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MEMORANDUM

To:	Mr. Matthew J. Hayes, P.E., Senior Engineer
Cc:	Eric V. Johnson, P.E., City Engineer
From:	Herman Peralta, P.E.; Green International Affiliates, Inc. (Green)
Date:	June 17, 2024
Project Name:	Saxonville Intersection Improvements Project
Project Number:	Green Project No. 20034
Subject:	Saxonville Intersection Improvements Project – Revised 85% Design Basis Memorandum

Under Green's Scope of Services, dated October 25, 2023, Green International Affiliates, Inc. (Green) was retained by the City to provide design phase engineering services for the Saxonville Intersection Improvements Project. The project involves corridor improvements along Central Street between Water Street and Concord Street, and Concord Street between Stones Court and the Sudbury River Bridge to the south for a project length of approximately 1500 feet.

The 35% Design was based on the Revised Conceptual Design submitted to the City on July 10, 2017 and feedback from abutters, local civic groups and the City. A public information hearing was held on May 31, 2018 and a second meeting with local business owners was held on February 25, 2019.

The 85% Design was based on the 35% Design submitted to the City and the design review comments received from the City on October 30, 2021. A public information meeting was held on November 12, 2020.

The revised 85% Design is based on the original 85% Design and includes additional revisions made based on comments from the City that were explained during a meeting held on August 29, 2023. These revisions included proposing a new signal at the Watson Place intersection, eliminating the RRFBs at the Watson Street intersection location, eliminating the proposed bump-outs, eliminating the proposed on-street parking, removing the cross sections that are not critical and adding grading plans to the plan set, adding bike lanes, and reducing the size of the parking lot at 1629 Concord Street to provide additional public green space.

The following design references have been used in preparing the plans:

<u>City of Framingham</u>

- Department of Public Works Construction Standards, Revised June 2021
- Department of Public Works Capital Improvement Program Guide, April, 2018
- City of Framingham Zoning By-laws

<u>State</u>

- MassDOT 2006 Project Development & Design Guide (PDDG)
- MassDOT Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code
- MassDOT 2017 Construction Standard Details

- MassDOT Notes on Walks and Wheelchair Ramps for Designers and Construction Engineers (3/2012)
- MassDOT 1990 Standard Drawings for Signs and Supports
- MassDOT 1968 Standard Drawings for Traffic Signals and Highway Lighting
- MassDOT Standard Details and Drawings for the Development of Temporary Traffic Control Plans
- Massachusetts Architectural Access Board

National Standards

- 2018 AASHTO A Policy on Geometric Design of Highways and Streets
- 2011 AASHTO Roadside Design Guide
- 2010 Highway Capacity Manual
- 2009 Manual On Uniform Traffic Control Devices
- ADA Accessibility Guidelines for Buildings and Facilitates (ADAAG)
- Public Rights of Way Accessibility Guidelines (PROWAG)
- American Standard for Nursery Stock
- Traffic Engineering Handbook
- The Federal Highway Administration (FHWA), Hydraulic Engineering Circular No. 22 (HEC-22) Second Edition, Urban Design Manual

Roadway Design

The proposed roadway design involves the full-depth reconstruction of the roadway corridor along Concord Street from Victoria Garden to Central Street, about 100 feet of Central Street west of Concord Street, and about 100 feet of Elm Street north of Central Street. The section of Central Street from the limit of full depth reconstruction to Water Street will be milled and resurfaced as will about 100 feet of Concord Street south of Victoria Garden. The proposed work will also consist of the removal and reconstruction of the curbs, sidewalks, driveways, and wheelchair ramps. The proposed roadway cross section of Concord Street, from Victoria Garden to Mechanic Street, consists of two 11-foot travel lanes with 5-foot bike lanes on both sides. The fifteen on-street parking spaces that were previously proposed have been removed to accommodate bike lanes in both directions. The cross section from Mechanic Street to Central Street consists of one 11-foot travel lane, one 11-foot turning lane, and a 2-foot shoulder on the northbound side and one 12-foot travel lane with a 4-foot shoulder on the southbound side. The bike lanes end at Mechanic Street and sharrows are used from Mechanic Street to the end of the project on Concord Street. The proposed roadway cross section of Central Street consists of two 11-foot turning lanes with a 1-foot shoulder on the eastbound side and one 11-foot travel lane, one 11-foot turning lane and a 1-foot shoulder on the westbound side. The cross section of Elm Street consists of one 13-foot travel lane with an 8-foot shoulder northbound and one 11-foot travel lane, one 11-foot turning lane and a 1-foot shoulder on the southbound side. Work on the sidestreets is minimal and consists mainly of blending the proposed work on Central and Concord Streets into the existing conditions. Sidewalks have a minimum width of 5-feet and generally follow the back of the existing sidewalk. The two- tiered sidewalk at the northwest corner of the Central Street/Concord Street/Water Street intersection will be eliminated.

