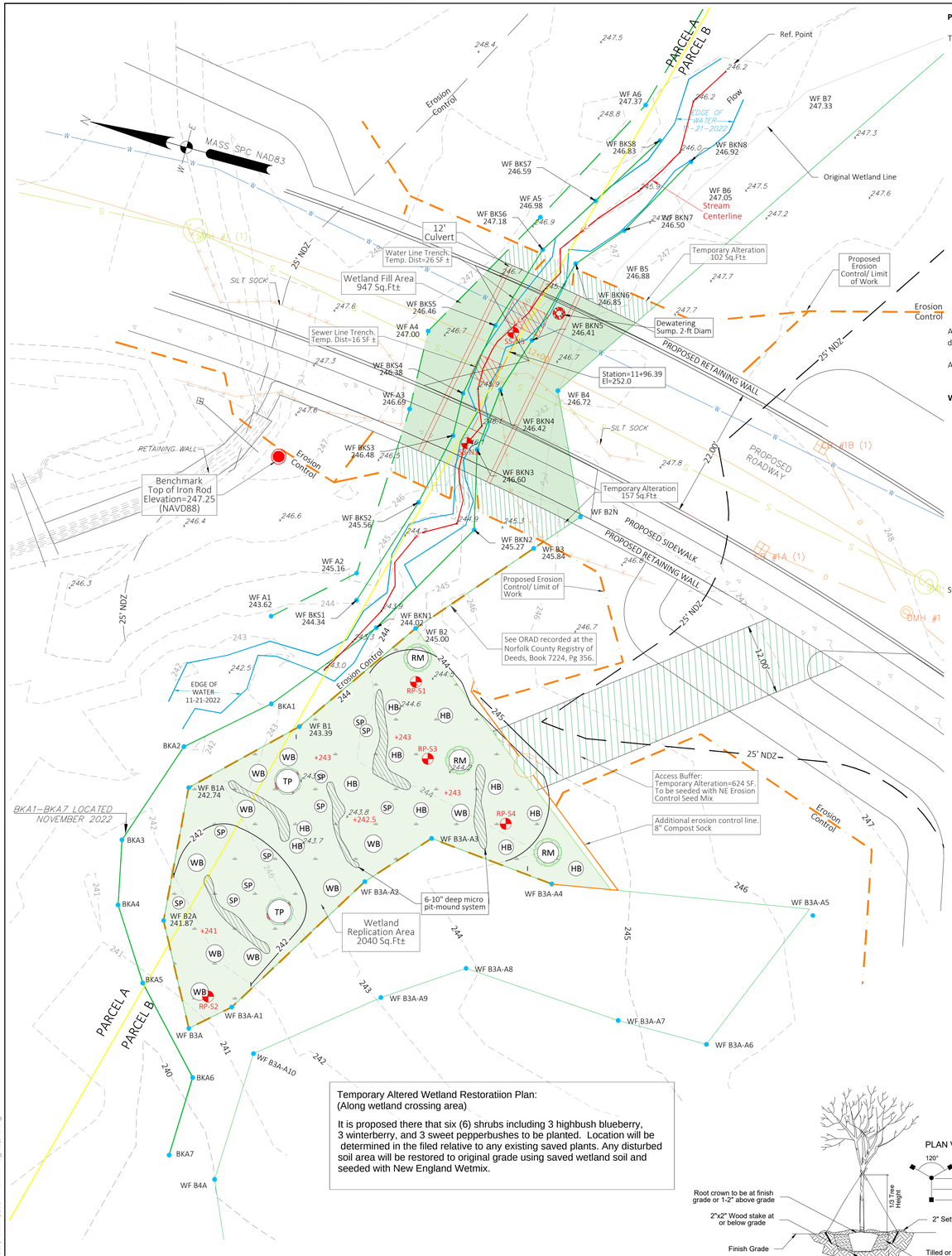


Temporary Altered Wetland Restoratiion Plan:
(Along wetland crossing area)

It is proposed there that six (6) shrubs including 3 highbush blueberry, 3 winterberry, and 3 sweet pepperbushes to be planted. Location will be determined in the filed relative to any existing saved plants. Any disturbed soil area will be restored to original grade using saved wetland soil and seeded with New England Wetmix.

Typical Tree Planting Detail (>2" Cal.)
N.T.S

Planting Monitoring and Vegetation Management Plan

The Wetland Scientist will inspect each of the following aspects of the replication before subsequent steps can occur.

1. Before excavation or installation of erosion control devices, a monitor/surveyor will ensure that the limits of works are properly marked.
2. Before soil is placed in the replication areas, a monitor/surveyor will check excavated elevations to ensure that post-construction groundwater elevations will be high enough to eventually create hydric conditions.
3. Once soil is placed in the replication areas, a wetland scientist/surveyor will inspect final surface elevations.
4. A monitor (Wetland scientist/biologist) shall oversee planting and seeding to ensure that specimens are correctly situated and maintained. Any invasive species observed by the monitor will be handpicked and removed from the site. Follow up inspection shall be conducted to assure the surveyor and invasive species plants removal in the spring time.
5. After one growing season (ideally during August), a monitor will inspect plantings to ascertain plant survival. Wherever two or more newly planted trees, shrubs, or herbs have died, the dead individuals will be removed by hand and specimens of the same species there replanted. Furthermore, the seed mix will be reseeded in any area where more than 3 SF of bare ground is visible. Any invasive species observed by the monitor will be handpicked and removed from the site.
6. If replanting is required at this first inspection, the monitor will assess plant survival again in October of the same year.
7. Another inspection will occur in August of the second year. Inspections will be conducted after subsequent growing seasons until wetland plants have colonized more than 75% of the disturbed area (this should occur by the end of the second growing season). The replication will then be considered successful according to 310 CMR 10.55 (4)(b)6, and inspections will cease. If, during any of the inspections, invasive species are observed, they will be handpicked and removed from the site.

A monitoring report will be submitted after planting, in late spring of the first year; and at the end of each subsequent growing season during which inspections occur. A sample monitoring data sheet is attached.

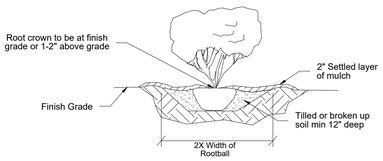
After vegetation is well established, the erosion control devices and any accumulated sediment will be removed by hand shovel.

