The City of WORCESTER

Administration & Finance – Purchasing Division
Christopher J. Gagliastro, MCPPO – Purchasing Director
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October 2, 2025

To All Bidders:

Subject: **Bid #: 8501-W6, Complete Streets Improvements – Endicott – Bigelow / DPW - CDBG**

ADDENDUM NO. 9

To Whom It May Concern:

With reference to our bid request relative to the above subject, please refer to the changes/modifications/clarifications to the original request.

- **PLEASE FIND ATTACHED GENERAL BID CLARIFICATIONS INCLUDING UPDATED BID ITEM SHEETS, ADDITIONAL SPECIFICATION SECTIONS AND REVISED PLANS**

Bidders are requested to acknowledge and/or include this addendum with submission. All other terms, conditions and specifications remain unchanged.

Very truly yours

Christopher J. Gagliastro
Purchasing Director

Green Island Phase II Addendum No. 9

ADDITIONAL SPECIFICATIONS:

Supplement to specifications: MEASUREMENT AND PAYMENT
MassDOT- SPEC R1- HAZARDOUS MATERIALS
MassDOT-SECTION 722 CONSTRUCTION SCHEDULING
MassDOT-SECTION 748 MOBILIZATION (2024 EDITION)
32 14 00 PRECAST CONCRETE PAVERS
33 44 19.13 STORMWATER TREATMENT SYSTEM
33 46 23 MODULAR STORMWATER STORAGE UNITS

UPDATED PLANS:

Sheet L110 Overall Preparation Plan
Sheet L111 Site Preparation Enlargement Plan
Sheet L112 Site Preparation Enlargement Plan
Sheet L113 Site Preparation Enlargement Plan
Sheet L114 Site Preparation Enlargement Plan
Sheet L115 Site Preparation Enlargement Plan
Sheet L116 Site Preparation Enlargement Plan
Sheet L117 Site Preparation Enlargement Plan
Sheet 123 Materials Enlargement Plan
Sheet 124 Materials Enlargement Plan
Sheet L125 Materials Enlargement Plan
Sheet L126 Materials Enlargement Plan
Sheet L127 Materials Enlargement Plan
Sheet 145 Grading and Drainage Enlargement Plan
Sheet L146 Grading and Drainage Enlargement Plan
Sheet L147 Grading and Drainage Enlargement Plan
Sheet L501 Construction Details
Sheet C100 Signage and Marking General Notes
Sheet C101 Signage and Pavement Marking Plan 1
Sheet C103 Signage and Pavement Marking Plan 3
Sheet C104 Signage and Pavement Marking Plan 4
Sheet C105 Signage and Pavement Marking Plan 5
Sheet C106 Signage and Pavement Marking Plan 6
Sheet C106 Signage and Pavement Marking Plan 7

		Item Qty	
104.00	TREE REMOVAL (LESS THAN 24 INCHES) INCLUDING STUMP	4.00	EA
107.00	STREET TREE REPLACEMENT	28.00	EA
110.00	PINE BARK MULCH	30.00	CY
112.20	TEST PITS	2.00	EA
113.00	TREE PROTECTION	1.00	EA
122.00	EARTH EXCAVATION BELOW NORMAL GRADE	5,165.00	CY
127.00	DENSE GRADED CRUSHED STONE	1,009.00	CY
130.00	CRUSHED STONE 3/4 INCH	171.00	CY
154.00	TOPSOIL EXCAVATED AND STACKED	32.00	CY
160.00	CLEANING UP	1.00	LS
171.00	INSTALLATION AND MAINTENANCE OF EROSION CONTROLS	742.00	LF
180.01	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM	1.00	LS
180.02	PERSONAL PROTECTION LEVEL C UPGRADE	100.00	HR
180.03	LICENSED SITE PROFESSIONAL SERVICES	100.00	HR
181.11	DISPOSAL OF UNREGULATED SOIL	2,000.00	TN
181.12	DISPOSAL OF UNREGULATED SOIL - IN-STATE FACILITY	2,000.00	TN
181.13	DISPOSAL OF UNREGULATED SOIL - OUT-OF-STATE FACILITY	1,792.00	TN
181.14	DISPOSAL OF HAZARDOUS WASTE	50.00	TN
210.12	Clean and CCTV 12" Pipe	275.00	LF
220.06	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 6" PVC	229.00	LF
220.08	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 8" PVC	101.00	LF
222.12	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 12" RCP	584.00	LF
230.60	6' MANHOLE BASE	1.00	EA
230.70	7' MANHOLE BASE	2.00	EA
230.80	8' MANHOLE BASE	2.00	EA
235.00	CATCH BASIN FRAME & GRATE	19.00	EA
236.00	MANHOLE FRAME & COVER	5.00	EA
240.00	WORCESTER STANDARD CATCH BASIN (5 foot diameter)	19.00	EA
244.20	REMOVE AND DISPOSE OF EXISTING CATCH BASIN	16.00	EA
245.00	GRANITE INLET STONE	8.00	EA
245.10	EXISTING GRANITE INLET STONE REMOVE & RESET	7.00	EA
246.00	8 INCH GREEN TRAPS	8.00	EA
265.00	REMOVE AND DISPOSE OF EXISTING MANHOLE	3.00	EA
304.04	REPLACING 4" - 12" GATE VALVE BOX, GRAVEL BASE	60.00	EA
304.06	REMOVE AND RETAIN WATER BOX	80.00	EA
304.07	RETURN AND RESET WATER BOX	20.00	EA
304.08	WATER BOX ADJUST TO GRADE, GRAVEL BASE	14.00	EA
305.06	6” Gate Valve	1.00	EA
305.08	8” Gate Valve	3.00	EA
310.40	Hydrant Removed and Reset	7.00	EA
402.00	FINE GRADING, ROLLING AND FINISHING	10,358.00	SY
403.00	GRINDING AND MILLING 1-1/2 INCH	1,911.00	SY
403.10	GRINDING (FULL DEPTH- 6"MAX)	5,914.00	SY
405.00	STRAIGHT CURB (VA-4)	2,114.00	LF
408.00	CIRCULAR CURB (10' RADIUS & OVER) (VA-4)	8.00	LF
409.00	CIRCULAR CURB (10" RADIUS & UNDER) (VA-4)	125.00	LF
410.00	CIRCULAR CORNER (WORCESTER STANDARD)	10.00	EA

		Item Qty	
416.00	CURB REMOVE AND RESET	1,140.00	LF
418.00	CURB REMOVAL & STACK	2,365.00	LF
422.10	SUPERPAVE 9.5 MM LEVEL 2	1,350.00	TN
422.20	SUPERPAVE 12.5 MM LEVEL 2	1,510.00	TN
426.00	NEW BITUMINOUS CONCRETE SIDEWALKS	61.00	TN
434.00	SAWING PAVEMENT	382.00	LF
440.00	NEW CONCRETE SIDEWALK 4 INCH	2,751.00	SY
444.00	NEW CONCRETE DRIVEWAY 6 INCH	394.00	SY
447.00	MODULAR UNIT (BRICK) PAVER SIDEWALK	217.00	SY
454.00	WHEELCHAIR RAMP CEMENT CONCRETE - 6" THICK WITH DETECTABLE WARNING PANELS	219.00	SY
481.00	ORNAMENTAL BOLLARD (COMPLETE IN PLACE)	12.00	EA
487.00	GAS BOX ADJUST TO GRADE, GRAVEL BASE	21.00	EA
501.00	4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	1,351.00	LF
502.00	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	1,805.00	LF
503.00	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	2,270.00	LF
504.00	PAVEMENT ARROW/LEGEND REFLECTORIZED WHITE (THERMOPLASTIC)	14.00	EA
509.10	GRANITE TRANSITION CURB FOR WHEEL CHAIR RAMPS - CURVED*	232.00	LF
509.20	GRANITE TRANSITION CURB FOR WHEEL CHAIR RAMPS - STRAIGHT*	738.00	LF
520.00	WARNING AND REGULATORY SIGNS	50.00	EA
522.00	TYPE "B" STREET NAME SIGNS	13.00	EA
523.00	TRAFFIC SIGN POLES	33.00	EA
523.10	REMOVE & RESET TRAFFIC SIGN POLE	4.00	EA
610.00	RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (SOLAR, AUDIBLE PUSH BUTTON)	1.00	LS
804.20	2-INCH ELECTRICAL CONDUIT (FOOT) TYPE NM PLASTIC (UL)	880.00	LF
810.20	ELECTRIC HANDHOLE PRECAST CONCRETE (EACH)	12.00	EA
812.20	LIGHT STANDARD FOUNDATION CONCRETE (EACH	12.00	EA
814.00	REMOVE AND RESET STREET LIGHT POLE	12.00	EA
823.00	STREET LIGHTING AS-BUILT PLAN	1.00	LS
909.00	MOBILIZATION (748) AND AS-BUILT DRAWINGS	1.00	LS
909.00	SCHEDULE OF OPERATIONS TYPE C-MASSDOT (722.3)	1.00	LS
909.00	REMOVE AND RESET EXISTING SIGN	1.00	LS
909.00	REMOVE AND RESET EXISTING MONUMENT (COMPLETE)	1.00	LS
909.00	DUST MONITORING	40.00	HR
909.00	REMOVE AND DISPOSE TRAFFIC SIGN POLE	5.00	EA
909.00	REMOVE AND DISPOSE CONCRETE PAVEMENT	2,601.00	SY
909.00	HYDRODYNAMIC SEPARATOR	3.00	EA
909.00	FOCALPOINT SYSTEM FURNISH & INSTALL (COMPLETE)	3.00	EA
909.00	R-TANK SYSTEM FURNISH & INSTALL (COMPLETE)	2.00	EA
909.00	RAIN GUARDIAN TURRET FURNISH & INSTALL (COMPLETE)	3.00	EA
909.00	RESET EXISTING PERMEABLE PAVERS FURNISH & INSTALL (COMPLETE)	246.00	SF
909.00	STORM TREE BOX FILTER FURNISH & INSTALL (COMPLETE)	7.00	EA

		Item Qty	
909.00	PLANTING AREAS -SHRUBS, PERENNIALS, RAIN GARDEN (COMPLETE)	3,196.00	SF
911.20	PAVEMENT MARKING REMOVAL	616.00	LF
912.20	BICYCLE LANE SYMBOL WITH ARROW OR SHARROW (DECAL)	8.00	EA
953.20	SILT SACK	46.00	EA

Complete Streets Improvements- Endicott- Bigelow/ DPW-CDBG
8501-W6

THE BIDDER MUST FILL IN THESE UNIT PRICES. Also carry out all extensions and fill in "Computed Totals."
In case of error or discrepancies, UNIT PRICES govern and written works take precedence over figures.

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
104.0000	TREE REMOVAL (LESS THAN 24 INCHES) INCLUDING STUMP		
	_____ Dollars	4.00	$ _____
	($ _____) EA		
107.0000	STREET TREE REPLACEMENT		
	_____ Dollars	28.00	$ _____
	($ _____) EA		
110.0000	PINE BARK MULCH		
	_____ Dollars	30.00	$ _____
	($ _____) CY		
112.2000	TEST PITS		
	_____ Dollars	2.00	$ _____
	($ _____) EA		
113.0000	TREE PROTECTION		
	_____ Dollars	1.00	$ _____
	($ _____) EA		
122.0000	EARTH EXCAVATION BELOW NORMAL GRADE		
	_____ Dollars	5,165.00	$ _____
	($ _____) CY		
127.0000	DENSE GRADED CRUSHED STONE		
	_____ Dollars	1,009.00	$ _____
	($ _____) CY		
130.0000	CRUSHED STONE 3/4 INCH		
	_____ Dollars	171.00	$ _____
	($ _____) CY		
154.0000	TOPSOIL EXCAVATED AND STACKED		
	_____ Dollars	32.00	$ _____
	($ _____) CY		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
160.0000	CLEANING UP		
	Dollars	1.00	$
	($) LS		
171.0000	INSTALLATION AND MAINTENANCE OF EROSION CONTROLS		
	Dollars	742.00	$
	($) LF		
180.0100	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM		
	Dollars	1.00	$
	($) LS		
180.0200	PERSONAL PROTECTION LEVEL C UPGRADE		
	Dollars	100.00	$
	($) HR		
180.0300	LICENSED SITE PROFESSIONAL SERVICES		
	Dollars	100.00	$
	($) HR		
181.1100	DISPOSAL OF UNREGULATED SOIL		
	Dollars	2,000.00	$
	($) TN		
181.1200	DISPOSAL OF UNREGULATED SOIL - IN-STATE FACILITY		
	Dollars	2,000.00	$
	($) TN		
181.1300	DISPOSAL OF UNREGULATED SOIL - OUT-OF-STATE FACILITY		
	Dollars	1,792.00	$
	($) TN		
181.1400	DISPOSAL OF HAZARDOUS WASTE		
	Dollars	50.00	$
	($) TN		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
210.1200	Clean and CCTV 12" Pipe		
	_____ Dollars	275.00	$ _____
	($ _____) LF		
220.0600	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 6" PVC		
	_____ Dollars	229.00	$ _____
	($ _____) LF		
220.0800	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 8" PVC		
	_____ Dollars	101.00	$ _____
	($ _____) LF		
222.1200	TRENCH EXCAVATION AND BACKFILL, FURNISH AND INSTALL 12" RCP		
	_____ Dollars	584.00	$ _____
	($ _____) LF		
230.6000	6' MANHOLE BASE		
	_____ Dollars	1.00	$ _____
	($ _____) EA		
230.7000	7' MANHOLE BASE		
	_____ Dollars	2.00	$ _____
	($ _____) EA		
230.8000	8' MANHOLE BASE		
	_____ Dollars	2.00	$ _____
	($ _____) EA		
235.0000	CATCH BASIN FRAME & GRATE		
	_____ Dollars	19.00	$ _____
	($ _____) EA		
236.0000	MANHOLE FRAME & COVER		
	_____ Dollars	5.00	$ _____
	($ _____) EA		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
240.0000	WORCESTER STANDARD CATCH BASIN (5 foot diameter)		
	_____ Dollars	19.00	$ _____
	($) EA		
244.2000	REMOVE AND DISPOSE OF EXISTING CATCH BASIN		
	_____ Dollars	16.00	$ _____
	($) EA		
245.0000	GRANITE INLET STONE		
	_____ Dollars	8.00	$ _____
	($) EA		
245.1000	EXISTING GRANITE INLET STONE REMOVE & RESET		
	_____ Dollars	7.00	$ _____
	($) EA		
246.0000	8 INCH GREEN TRAPS		
	_____ Dollars	8.00	$ _____
	($) EA		
265.0000	REMOVE AND DISPOSE OF EXISTING MANHOLE		
	_____ Dollars	3.00	$ _____
	($) EA		
304.0400	REPLACING 4" - 12" GATE VALVE BOX, GRAVEL BASE		
	_____ Dollars	60.00	$ _____
	($) EA		
304.0600	REMOVE AND RETAIN WATER BOX		
	_____ Dollars	80.00	$ _____
	($) EA		
304.0700	RETURN AND RESET WATER BOX		
	_____ Dollars	20.00	$ _____
	($) EA		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
304.0800	WATER BOX ADJUST TO GRADE, GRAVEL BASE		
	_____ Dollars	14.00	$ _____
	($) EA		
305.0600	6” Gate Valve		
	_____ Dollars	1.00	$ _____
	($) EA		
305.0800	8” Gate Valve		
	_____ Dollars	3.00	$ _____
	($) EA		
310.4000	Hydrant Removed and Reset		
	_____ Dollars	7.00	$ _____
	($) EA		
402.0000	FINE GRADING, ROLLING AND FINISHING		
	_____ Dollars	10,358.00	$ _____
	($) SY		
403.0000	GRINDING AND MILLING 1-1/2 INCH		
	_____ Dollars	1,911.00	$ _____
	($) SY		
403.1000	GRINDING (FULL DEPTH- 6"MAX)		
	_____ Dollars	5,914.00	$ _____
	($) SY		
405.0000	STRAIGHT CURB (VA-4)		
	_____ Dollars	2,114.00	$ _____
	($) LF		
408.0000	CIRCULAR CURB (10' RADIUS & OVER) (VA-4)		
	_____ Dollars	8.00	$ _____
	($) LF		
409.0000	CIRCULAR CURB (10" RADIUS & UNDER) (VA-4)		
	_____ Dollars	125.00	$ _____
	($) LF		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
410.0000	CIRCULAR CORNER (WORCESTER STANDARD)		
	Dollars	10.00	$
	($) EA		
416.0000	CURB REMOVE AND RESET		
	Dollars	1,140.00	$
	($) LF		
418.0000	CURB REMOVAL & STACK		
	Dollars	2,365.00	$
	($) LF		
422.1000	SUPERPAVE 9.5 MM LEVEL 2		
	Dollars	1,350.00	$
	($) TN		
422.2000	SUPERPAVE 12.5 MM LEVEL 2		
	Dollars	1,510.00	$
	($) TN		
426.0000	NEW BITUMINOUS CONCRETE SIDEWALKS		
	Dollars	61.00	$
	($) TN		
434.0000	SAWING PAVEMENT		
	Dollars	382.00	$
	($) LF		
440.0000	NEW CONCRETE SIDEWALK 4 INCH		
	Dollars	2,751.00	$
	($) SY		
444.0000	NEW CONCRETE DRIVEWAY 6 INCH		
	Dollars	394.00	$
	($) SY		
447.0000	MODULAR UNIT (BRICK) PAVER SIDEWALK		
	Dollars	217.00	$
	($) SY		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
454.0000	WHEELCHAIR RAMP CEMENT CONCRETE - 6" THICK WITH DETECTABLE WARNING PANELS		
	Dollars	219.00	$
	($) SY		
481.0000	ORNAMENTAL BOLLARD (COMPLETE IN PLACE)		
	Dollars	12.00	$
	($) EA		
487.0000	GAS BOX ADJUST TO GRADE, GRAVEL BASE		
	Dollars	21.00	$
	($) EA		
501.0000	4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)		
	Dollars	1,351.00	$
	($) LF		
502.0000	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)		
	Dollars	1,805.00	$
	($) LF		
503.0000	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)		
	Dollars	2,270.00	$
	($) LF		
504.0000	PAVEMENT ARROW/LEGEND REFLECTORIZED WHITE (THERMOPLASTIC)		
	Dollars	14.00	$
	($) EA		
509.1000	GRANITE TRANSITION CURB FOR WHEEL CHAIR RAMPS - CURVED*		
	Dollars	232.00	$
	($) LF		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
509.2000	GRANITE TRANSITION CURB FOR WHEEL CHAIR RAMPS - STRAIGHT*		
	_____ Dollars	738.00	$ _____
	($) LF		
520.0000	WARNING AND REGULATORY SIGNS		
	_____ Dollars	50.00	$ _____
	($) EA		
522.0000	TYPE "B" STREET NAME SIGNS		
	_____ Dollars	13.00	$ _____
	($) EA		
523.0000	TRAFFIC SIGN POLES		
	_____ Dollars	33.00	$ _____
	($) EA		
523.1000	REMOVE & RESET TRAFFIC SIGN POLE		
	_____ Dollars	4.00	$ _____
	($) EA		
610.0000	RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (SOLAR, AUDIBLE PUSH BUTTON)		
	_____ Dollars	1.00	$ _____
	($) LS		
804.2000	2-INCH ELECTRICAL CONDUIT (FOOT) TYPE NM PLASTIC (UL)		
	_____ Dollars	880.00	$ _____
	($) LF		
810.2000	ELECTRIC HANDHOLE PRECAST CONCRETE (EACH)		
	_____ Dollars	12.00	$ _____
	($) EA		
812.2000	LIGHT STANDARD FOUNDATION CONCRETE (EACH		
	_____ Dollars	12.00	$ _____
	($) EA		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
814.0000	REMOVE AND RESET STREET LIGHT POLE		
	Dollars	12.00	$
	($) EA		
823.0000	STREET LIGHTING AS-BUILT PLAN		
	Dollars	1.00	$
	($) LS		
900.0000	Lump Sum Reserve		
	four hundred thirty thousand and xx / 100 Dollars		$ 430,000.00
909.0001	MOBILIZATION (748) AND AS-BUILT DRAWINGS		
	Dollars	1.00	$
	($) LS		
909.0002	SCHEDULE OF OPERATIONS TYPE C-MASSDOT (722.3)		
	Dollars	1.00	$
	($) LS		
909.0004	REMOVE AND RESET EXISTING SIGN		
	Dollars	1.00	$
	($) LS		
909.0005	REMOVE AND RESET EXISTING MONUMENT (COMPLETE)		
	Dollars	1.00	$
	($) LS		
909.0007	DUST MONITORING		
	Dollars	40.00	$
	($) HR		
909.0009	REMOVE AND DISPOSE TRAFFIC SIGN POLE		
	Dollars	5.00	$
	($) EA		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
909.0010	REMOVE AND DISPOSE CONCRETE PAVEMENT		
	Dollars	2,601.00	$
	($) SY		
909.0012	HYDRODYNAMIC SEPARATOR		
	Dollars	3.00	$
	($) EA		
909.0013	FOCALPOINT SYSTEM FURNISH & INSTALL (COMPLETE)		
	Dollars	3.00	$
	($) EA		
909.0014	R-TANK SYSTEM FURNISH & INSTALL (COMPLETE)		
	Dollars	2.00	$
	($) EA		
909.0015	RAIN GUARDIAN TURRET FURNISH & INSTALL (COMPLETE)		
	Dollars	3.00	$
	($) EA		
909.0016	RESET EXISTING PERMEABLE PAVERS FURNISH & INSTALL (COMPLETE)		
	Dollars	246.00	$
	($) SF		
909.0017	STORM TREE BOX FILTER FURNISH & INSTALL (COMPLETE)		
	Dollars	7.00	$
	($) EA		
909.0018	PLANTING AREAS -SHRUBS, PERENNIALS, RAIN GARDEN (COMPLETE)		
	Dollars	3,196.00	$
	($) SF		
911.2021	PAVEMENT MARKING REMOVAL		
	Dollars	616.00	$
	($) LF		

ITEM NUMBER AND DESCRIPTION		ESTIMATED QUANTITY	COMPUTED TOTALS
912.2020	BICYCLE LANE SYMBOL WITH ARROW OR SHARROW (DECAL)		
	Dollars	8.00	$
	($) EA		
953.2020	SILT SACK		
	Dollars	46.00	$
	($) EA		

TOTAL BID PRICE INCLUDING CONTINGENCY

_____Dollars and _____Cents
(amount in words)

$_____
(amount in figures)

This proposal is based on provisions of the following addenda:

No. _____ No. _____

No. _____ No. _____

All amounts and totals given above will be subject to verification by the City. In case of variation between Unit Bid Price and Totals shown by the Bidder, the Unit Price written in words will be considered to be the bid.

The City reserves the right to reject any and all bids, wholly or in part, and to make awards in a manner deemed in the best interests of the City.

The above estimated quantities form an approximate statement of the extent of the work to be done, based upon the estimate of the Contracting Officer. The City does not expressly or by implication agree that the actual quantity of work will correspond therewith, but reserves the right to increase or decrease the quantity of any class or portion of the work, as may be deemed necessary by the Contracting Officer.

MEASUREMENT AND PAYMENT

Measurement and Payment shall be as specified in the City of Worcester's Standard Specifications and Detail Section with exception of the following items:

1.01 GENERAL:

A. All work performed as described in these contract documents will be paid for under one or more of the items listed in the BID ITEM SHEET. All other activities required in connection with performance of the work, including all work required under this Contract, whether described in the contract documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the BID ITEM SHEET, but will be considered incidental to performance of the overall project.

B. Each unit or lump-sum price stated in the BID ITEM SHEET shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications.

C. The payment items listed herein and in the BID ITEM SHEET are intended to provide full payment for the work shown on the drawings and specified herein. Any work called for or implied in the documents but not listed as a payment item shall be considered incidental to the overall project.

D. Unless otherwise noted, each item shall be furnished and installed in accordance with the technical section whether a specific applicable payment item exists or not.

1.02 MASSDOT ITEMS

A. The work under this contract for these items shall be measured and paid for in accordance with applicable MassDOT Standard Specifications for Highways and Bridges, latest edition, and any supplemental specifications included herein.

B. The following items are MassDOT standard bid items and shall be measured and paid for as described in the referenced MassDOT specifications:

- Item 180.01 – Environmental Health And Safety Program
- Item 180.02 – Personal Protection Level C Upgrade
- Item 180.03 – Licensed Site Professional Services
- Item 181.11 – Disposal Of Unregulated Soil
- Item 181.12 – Disposal Of Regulated Soil-In State Facility
- Item 181.13 – Disposal Of Regulated Soil-Out-Of-State Facility
- Item 181.14 – Disposal Of Hazardous Waste

1.03 GRANITE TRANSITION CURB FOR WHEEL CHAIR RAMPS

A. Work under this item shall conform to Section 32 16 00, CURBING.

B. The work under items 509.1 and 509.2 will be measured and paid for at the contract unit price per linear feet, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid for at the contract unit price under Items 509.1 and 509.2.

1.04 MOBILIZATION:

A. This item shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, for the establishment of all contractor's field offices, buildings, and other facilities necessary for work on the project and all other work and operations which must be performed or for costs which must be incurred prior to beginning work. The unit bid price Mobilization shall not exceed 3% of the contract bid total, exclusive of this item. Failure to observe this requirement may result in rejection of the bid.

B. Payment for Mobilization shall be paid on a lump sum basis under Item 909.0001.

1.05 SCHEDULE OF OPERATIONS (TYPE C)

A. The work under this contract for these items shall be measured and paid for in accordance with applicable MassDOT Standard Specifications for Highways and Bridges, latest edition, and any supplemental specifications included herein.

B. The following items are MassDOT standard bid items and shall be measured and paid for as described in the referenced MassDOT specifications:

- Item 909.0002 – Schedule Of Operations Type C

1.06 REMOVE AND RESET EXISTING SIGN

A. Work under this item shall conform to the relevant provisions under Section 828 and Section 840 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The Contractor shall remove and reset all signs as shown on the plans and/or as directed by the Engineer.

B. Signs removed and reset shall be measured and paid for as lump sum, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid on a lump sum basis under Item 909.0004.

1.07 REMOVE AND RESET EXISTING MONUMENT

A. Work under this item shall conform to the relevant provisions under Section 710 of the MassDOT Standard Specifications for Highways and Bridges, Item 450 of the City of Worcester's Standard Specifications and Detail Section and the following:

The Contractor shall remove and reset all monuments as called out on the plans and as directed by the Engineer.

B. Monument removed and reset will be measured and paid for as lump sum, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid on a lump sum basis under Item 909.0005.