Alignments and profiles have been developed for Concord Street and Central Street. The Concord Street crown line will remain in approximately its current location. Central Street will be superelevated to match the existing condition due to the north side being higher than the south side and restrictions of matching existing entrances on both sides of the right-of-way. The proposed pavement structure is based on the City's

standard detail R-5.1.0. The top course will be 3" and placed in two lifts of 12.5 mm Superpave Surface Course, the 5" intermediate course will be paved with two lifts of 19.0 mm Superpave Intermediate Course, and the subbase will be 12" of gravel borrow. The material types are based on MassDOT's 2020 Standard Specifications for Highways and Bridges.

Sidewalks, driveways and wheelchair ramps are in accordance with the City details and PROWAG. A brick accent strip is proposed and will be similar to the strip constructed at the Concord Street/School Street Intersection. The reveal of the granite curb is mainly 7-inches but there are a few locations where the reveal is less due to constraints at the back of sidewalk. The curb height in front of Casa Del Taco is 4 inches and 6 inches to match the sidewalk to the entrances. The curb height is lower between the wheelchair ramps and driveways on both sides of Concord Street at a few locations throughout the project to avoid reducing the driveway opening widths or avoid ramps that are not ADA compliant. The curb reveal in front of #2 and #11 Central Street is 5 inches to match the stairs. The curb reveal varies in front of #4 Elm Street to match the existing stairs. The existing guardrail on the southerly corner of the Concord Street/Central Street intersection will remain in place as it is outside the City's right-of-way. The guardrail is not needed based on the clear zone guidelines in AASHTO's Roadside Design Guide Table 3-1.

Design Vehicle

The proposed geometry at the southwest corner of Central and Concord Street can safely accommodate the WB-67 vehicle.

Drainage Design

Green assembled and analyzed the available and pertinent data for the design of drainage improvements within the project area. The goal of the drainage study is to maintain existing system functionality and provide upgrades where necessary to accommodate the new roadway geometry, minimize flooding, and also to maintain a catch basin spacing of approximately 300 feet.

Existing Conditions

The paved roadway surfaces within the project limits are curbed. Stormwater runoff from the crowned roadway flows along the curb and gutter and into a catch basin. Runoff from the front of parking lots adjacent to the road sheet flows towards the road. The stormwater collected by catch basins is conveyed by drain pipes to the different outlet points. There are two (2) drainage systems within project limits.

The Concord Street drainage system (system #1A) discharges to the Sudbury River via 36" RCP pipe located at Sudbury River Bridge. The drainage system from Elm Street (system #1B) flows into the 15" drain pipe on Mechanic Street which flows into a closed drainage system following the Sudbury River. The system eventually connects with system 1A and flows to a pumping station. The Central Street drainage system (System #2) flows into the 12" RCP pipe on the south side of the street which discharges into the Sudbury Pond.
The streets intersecting with Concord Street have their own drainage systems and are not connected to the three systems that service the project area.

DRAINAGE SYSTEM #1

Drainage System #1A consists of roadway drainage components along Concord Street from Mechanic Street to the Sudbury River Bridge. There is an existing low point at Station 1+50. Drain pipes carry

stormwater collected by catch basins to a 36" RCP pipe which connects to an existing drainage system carrying flow to a pumping station.

