOTAL 5	$198,091.70
SURVEY/ROW RESEARCH	TBD		$0.00
		SUBTOTAL 4	$198,091.70
ROW NEGOTIATION / ACQUISITION	TBD		$0.00
		SUBTOTAL 5	$198,091.70
ENVIRONMENTAL	TBD		$0.00
		SUBTOTAL 6	$198,091.70
UTILITIES	TBD		$0.00
		SUBTOTAL 7	$198,091.70
		Rounding	$1,908.30
		GRAND TOTAL	**$200,000.00**

Windham Smart Signal Evaluation & Pedestrian Improvements

Windham, Maine

PROJECT CONCEPTUAL ESTIMATE

Concept Plan

NOTE(S)

1. This conceptual estimate has been developed based on aerial photos and approximate Right of Way. Verification of existing topography and ROW is necessary before design can be fully developed and may impact costs.
2. Traffic Control was estimated at a higher percentage than normal to account for RTE 302 traffic
3. Design and associated costs are expected to evolve based on input from property owner meetings and public meetings.
4. It is assumed that Right of Way would be negotiated such that the alignment of the sidewalk would not nessesitate utility relocations.
5. Estimate does not include ancillary construction costs associated with business/property owner relations (landscaping etc. adjacent to project)
6. Due to the length of the project and the proximity to town the field office item and cost are not included in this estimate.
7. Striping may need to be done in conjunction w/ future overlay project thus influencing schedule and costs.
8. No costs have been included for property negotiations/compensation and/or grading easements should they be needed. The goal is to minimize impacts and contain the work within the ROW however the design will take into account utilities, ADA requirements and other design features which may affect ROW impacts.
9. Due to uncertainty of the scheduling cost have not been inflated to construction year dollars.
10. It is assumed that neither new drainage nor modficiation of existing drainage would be needed.
11. Environmental services have not been included in this estimate. Based on a review of MaineDOT's Map Viewer there are no wetlands or historic properties in the vicinity of the project. Therefore this cost is expected to be nominal.
12. Cost of sign replacement, relocation and adjustment is assumed to be covered in the contingency.
13. For conceptual estimating purposes all curb was estimated as vertical granite curb. It should be understood that this will be broken into terminals and radius curb as necessary. LF costs are expected to be similar
14. Utility Coordination not included in this estimate.
15. Costs are not included for testing and/or remediation of hazardous soils.
16. It is assumed that the cost of relocation of private signs would be the responsibility of the owner.

Windham Smart Signal Evaluation & Pedestrian Improvements

Windham, Maine

PROJECT CONCEPTUAL ESTIMATE

Concept Plan

Bid Item Description	*Unit*	*EST QTY*	*Unit Cost*	*TOTAL Cost*
TRAFFIC & PEDESTRIAN SIGNALS				
MAST ARM FOR TRAFFIC SIGNAL (AT RIVER ROAD AND 302)	EA	1	$125,000.00	$125,000.00
MAST ARM FOR TRAFFIC SIGNAL (AT SHAW'S PLAZA)	EA	1	$125,000.00	$125,000.00
MAST ARM FOR TRAFFIC SIGNAL (AT LANDING ROAD)	EA	1	$125,000.00	$125,000.00
MAST ARM FOR TRAFFIC SIGNAL (AT FRANKLIN DRIVE)	EA	1	$125,000.00	$125,000.00
	TRAFFIC & PEDESTRIAN SIGNALS SUBTOTAL			$500,000.00
LIGHTING				
Per 10/15/19 email from Windham to TYLI, direction was to "Forgo landscaping and lighting for future construction".				
	LIGHTING SUBTOTAL			$0.00
LANDSCAPING				
Per 10/15/19 email from Windham to TYLI, direction was to "Forgo landscaping and lighting for future construction".				
	LANDSCAPING SUBTOTAL			$0.00

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			SUBTOTAL	$500,000.00
TRAFFIC CONTROL	15%			$75,000.00
			SUBTOTAL 2	$575,000.00
MOBILIZATION (% OF QUANTITY COSTS INCLUDING TRAFFIC CONTROL)	10%			$57,500.00
			SUBTOTAL 3	$632,500.00
PE(15%) AND CE(15%) (% OF ALL COSTS)	30%			$189,750.00
			SUBTOTAL 4	$822,250.00
CONTINGENCY (% OF ALL COSTS)	25%			$205,562.50
			SUBTOTAL 5	$1,027,812.50
SURVEY/ROW RESEARCH		TBD		$0.00
			SUBTOTAL 4	$1,027,812.50
ROW NEGOTIATION / ACQUISITION		TBD		$0.00
			SUBTOTAL 5	$1,027,812.50
ENVIRONMENTAL		TBD		$0.00
			SUBTOTAL 6	$1,027,812.50
UTILITIES		TBD		$0.00
			SUBTOTAL 7	$1,027,812.50
			Rounding	$2,187.50
			GRAND TOTAL	**$1,030,000.00**

Windham Smart Signal Evaluation & Pedestrian Improvements

Windham, Maine

PROJECT CONCEPTUAL ESTIMATE

Concept Plan

NOTE(S)

1. This conceptual estimate has been developed based on aerial photos and approximate Right of Way. Verification of existing topography and ROW is necessary before design can be fully developed and may impact costs.
2. Traffic Control was estimated at a higher percentage than normal to account for RTE 302 traffic
3. Design and associated costs are expected to evolve based on input from property owner meetings and public meetings.
4. It is assumed that Right of Way would be negotiated such that the alignment of the sidewalk would not nessesitate utility relocations.
5. Estimate does not include ancillary construction costs associated with business/property owner relations (landscaping etc. adjacent to project)
6. Due to the length of the project and the proximity to town the field office item and cost are not included in this estimate.
7. Striping may need to be done in conjunction w/ future overlay project thus influencing schedule and costs.
8. No costs have been included for property negotiations/compensation and/or grading easements should they be needed. The goal is to minimize impacts and contain the work within the ROW however the design will take into account utilities, ADA requirements and other design features which may affect ROW impacts.
9. Due to uncertainty of the scheduling cost have not been inflated to construction year dollars.
10. It is assumed that neither new drainage nor modficiation of existing drainage would be needed.
11. Environmental services have not been included in this estimate. Based on a review of MaineDOT's Map Viewer there are no wetlands or historic properties in the vicinity of the project. Therefore this cost is expected to be nominal.
12. Cost of sign replacement, relocation and adjustment is assumed to be covered in the contingency.
13. For conceptual estimating purposes all curb was estimated as vertical granite curb. It should be understood that this will be broken into terminals and radius curb as necessary. LF costs are expected to be similar
14. Utility Coordination not included in this estimate.
15. Costs are not included for testing and/or remediation of hazardous soils.
16. It is assumed that the cost of relocation of private signs would be the responsibility of the owner.