Wetland Replication and Stream Crossing Special notes:

1. Clearing of the BVW and BVW replication area is prohibited until the Wetland Scientist reviews the area for woody plants to potentially transplant, as indicated on the Stream crossing and Wetland Replication Plan.
2. The contractor shall cover all stockpiled hydric soils and keep them moist until their eventual reuse.
3. The subgrade of the BVW replication area should be loosened prior to placing hydric soil backfill to provide sufficient vegetation rooting depth if a heavily compacted C-layer is encountered. The design wetland scientist should be contact to inspect the site condition to assure that the C-soil is not heavily compacted prior to the placement of the top 12 inches or more organic hydric soils in the replication area.
4. The BVW replication area to be overseeded by doubling the recommended application rate in the NE Wetmix spec with placing clean straw mulch over the seed to promote stability and germination in the replication area.
5. Field survey of the stream channel has been conducted and recorded and analyzed. The information of the channel morphology is presented in the plan for reference in case channel restoration is needed. A 8-ft steel plate to protect the channel that is appropriate for the 12-ft culvert installation. In section of utility installation, the channel will be restored with the channel width and depth as surveyed with 1:1 slope and the saved root rich bank materials plus some 12" anchoring stones extending 6" below the bottom elevation.

Stormwater Basin Vegetation Management

1. The stormwater basin area shall be mowed twice a year in top of the embankment and slope to prevent the establishment of woody plants, especially trees for the protection of the embankment of the basin.
2. The bottom area of the basins shall be mowed once a year if gets dry in the early fall. All plant clips shall be removed out of the basin area and disposed of properly off site.



Typical Shrub Planting Detail
N.T.S

NOTES: TYPICAL SHRUB PLANTING, INDIVIDUAL PLANTING HOLE

1. Dig planting hole at least 2x the width of the root ball or container.
2. Scarify subgrade and sides of planting hole when planting in clay soil.
3. Set the top of the root ball level with the soil surface, or 1-2" above if the soil is prone to settling.
4. If container grown plant, gently slide plant out of container. Disturb the roots.
5. If b&b plant, remove burlap from at least the top 12 inches of the rootball, without disturbing the rootball. Remove all cord from the trunk. Remove burlap and wire basket (if present) from the root ball.
6. Back fill the planting hole with excavated native soil, broken up or tilled. Water to remove air pockets. Do not add amendments.
7. Place pine straw or bark mulch on the surface to a (settled) depth of 1 to 3 inches.

NOTES: TREE PLANTING (>2"CAL.)

1. All plant materials shall be in accordance with the american standards for nursery stock (ansi z60.1-2004). Plant according to ansi a300 part 6.
2. Dig the planting hole a minimum of 2x width of rootball for at least the first 12 inches of depth. Below 12 inches, dig hole wide enough to permit adjusting. Do not dig the hole deeper than root ball depth.
3. Scarify the subgrade and sides of the planting hole when planting in clay soils (more than 15% clay).
4. Lift and set the tree by root ball only. Do not lift using the tree trunk and do not use tree trunk as a lever.
5. Set the top of the root ball level with the soil surface or slightly higher if the soil is prone to settling.
6. After the tree is set in place, remove burlap, wire and straps from at least the upper 1/3 of the rootball.
7. Backfill with existing soil that has been well-tilled or broken up. Do not add amendments to the backfill soil. Amend the surface with mulch.
8. Use three 2" x 2" wood stakes driven into undisturbed soil a minimum of 16 inches. Space stakes equally around the tree.
9. Attach 3/4" nylon webbing to connect the tree to stakes. Attach webbing at 1/3 the tree height.
10. Apply a 2-3" (settled) depth of pine straw or bark mulch to the planting surface. Leave a 2" space around the trunk for air circulation.
11. Pruning shall be limited to dead, diseased, or broken limbs only and shall be in accordance with ansi a300 specifications.
12. Remove any trunk wrap remaining at time of planting. No wraps shall be placed on trunk.

Crossing Section				
Soil at S5-N5 (upstrem end of crossing)				
Depth, in				
0 - 6	S.L.	10 YR2/1		
6"+	stone			
Soil at S3-N3 (downstrem end of crossing)				
Depth, in				
0	Boulder	Elev. =264.1		
Replication area				
RP-S1				
Depth, in	Horizon	Texture	Matrix color	Note
0-2"	Oa	leaf matt		
2-8"	A	S.L.	10YR 2/1	friable
8"-20"	B	M.L.S.	2.5Y 6/4	saturation at bottom
20+	Cr	stones		@18"
RP-S2				
Depth, in	Horizon	Texture	Matrix color	Note
0-8"	A	S.L.	10YR 2/1	friable
8"-20"	B	M.L.S. - SL	2.5Y 6/4	saturation at bottom
20+	Cr	stones		@16" high GW
RP-S3				
Depth, in	Horizon	Texture	Matrix color	Note
0-10"	A	S.L.	10YR 2/1	friable
10	Cr	stones		
RP-S4				
Depth, in	Horizon	Texture	Matrix color	Note
0-8"	A	S.L.	10YR 2/1	friable
8"-12"	B	M.L.S. - SL	2.5Y 5/4	friable
12+	Cr	stones		@18" high GW