Drainage System #1B collects stormwater from the high point at Station 103+05 on Central Street to Mechanic Street, and from Elm Street. Drain pipes carry the stormwater collected by catch basins to the existing 15" RCP Pipe on Mechanic Street which ultimately discharges into the Sudbury River. The flow is conveyed with a closed drainage system to combine with system 1A and flow to the pumping station before discharging into the Sudbury River. There are two existing connections to this system from offsite parking lots adjacent to Concord Street. They are, an existing catch basin (Station 12+70 RT) and a pipe overflow (Station 10+82 RT).

DRAINAGE SYSTEM #2

Drainage System #2 is a closed drainage system that collects stormwater from the high point at Station 103+05 on Central street, to Water Street. Drain pipes carry the stormwater collected by catch basins to the existing 12" RCP Pipe that discharges into the existing closed system which runs along the south side of the Central Street.

There is a connection from a drain manhole that comes from Liberty Square Condominium (#7 Central Street). A new manhole and 12" RCP pipe have been proposed to convey water to EX. DMH (STA. 101+75 L).

Proposed Improvements

The trunk lines in Drainage System #1A within the limits of full depth pavement reconstruction will be replaced under this project. The trunk lines in Drainage System #1B will be replaced except for the lines on Elm Street that extend beyond the project limits. The trunk lines in Drainage System #2 will be retained except for the drain pipe between the manhole near the northeast corner of Water, Central Streets and the driveway at House #7 which will be replaced. The proposed improvements to these drainage systems include the installation of new single grate catch basins, drain manholes and gutter inlets with deep sump manholes. Our drainage analysis is discussed below.

Roadway Drainage Analysis

Inlet Analysis

The first part of the analysis evaluates drainage of the roadway surface using the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 22 (HEC-22) and verifies that existing catch basins are at the proper locations and that the gutterline spreads are not excessive. Hydraflow Storm Sewers Extension for AutoCAD Civil 3D 2018™ Version 18.3 was used to perform the spread analysis.

Under proposed conditions where the shoulder is two (2) feet, the maximum allowable spread is six (6) feet. Under proposed conditions where the shoulder is five (5) feet, the maximum allowable spread is eight (8) feet. Additional single/double grate catch basins, gutter inlets are proposed which will keep spreads within allowable limits. At three (3) locations, CBCI (1-1), CB 6+69 LT and CB 5+62 LT where analysis show the spread that exceeds 6 feet but less than maximum allowable spread that is eight (8) feet. There is one (1) catch basin (CBCI 1-11) where the analysis showed spread is more than the allowable six (6) feet. The spread is 6.61 feet. Using a DGCB did not alter the results.

The Inlet Analysis output report showing the calculated spreads at all catch basins is included in Appendix A. Locations where the spread is above the maximum preferred are circled.

Hydraulic Grade Line Analysis

The second part of the analysis is the Hydraulic Grade Line (HGL) check of the trunk lines to evaluate the design capacity and velocities in the existing pipes. Hydraflow Storm Sewers Extension for AutoCAD Civil 3D 2018™ Version 18.3 was used for the HGL analysis. Friction loss in pipes was calculated using Manning's equation.

The HGL analysis determined the water surface elevation at each structure by calculating the friction loss through the downstream length of pipe and adding it to the water surface elevation in the downstream structure. In addition, head losses through the upstream structure were accounted for, such as expansion and contraction of flow through the structure and changes in pipe direction (i.e. bend losses). All the head losses were summed together to determine the total head required at the upstream structure to convey the design flow through the system.

For the existing trunk line hydraulic analysis in the project area, the peak runoff contributing to each inlet structure was computed using the Rational Method per MassDOT PDDG. The HGL should not rise to within 0.75 foot of the cover or top of any inlet for the design discharge for 10 years storm event.

Under proposed conditions, in system #1A, there are locations where the HGL does not meet requirements. During 35% it was recommended to upsize the pipes in System #1A, however, City indicated that there are no flooding issues at those locations. Therefore, per City's request, the pipes in System #1A are not upsized and only proposed to be replace in kind based on CCTV reports.

The Hydraulic Grade Analysis output report is appended to this memorandum to show the calculated HGL. Refer to Appendix B. Locations where the HGL is does not meet the requirement are circled.

Conclusion

The proposed drainage system improvements (as part of the 85% Plan Submission) will meet requirements of the MassDOT PDDG, except for the area where the spread exceeds 6 feet by less than a foot and where the HGL does not meet requirements. Based on CCTV reports several existing drain pipes are being replaced in kind within project limits.

