Shinglemill LLC

Rockland, MA

ZBA Submission Package – REV 2

9/4/2020

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Exhibit 1

Comments and Response Summary

Shingle Mill - Submission Package REV 2

Comment and Response Summary

REF. #	COMMENT	RESPONSE
7/21/20 ZBA MEETING COMMENTS		
General		
1	Amory Engineers requested a comprehensive comment response letter to original Amory report indicated where comments are addressed in rev package	Sent to Pat Brennan 7/29/20
2	Judi Barrett to compile Town Dept comments and provide to JSR	Received 8/18/20
3	Town brought attention to 180-day time frame for permit review	
Civil & Site		
4	ZBA requested a copy of the ORAD previously filed	Applicant provided ORAD 7/31/20 via email. Also enclosed
5	ZBA requested applicant identify potential impacts on resource areas	The project does not impact wetland areas. The area of wetland buffer impact is indicated on the Site Data on the Overall Site Plan, Sheet C-102.
6	ZBA requested applicant confirm wetland flags shown on plan match ORAD	Applicant confirmed wetland boundary matches the flags shown on the ORAD.
7	ZBA requested calculation of upland vs. wetland to understand real density	Total upland area for property has been provided in the Site Data on the Overall Site Plan, Sheet C-102.
8	ZBA requested that the cover sheet of civil set indicate Shingle Mills as applicant and that the permit is Comprehensive not Special	Cover sheet has been revised accordingly.
9	Town expressed concern with stormwater BMP (gravel wetland) detention time. Standing water?	The enclosed Drainage Analysis shows that the draw down time for the gravel wetland is approximately 47-hours.
10	ZBA requested a copy of the Geotechnical & Environmental reports to Pat Brennan - Amory noted he was comfortable reviewing and that an additional geotechnical peer review would not be necessary	Applicant sent geotechnical and environmental summary memorandum to Armory Engineers on 7/31/20. Enclosed is a copy of this memorandum.
11	Provide driveway cross sections for every 100 ft along the Pond Street driveway and by Road Improvement (1:1 scale)	See roadway cross sections on Sheet C-201 through 208 of revised package dated September 4, 2020. Note that approx. 250 ft of retaining wall has been eliminated to reduce the impact of the driveway to abutters property. Renderings of view from abutters property have been included in the package. Refer to "Landscape Rendering #1".
Road Improvements		
12	Verify if easement attained is long enough to accommodate design	See Amory Comments / Additional Coments #8
Landscape Design		
13	Explore opportunities for outdoor amenities (playground, basketball court)	Recreational space was added to the plan on the southwest corner of the development off of Wilson Street. Open lawn space and shade trees form a useable area directly accessible from the southern parking lot and Community Building. Buffer planting provides privacy between adjacent abutters. See sheet LP1.0/LP1.1 of the Landscape Drawings.
14	ZBA expressed concern in regards to the amount of parking provided	See attached narrative titled "Shingle Mill- Narrative 2020-SEP-15" regarding demographics, community usage, and parking.
15	Provide cut sheets for lighting and confirm "dark sky"	Applicant provided fixture cut sheets 7/31/20 via email. Also included in this package
Architectural		
16	Town expressed concern that lighter facade colors may be too bright for such a large building (high visibility). Consider alt color scheme	Applicant has heard the town's concern about the façade materials being too light. Included in this submission is more in depth color study titled “Shingle Mill-Exterior Color Study 2020-SEP-15”, to show the true nature of the colors selected. The applicant feels that the colors are not too light and fit with local and surrounding color palettes. The blues and greys are soothing colors and the white trim is more traditional and suitable for this project.
17	Review alternative roof design (i.e. dormer top floor rather than bathtub roof?)	Applicant has heard the town's concern about the style of roof but believes the hybrid- gable roof fits with the New England vernacular and creates a more residential feel than a flat roof. Additionally, the design acts as a sound and visual barrier to unsightly rooftop equipment.
Construction		
18	No access for construction vehicles down Wilson Street, include demo for Wilson St house	Aknowledged
19	Building department will assemble a team to review project during construction to confirm adherence to Chapter 40B permit	Aknowledged
TOWN DEPARTMENT COMMENTS (issued 8/18/20)		
Abington & Rockland Joint Water Works (7/30/20 Letter)		
1	A&R JWW expressed concern that heavy construction and the import of fill close to wetlands elevates the risk of contamination of the water supply	The project will install erosion control measures for construction activities as per locations on Grading, Drainage & Erosion Control Sheet C-103.1 & 103.2 and as per Erosion Control Notes & Details on Sheet C-501. The project will be required to file a Notice of Intent (NOI) with the EPA for a Construction General Permit (CGP) in order to be covered under the National Pollutant Discharge Elimination System (NPDES) program. The CGP will require that a Stormwater Pollution Prevention Plan (SWPPP) be implemented during construction activities which includes regular monitoring of erosion control measures and stormwater BMP's to ensure they are maintained and operating properly. In addition, applicant will prepare a Soil and Groundwater Management Plan for construction. The plan will detail the specific geotechnical and environmental parameters that will regulate the import of fill soils sourced for the Site. There is no significant construction dewatering activities planned at this time. The SGMP to be protective of both human health and the environment and the soils acceptance protocols will be developed in accordance with the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000) and the Massachusetts Department of Environmental Protection (MassDEP) Similar Soils Provision Guidance (MassDEP Policy WSC#-13-500).