1.08 DUST MONITORING

A. Work under this item shall conform to Section 01 14 19.16, DUST CONTROL AND MONITORING.

B. The work for this item shall constitute full compensation to the Contractor for dust monitoring and be measured as lump sum. The Contractor shall monitor dust levels using a minimum of four (4) dust monitors during periods of excavation or soil handling. Dust levels shall be measured during the entirety of the exaction period.

C. The work shall be paid for at the contract unit price under Item 909.0007.

1.09 REMOVE AND DISPOSE TRAFFIC SIGN POLE

A. Work under this item shall conform to Section 523 of the City of Worcester's Standard Specifications and Detail Section, the relevant provisions under Subsections 828 and 840 of the MassDOT Standard Specifications for Highways and Bridges, and the following:

The Contractor shall remove and dispose of all traffic signs that are shown on the plan and/or as directed by the Engineer.

B. Traffic sign poles removed and disposed shall be measured and paid for at the contract unit price per each, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid for at the contract unit price under Item 909.0009.

1.10 REMOVE AND DISPOSE CONCRETE PAVEMENT

A. Work under this item shall conform to Section 116 of the City of Worcester's Standard Specifications and Detail Section.

B. Concrete Pavement removed and disposed shall be measured and paid for at the contract unit price per square yard, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid for at the contract unit price under Item 909.0010.

1.11 HYDRODYNAMIC SEPERATOR

A. Work under this item shall conform to Section 33 44 19.13, STORMWATER TREATMENT SYSTEM.

B. The work shall be measure and paid for at the contract unit price for each and in accordance with Section 22 44 19.13, STORMWATER TREATMENT SYSTEM.

C. The work shall be paid for at the contract unit price under Item 909.0012.

1.12 FURNISH AND INSTALL FOCALPOINT SYSTEM

A. Work under this item shall conform to Section 33 44 19.13, STORMWATER TREATMENT SYSTEM.

B. The work shall be measure and paid for at the contract unit price for each and in accordance with Section 22 44 19.13, STORMWATER TREATMENT SYSTEM.

C. The work shall be paid for at the contract unit price under Item 909.0013.

1.13 FURNISH AND INSTALL R-TANK SYSTEM AND RAIN GUARDIAN TURRET

A. Work under this item shall conform to Section 33 46 23, MODULAR STORMWATER STORAGE UNITS.

B. The work shall be measure and paid for at the contract unit price for each and in accordance with Section 22 44 19.13, 33 46 23, MODULAR STORMWATER STORAGE UNITS.

C. R-Tank System shall be paid for at the contract unit price under Item 909.0014.

D. Rain Guardian Turret shall be paid for at the contract unit price under Item 909.0015.

1.14 RESET EXISTING CONCRETE PAVERS

A. Work under this item shall conform to Section 32 14 00, Precase Concrete Pavers.

B. The work under item 909.0016 will be measured and paid for at the contract unit price per square foot, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid for at the contract unit price under 909.0016.

1.15 FURNISH AND INSTALL STORM TREE BOX FILTER

A. Work under this item shall conform to Section 33 44 19.13, STORMWATER TREATMENT SYSTEM.

B. The work shall be measure and paid for at the contract unit price for each and in accordance with Section 22 44 19.13, STORMWATER TREATMENT SYSTEM.

C. The work shall be paid for at the contract unit price under Item 909.0017.

1.16 PLANTING AREAS

A. Work under this item shall conform to Section 32 93 00, TREES, SHRUBS, GROUNDCOVERS, AND LANDSCAPING.

B. The work under item 909.0018 will be measured and paid for at the contract unit price per square foot, complete in place, including all labor, materials, equipment and incidental costs required for the work.

C. The work shall be paid for at the contract unit price under Item 909.0018.

1.17 PAVEMENT MARKING REMOVAL

A. Work under this item shall conform to the relevant provisions under Section 850 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The Contractor shall remove all existing pavement markings that are shown on the plan, are in conflict with proposed pavement markings, and/or as directed by the Engineer.

B. Pavement marking removed will be measured and paid for at the contract unit price per linear foot. Payment shall constitute full compensation for removal and disposal of existing pavement markings, including any necessary repairs to the roadway surface, and any incidental costs required to complete the work.

C. The work shall be paid for at the contract unit price under Item 911.2021.

1.18 ENVIRONMENTAL PROTECTION (SILT SACKS):

A. The unit price to be paid for under the appropriate subdivision of this item shall be measured for payment per silt sack installed in catch basins impacted by construction activities, as directed by the Engineer.

B. The contract unit price under the appropriate subdivision of this item shall constitute full compensation for the furnishing and installing of silt sacks in catch basins where directed by the Engineer; their maintenance during the period the catch basin is impacted by

construction activities as determined by the Engineer; and their removal and disposal at the end of said period.

C. Any additional work items required to adhere to the provisions of this section which are not listed in the BID ITEMS SHEET shall be considered incidental to the project and not measured separately for payment.

D. The work shall be paid for at the contract unit price under Item 953.2020.

1.19 PROJECT AS-BUILT RECORD DRAWINGS

A. Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project. Work under this item shall conform to Section 01 78 39, PROJECT AS-BUILT DRAWINGS.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

ITEM 180.01 (Continued)

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

Method of Measurement and Basis of Payment

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, soils, sediments and/or groundwater may be contaminated. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include sampling, analysis and characterization of potentially contaminated media, preparation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the Massachusetts Contingency Plan (MCP). LSP hours related to the characterization and disposal of contaminated soil and/or sediment are incidental to the disposal items. An estimate of LSP services to be provided shall be submitted to the Engineer for approval before any LSP activity begins.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the DEP shall be submitted for all work assignments listed for the LSP and environmental technicians.

The LSP shall evaluate soil and/or sediment with discoloration, odor, and presence of petroleum liquid or sheening on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect soil and/or sediment. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall adequately characterize subsurface conditions prior to backfill in areas where contaminated material has been excavated. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

Contaminated soil, sediment and/or groundwater shall be handled in accordance with all applicable state and federal statutes, regulations and policies. The LSP shall adequately characterize contaminated media for comparison to the requirements of the MCP. The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise format which tracks the excavation, stockpiling, analysis and reuse/disposal of all suspect contaminated soils, sediments and groundwater. These records shall be up-to-date and available to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, penalties and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, penalties and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Department before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

ITEM 180.03 (Continued)

Laboratory Testing in Support of LSP Services

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included.

In order to maintain compliance with the MCP or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

Method of Measurement and Basis of Payment

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours. LSP hours related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The contractor will be reimbursed upon satisfactory written evidence of payment. The contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider. Laboratory testing related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory Testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these Items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 through 181.14 (Continued)

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

Method Of Measurement And Basis Of Payment

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

ITEM 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEMS 181.11 through 181.14 (Continued)

ITEM 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

SECTION 722

CONSTRUCTION SCHEDULING

DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule when required in this Subsection. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

The requirements for scheduling submissions are established based on the Project Value at the time of the bid and are designated as Type A, B, C or D. The definitions of these Schedule Requirement Types are summarized below. Complete descriptions of all detailed requirements are established elsewhere in this specification.

Type A – for all Site-Specific Contracts with a Project Value over $20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Resource-Loading
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Cost-loaded CPM
- Contractor-furnished CPM software, computer and training

Type B – for all Site-Specific Contracts with a Project Value between $10 Million and $20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded CPM
- Resource-Loading
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

SECTION 722 (Continued)

Type C – for all Site-Specific Contracts with a Project Value between $3 Million and $10 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

Type D - for all contracts with a Project Value less than $3 Million; various locations contracts of any dollar amount; contracts with durations less than one-hundred and eighty (180) Calendar Days; and other contracts as determined by the Engineer.

- Bar chart schedule updated monthly or at the request of the Engineer (See Section 722.62.B - Bar Charts.)
- Monthly Projected Spending Report (PSR) (See Section 722.62.F - Projected Spending Reports.)

MATERIALS, EQUIPMENT, PERSONNEL

722.40 General

A. Software Requirements (Types A, B and C)

The Contractor shall use Primavera P6 computer scheduling software.
In addition to the requirements of Section 740 – Engineer's Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer's Field Office within twenty-eight (28) Calendar Days after Notice to Proceed. The computer and software shall be maintained and serviced as recommended by the computer manufacturer and/or as required by the Engineer during the duration of the Contract at no additional cost to the Department. The Contractor shall provide professional training in the basic use of the software for up to eight (8) Department employees. The trainer shall be approved by the Engineer. This training shall be provided within twenty-eight (28) Calendar Days after Notice to Proceed.

B. Scheduler Requirements

For all schedule types, if the Contractor plans to use outside scheduling services, the scheduler shall be approved as a subcontractor by the Engineer.

For Type A, B and C Schedules the name of the Contractor's Project Scheduler together with his/her qualifications shall be submitted to the Department for approval by the Engineer within seven (7) Calendar Days after NTP. The Project Scheduler shall have a minimum of five [5] years of project CPM scheduling experience, three [3] years of which shall be on projects of similar scope and value as the project for which the Project Scheduler is being proposed. References shall be provided from past projects that can attest to the capabilities of the Project Scheduler.

SECTION 722 (Continued)

CONSTRUCTION METHODS

722.60 General

A. Schedule Planning Session
(Types A, B and C)

The Contractor shall conduct a schedule planning session within seven (7) Calendar Days after the Contractor receives the NTP and prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

1. the Work to be performed by the Contractor and its subcontractors;
2. the planned construction sequence and phasing; planned crew sizes;
3. summary of equipment types, sizes, and numbers to be used for each work activity;
4. all early work related to third party utilities;
5. identification of the most critical submittals and projected submission timelines;
6. estimated durations of major work activities;
7. the anticipated Critical Path of the project and a summary of the activities on that Critical Path;
8. a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges;
9. a summary of the anticipated quarterly cash flow over the life of the project.

This will be an interactive session and the Contractor shall answer all questions that the Department and its consultants may have. The Contractor shall provide a minimum of five (5) copies of a written summary of the information presented and discussed during the session to the Engineer. The Contractor's Baseline Schedule and accompanying Schedule Narrative shall incorporate the information discussed at this Schedule Planning Session.

B. Schedule Reviews by the Department (All Types)

1. Baseline Schedule Reviews

The Engineer will respond to the Baseline Schedule Submission within thirty (30) Calendar Days of receipt providing comments, questions and/or disposition that either accepts the schedule or requires revision and resubmittal. Baseline Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.

2. Contract Progress Schedule / Monthly Update Reviews

The Engineer will respond to each submittal within twenty one (21) Calendar Days. Schedules shall be resubmitted by the Contractor within five (5) Calendar Days after receipt of the Engineer's comments.

Failure to submit schedules as and when required could result in the withholding of full or partial pay estimate payments by the Engineer.

SECTION 722 (Continued)

722.61 Schedule Content and Preparation Requirements
(Types A, B and C unless otherwise noted)

Each Contract Progress Schedule shall fully conform to these requirements.

A. LOGIC

The schedules shall divide the Work into activities with appropriate logic ties to show:

1. conformance with the requirements of this Section and Division I, Subsection 8.02 - Schedule of Operations
2. the Contractor's overall approach to the planning, scheduling and execution of the Work
3. conformance with any additional sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.

B. ACTIVITIES

The schedules shall clearly define the progression of the Work from NTP to Contractor Field Completion (CFC) by using separate activities for each of the following items:

1. NTP
2. Each component of the Work defined by specific activities
3. Detailed activities to satisfy permit requirements
4. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before purchasing
5. The preparation and submission of shop drawings, procedures and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable
6. The review and return of shop drawings, procedures and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer
7. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third party work affecting the Contract
8. The Critical Path, clearly defined and organized
9. Float shall be clearly identified
10. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
11. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
12. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
13. Full Beneficial Use (FBU) Contract Milestone per the requirements of Subsection 8.03 - Prosecution of Work
14. Contractor’s request for validation of FBU (ready to open to traffic)
15. The Department’s confirmation of completed work to allow for FBU

SECTION 722 (Continued)

16. Substantial Completion Contract Milestone per the requirements of Subsections 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
17. Contractor's request for validation of Substantial Completion
18. Punchlist Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
19. Contractor confirmation that all punchlist work and documentation has been completed
20. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
21. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
22. Contractor Field Completion Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
23. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
24. Traffic work zone set-up and removal, night work and phasing
25. Early Utility Relocation (by others) that has been identified in the Contract
26. Right-of-Way (ROW) takings that have been identified in the Contract
27. Material Certifications
28. Work Breakdown Structure in accordance with the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at: https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit
29. For Type A and B Contracts only: All items to be paid, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

C. EARLY AND LATE DATES

Early Dates shall be based on proceeding with the Work or a designated part of the Work exactly on the date when the corresponding Contract Time commences. Late Dates shall be based on completing the Work or a designated part of the Work exactly on the corresponding Contract Time, even if the Contractor anticipates early completion.

SECTION 722 (Continued)

D. DURATIONS

Activity durations shall be in Work Days. Planned Original Durations shall be established with consideration to resources and production rates that correspond to the Contractor's Bid Price. Within all of the Department-required schedules, the Contractor shall plan the Work using durations for all physical construction activities of no less than one (1) Work Day and no greater than fourteen (14) Work Days, unless approved by the Engineer as part of the Baseline Schedule Review.

Should there be an activity with a duration that is determined by the Engineer to be unreasonable, the Contractor will be asked to provide a basis of the duration using bid documents, historic production rates for similar work, or other form of validation that is acceptable to the Engineer. Should the Contractor and the Engineer be unable to agree on reasonable activity durations, the Engineer will, at a minimum, note the disagreement in the Baseline Schedule Review along with a duration the Engineer considers reasonable and the basis for that duration. A schedule that contains a substantial number of activities with durations that are deemed unreasonable by the Engineer will not be accepted.

E. MATERIALS ON HAND (for Types A and B only)

The Contractor shall identify in the Baseline Schedule all items of permanent materials (Materials On Hand) for which the Contractor intends to request payment prior to the incorporation of such items into the Work.

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label as specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit

G. ACTIVITY IDENTIFICATION NUMBERS

The Contractor shall use the activity identification numbering system specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

H. ACTIVITY CODES

The Contractor shall use the activity codes specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

I. CALENDARS

Different calendars may be created and assigned to all activities or to individual activities. Calendars define the available hours of work in each Calendar Day, holidays and general or project-specific non-Work Days such as Fish Migration Periods, time of year (TOY) restrictions and/or area roadway restrictions.

SECTION 722 (Continued)

Examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Refer to the Project Special Provisions for specific restrictions.
- Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced. Refer to the Project Special Provisions for specific restrictions.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods: Refer to the Project Special Provisions for specific restrictions.
- Night-time paving and striping operations, traffic and temperature restrictions: Refer to the Project Special Provisions for specific restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. FLOAT

For the calculation of float in the CPM schedule, the setting for *Retained Logic* is required for all schedule submissions, starting with the Baseline Schedule Submission. Should the Contractor have a reason to propose that an alternative calculation setting such as *Progress Override* be used, the Contractor shall obtain the Engineer's approval prior to modifying to this setting.

K. COST AND RESOURCE LOADING (Types A and B only)

For all Type A and B Schedules, the Contractor shall provide a cost and resource-loaded schedule with an accurate allocation of the costs and resources necessary to complete the Work. The costs and resources shall be assigned to all schedule activities in order to enable the Contractor to efficiently execute the Contract requirements and the Engineer to validate the original plan, monitor progress, provide cash flow projections and analyze delays.

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.

SECTION 722 (Continued))

4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource- loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.
8. For Type A Schedules, each month, the Contractor will be paid using the Cost-loaded CPM activities for Lump Sum payment items. This requirement supersedes any requirements elsewhere in this Contract regarding partial payments of schedule-of-values for all Lump Sum items.

L. NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE

1. Milestones or constraint dates not specified in the Contract
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer
4. Delayed starts of follow-on trades
5. Float suppression techniques

722.62 Submittal Requirements

All schedules shall be prepared and submitted in accordance with the requirements listed below.

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

Except as stated elsewhere in this subsection, schedule submittals shall include each of the documents listed below, prepared in two formats, for distribution as follows:

a. four (4) compact discs (CD); one (1) each for the Office of Project Controls and Performance Oversight (O-PC&PO), the Boston Construction Section Office, the District Construction Office and the Resident Engineer's Office. Additional copies shall be required if the work is performed in more than one district.
b. two (2) hard copies plotted in color on 24" X 36" paper; one (1) copy each for the District Construction Office and the Resident Engineer's Office. No copies for the O-PC&PO and the Boston Construction Section Office. Additional copies shall be required if the work is performed in more than one district.

SECTION 722 (Continued)

A. Narratives

A written narrative shall be submitted with every schedule submittal. The narrative shall:

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent;
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements;
3. provide all references to any Notice of Delay that has been issued, within the time period of the Contract Progress Schedule Update, by letter to the Engineer. Note that any Notice of Delay that is not issued by letter will not be recognized by the Engineer. See Subsection 722.64.A - Notice of Delay;
4. provide a description of each third-party utility's planned vs. actual progress and note any that are trending late or are late per the durations and commitments as provided in the PUC Form; provide a description of the five (5) most important responses needed from the Department and the need date for the responses in order to maintain the current Schedule of Record;
5. provide a description of all critical issues that are not within the control of the Contractor or the Department (third party) and any impact they had or may have on the Critical Path;
6. provide a description of any possible considerations to improve the probability of completing the project early or on-time;
7. compare Early and Late Dates for activities on the Critical Path and describe reasons for changes in the top three (3) most critical paths ;
8. describe the Contractor's plan, approach, methodologies and resources to be employed for completing the various operations and elements of the Work for the top three (3) most critical paths. For update schedules, describe and propose changes to those plans and verify that a Proposal Schedule is not required;
9. describe, in general, the need for shifts that are not 5 days/week, 8 hours/day, the holidays that are inserted into each calendar and a tabulation of each calendar that has been used in the schedule;
10. describe any out-of-sequence logic and provide an explanation of why each out-of-sequence activity does not require a correction, if one has not been provided, and an adequate demonstration that these changes represent the basis of how these activities will be built, including considerations for resources, dependencies and previously-approved production rates;
11. identify any possible duration increases resulting from actual or anticipated unit price item quantity overruns as compared to the baseline duration, with a corresponding suggestion to mitigate any possible delays to the Critical Path. If the delay is anticipated to impact the Critical Path, refer to Subsections 4.06 - Increased or Decreased Contract Quantities and 8.10 - Determination and Extension of Contract Time for Completion and submit a letter to the Engineer notifying of a potential delay;
12. include a schedule log consisting of the name of the schedule, the data date and the date submitted.

SECTION 722 (Continued)

B. Bar Charts (Types A, B, C and D)

One (1) time-scaled bar chart containing all activities shall be prepared and submitted using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements Activities shall be linked by logic ties and shown on their Early Dates. Critical Paths shall be highlighted and Total Float shall be shown for all activities.

A second time-scaled bar chart shall also be prepared containing only the Critical Path or, if the Critical Path is not the longest path, the Longest Path using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Total Float shall be shown for all activities.

Bar Charts shall be printed in color and submitted on 11" X 17" paper or, if approved by the Engineer, as a .pdf file.

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily-read comparison of progress during the present and previous reporting periods. The DASC shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit

The reports described in Subsections D, E and F below shall be submitted with all of the schedules listed in Subsection722.20 - General:

D. Activity Cost Report and Monthly Cash Flow Projections (Type A only)

With each Contractor Quantity Estimate (CQE), the Contractor shall submit an Activity Cost Report and Cash Flow Projection that includes all activities grouped by Contract Bid Item.

The Activity Cost Report shall be generated from the Schedule of Record and shall be the basis of the Monthly Cash Flow Projection. Within each contract Bid Item, activities shall be sequenced by ascending activity identification number and shall show:

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start and finish dates for each completed activity.

For Unit Price pay items, in addition to the above, estimates to complete and any variance to the estimated Contract quantity shall be shown.

E. Resource Graphs (Type A only)

Monthly and cumulative resource graphs for the remaining Contract period using the Early Dates and Late Dates in the Contract Progress Schedule shall be included as part of each schedule submittal.

SECTION 722 (Continued)

F. Projected Spending Reports (Types B, C and D)

A Projected Spending Report (PSR) shall be prepared and submitted in accordance with the instructions listed at the end of this section. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. If the difference between the Contractor's monthly projections vs. the actual spending is greater than 10%, the Contractor's monthly spending projection shall be revised and resubmitted within fifteen (15) Calendar Days.

The Projected Spending Report (PSR) shall be depicted in a tabular format and printed in color on 11 x 17-sized paper or larger as approved by the Engineer. For additional instructions and a template for preparing the Projected Spending Report (PSR), refer to the Contractor's Construction Schedule Toolkit located on the MassDOT-Highway Division website at: https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit or consult with the District Construction Scheduler.

722.63. Progress Schedule Requirements

A. Baseline Schedule

The Baseline Schedule shall be due thirty (30) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule shall only reflect the Work awarded to the Contractor and shall not include any additional work involving Extra Work Orders or any other type of alleged delay. The Baseline Schedule shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements. Once the Baseline Schedule has been accepted by the Engineer, with or without comments, it shall represent the as-planned schedule for the Work and become the Contract Progress Schedule of Record until such time as the schedule is updated or revised under Subsections 722.63.C - Contract Progress Schedules / Monthly Updates, 722.64.C - Recovery Schedules and 722.64.D - Proposal Schedules.

The Cost and Resource-Loading information (Types A and B only) shall be provided by the Contractor within forty-five (45) Calendar Days after NTP.

The Engineer's review comments on the Baseline Schedule and the Contractor's responses to them will be maintained for the duration of the Contract and will be used by the Engineer to monitor the Contractor's work progress by comparing it to the Contract Progress Schedule / Monthly Update.

B. Interim Progress-Only Schedule Submissions

The first monthly update of the Contract Progress Schedule/Monthly Update is due within seventy (70) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule review period ends at sixty (60) Calendar Days after NTP, see Subsection 722.60.B - Schedule Reviews by the Department. If the Baseline Schedule has not been accepted within sixty (60) Calendar Days after NTP, an Interim Progress-Only Schedule shall be due within seventy (70) Calendar Days after NTP. The purpose of the Interim Progress-Only Schedule is to document the actual progress of all activities, including non-construction activities, from NTP until the Baseline Schedule is accepted.

SECTION 722 (Continued)

C. Contract Progress Schedules / Monthly Updates (Types A, B, C and D)

The first Contract Progress Schedule shall be submitted by the Contractor no later than seventy (70) Calendar Days after NTP. The data date for this first Progress Schedule shall be sixty (60) Calendar Days after NTP. Subsequent Progress Schedules shall be submitted monthly.

Each Contract Progress Schedule shall reflect progress up to the data date. Updated progress shall be limited to as-built sequencing and as-built dates for completed and in-progress activities. As-built data shall include actual start dates, remaining Work Days and actual finish dates for each activity, but shall not change any activity descriptions, the Original Durations, or the Original Resources (as planned at the time of bid), without the acceptance of the Engineer. If any activities have been completed out-of-sequence, the Contractor shall propose new logic ties for affected in-progress and future activities that accurately reflect the previously-approved sequencing. Alternatively, the Contractor may submit to the Engineer for approval an explanation of why an out-of-sequence activity does not require a correction and an adequate demonstration that the changes accurately represent how the activities will be built, including considerations for resources, dependencies and previously approved production rates. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

No revisions to logic ties; sequence, description or duration of future activities; or planned resource costs shall be made without prior approval by the Engineer.

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule fragnet submission. Once approved by the Engineer, the Contractor may incorporate the logic in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

For any proposed changes to the original sequence, description or duration of future activities, the Contractor shall submit to the Engineer for approval an explanation of how the proposed description or duration change reflects how the activity will be progressed, including considerations for resources and previously approved production rates. Any description or duration change that does not accurately reflect how the activity will be progressed will not be approved by the Engineer. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

SECTION 722 (Continued)

D. Short-Term Construction Schedule

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a bar chart format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule, and may be at a greater level of detail.

The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities. Short-Term Construction Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements.

Failure to submit Short-Term Construction Schedules every two (2) weeks may result in withholding of full or partial payments by the Engineer.

722.64 Impacted Schedule Requirements

A. Notice of Delay

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within three (3) Calendar Days of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

A Time Entitlement Analysis (TEA) shall consist of a descriptive narrative, prepared in accordance with Subsection 722.62.A - Narratives, and an as-built CPM schedule, which may be in the form of a schedule fragnet (that has been developed from the project's Contract Progress Schedule of Record, and illustrates the impact of a delay to the Critical Path, Contract Milestones and/or Contract Completion Date as required in Subsection 8.10 - Determination and Extension of Contract Time for Completion. TEAs shall also be used to determine the schedule impact of proposed Extra Work Orders (EWO) as also required in Subsection 8.10.

SECTION 722 (Continued)

TEAs shall be prepared and submitted in accordance with the requirements of Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements and shall be based on the Contract Progress Schedule of Record applicable at the start of the delay or impact from an EWO. A TEA fragnet must start with a specific new activity describing the work contained in either a Notice of Delay previously submitted to the Department per Subsection 722.64.A - Notice of Delay or an EWO.

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fourteen (14) Calendar Days after a request for a TEA by the Engineer for any other reason.

A TEA shall be submitted to the Engineer before any Time Extension is granted to the Contractor. Time Extensions will not be granted unless the TEA accurately reflects an evaluation of all past delays and the actual events that occurred that impacted the Critical Path. The TEA must also demonstrate a plan for the efficient completion of all of the remaining work through an optimized CPM Schedule. The analysis shall include all delays, including Contractor-caused delays, and shall be subdivided into timeframes and causes of delays.

TEAs shall incorporate any proposed activities, logic ties, resource considerations, and activity costs required to most efficiently demonstrate the schedule impacts in addition to detailing all impacts to existing activities, logic ties, the Critical Path, Contract Milestones and the Contract Completion Date. In addition, TEAs shall accurately reflect any changes made to activities, logic ties, restraints and activity costs, necessitated by an Extra Work Order or other schedule impact, for the completion of the remaining work. The Contractor shall provide TEAs that demonstrate that all delays have been mitigated to the fullest extent possible without requiring an Equitable Adjustment to the original bid basis.

All TEAs shall clearly indicate any overtime hours, additional shifts and the resource that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. The Engineer shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions if it is determined to be in the best interest of the Department to do so.

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates.

During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

The Engineer may request that the Contractor prepare a Proposal Schedule or a Recovery Schedule to further mitigate any delays that are shown in the accepted TEA/Contract Progress Schedule.

SECTION 722 (Continued)

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule within fourteen (14) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates. This requirement is critical to the Department's ability to make informed decisions regarding Contract Time and costs.