Traffic Signal Design

The proposed traffic signal design includes reconstruction of three outdated traffic signals within the project limits (Central Street at Water Street, Central Street at Concord Street/Elm Street, and Concord Street at Watson Place). The two intersections of Central Street at Water Street and Central Street at Concord Street/Elm Street will operate as one signal system controlled by a single traffic signal controller as determined during the 35% Design. The City's preferred Siemens m60 (Model: 8132-1900-018) controller is specified under the 85% Design.

The third intersection of Concord Street at Watson Place will operate as its own individual signal system; however, it will be coordinated with the two intersections of Central Street at Water Street and Central Street at Concord Street/Elm Street. The existing signal equipment will be replaced with ornamental

equipment to be painted black and the existing traffic signal control equipment will be replaced with new equipment. The design includes one 45-foot mast arm, 4 traffic signal posts, pedestrian signal equipment, vehicle and bicycle detection, and emergency pre-emption equipment. Pavement markings include crosswalks across Watson Place and Central Street and stop bars and lane markings along each approach.

As noted above, the current signal operations were modified from 85% Design at all study intersections to include coordination for the new signal design at Central Street at Watson Place. Traffic turning movement counts were collected at the intersection of Central Street at Watson on March 7th, 2024. A seasonal factor of 1.01 was applied to the count data to account for average annual traffic volumes. Based upon review of local count stations, an annual growth rate of 1.5% per year for 10 years was used to forecast future 2034 roadway volumes at the study intersection.

In order to coordinate the entire study network, the previously analyzed intersection of Concord Street/Elm Street and Central Street/Water Street volumes were projected to future design year of 2034. To reflect the new operations, the signal phasing sequence and timings were adjusted to optimize traffic signal operations and traffic flow through the signalized system. An updated Level of Service (LOS) analyses were completed for the proposed study intersections. The results of the LOS analysis for the 35% Design, the initial 85% Design, and the Revised 85% Design are shown in Table 1 and 2 below for the morning and afternoon peak hours, respectively. The LOS analyses reports are included in Appendix C.

Table 1 – Summary of Level of Service Analysis – Morning Peak Hour

	2027 35% Design					2027 85% Design					2034 Revised 85% Design				
	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)
Central Street / Water Street															
Central St EB L	25.5	C	0.26	28	74	30.9	C	0.16	42	118	41.7	D	0.25	60	135
Central St EB TR	36	D	0.68	123	299	33.6	C	0.41	185	402	48.9	D	0.59	270	537
Central St WB LT	21	C	0.26	101	121	29.2	C	0.16	106	136	41.2	D	0.23	128	116
Central St WB R	1.4	A	0.18	0	65	1.6	A	0.32	0	0	1.2	A	0.18	1	0
Framed in Time NB LTR	34	C	0.01	0	5	70	E	0.02	1	8	67	E	0.01	1	8
Water St SB TL	28.7	C	0.75	203	627	53.9	D	0.86	503	795	46.1	D	0.85	606	1045
Intersection Total	*23.3*	*C*				*34.6*	*C*				*38.9*	*D*			
Central Street / Elm Street / Concord Street															
Central St EB LT	78.6	E	0.82	174	283	170.5	F	1.2	205	338	301.7	F	1.53	289	393
Central St EB R	127.1	F	1.2	655	859	98	F	1.14	699	476	237.3	F	1.45	1116	1275
Niko's Pizzeria WB LTR	59.2	E	0.03	4	15	57.5	E	0.02	3	16	61.2	E	0.03	5	21
Concord St NB L	116.5	F	1.04	388	580	107.6	F	1	312	552	291.9	F	1.51	473	687
Concord St NB TR	16.5	B	0.4	216	290	15	B	0.51	120	210	22.3	C	0.66	146	252
Elm St SB LT	109.3	F	1.1	775	1004	219	F	1.37	845	1161	303.2	F	1.57	1086	1319
Elm St SB R	0.4	A	0.15	0	0	0.5	A	0.17	0	0	0.6	A	0.16	0	0
Saxonville Mills NEB LTR	1.4	A	0.19	0	0	0.4	A	0.11	0	0	71.2	E	0.07	5	20
Intersection Total	*91.7*	*F*				*116.8*	*F*				*221.4*	*F*			
Concord Street at Watson Place															
Watson St EB L	-	-	-	-	-	-	-	-	-	-	43.2	D	0.34	13	51
Concord ST NB T	-	-	-	-	-	-	-	-	-	-	3.5	A	0.54	150	248
Concord St SB T	-	-	-	-	-	-	-	-	-	-	2.8	A	0.59	15	0
Intersection Total	-	-	-	-	-	-	-	-	-	-	*3.9*	*A*			