2	A&R JWW requested that the applicant perform and file the necessary evaluation assuring that the water supply will be neither impacted or contaminated in any manner, including construction accidents and long-term contamination of the aquifer	The project will install permanent stormwater best management practices (BMP) will be installed to treat and recharge stormwater runoff to Massachusetts DEP stormwater standards. The project will be required to implement the Operation & Maintenance Plan provided in Stormwater Report to ensure BMP's are operating properly.
3	A&R JWW stated that approval by other boards does not constitute water availability. Applicant must meet with A&R JWW Commissioner to establish an acceptable plan of action to obtain approval for water availability.	Applicant will coordinate with A&R JWW to establish an acceptable plan of action to obtain approval for water availability.
Highway Department (4/3/20)		
1	Would require to have at least a 2 inch minus stone apron to alleviate sediment and debris from going onto Pond Street. (stabilized stone construction exit)	See stabilized construction entrance locations on Sheets C-101.1 and C-103.1 and detail on Sheet C-501
2	Will need to show significant drainage upgrade on site. All drainage will need to stay on site. Town does not have capacity to handle additional.	The stormwater management system is designed to meet Massachusetts DEP stormwater standards and will not be discharged to the municipal closed drainage system.
3	Upgrade left turn into facility. Widen format	See roadway improvements on Site Plan, Sheet C-102.1
4	Upgrade right turn lane exit onto Pond Street. Widen format. Upgrade all markings to accommodate north of the above	See roadway improvements on Site Plan, Sheet C-102.1
5	Install a sidewalk along Pond Street as well as turn ramp, crosswalk and additional pedestrian signal. Need to coordinate with Mass DOT on pedestrian signals if required from Turner Rd to Hingham St.	See roadway improvements on Site Plan, Sheet C-102.1
6	Overlay, shim and microsurface adjacent roads. Wright, Curry, Wilson and Colby. *With this condition we will allow gate at end of road on Wilson and also to use these roads for secondary access during construction*	Applicate to coordinate exicution of scope with Highway Dept.
7	Any additional drainage on above mentioned roads especially Wright and Curry will need to be looked at with close proximity to entrance road topography difference.	Applicate to coordinate with Highway Dept.
8	All work will need to comply with Town of Rockland excavation and Construction specifications	Aknowledged
9	Pond Street will need to be cleaned daily from debris and/or sediment	Aknowledged
Sewer Department (3/18/20)		
1	The initial review meet the requirements established by the Sewer Commission	
2	Applicant would need to meet with Rockland Sewer Commission for final review of plan(s)	Applicate to coordinate with Sewer Commission
3	The Sewer Commission will establish required fees associated with the project	
Rockland Police Department		
1	Rockland PD has reviewed the plans and does not have any issue with the plans as proposed	
Rockland Fire department		
	No Comments Recived	
Board of Health		
1	Board of Health expressed concern in regards to storm infiltration due to possible soils contamination due to the sites prior use as a junk yard.	See response above to ARJWW Item #1 with respect to stormwater. Enclosed is an Environmental Summary Memo. Upon completion of the initial subsurface investigation at the Site, there were no MassDEP Reportable Conditions identified in Site soils. As detailed in the summary memo, pockets of residual buried solid waste were identified and will be removed to the extent feasible during construction. A Soil and Groundwater Management Plan will be prepared by the applicant that details the geotechnical and environmental parameters for imported fill.
AMORY ENGINEERS 40B AE REPORT 8/14/20		
	Comments	
	We note the following with respect to the list of requested exceptions, waivers and permits	
1	The list does not identify the relief that is requested from each bylaw/rule/regulation. The Board needs to know what relief is sought in order to determine the impacts of granting each waiver.	Applicant provided requested waiver list 7/31/20 via email. Also enclosed
2	Waiver 1 appears to ask that the Applicant not be required to submit a Notice of Intent to the Conservation Commission. This is a State requirement and cannot be waived under Chapter 40B	Applicant is filing a supplemental NOI filing to ConCom with the enclosed Site Plan package and Drainage Analysis.
3	The proposed development would require Site Plan Review if not applied for under Chapter 40B. The list of waivers should identify waivers requested from the Rules and Regulations of the Planning Board (R&R) as they relate to Site Plan Review, Design Standards and Construction Specifications.	Waivers from the R&R are included in the updated list of waivers
	General and Roadway	
1	As noted above, essentially the entire site proposed for development will be constructed on fill. A mass balance analysis should be provided so that the Board understands the amount of fill required along with an estimated number of truck trips required to import the fill	See enclosed cut and fill analysis
2	The Typical Retaining Wall Section on Sheet C-502 shows a fence and guardrail along the top of retaining walls and indicates that the wall will be designed by a registered structural engineer. The revised grading plans should indicate top and bottom of wall elevations as the May 14, 2020 plans showed.	Top and bottom of wall elevation have been added to the Grading, Drainage & Erosion Control Plan, Sheets C-103.1 & 103.2.
3	The Typical Retaining Wall Section on Sheet C-502 specifies the walls to be Versa-Lok modular concrete walls. The detail shows disturbance between the wall and wetlands. In some locations there does not appear to be sufficient space between the wall and wetland to allow for disturbance without encroaching into the wetlands.	See Driveway Section View, Sheets C-201 through 208 for locations of retaining walls along wetlands.

