

PRELIMINARY DESIGN REPORT

FOR THE 21ST CENTURY MASTER PLAN PRELIMINARY DESIGN PROJECT IN WINDHAM

**For the
Town of Windham**

**Prepared By:
T.Y. Lin International
MRLD Landscape Architecture + Urbanism
Wright-Pierce**

May 2016

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

Town(s): Windham		Route(s): U.S. Routes 302, 115, 35	
WIN: N/A		Federal Project No: N/A	
Project Type: Complete Streets and Safety Project			
Project Location: US Route 302 – River Road to Whites Bridge Road/Route 35 from US Route 302 to Basin Road/Route 115 from US Route 302 to Collins Pond Road			
Length:	BRLM:	ERLM:	RLM Date:
Program: N/A		Program Manager: N/A	
Project Manager: N/A		Designer: T.Y. Lin International	
FHWA Oversight: N/A		Engineer of Record: Thomas Errico	

PLANNING

Project History:

The 21st Century Plan was adopted by the Windham Town Council in January 2013. It calls for transportation improvements, land use ordinances, streets and architecture in North Windham to address the desire of the community to establish a renewed sense of place in Windham's commercial center. The 21st Century Plan is based on a Complete Streets philosophy and calls for transforming North Windham into a safe and comfortable place for people of all ages and abilities to work, live and spend time. It calls for improved access management on US Route 302, the completion of the areas fragmented pedestrian and bicycle network and quality streetscapes.

Purpose & Need:

The purpose of this project is to prepare preliminary design plans that provide improved pedestrian facilities, access management, safety, streetscape, traffic signal efficiency, and the feasibility and cost of underground utilities.

Brief Summary of Proposed Scope of Work:

Work generally includes the construction of a new sidewalk on the west side of US Route 302 from River Road to Whites Bridge Road and replacement of sidewalk on the east side; sidewalks on both sides of Route 35 from US Route 302 to Basin Road; a sidewalk on the south side of Route 115 from US Route 302 to Collins Pond Road; and providing additional crosswalks at all signalized intersections. Additionally, work includes upgrading the traffic signal system and installing pedestrian scale ornamental lights and streetscape elements.

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TRAFFIC

	Section 1	Section 2	Section 3	Section 4
Section Description	US Route 302 – River Road to Route 35/115	US Route 302 – Route 35/115 to Shaw's Drive	US Route 302 – Shaw's Drive to Landing Drive	US Route 302 – Landing Drive to Franklin Drive
Corridor Priority	1	1	1	1
Functional Class	Other Principal Arterial	Other Principal Arterial	Other Principal Arterial	Other Principal Arterial
NHS/Non-NHS	NHS	NHS	NHS	NHS
Posted Speed	30 MPH	30 MPH	30 MPH	30 MPH
Design Speed	N/A	N/A	N/A	N/A
2015 AADT (Current)	23,541	26,302	24,858	23,414
2035 AADT (Design)	28,250	31,560	29,830	28,100
DHV	N/A	N/A	N/A	N/A
CRF (Critical Rate Factor) 2012 – 2014: 5.64				
High Crash Locations: Boody's Corner; Route 35/115 to Shaw's Drive; Landing Road to Franklin Drive				

	Section 5	Section 6	Section 7	
Section Description	US Route 302 – Franklin Drive to Whites Bridge Road	Route 35 – US Route 302 to Basin Road	Route 115 – US Route 302 to Collins Pond Road	
Corridor Priority	1	3	3	
Functional Class	Other Principal Arterial	Major Urban Collector	Minor Arterial	
NHS/Non-NHS	NHS	Non-NHS	Non-NHS	
Posted Speed	30 MPH	35 MPH	30 MPH	
Design Speed	N/A	N/A	N/A	
2015 AADT (Current)	22,982	9,105	14,587	
2035 AADT (Design)	27,600	10,930	17,500	
DHV	N/A	N/A	N/A	
CRF (Critical Rate Factor) 2012 – 2014: 5.64				
High Crash Locations: None in these sections				

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DESIGN

Proposed Cross Section / Typical Section:

No changes to roadway cross-sections are proposed. It is recommended that during the final design process lane width reductions be considered so that wider shoulders for bicycle use can be provided. Refer to streetscape section for cross-section graphics.

Pavement Structure / Section Depth:

This project does not include any significant roadway paving reconstruction. The sidewalks will consist of 2" of HMA 9.5mm (nominal material size) over 12" of aggregate subbase course gravel.

Summary of Pedestrian & Bicycle Accommodations:

The project consists of significant pedestrian improvements including:

- Adding a new sidewalk on the west side of US Route 302 from River Road to Whites Bridge Road and upgrading the east side sidewalk. From River Road to Franklin Drive the existing sidewalk on the east side will be reconstructed.
- Adding sidewalks on both sides of Route 35 from US Route 302 to Basin Road.
- Adding a sidewalk on the south side of Route 115 from US Route 302 to Collins Pond Road.
- Adding a sidewalk on the north side of Route 115 from US Route 302 to Abby Road.
- Adding additional crosswalks at all signalized intersections.

ENVIRONMENTAL PERMITS / ISSUES

Not Applicable

RIGHT-OF-WAY COORDINATION

Impacts to right-way are expected as part of this project, mostly in the form of easements for the construction of (and in some areas the permanent placement of) sidewalks and streetscape elements. Refer to the plan for specific impact locations.

UTILITY IMPACTS/ISSUES

Above Ground Utilities:

This project applies a sidewalk minimum clear width of 4-feet for a maximum of 2-feet for the purpose of navigating past a utility obstruction. In the instance this clear width does not exist nor can be obtained by widening the sidewalk then the utility obstruction will need to be moved. It is anticipated that several of the existing utility poles, fire hydrants and miscellaneous utility boxes will need to be relocated.

Below Ground Utilities:

See later section for evaluation of underground utility feasibility and cost.

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ROW issues related to utilities:

There are several utilities which will need to be relocated as part of the project. The available space within the ROW is limited, therefore it is anticipated that some of the utilities will be relocated outside of the existing ROW.

GEOTECHNICAL COORDINATION

Not Applicable.

PUBLIC PROCESS

Public Contact Method and Date(s):

- A day long open house was held on December 17, 2015 at the Chamber of Commerce.
- A Public meeting was held on March 10, 2016 at Smitty's Cinema.
- April and May 2016 site meetings with property owners and businesses (30 +/-).
- A presentation of the draft Preliminary Engineering Documents to the Council and public on May 3, 2016.
- All materials and presentations have been posted on Town website for public review.

Concerns Identified at Open House and Public Meeting:

Notes from the Public Meetings have been prepared. Key concerns include:

- Maintain capacity on US Route 302
- Improve safety
- Increase capacity (add more travel lanes)
- No bike lanes
- Add bike lanes
- Sidewalks / ADA compliance necessary
- Relocate utility poles blocking sidewalks
- Crosswalks needed
- Right in / right out at select locations
- Medians length of study area to guide movement
- No medians / strategic location of medians
- Close / consolidate curb cuts
- Narrow drives / do not narrow drives
- Do not block signs with new trees
- Include decorative / pedestrian-scaled lighting
- Bury utilities
- Don't bury utilities – focus on other improvements
- Do it right. Spend the money now
- Minimize construction impacts
- Implement other connectivity / infill / design recommendations of 21st Century Downtown Plan
- Coordinate road and streetscape work with sewer planning, however do not make one project contingent on the other
- Continue to implement new zoning and design standards to enable recommendations of 21st Century Downtown Plan
- There was a general agreement to proceed with the project and do it right. The area needs to remain competitive.

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- Concern that if the project is broken into to many phases it will not only impact the area, but create an inconsistent design
- Clearly identify funding sources and strategies
- Continue to work with individual businesses and frontages on fine-tuning access management, streetscape, and options for burying utilities
- Keep sidewalks a 5-foot consistent width and do not increase one area to an 8-foot width
- Consider crosswalks on Route 115 and on Route 35
- Restudy a by-pass around the commercial core. Traffic is the main issue.
- Confirm with Fire Department that they do not require their own signal to access US Route 302
- Make sure this project is coordinated with the intersection projects at River Road and Angler's Way

PRELIMINARY COST ESTIMATE

Costs have been developed to a level of detail commensurate to the plans. The costs provided give an order of magnitude understanding of cost of the project. It should be noted that there are a number of factors which will influence the final cost of this project. See the supplemental information provided below and in the appendices for further understanding of these factors.

ROADWAY AND PEDESTRIAN IMPROVEMENTS*		COST
CATEGORY 1:	SIDEWALK AND ROADWAY IMPROVEMENTS	\$2,040,000
CATEGORY 2:	SIGNALS	\$1,540,000
CATEGORY 3:	LIGHTING	\$2,660,000
CATEGORY 4:	LANDSCAPING	\$540,000
SUBTOTAL 1 (ROADWAY AND PEDESTRIAN IMPROVEMENTS)		\$6,780,000
UTILITY RELOCATION**		
CATEGORY 5:	UTILITIES RELOCATION (RIVER RD. TO FRANKLIN DR.)	\$7,800,000
CATEGORY 6:	ANCILLARY UTILITY RELOCATION COSTS (PAVEMENT OVERLAY)	\$1,000,000
SUBTOTAL 2 (UTILITY RELOCATION)		\$8,800,000
TOTAL PROJECT COST		
PROJECT TOTAL		\$15,580,000

* SEE APPENDIX A FOR DETAILED ESTIMATE AS WELL AS ESTIMATE NOTES AND ASSUMPTIONS

** SEE UTILITY SECTION, WITHIN THIS REPORT, FOR ADDITIONAL DETAILS REGARDING THE UTILITY ESTIMATE

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SUMMARY OF PRELIMINARY ENGINEERING

Horizontal Alignment:

Limited changes to the horizontal alignment are proposed for this project.

- At the US Route 302/Route 35/Route 115 intersection the northwest corner will be modified to accommodate a sidewalk. The radius will be reduced.
- At the US Route 302/Landing Road intersection the northwest corner will be modified to accommodate a sidewalk. The turning lane will be removed.

Vertical Alignment:

No changes are proposed outside of adding sidewalks and median islands

Typical Section:

The number of lanes will remain unchanged. It is recommended that lane widths be narrowed to allow for a wider shoulder along US Route 302. This change would be implemented at the time of pavement resurfacing.

Pavement Structure:

Sidewalk pavement structure: 2" HMA 9.5mm over 12" Aggregate Subbase.