Construction Sequencing for Wetland/Stream Crossing

1. Stake out the limit of work and install erosion control as Franklin Conservation Commission approved.
2. Demarcate the wetland replication area. The design wetland scientist shall pre-mark any plants that may be saved in the replication area and from the wetland crossing area that may be transplanted.
3. Strip the wetland replication area and save the topsoil for later use.
4. Excavate the wetland replication area to 12" below the proposed rough grade.
5. Call the design wetland scientist for grade inspection and adjust the grade as needed for wetland plants.
6. Place the topsoil back to the design grade, if needed use the onsite clean loam to mixed with compost to mimic wetland soil 1/2 compost and 1/2 regular loamy soil.
7. Plant the proposed plants:
   a. Call the wetland scientist to check the location of the proposed plants for final adjustment according to the prepared grade and hydrology.
   b. Excavated the planting hole 2-3 times of the root ball size.
   c. Place the plant in the hole and water the hole to full saturation.
   d. Backfill the hole and tamp the soil to avoid air pocket in the fill.
   e. Place 2 ft woodchips or compost around the plants (trees or shrubs)
8. The replication shall be monitored for two growing seasons and with 75% more survive rate and ground cover in the replication area or as Order of Conditions required.
9. Install the sewer and/or water line across underneath the wetland at the design depth and location.
10. It can put the line in a Schedule 80 PVC sleeves given the crossing and possible future replacement. The sleeves shall be extended 5 ft beyond the footing of the culvert.
11. Back fill the sleeves and/or sewer and water lines and compacted to the required compaction ratio 95%.
12. Excavate the culvert footing hole and install the footing as proposed.
13. The bottom of the hole and rebar work shall be inspected by the design engineer prior to pouring concrete.
14. Install the super culvert and grout the seams of culvert and footing.
15. Backfill with proper materials, no large stones of 6" or more should be used for backfill around the culvert.
16. Install the headwall and retaining wall on both sides of the culvert.
17. Install guard rail and safety C-L fence along the retaining wall.
18. Install the road subbase to be ready for top paving.

Wetland replication access buffer zone impact restoration plan:

1. The access will be marked in the field prior to construction.
2. The design wetland Scientist will review the area with the Conservation agent to identify the impacted shrubs if any. Field adjustment of the access may be required with the mutual agreement with the Agent to avoid or minimize the access impact on buffer zone vegetation. The project wetland scientist shall photo document the existing access area with counted plants and species for future reference.
3. The access shall be temporarily protected with steel plate or rubber matting as for the temporary stream and wetland crossing.
4. Any unavoidable impact on vegetation (shrubs and trees) except for invasive species, shall be mitigated in 1:1 ratio or better by planting in kind plants in the impacted area according to the same planting standard as the wetland replication area.
5. The impacted area shall be monitored for two consecutive growing seasons as the BVW replication area as the Order conditioned by Franklin Conservation Commission.
6. Any dead plants shall be replanted.

Bank and Land Under Water (LUW) Restoration Plan:

The proposed project will involve an intermittent stream crossing of about 35 section of about 4 ft wide by less than 12-in deep. The crossing will be a 12-ft span open bottom box culvert. There will be a 4ft section temporarily excavated for sewer and water line installation. The rest of utilities including electric and cable will be located above the top of culvert and not to impact the bank and LUW. Except for the sewer/sewer trench construction, the rest of the bank and channel will be covered with steel plates to allow water flow and protected. The plan is devised with flexibility to allow of field use:

1. The water/sewer trenches shall be demarcated in the field prior to installation of sewer line and before the culvert installation.
2. Any temporary alteration of bank and LUW shall be documented prior to alteration by the design wetland scientist, which includes the bank section feature: bank height, bankfull width, substrate materials
3. If the bank of LUW shall be excavated, it shall be conducted in sequence to save the materials in order of layers
4. A 10" schedule 80 PVC sleeve shall be installed under the culvert for the 8" sewer/water lines installation per the design detail drawings.
5. The saved materials from excavation shall be used in restoring the temporarily altered bank and LUW to match the documented geometry and restore the materials in the same order as excavated and stored.
6. The restored section of the bank shall be protected with jute netting in the bottom and coil roll along the bank toe of slopes.

Planting Schedule for Franklin Heights, Franklin, MA
By Creative Land & Water Engineering, LLC

Key #		Common name	*Botanical name*	Mature Height	Mature Spread	Size	Condition	Spacing	Quantity
Trees	RM	Red Maple	*Acer rubrum*	40-60'	40'	3.0" Cal.	B+B	12' O.C.	3
	TP	Tupelo	*Nyssa sylvatica*	30-50'	20-30'	3.0" Cal.	B+B	12' O.C.	2
Shrubs	HB	Highbush blueberry	*Vaccinium corymbosum*	6-12'	6-12'	#3	Cont.	6' O.C.	10
	SP	Sweetpepper bush	*Clethra alnifolia*	3-8'	4-6'	#1	Cont.	6' O.C.	10
	WB	Winterberry holly	*Ilex verticillata*	3-15'	3-15'	#1	Cont.	6' O.C.	10
Ground Cover	-	New England Wetland Seed Mix		Quantity:			1 Pound		

Plant Selection Notes

- Use only straight species, no cultivars. (Cultivars have been bred for aesthetic traits and this is at the expense of other habitat-supportive traits. Also, cultivars cannot cross-pollinate with naturally occurring straight species out in the landscape.)
- Quality - trees should be single stems with well-spaced numerous branches per the American Association of Nurserymen standards.
- Shrubs should be well shaped and have sufficient well-spaced side branches per the American Association of Nurserymen standards.

OWNER(S)
JOSEPHINE A. FARINA AND CATHERINE L. MEDAGLIA, TRUSTEES OF THE HARMONY NOMINEE REALTY TRUST PO BOX 600269 120 ADAMS STREET NEWTON, MA 02460 JOHN A. FARINA ANTHONY J. MEDAGLIA, JR. STEPHEN M. COLLINS BRYON R. COLLINS DAVID C. COLLINS SEAN C. COLLINS C/O KATHRYN G. COLLINS, ESQ. HORNUNG & SCIMONE PC 5 COMMONWEALTH ROAD, 4TH FLOOR NATICK, MA 01760
APPLICANT
OLIVER CROSSING REALTY TRUST 148 PARK STREET NORTH READING MA, 01864
PLAN REFERENCE
FRANKLIN HEIGHTS PARCEL B 40B DEVELOPMENT PLAN FRANKLIN MASSACHUSETTS BY GUERRIERE & HALNON, INC. 55 WEST CENTRAL ST, FRANKLIN, MA 02038 DATED JULY 7, 2022

Creative Land & Water Engineering, LLC
Environmental Scientists and Engineers
P.O. Box 584 - Southborough - MA - 01772
774-454-0266 www.claweng.com

Plan Title:	Stream Crossing and Wetland Replication Plan
Project Name:	Franklin Heights
Site Address:	Franklin Heights, Franklin, MA 02038
Owner:	-
Client:	Oliver Crossing Realty Trust

Project No:	J101-4	Drawn by:	FA	Date:	07/20/22
Designed by:	DSW, FA	Approved by:	DSW	Scale:	1"=10'
Sheet No:	1 of 2				