4	Additional guard rails are proposed where parking areas are adjacent to retaining walls, however, there should be a guard rail along the south end of the parking area west of the rectangular building.	Guardrail has been added in the area along the south end of the parking lot west of the rectangular building. See Site Plan, Sheet C-102.2. Guard rail is shown in the area mentioned. See landscape plan sheet L1.0
5	An analysis should be provided to demonstrate that the Rockland Fire Department's largest apparatus may freely maneuver within the proposed roadway and around the site. We recommend consultation with the Fire Department to confirm their satisfaction with the access.	See Fire Truck Turning Plan, Sheet C-701. Grass pave was removed behind both the "L" building and Bar building to provide additional open space. See plan LP1.0 of the Landscape Drawings.
6	Per request of the of ZBA, roadway cross-sections at every 100ft should be included in the next Site Plan package	See Driveway Section View, Sheets C-201 through 208
7	The four-inch gravel and eight-inch gravel layers on the Typical Pavement Section on Sheet 22 should be specified to be dense-graded crushed stone (M2.01.7) and Type C gravel (M1.03.0, 2-inch largest stone), respectively.	The pavement section details on Sheet C-502 have been revised to specify dense-graded crushed stone (M2.01.7) and Type C gravel (M1.03.0, 2-inch largest stone).
8	We recommend that the Cape Cod berm along the access road be installed integrally with the binder and wearing courses of pavement.	Curbing along driveway has been revised to Cape Cod Berm (CCB). See Site Plan, Sheet C-102.1 & 102.2 for locations CCB locations. See Sheet C-503 for CCB detail.
9	We note that there is no pedestrian access proposed along the proposed roadway between Pond Street and the proposed buildings. Pedestrian facilities should be considered and if proposed there should be lighting.	In consideration of the fact that there is no pedestrian access along Pond Street, we have omitted sidewalks along the "Pond Street access road" as it would dead end once Pond Street was reached.
10	It was previously noted that it was not clear where the proposed sidewalk ends behind the larger building (northeast corner). The comment was addressed in the previous package	See Site Plan, Sheet C-102.2 and Hardscape Plan, Sheet L1.1 for proposed sidewalk locations.
11	The Bituminous Concrete Sidewalk detail on Sheet 22 should specify that the maximum allowable cross slope is two percent (2%) in accordance with the Americans with Disabilities Act (ADA) and Massachusetts Architectural Access Board (AAB) requirements.	The Concrete Sidewalk with Monolithic Curb Detail on Sheet C-502 and concrete paving details on Sheet LD1.0 indicates that sidewalks shall have 2% max slope cross slope.
12	Confirmation that truck access to dumpster location no longer applies due to elimination of dumpsters	Addressed. There will be no open dumpster on the site. The project will use trash compactor room within the buildings.
13	Confirmation that dumpster pad dimension comment no longer applies due to elimination of dumpsters	Addressed. There will be no open dumpster on the site. The project will use trash compactor room within the buildings.
14	Confirmation that the Zoning Table on Sheet 2 now includes a column for required dimensions.	Addressed. See Overall Site Plan, Sheet C-102 for site data.
15	Confirmation that proposed landscaping is now shown on the plans	Addressed
16	Photometric plans E1.0 and E1.1, prepared by Traverse Landscape Architects show that there will be no light trespass onto adjacent properties.	Addressed
	Utilities	
1	Confirmation that the size, type and materials of construction of the proposed water main is now specified on the plans	Addressed. An 8-inch ductile iron water main is proposed. See Utilities Plans, Sheets C-104.1 & 2 for locations and size. See Sheet C-503 for water details.
2	Documentation should be provided to demonstrate that there will be adequate water supply for domestic use and fire flow.	See Abington & Rockland Joint Water Works Comments #3
3	Documentation of adequate capacity in the existing municipal sewer system should be provided.	See Sewer Dept Comments #2
	Stormwater and Erosion Control	
1	The drainage calculations indicate that the post-development rate and volume of stormwater runoff will not exceed existing conditions. However, the calculation time span should be extended to run from 5 to 48 hours to more accurately assess the total volume of runoff and verify that it will not be increased in the proposed conditions during the 2-, 10-, 25- and 100-year storm events.	The drainage analysis has been revised to increase the calculation time span from 5 hours to 48 hours.
2	Confirmation that the BMP has been revised to verify that post development runoff will not exceed existing and that the discharge locations of the underdrains are shown/specified.	Addressed. The BMP has been revised to a gravel wetland. See layout on Grading, Drainage & Erosion Control, Sheet C-103.2 and details on Sheet C-505.
3	A waiver has been requested to allow for HDPE pipe. If HDPE pipe is allowed, we recommend that flared end sections be reinforced concrete. The riprap at the flared ends should be specified to conform to M2.02.3.	A note has been added to the Rip-Rap Apron Detail stating that rip rap stone shall meet the requirements of Mass DOT Item M2.02.3.
4	The retaining wall is now shown about eight feet off the building and the wall is proposed to be a segmental type wall which requires horizontal geosynthetic reinforcement behind the wall. Future maintenance of the drain line would likely require disturbing the geosynthetic reinforcement which could compromise the stability of the wall.	The height & limit of retaining have been revised as shown on Sheet C-103.2. The pinch point of the wall is now 11ft from the building wall to provide further separation and the remaining portions of the wall have been pulled further back from the building to the extent possible.