During the prosecution of the Work, should the Contractor's progress on a critical operation clearly not meet anticipated production, without cause by fault of the Department, or should a critical activity or series of activities not be staffed in accordance with the Contractor's approved Baseline Schedule resource planning, the Contractor shall be obligated to recover such delay. Recovery Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements within fourteen (14) Calendar Days of any of the cases listed above.

Recovery Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in to the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions, without additional compensation for any Contractor delays, if it is determined to be in the best interest of the Department to do so.

During the review of any Recovery Schedule, all Contract Progress Schedules shall continue to be required every month.

The Engineer may request that the Contractor prepare a Recovery Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

Changes represented in accepted Recovery Schedules shall be incorporated into the next Contract Progress Schedule.

D. Proposal Schedules

A Proposal Schedule is an alternative schedule used to evaluate proposed changes to the Contract scope or significant alternatives to previously approved approaches to complete the Work, which may include changes to activity durations, logic and sequence. For Types A and B Schedules, the Proposal Schedule shall be cost and resource-loaded.

A Proposal Schedule may be requested by the Department at any time or may be offered by the Contractor. The Engineer may request that the Contractor prepare a Proposal Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

The Contractor shall submit the Proposal Schedule within thirty (30) Calendar Days of a request from the Department.

SECTION 722 (Continued)

The Proposal Schedule shall not be considered a Schedule of Record until the logic, durations, narrative and basis of the Proposal Schedule have been accepted by the Engineer. If the Proposal Schedule took the form of a fragnet, it must be incorporated into the Contract Progress Schedule of Record showing the current progress of all other activities and the impacts/results of the changes made by the Proposal Schedule before the Proposal Schedule is accepted by the Department.

Proposal Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts.

Changes represented in accepted Proposal Schedules shall be incorporated into the next Contract Progress Schedule. During the review of any Proposal Schedule, all Contract Progress Schedules shall continue to be required every month.

E. Disputes (Types A, B, C and D)

All schedules shall be submitted, reviewed, dispositioned and accepted in the timely manner specified herein so as to provide the greatest possible benefit to the execution of this Contract.

Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

COMPENSATION

722.80 Method of Measurement and Basis of Payment (Types A, B, C and D)

The Special Provisions will specify the fixed-price amount to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this lump-sum, fixed-price bid item amount in his/her bid. Failure to do so may be grounds for the rejection of the bid.

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals will be paid for under the fixed price amount.

This fixed price amount is for payment purposes only and is separate from what the Department considers to be the Contractor's General Condition costs. If the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs shall be included in the Contractor's overall bid price.

Twenty percent (20%) of this pay item will be paid upon the Engineer's acceptance of the Contractor's Baseline Schedule, prepared and submitted in accordance with Subsection 722.63.A.

SECTION 722 (Continued)

The remaining eighty percent (80%) of this pay item will be paid in equal monthly installments distributed across the Contract Duration from Notice to Proceed (NTP) to Contractor Field Completion (CFC), less the 2 months required for the submittal and review of the Baseline Schedule in accordance with the following formula:

$$\text{Monthly Payment} = \frac{\text{Remaining Fixed Price amount (80\% of Item 100.)}}{\text{Contract Duration in whole months} - 2 \text{ months}}$$

The timely and accurate submission of the Baseline Schedule is critical to the Contract and the Department's ability to make informed decisions. Only payments under Item 740 - Engineer's Field Office and Item 748 – Mobilization will be made until the Baseline Schedule is accepted by the Engineer.

No payment for any other pay item will be processed beyond seventy-five (75) Calendar Days from Notice to Proceed (NTP) until the Baseline Schedule is accepted by the Engineer. Until the Engineer's acceptance of the Baseline Schedule, the combined total of all payments made to the Contractor will be limited to an amount no greater than the total price for Item 748 - Mobilization or 3% of the contract price, whichever is less.

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. Late submittal of missed Contract Progress Monthly Updates will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

Failure to submit schedules as and when required may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

Failure to submit schedules that are acceptable to the Engineer may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

The Schedule of Operations pay item will be adjusted to pay for only the actual quantity of schedules that have been submitted in accordance with this section.

The Contractor's failure or refusal to comply with the requirements of this Section shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence and may result in the withholding of full or partial payments by the Engineer.

SECTION 722 (Continued)

Should there be a Time Extension granted to the Contractor, the Engineer may provide an Equitable Adjustment for additional Contract Progress Schedule Updates at intervals directed by the Engineer. Item 100. will be the basis for this Equitable Adjustment.

722.82 Payment Items

100.	SCHEDULE OF OPERATIONS - FIXED PRICE $_____	LUMP SUM

COMPENSATION

746.80: Method of Measurement

Transportation shall be measured by the month per vehicle and shall be the actual number of months each vehicle is required and available to the Engineer.

746.81: Basis of Payment

Transportation Vehicles will be paid for at the contract unit price bid per month for each vehicle, which price and payment shall be full compensation for the vehicle including all fees, insurance costs, maintenance costs, fuel and lubrication costs, repair costs and all other incidental expenses necessary to provide a legally operable vehicle to the satisfaction of the Engineer.

746.82: Payment Items

*746.___	Transportation Vehicle No. ___	Month
746.6	Transportation Office Van	Month

*Item number will differentiate to indicate number of transportation vehicle.

SUBSECTION 748: MOBILIZATION

DESCRIPTION

748.20: General

This item shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, for the establishment of all contractor's field offices, buildings, and other facilities necessary for work on the project and all other work and operations which must be performed or for costs which must be incurred prior to beginning work. The unit bid price for Item 748, Mobilization shall not exceed 3% of the contract bid total, exclusive of this item. Failure to observe this requirement may result in rejection of the bid in accordance with Subsection 2.04: Preparation of Proposals.

CONSTRUCTION METHODS

748.60: General

The work required to provide the above facilities and services for Mobilization shall be done in a safe and workmanlike manner and shall conform with any pertinent local or state law, regulation or code. Good housekeeping consistent with safety shall be maintained.

COMPENSATION

748.80: Method of Measurement

Payment for Mobilization will be made on a lump sum basis.

SECTION 32 14 00

PRECAST CONCRETE UNIT PAVING

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall furnish all necessary labor, materials, equipment, transportation and services necessary to complete the work of this Section as specified herein, as shown on the drawings, or both.

B. The work of this Section includes, but is not limited to the following:

1. Concrete Unit Pavers

1.02 RELATED WORK

A. Section 01 33 23, SUBMITTALS

B. Section 03 30 00, CAST IN PLACE CONCRETE

C. Section 31 00 00, EARTHWORK

1.03 QUALITY ASSURANCE:

A. Installation shall be by a contractor and crew with at least one year of experience in placing interlocking concrete pavers on projects of similar nature.

1.04 SUBMITTALS – IN ACCORDANCE WITH SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Shop or product drawings and product data.

1. Pavers.
2. Bituminous base material

B. Full size samples of concrete paving units to indicate color and shape selections.

C. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.

D. The layout, pattern, and relationship of paving joints to fixtures and project formed details.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Concrete pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product.

B. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

1.06 ENVIRONMENTAL CONDITIONS:

A. Bituminous concrete or pavers shall not be installed during heavy rain or snowfall.

B. Pavers shall not be installed over frozen base materials.

PART 2 – PRODUCTS

2.01 CONCRETE PAVERS:

A. Concrete Pavers: Holland Stone by Unilock, Uxbridge, MA, 508-278-4536 or approved equivalent.

1. Pattern: B Running Bond
2. Color: Granite 50%, Charcoal 50%
3. Size: 4”x8”x3”

B. Pavers shall meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units. Efflorescence shall not be a cause for rejection.

2.02 Base and Joint Material:

A. Bituminous concrete base material and neoprene tack coat shall be in compliance with Worcester City Standard Specifications.

B. Joint sand shall be in compliance with Worcester City Standard Specifications.

:

PART 3 – EXECUTION

3.01 SITE PREPARATION:

A. Complete all underground utility work, curbing, foundations, and wall construction prior to commencement of subbase construction.

B. Compact the existing subgrade prior to placement of subbase material to at least 95% Standard Proctor Density per ASTM D 698.

D. Under no circumstances shall further pavement construction proceed until the subgrade has been inspected and approved by the Landscape **Architect/Engineer**.

E. Joint Sand Color to be grey.

3.02 SUBBASE AND BASE INSTALLATION:

A. Place subbase materials in conformance with Worcester City Standard Specifications.

B. The upper surface of the subbase shall be sufficiently well graded and compacted to prevent infiltration of the bedding sand into the base both during construction and throughout its service life. Segregated areas of the granular base shall be blended by the application of crushed fines that have been watered and compacted into the surface.

C. Before commencing the placing base material and the placement of the interlocking concrete pavers, the base shall be inspected by the **Landscape Architect/Engineer** to insure surface is clean and built in conformance with details. The Contractor shall verify elevation difference between bituminous concrete base and adjacent finish surfaces and top of curb to ensure concrete paver can be installed flush with bordering materials.

3.03 PAVER INSTALLATION:

A. Concrete pavers shall be installed in compliance with Worcester City Standard Specifications.

B. All work to within 3 ft. of the laying face must be left fully compacted with sand-filled joints at the completion of each day.

C. Excess joint sand shall be swept off when the job is complete.

3.04 RESET CONCRETE PAVERS:

A. All concrete pavers to be removed and reset shall be installed per Worcester City Standard Specifications.

3.05 FIELD QUALITY CONTROL:

A. Final elevations shall be checked for conformance to the drawings after removal of excess joint sand.

C. Remove and reset any pavers not conforming to the elevations shown and all other requirements previously specified herein.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASURMENT AND PAYMENT:

A. All work associated with the installation of concrete unit pavers including base material shall be compensated under bid item # 447 per square yard.

B. All work associated with resetting existing concrete unit pavers including base material shall be compensated under bid item # 909.0016 per square yard.

END OF SECTION

SECTION 33 44 19.13

STORMWATER TREATMENT SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install all precast concrete storm-water treatment systems and appurtenances in accordance with the Drawings and these specifications.

1.02 RELATED WORK:

A. Section 03 30 00, CAST-IN-PLACE CONCRETE
B. Section 31 00 00, Earthwork
C. Section 32 13 13, Portland Cement Concrete Pavement
D. Section 32 93 00 Trees, Shrubs Groundcovers and Landscaping

1.03 REFERENCES-

ASTM International (ASTM)

ASTM	A48	Standard Specification for Gray Iron Castings
ASTM	B209/B209M	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM	B308/B308M	Standard Specification for Aluminum Alloy 6061-T6 Standard Structural Profiles
ASTM	C32	Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)
ASTM	C109/C109M	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. Cube Specimens)
ASTM	C139	Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM	C150/C150M	Standard Specification for Portland Cement

ASTM	C478	Standard specification for precast reinforced concrete manhole sections
ASTM	C858	Standard specification of underground precast concrete utility structures
ASTM	C857	Standard Practice for Minimum Structural Design for Underground Precast Concrete Utility Structures
ASTM	C858	Standard Specification for Underground Precast Concrete Utility Structures
ASTM	C891	Standard Practice for Installation of Underground Precast Utility Structures
ASTM	C923/C923M	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
ASTM	C990/C990M	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

American Association of State Highway Transportation Officials (AASHTO)

AASHTO	M105	Standard Specification for Gray Iron Castings

1.04 QUALITY CONTROL INSPECTION:

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer’s acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have

a minimum compressive strength of 4,000 psi when tested in accordance with ASTM C-109. Epoxy mortar may be utilized for repairs.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Shop Drawings:

1. Structural design calculations and shop drawings, which shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed.

B. Operations and Maintenance Manual

1. Furnish four copies of the operation and maintenance manuals for each stormwater treatment system. Operation and Maintenance procedures shall be as specified by the manufacturer.

C. Performance Documentation

1. The following documentation must be submitted by the contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

a. Manufacturing Experience: The manufacturer shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

D. Product Data

1. Submit manufacturer's product data for all stormwater treatment components.

E. Certification

1. Manufacturer shall submit a letter of certification that the complete system meets or exceeds technical and packaging requirements. Biofiltration media packaging must bear a batch number making from the manufacture which matches a letter from the manufacture certifying performance testing of the batch to meet or exceed the required infiltration rate.

F. Drawings

1. Manufacture shall provide dimensional drawing including details for construction, materials, specifications

G. Manufacturer's Warranty

1. Manufacturer shall provide a warranty for all components of the HPMBS for a period of one year provided the unit is installed, operated and maintained in accordance with the manual.

H. Substitutions

1. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop Drawings

Structural design calculations and shop drawings, which shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed.

Affidavit on Patent Infringement

The Contractor shall submit to the Engineer, prior to installation of the stormwater treatment system, an affidavit regarding patent infringement rights stating that any suit or claim against the Owner due to alleged infringement rights shall be defended by the Contractor who will bear all the costs, expenses and attorney's fees incurred thereof.

Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Laboratory Data

The stormwater treatment system supplier shall provide documentation of Total Suspended Solids (TSS) removal efficiency from laboratory testing conducted on the supplier’s full-scale system. The documentation shall include:

a. TSS removal efficiency versus operating rate for the full operating range of the stormwater treatment system for a uniform 50-micron particle size.
b. TSS removal calculations for each system specified herein. The calculations must demonstrate that the system(s) is capable of achieving a net annual TSS removal efficiency as required by local regulations and as based upon a uniform 50-micron particle size and the best available rainfall data for the project site location.

2. Field Test Data

The stormwater treatment system supplier shall provide documentation of TSS removal efficiency from field testing conducted on an installed system. The documentation shall be in accordance with the following:

a. The testing and documentation shall have been conducted by an independent third party.
b. The testing and documentation shall include at least 10 storms.
c. The testing and documentation must show TSS removal results that meet or exceed the performance requirements for the system(s) specified herein.

3. Manufacturing Experience

The stormwater treatment supplier shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

Operation and Maintenance Manuals

Furnish four copies of the operation and maintenance manuals for the stormwater treatment systems.

1.07 GENERAL

A. Contractor shall furnish and install a precast concrete tree filter system, complete and operable as shown and specified herein, and in accordance with the requirements of the plan and contract documents.
B. Precast concrete structure shall be manufactured at a concrete products plant with approved facilities. A sample structure shall be made available for inspection by the Engineer. Selected structure shall meet the requirements of the manufacturer.

PART 2 - PRODUCTS

2.01 STORM TREE FILTER SYSTEM

A. Each stormwater treatment system shall be a “Storm Tree Filter System with Interior Sump” as manufactured by StormTree, 24 Corliss Street, Suite 9092, Providence, RI 02940, (401)-626-8999, www.storm-tree.com, or approved equal.

B. Each fiberglass tree grate and cast iron fiberglass assembly shall be fabricated by U.S. Foundry (to meet requirements by the “Buy American” Provisions; U.S. Foundry | Buy American Provisions (usfoundry.com)

C. Storm Tree Filter Design and Materials

1. Precast Concrete Structure: the precast concrete structure shall consist of a four-sided, two chamber rectangular box with open sides below the elevation of the root ball and an open bottom with an interior sump with an enclosed bottom. The two chambers shall be separated by a precast weir as shown on the Plan. The sump chamber shall have weep holes cast into one or more sidewalls. The dimensions of the structure shall match those shown on the Plan. The curb portion of the structure shall conform to the requirements of and be capable of supporting HS-20 wheel loading based on local regulatory specifications unless otherwise modified or specified by the engineer.

2. Grating: The structure shall include a two-piece fiberglass (tree) grate. The grating shall be designed to withstand a minimum pedestrian loading of 500 lbs/ft2 as a uniform live loading during the life of the installation. All pieces shall be removeable allowing access for the cleaning and maintenance of the system interior. The two-piece grate shall have an opening in each piece that forms a square to provide an opening for a planted tree. The grates shall be recessed flush into the top of the precast structure as shown on the plan. The grate shall be of fiberglass fabrication and be ADA compliant having no greater than a .50" opening. The fiberglass grate shall be 1-1/2 inches deep and supported in the recess of the precast concrete.

3. An Engineered Media consisting of both organic and inorganic aggregates with a minimum depth of 24" or as indicated on the plans. The media is designed to provide high flow rate infiltration and promote healthy plant growth. The Engineered Media shall be free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of all grasses or other noxious weeds. Engineered Media shall consist of the following components:

   a. 60-70% Sand: ASTM standard F 2396 or 2mm USGA specification sand for golf course fairway top dressing.
   b. 15-25 % Topsoil of one of the following classifications per USDA Soil Texture:
      -Fine Sandy Loam or Sandy Loam
      -Topsoil shall have the following mechanical analysis:

Textural Class	Percentage of Total Weight	Average Percentage
Sand (0.05 – 2.0mm)	50 – 80	70
Silt (0.002 – 0.05mm)	15 – 30	20
Clay (Less than 0.002mm)	5 – 10	10

   c. 5-10% Compost (Organic Matter): Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well

composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic.
Compost shall have the following properties:

Parameters	Range
pH	6.5 – 7.5
Moisture content	35% - 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N ratio	15 - 30:1
Particle Size	< 1/2-inch
Organic Matter Content	> 40%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

d. PH level of engineering soil media shall be 5.2-7.0.

4. A geotextile mesh, meeting the manufacturer's requirements placed between the media and stone layers. The mesh shall be such as to allow for the passage of water and restricting sediment transport while minimizing occlusion.
5. A perforated PVC underdrain pipe of specific dimension within a washed crush stone layer to convey infiltrating water and provide for sediment accumulation. The underdrain pipe is connected to a vertical closed riser pipe with an open top to serve for overflow/bypass, or access for cleanout.

6. Angular, crushed, washed stone with a dimension of between 0.25-0.75 inches.

2.02 FOCAL POINT HIGH-PERFORMANCE MODULAR BIOFILTRATION (HPMBS) SYSTEM

A. Focal Point HPMBS shall be manufactured by Convergent Water Technologies Inc., (800) 711-5428, www.convergentwater.com (or approved equal)

B. Plant Component
   2. Planting shall be in accordance with construction documents.

C. Biofilter Components
   1. This component employs a high performance cross-section in which each element is highly dependent on the others to meet the performance specifications for the complete system.

   2. As indicated in the approved drawings, the elements of the biofilter include:
      a. Mulch protective layer (if specified)
      b. An advanced high infiltration rate biofiltration planting media bed which utilizes physical chemical and biological mechanisms of the soil, plant, and microbe complex to remove pollutants found in storm water runoff.
      c. A separation layer which utilizes the concept of bridging to separate the biofiltration media from the underdrain without the use of geotextile fabrics.

d. A wide aperture mesh layer utilized to prevent bridging stone from entering the underdrain/storage element.
e. A modular, high infiltration rate flat pipe style underdrain/ storage system which is designed to directly infiltrate or exfiltrate water through its surface. The modular underdrain must provide a minimum of 95% void space.

3. Energy Dissipation Component
   a. An energy Dissipation Component is typically specified to slow and spread out water as it enters the system. This component is dependent upon the design in the approved drawings, but typically consists of a rock gabion, rock filter dam, or dense vegetation element such as native grasses, either surrounding the biofiltration component or lacted immediately upstream.

4. Pretreatment Component
   a. Pretreatment, when specified, is typically accomplished by locating the biofiltration component downstream of a swale, curb cut / rock apron, sediment forebay, deep or shallow sump water quality manhole, etc. These bmps should target trash and debris and medium to course sediment.

5. Observation maintenance Component
   a. An observation and maintenance port shall be installed per the approved drawings to provide for easy inspection of the underdrain/storage element, and cleanout access if needed.

6. Extreme Event Overflow (by others)
   a. An extreme event overflow should be located external to, but near the biofiltration element to provide bypass when needed. This may be an overland flow bypass structure, beehive overflow grate structure, or equivalent that serves the purpose. Beehive overflow structure should include a removable filter insert to provide a minimum 50% TSS removal and control of gross pollutants, trash and floatables.

7. Mulch
   a. Mulch shall be double shredded hardwood (non-floatable), shall comply with the type and size required by the approved drawings, and shall be screened to minimize fines. Rock mulch is an alternative to wood-based mulch and typically consists of clean, rounded river rock (3-4” diam in size).

8. Biofiltration Media
   a. Biologically active biofiltration media shall be visually inspected to ensure appropriate volume, texture and consistency with the approved drawings, and must bear a batch number marking from the manufacturer which certifies performance testing of the batch to meet to exceed the required infiltration rate of 100 in/hour. A third party laboratory test must be provided to certify the 100i in/hour rate.

b. Pollutant removal performance, composition, and characteristics of the biofiltration media must meet or exceed the following minimum standards as demonstrated by testing acceptable to the project engineer:

Pollutant	Removal Efficiency
TSS	91%
Phosphorus	66%
Nitrogen	48%
Composition and Characteristics	
Sand - Fine	< 5%
Sand – Medium	10% - 15%
Sand – Coarse	15% - 25%
Sand – Very Coarse	40% - 45%
Gravel	10% - 20%
Infiltration Rate	>100 inches per hour
Peat Moss*	5% - 15%
*** Peat Moss Specification**	
Listed by Organic Materials Review Institute 100% natural peat (no composted, sludge, yard or leaf waste) Total Carbon >85% Carbon to Nitrogen Ratio 15:1 to 23:1 Lignin Content 49% to 52% Humic Acid >18% pH 6.0 to 7.0 Moisture Content 30% to 50% 95% to 100% passing 2.0mm sieve > 80% passing 1.0mm sieve	

9. Underdrain/Storage System
   a. Underdrain/ storage components shall be manufactured in an ISO certified facility and be manufactured from at least 90% post-consumer recycled materials.
   b. Underdrain/Storage components shall meet or exceed the following characteristics:

Property	Value
Surface Void Area	≥ 85%
Unit Weight	3.25 lbs/cf
Service Temperature	-14° to 167°
Unconfined Crush Strength	32.48 psi
180 Day Creep Test	
Load Applied – Initial and Sustained	11.16 psi
• Creep Sustained – After 180 Days	0.20 inches
• Creep Sustained – After 180 Days	1.13 %
• Projected Creep – 40 years	1.72%

10. Separation Mesh
    a. Separation mesh shall be composed of high tenacity monofilament polypropylene yarns that are woven together to produce an open mesh geotextile which shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids. The mesh shall meet or exceed the following characteristics.

Properties	Test Method	Unit	Min Ave Roll Value	
			MD	CD
Tensile Strength	ASTM D4595	kN/m (lbs/ft)	21 (1440)	25.3 (1733)
Creep Reduced Strength	ASTM D5262	kN/m (lbs/ft)	6.9 (471)	8.3 (566)
Long Term Allowable Design Load	GRI GG-4	kN/m (lbs/ft)	5.9 (407)	7.2 (490)
UV Resistance (at 500 hours)	-	% strength retained	90	
Aperture Size (machine direction)	-	mm (in)	2 (0.08)	
Aperture Size (cross machine direction)	-	mm (in)	2 (0.08)	
Mass/Unit Area	ASTM D5261	g/m^2 (oz/yd^2)	197 (5.8)	

11. Bridging Stone
    a. Bridging stone shall be 3/8" pea gravel, or other diameter sized to prevent migration of filter media, as specified by manufacturer.
    b. Biofiltration media shall be segregated from any other aggregate materials and shall be protected against contamination, including contamination from any stormwater runoff from areas of the site which are not stabilized.

2.03 HYDRODYNAMIC SEPERATOR (HDS)

A. Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.

B. Each stormwater treatment system shall be a VortechS^{TM} System as manufactured by Contech Engineered Solutions LLC **or approved equal.**

C. Concrete for precast storm-water treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:

1. The wall thickness shall not be less than 6-inches (152 mm) or as shown on the dimensional drawings. In all cases the top slab and wall thickness shall be no less

than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a Licensed Professional Engineer.

2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II Portland cement conforming to ASTM C 150.

4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.

5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s) and shall be sealed by the Contractor with a rubber seal system meeting the requirements of ASTM C923.

D. Internal aluminum plate components shall be ¼-inch (6 mm) thick aluminum alloy 5052-H32 in accordance with ASTM B 209.

E. Internal aluminum angle components shall be ¼-inch (6 mm) thick aluminum alloy 6063 in accordance with ASTM B 308.

F. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

G. Casting for manhole frames and covers shall be in accordance with ASTM A48, CLASS 30B and AASHTO M105.

H. A bitumen sealant in conformance with ASTM C 990 shall be utilized in affixing the aluminum swirl chamber to the concrete vault.

2.04 HDS PERFORMANCE

A. Unless otherwise indicated, all equipment used shall provide the results listed in the schedule below. Proposed equipment shall be submitted in writing to the Engineer, along with sufficient data supported by certified tests that the system can meet the end results shown in the table and this specification section:

Instruction to Specifier – Insert appropriate information into the table below for your project, including location, model no., treatment capacity and storage capacity and delete this instruction.

Table 2.02

Location	Vortechs Model (1)	Design Treatment Capacity (cfs) (2)	Sediment Storage (yd^3) (2)

(1) Systems shall be Vortechs Models as noted or approved equal.
(2) The systems shall be capable of providing above flow capacities and sediment storage volumes.

B. Each stormwater treatment system shall include a circular aluminum "swirl chamber" (or "grit chamber") with a tangential inlet to induce a swirling flow pattern that will accumulate and store settle-able solids in a manner and a location that will prevent re-suspension of previously captured particulates.

C. Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

D. Each stormwater treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a uniform 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity listed in Table 2.02 and shall not resuspend trapped sediments or reentrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.

E. Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in Table 2.02. The systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

F. A feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

G. The stormwater treatment system manufacturer shall furnish documentation which supports all product performance claims and features, storage capacities and maintenance requirements.

H. Stormwater treatment systems shall be completely housed within one structure.

2.05 TREE FILTER PERFORMANCE

A. Function: The tree filter system shall function to remove pollutants by the following treatment process: sedimentation, physical, and biological processes.

B. Pollutants: The tree filter system is designed to reduce or remove debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

C. Bypass: The tree filter system shall utilize an internal bypass to divert excessive flows.

PART 3 - EXECUTION

3.01 FOCAL POINT AND STORM TREE BOX FILTER INSTALLATION

A. Each stormwater treatment system shall be installed per the manufacturer's specifications.

3.02 HDS INSTALLATION

A. Each stormwater treatment system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise required by the Engineer.

B. Place the precast base unit on a granular subbase of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.

C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990 along the construction joint in the section that is already in place.