Rev.:	Date:	Description	By:
4	1/25/23	Temporary wetland impact restoration	
3	1/20/23	Notes, plan notes, dewatering and crossing details	DSW/FA
2	12/05/22	Stream profile, existing grade, wetland replication	DSW/FA
1	9/16/22	Vegetation monitoring notes	DSW/FA

COMMONWEALTH OF MASSACHUSETTS
DESHENG WANG
CIVIL
NO.39511
REGISTERED PROFESSIONAL ENGINEER

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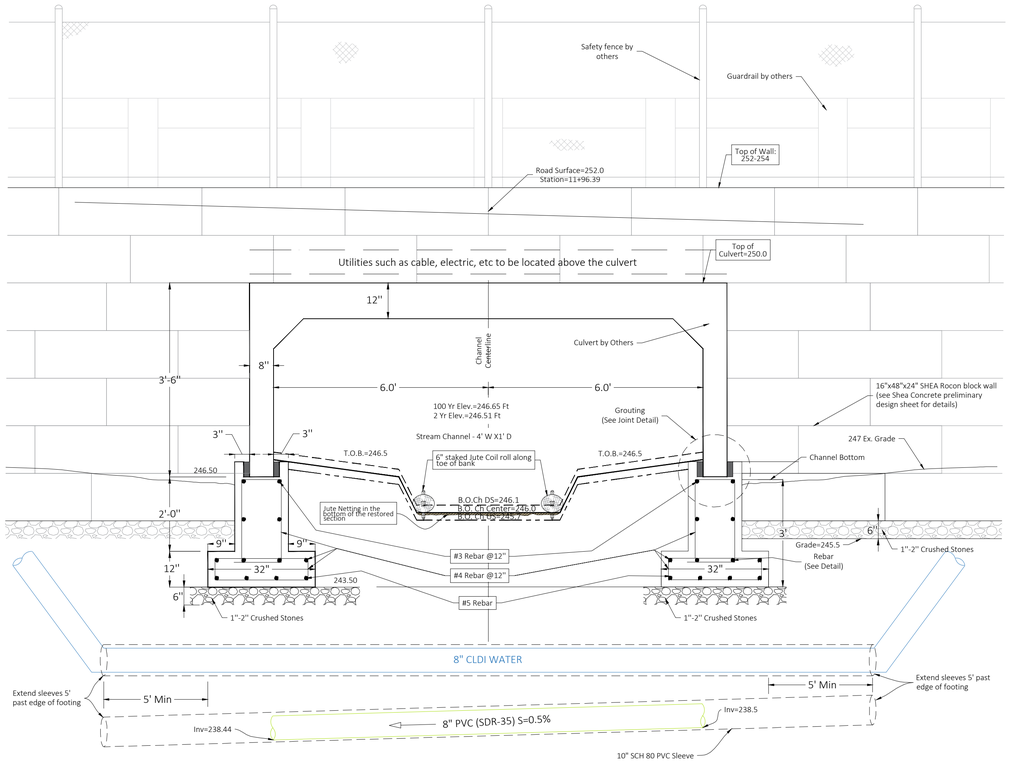
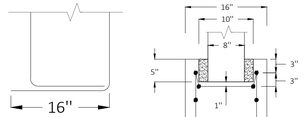


Culvert Cross Section Detail
N.T.S

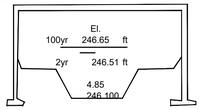


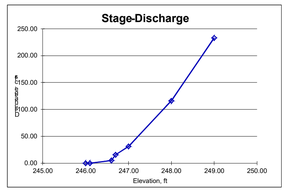
Rebar Detail
N.T.S

Joint Detail
N.T.S

Table : **Outflow Analysis and Storage Indication at Road Crossing (Franklin Heights)**

Broad-crested weir width (ft):			1.00		Triangular weir angle:	90.00	Bankheight: 0.50
Broad-crested weir length (ft):			4.85	12.00	Manning's n:	0.01	Net width (in.): 2.00
Weir crest elevation (ft):			246.10		dt	360 sec	Slot INV (ft): 250.00
Elevation	Total Q	2S/dt + Q	H-z		Qweir	Qtw	Depression area Storage
ft	cfs	cfs	ft		cfs	cfs	sq. ft cu. ft
246.00	0.00	0.000	0.000		0.000	0	61.62 0.000
246.10	0.00	0.034	0.000		0.000	0	240 6.162
246.60	5.01	5.753	0.500		4.562	0.45	270 133.662
246.70	15.75	16.733	0.600		15.042	0.71	600 177.162
247.00	31.27	33.303	0.900		29.320	1.95	660 366.162
248.00	115.78	121.644	1.900		103.157	12.62	720 1056.162
249.00	233.05	242.918	2.900		196.732	36.32	720 1776.162
				Elev, ft	Vel, ft/s		
Q2=	3.540		cfs	246.51	1.64		
Q100=	15.600		cfs	246.65	4.82		





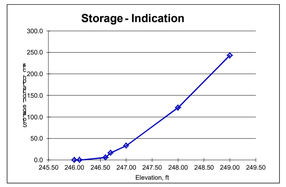


Figure 3: Rating Curve and Storage-Indication Curve

Table 1. **Estimating Magnitude and Frequency of Floods for Ungaged Sites**
Franklin Heights, Franklin, MA

Project: Franklin Heights — Hydrologist: Desheng Wang, Ph.D., P.E.
Stream: un-named — Company: Creative Land & Water Engineering, LLC
Date: 12/5/2022