Table 2 – Summary of Level of Service Analysis – Evening Peak Hour

	2027 35% Design					2027 85% Design					2034 Revised 85% Design				
	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)	Delay (S)	LOS	V/C	50th Q (FT)	95th Q (FT)
Central Street / Water Street															
Central St EB L	37.6	D	0.5	35	100	143.7	F	0.98	82	177	29.6	C	0.23	51	253
Central St EB TR	29.1	C	0.44	69	135	56.3	E	0.51	147	219	27.2	C	0.22	100	235
Central St WB LT	35.1	D	0.67	207	210	35.2	D	0.78	184	178	17.6	B	0.33	176	111
Central St WB R	8	A	0.47	69	31	9.4	A	0.59	45	0	19.7	B	0.52	204	0
Framed in Time NB LTR	0	A	0.01	0	0	0	A	0.01	0	0	0	A	0.01	0	0
Water St SB L	18.5	B	0.45	94	384	52.1	D	0.74	340	455	89.3	F	0.83	403	558
Water St SB TR	0.1	A	0.05	0	0	0.1	A	0.06	0	0	0.1	A	0.07	0	0
Intersection Total	*18.3*	*B*				*35.6*	*D*				*37*	*D*			
Central Street / Elm Street / Concord Street															
Central St EB LT	61.8	E	0.47	92	174	301.3	F	1.46	135	275	335.5	F	1.56	156	237
Central St EB R	12.7	B	0.56	136	266	17.8	B	0.59	311	403	71.4	E	0.74	363	626
Niko's Pizzeria WB LTR	51.4	D	0.06	4	18	57.4	E	0.07	4	20	58.6	E	0.07	4	20
Concord St NB L	202	F	1.34	1060	1286	178.4	F	1.29	932	1265	398	F	1.79	1285	1525
Concord St NB TR	18.9	B	0.55	332	430	14.8	B	0.62	188	320	28.3	C	0.82	269	380
Elm St SB LT	192.8	F	1.28	584	795	285.4	F	1.51	598	867	375	F	1.72	768	985
Elm St SB R	4.8	A	0.35	0	36	1.7	A	0.34	0	0	1.8	A	0.35	0	0
Saxonville Mills NEB LTR	1.2	A	0.14	0	0	0.3	A	0.08	0	0	0	A	0.01	0	0
Intersection Total	*103.3*	*F*				*121.5*	*F*				*218.6*	*F*			
Concord Street at Watson Place															
Watson St EB L	-	-	-	-	-	-	-	-	-	-	47.7	D	0.27	12	44
Concord St NB T	-	-	-	-	-	-	-	-	-	-	5.8	A	0.72	319	539
Concord St SB T	-	-	-	-	-	-	-	-	-	-	1.9	A	0.48	28	28
Intersection Total	-	-	-	-	-	-	-	-	-	-	*4.7*	*A*			

The intersection capacity analyses indicated the following:

- Traffic signal operations at the Concord Street at Watson Place intersection are anticipated to operate with high LOS of A and minimal delays during both the morning and afternoon peak hours.
- Traffic signal operations at the Central Street at Water Street are expected to decrease slightly for both morning and afternoon peak hours between the 85% Design and the Revised 85% Design as a result of adjusting signal timings to coordinate with the new proposed signal at Concord Street at Watson Place.
- Traffic signal operations at the Central Street/Elm Street/Concord Street intersection is expected to remain at LOS F under the Revised 85% Design during both weekday morning and afternoon peak hours relative to the 85% Design with moderate increases to vehicle delays.