Drainage/Hydrology:

No major changes are anticipated to existing drainage. Where changes to the existing gutter line are being proposed, the drainage will be modified to accommodate the changes. Drainage areas and direction of flows are not expected to change significantly. The existing culverts on either side of Manchester Drive at the intersection of Route 35 will be extended to accommodate the proposed sidewalk. The existing culverts under US Route 302 at Outlet Brook will be extended to accommodate the proposed sidewalk.

Traffic Analysis:

The following presents traffic analyses conducted in support of the preliminary design process. It is based upon intersection turning movement traffic counts collected in 2015 and increased by 20% to account for future growth. The No-Build condition represents no changes.

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US Route 302/River Road

A traffic evaluation was conducted evaluating the implementation of a lead protected phase for southbound US Route 302 into Turning Leaf Drive and adding a crosswalk on the northerly leg of the intersection. As noted additional delay can be expected with the introduction of a left-turn phase. Northbound capacity will be reduced.

US Route 302 and River Road/Turning Leaf Drive													
		EBLT	EBR		WB			NB			SB		ALL
NO BUILD	AM PEAK	23.7	16.4		16.9			10.3			10.3		11.3
	LOS	C	B		B			B			B		B
	QUEUE	108	7		21			166			275		n/a
	PM PEAK	41.9	16.2		17.1			13.1			15.5		17.3
	LOS	D	B		B			B			B		B
	QUEUE	265	6		33			290			308		n/a
W/Improvement	AM PEAK	108	52.8		53.7			81.5			5.1		49.4
	LOS	F	D		D			F			A		D
	QUEUE	325	0		31			543			28		n/a
	PM PEAK	139.1	26.1		27.2			67.9			27.2		56.8
	LOS	F	C		C			E			C		E
	QUEUE	404	0		28			620			550		n/a

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US Route 302/Route 35/Route 115

A traffic evaluation was conducted evaluating the elimination of a lane on the Route 35 approach (Build 1) and adding crosswalks on westerly and southerly legs of the intersection (Build 2). As noted in the following table, the intersection will see a significant degradation in level of service with the elimination of the lane on Route 35 and therefore it is not recommended. Some minor increases in delay can be expected with introduction of the pedestrian crossings.

US Route 302 and Route 35/Route 115														
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ALL
NO BUILD	AM PEAK	112.9	115.7	22.3	177.6	85.1	22.2	113.2	92.3	28.9	116.9	32.3	34.2	70.9
	LOS	F	F	C	F	F	C	F	F	C	F	C	C	E
	QUEUE	212	385	125	300	345	300	324	537	94	588	403		n/a
	PM PEAK	112.2	80.3	14.9	150.9	83.8	19.6	79.2	93.3	40.1	155.3	70.9	70.8	80.4
	LOS	F	F	B	F	F	B	E	F	D	F	E	E	F
	QUEUE	258	511	112	366	543	349	463	795	136	742	573		n/a
BUILD 1	AM PEAK	338	115.7	39	361.2	71.8	58.7	81	258.9	46.8	384.7	21.5	22.6	144.1
	LOS	F	F	D	F	E	E	F	F	D	F	C	C	F
	QUEUE	289	385	159	349	337	416	246	1303	5	762	351		n/a
	PM PEAK	150.1	91.5	18.2	328.1	122.6	61.8	64	267.4	28	407.3	55.2	55.2	154.6
	LOS	F	F	B	F	F	E	E	F	C	F	E	E	F
	QUEUE	288	564	125	420	619	595	439	1929	154	939	610		n/a
BUILD 2	AM PEAK	164.5	115.7	22.3	177.6	71.8	20.2	86.6	82.7	27	116.7	32.1	34	68.5
	LOS	F	F	C	F	E	C	F	F	C	F	C	C	E
	QUEUE	241	385	125	300	337	300	324	537	94	571	405		n/a
	PM PEAK	117.6	91.5	16.9	158.9	94.8	20.6	66	81.1	40.6	135.7	60.9	60.8	75.1
	LOS	F	F	B	F	F	C	E	F	D	F	E	E	E
	QUEUE	274	564	126	371	586	377	490	835	150	777	608		n/a

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US Route 302/Shaw's Plaza Drive

A traffic evaluation was conducted that investigated changing the lane assignment on both minor approaches to a left lane and a shared through/right and adding crosswalks on all four approaches. As noted, level of service is improved with the change and suggested for implementation.

US Route 302 and Shaw's Plaza Drive											
		EBL	EBT	EBR	WBL	WBTR	NBL	NBTR	SBL	SBTR	ALL
NO BUILD	AM PEAK	61		53.2	71.6	53.5	0.4	0.3	0.9	1.2	7.2
	LOS	E		D	E	D	A	A	A	A	A
	QUEUE	152		67	105	99	17	142	18	157	n/a
	PM PEAK	53.7		48.5	66.2	47.2	18.4	24.1	25.2	1.5	18.1
	LOS	D		D	E	D	B	C	C	A	B
	QUEUE	126		72	111	69	23	183	14	181	n/a
W/Improvement	AM PEAK	69.3	61.2		70.3	60	0.2	0.1	0.5	0.7	7.5
	LOS	E	E		E	E	A	A	A	A	A
	QUEUE	116	98		108	99	15	153	14	158	n/a
	PM PEAK	62.7	57.7		69.7	54.8	0.3	0.2	0.2	0.2	6.6
	LOS	E	E		E	D	A	A	A	A	A
	QUEUE	110	96		123	70	19	156	3	41	n/a

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US Route 302/Landing Drive

A traffic evaluation was conducted that investigated several potential changes to the intersection including signalizing the channelized right-turn on northbound US Route 302; eliminating the double left turns and split traffic signal phases on the side street approaches; removing the southbound US Route 302 right lane; and accommodating added crosswalks. These changes are reflected in the Full Build Scenario. Build 2 is similar to the Full Build but does not include any modifications to the side street lane assignment or phasing. Based upon the results, the full build improvements are recommended.

US Route 302 and Landing Road														
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ALL
NO BUILD	AM PEAK	54.3	54.6	45.2	63.3	62.2	48.8	58.4	21.5	15.2	95.5	41.7	29	38.7
	LOS	D	D	D	E	E	D	E	C	B	F	D	C	D
	QUEUE	250	258	70	225	224	0	371	505	77	111	636	136	n/a
	PM PEAK	55.3	54.6	43.4	63.8	63.9	47.3	61.5	28.1	16.5	88.4	55.7	32.8	44
	LOS	E	D	D	E	E	D	E	C	B	F	E	C	D
	QUEUE	282	284	69	275	285	7	480	670	107	56	607	93	n/a
FULL BUILD	AM PEAK	46.7	57	54.6	55.3	64.9	60.4	73.4	21.9	15.7	75.5	53.7		44.6
	LOS	D	E	D	E	E	E	E	C	B	E	D		D
	QUEUE	352	136	73	268	116	0	497	473	211	127	931		n/a
	PM PEAK	50.5	55.3	52.9	60.5	68.6	60.5	72.1	26.1	15.9	72.9	66.3		48.7
	LOS	D	E	D	E	E	E	E	C	B	E	E		D
	QUEUE	500	142	69	365	138	11	598	714	232	60	542		n/a
BUILD 2	AM PEAK	63.7	64	52.9	78.4	77.1	57.7	73.4	22.7	16.2	75.5	57.6		48.9
	LOS	E	E	D	E	E	E	E	C	B	E	E		D
	QUEUE	242	249	68	192	195	0	483	555	206	129	994		n/a
	PM PEAK	68.4	67.5	51.8	81.5	82	56.2	78.2	26.9	16.3	78.5	69.4		53.4
	LOS	E	E	D	F	F	E	E	C	B	E	E		D
	QUEUE	291	295	71	228	235	9	591	843	194	84	917		n/a

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US Route 302/Franklin Drive

A traffic analysis was conducted that investigating changing the lane assignment on Franklin Drive to a left lane and a shared through/right lane. Given increased delay, no changes are suggested with the exception of adding crosswalks.

US Route 302 and Franklin Drive											
		EB	WBL	WBT	WBR	NBL	NBTR		SBL	SBTR	ALL
NO BUILD	AM PEAK	51.9	66.5		55.8	3.1	1.2		7.8	9.6	10.5
	LOS	D	E		E	A	A		A	A	B
	QUEUE	30	171		106	0	18		54	295	
	PM PEAK	51.3	59		79.8	2.8	1.4		6.4	7.8	10.6
	LOS	D	E		E	A	A		A	A	B
	QUEUE	28	112		185	0	14		51	308	
BUILD	AM PEAK	61.4	69.3	59.5		2.5	1		6.8	8.2	10.1
	LOS	E	E	E		A	A		A	A	B
	QUEUE	35	161	127		0	52		15	155	
	PM PEAK	64	59.5	85.2		2.9	1.2		6.7	8.1	11.1
	LOS	E	E	F		A	A		A	A	B
	QUEUE	32	109	201		0	18		54	325	

Intersection Geometry:

The project will include the following intersection geometry improvements:

- River Road – No changes.
- Route 35/Route 115 – The northwest corner (Irving) radius will be adjusted to allow for construction of a sidewalk.
- Shaw's Drive – No changes.
- Landing Road – Southbound right lane is being eliminated.
- Franklin Drive – No changes

Right-of-Way:

The approximate location of the existing Right of Way (ROW) was determined using construction plans for past construction projects in this area. In addition to the plans there was limited monumentation obtained in the survey. It should be noted that the plan sets available spanned several decades. The plan information was limited and sometimes varied between the different plan sets. The survey did pick up limited monumentation. Some of this was consistent with the plan information, some of it did not. The existing ROW was established by orienting the available information with the topographic information.

Based on the approximate ROW which has been established it is understood that the roadway width and existing sidewalk occupy much of the existing ROW for the portion of US Route 302 within the project limits. Based on the approximate existing ROW the following are anticipated ROW conflicts:

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- Slope impacts @ STA 32+00, LT, @ 103+00, LT as well as other locations where topography will challenge the installation of the proposed sidewalk
- Drive modifications
- Relocation of existing utilities and/or widening of existing sidewalk to alleviate accessibility conflicts along the proposed sidewalk
- Installation of pedestrian lighting
- Construction of the 8-foot sidewalk between Boody's Corner and Franklin Drive
- Relocation of Shaw's Plaza sign
- Installation of some of the traffic signal mast arms
- Crosswalks at Shaw's Plaza Drive
- Utility modifications (associated with burying the existing utilities underground)

Before final design can commence the location of existing ROW will need to be thoroughly researched and precisely established. From that information the necessary easements can be established.