	Rural Area (Easton Mass., Wandle 1983)	Urban (State Wide, [2])
Q_2	= 36.30 A $^{0.682}$	2.35 A $^{0.41}$ $SL^{0.17}$ $(RI2+3)^{2.04}$ $(ST+8)^{-0.65}$ $(13\text{-}BDF)^{0.32}$ $IA^{0.15}$ $RQ100^{0.47}$
Q_{10}	= 72.12 A $^{0.660}$	A in Sq. miles, Q in ft^3/s — 2.99 A $^{0.32}$ $SL^{0.15}$ $(RI2+3)^{1.75}$ $(ST+8)^{-0.57}$ $(13\text{-}BDF)^{0.30}$ $IA^{0.09}$ $RQ100^{0.58}$
Q_{25}	= 96.71A $^{0.651}$	2.78 A $^{0.31}$ $SL^{0.15}$ $(RI2+3)^{1.76}$ $(ST+8)^{-0.55}$ $(13\text{-}BDF)^{0.29}$ $IA^{0.07}$ $RQ100^{0.60}$
Q_{50}	= 118.1 A $^{0.645}$	2.67 A $^{0.29}$ $SL^{0.15}$ $(RI2+3)^{1.74}$ $(ST+8)^{-0.53}$ $(13\text{-}BDF)^{0.28}$ $IA^{0.06}$ $RQ100^{0.62}$
Q_{100}	= 143.1 A $^{0.638}$	2.5 A $^{0.29}$ $SL^{0.15}$ $(RI2+3)^{1.76}$ $(ST+8)^{-0.52}$ $(13\text{-}BDF)^{0.28}$ $IA^{0.06}$ $RQ100^{0.63}$
Q_{500}		2.27 A $^{0.29}$ $SL^{0.15}$ $(RI2+3)^{1.86}$ $(ST+8)^{-0.54}$ $(13\text{-}BDF)^{0.27}$ $IA^{0.05}$ $RQ500^{0.63}$

Urbanization Impact Analysis

Cross Section	Area, mi^2	Q_2, cfs	Q_{10}, cfs	Q_{50}, cfs	Q_{100}, cfs	Q_{500}, cfs	SL, ft/mi	RI2, in	ST, %	BDF (0 -12)	IA, %	UQ2,cfs	UQ10,cfs	UQ_{50}, cfs	UQ_{100},cfs	UQ_{500}, cfs
Stream Crossi	0.025	2.93	6.32	10.93758	13.60		617	1.5	20	0	5	3.54	7.81	**13.31**	**15.60**	

References:

[1] Wandle, S.W., 1983, Estimating peak discharges of small, rural streams in Massachusetts:
U.S. Geological Survey Water-Supply Paper 2214, 26 p.

[2] The National Flood Frequency Program, Version 3: A Computer Program for Estimating Magnitude and Frequency of Flood for Ungaged Sites
U.S. Geological Survey, compiled by K. G. Ries III and M.Y Crouse, Water Resources Investigations Report 02-4168.

[3] Zarriello, Philip, 2016 Magnitude of flood flows for selected annual exceedance probabilities for streams in Massachusetts
U.S.G.S., Scientific invstigation Report 2016-5156.

where

UQ2, UQ5,... UQ500 are the urban peak discharges, in cubic feet per second (ft3/s), for the 2-, 5-, ... 500-year recurrence intervals;
A is the contributing drainage area, in square miles, as determined from the best available topographic maps; in urban areas, drainage systems sometimes cross topographic divides. Such drainage changes should be accounted for when computing A; **SL** is the main channel slope, in feet per mile (ft/mi), mea-sured between points that are 10 percent and 85 percent of the main channel length upstream from the study site (for sites where SL is greater than 70 ft/mi, 70 ft/mi is used in the equations); **RI2** is the rainfall, in inches (in) for the 2-hour, 2-year recurrence interval, determined from U.S. Weather Bureau (USWB) Technical Paper 40 (1961) (eastern USA), or from NOAA Atlas 2 (Miller and others, 1973) (western USA);
ST is basin storage, the percentage of the drainage basin occupied by lakes, reservoirs, swamps, and wetlands; in-channel storage of a temporary nature, resulting from detention ponds or roadway embankments, should not be included in the computation of ST;
BDF is the basin development factor, an index of the preva- lence of the urban drainage improvements; **IA** is the percentage of the drainage basin occupied by impervious surfaces, such as houses, buildings, streets, and parking lots; and **RQT**, are the peak discharges, in cubic feet per second, for an equivalent rural drainage basin in the same hydro- logic area as the urban basin, for a recurrence interval of T years; equivalent rural peak discharges are computed from the rural equations for the appropriate State, in the NFF program, and are automatically transferred to the urban computations. The basin development factor (**BDF**) is a highly signifi-cant variable in the equations, and provides a measure of the efficiency of the drainage basin. It can easily be determined from drainage maps and field inspections of the drainage basin. The basin is first divided into upper, middle, and lower thirds on a drainage map, as shown in figure 1A-C. Each third should contain about one-third of the contributing drainage area, and stream lengths of two or more streams should be approximately the same in each third. However, stream lengths of different thirds can be different. For instance, in figure 1C, the stream distances of the lower third are all about equal, but are longer than those in the middle third. Precise definition of the basin thirds is not considered necessary because it will not have much effect on the final value of BDF. Therefore, the boundaries between basin thirds can be drawn by eye without precise measurements. Within each third of the basin, four characteristics of the drainage system must be evaluated and assigned a code of 0 or 1. Summation of the 12 codes (four codes in each third of the basin) yields the BDF. The following guidelines should not be considered as requiring precise measurements. A certain amount of subjectivity will necessarily be involved, and field checking should be performed to obtain the best estimates. Channel improvements.—If channel improvements such as straightening, enlarging, deepening, and clearing are preva- lent for the main drainage channels and principal tributar- ies (those that drain directly into the main channel), then a code of 1 is assigned. To be considered prevalent, at least