As demonstrated by Table 1, the LOS of the signalized intersections decrease slightly as a result of adjusting signal timings to provide coordination between the proposed signal at Central Street/Elm Street/Concord Street and Central Street/Water Street with the newly proposed signal at Concord Street/Watson Place. Impacts are mostly experienced at the Central Street/Water Street intersection where the approaches experience longer red intervals than under previous design operations. However, it is noted that the Revised 85% Design is using a design year of 2034, seven years more than the design year for the analysis of the 35% and 85% Design.

Pedestrian Crossings/Bumpouts

The bump-outs that were previously proposed have been removed to accommodate bike lanes in both directions along Concord Street.

Utilities

Conduit and manholes for future installation of fiber optic cable are included in the project.

There are three utility poles that are required to be relocated to accommodate the proposed work and the clear path at all poles will be ADA compliant. There is one location where the utility pole will be located further from the curb due to the reduction in roadway width. The pole at Mechanic Street will be relocated closer to the revised curb line to provide a wider clear path for sidewalk users and the utility pole on the northwest corner of Concord/Central Streets will be relocated out of the proposed wheelchair ramp. This pole needed to be replaced with the elimination of the tiered sidewalk. The utility pole on the southwest corner of the Concord/Central Streets intersection will be located closer to the back of sidewalk to align with the relocated pole on Elm Street. The relocation of the utility poles was discussed and coordinated with Verizon and Eversource at the site utility meeting held on July 16, 2021.

The closed drainage system has been designed to avoid subsurface utility conflicts. We conducted subsurface utility explorations (vacuum excavations) prior to the 85% Design to confirm the locations of existing utilities.

Street Lights

A proposed lighting layout was performed. Lighting was added at the crosswalk locations and previous locations were adjusted to assure compliance with current ANSI/IES RP-8-22 ‘Recommended Practice Guidelines for Roadway Lighting’. Special attention was given to roadway crossing areas to assure higher lighting levels along both the horizontal (roadway surface) and vertical planes (visibility of pedestrians in

crosswalk). A total of 39 lights are proposed along Concord Street on both sides of the street. There are 15 lights at the Concord/Central/Elm Streets intersection that have 2 luminaires. The remaining 24 lights have single luminaires and are located along Concord Street. The 10 luminaires proposed on Central Street will only be on both the north and south side of the street, due to the roadway width. The lighting design proposes a max/min of less than 10 fc illuminance to match the previous lighting design at the intersection of Central Street at School Street. The new lights will be controlled by a lighting control cabinet located in the grass area between the back of sidewalk and the Danforth Street Parking lot.

Due to the size of the proposed lighting pole bases and the narrow width of the sidewalk we encountered ADA access issues in several areas on the west side of Concord Street. To mitigate the issue, we adjusted the width of the sidewalk around the area of the poles to assure all sidewalks remained ADA compliant.

City Parking Lot (Danforth Street)

The City parking lot includes the full-depth reconstruction of the parking lot, restriping the parking spaces and a paid parking kiosk. The kiosk will be installed adjacent to a new walkway that will provide access to the parking lot from Concord Street. The existing parking lot had 23 parking spaces and the new parking lot will provide a total of 15 public parking spaces. This reduction of spaces along Concord Street allows for the additional green space to construct a park. This also reduced the total impervious area throughout the project. The design of the parking space stalls follows the City's zoning by-laws. However, the width of the aisle is 24 feet which follows the Traffic Handbook Guidelines. The City's zoning by-laws (Section IV) require the aisle to be 28 feet wide for two-way traffic which cannot be obtained within the existing parcel. The narrower aisle width needs to be approved by the City. We assume that a temporary easement will not be required for the parking lot as the Framingham Redevelopment Authority owns the parcel.

Commercial Driveways

The driveway opening at Extra Space Storage has been reduced to 30-feet wide, providing better control for access/egress. The driveways to the mill building opposite Water Street will remain and one opening is incorporated into the traffic signal system at the intersection.