Traffic Signal Design:

The design includes full replacement of all traffic signals in the study area and generally includes the following:

- Mast Arm supports
- Count-down pedestrian heads and ADA compliant push buttons
- Video Detection
- Ground-mounted signal cabinet and controller equipment
- System coordination equipment that allows for integration into the PACTS Regional Traffic Management System (RTMS).

Access Management:

See Appendix B for a table which summarizes driveway and other miscellaneous conflicts and the resolutions of those conflicts.

Utilities:

As a part of the downtown planning for the Town of Windham, Wright-Pierce reviewed options with respect to the potential removal/relocation of overhead (OH) utilities underground from a portion of US Route 302, more specifically from River Road north to Angler's Road. The overall goal of the removal/relocation is to limit the number of visible electrical/cable/telephone lines along US Route 302 in the downtown area via relocation to underground (UG) locations.

Based on preliminary discussions with the Town, the overall focus area has been subdivided into the following segments for evaluation:

- River Road to Boody's Corner (Route 35/115)
 - Boody's Corner as a standalone location (from about the Manchester School drive south of the intersection to about Shaw's Plaza Drive).
 - Boody's Corner to Shaw's Plaza
 - Shaw's Plaza to Landing Road
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- Landing Road to Franklin Drive
- Franklin Drive to Anglers Road

This evaluation has been prepared as a summary of project considerations and planning level cost estimate for relocation of overhead utilities underground.

Project Considerations

Based on our work with many communities, the planning level considerations are generally focused on the aesthetic value provided to a community with the removal of overhead electrical lines below ground. As with a project of this size, there are a number of considerations that need to be addressed, each having varying cost implications to relocation.

- **Existing Overhead Conditions:** As with any relocation, the type of overhead utility (3 phase vs single phase), number of transformers, and conduit requirements to support both primary and redundancy as well as cable, television, phone and communication wires may impact the size and requirements of the conduits, AKA the duct bank.
- **Service Locations:** The change from overhead service to underground services to each individual property will require modification to the service entrance and meter at each property impacted. This will require evaluation and code review of individual properties to determine code compliance and may require upgrades to the service entrance at buildings to meet current codes. At the planning level stage, it is hard to gauge the cost associated with each property.
- **Right-of-Way:** The current road configuration; two lanes in each direction, paved shoulders and a center turn lane occupy 66' (on average) of an approximate 80' ROW. The placement of underground vaults and conduit would likely require detailed survey of available ROW and likely establishing easements for service lines, pad mounted transformers, etc.
- **Utility Accommodation:** As with many existing developed areas, coordination with other underground utilities will be required to accommodate duct bank installation. Given the construction methods and likely concrete encapsulation of the conduits, it is likely significant setback from existing utilities may require relocation of underground lines to accommodate each utility in various segments.
- **Street Lights:** Removal of overhead poles in any service area, particularly downtown areas, will likely require the installation of additional streetlight infrastructure to support the safety of motorists and pedestrians in the downtown areas.
- **Earthwork, Excavation and Site Restoration:** This includes the extent of the individual service runs.
- **Service Risers:** One of the most costly items that affect the cost per foot is the number of circuit risers, which are the locations where the OH lines transfer to UG and vice versa. These locations require at least 2 new poles to be set and wired with the risers. These locations also require UG concrete vaults. The circuit riser



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locations would exist at the ends of the project area and on both sides of any intersection, where side streets intersect with the main line, e.g., Route 35/115, Shaw's Plaza intersection, Landing Road and Angler's Road.

- Economy of Scale: Additionally, there's an economy of scale factor that reduces the per foot cost as the project expands in length.

Planning Level Cost Estimations

For the purpose of the Windham 21st Century Master Plan and preparation of an order of magnitude planning level cost estimate, we have tried to capture project considerations which would need to be addressed. The planning level cost estimate provided for each individual segment below is based on past experience by Wright-Pierce, discussions with CMP and research of other projects completed in the State and within close proximity to this project areas.

There are three major cost factors in UG utility work; (1) what the various utility companies charge, which typically includes the cost and labor for the new wire, transformers, energizing the conduit and removal of the old wires, poles and equipment, (2) the cost to acquire right-of-way (ROW) or easements, and (3) what the General Construction Contractor will charge to do everything else e.g.:

- Trenching, installation of conduit, backfilling. For the Falmouth, ME Route One project CMP required 12, 6" diameter conduits (6 over 6), concrete encased. The other utility companies also required numerous conduits. Some of the conduits were installed in case of emergency, expansion, upgrades, future needs, etc.;
- Installation of 7'x13' concrete vault manholes required by both CMP and Oxford Networks,
- Numerous person sized pull-box manholes for fishing and pulling wire through the conduits,
- Earthwork and excavation associated with the UG wire utilities,
- Installation of lateral feeds, restoration and repaving of the trenches, etc.

The following numbers are what the various utility companies charged for the one mile long Falmouth, ME Route One project:

\$2,000,000. - Central Maine Power
\$635,000. - Fairpoint Communications
\$213,000. - Oxford Networks
\$85,000. - Time Warner Cable
\$6,500. - OTT Communications

This estimate does not include ROW or easement acquisition, or exact number of service entrance upgrades. There's a chance that some of the service entrances are outdated or non-code compliant. We would recommend that a licensed electrician review every service entrance for potential upgrades and estimate a cost for those upgrades. We have found that the individual business owners are not willing to pay for service upgrades due to a town enacted project. The Town should consider paying for these upgrades where necessary. We would estimate an average cost of \$18,000 per upgrade. For estimating purposes, we are applying a contingency for ten service upgrades for an additional project cost of \$180,000.

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

The exact locations of the various segments for the Windham project would need to be designed with further input by the individual utility companies and should be looked into early on in the project technical design phase so as to refine construction cost estimates further.

Based on our past experience, research and discussions with the CMP, we are estimating an order of magnitude cost of 7.2 to 8.2 million dollars per mile or \$1,364 to \$1,553 per linear feet.

For the Windham 21st Century Master Plan, the following costs can be anticipated for each segment outlined below:

- \$3,900,000 - Boody's Corner as a standalone location. Assumes a circuit drop location just south of the Manchester School driveway to a circuit riser just north of Shaw's Plaza to remove crisscross OH lines at the Shaw's Plaza and Windham Shopping Plaza intersection.

The following segments were considered as if they would be built in phases, building off of one another.

- \$4,200,000 - River Road to Boody's Corner (Route 35/115). Assumes a circuit drop location just south of River Road to remove crisscross OH lines at River Road/Turning Leaf Drive intersection to a circuit riser just north of Boody's Corner and circuit drops and risers on Route 115 and Route 35 to remove crisscross lines within the entire intersection.
- \$1,500,000 - Boody's Corner to Shaw's Plaza. Assumes starting where above segment ends to a circuit riser just north of Shaw's Plaza to remove crisscross OH lines at the Shaw's Plaza and Windham Shopping Plaza intersection.
- \$1,800,000 - Shaw's Plaza to Landing Road. Assumes starting where above segment ends to a circuit riser just north of Landing Road to remove crisscross OH lines at the Windham Mall intersection. This also includes UG service for approximately 150 feet west on Landing Road.
- \$1,200,000 - Landing Road to Franklin Drive. Assumes starting where above segment ends to a circuit riser just north of Landing Road to remove crisscross OH lines at the Windham Mall intersection. This also includes UG service for approximately 150 west on Landing Road.

The above four segments equal approximately 5,600 linear feet along US Route 302. If the above four segments were to be constructed in one phase the overall costs would be closer to \$7,800,000, including the \$180,000 contingency for the service upgrades. The lower number is based on an economy of scale, doing the project at once, one final design, one contractor price, etc.

Additionally, if the Town wanted to add an additional segment of Franklin Drive to Anglers Road, (3,300 l.f.) that segment would cost approximately \$4,500,000 to 5,000,000, depending on the construction timing.

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

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Streetscape:

As part of the Preliminary Engineering documents streetscape elements including street trees, fencing, and the location of street benches (TBD) have been coordinated with the location of sidewalks, access management measures, streetlights, utilities, and center medians. The improvements will make US Route 302 safer for all users, improve aesthetics, reduce visual clutter, improve wayfinding, and provide environmental benefits including stormwater treatment and retention (the study area is located over a major aquifer recharge zone), reduction of the heat island effect, and mitigate CO2 emissions.

There is not much room to make improvements within the right of way. In addition, there are numerous above ground and below ground utilities, business and directional signage, as well as other components of the built environment requiring the careful placement or replacement of street trees.

The following general guidelines shall be followed for the planting or replanting of street trees.

1. Work with individual property owners and businesses to coordinate the landscaping along their frontage.
2. All street trees shall have a 10' vertical and 8' horizontal clearance from above ground utilities.
3. All street trees shall be planted with a root barrier system to minimize root impacts on adjacent sidewalks and parking areas.
4. All street trees shall be planted in an area 4' x 4' clear, even if this requires the saw cutting of pavement to create a tree pit.
5. The trunk of all tree shall be located at least 2' from the edge of sidewalks and parking areas.
6. In general, space is limited throughout the corridor and columnar trees with an upright habit are recommended along the corridor. Such trees include:

Ginkgo balboa 'Princeton Sentry' (male)

Acer x freemanii 'Armstrong'

Quercus palustris 'Green Pillar'

Carpinus betulus 'Fastigiata'

The above trees or similar as approved, are also suitable for median island plantings. In addition to the above, appropriate trees for medians include:

Zelkova serrata 'Green Vase'

Gleditsia triacanthos var. *inermis*

Ginkgo biloba (male)

Acer rubrum

While the form of the tree is critical in regards to the location of overhead utilities – if the utilities remain above ground - a diversity of street tree species is recommended to avoid mass die off, provide a range of urban habitat, and broaden aesthetic character.