5	A waiver has been requested to allow for the subsurface system. However, documentation to verify that the system is capable of supporting the Fire Department's heaviest apparatus has not been provided.	Manufacturer information regarding H20 loading has been included in the detail on Sheet C-506.
6	Confirmation that the gas trap hood in the catch basins has been specified to be The Eliminator as per detail on Sheet C-504.	Addressed. See detail on Sheet C-504.
7	In order to convey the design storm, catch basin CB-C1 should be equipped with a double frame and grate. Pipe sizing calculations should be provided to verify all pipe and inlet capacities are adequate.	Double frame and grate catch basins have been called out for PCB-11 & 12 on Sheet C-103.2. Pipe sizing calculations have been added to the revised Drainage Analysis.
8	Confirmation that the comment that the Rain Garden section of the Operation and Maintenance Plan (O&M) should include annual soil/media addition. is no longer applicable due to the fact that the BMP has been revised to a gravel wetland and O&M requirements for the gravel wetland and are included in the Stormwater Management Report.	Addressed. See O&M Plan included in Stormwater Report.
9	Confirmation that rain garden plant type comment is no longer applicable	Addressed
10	Confirmation that the Erosion Control Barrier detail now specifies the filter sock at 12-inch diameter.	Addressed. See detail on Sheet C-501.
11	Confirmation that the Floodplain Impact & Replication Detail on Sheet C-506 shows that the impacted floodplain volume is 19.2 CY and the replication is 57 CY which is a ratio of 3:1.	Addressed. See detail on Sheet C-506.
12	Provide photo documentation of assessment of condition of culverts under the proposed Pond Street access driveway	See enclosed culvert photos.
	Additional Comments - August 14, 2020	
1	The drainage calculations require revision to accurately model the post-development runoff from the development. Issues include the following:	
a.	The HydroCAD model does not include the 4-foot wide by 6-inch high weir at El. 137.25 in the outlet control structure for the gravel wetland. Including this weir will likely show that outflow from the gravel wetland is much greater than reported and may result in post-development runoff greater than existing.	The drainage analysis and Gravel Wetland outlet structure detail on Sheet C-505 have been revised to match.
b.	The outlet from the subsurface infiltration system is modeled as an 18-ingh pipe at El. 140.0. The outlet is actually a 15-inch pipe at El. 139.25.	The drainage analysis and Infiltration / detention basin outlet structure detail on Sheet C-505 have been revised to match.
2	The elevation of the top of the riser pipes should be specified on the Gravel Wetland detail on Sheet C-505.	Elevation for the gravel wetland riser pipes have been added to the Gravel Wetland Detail on Sheet C-505.
3	Note 2 on the Gravel Wetland detail on Sheet C-505 states " Infiltration testing of the native soils at the subgrade of the proposed gravel wetland shall occur prior to the installation of the gravel wetland and shall be coordinated with the engineer. If the native soils exceed a permeability rate of 0.03 ft/day the soils should (be) amended or liner added as determined by the engineer." Should the Board approve the project we recommend that this be a condition of approval with the following sentence added: "The infiltration testing shall be witnessed by the Board's consultant engineer and the soil amendment or liner shall be subject to approval by the Board's consultant engineer."	Gravel Wetland Note #2 on Sheet C-505 has been revised to include the following, "The infiltration testing shall be witnessed by the Board's consultant engineer and the soil amendment or liner shall be subject to approval by the Board's consultant engineer."
4	There does not appear to be adequate access around the gravel wetland for maintenance equipment.	Gravel wetland can be accessed via stone apron in the north west corner of the parking lot and the berm around the back side of the gravel wetland is 8-feet wide to allow for access. See Grading, Drainage & Erosion Control Plan, Sheet C-103.2.
5	Inspection ports should be provided on the subsurface infiltration system. The inspection ports should be shown in plan and detailed in the plans.	Location of proposed inspection ports have been added to the infiltration / detention basin layout on C-103.2 and detail on Sheet C-506.
6	Section 3.3.6 of the Long Term Pollution Prevention, Operation & Maintenance Plan included in the Stormwater Management Report notes that snow storage areas are shown on the plans. We have not seen where these areas are shown.	Snow storage areas have been added to the Site Plan, Sheet C-102.2 and Site Note# 14 has been added to Sheet G-101 indicating that "The property manager will be responsible for timely snow removal from all private sidewalks, driveways, and parking areas. Snow removal will be hauled off-site and legally disposed of when necessary."
7	The Rockland Wetland Protection Bylaw (Chapter 407), defines the 100-foot buffer to wetlands as a resource area. Much of this project with within this resource area (the 100- foot buffer to wetlands). We request that the Applicant's engineer provide the total area of disturbance and the total proposed impervious area within the I00-foot buffer to wetlands so that we may assess the impacts.	The total buffer impact area and impervious portion of the buffer area has been added to the Site Data table on the Overall Site Plan, Sheet C-102.
8	Some of the proposed improvements along Pond Street are not within the Pond Street right-of-way and are on private property which does not belong to the Applicant.	Easement has been negotiated with abutter. Any additional provisions will be coordinated.
9	A waiver has been requested to allow for all non-handicap parking spaces to be "compact spaces" at 9-ft. wide by 18-ft. long. Dimensions on Sheet C-102.2 indicate that these are the typical dimensions of the parking spaces. However, all non-handicap parking spaces scale at 9.5-ft wide by 19.5-ft. long.	All parking spaces scale to be 9-ft by 18-ft on Sheet C-102.2. Additional dimensions have been added throughout the parking lot to demonstrate this.