D. After setting the base and wall or riser sections, install the circular swirl chamber wall by bolting the swirl chamber to the side walls at the three (3) tangent points and at the 3-inch wide inlet tab using HILTI brand concrete anchors or equivalent 1/2-inch diameter by 2-3/4-inch minimum length at heights of approximately 3-inches off the floor and at the mid-height of the completed trap (at locations of pre-drilled holes in aluminum components). Seal the bottom edge of the swirl chamber to the trap floor with the supplied aluminum angle flange. Adhere ¼-inch thick by 1-inch wide neoprene sponge material to the flange

with half of its width on the horizontal leg of the flange and half of its width on the vertical leg. The aluminum angle flange shall be affixed to the floor with a minimum 3/8-inch diameter by 2-3/4-inch drop in wedge anchor at the location of the predrilled holes. Affix the swirl chamber to the flange with hex head ¼-inch x 1-1/2-inch zinc coated self- tapping screws at the location of the predrilled holes. Seal the vault sidewalls to the outside of the swirl chamber from the floor to the same height as the inlet pipe invert using butyl mastic or approved equal.

E. Prior to setting the precast roof section, bitumen sealant equal to ASTM C990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least 1-inch greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.

F. After setting the precast roof section of the storm-water treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a ¼-inch maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Storm-water Treatment Systems shall conform to ASTM specification C 891 “Standard Practice for Installation of Underground Precast Utility Structures”.

G. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.

H. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASURMENT AND PAYMENT:

A. All work associated with the installation of modular stormwater components and structures shall include geotextile fabric, soil media and mulch, stone, concrete framing, piping and base materials and be paid for under bid items for **each**:

-909.0012- Hydrodynamic Separator
-909.0013- Focal Point System
- 909.0017-Storm Tree Box Filter

END OF SECTION

SECTION 33 46 23

MODULAR STORMWATER STORAGE UNITS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install the underground stormwater system and appurtenances in accordance with the Drawings and these specifications.

1.02 RELATED WORK:

A. Section 31 00 00, EARTHWORK

1.03 QUALITY CONTROL INSPECTION:

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer’s acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 00 SUBMITTAL PROCEDURES, SUBMIT THE FOLLOWING:

A. Shop Drawings

Structural design calculations and shop drawings, which shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed.

B. Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Manufacturing Experience

   The manufacturer shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

C. Operation and Maintenance Manuals

1. Furnish four copies of the operation and maintenance manuals for the stormwater treatment system. Operation and Maintenance procedures shall be as specified by the manufacturer.

D. Product Data

1. Submit manufacturer's product data for all underground stormwater systems.

E. Certification

1. Manufacturer shall submit a letter of certification that the complete system meets or exceeds technical and packaging requirements.

F. Drawings

1. Manufacturer shall provide dimensional drawing including details for construction, materials, specifications.

G. Manufacturer's Warranty

1. Manufacturer shall provide warranty for all components of the HPMBS for a period of one year provided the unit is installed, operated and maintained in accordance with the manual.

H. Substitutions

1. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening.

PART 2 - PRODUCTS

2.01 MATERIALS AND DESIGN:

A. Underground Stormwater System, materials, and design shall conform to those indicated on the drawings, or, if applicable, in shop drawings and installation instructions provided by the system manufacturer.

2.02 R-TANK UNITS

A. Contractor shall install R-TANK HD UNIT as manufactured by Ferguson Waterworks, (800)-448-3636, www.acfenvironmental.com

B. GEOSYNTHETICS
   1. Geotextile: A geotextile envelope is required to prevent backfill material from entering the R-Tank Modules
      a. The standard geotextile shall be an 8 oz per square yard nonwoven geotextile (ACF No80 or equivalent)
   2. Geogrid: For installations subject to traffic loads and/or required by project plans, install geogrid (ACF BX12 or equivalent) to reinforce backfill above the R-Tank system. Geogrid is not always required for R-Tank installation and is often not required for non-traffic load applications.

C. BACKFILL & COVER MATERIALS
   1. Bedding Materials: Stone (angular and smaller than 1.5” diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System shall be used below the R-Tank system (3” minimum). Material must be free from lumps, debris, and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation. For infiltration applications, bedding material shall be free draining.
   2. Side and Top Backfill: Material must be free from lumps, debris, and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.
   3. Traffic Applications- Free draining material shall be used adjacent to (24” minimum) and above (for the first 12”) the R-Tank system.
      a. For HD and SD modules, backfill materials shall be free draining stone (angular and smaller than 1.5 in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System).
      b. For UD modules with less than 14” of top cover, backfill materials shall be free draining stone (angular and small than 1.5” in diameter). The use of soil backfill on the sides and top of the UD module is not permitted unless the modules are installed outside of traffic areas or with cover depths of 14” or more. The top backfill material (from top of module to bottom of pavement base or 12” maximum must be consistent with side backfill.
   4. Non-Traffic/ Green Space Applications- For all R-Tank modules installed in green spaces and not subjected to vehicular loads, backfill materials may either follow the guidelines for Traffic Applications above, or the top backfill layer (12” minimum) may consist of AASHTO #57 stone blended with 30-40% (by volume) topsoil to aid in establishing vegetation.
   5. Additional Cover Materials : Structural fill shall consist of granular materials meeting the gradational requirements of SM, SP, SW, GM, GW as classified by the Unified Soil Classification System. Structural fill shal have a maximum of 25% passing the No. 200 sieve, shall have a maximum clay content of 10 percent and maximum Plasticity Index of 4. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.

2.03 STORMWATER PRETREATMENT COMPONENTS: RAIN GUARDIAN TURRET

D. Each rain guardian turret pretreatment chamber shall be manufactured by Stoneworks Architectural Precast/Cast Stone, 11555 205th Ave NW, Elk River, MN 55330 (763)-633-2200, www.stoneworksap.com, or approved equal.

E. Rain Guardian Turret Design and Materials

1. Top Grate mechanically separates larger debris pieces from stormwater runoff, thereby increasing storage space for sediment and finer debris within the unit. In addition, the top grate of the box must minimally support pedestrian foot traffic loads due to frequent positioning in the road.

2. Impermeable side walls wen connected to water permeable filter sidewall, create a debris and sediment trap. Chamber therefore allows heavier solids to settle and collect in an easy to clean location. The sidewalls also contain flow, thereby preventing inlet erosion.

3. Water permeable filter sidewall is independently connected to the impermeable side walls. Permeable filter allows for the box to dry out between runoff events, easing maintenance by preventing the need to remove sediment/debris in a slurry state. It also prevents anoxic conditions and habitat for mosquito reproduction.

4. The concrete dry filter box must provide for high volume overflow during large storm events such that water within the structure does not overtop the sidewalls, which would reduce the box's ability to retain floatables and maintain a stable inlet. The overflow points also ensure stormwater will not bypass the BMP until it reaches capacity.

5. The box should include a splash pad downstream of the principal (permeable filter wall) and emergency overflow (concrete weir) points to reduce scouring below the box (i.e. within the aggregate base and BMP soil).

6. All components must be easily cleaned without specialized equipment.

7. Turret shall have a 3 point pick using recessed lifting pockets with a standard hook.

8. Fiberglass top grate shall be 32 lbs, 1-1/2" thick- 1,760 lb concentrated load or 409 lb/sq-ft uniform load.

9. Concrete filter box shall comply to the following values:

PROPERTY OF BOX INLET STRUCTURE	VALUE OR METHOD
Steel reinforced, cold joint secured monolithic concrete structure, weight	1,030 lbs.
Concrete minimum compressive strength	4,500 psi at 28 days
Concrete air entrained	5-8.5% by volume
Manufactured and designed standard	ASTM C858
Standard exterior dimensions	46” x 50” base, 19.5” total height

10. The stormwater pretreatment component of the underground stormwater chamber system has been designed to meet the requirements of the Massachusetts Stormwater Handbook and has been approved by the local Conservation Commission. Configuration of the stormwater pretreatment component of the system must be as indicated on the plans in order to comply with local approval. If the Contractor wishes to propose an alternative pretreatment approach, the Contractor must secure approval from the local Conservation Commission for the alternative approach at no additional cost to the owner.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Each stormwater system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise required by the Engineer.

B. Installation of Chambers, stone and fabric shall be completed as indicated in the manufacturer’s installation instructions.

3.02 MAINTENANCE

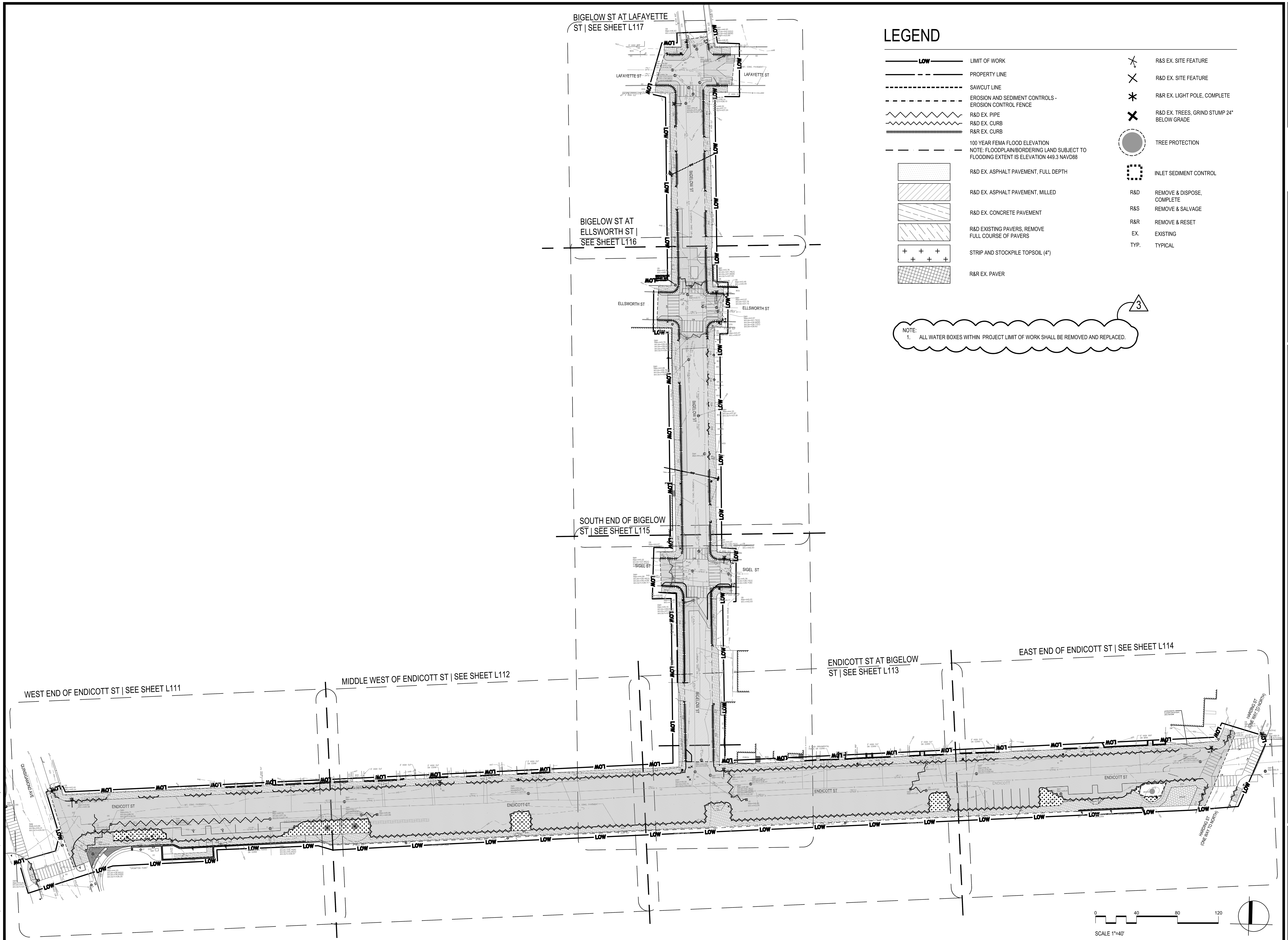
A. Maintenance for each stormwater system shall be in accordance to manufacturer’s specifications.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASURMENT AND PAYMENT:

A. All work associated with the installation of modular stormwater components shall include geotextile fabric, soil media and mulch, stone, base materials and be compensated under bid items for **each**:
-909.0014- R-Tank System
-909.0015-Rain Guardian Turret

END OF SECTION



LEGEND

LOW	LIMIT OF WORK
	PROPERTY LINE
	SAWCUT LINE
	EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
	R&D EX. PIPE
	R&D EX. CURB
	R&R EX. CURB
	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
	R&D EX. ASPHALT PAVEMENT, FULL DEPTH
	R&D EX. ASPHALT PAVEMENT, MILLED
	R&D EX. CONCRETE PAVEMENT
	R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
	STRIP AND STOCKPILE TOPSOIL (4")
	R&R EX. PAVER
	R&S EX. SITE FEATURE
	R&D EX. SITE FEATURE
	R&R EX. LIGHT POLE, COMPLETE
	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
	TREE PROTECTION
	INLET SEDIMENT CONTROL
R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

3

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

Project:
GREEN ISLAND PHASE II

WORCESTER, MA 01610

Weston & Sampson
Weston & Sampson Engineers, Inc.
85 Devonshire Street, 3rd Floor
Boston, MA 02109
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description
1	8/21/2025	ADDENDUM NO. 3
2	9/04/2025	ADDENDUM NO. 4
3	10/1/2025	ADDENDUM NO. 9

COA:

Seal:

Issued For:

BID DOCUMENTS

Scale: AS SHOWN

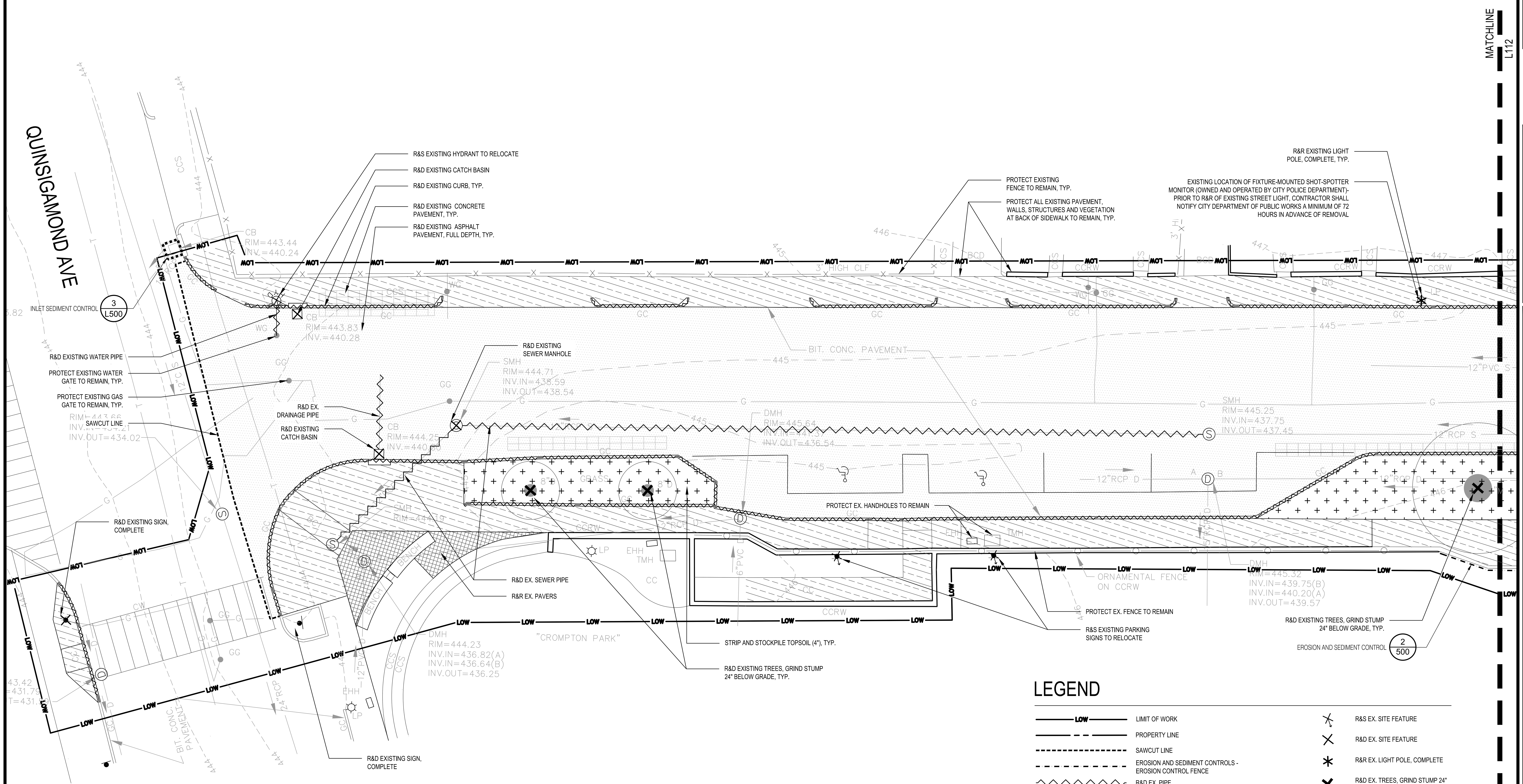
Date:	11/01/ 2024
Drawn By:	TZ, KA
Reviewed By:	MS
Approved By:	BK
W&S Project No.:	ENG_22-1008
W&S File No.:	

Drawing Title:

OVERALL SITE PREPARATION PLAN

Sheet Number:

L110


QUINSIGAMOND AVE
R&S EXISTING HYDRANT TO RELOCATE
R&D EXISTING CATCH BASIN
R&D EXISTING CURB, TYP.
R&D EXISTING CONCRETE PAVEMENT, TYP.
R&D EXISTING ASPHALT PAVEMENT, FULL DEPTH, TYP.
PROTECT EXISTING FENCE TO REMAIN, TYP.
PROTECT ALL EXISTING PAVEMENT, WALLS, STRUCTURES AND VEGETATION AT BACK OF SIDEWALK TO REMAIN, TYP.
R&R EXISTING LIGHT POLE, COMPLETE, TYP.
EXISTING LOCATION OF FIXTURE-MOUNTED SHOT-SPOTTER MONITOR (OWNED AND OPERATED BY CITY POLICE DEPARTMENT)- PRIOR TO R&R OF EXISTING STREET LIGHT, CONTRACTOR SHALL NOTIFY CITY DEPARTMENT OF PUBLIC WORKS A MINIMUM OF 72 HOURS IN ADVANCE OF REMOVAL
INLET SEDIMENT CONTROL
3
L500
R&D EXISTING WATER PIPE
PROTECT EXISTING WATER GATE TO REMAIN, TYP.
PROTECT EXISTING GAS GATE TO REMAIN, TYP.
SAWCUT LINE
R&D EXISTING SEWER MANHOLE
R&D EX. DRAINAGE PIPE
R&D EXISTING CATCH BASIN
R&D EXISTING SIGN, COMPLETE
BIT. CONC. PAVEMENT
PROTECT EX. HANDHOLES TO REMAIN
R&D EX. SEWER PIPE
R&R EX. PAVERS
"CROMPTON PARK"
ORNAMENTAL FENCE ON CCRW
STRIP AND STOCKPILE TOPSOIL (4"), TYP.
R&D EXISTING TREES, GRIND STUMP 24" BELOW GRADE, TYP.
PROTECT EX. FENCE TO REMAIN
R&S EXISTING PARKING SIGNS TO RELOCATE
R&D EXISTING TREES, GRIND STUMP 24" BELOW GRADE, TYP.
EROSION AND SEDIMENT CONTROL
2
500
R&D EXISTING SIGN, COMPLETE
MATCHLINE L112
MATCHLINE L112

LEGEND

Symbol	Description
LOW	LIMIT OF WORK
	PROPERTY LINE
	SAWCUT LINE
	EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
	R&D EX. PIPE
	R&D EX. CURB
	R&R EX. CURB
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	R&R EX. PAVER
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	R&D EX. SITE FEATURE
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	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
	TREE PROTECTION
	INLET SEDIMENT CONTROL
R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

0 10 20 30
SCALE 1"=10'

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

3

Project:
GREEN ISLAND PHASE II

WORCESTER, MA 01610

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COA:

Seal:

Issued For:
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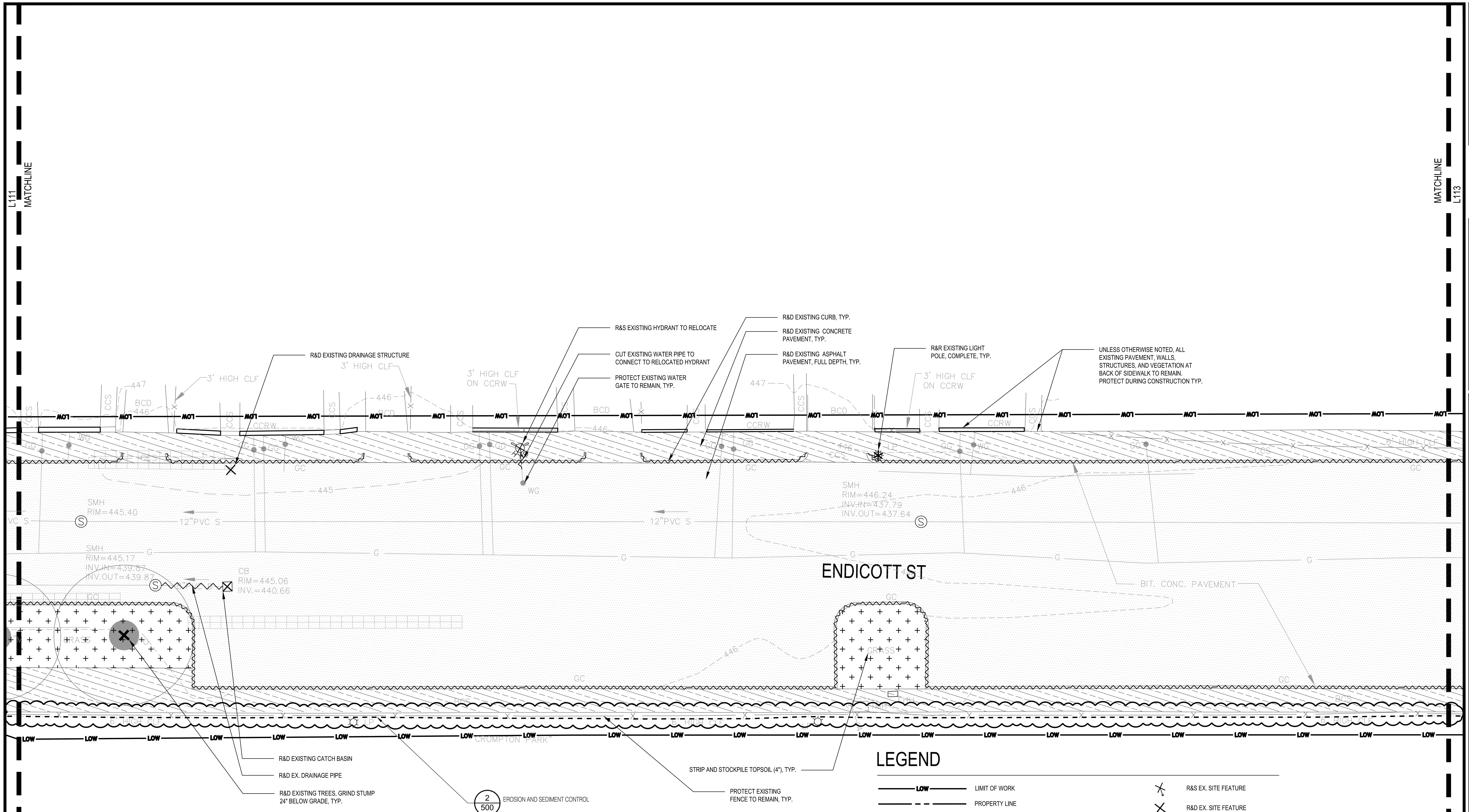
W&S Project No.: ENG_22-1008
W&S File No.:

Drawing Title:
SITE PREPARATION ENLARGEMENT PLAN

Sheet Number:
L111



LEGEND

LOW	LIMIT OF WORK
	PROPERTY LINE
	SAWCUT LINE
	EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
	R&D EX. PIPE
	R&D EX. CURB
	R&R EX. CURB
	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
	R&D EX. ASPHALT PAVEMENT, FULL DEPTH
	R&D EX. ASPHALT PAVEMENT, MILLED
	R&D EX. CONCRETE PAVEMENT
	R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
+ + +	STRIP AND STOCKPILE TOPSOIL (4")
	R&R EX. PAVER
	R&S EX. SITE FEATURE
	R&D EX. SITE FEATURE
	R&R EX. LIGHT POLE, COMPLETE
	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
	TREE PROTECTION
	INLET SEDIMENT CONTROL
R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

3

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

0 10 20 30
SCALE 1"=10'

Project: GREEN ISLAND PHASE II

WORCESTER, MA 01610

Weston & Sampson

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2	9/04/2025	ADDENDUM NO. 4
3	10/1/2025	ADDENDUM NO. 9