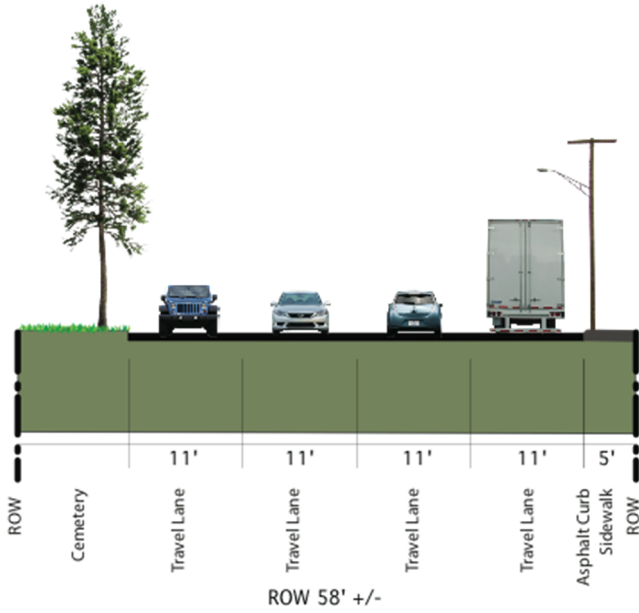
Following are before and after cross sections at three locations along the corridor. Starting from the south running north, the cross sections are located at approximately the cemetery, the North Windham Shopping Center, and the Citgo. These locations were selected because they represent the basic three proposed conditions along the length of the study area.

HIGHWAY PRELIMINARY DESIGN REPORT

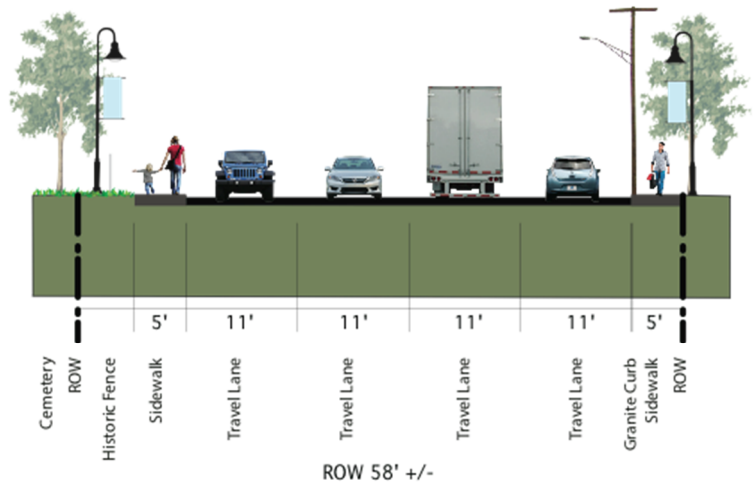
Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016



SECTION 1 AT CEMETERY - EXISTING



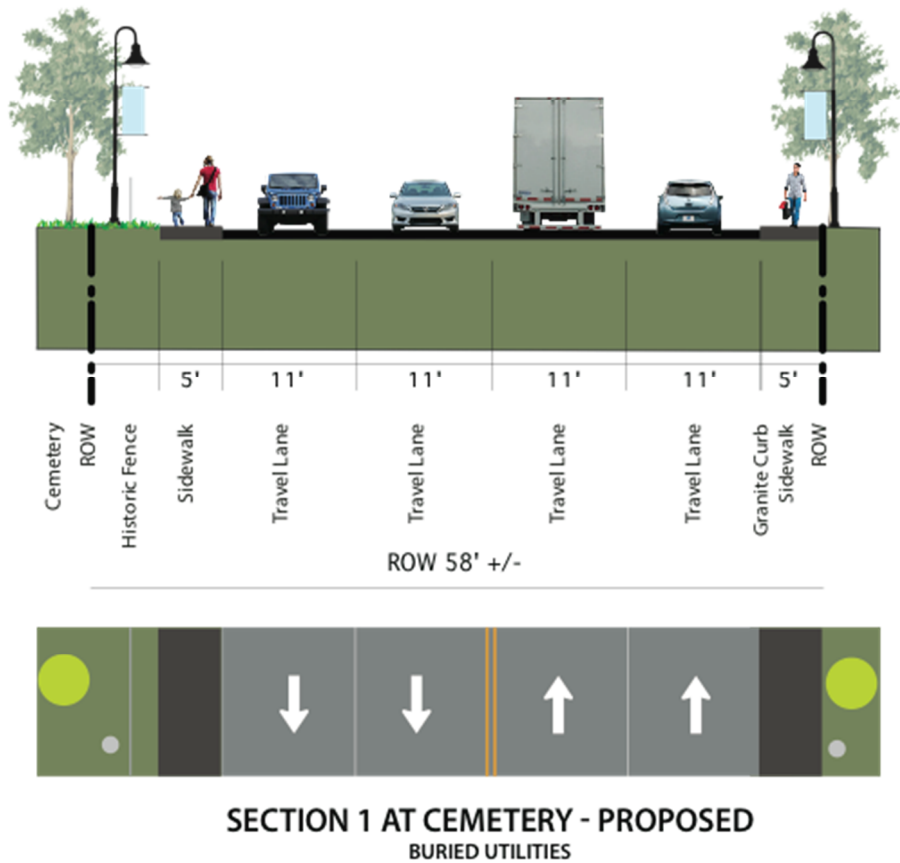
SECTION 1 AT CEMETERY - PROPOSED

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

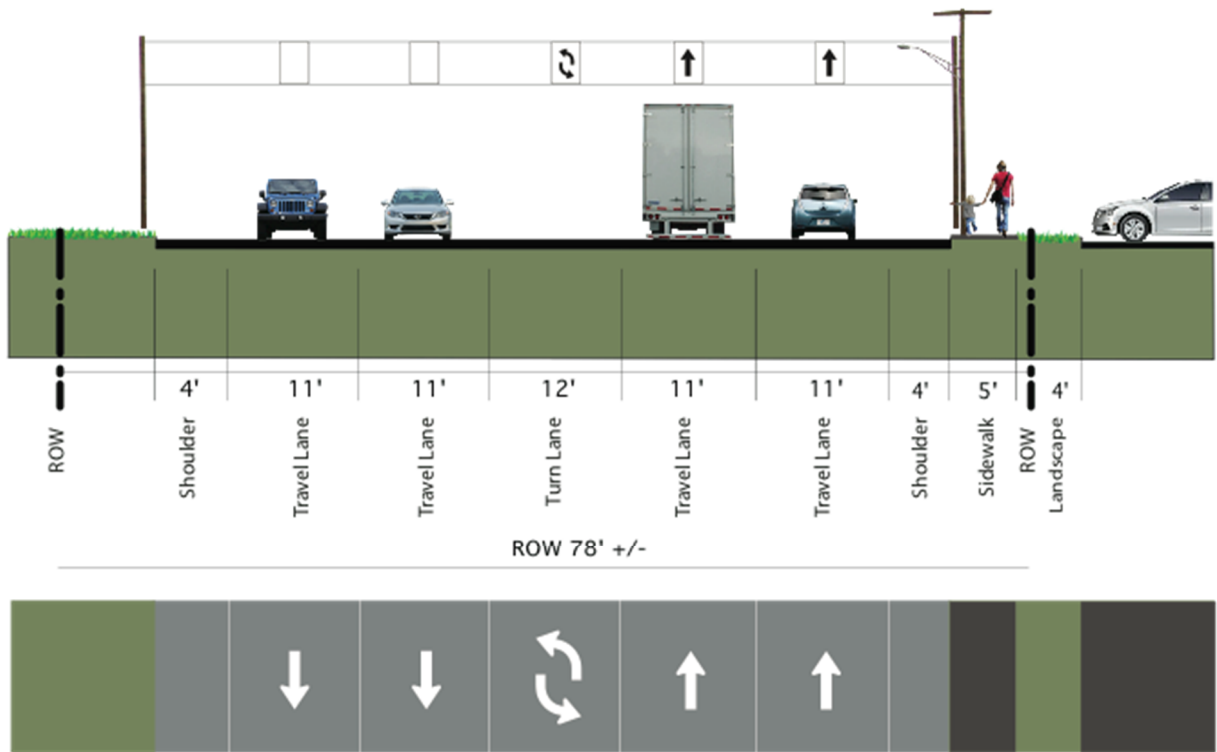


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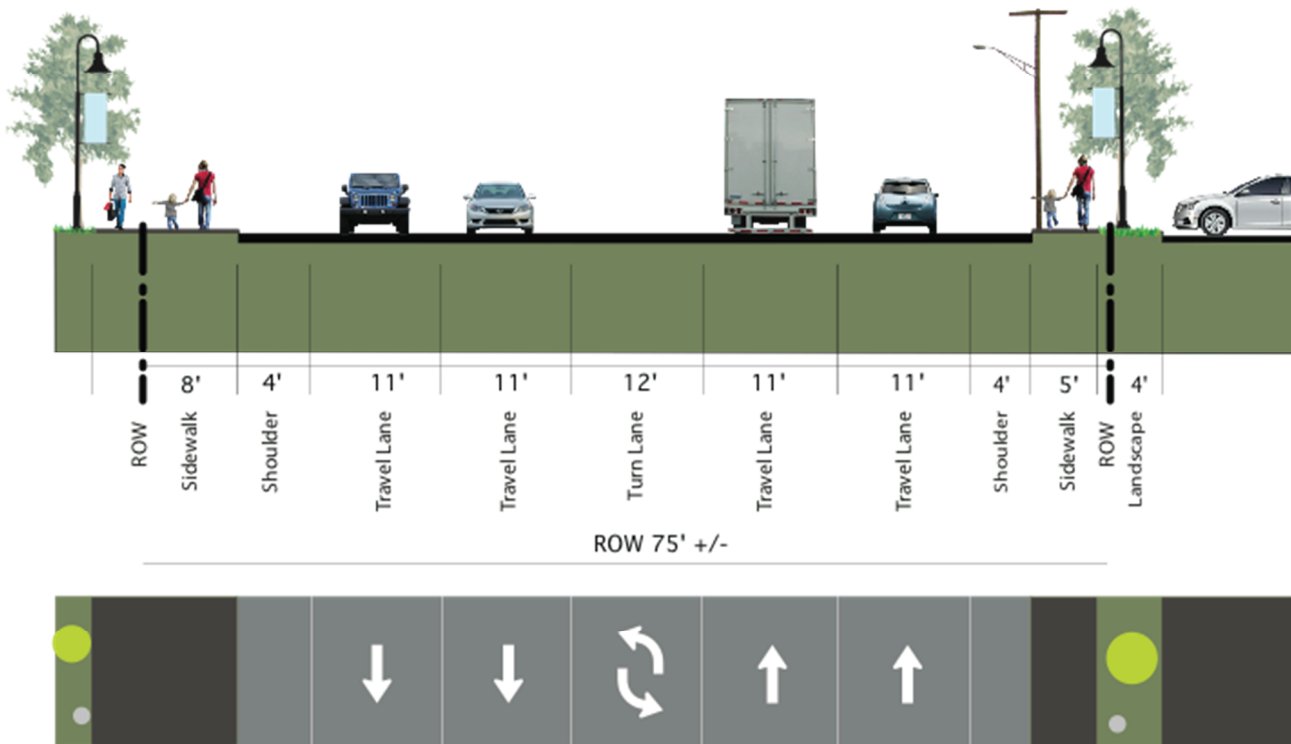
SECTION 2 AT NORTH WINDHAM SHOPPING PLAZA - EXISTING