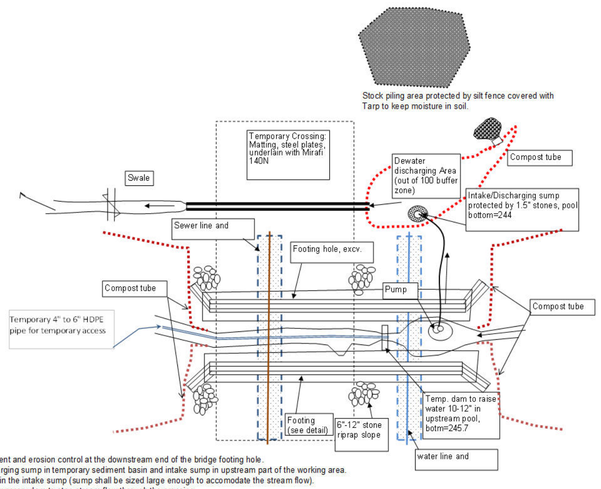
Long, narrow basin

Upper Third

Middle Third

Lower Third

50 percent of the main drainage channels and principal tributaries must be improved to some degree over natural conditions. If channel improvements are not prevalent, then a code of 0 is assigned.
Channel linings.—If more than 50 percent of the length of the main channels and principal tributaries has been lined with an impervious surface, such as concrete, then a code of 1 is assigned to this characteristic; otherwise, a code
of 0 is assigned. The presence of channel linings would obviously indicate the presence of channel improvements as well. Therefore, this is an added factor and indicates a more highly developed drainage system.
Storm drains or storm sewers.—Storm drains are defined as those enclosed drainage structures (usually pipes), com- monly used on the secondary tributaries where the drainage is received directly from streets or parking lots. Many of these drains empty into open channels; however, in some basins they empty into channels enclosed as box and pipe culverts. Where more than 50 percent of the secondary tributaries within a subarea (third) consists of storm drains, then a code of 1 is assigned to this aspect; otherwise, a code of 0 is assigned.
Curb-and-gutter streets.—If more than 50 percent of the subarea (third) is urbanized (covered with residential, com- mercial, and/or industrial development), and if more than 50 percent of the streets and highways in the subarea are constructed with curbs and gutters, then a code of 1 is be assigned to this aspect; otherwise, a code of 0 is assigned. Drainage from curb-and-gutter streets commonly empties into storm drains.



Dewatering Steps:
1. Install sediment and erosion control at the downstream end of the bridge footing hole.
2. Install discharging sump in temporary sediment basin and intake sump in upstream part of the working area.
3. Install pump in the intake sump (sump shall be sized large enough to accomodate the stream flow).
4. Install the temporary dam to stop stream flow through the crossing.
5. Excavate the bridge footing holes and install footing as designed.
6. If the footing hole requires dewatering, it shall be pumped to Pond #3 as described above.
7. The design engineer shall inspect the dewatering setup before the excavation starts.
8. If the stream channel will be altered temporarily, the surface substrate of the channel shall be excavated and saved on-site and be put back after the footing of the culvert is installed. The substrate shall be used to restore the channel to the same as the original geometry.
9. The restored channel shall be inspected by the design wetland scientist and hydraulic engineer.
10. It is also recommended that the footing installation be carried out in a time slot of a few consecutive days, when no rain is forecasted.

Dewatering Plan - Stream Crossing , Franklin Heights, Franklin, MA

Wetland/Stream Crossing Design Analysis (current, wider road layout):

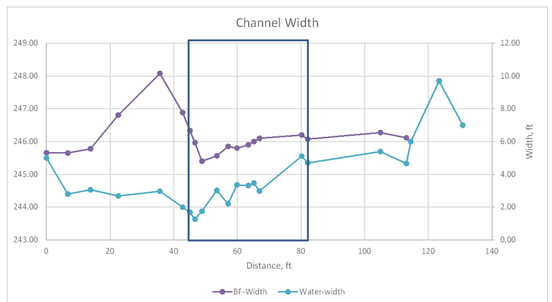
Design factors:

	size		Quantity	Total
Crossing channel:	4	ft		
bankfull width:	1	ft		
Road paving:	22	ft	1	22
onside sidewalk:	5	ft	1	5
Curb width:	0.5	ft	2	1
Grass strip:	3	ft	1	3
Guardrail/Retaining wall:	2	ft	2	4
Total width:				35

Design output:

	Dimension		Required Per ACOE	Meet reqred
Culvert span:	**12**	**ft**		
Height:	**2.5**	**ft**		
Crossing width:	**35**	**ft**		
Openning ratio:	**0.26**	**m**	**0.25** m	yes
Stream crossing ratio:	**3**		**1.2**	yes
Wetland fill area:	947	sf	about 420 sf will be under the culvert and partially impacted and 259 sf temp. alteration for construction.	
Wetland rep area:	2140	sf	1894	yes
Design ratio:	2.26	:1	2:1 ratio	yes

Note: The stream crossing and wetland replication will be reviewed with Franklin Conservation Commission to be finalized.



Stream Morphological Surveying

Distance	Elevation	LB, elev	RB ELV	Bk Ch. Width	Water W	Note
Ft.	Ft.	ft	ft	ft	ft	
0	243.00	244.00	243.62	5.32	5.00	
6.74	243.30	244.02	244.00	5.30	2.80	
13.86	243.90	244.20	245.16	5.56	3.06	
22.59	244.00	245.00	246.50	7.62	2.68	
35.63	244.90	245.27	245.56	10.16	2.97	
42.82	245.00	245.94	246.58	7.76	2.00	
45.1	245.90	246.50	246.50	6.67	1.68	D/S end of Xing
46.68	246.00	246.50	246.50	5.93	1.26	
48.87	246.10	246.50	246.50	4.80	1.75	
53.54	246.10	246.50	246.48	5.13	3.02	
57.08	246.00	246.42	246.38	5.70	2.20	
59.88	245.90	246.42	246.38	5.60	3.36	
63.44	246.00	246.42	246.38	5.80	3.32	
65.19	246.10	246.42	246.38	6.00	3.47	
66.94	246.00	246.42	246.41	6.20	2.98	
80.18	245.70	246.50	246.50	6.40	5.11	
82.12	245.71	246.60	246.60	6.15	4.70	U/S end of Xing
104.91	245.90	246.70	246.70	6.55	5.39	
113.1	246.00	246.92	246.83	6.23	4.66	
114.48	246.00	246.92	246.83	6.00	6.00	two trees
123.38	246.20	246.70	247.37	9.70	9.69	no bank marked
130.80	246.20	246.70	247.37	7.00	7.00	no bank marked
Culvert Avg	245.96	246.47	246.46	5.85	2.99	
Bank height		0.52	0.50			