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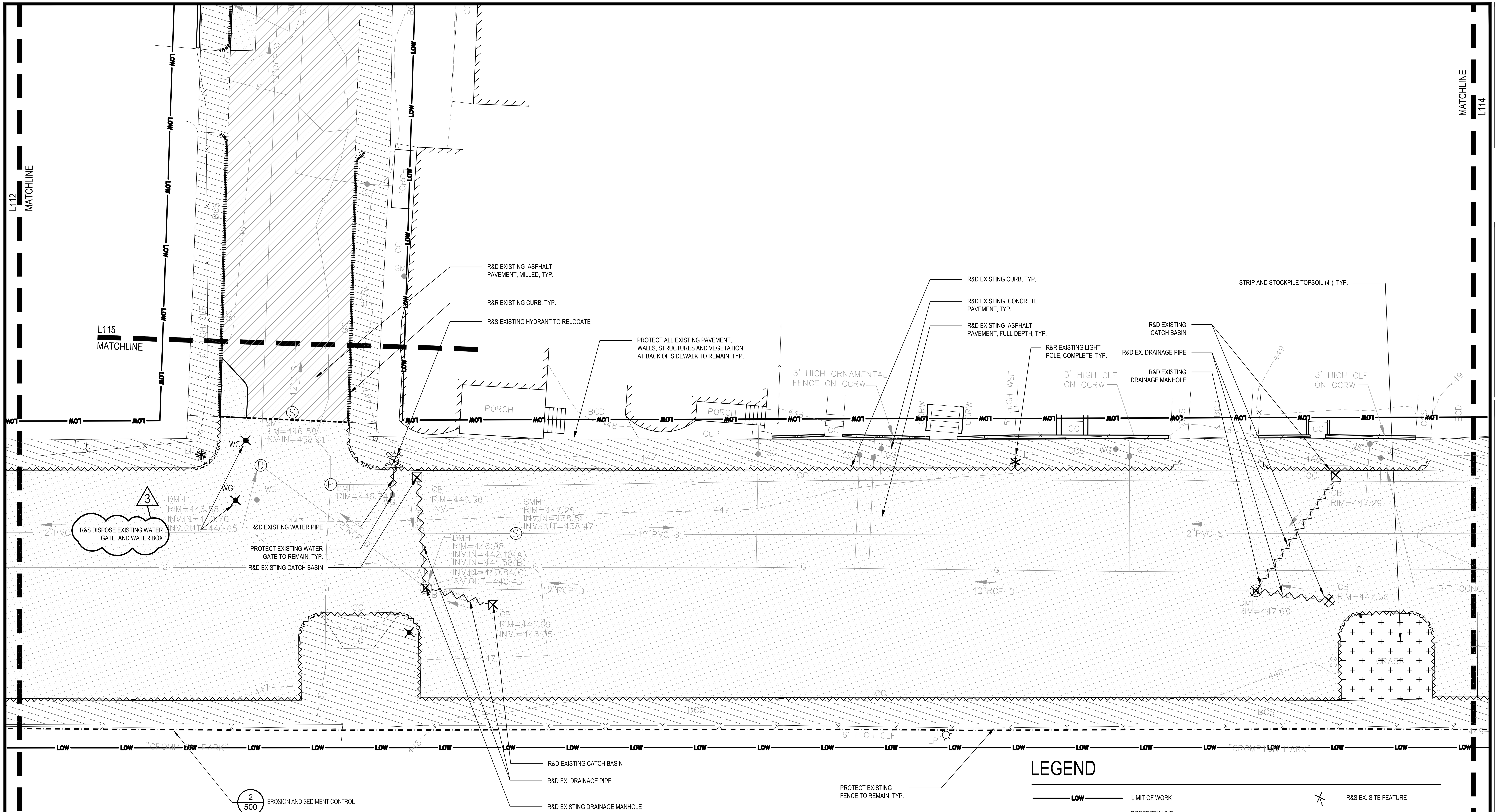
Drawing Title: SITE PREPARATION ENLARGEMENT PLAN

Sheet Number: L112



LEGEND

LOW	LIMIT OF WORK
	PROPERTY LINE
	SAWCUT LINE
	EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
	R&D EX. PIPE R&D EX. CURB R&R EX. CURB
	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
	R&D EX. ASPHALT PAVEMENT, FULL DEPTH
	R&D EX. ASPHALT PAVEMENT, MILLED
	R&D EX. CONCRETE PAVEMENT
	R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
	STRIP AND STOCKPILE TOPSOIL (4")
	R&R EX. PAVER
	R&S EX. SITE FEATURE
	R&D EX. SITE FEATURE
	R&R EX. LIGHT POLE, COMPLETE
	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
	TREE PROTECTION
	INLET SEDIMENT CONTROL
R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED. (3)

0 10 20 30
SCALE 1"=10'

Project: GREEN ISLAND PHASE II
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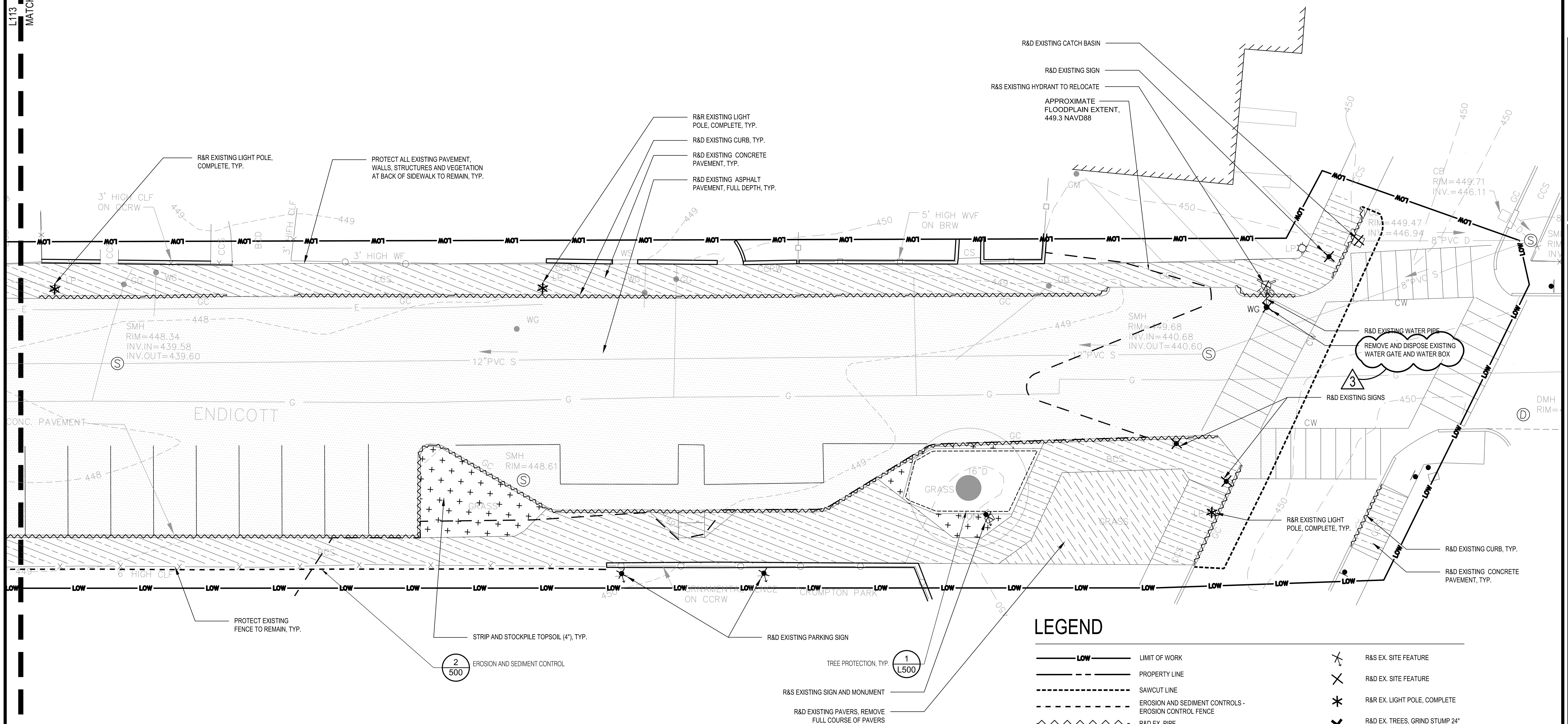
Drawing Title: SITE PREPARATION ENLARGEMENT PLAN

Sheet Number: L113


L113 MATCHLINE
R&R EXISTING LIGHT POLE, COMPLETE, TYP.
PROTECT ALL EXISTING PAVEMENT, WALLS, STRUCTURES AND VEGETATION AT BACK OF SIDEWALK TO REMAIN, TYP.
R&R EXISTING LIGHT POLE, COMPLETE, TYP.
R&D EXISTING CURB, TYP.
R&D EXISTING CONCRETE PAVEMENT, TYP.
R&D EXISTING ASPHALT PAVEMENT, FULL DEPTH, TYP.
R&D EXISTING CATCH BASIN
R&D EXISTING SIGN
R&S EXISTING HYDRANT TO RELOCATE
APPROXIMATE FLOODPLAIN EXTENT, 449.3 NAVD88
R&D EXISTING WATER PIPE
REMOVE AND DISPOSE EXISTING WATER GATE AND WATER BOX
R&D EXISTING SIGNS
R&R EXISTING LIGHT POLE, COMPLETE, TYP.
R&D EXISTING CURB, TYP.
R&D EXISTING CONCRETE PAVEMENT, TYP.
ENDICOTT
CONC. PAVEMENT
CRUMPTON PARK
12"PVC S
SMH RIM=448.34 INV.IN=439.58 INV.OUT=439.60
SMH RIM=449.68 INV.IN=440.68 INV.OUT=440.60
SMH RIM=448.61
CB RIM=449.71 INV.=446.11
RIM=449.47 INV.=446.94
8"PVC D
3' HIGH CLF ON CCRW
3' HIGH WVF ON BRW
ORNAMENTAL FENCE ON CCRW
6' HIGH CLF
GRASS
PROTECT EXISTING FENCE TO REMAIN, TYP.
STRIP AND STOCKPILE TOPSOIL (4"), TYP.
2 500 EROSION AND SEDIMENT CONTROL
R&D EXISTING PARKING SIGN
TREE PROTECTION, TYP. 1 L500
R&S EXISTING SIGN AND MONUMENT
R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

LEGEND

Symbol	Description
—LOW—	LIMIT OF WORK
— — —	PROPERTY LINE
- - - -	SAWCUT LINE
— - — -	EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
	R&D EX. PIPE
	R&D EX. CURB
	R&R EX. CURB
— — —	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
	R&D EX. ASPHALT PAVEMENT, FULL DEPTH
	R&D EX. ASPHALT PAVEMENT, MILLED
	R&D EX. CONCRETE PAVEMENT
	R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
+ + +	STRIP AND STOCKPILE TOPSOIL (4")
	R&R EX. PAVER
	R&S EX. SITE FEATURE
	R&D EX. SITE FEATURE
*	R&R EX. LIGHT POLE, COMPLETE
✕	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
●	TREE PROTECTION
	INLET SEDIMENT CONTROL
R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

0 10 20 30
SCALE 1"=10'

Project: GREEN ISLAND PHASE II

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W&S File No.:	

Drawing Title: SITE PREPARATION ENLARGEMENT PLAN

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R&S EXISTING HYDRANT TO RELOCATE

R&D EXISTING WATER PIPE

PROTECT EXISTING WATER GATE TO REMAIN, TYP.

SAWCUT LINE, TYP.

3 / L500 INLET SEDIMENT CONTROL, TYP.

R&R EXISTING LIGHT POLE, COMPLETE, TYP.

PROTECT ALL EXISTING PAVEMENT, WALLS, STRUCTURES AND VEGETATION AT BACK OF SIDEWALK TO REMAIN, TYP.

R&R EXISTING CURB, TYP.

R&D EXISTING CONCRETE PAVEMENT, TYP.

R&D EXISTING ASPHALT PAVEMENT, MILLED, TYP.

L116 MATCHLINE

MATCHLINE L113

R&D EXISTING CATCH BASIN

R&D EXISTING SIGN

PROTECT EXISTING FENCE TO REMAIN, TYP.

R&D EXISTING ASPHALT PAVEMENT, FULL DEPTH, TYP.

R&D EXISTING SIGN

R&D EXISTING CATCH BASIN

R&D EX. DRAINAGE PIPE

R&D EXISTING CATCH BASIN

LEGEND

LOW — LIMIT OF WORK	R&S EX. SITE FEATURE
PROPERTY LINE	R&D EX. SITE FEATURE
SAWCUT LINE	R&R EX. LIGHT POLE, COMPLETE
EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE	R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
R&D EX. PIPE	
R&D EX. CURB	
R&R EX. CURB	TREE PROTECTION
100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88	INLET SEDIMENT CONTROL
3 R&D EX. ASPHALT PAVEMENT, FULL DEPTH	R&D REMOVE & DISPOSE, COMPLETE
R&D EX. ASPHALT PAVEMENT, MILLED	R&S REMOVE & SALVAGE
R&D EX. CONCRETE PAVEMENT	R&R REMOVE & RESET
R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS	EX. EXISTING
STRIP AND STOCKPILE TOPSOIL (4")	TYP. TYPICAL
R&R EX. PAVER	

3 NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

0 10 20 30

SCALE 1"=10'

Project:

GREEN ISLAND PHASE II

WORCESTER, MA 01610

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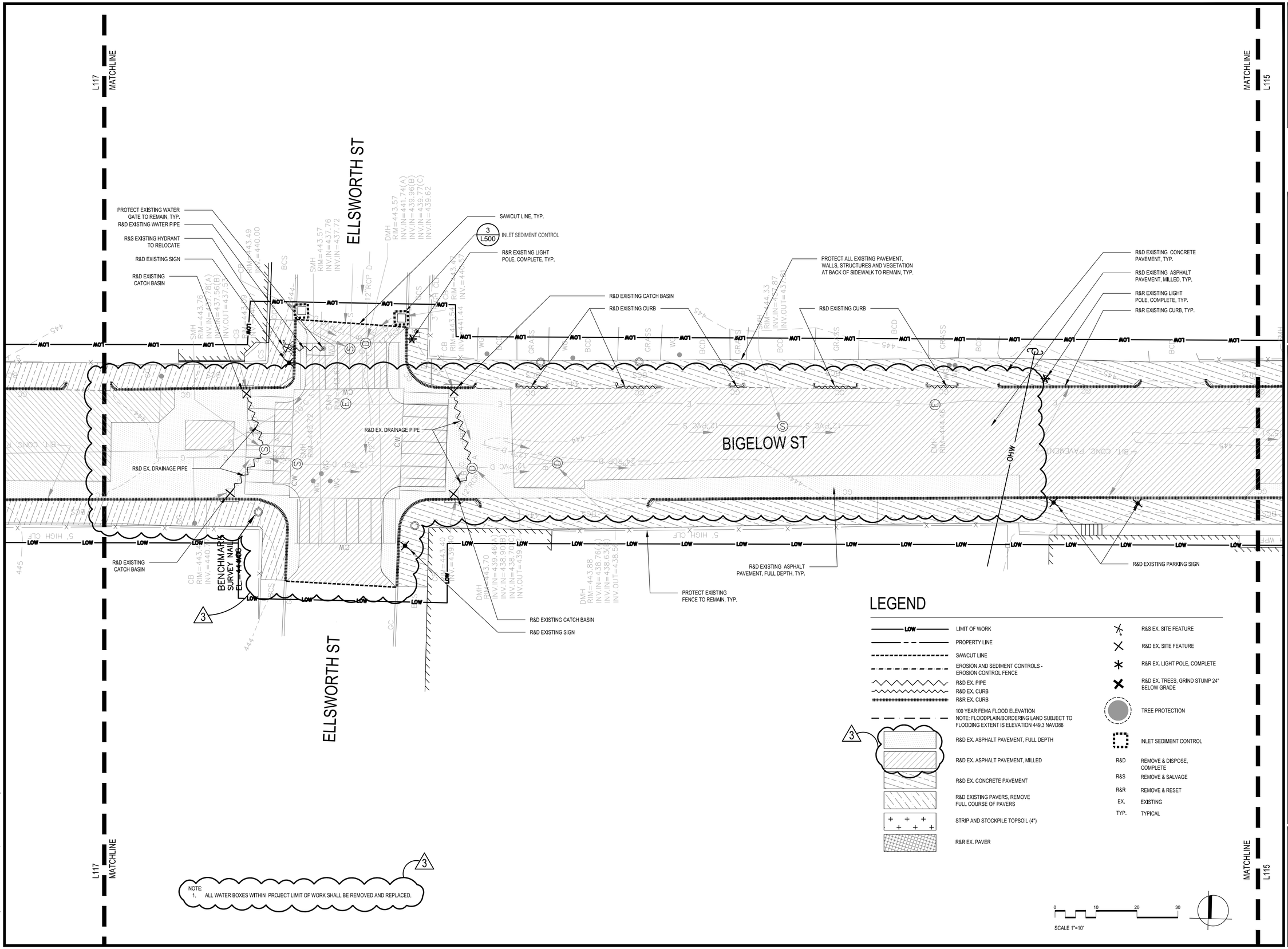
SITE PREPARATION ENLARGEMENT PLAN

Sheet Number:

L115



LEGEND

- LIMIT OF WORK
- PROPERTY LINE
- SAWCUT LINE
- EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
- R&D EX. PIPE
- R&D EX. CURB
- R&R EX. CURB
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- R&D EX. ASPHALT PAVEMENT, FULL DEPTH
- R&D EX. ASPHALT PAVEMENT, MILLED
- R&D EX. CONCRETE PAVEMENT
- R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
- STRIP AND STOCKPILE TOPSOIL (4")
- R&R EX. PAVER
- R&S EX. SITE FEATURE
- R&D EX. SITE FEATURE
- R&R EX. LIGHT POLE, COMPLETE
- R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
- TREE PROTECTION
- INLET SEDIMENT CONTROL
- R&D REMOVE & DISPOSE, COMPLETE
- R&S REMOVE & SALVAGE
- R&R REMOVE & RESET
- EX. EXISTING
- TYP. TYPICAL

NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

0 10 20 30
SCALE 1"=10'

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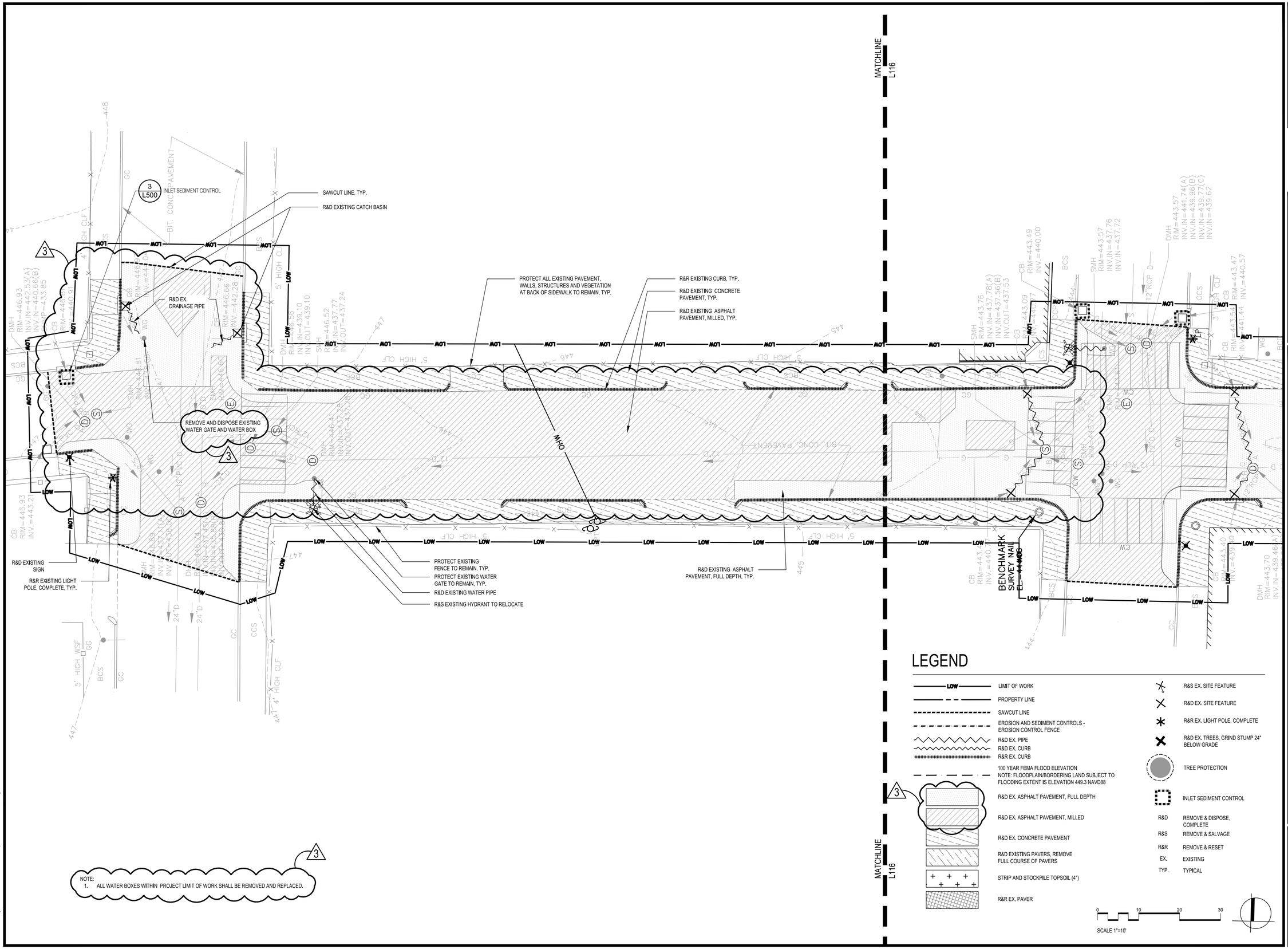
Drawing Title:
SITE PREPARATION ENLARGEMENT PLAN

Sheet Number:
L116



NOTE:
1. ALL WATER BOXES WITHIN PROJECT LIMIT OF WORK SHALL BE REMOVED AND REPLACED.

LEGEND

- LOW — LIMIT OF WORK
- PROPERTY LINE
- SAWCUT LINE
- EROSION AND SEDIMENT CONTROLS - EROSION CONTROL FENCE
- R&D EX. PIPE
- R&D EX. CURB
- R&R EX. CURB
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- R&D EX. ASPHALT PAVEMENT, FULL DEPTH
- R&D EX. ASPHALT PAVEMENT, MILLED
- R&D EX. CONCRETE PAVEMENT
- R&D EXISTING PAVERS, REMOVE FULL COURSE OF PAVERS
- STRIP AND STOCKPILE TOPSOIL (4")
- R&R EX. PAVER

- R&S EX. SITE FEATURE
- R&D EX. SITE FEATURE
- R&R EX. LIGHT POLE, COMPLETE
- R&D EX. TREES, GRIND STUMP 24" BELOW GRADE
- TREE PROTECTION
- INLET SEDIMENT CONTROL

R&D	REMOVE & DISPOSE, COMPLETE
R&S	REMOVE & SALVAGE
R&R	REMOVE & RESET
EX.	EXISTING
TYP.	TYPICAL

0 10 20 30

SCALE 1"=10'

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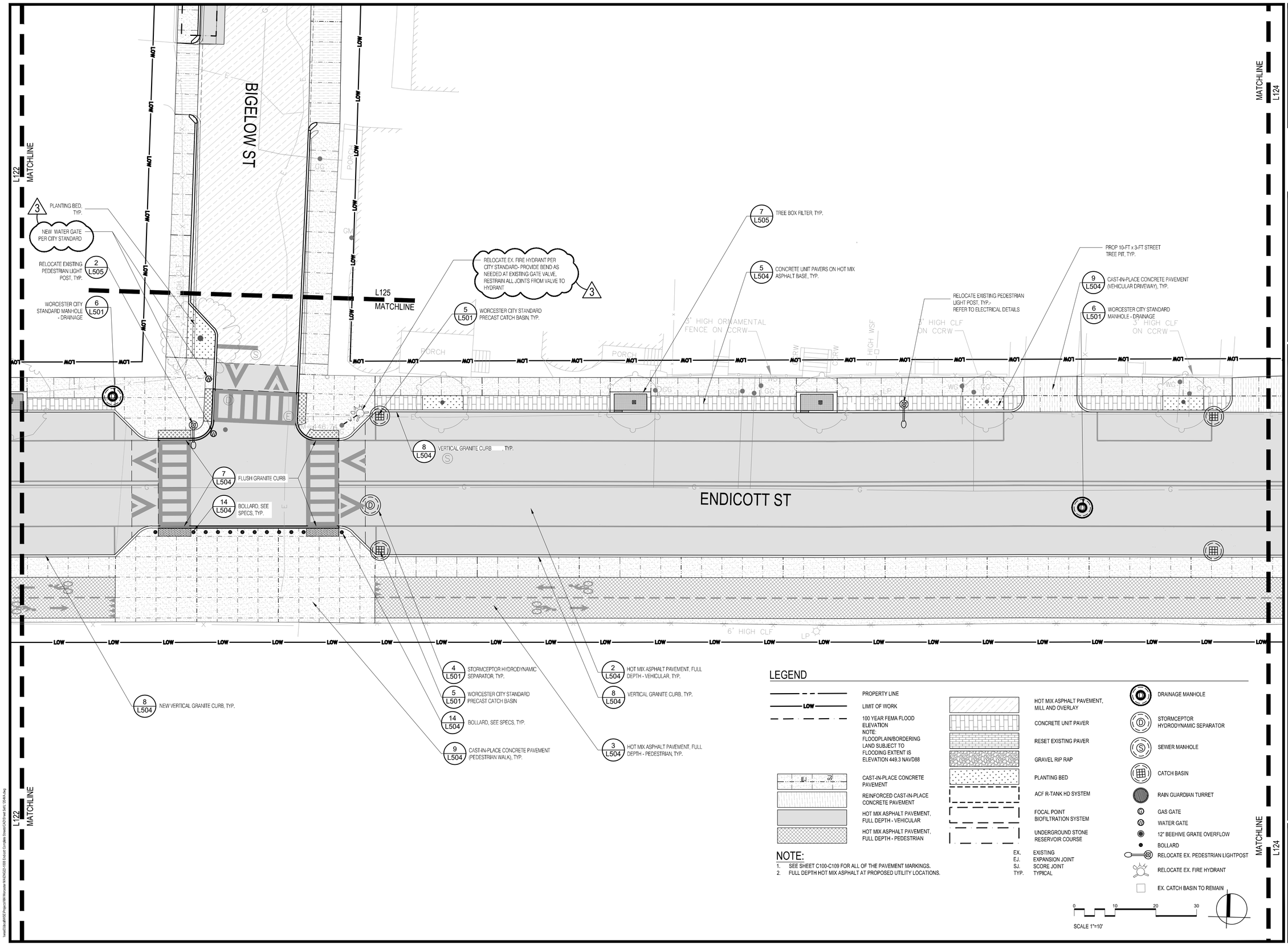
L117



LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- CAST-IN-PLACE CONCRETE PAVEMENT
- REINFORCED CAST-IN-PLACE CONCRETE PAVEMENT
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - VEHICULAR
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - PEDESTRIAN
- HOT MIX ASPHALT PAVEMENT, MILL AND OVERLAY
- CONCRETE UNIT PAVER
- RESET EXISTING PAVER
- GRAVEL RIP RAP
- PLANTING BED
- ACF R-TANK HD SYSTEM
- FOCAL POINT BIOFILTRATION SYSTEM
- UNDERGROUND STONE RESERVOIR COURSE
- DRAINAGE MANHOLE
- STORMCEPTOR HYDRODYNAMIC SEPARATOR
- SEWER MANHOLE
- CATCH BASIN
- RAIN GUARDIAN TURRET
- GAS GATE
- WATER GATE
- 12" BEEHIVE GRATE OVERFLOW
- BOLLARD
- RELOCATE EX. PEDESTRIAN LIGHTPOST
- RELOCATE EX. FIRE HYDRANT
- EX. CATCH BASIN TO REMAIN

EX. EXISTING
EJ. EXPANSION JOINT
SJ. SCORE JOINT
TYP. TYPICAL

NOTE:

1. SEE SHEET C100-C109 FOR ALL OF THE PAVEMENT MARKINGS.
2. FULL DEPTH HOT MIX ASPHALT AT PROPOSED UTILITY LOCATIONS.

0 10 20 30
SCALE 1"=10'