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

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Final Distribution Date: 5/31/2016

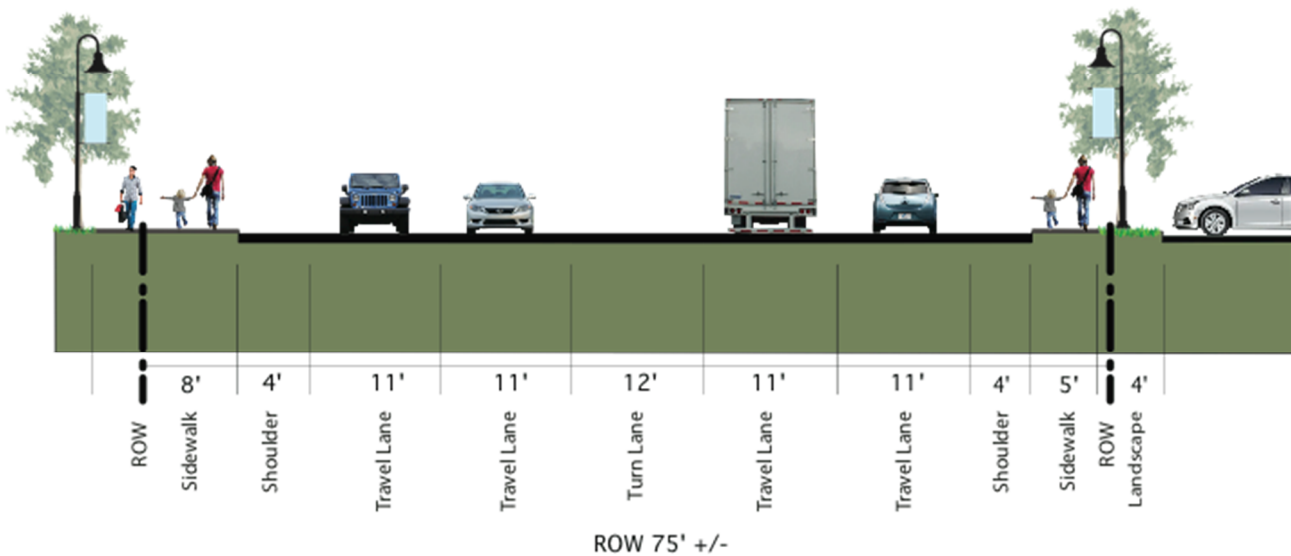


HIGHWAY PRELIMINARY DESIGN REPORT

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Final Distribution Date: 5/31/2016



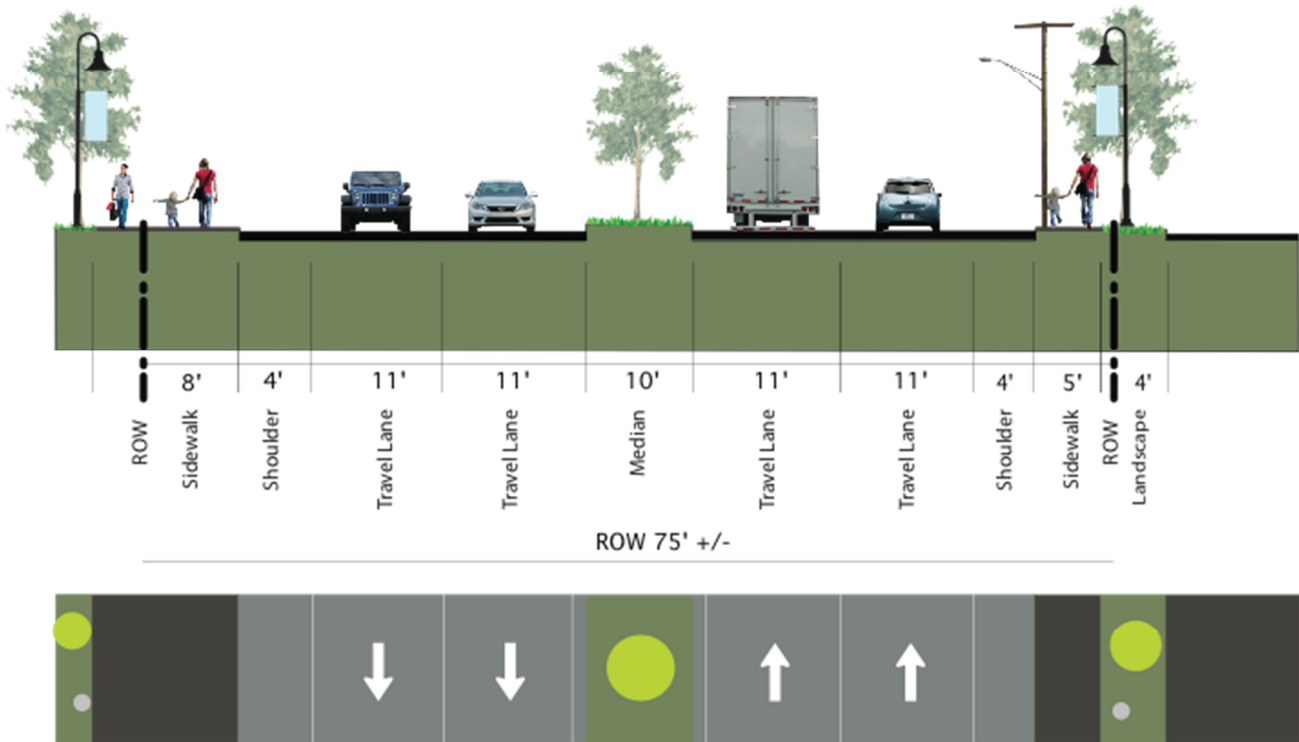
SECTION 2 AT NORTH WINDHAM SHOPPING PLAZA - PROPOSED
BURIED UTILITIES

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

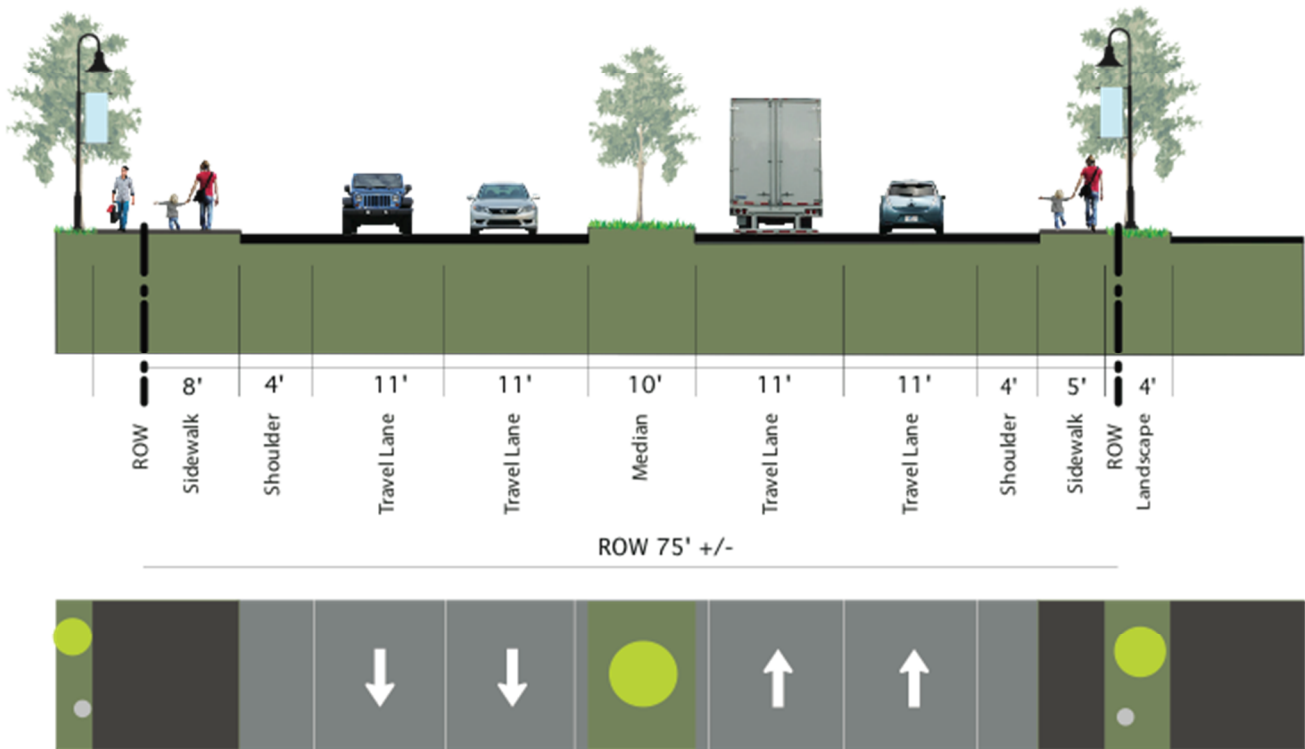


HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016



SECTION 3 AT CITGO STATION - PROPOSED
BURIED UTILITIES

HIGHWAY PRELIMINARY DESIGN REPORT

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Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

Following are images of typical streetscape features such as benches, trees, and a decorative historic fence along the cemetery frontage. Information on the specified streetlights is located in a different section of this report.



Detail of typical iron or aluminum historic fence



Typical historic style bench – recycled material

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016



Typical roadside columnar tree



Typical median planting with street trees and low shrubs

HIGHWAY PRELIMINARY DESIGN REPORT

Project Name: 21st Century Master Plan Prelim Engineering

Draft Distribution Date: 4/11/2016

Final Distribution Date: 5/31/2016

Lighting:

The objective of the preliminary lighting design is to enable the design team to produce an estimate of probable cost for installation of a pedestrian scale lighting system with a reasonable level of accuracy which will enable the town to evaluate cost and establish a budget for this work. The scope of the proposed lighting system will provide lighting on sidewalks on both sides of the roadway (US Route 302) within the limits of the 21st Century Downtown Plan extending from River Road to the intersection of US Route 302 with Franklin Drive. The proposed system is intended to provide sidewalk lighting meeting the recommendations of AASHTO however it has the potential of providing the required level of illumination and performance for the lighting of US Route 302 within this area. The proposed lighting system consists of decorative luminaires with led light source and decorative poles with luminaires mounted at 14 feet. Poles are spaced at 50 feet in a staggered pattern to the extent limited by existing and proposed roadway and driveway conditions. The proposed luminaires are of high quality, holophane “hallbrook extended” gelb-050-4k with asymmetric tear drop glass optics. Proposed poles are of a historical style and would be provided by the luminaire manufacturer. See Appendix C for Pedestrian Lighting Details.