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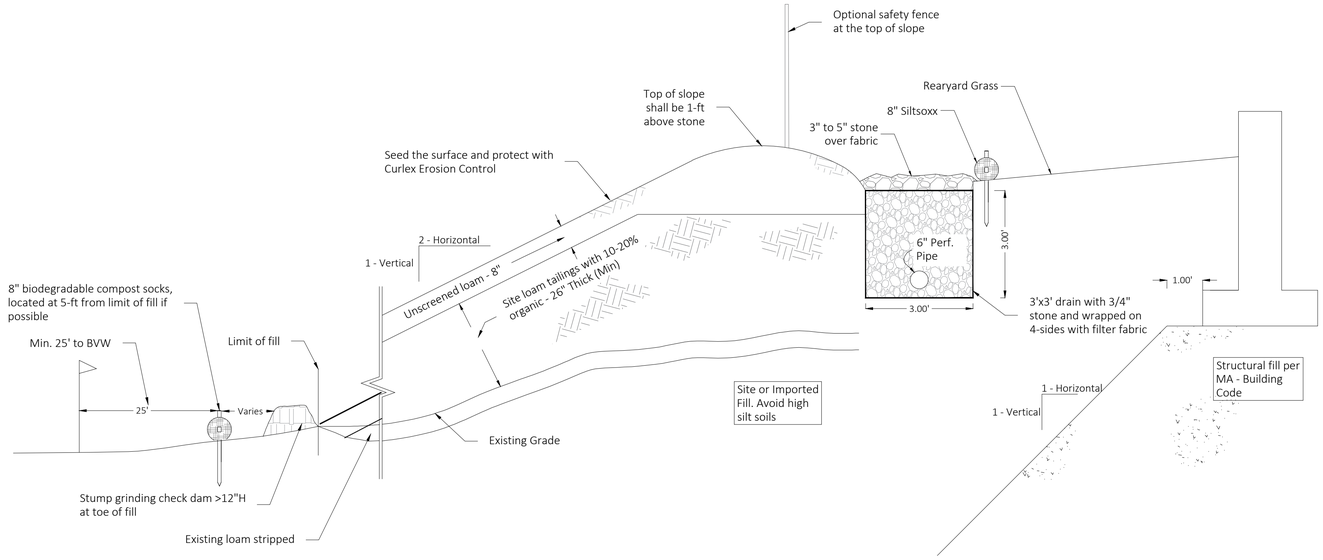
Plan Title:	Stream Crossing and Wetland Replication Plan		
Project Name:	Franklin Heights		
Site Address:	Franklin Heights, Franklin, MA 02038		
Owner:	-	Client:	Oliver Crossing Realty Trust
Project No: J101-4	Drawn by: FA	Date: 07/20/22	Sheet No: 2 of 2
Designed by: DSW, FA	Approved by: DSW	Scale: 1"=10'	

Rev.:	Date:	Description	By:
3	1/20/23	Notes, plan notes, dewatering and crossing details	DSW/FA
2	12/05/22	Stream profile, existing grade, wetland replication	DSW/FA
1	9/16/22	Vegetation monitoring notes	DSW/FA

COMMONWEALTH OF MASSACHUSETTS — DESHENG WANG — CIVIL — NO.39511 — REGISTERED PROFESSIONAL ENGINEER



Slope stabilization cross-section and slope runoff interception drain detail
N.T.S

NEW ENGLAND WETLAND PLANTS, INC

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EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Wetmix (Wetland Seed Mix)

Botanical Name	Common Name	Indicator
Carex vulpinoidea	Fox Sedge	OBL
Carex scoparia	Blunt Broom Sedge	FACW
Carex lurida	Lurid Sedge	OBL
Carex lupulina	Hop Sedge	OBL
Poa palustris	Fowl Bluegrass	FACW
Bidens frondosa	Beggar Ticks	FACW
Scirpus atrovirens	Green Bulrush	OBL
Asclepias incarnata	Swamp Milkweed	OBL
Carex crinita	Fringed Sedge	OBL
Vernonia noveboracensis	New York Ironweed	FACW+
Juncus effusus	Soft Rush	FACW+
Aster lateriflorus (Symphyotrichum lateriflorum)	Starved/Calico Aster	FACW
Iris versicolor	Blue Flag	OBL
Glyceria grandis	American Mannagrass	OBL
Mimulus ringens	Square Stemmed Monkey Flower	OBL
Eupatorium maculatum (Eutrochium maculatum)	Spotted Joe Pye Weed	OBL

PRICE PER LB. $135 MIN. QUANTITY: 1 lbs. TOTAL: APPLY: 18LBS/ACRE: 2500 SF/lb

The New England Wetmix (Wetland Seed Mix) contains a wide variety of native seeds that are suitable for most wetland restoration sites that are not permanently flooded. All species are best suited to moist ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. The mix is well suited for detention basin borders and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months the seed mix will germinate the following spring. During the first season of growth several species will produce seeds while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is comprised of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

The wetland seeds in this mix can be sown by hand, with a hand-held spreader, or hydro-seeded on large or hard to reach sites. Lightly rake to insure good seed-to-soil contact. Seeding can take place on frozen soil, as the freezing and thawing weather of late fall and late winter will work the seed into the soil. If spring conditions are drier than usual watering may be required. If sowing during the summer months supplemental watering will likely be required until germination. A light mulch of clean, weed free straw is recommended.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes

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New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites

Botanical Name	Common Name	Indicator
Elymus riparius	Riverbank Wild Rye	FACW
Schizachyrium scoparium	Little Bluestem	FACU
Festuca rubra	Red Fescue	FACU
Andropogon gerardii	Big Bluestem	FAC
Panicum virgatum	Switch Grass	FAC
Vernonia noveboracensis	New York Ironweed	FACW+
Agrostis perennans	Upland Bentgrass	FACU
Bidens frondosa	Beggar Ticks	FACW
Eupatorium maculatum (Eutrochium maculatum)	Spotted Joe Pye Weed	OBL
Eupatorium perfoliatum	Boneset	FACW
Aster novae-angliae (Symphyotrichum novae-anglia	New England Aster	FACW-
Scirpus cyperinus	Wool Grass	FACW
Juncus effusus	Soft Rush	FACW+

PRICE PER LB. $37.00 MIN. QUANITY 3 LBS. TOTAL: $111.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites contains a selection of native grasses and wildflowers designed to colonize generally moist, recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. It is an appropriate seed mix for ecologically sensitive restorations that require stabilization as well as long-term establishment of native vegetation. This mix is particularly appropriate for detention basins that do not hold standing water. Many of the plants in this mix can tolerate infrequent inundation, but not constant flooding. The mix may be applied by hand, by mechanical spreader, or by hydro-seeder. After sowing, lightly rake, roll or cultipack to insure good seed-to-soil contact. Best results are obtained with a Spring or late Summer seeding. Late Fall and Winter dormant seeding requires an increase in the application rate. A light mulching of clean, weed-free straw is recommended