Exhibit 2

Site Context Photos

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

Site Context 1

Date: September 15th, 2020
ZBA Hearing #3

5 Essex Green Drive
Suite 11A
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

Site Context 2

Date: September 15th, 2020
ZBA Hearing #3

5 Essex Green Drive
Suite 11A
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Exhibit 3

Architectural Renderings, Floor Plans & Elevations

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

"L" Building Entry Rendering

Date: September 15th, 2020
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Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

South West Rendering

Date: September 15th, 2020
ZBA Hearing #3

5 Essex Green Drive
Suite 11A
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

West Rendering

Date: September 15th, 2020
ZBA Hearing #3

5 Essex Green Drive
Suite 11A
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

Club House Rendering

Date: September 15th, 2020
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5 Essex Green Drive
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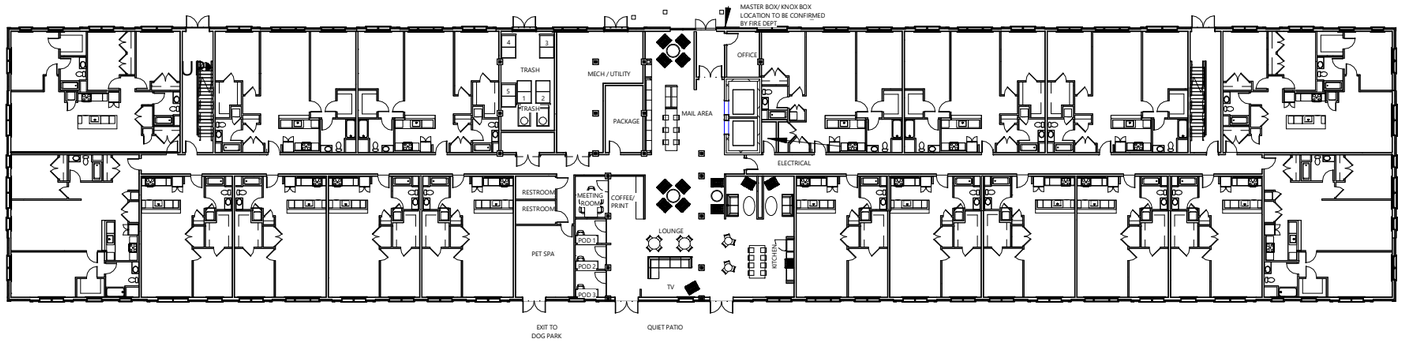
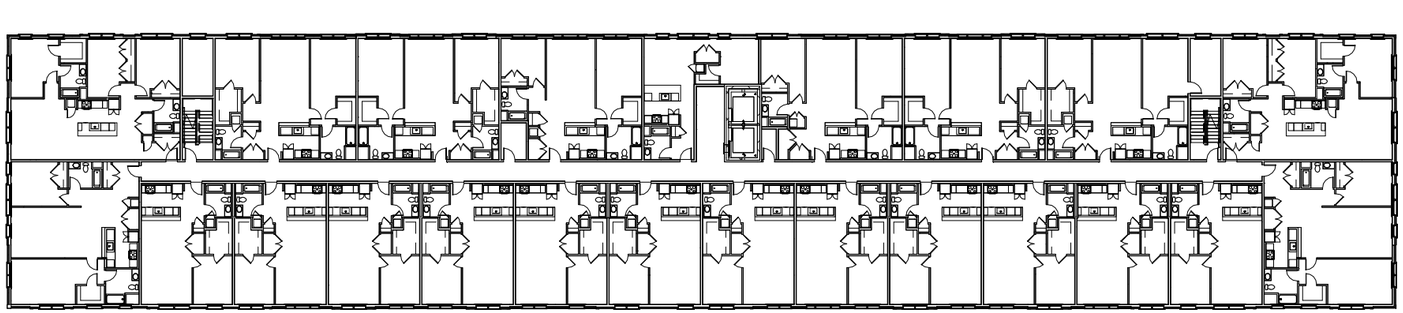
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN



FIRST FLOOR PLAN - BAR BUILDING

2 1" = 40'-0"



TYPICAL FLOOR PLAN - BAR BUILDING

1 1" = 40'-0"

UNIT COUNT BAR BUILDING

	1ST	2ND	3RD	4TH	5TH	TOTAL
STUDIO	0	1	1	1	1	4
ONE BEDROOM	9	12	12	12	12	57
TWO BEDROOM	7	8	8	8	8	39
THREE BEDROOM	2	2	2	2	2	10
TOTAL	18	23	23	23	23	110

Shingle Mill

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BAR BUILDING PLANS

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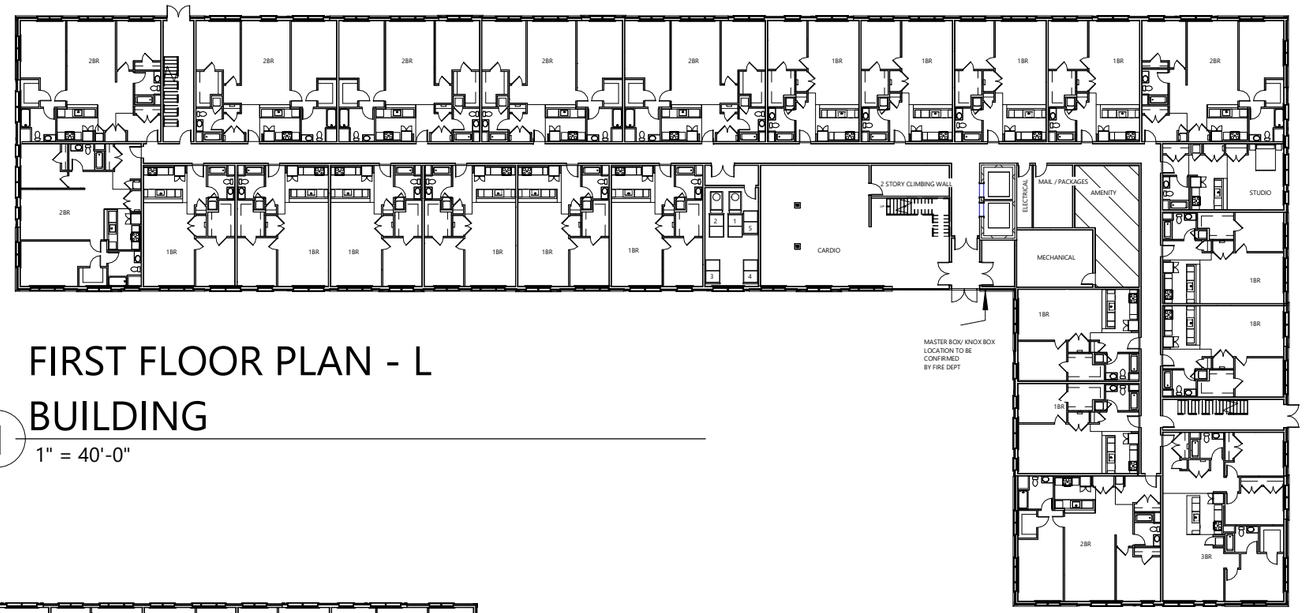
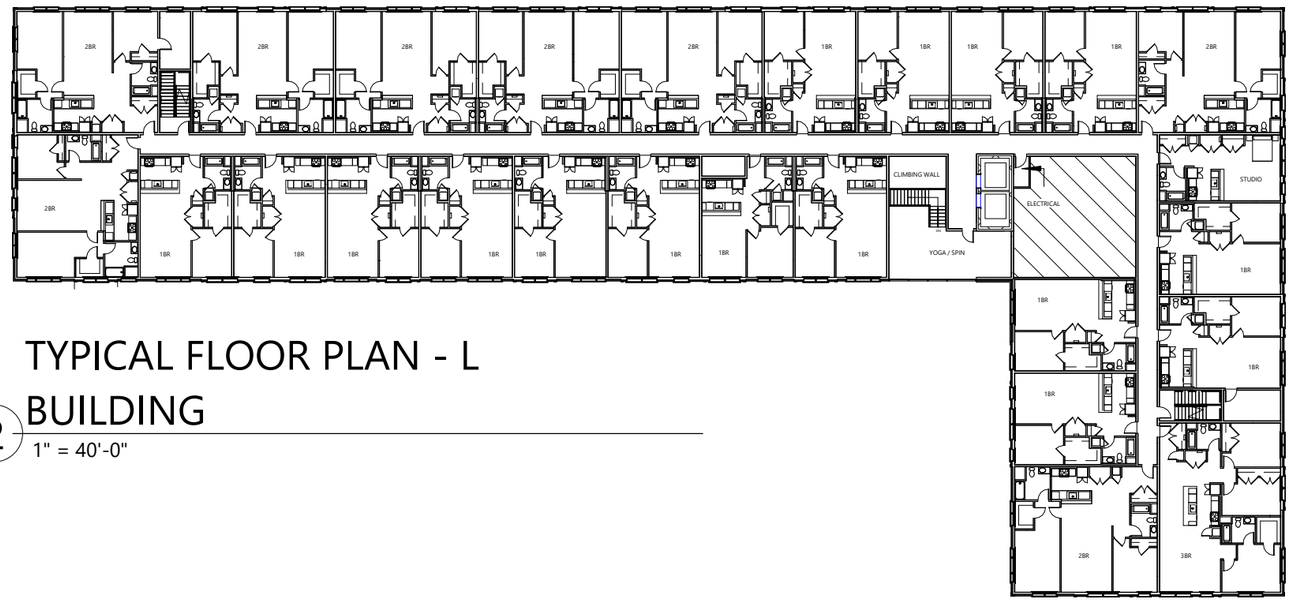
DMS design,llc
ARCHITECTURE & INTERIOR DESIGN