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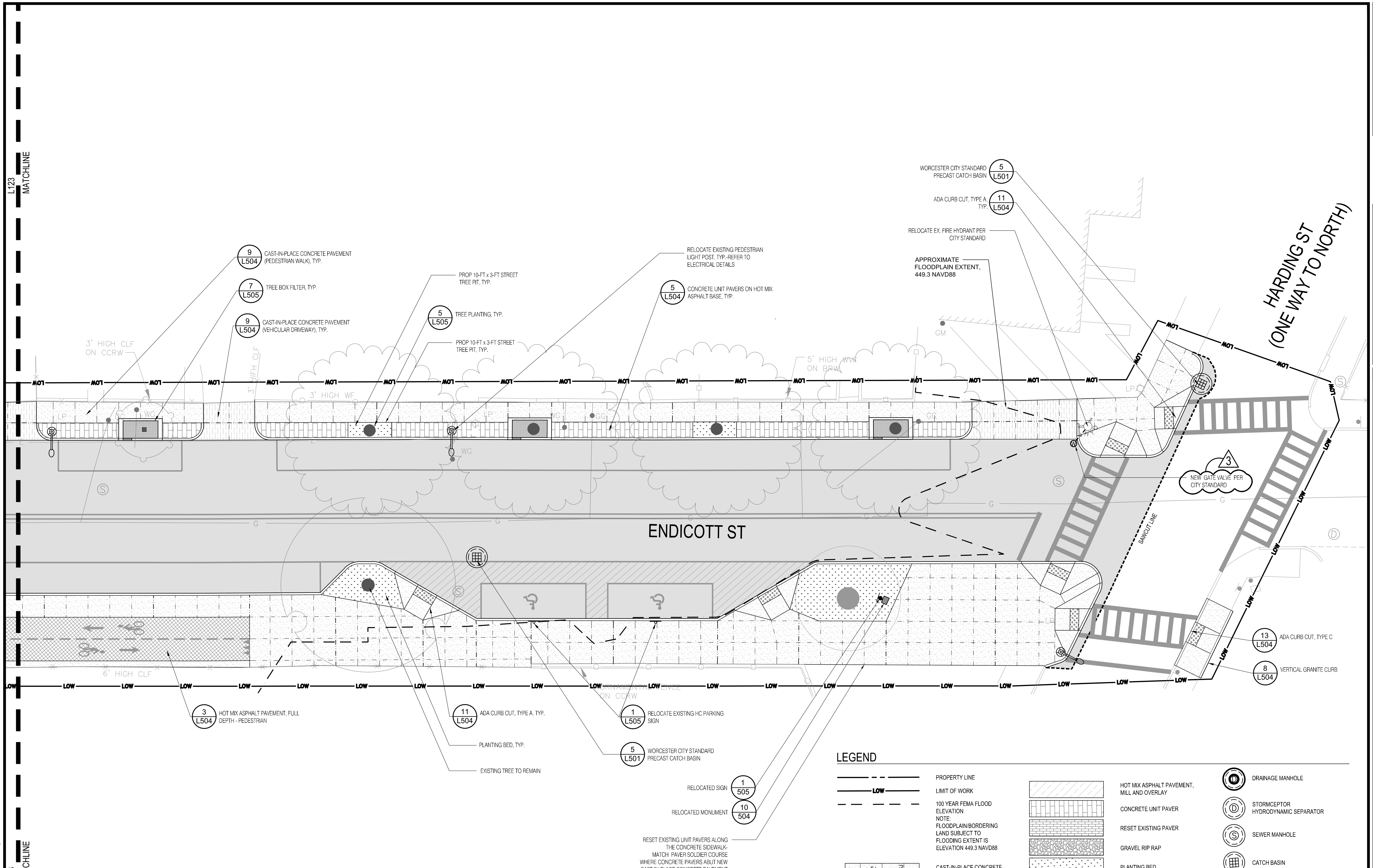
MATERIALS ENLARGEMENT PLAN

Sheet Number:
L123



LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- CAST-IN-PLACE CONCRETE PAVEMENT (E.J. / S.J.)
- REINFORCED CAST-IN-PLACE CONCRETE PAVEMENT
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - VEHICULAR
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - PEDESTRIAN
- HOT MIX ASPHALT PAVEMENT, MILL AND OVERLAY
- CONCRETE UNIT PAVER
- RESET EXISTING PAVER
- GRAVEL RIP RAP
- PLANTING BED
- ACF R-TANK HD SYSTEM
- FOCAL POINT BIOFILTRATION SYSTEM
- UNDERGROUND STONE RESERVOIR COURSE
- DRAINAGE MANHOLE
- STORMCEPTOR HYDRODYNAMIC SEPARATOR
- SEWER MANHOLE
- CATCH BASIN
- RAIN GUARDIAN TURRET
- GAS GATE
- WATER GATE
- 12" BEEHIVE GRATE OVERFLOW
- BOLLARD
- RELOCATE EX. PEDESTRIAN LIGHTPOST
- RELOCATE EX. FIRE HYDRANT
- EX. CATCH BASIN TO REMAIN

EX.	EXISTING
E.J.	EXPANSION JOINT
S.J.	SCORE JOINT
TYP.	TYPICAL

NOTE:

1. SEE SHEET C100-C109 FOR ALL OF THE PAVEMENT MARKINGS.
2. FULL DEPTH HOT MIX ASPHALT AT PROPOSED UTILITY LOCATIONS.

0 10 20 30
SCALE 1"=10'

Project: GREEN ISLAND PHASE II

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Drawing Title: MATERIALS ENLARGEMENT PLAN

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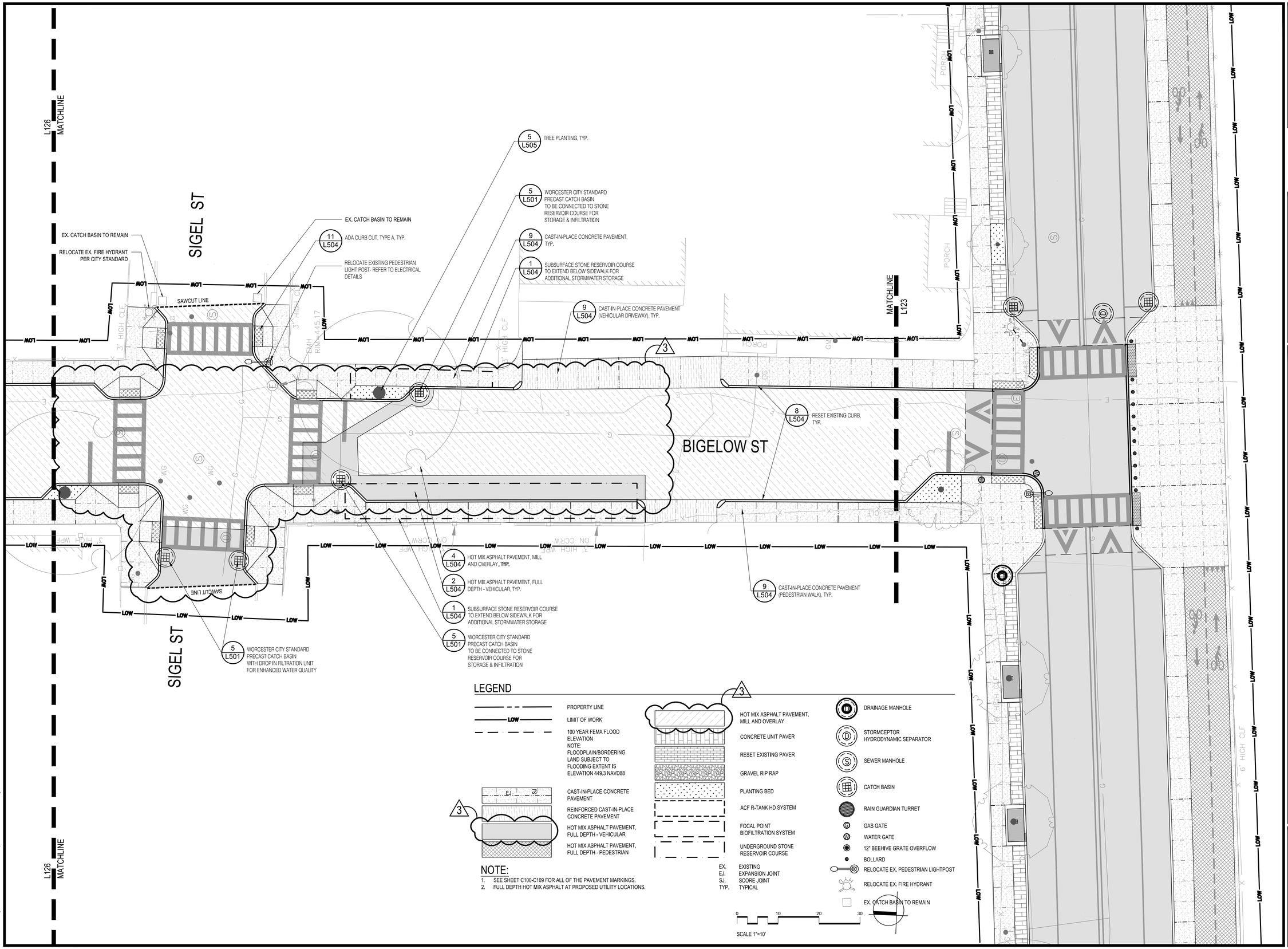

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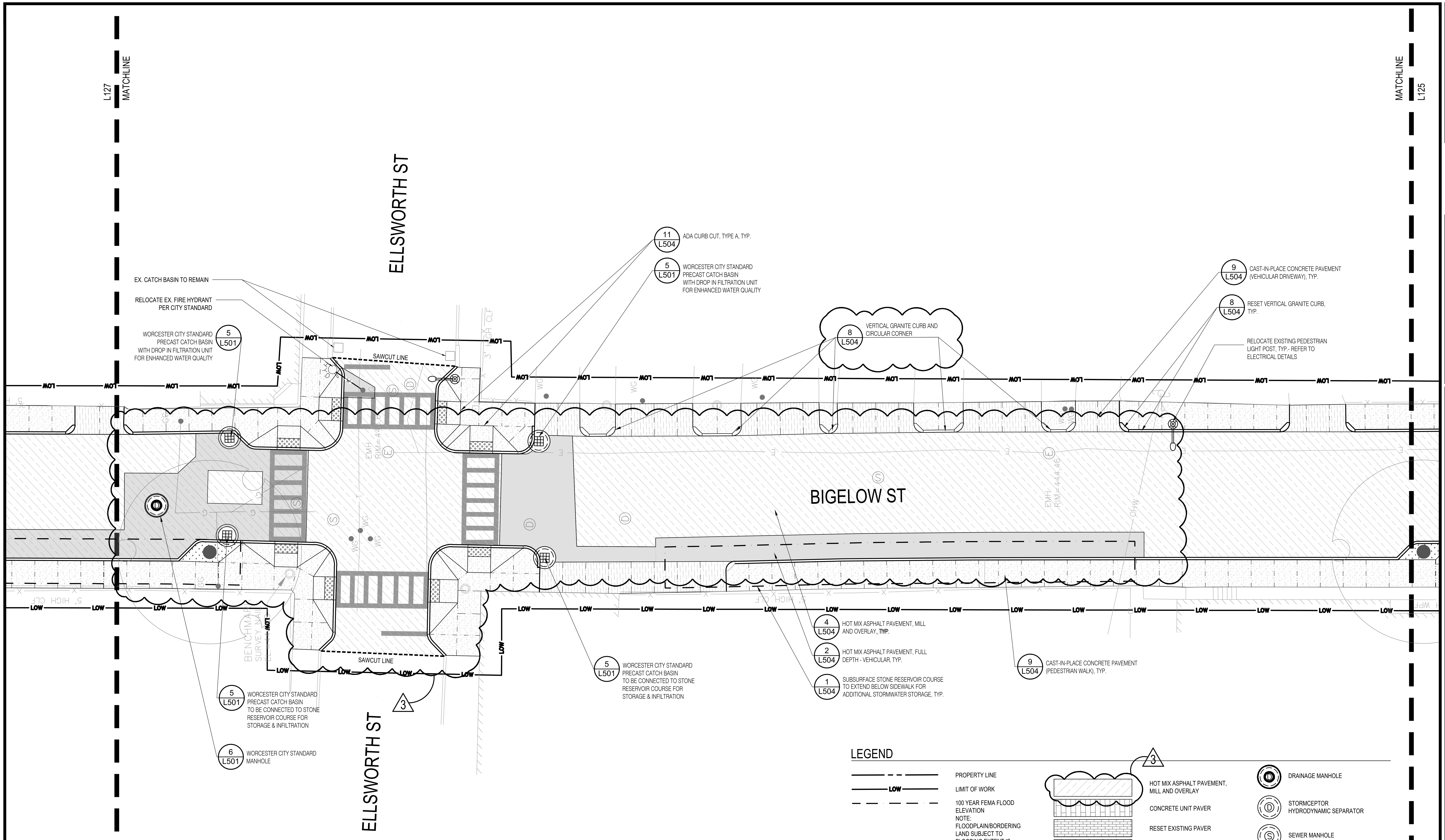
MATERIALS ENLARGEMENT PLAN

Sheet Number:
L125



L127 MATCHLINE
MATCHLINE L125
ELLSWORTH ST
BIGELOW ST
ELLSWORTH ST
EX. CATCH BASIN TO REMAIN
RELOCATE EX. FIRE HYDRANT PER CITY STANDARD
5 L501 WORCESTER CITY STANDARD PRECAST CATCH BASIN WITH DROP IN FILTRATION UNIT FOR ENHANCED WATER QUALITY
11 L504 ADA CURB CUT, TYPE A, TYP.
5 L501 WORCESTER CITY STANDARD PRECAST CATCH BASIN WITH DROP IN FILTRATION UNIT FOR ENHANCED WATER QUALITY
8 L504 VERTICAL GRANITE CURB AND CIRCULAR CORNER
9 L504 CAST-IN-PLACE CONCRETE PAVEMENT (VEHICULAR DRIVEWAY), TYP.
8 L504 RESET VERTICAL GRANITE CURB, TYP.
RELOCATE EXISTING PEDESTRIAN LIGHT POST, TYP.- REFER TO ELECTRICAL DETAILS
SAWCUT LINE
4 L504 HOT MIX ASPHALT PAVEMENT, MILL AND OVERLAY, TYP.
2 L504 HOT MIX ASPHALT PAVEMENT, FULL DEPTH - VEHICULAR, TYP.
1 L504 SUBSURFACE STONE RESERVOIR COURSE TO EXTEND BELOW SIDEWALK FOR ADDITIONAL STORMWATER STORAGE, TYP.
9 L504 CAST-IN-PLACE CONCRETE PAVEMENT (PEDESTRIAN WALK), TYP.
5 L501 WORCESTER CITY STANDARD PRECAST CATCH BASIN TO BE CONNECTED TO STONE RESERVOIR COURSE FOR STORAGE & INFILTRATION
5 L501 WORCESTER CITY STANDARD PRECAST CATCH BASIN TO BE CONNECTED TO STONE RESERVOIR COURSE FOR STORAGE & INFILTRATION
6 L501 WORCESTER CITY STANDARD MANHOLE
SAWCUT LINE
3
EMH RIM=444.46
LOW

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- CAST-IN-PLACE CONCRETE PAVEMENT
- REINFORCED CAST-IN-PLACE CONCRETE PAVEMENT
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - VEHICULAR
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - PEDESTRIAN
- HOT MIX ASPHALT PAVEMENT, MILL AND OVERLAY
- CONCRETE UNIT PAVER
- RESET EXISTING PAVER
- GRAVEL RIP RAP
- PLANTING BED
- ACF R-TANK HD SYSTEM
- FOCAL POINT BIOFILTRATION SYSTEM
- UNDERGROUND STONE RESERVOIR COURSE
- DRAINAGE MANHOLE
- STORMCEPTOR HYDRODYNAMIC SEPARATOR
- SEWER MANHOLE
- CATCH BASIN
- RAIN GUARDIAN TURRET
- GAS GATE
- WATER GATE
- 12" BEEHIVE GRATE OVERFLOW
- BOLLARD
- RELOCATE EX. PEDESTRIAN LIGHTPOST
- RELOCATE EX. FIRE HYDRANT
- EX. CATCH BASIN TO REMAIN

EX. EXISTING
EJ. EXPANSION JOINT
SJ. SCORE JOINT
TYP. TYPICAL

NOTE:

1. SEE SHEET C100-C109 FOR ALL OF THE PAVEMENT MARKINGS.
2. FULL DEPTH HOT MIX ASPHALT AT PROPOSED UTILITY LOCATIONS.

SCALE 1"=10'

Project: GREEN ISLAND PHASE II

WORCESTER, MA 01610

Weston & Sampson
Weston & Sampson Engineers, Inc.
85 Devonshire Street, 3rd Floor
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Consultants:

Revisions:

No.	Date	Description
1	8/21/2025	ADDENDUM NO. 3
2	9/04/2025	ADDENDUM NO. 4
3	10/1/2025	ADDENDUM NO. 9

COA:

Seal:

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Date: 11/01/2024
Drawn By: TZ, KA
Reviewed By: MS
Approved By: BK
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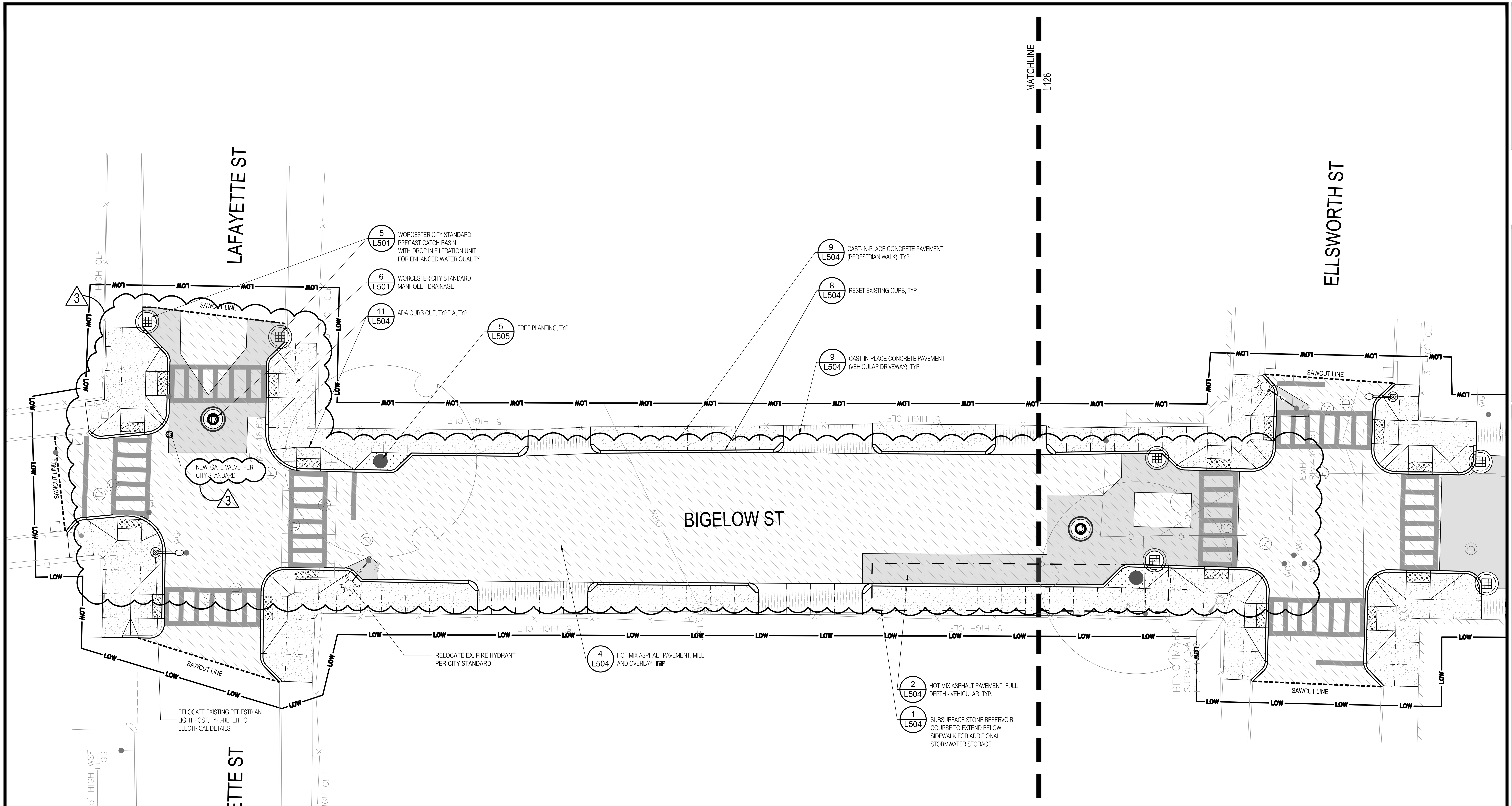
Drawing Title: MATERIALS ENLARGEMENT PLAN

Sheet Number: L126



LEGEND

- PROPERTY LINE
- LOW — LIMIT OF WORK
- 100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN/BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
- CAST-IN-PLACE CONCRETE PAVEMENT (EJ, SJ)
- REINFORCED CAST-IN-PLACE CONCRETE PAVEMENT
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - VEHICULAR
- HOT MIX ASPHALT PAVEMENT, FULL DEPTH - PEDESTRIAN
- HOT MIX ASPHALT PAVEMENT, MILL AND OVERLAY
- CONCRETE UNIT PAVER
- RESET EXISTING PAVER
- GRAVEL RIP RAP
- PLANTING BED
- ACF R-TANK HD SYSTEM
- FOCAL POINT BIOFILTRATION SYSTEM
- UNDERGROUND STONE RESERVOIR COURSE
- DRAINAGE MANHOLE
- STORMCEPTOR HYDRODYNAMIC SEPARATOR
- SEWER MANHOLE
- CATCH BASIN
- RAIN GUARDIAN TURRET
- GAS GATE
- WATER GATE
- 12" BEEHIVE GRATE OVERFLOW
- BOLLARD
- RELOCATE EX. PEDESTRIAN LIGHTPOST
- RELOCATE EX. FIRE HYDRANT
- EX. CATCH BASIN TO REMAIN

EX. EXISTING
EJ. EXPANSION JOINT
SJ. SCORE JOINT
TYP. TYPICAL

NOTE:

1. SEE SHEET C100-C109 FOR ALL OF THE PAVEMENT MARKINGS.
2. FULL DEPTH HOT MIX ASPHALT AT PROPOSED UTILITY LOCATIONS.

0 10 20 30
SCALE 1"=10'

Project: GREEN ISLAND PHASE II

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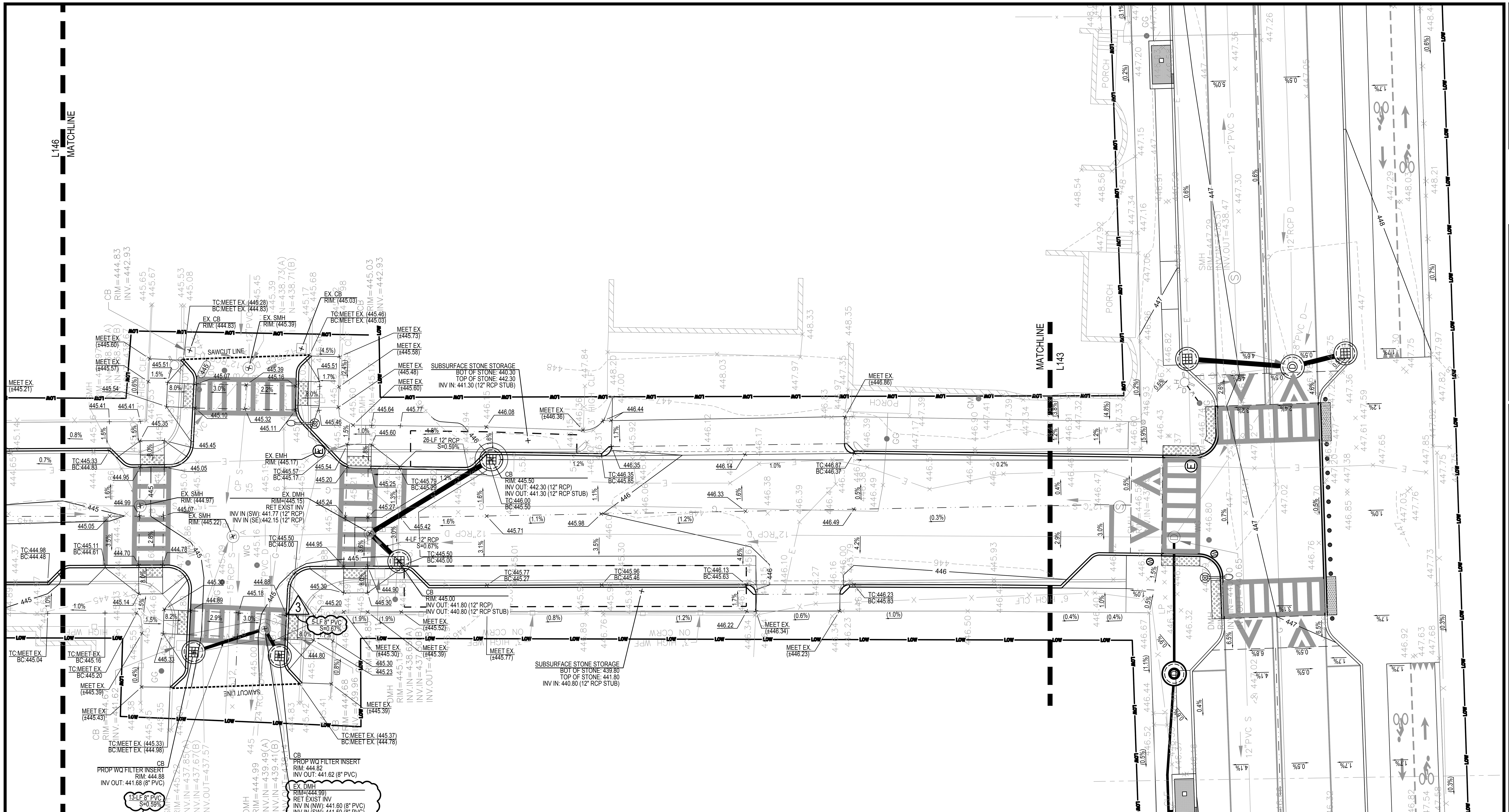
Sheet Number: L127



PROPERTY LINE	
LIMIT OF WORK	
EXISTING MINOR CONTOUR LINE	
EXISTING MAJOR CONTOUR LINE	
EXISTING DRAINAGE LINE	
EXISTING WATER LINE	
PROPOSED WATER LINE	
PROPOSED DRAINAGE PIPE	
PROPOSED MINOR CONTOUR LINE	
PROPOSED MAJOR CONTOUR LINE	
GRAD BREAK LINE	
SWALE LINE	
100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN / BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88	
PROPOSED DRAINAGE MANHOLE	
PROPOSED STORMCEPTOR HYDRODYNAMIC SEPARATOR	
PROPOSED SEWER MANHOLE	
PROPOSED CATCH BASIN	
RAIN GUARDIAN TURRET	
12" BEEHIVE GRATE OVERFLOW	
EXISTING CATCH BASIN	
EXISTING SEWER MANHOLE	
EXISTING DRAINAGE MANHOLE	
EXISTING ELECTRICAL MANHOLE	
RELOCATE EX. GAS GATE	
RELOCATE EX. WATER GATE	
RELOCATE EX. FIRE HYDRANT	
(0.5%)	EXISTING SLOPE
0.5%	PROPOSED SLOPE
27.19	PROPOSED SPOT ELEVATION
(27.19) × 448.72	EXISTING SPOT ELEVATION
TYP.	TYPICAL
EX.	EXISTING
CB	CATCH BASIN
DMH	DRAINAGE MANHOLE
SMH	SEWER MANHOLE
EMH	ELECTRICAL MANHOLE
HDS	HYDRODYNAMIC SEPARATOR
TC	TOP OF CURB
BC	BOTTOM OF CURB

NOTE:
1. WORCESTER STANDARD GREEN TRAPS (WQ FILTER) SHALL BE INSTALLED IN CONFORMANCE WITH CITY STANDARD CATCH BASIN DETAIL AND MANUFACTURER'S SPECIFICATIONS. GREEN TRAPS SHALL BE SUPPLIED BY TOLMAN MANUFACTURING COMPANY OR APPROVED EQUAL.