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

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New England Erosion Control/Restoration Mix for Dry Sites

Botanical Name	Common Name	Indicator
Elymus canadensis	Canada Wild Rye	FACU+
Festuca rubra	Red Fescue	FACU
Lolium multiflorum	Annual Ryegrass	
Lolium perenne	Perrenial Ryegrass	
Schizachyrium scoparium	Little Bluestem	FACU
Panicum virgatum	Switch Grass	FAC
Sorghastrum nutans	Indian Grass	UPL

PRICE PER LB. $18.00 MIN. QUANITY 5 LBS. TOTAL: $90.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix For Dry Sites provides an appropriate selection of native and naturalized grasses to ensure that dry and recently disturbed sites will be quickly revegetated and the soil surface stabilized. It is an appropriate seed mix for road cuts, pipelines, steeper slopes, and areas requiring quick cover during the ecological restoration process. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or late Summer seeding. Late Spring through Mid-Summer seeding will benefit from a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

NOTE: ALL DISTURBED AREAS SHALL BE SEEDED WITH THE APPROPRIATE SEED MIX AS SOON AS GRADING WORK IS COMPLETED TO OBTAIN THE BEST RESULTS.

Fill Operation and Slope Stabilization Plan

1. Fill operations to proceed in continuous starting to strip and clear fill bottom in existing soil suitable as structurally sound confirmed by competent professional and Town agent.
2. Fill operation to proceed as follows in 1 ft lift:
   a. Install loam tailings with some onsite surface organics along the edge of fill second tier erosion control
   b. Install site or import fill in 1 ft light in area not under buildings
   c. Install structural fill in 1 ft lift under buildings
   d. Compact entire lift in one operation being carefully to weave all three materials together to 95% compaction ratio
3. At the end of every day and any time rain is imminent, a continuous berm of loam tailings at least 1 ft above existing fill is to be in place
4. When fill at bottom of footing elevation, complete final slope stabilization as follows:
   a. Grade to contours shown on plan
   b. Spread 8 inches site loam on slope
   c. Seed with Agway or Blueseal Conservation Seed mix
   d. Use 5-10-5 fertilizer or as approved and pelletized lime to promote grass growth
   e. Install Curlex fabric as per manufacture for surface erosion control on slope
5. Install foundations
6. Complete backfill around the foundation and compact
7. Complete final slope stabilization: top of slope to be at least 1 ft above backyard grade to prevent concentrated runoff from going over slope
8. Install slope runoff interception drain as per detail shown
9. Install silt sack or as directed by the environmental monitor/wetland scientist to protect drains until grass established around units not to cause erosion
10. Remove silt socks and other erosion control not biodegradable.

Construction Phase Plan

The project is divided into five (5) phases to minimize erosion.

Phase I

a. Install/maintain the erosion control and the temporary crossing along the wetland crossing from station 10+00 to 14+50
b. Using Conservation Commission approved or equal device to create suitable temporary access through wetland using wood or rubber mats, steel plates and temporary culvert as needed
c. Install perimeter erosion control for the entire site
d. Clear for road, wetland replication area, stormwater basin #1, units 41/42 (location of site trailer and storage containers)
e. Prepare replication area as designed and approved by Franklin Conservation Commission
f. Strip top soil from 10+00 to 14+50 and transport soil to wetland replication area with wetland plants to be saved
g. Construct wetland replication with planting as specified and protect it from erosion damage
h. Construct access road from 10+00 to 14+50 including the installation of culvert per designed plan; complete the road to binder
i. All catch basin grates are set at binder grade so that drainage can function as designed. This applies to all Phases.

Phase II

a. Clear for road 21+00 to 27+00, units 1-20 and units 53 to 60; infiltration basin #2 and any dry wells associated with units
b. Strip and stockpile loam for road construction in area units 53, 54, 55, and 56
c. Construct road and utilities to binder start 27+00 to 23+00 including units 5 to 12 loop road
d. During road and utilities installation, begin foundation and building work starting with units 1 /2 in order
e. Stromwater basin #1 to be complete to functional prior to installation of binder for this phase
f. Infiltration Basin #2 to be functional prior to foundations for units 9/10
g. Unit construction to continue around loop, loam to remain in area of units until construction commences on those units
h. All stumps to be ground on site, chips to be used for erosion control as continency measure during construction.

Phase III

a. Clear for balance of road and units 43 to 52 and units 21 to 24
b. Create new loam stockpile in area 51/52
c. Surplus site fill to be stockpile units 47 to 50
d. Construct balance of road to binder
e. Unit construction to continue in sequence around site

Phase IV

a. Clear balance of trees
b. Construct structural fill to bottom of footing elevation +/-
c. Stabilize slope as per fill operation details
d. Additional row of erosion control
e. Unit construction balance of site

Phase V

a. Adjust castings to final grade and install top cot for all roads
b. Clean all basins and catch basins
c. Punch list

Erosion control devices to be used during construction include but not limited to:

- Compost socks
- Stake silt fence
- Woodchips or stump grinding check dams
- Runoff interception swales
- Sediment basins
- Flocculant for turbidity control as needed
- Mud traps at intersection of pavement and dirt road
- Hydroseeding

Creative Land & Water Engineering, LLC
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774-454-0266 www.claweng.com

Plan Title:	Construction phasing and slope stabilization plan		
Project Name:	Franklin Heights		
Site Address:	Franklin Heights, Franklin, MA 02038		
Owner: -		Client: Oliver Crossing Realty Trust	
Project No: J101-4	Drawn by: FA	Date: 12/06/22	Sheet No: 1 of 1
Designed by: DSW, FA	Approved by: DSW	Scale: Indicated	
1	1/20/23	Slope stabilization details. Notes	DSW/FA
Rev.:	Date:	Description	By:

COMMONWEALTH OF MASSACHUSETTS
DESHENG WANG
CIVIL
NO.39511
REGISTERED PROFESSIONAL ENGINEER