APPENDIX A

COST ESTIMATE

WINDHAM 21ST CENTURY MASTER PLAN IMPROVEMENTS

Windham, Maine

PROJECT PROGRESS ESTIMATE

Based on May 31, 2016 Plans

<i>Bid Item Description</i>	<i>Unit</i>	<i>EST QTY</i>	<i>Unit Cost</i>	<i>TOTAL Cost</i>
CIVIL				
REMOVING SINGLE TREE TOP ONLY	EA	30	\$425.00	\$12,750.00
REMOVING STUMP	EA	30	\$175.00	\$5,250.00
REMOVING PAVEMENT SURFACE	SY	100	\$47.00	\$4,700.00
COMMON EXCAVATION	CY	3300	\$19.97	\$65,901.00
AGGREGATE BASE COURSE - CRUSHED	CY	1200	\$36.50	\$43,800.00
AGGREGATE SUBBASE COURSE - GRAVEL	CY	3900	\$33.40	\$130,260.00
HOT MIX ASPHALT 9.5 MM HMA (SIDEWALKS, DRIVES & INCIDENTAL)	T	1000.00	\$185.00	\$185,000.00
HOT MIX ASPHALT 9.5 MM SURFACE	T	135.00	\$120.00	\$16,200.00
HOT MIX ASPHALT 12.5 MM BASE	T	135.00	\$130.00	\$17,550.00
BITUMINOUS TACK COAT - APPLIED	G	30.00	\$13.18	\$395.40
18" CULVERT OPTION III	LF	40	\$80.00	\$3,200.00
CATCH BASIN TYPE B1-C	EA	3	\$3,250.00	\$9,750.00
ALTERING CATCH BASIN TO MANHOLE	EA	2	\$1,260.00	\$2,520.00
REBUILDING CATCH BASIN	EA	13	\$2,718.00	\$35,334.00
ADJUSTING MANHOLE OR CATCHBASIN TO GRADE	EA	7	\$694.00	\$4,858.00
CATCH BASIN TYPE A5-C	EA	1	\$3,135.00	\$3,135.00
CURB RAMP DETECTABLE WARNING FIELD	SF	328	\$73.00	\$23,944.00
VERTICAL CURB TYPE 1	LF	5434	\$38.00	\$206,492.00
CURB TYPE 5	LF	3566	\$31.00	\$110,546.00
PLAIN RIPRAP	CY	8	\$69.00	\$552.00
EROSION CONTROL BLANKET	SY	500	\$3.96	\$1,980.00
LOAM	CY	845	\$55.00	\$46,475.00
SEEDING METHOD NUMBER 2	UN	71	\$57.00	\$4,022.61
MULCH – PLAN QUANTITY	UN	71	\$50.92	\$3,615.32
BARK MULCH	CY	40	\$78.00	\$3,120.00
EROSION CONTROL GEOTEXTILE	SY	400	\$4.28	\$1,712.00
12" SOLID WHITE PAVEMENT MARKING LINE	SF	1341	\$2.34	\$3,137.94
4" WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE	LF	54134	\$1.00	\$54,134.00
WHITE OR YELLOW PAVEMENT & CURB MARKING	SF	6885	\$3.25	\$22,376.25
HAND LABOR, STRAIGHT TIME	MH	40	\$43.00	\$1,720.00
ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	HR	40	\$133.00	\$5,320.00
TRUCK - LARGE (INCLUDING OPERATOR)	HR	40	\$77.00	\$3,080.00
SMALL FRONT END LOADER (INCLUDING OPERATOR)	HR	40	\$106.00	\$4,240.00
FIELD OFFICE, TYPE B	EA	1	\$6,300.00	\$6,300.00
TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LS	1	\$4,000.00	\$4,000.00
TEST PIT	EA	25	\$350.00	\$8,750.00
SLOPE PROTRECTION / STABILIZATION (@ RIVER ROAD)	LS	1	\$55,000.00	\$55,000.00
SLOPE PROTRECTION / STABILIZATION (@ OUTLET BROOK)	LS	1	\$80,000.00	\$80,000.00
SIDEWALK AND ROADWAY IMPROVEMENTS SUBTOTAL				\$1,191,120.52
TRAFFIC & PEDESTRIAN SIGNALS				
MAST ARM POLE FOUNDATION	EA	19	\$2,500.00	\$47,500.00
CONTROLLER CABINET FOUNDATION	EA	5	\$1,100.00	\$5,500.00
PREEMPTIVE SYSTEM	EA	5	\$14,000.00	\$70,000.00
TRAFFIC SIGNAL CONTROL SYSTEM WITH CABINET	EA	5	\$30,000.00	\$150,000.00
VIDEO DETECTION SYSTEM	EA	5	\$25,000.00	\$125,000.00
INTERCONNECT	EA	5	\$10,000.00	\$50,000.00
MAST ARM POLE	EA	19	\$13,000.00	\$247,000.00
PEDESTAL POLE	EA	18	\$1,000.00	\$18,000.00
PEDESTRIAN BUTTON AND FOUNDATION	EA	36	\$1,000.00	\$36,000.00
RECTANGULAR RAPID FLASHING BEACON (AT NORTHWOOD DR.)	EA	1	\$10,000.00	\$10,000.00
RECTANGULAR RAPID FLASHING BEACON (AT COLLINS POND RD.)	EA	1	\$10,000.00	\$10,000.00
COUNTDOWN PEDESTRIAN HEADS	EA	36	\$1,500.00	\$54,000.00

<i>Bid Item Description</i>	<i>Unit</i>	<i>EST QTY</i>	<i>Unit Cost</i>	<i>TOTAL Cost</i>
PRECAST CONCRETE JUNCTION BOX	EA	21	\$750.00	\$15,750.00
TRAFFIC SIGNAL AT: RIVER ROAD AND 302	EA	1	\$9,000.00	\$9,000.00
TRAFFIC SIGNAL AT: BOODY'S CORNER	EA	1	\$13,000.00	\$13,000.00
TRAFFIC SIGNAL AT: SHAW'S PLAZA	EA	1	\$12,000.00	\$12,000.00
TRAFFIC SIGNAL AT: LANDING ROAD	EA	1	\$13,000.00	\$13,000.00
TRAFFIC SIGNAL AT: FRANKLIN DRIVE	EA	1	\$12,000.00	\$12,000.00
TRAFFIC & PEDESTRIAN SIGNALS SUBTOTAL				\$897,750.00
LIGHTING				
CONDUIT & WIRE	LF	13705	\$15.00	\$205,575.00
JUNCTION BOX	EA	26	\$420.00	\$10,920.00
DIR. BORE	EA	1407	\$45.00	\$63,318.75
POLE BASE	EA	209	\$560.00	\$117,040.00
POLES W/LUMINAIRES	EA	209	\$5,500.00	\$1,149,500.00
EL SERVICE & CONTROLS	EA	1	\$7,600.00	\$7,600.00
LIGHTING SUBTOTAL				\$1,553,953.75
LANDSCAPING				
TREES 3" CALIPER INSTALLED	EA	154	\$800.00	\$123,200.00
STREETSCAPE BENCH	EA	6	\$2,000.00	\$12,000.00
FENCE (HISTORIC CAST IRON)	LF	326	\$75.00	\$24,450.00
CURB TYPE 5 (for Tree Plantings)	LF	320	\$31.00	\$9,920.00
REM EXIST BIT PAVEMENT	SY	45	\$47.00	\$2,115.00
MEDIAN ISLAND GROUND PLANTINGS (INCLUDING SOIL PREPARATION)	SF	13000	\$11.00	\$143,000.00
LANDSCAPING SUBTOTAL				\$314,685.00

			SUBTOTAL	\$3,957,509.27
TRAFFIC CONTROL	10%			\$395,750.93
			SUBTOTAL 2	\$4,353,260.20
MOBILIZATION (% OF QUANTITY COSTS INCLUDING TRAFFIC CONTROL)	10%			\$435,326.02
			SUBTOTAL 3	\$4,788,586.22
CONTINGENCY (% OF ALL COSTS)	25%			\$1,197,146.55
			SUBTOTAL 4	\$5,985,732.77
FINAL DESIGN AND CONSTRUCTION ENGINEERING (% OF ALL COSTS)	15%			\$718,287.93
			SUBTOTAL 5	\$6,704,020.70
ROW SURVEY/RESEARCH				\$50,000.00
			SUBTOTAL 4	\$6,754,020.70
ROW NEGOTIATION / ACQUISITION	TBD			\$0.00
			SUBTOTAL 5	\$6,754,020.70
			Rounding	\$25,979.30
			GRAND TOTAL	\$6,780,000.00

<i>Bid Item Description</i>	<i>Unit</i>	<i>EST QTY</i>	<i>Unit Cost</i>	<i>TOTAL Cost</i>
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NOTE(S)

1. This project has been developed based on approximate Right of Way. Verification of existing ROW is necessary before final design can be done.
2. The Slope Stabilization line items are based on a anticipated MSE Wall treatment at each area.
3. Design and associated costs are expected to evolve based on further input from property owner meetings and public meetings.
4. Costs are influenced by aesthetic options for items such as the fence and light poles.
5. Estimate does not include ancillary construction costs associated with business/property owner relations (landscaping etc. adjacent to project)
6. See supplemental utility estimate for additional costs pertaining to the Under Ground Utilities Feasibility Study.
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.
9. Due to uncertainty of the scheduling cost have not been inflated to construction year dollars.
10. Costs have been developed assuming minimal replacement and/or resetting of existing granite curb.
11. Final design of this project should be coordinated with other roadway and utility projects in the area.