FIRST FLOOR PLAN - L BUILDING

1 1" = 40'-0"



TYPICAL FLOOR PLAN - L BUILDING

2 1" = 40'-0"

UNIT COUNT 'L' BUILDING

	1ST	2ND	3RD	4TH	5TH	TOTAL
STUDIO	2	1	1	1	1	6
ONE BEDROOM	11	16	16	16	16	75
TWO BEDROOM	7	9	9	9	9	43
THREE BEDROOM	2	0	0	0	0	2
TOTAL	24	26	26	26	26	126

SHINGLE MILL

75, 77, 79 Pond Street,
Rockland, MA

L BUILDING - PLANS

Date: September 15th, 2020
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5 Essex Green Drive
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DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

2 NORTH ELEVATION

1/32" = 1'-0"

3 EAST ELEVATION

1/32" = 1'-0"

4 WEST ELEVATION

1/32" = 1'-0"

1 SOUTH ELEVATION

1/32" = 1'-0"

Shingle Mill

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Rockland, MA

BAR BUILDING - ELEVATIONS

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DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

2 SOUTH ELEVATION

1/32" = 1'-0"

1 WEST ELEVATION

1/32" = 1'-0"

3 EAST ELEVATION

1/32" = 1'-0"

4 NORTH ELEVATION

1/32" = 1'-0"

SHINGLE MILL

75, 77, 79 Pond Street,
Rockland, MA

L BUILDING - ELEVATIONS

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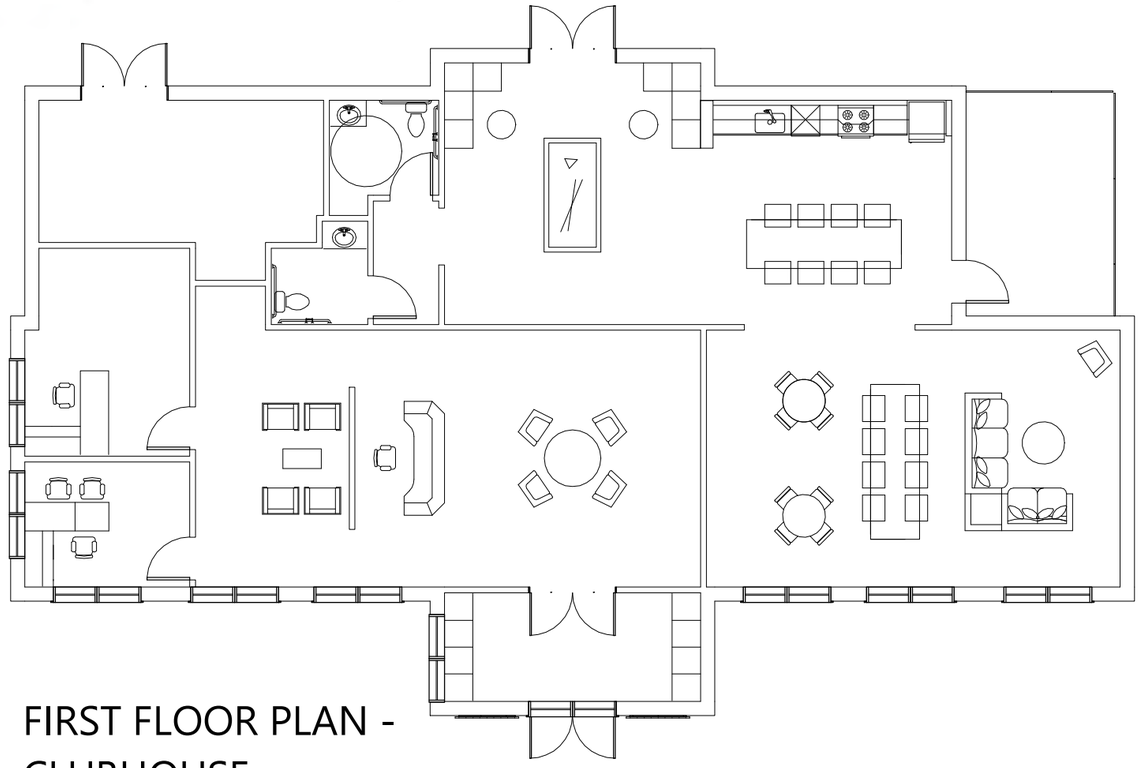
DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