Right-of-Way

In order to minimize right-of-way (ROW) impacts, the geometric layout/roadway alignment has remained largely unchanged. The width of the roadway pavement on Concord Street has been reduced to provide a more uniform width and to provide wider sidewalks. Along much of the project length, temporary easements will be needed to construct the proposed improvements. Permanent easements will be required to construct the sidewalk opposite Danforth Street. The existing sidewalk is outside the existing right-of-way at this location. Additional easement may be needed to accommodate design changes at the 100% stage. Due to the elimination of the two-tier sidewalk at the corner of Elm and Central Street the stairs on the 4 Elm Street property that are facing Central Street will need to be extended. The stairs from this private property will now be partially within the City ROW.

Traffic Management Plans/Detours

Concord Street and Central Street are heavily travelled roadways in the City of Framingham. It is anticipated the Contractor will need to reduce traffic to one lane to complete the work in a timely and cost-effective manner. To minimize impacts to traffic, two one-directional detours are anticipated. These two detour routes were evaluated and completed to facilitate the proposed full-depth construction. We have evaluated

two potential detour routes (one southbound and one northbound) for a half-roadway closure. The two potential detour routes and their proposed signage can be seen on Sheet 47 of the 85% Design Plans. The detour is only proposed for work during the day. Normal traffic operations will be restored during non-work hours.

The total length of the southbound detour route is approximately 2.35 miles and passes through two signalized intersections. At the beginning of this detour route, southbound vehicles traveling along Elm Street will be directed to turn right onto Central Street at the signalized intersection. Vehicles will continue southbound/westbound on Central Street until they are directed to turn left onto Fenwick Street. At the end of Fenwick Street vehicles will be directed to turn left onto Summer Street at the recently reconstructed unsignalized intersection. Once on Summer Street, vehicles will continue to travel eastbound until the end of the detour route at the Summer Street/Concord Street intersection. This detour route does not impact emergency vehicles exiting for a call from Framingham Fire Station 2. We anticipate a police detail will be needed during the peak periods at three key intersections along the southbound detour route.

The total length of the northbound detour route is approximately 3.25 miles and passes through two signalized intersections. At the beginning of this detour route, northbound vehicles traveling along Concord Street will be directed to turn right onto School Street at the signalized intersection. Vehicles will continue eastbound on School Street (Route 126) until they are directed to turn left onto Old Connecticut Path (Route 126) at the unsignalized intersection. Once on Old Connecticut Path (Route 126), vehicles will travel northbound until they are directed to turn left onto Stonebridge Road. They will travel westbound on Stonebridge Road/Potter Road until the end of the detour route at the Potter Road/Elm Street signalized intersection. This detour route will require a detour for emergency vehicles exiting for a call from Framingham Fire Station 2 going northbound. In addition, we anticipate a police detail will be needed during the peak periods at four key intersections along the northbound detour route.

Typical temporary traffic management setup details are provided on Sheets 45 and 46 of the 85% Design Plans. These typical setup details will suffice to accommodate work that does not require a detour. Site-specific plans for up to four (4) construction stages are also anticipated for the proposed work on Central Street and will be included in the 85% Design Plans. The traffic management plans will comply with City of Framingham standards and will include requirements for the contractor to maintain access to all abutters. We assume staging will not be required for the Danforth Street parking lot construction.

Landscaping

Landscaping has been added at several locations:

1. The east side of Concord Street at Danforth Street along the front of the City's parking lot
2. The southwest corner of the Concord/Central Streets intersection

The James J. McGrath Memorial sign is relocated to the landscape area at Danforth Street. A memorial stone has been added at the request of the City.

Permits

A Request for Determination of Applicability (RDA) to the Framingham Conservation Commission was prepared and submitted. A negative determination was received.

Hazardous Materials

Some asbestos cement sewer pipe has been identified within the project limits from record information provided by the City. The proposed drainage work is limited to adding catch basins connected to existing drain manholes or new drain manholes constructed on the existing drain trunk line. The proposed drainage work should not expose the AC pipe. Items have been included in the estimate should hazardous material be encountered. Specifications are included with this submission.

Cost Estimate

We have prepared a preliminary itemized cost estimate for all anticipated items. The pay items utilize the MassDOT Standard Nomenclature for pay items and Standard Specifications for measuring and payment. The unit prices are based on MassDOT's weighted average unit bid prices. A contingency of 10% has been added to the estimated cost which is commensurate with this design stage.

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