APPENDIX B

DRIVEWAY AND MICELLANEOUS CONFLICTS

**WINDHAM 21ST CENTURY PLAN - PRELIMINARY PLANS
DRIVEWAY AND MISCELLANEROUS IMPACTS**

SHEET #	STATION	PROPERTY	ISSUE	IMPACT			IMPACT MODIFIED TO REFLECT PROPERTY OWNER INPUT	COMMENT
				CLOSURE	NARROW	MEDIAN/OTHER		
3	33+00.00 LT	LUBE EXPRESS	STEEP SLOPE PUSHED OUT BY ADDED SIDEWALK			X		EMBANKMENT STABILIZATION AND/OR GRADING TO BE DETERMINED WITH FURTHER DESIGN
4	35+25.00 LT	KARGOS (PLAZA)	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE OPENING NARROWED TO 30'
4	36+80.00 RT	LIFETIME MUFFLER (PLAZA)	MULTIPLE EXISTING DRIVES	X			X	CLOSE DRIVE
4	38+10.00 RT	ATLANTIC FUEL INJECTION	MULTIPLE EXISTING DRIVES				X	PER OWNER INPUT DRIVES REMAIN OPEN TO ACCOMMODATE DELIVERIES
4	37+80.00 LT	ROSIE'S (PLAZA)	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	PER OWNER INPUT THIS DRIVE WILL REMAIN OPEN TO MAINTAIN EXISTING ACCESSABILITY. NEXT DRIVE WILL BE CLOSED INSTEAD. DRIVE WILL BE NARROWED TO ACCOMADATE SIDEWALK
4	38+50.00 LT	ROSIE'S (PLAZA)	MULTIPLE EXISTING DRIVES	X			X	PER OWNER INPUT THIS IS THE CHOOSEN DRIVE TO CLOSE
4	39+80.00 LT	CHILDREN'S ADVENTURE (PLAZA)	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE OPENING NARROW TO 32'
5	43+15.00 LT	FIRE DEPT.	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	DRIVE OPENING NARROWED TO 40'
5	43+50.00 RT	MEDICAL REIMBURSEMENT SERVICES	MULTIPLE EXISTING DRIVES	X			X	PER DISCUSSIONS WITH OWNER THIS DRIVE TO BE CLOSED
5	44+25.00 LT	FIRE DEPT.	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	PER DISCUSSIONS WITH FIRE DEPT. THIS DRIVE NARROWED TO 76'
5	44+00.00 RT	MEDICAL REIMBURSEMENT SERVICES	MULTIPLE EXISTING DRIVES			X	X	PER DISCUSSIONS WITH OWNER THIS DRIVE WIDENED TO OFFSET CLOSURE OF OTHER DRIVE
6	48+80.00 RT	725 ROOSEVELT	PARKING SPACE CONFLICTS WITH SIDEWALK			X		ELIMINATE PARKING SPACE TO ACCOMMODATE SIDEWALK
6	49+30.00 LT	REPUBLICASH	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE OPENING NARROWED TO 24'
6	49+50.00 RT	AMATO'S	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	DRIVE OPENING NARROWED TO 30'
6	50+25.00 RT	AMATO'S	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	DRIVE OPENING NARROWED TO 30'
6	50+80.00 LT	WINDHAM RENTAL	MULTIPLE EXISTING DRIVES	X			X	CLOSE CURB CUT. TO ADDRESS OWNERS CONCERNS THIS SHALL BE CONSTRUCTED WITH CURB TYPE 5 (MOUNTABLE CURB)
6	52+60.00 RT	WALGREENS (PLAZA)	UNRESTRICTED LEFT TURNS INTO THIS DRIVE IS RESULTING IN ACCIDENTS		X			DRIVE SLIGHTLY NARROWED TO ACCOMMODATE SIDEWALK
7	57+00.00 RT	CROSS INSURANCE	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
7	57+60.00 LT	IRVING	PLANTINGS CONFLICT WITH PROPOSED SIDEWALK		X			ALTER DRIVE / PLANTINGS TO ACCOMMODATE SIDEWALK

**WINDHAM 21ST CENTURY PLAN - PRELIMINARY PLANS
DRIVEWAY AND MISCELLANEROUS IMPACTS**

SHEET #	STATION	PROPERTY	ISSUE	IMPACT			IMPACT MODIFIED TO REFLECT PROPERTY OWNER INPUT	COMMENT
				CLOSURE	NARROW	MEDIAN/OTHER		
8	61+25.00 LT	TD BANK	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE TO BE NARROWED TO 24'
8	62+10.00 LT	MAINE PAWN	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE TO BE NARROWED TO 24'
8	66+50.00 LT	SHAW'S (PLAZA)	EXISTING SIGN CONFLICTS WITH PROPOSED SIDEWALK			X		MOVE SIGN BACK / ADD CROSSWALK ACROSS DRIVE OUTSIDE ROW
9	67+00.00 LT	BANK OF AMERICA	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
9	72+40.00 RT	EVERGREEN BANK	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
9	72+60.00 LT	786 ROOSEVELT TR	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
10	79+00.00 LT	MCDONALDS	SLIP LANE DRIVE CONFLICTS WITH PROPOSED SIDEWALK RESULTING IN HIGHER PROBABILITY FOR VEHICLE PEDESTRICAN CONFLICT			X	X	REALIGN DRIVEWAY // ACCESS LIMITED DUE TO ADDED MEDIAN
11	80+00.00 LT	DOLLAR TREE (PLAZA)				X		ACCESS LIMITED DUE TO ADDED MEDIAN
11	80+50.00 RT	CITGO	MULTIPLE EXISTING DRIVES & DRIVE OPENING WIDTH EXCEEDS STANDARDS		X	X		ACCESS LIMITED DUE TO ADDED MEDIAN // MULTIPLE DRIVES// NARROW DRIVE OPENING
11	81+50.00 LT	CUMBERLAND COUNTY CREDIT UNION				X		ACCESS LIMITED DUE TO ADDED MEDIAN // MULTIPLE DRIVES CLOSE AND/OR NARROW DRIVE (MAY BE TOUGH..DRIVE IS PART OF DRIVETHRU FLOW)
11	81+50.00 RT	CITGO	MULTIPLE EXISTING DRIVES & DRIVE OPENING WIDTH EXCEEDS STANDARDS		X	X		ACCESS LIMITED DUE TO ADDED MEDIAN // MULTIPLE DRIVES// NARROW DRIVE OPENING
11	83+50.00 LT	TANORAMA	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			DRIVE TO BE NARROWED TO 32'
12	91+75.00 LT	HOMESTEAD MORTGAGE				X		ACCESS LIMITED DUE TO ADDED MEDIAN
12	91+25.00 RT	PRATT ABBOTT	MULTIPLE EXISTING DRIVES	X			X	CLOSE ONE OF MULTIPLE EXISTING DRIVES
13	93+00.00 LT	PAT'S PIZZA				X		ACCESS LIMITED DUE TO ADDED MEDIAN
13	93+00.00 RT	PRATT ABBOTT	MULTIPLE EXSITING DRIVES			X		ACCESS LIMITED DUE TO ADDED MEDIAN
13	97+30.00 LT	RICHARDSON'S BOAT YARD	MULTIPLE EXISTING DRIVES	X			X	CLOSE CURB CUT. TO ADDRESS OWNERS CONCERNS THIS SHALL BE CONSTRUCTED WITH CURB TYPE 5 (MOUNTABLE CURB)
14	101+25.00 LT	STAR NAILS, ET. AL. (PLAZA)	MULTIPLE EXISTING DRIVES	X				CLOSE ONE OF MULTIPLE EXISTING DRIVES
14	103+00.00 LT	FOREST AVE. LLC	STEEP SLOPE PUSHED OUT BY ADDED SIDEWALK			X		EMBANKMENT STABILIZATION / RETAINING WALL
15	109+50.00 LT	888 ROOSEVELT TRAIL LLC.				X		ACCESS LIMITED DUE TO ADDED MEDIAN (UNDEVELOPED AREA TO THE WEST)
15	109+75.00 RT	REAL ESTATE				X	X	ACCESS LIMITED DUE TO ADDED MEDIAN (ISLAND NOT CONSTRUCTED UNTIL INTER PROPERTY ACCESS HAS BEEN NEGOTIATED)

**WINDHAM 21ST CENTURY PLAN - PRELIMINARY PLANS
DRIVEWAY AND MISCELLANEROUS IMPACTS**

SHEET #	STATION	PROPERTY	ISSUE	IMPACT			IMPACT MODIFIED TO REFLECT PROPERTY OWNER INPUT	COMMENT
				CLOSURE	NARROW	MEDIAN/OTHER		
15	112+00.00 RT	PORTLAND MATTRESS				X		ACCESS LIMITED DUE TO ADDED MEDIAN
20	404+25.00 RT	75 TANDBERG LLC	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
20	406+10.00 RT	79 TANDBERG TR	MULTIPLE EXISTING CURB CUTS/ DRIVES	X				CLOSE CURB CUT
20	408+20.00 RT	SCHOOL	MULTIPLE EXISTING CURB CUTS/ DRIVES	X				CLOSE CURB CUT
20	408+70.00 RT	85 TANDBERG TR (EDWARD FORTIER)	MULTIPLE EXISTING DRIVES	X				CLOSE DRIVE
21	412+00.00 RT	91 TANDBERG TR (THREE STONES LLC)	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X		X	DRIVE TO BE NARROWED TO 45'
21	413+00.00 RT	95 TANDBERG TR (CBP LLC)	DRIVE OPENING WIDTH EXCEEDS STANDARDS		X			ALREADY BE NARROWED AS PART OF SITE DEVELOPMENT

NOTES

- 1 DRIVE MODIFICATIONS DONE FOR THE PURPOSE OF REDUCING PEDESTRIAN / VEHICLE CONFLICTS AND ACCOMODATING PROPOSED SIDEWALK
- 2 CONSIDERATION HAS BEEN GIVEN TO EXISTING DRIVEWAY WIDTHS, CURRENT PROPERTY USE AND FUNCTIONALITY
- 3 MEDIAN ISLANDS ARE PROPOSED TO LIMIT LEFT TURN MOVEMENTS
- 4 SHEET # REFERENCES THE WINDHAM 21ST CENTURY PRELIMINARY PLANS

filename:

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APPENDIX C

PEDESTRIAN LIGHTING DETAILS



Charleston Aluminum Pole BC (Bishops Crook Crossarm) Hallbrook® W Bowl Glass



POLE ATTRIBUTES:

Description The lighting post shall be all aluminum, one-piece construction, with a classic tapered and fluted base design.

Materials The base and fluted tapered cast shaft shall be heavy wall, cast aluminum produced from certified ASTM 356.1 Ingot per ASTM B-179-95a or ASTM B26-95. The straight shaft shall be extruded from aluminum, ASTM 6061 alloy, heat treated to a T6 temper. The tapered shaft shall be extruded from aluminum ASTM 6063 alloy, spun to a tapered shape, then heat treated to a T6 temper. All hardware shall be tamper resistant stainless steel.