3 WEST ELEVATION
3/32" = 1'-0"

1 NORTH ELEVATION
3/32" = 1'-0"



FIRST FLOOR PLAN - CLUBHOUSE
2
3/32" = 1'-0"

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

CLUBHOUSE PLANS & ELEVATIONS

Date: September 15th, 2020
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Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

SHINGLE MILL APARTMENTS

EXTERIOR COLOR STUDY

ARCHITECTURAL SECTION 16

2020-SEP-15

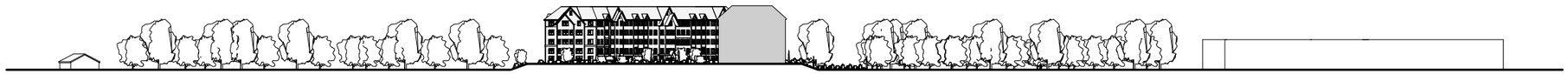
* BASED ON CERTAINTEED COLORS

DMS design
Architecture & Interior Design

5 Essex Green Dr. Suite 11A
Peabody, MA 01960

Exhibit 4

Site Section

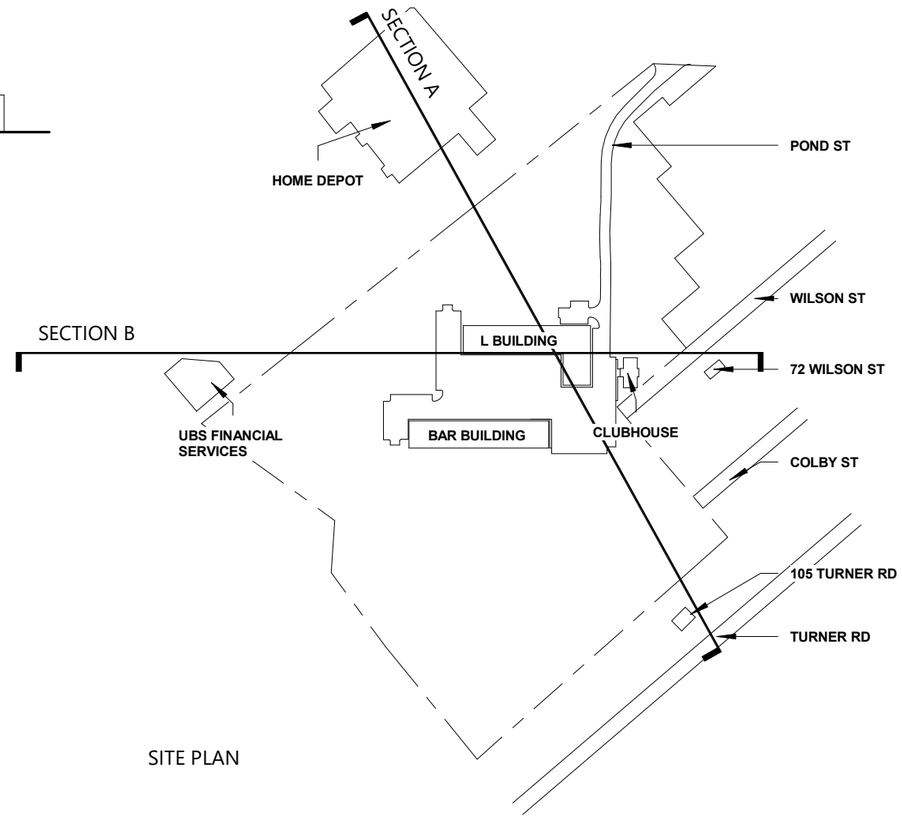


1 SECTION A

1" = 160'-0"

2 SECTION B

1" = 160'-0"