0 10 20 30
SCALE 1"=10'

Project:
GREEN ISLAND PHASE II
WORCESTER, MA 01610

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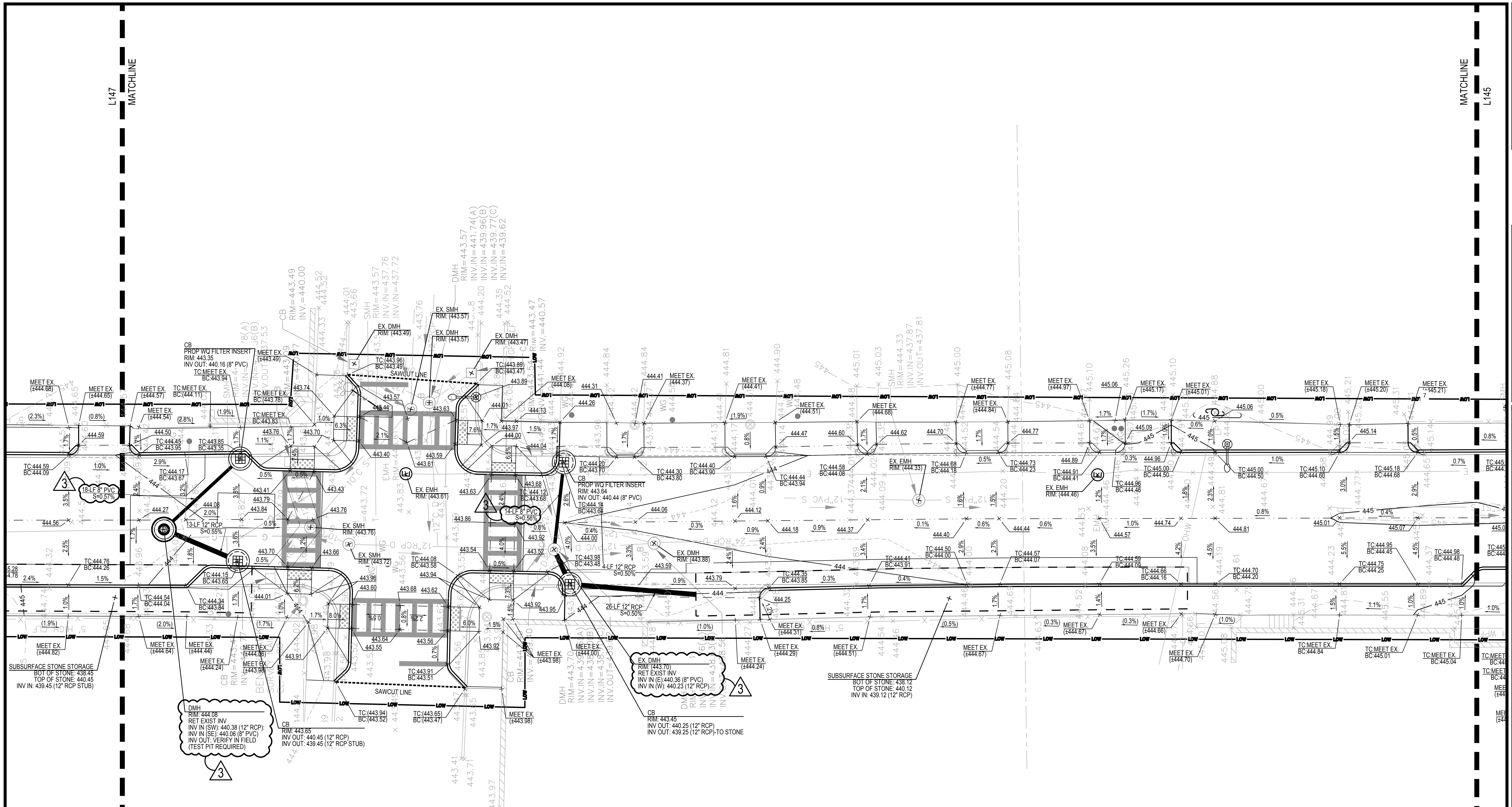
Drawing Title:
GRADING AND DRAINAGE ENLARGEMENT PLAN

Sheet Number:
L145



Symbol	Description
	PROPERTY LINE
LOW	LIMIT OF WORK
444	EXISTING MINOR CONTOUR LINE
445	EXISTING MAJOR CONTOUR LINE
D	EXISTING DRAINAGE LINE
	EXISTING WATER LINE
W	PROPOSED WATER LINE
	PROPOSED DRAINAGE PIPE
444	PROPOSED MINOR CONTOUR LINE
445	PROPOSED MAJOR CONTOUR LINE
	GRAD BREAK LINE
	SWALE LINE
	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN / BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88
	PROPOSED DRAINAGE MANHOLE
	PROPOSED STORMCEPTOR HYDRODYNAMIC SEPARATOR
	PROPOSED SEWER MANHOLE
	PROPOSED CATCH BASIN
	RAIN GUARDIAN TURRET
	12" BEEHIVE GRATE OVERFLOW
	EXISTING CATCH BASIN
	EXISTING SEWER MANHOLE
	EXISTING DRAINAGE MANHOLE
	EXISTING ELECTRICAL MANHOLE
	RELOCATE EX. GAS GATE
	RELOCATE EX. WATER GATE
	RELOCATE EX. FIRE HYDRANT
(0.5%)	EXISTING SLOPE
0.5%	PROPOSED SLOPE
27.19	PROPOSED SPOT ELEVATION
(27.19) × 448.72	EXISTING SPOT ELEVATION
TYP.	TYPICAL
EX.	EXISTING
CB	CATCH BASIN
DMH	DRAINAGE MANHOLE
SMH	SEWER MANHOLE
EMH	ELECTRICAL MANHOLE
HDS	HYDRODYNAMIC SEPARATOR
TC	TOP OF CURB
BC	BOTTOM OF CURB

NOTE:
1. WORCESTER STANDARD GREEN TRAPS (WQ FILTER) SHALL BE INSTALLED IN CONFORMANCE WITH CITY STANDARD CATCH BASIN DETAIL AND MANUFACTURER'S SPECIFICATIONS. GREEN TRAPS SHALL BE SUPPLIED BY TOLMAN MANUFACTURING COMPANY OR APPROVED EQUAL.

0 10 20 30
SCALE 1"=10'

Project:
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WORCESTER, MA 01610

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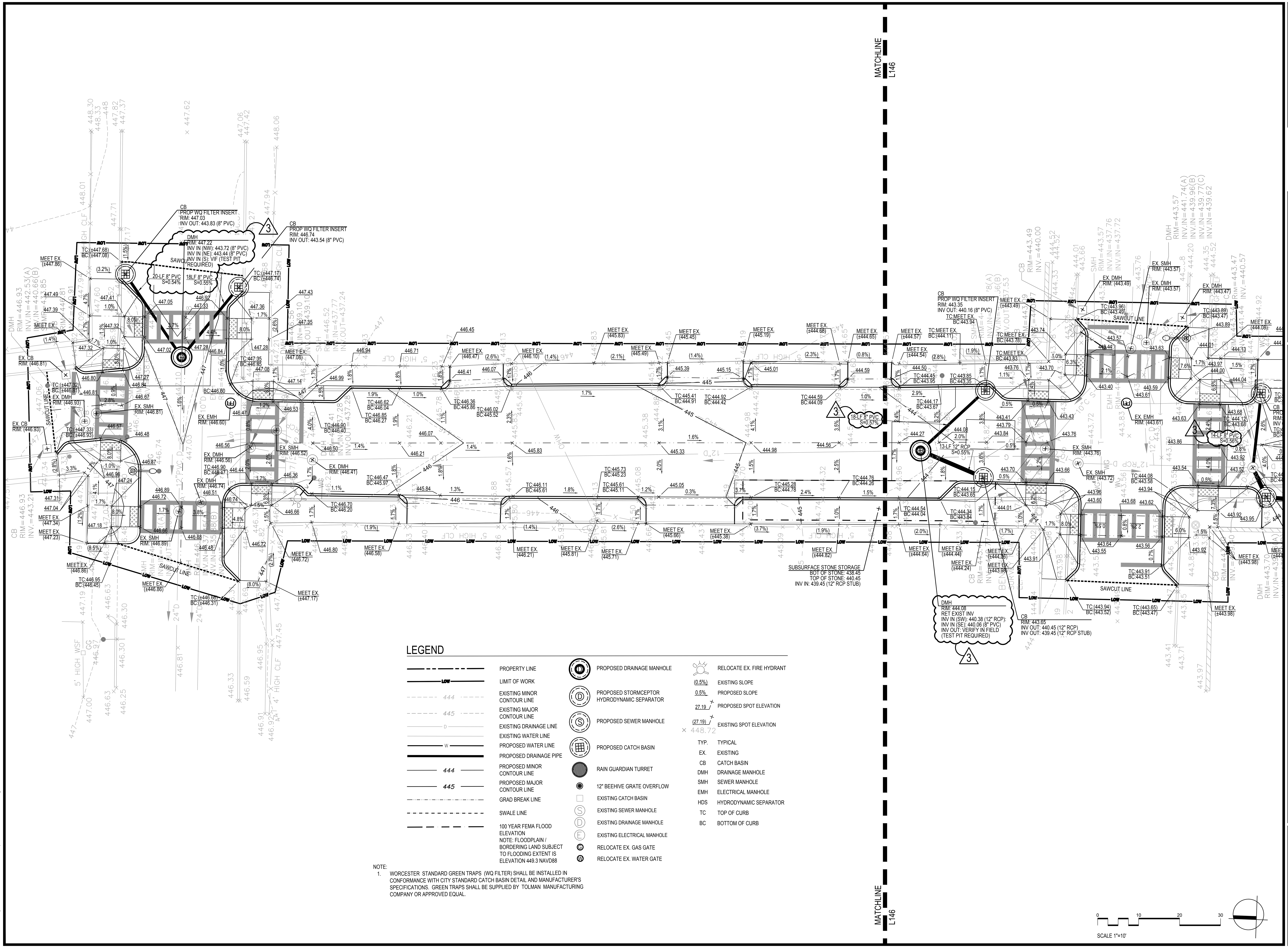
Drawing Title:
GRADING AND DRAINAGE ENLARGEMENT PLAN

Sheet Number:
L146



LEGEND

	PROPERTY LINE		PROPOSED DRAINAGE MANHOLE		RELOCATE EX. FIRE HYDRANT
	LIMIT OF WORK		PROPOSED STORMCEPTOR HYDRODYNAMIC SEPARATOR	(0.5%)	EXISTING SLOPE
444	EXISTING MINOR CONTOUR LINE			0.5%	PROPOSED SLOPE
445	EXISTING MAJOR CONTOUR LINE		PROPOSED SEWER MANHOLE	27.19	PROPOSED SPOT ELEVATION
D	EXISTING DRAINAGE LINE			(27.19) × 448.72	EXISTING SPOT ELEVATION
	EXISTING WATER LINE			TYP.	TYPICAL
W	PROPOSED WATER LINE		PROPOSED CATCH BASIN	EX.	EXISTING
	PROPOSED DRAINAGE PIPE			CB	CATCH BASIN
444	PROPOSED MINOR CONTOUR LINE		RAIN GUARDIAN TURRET	DMH	DRAINAGE MANHOLE
445	PROPOSED MAJOR CONTOUR LINE		12" BEEHIVE GRATE OVERFLOW	SMH	SEWER MANHOLE
	GRAD BREAK LINE		EXISTING CATCH BASIN	EMH	ELECTRICAL MANHOLE
	SWALE LINE		EXISTING SEWER MANHOLE	HDS	HYDRODYNAMIC SEPARATOR
	100 YEAR FEMA FLOOD ELEVATION NOTE: FLOODPLAIN / BORDERING LAND SUBJECT TO FLOODING EXTENT IS ELEVATION 449.3 NAVD88		EXISTING DRAINAGE MANHOLE	TC	TOP OF CURB
			EXISTING ELECTRICAL MANHOLE	BC	BOTTOM OF CURB
			RELOCATE EX. GAS GATE		
			RELOCATE EX. WATER GATE		

NOTE:
1. WORCESTER STANDARD GREEN TRAPS (WQ FILTER) SHALL BE INSTALLED IN CONFORMANCE WITH CITY STANDARD CATCH BASIN DETAIL AND MANUFACTURER'S SPECIFICATIONS. GREEN TRAPS SHALL BE SUPPLIED BY TOLMAN MANUFACTURING COMPANY OR APPROVED EQUAL.

Project:
GREEN ISLAND PHASE II

WORCESTER, MA 01610

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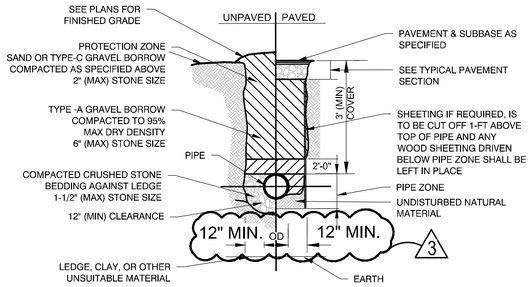
Drawing Title:
GRADING AND DRAINAGE ENLARGEMENT PLAN

Sheet Number:
L147

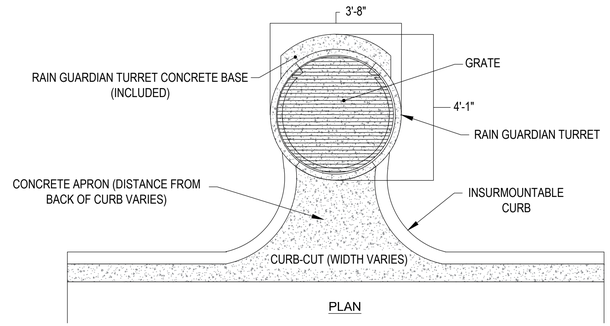


NOTES:

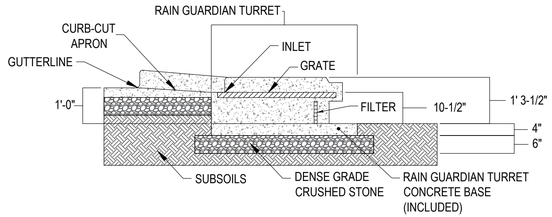
1. GRAVEL BORROW SHALL CONFORM TO MASSDOT SPECIFICATION M1.030
2. CRUSHED STONE BEDDING SHALL CONFORM TO MASSDOT SPECIFICATION M2.01.1

1 DRAIN TRENCH

NOT TO SCALE



PLAN



SECTION

3 RAIN GUARDIAN TURRET

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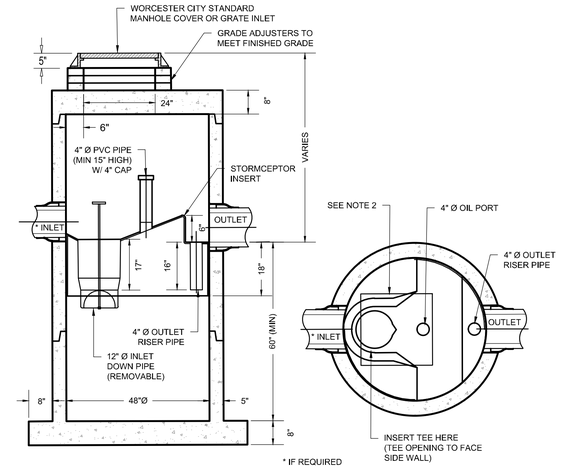


SECTION THROUGH CHAMBER

PLAN VIEW

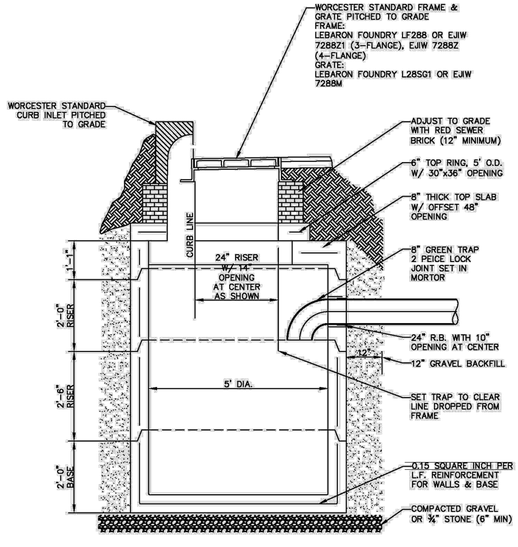
NOTES:

1) THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.

2) THE COVER SHOULD BE POSITIONED OVER THE OUTLET DROP PIPE AND THE OIL PORT.

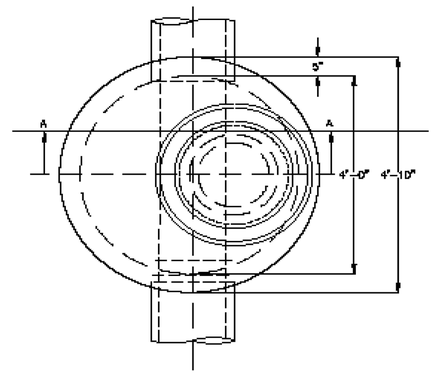
4 STORMCEPTOR HYDRODYNAMIC SEPARATOR

NOT TO SCALE

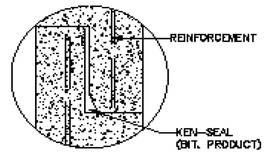


5 WORCESTER CITY STANDARD PRECAST CATCH BASIN

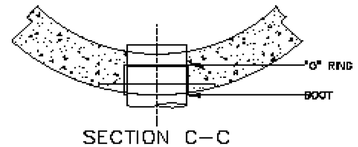
NOT TO SCALE



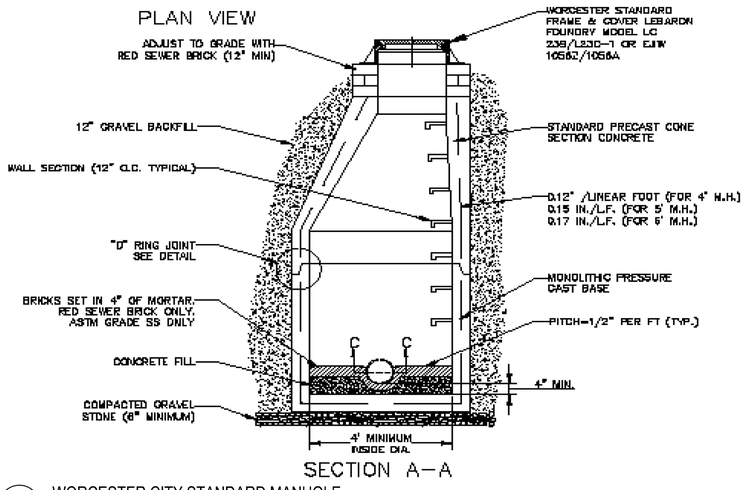
PLAN VIEW



"O" RING JOINT DETAIL



SECTION C-C



SECTION A-A

6 WORCESTER CITY STANDARD MANHOLE

NOT TO SCALE

Project:

GREEN ISLAND PHASE II

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W&S Project No.:	ENG_22-1008
W&S File No.:	

Drawing Title:

CONSTRUCTION DETAILS

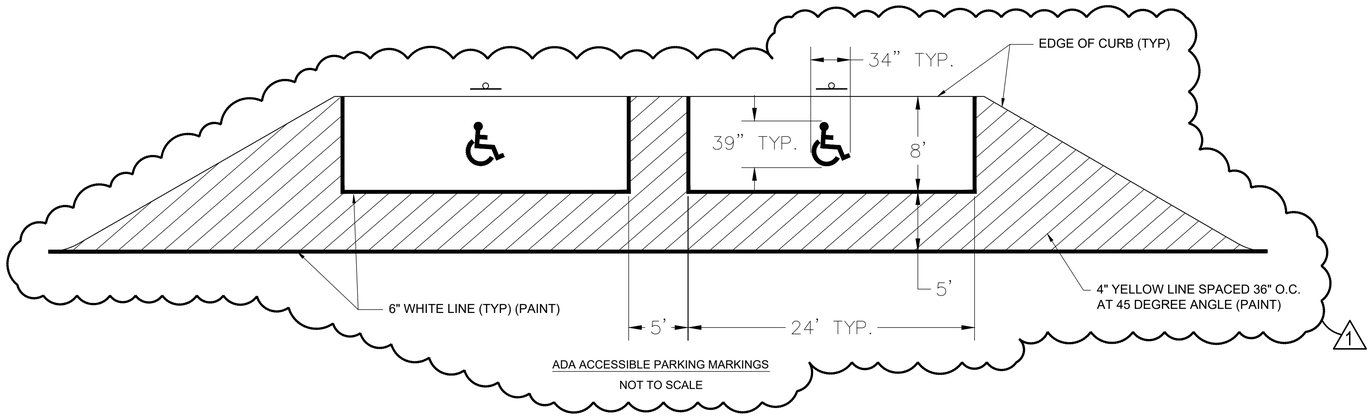
Sheet Number:

L501

GENERAL NOTES

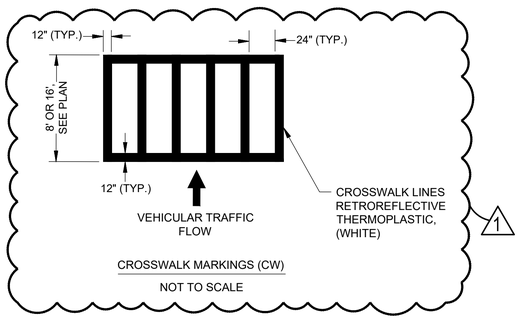
1. THE MINIMUM MOUNTING HEIGHT OF POST-MOUNTED SIGNS, MEASURED VERTICALLY FROM THE BOTTOM OF THE LOWEST SIGN TO THE TOP OF THE CURB OR SIDEWALK, OR TO THE ELEVATION OF THE NEAR EDGE OF THE TRAVELED WAY, SHALL BE 7 FEET UNLESS OTHERWISE SPECIFIED ON THE PLANS.
2. CONTRACTOR SHALL REMOVE ALL PAVEMENT MARKINGS WHICH CONFLICT WITH PROPOSED PAVEMENT MARKINGS. THE METHOD OF REMOVAL SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF MASSDOT HIGHWAY DIVISION.
3. ALL SIGN POSTS SHALL BE 2' QWIK PUNCH SIGN POSTS WITH A 2¼" SQUARE GALVANIZED ANCHOR AND RAIN CAP - POWDER COATED BLACK, OR APPROVED EQUAL.
4. ALL SYMBOLS SHALL BE PRE-FORM RETROREFLECTIVE THERMOPLASTIC MATERIAL.
5. ALL MARKINGS AND SYMBOLS SHALL CONFORM WITH MUTCD STANDARDS.
6. UNLESS OTHER WISE NOTED, PAVEMENT MARKING LINES SHALL BE IN CONFORMANCE WITH WORCESTER CITY STANDARD SPECIFICATION.