Construction The shaft shall be double welded to the base casting and shipped as one piece for maximum structural integrity. The shaft shall be welded inside the base casting at the top of the access door, and externally where the shaft exits the base. All welding shall be per ANSI/AWS.

Dimensions The post shall be X'-XX" in height with a 12" or 16" diameter base. At the top of the post, an integral tenon with a transitional donut shall be provided for luminaire mounting.

Installation The post has an option to have four L-Type hot dip galvanized anchor bolts shipped with it. A door shall be provided in the base for anchorage and wiring access. A grounding screw shall be provided inside the base opposite the door.

CROSSARM ATTRIBUTES:

DESCRIPTION The classic design of the Bishops Crook Style arm shall be tenon mounted, using a 1 1/2" NPT fitting for Luminaire mounting.

MATERIALS The Luminaire arm shall be 1-1/2" sch. 80 aluminum pipe (6061-T6 alloy). The mounting hub for the arm shall be 3" sch. 40 x 10" long, aluminum pipe (6061-T6 alloy). All hardware shall be stainless steel. The arm shall be heat-treated to a T6 condition after fabrication.

DIMENSIONS The single arms shall rise 54" and measure 30" from post center to Luminaire center, with a 1-1/2" NPT male fitting for Luminaire mounting. The twin arm shall rise 44" and span 66" from Luminaire center to Luminaire center. The bend in the arms shall have a radius of 15".

INSTALLATION The arm shall mount onto a 3" x 6" tall tenon and secured with six stainless steel set screws. **Requires P09 Tenon**

FIXTURE ATTRIBUTES:

The Hallbrook® Ext GlasWerks LED With Bowl Glass Series is a Euro styled luminaire of an LED prismatic glass optical assembly shielded by a decorative formed reflector and a top mounted cast aluminum electrical assembly with circumferential 1-1/12 inch reveal.

Optical Assembly: The optical assembly consists of a thermal resistant borosilicate glass lens mechanically held in a formed aluminum door frame. The door frame is attached to the spun cover with set screws. Light from the LED module is distributed by precisely molded optical interface to maximize utilization, uniformity and luminaire spacing. Multiple LED boards are available for symmetrical or asymmetric distribution and choice of wattage.

Electrical Housing Assembly: The cast aluminum electrical housing, has a smooth domed contour. A terminal block is provided with a quick disconnect receptacle. The housing is hinged with a tool-less latch to provide easy access to the gear assembly. The unitized assembly, containing the electronic driver and other electrical components, plugs into the quick disconnect receptacle. The pendant housing has an integral 1-1/2 inch NPT threaded entry with stainless steel set-screw. The arm mount version is provided with two U-bolts with washers and nuts and two leveling set screws that lock the housing to a 2 inch nominal (2-3/8" O.D.) horizontal arm and allow a +/-5 degree adjustment from horizontal to the cover.

Finish: The luminaire is finished with polyester powder to ensure maximum durability.

Listing: The luminaire is CSA listed as suitable for wet locations up to 40°C ambient temperature. IP66 optics. IP55 housing.

Base Fixture Provided With 2ft Prewired Leads

Configure Entire Pole Package Assembly For Pole and Arm Combinations

SPECIFICATIONS

FIXTURE

Hallbrook® Extended Cover Bowl GlasWerks LED

•[GELB 050 4K AS 2 B 4]

Prefix: GELB

Source and Wattage: 50W System

Color Temperature: 4000K

Voltage: Auto-Sensing Voltage (120-277)

Mounting: Pendant 1.5 NPT

Finish: Black

Optics: Asymmetric Teardrop Glass

ROAM: None

Photocontrol Receptacle: None

Dimming Driver: None

Leads: None

Photocontrols: None

Surge Protector: None

Leveling Fitter: None

Pipe: None

Fitter Finish: None

Luminaire EPA: 1.6

Luminaire Weight: 56

ARM / MOUNTING BRACKET

Bishop's Crook Crossarm; Oriented at 180 degrees.

•[1 BC 90R15F BK]

Fixture Quantity: One Fixture

Prefix: Bishops Crook Arm

Arms: Single Arm 90°

Finish: Black

Arm EPA: 1.04

Arm Weight: 25

POLE

Charleston Aluminum Pole

•[CHA 18 L5J 16 P09 ABG BK S204C S156C]

Prefix: Charleston, Aluminum Pole

Height: 18 feet (Actual Height: 18'-0")

Shaft Style: L5J SiteLink 5.25 inch Fluted, .25 wall

Base: 16 inch Round Base

Tenon: 3 X 6 Tenon

Pole Mounting: Anchor bolts, galvanized steel

Finish: Powder Coat Paint Finish, Black

Breakaway Kit: None

Breakaway Kit Finish: None

Base EPA: 4.26066666667

Base Weight: 50

Anchor Bolt: AB-31-4

ACCESSORY

Cast Aluminum Banner Arm; 1 T/B arm(s), height Mounted at 17'-0"

•[BA 24 L45 H 4 BK]

Banner Arm Type: Top and Bottom Arm

Orientation: 1 Top and Bottom Arm Only

Eyebolt on Post For Use With SAE Banner: None

Arm Length: 24 Inches

Mounting: Sitelink Single Banner Arm, Small Tracnut For SL4/5 Shafts

Finial: Half Sphere

Arm Diameter: 1" Diameter

Finish: Black

Banner Options: None

Scroll: None

EPA: 9.6

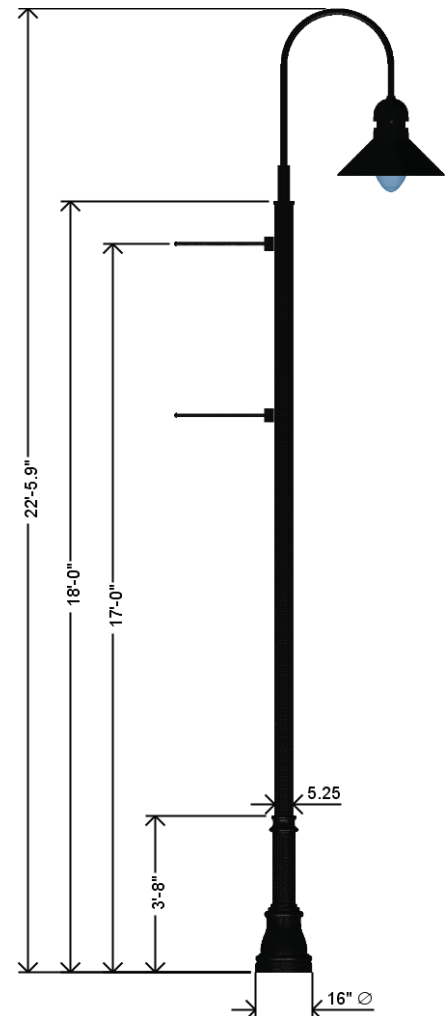
Weight: 5

Your Assembly Wind Load status: Pass

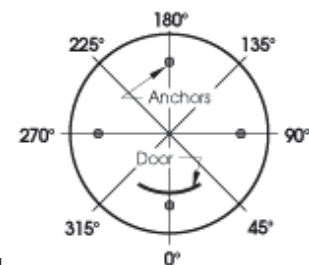
Passed for wind speed: 90 MPH

For further details, review the Structural Analysis Report.

Charleston Aluminum Pole BC (Bishops Crook Crossarm) Hallbrook® W Bowl Glass



Anchorage/Orientation Plan



Hand Hole is at 0 deg.

Customer Approval:

Job Name: Windham 21st Century Downtown

Client Name:

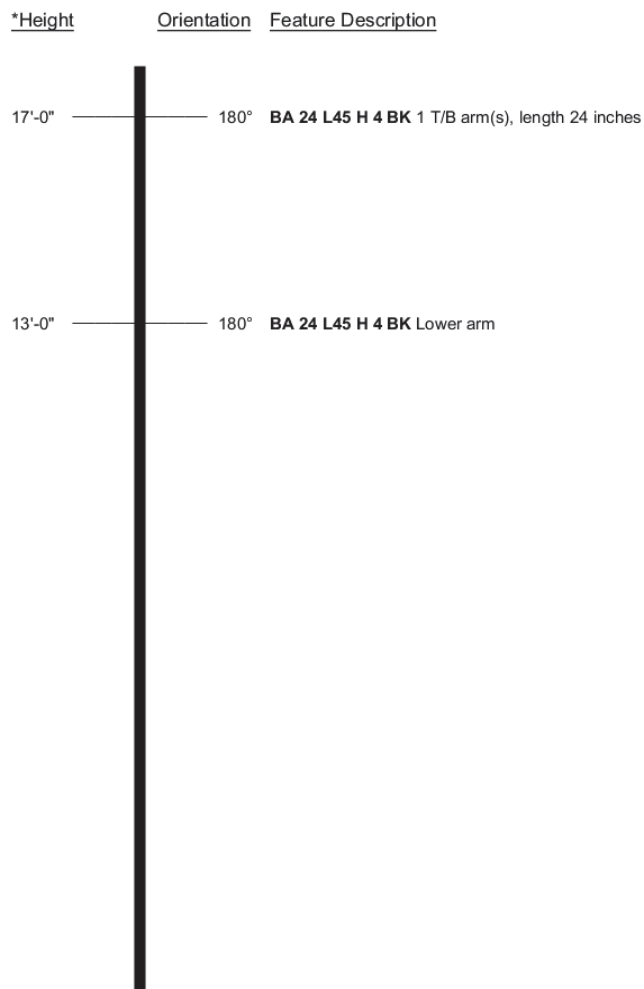
signature

date

Created By: Jim Bailey

Date: 17-May-16

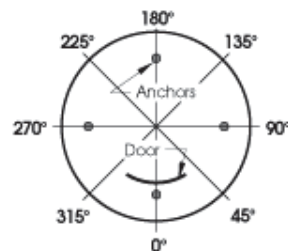
ORIENTATION DRAWING



The hand hole is located at zero (0) degrees.
Height from bottom of base / anchor plate.

Post	Height
CHA 18 L5J 16 P09 ABG BK S204C S156C	18'-0"

Anchorage/Orientation Plan



Customer Approval:

Job Name: Windham 21st Century Downtown

Client Name: _____

signature

date

Created By: Jim Bailey

Date: 17-May-16