1



ADA ACCESSIBLE PARKING MARKINGS

NOT TO SCALE



CROSSWALK MARKINGS (CW)

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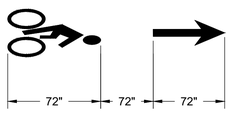

BICYCLE LANE SYMBOL

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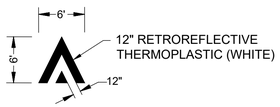

TABLED INTERSECTION MARKINGS

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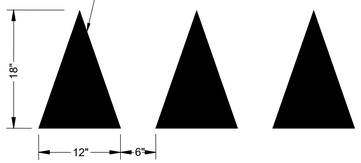
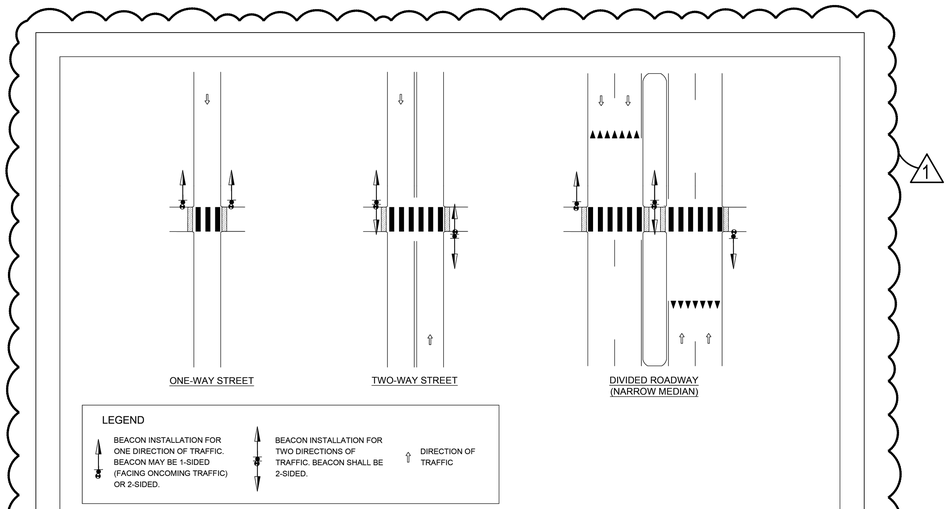
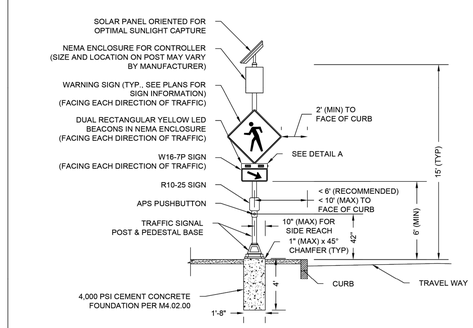


YIELD LINE PER MUTCD

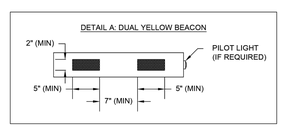
NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division	CONSTRUCTION STANDARDS SECTION 800	RECTANGULAR RAPID FLASHING BEACON TYPICAL LAYOUTS	ISSUE DATE JAN 2025	DRAWING NUMBER 825.0.2



NOTES:
1. CROSSWALK AND ADA/AAB-COMPLIANT RAMPS NOT SHOWN. SEE PLANS FOR LOCATIONS.
2. APS PUSHBUTTONS SHALL BE POSITIONED TO MEET ALL ADA/AAB REQUIREMENTS.



massDOT Massachusetts Department of Transportation Highway Division	CONSTRUCTION STANDARDS SECTION 800	RECTANGULAR RAPID FLASHING BEACON ELEVATION VIEW	ISSUE DATE JAN 2025	DRAWING NUMBER 825.0.1

1

ABBREVIATIONS

APPROX	APPROXIMATE
CW	CROSSWALK
DBYL	DOUBLE YELLOW CENTER LINE
PED	PEDESTRIAN
RRFB	RECTANGULAR RAPID FLASHING BEACON
SWL	SOLID WHITE LINE
ST	STREET
TYP	TYPICAL
VAR	VARIABLE
WCR	WHEELCHAIR RAMP
YL	YIELD LINE

PAVEMENT MARKING LEGEND

SWL	6" SOLID WHITE LINE (PAINT)
12" SWL	12" SOLID WHITE LINE (RETROFLECTIVE THERMOPLASTIC)
DBYL	6" SOLID DOUBLE YELLOW CENTER LINE (PAINT)
CW	WHITE - CROSSWALK (RETROFLECTIVE THERMOPLASTIC)
4" SYBL	4" SINGLE YELLOW BROKEN LINE - 3' LINE WITH 9' GAP PER MUTCD (PAINT)

EXISTING	PROPOSED	DESCRIPTION
		SIGN AND POST SIGN AND POST (2 POSTS)
		BICYCLE LANE SYMBOL (RETROREFLECTIVE THERMOPLASTIC)
		SHARED LANE MARKING SYMBOL (RETROREFLECTIVE THERMOPLASTIC)
		WHITE PAVEMENT LEGEND AND ARROW (RETROREFLECTIVE THERMOPLASTIC)

Project:
GREEN ISLAND PHASE II

WORCESTER, MA 01610

Weston & Sampson
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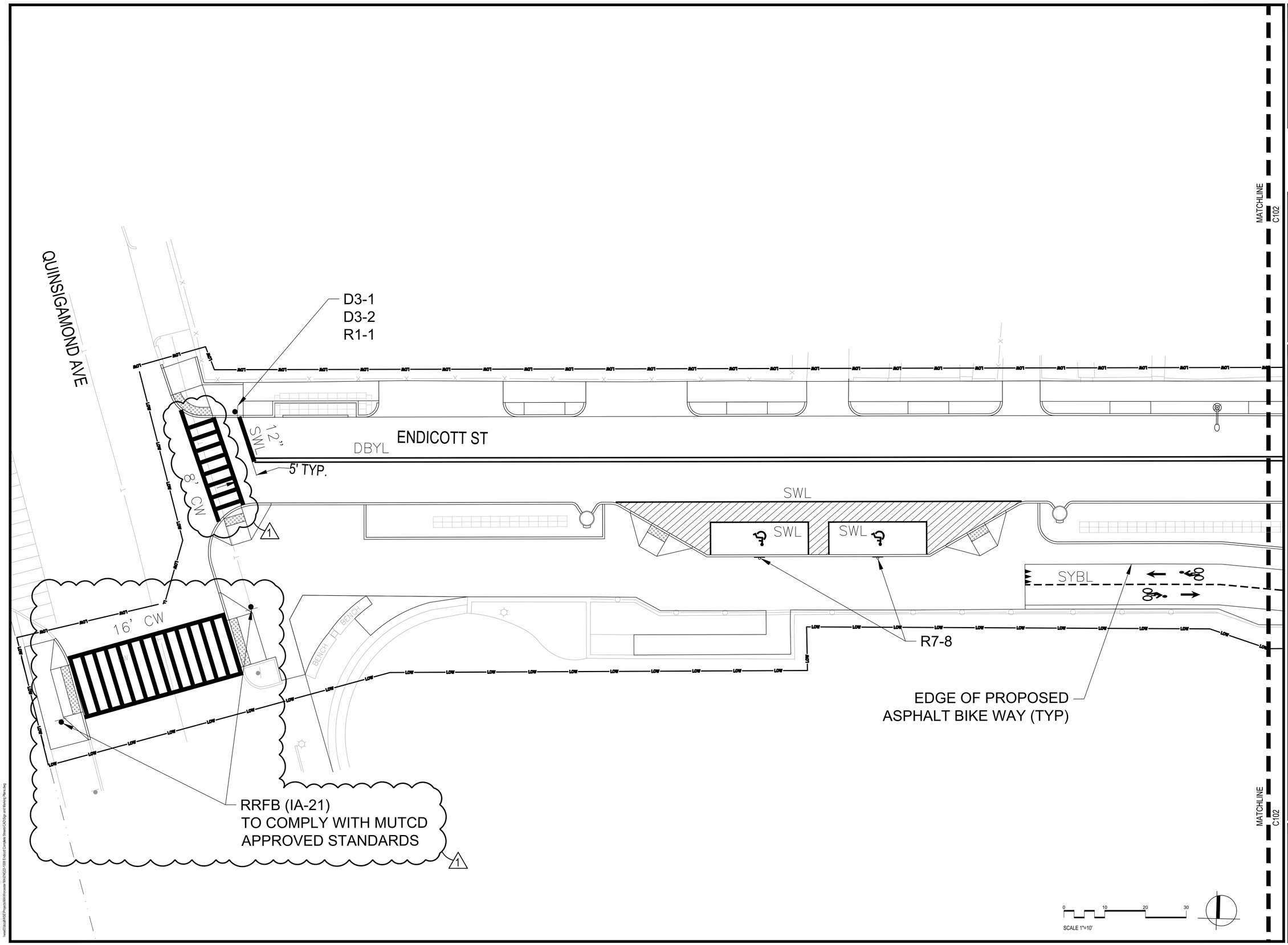
W&S Project No.: ENG_22-1008
W&S File No.:

Drawing Title:
SIGNAGE AND MARKING GENERAL NOTES

Sheet Number:
C100



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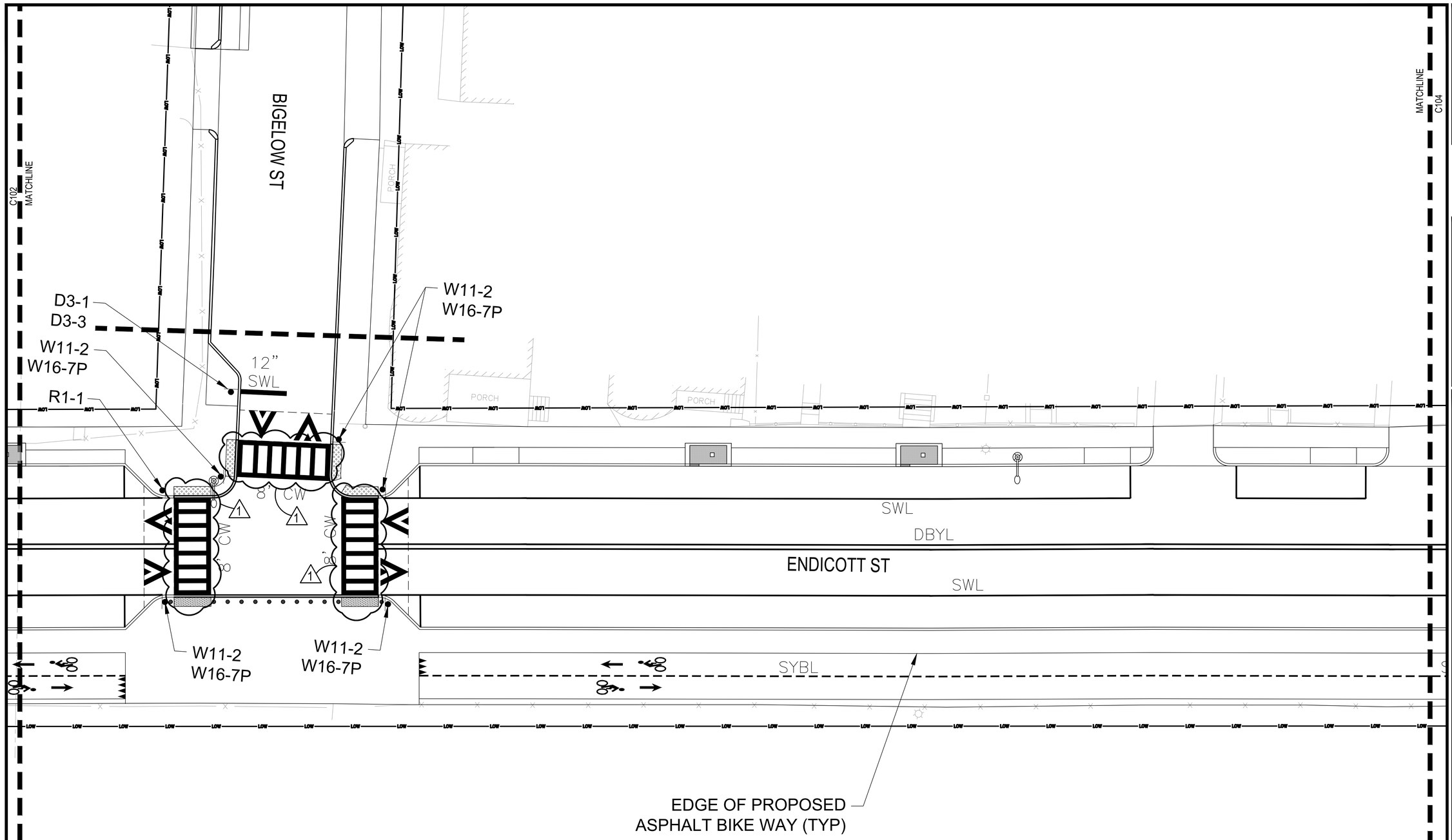
Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 1

Sheet Number:
C101



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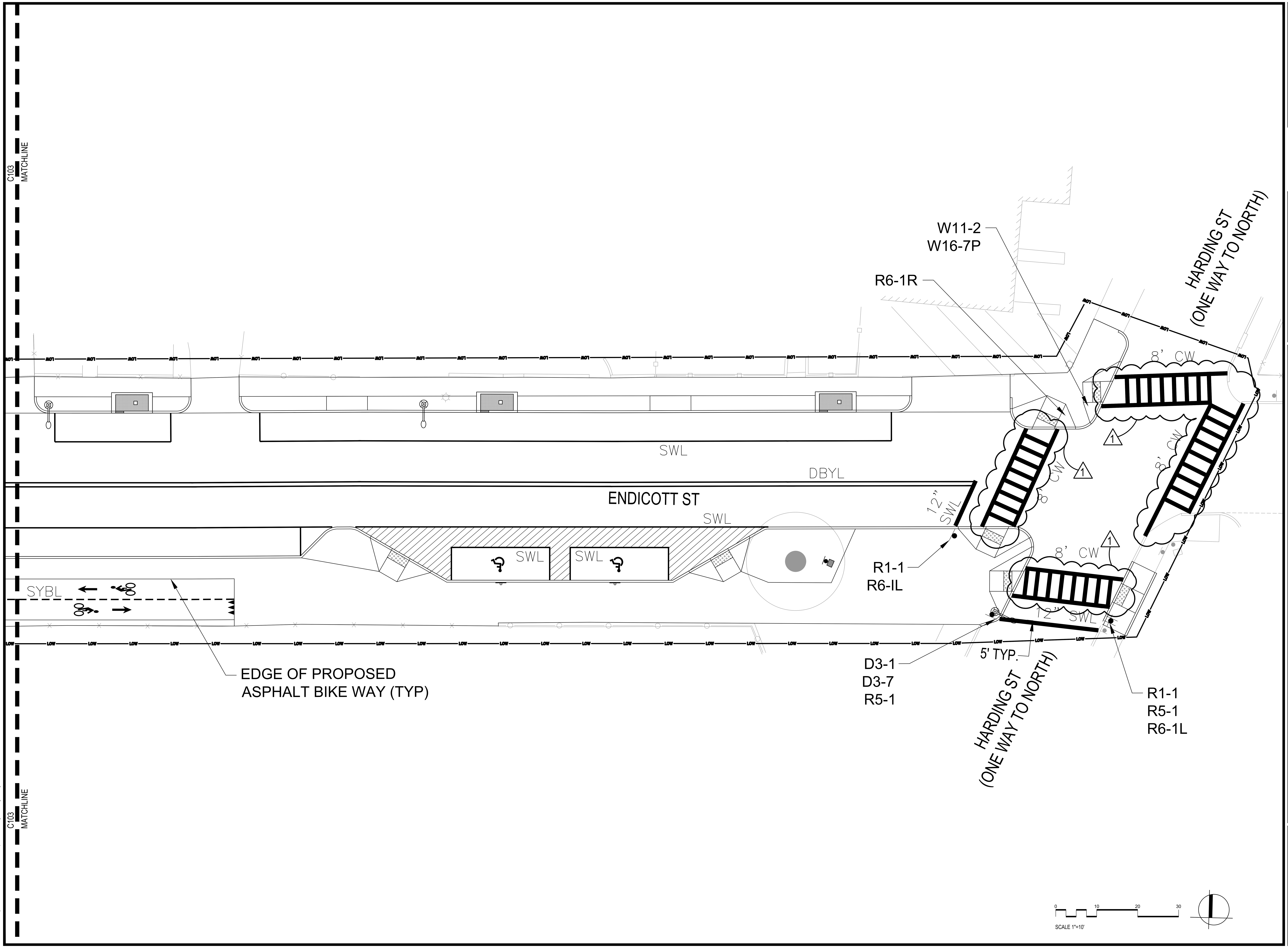
Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 3

Sheet Number:
C103



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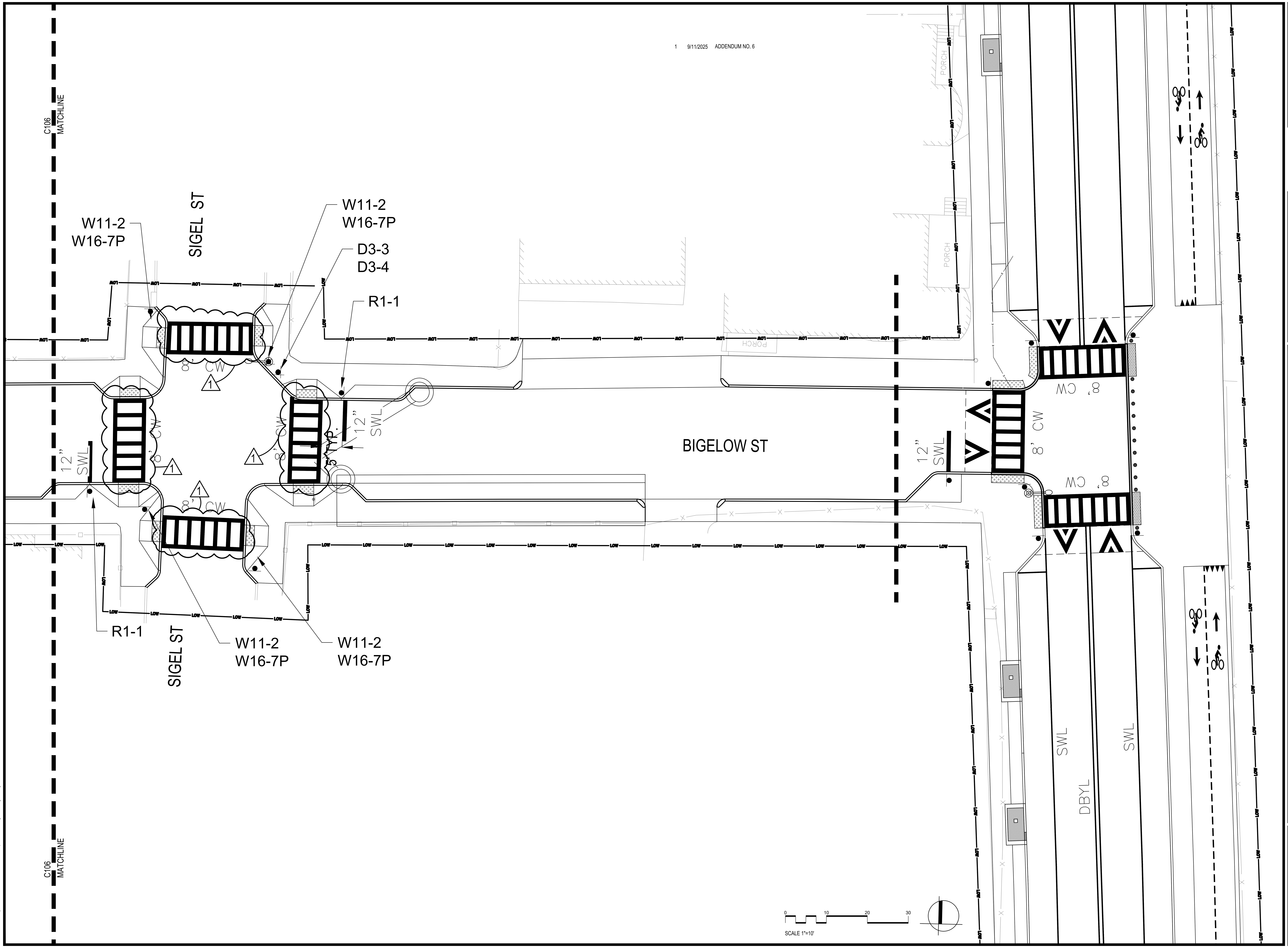
Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 4

Sheet Number:
C104



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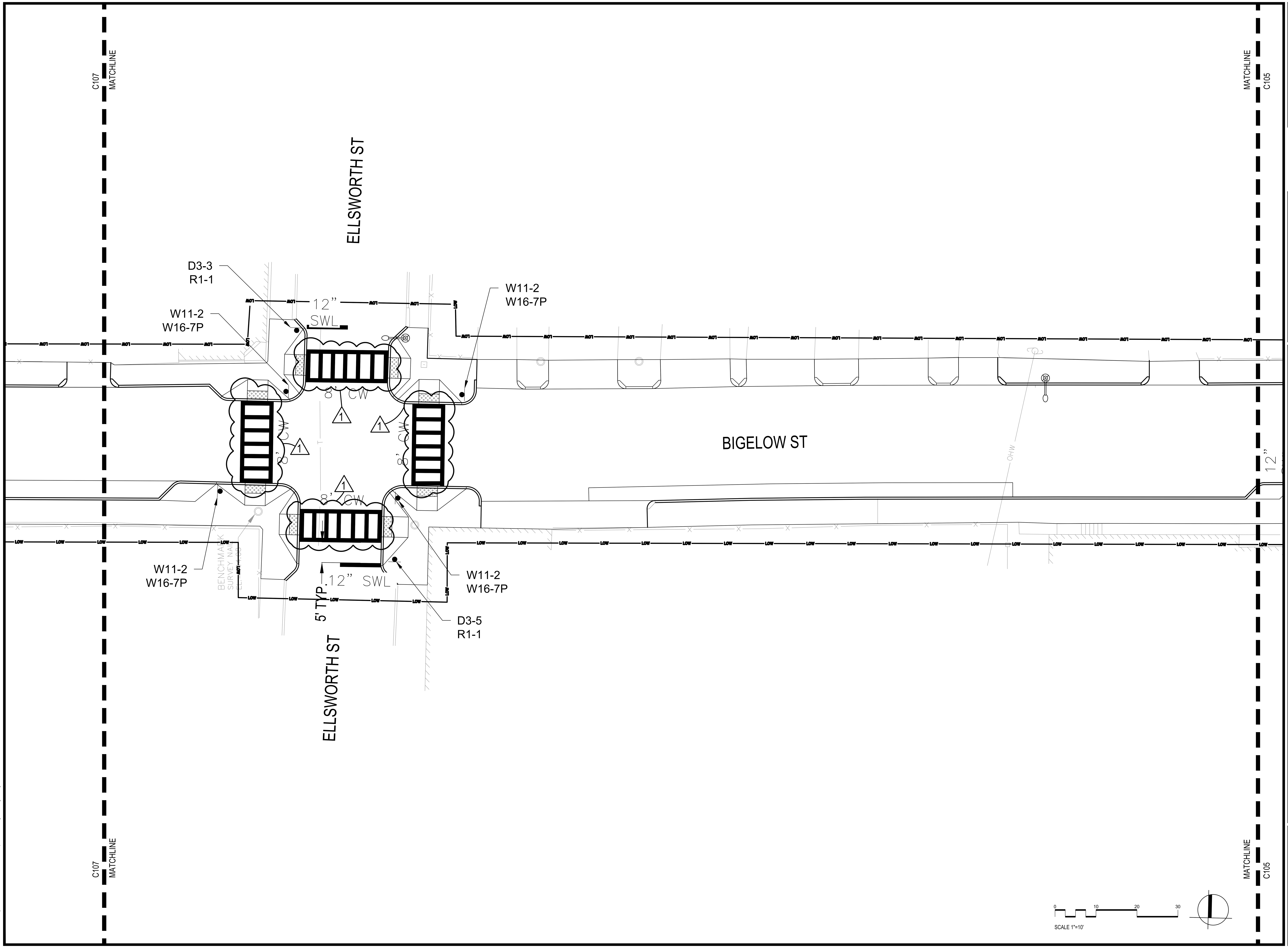
W&S File No.:

Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 5

Sheet Number:
C105



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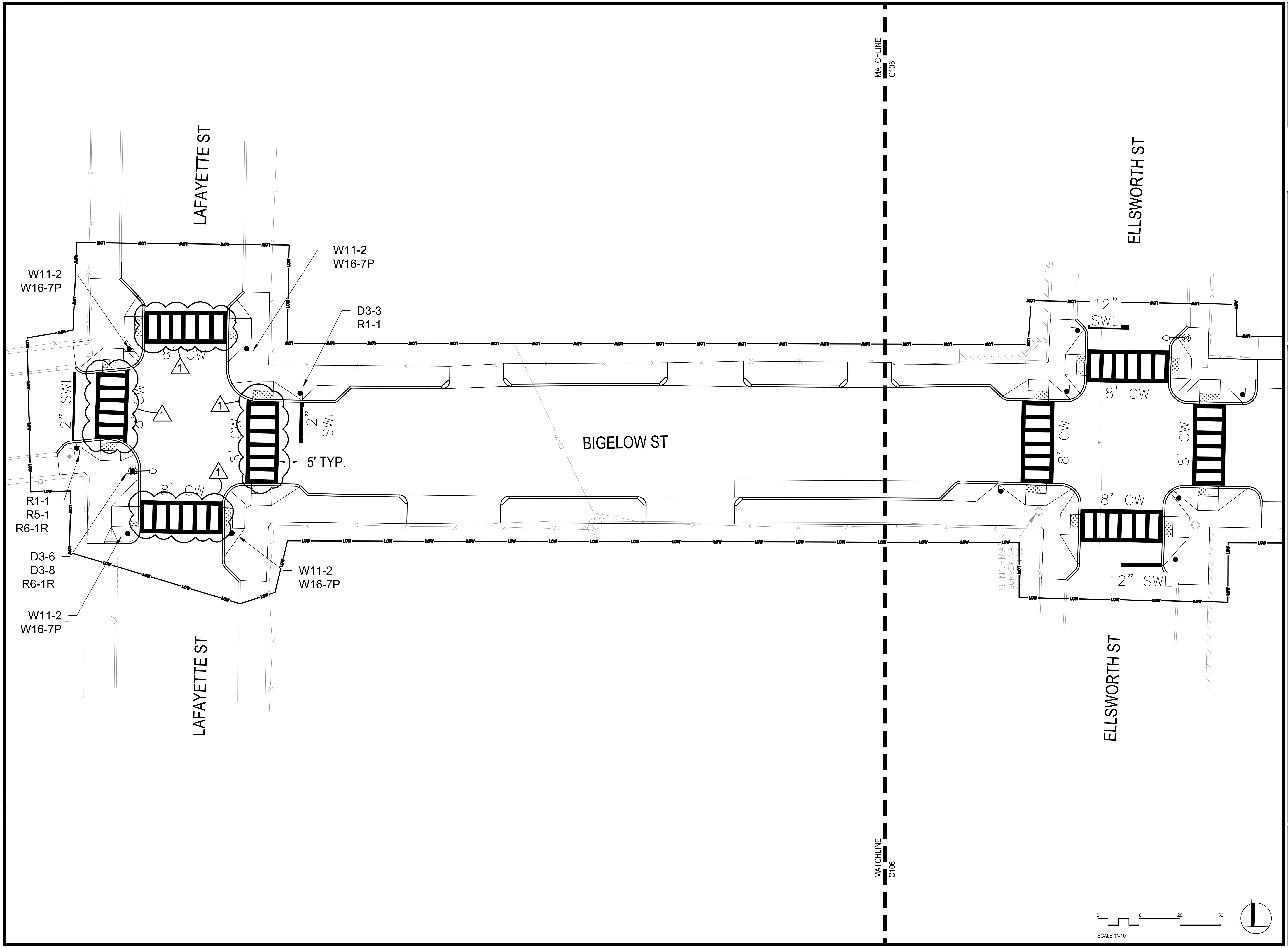
W&S File No.:

Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 6

Sheet Number: C106



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W&S Project No.: ENG_22-1008
W&S File No.:

Drawing Title:
SIGNAGE AND PAVEMENT MARKING PLAN 7

Sheet Number:
C107