SITE PLAN

Shingle Mill

75, 77, 79 Pond Street,
Rockland, MA

SITE SECTIONS

Date: September 15th ZBA Hearing #3

5 Essex Green Drive
Suite 11A
Peabody, MA 01960
Phone: 978-965-3470

DMS design,llc
ARCHITECTURE & INTERIOR DESIGN

Exhibit 5

Site Engineering Plans

SHINGLE MILL MULTI-FAMILY DEVELOPMENT

75 - 79 POND STREET

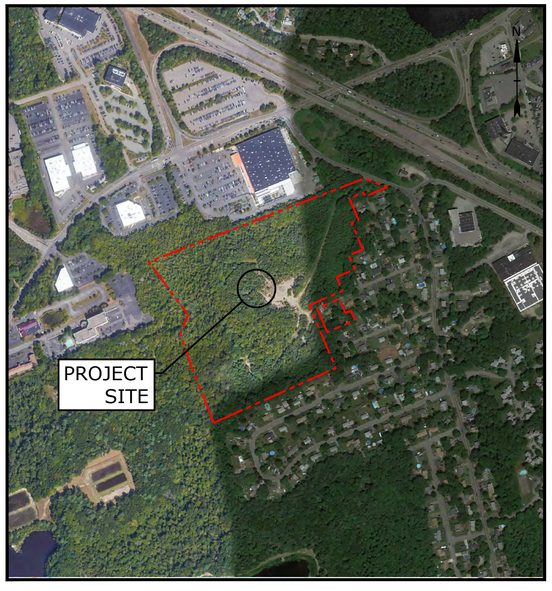
ROCKLAND, MASSACHUSETTS

COMPREHENSIVE PERMIT DRAWINGS

JULY 13, 2020

LAST REVISED: SEPTEMBER 4, 2020

LIST OF DRAWINGS		
SHEET NO.	SHEET TITLE	LAST REVISED
	COVER SHEET	09/04/2020
G-101	GENERAL NOTES, ABBREVIATIONS & LEGEND SHEET	09/04/2020
3 OF 24	EXISTING CONDITIONS KEY PLAN	05/14/2020
4 OF 24	EXISTING CONDITIONS SHEET	05/14/2020
5 OF 24	EXISTING CONDITIONS SHEET	05/14/2020
6 OF 24	EXISTING CONDITIONS SHEET	05/14/2020
7 OF 24	EXISTING CONDITIONS SHEET	05/14/2020
C-101.1	EXISTING CONDITIONS / DEMOLITION PLAN	09/04/2020
C-101.2	EXISTING CONDITIONS / DEMOLITION PLAN	09/04/2020
C-101.3	EXISTING CONDITIONS / DEMOLITION PLAN	09/04/2020
C-102	OVERLAY SITE LAYOUT PLAN	09/04/2020
C-102.1	SITE PLAN	09/04/2020
C-102.2	SITE PLAN	09/04/2020
C-102.3	SITE PLAN	09/04/2020
C-103.1	GRADING, DRAINAGE, & EROSION CONTROL PLAN	09/04/2020
C-103.2	GRADING, DRAINAGE, & EROSION CONTROL PLAN	09/04/2020
C-103.3	GRADING, DRAINAGE, & EROSION CONTROL PLAN	09/04/2020
C-104.1	UTILITY PLAN	09/04/2020
C-104.2	UTILITY PLAN	09/04/2020
C-201	DRIVEWAY PLAN & PROFILE	09/04/2020
C-202	DRIVEWAY SECTION VIEW	09/04/2020
C-203	DRIVEWAY SECTION VIEW	09/04/2020
C-204	DRIVEWAY SECTION VIEW	09/04/2020
C-205	DRIVEWAY SECTION VIEW	09/04/2020
C-206	DRIVEWAY SECTION VIEW	09/04/2020
C-207	DRIVEWAY SECTION VIEW	09/04/2020
C-208	DRIVEWAY SECTION VIEW	09/04/2020
C-501	EROSION CONTROL NOTES AND DETAILS SHEET	09/04/2020
C-502	DETAILS SHEET	09/04/2020
C-503	DETAILS SHEET	09/04/2020
C-504	DETAILS SHEET	09/04/2020
C-505	DETAILS SHEET	09/04/2020
C-506	DETAILS SHEET	09/04/2020
C-701	FIRE TRUCK TURNING PLAN	09/04/2020



AERIAL PROJECT LOCATION MAP
SCALE: 1" = 500'

APPLICANT:
Shinglemill, LLC
4 First Street
Bridgewater, Massachusetts 02324

OWNER:
Caparrotta Maurice Trustee
195 Libbey Parkway Unit #2
Weymouth, Massachusetts 02189

PREPARED FOR:
Jones Street Resdential
100 High Street, Suite 2500
Boston, Massachusetts 02110

PREPARED BY:
Tighe&Bond
Engineers | Environmental Specialists

BRADLEE MAZZOLA CIVIL No. 42148 REGISTERED PROFESSIONAL ENGINEER 9.2.20

COMMONWEALTH OF MASSACHUSETTS PATRICK CRIMMINS PE Civil No. 55629 REGISTERED PROFESSIONAL ENGINEER
Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

COMPLETE SET 34 SHEETS

811 DigSafe MA-ME-NH-RI-VT

Last Save Date: September 2, 2020 1:27 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:27 PM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Cover Sheet.dwg Layout Tab: CS

GENERAL NOTES:

1. THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE AND THE LOCATIONS ARE NOT GUARANTEED BY THE OWNER OR THE ENGINEER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES, ANTICIPATE CONFLICTS, REPAIR EXISTING UTILITIES AND RELOCATE EXISTING UTILITIES REQUIRED TO COMPLETE THE WORK.
2. COORDINATE ALL WORK WITHIN PUBLIC RIGHT OF WAYS WITH THE TOWN OF ROCKLAND.
3. THE CONTRACTOR SHALL EMPLOY A MASSACHUSETTS LICENSED LAND SURVEYOR TO DETERMINE ALL LINES AND GRADES.
4. THE CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES. CALL DIG SAFE AT LEAST 72 HOURS PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION/CONSTRUCTION ACTIVITIES.
5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE THEMSELVES AND COMPLY WITH THE CONDITIONS OF ALL OF THE PERMIT APPROVALS.
6. THE CONTRACTOR SHALL OBTAIN AND PAY FOR AND COMPLY WITH ADDITIONAL PERMITS, NOTICES AND FEES NECESSARY TO COMPLETE THE WORK AND ARRANGE FOR AND PAY FOR NECESSARY INSPECTIONS AND APPROVALS FROM THE AUTHORITIES HAVING JURISDICTION.
7. THE CONTRACTOR SHALL PHASE DEMOLITION AND CONSTRUCTION AS REQUIRED TO PROVIDE CONTINUOUS SERVICE TO EXISTING BUSINESSES AND HOMES THROUGHOUT THE CONSTRUCTION PERIOD. EXISTING BUSINESS AND HOME SERVICES INCLUDE, BUT ARE NOT LIMITED TO ELECTRICAL, COMMUNICATION, FIRE PROTECTION, DOMESTIC WATER AND SEWER SERVICES. TEMPORARY SERVICES, IF REQUIRED, SHALL COMPLY WITH ALL FEDERAL, STATE, LOCAL AND UTILITY COMPANY STANDARDS. CONTRACTOR SHALL PROVIDE DETAILED CONSTRUCTION SCHEDULE TO OWNER PRIOR TO ANY DEMOLITION/CONSTRUCTION ACTIVITIES AND SHALL COORDINATE TEMPORARY SERVICES TO ABUTTERS WITH THE UTILITY COMPANY AND AFFECTED ABUTTER.
8. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM WITH APPLICABLE FEDERAL, STATE, AND LOCAL CODES & SPECIFICATIONS.
9. ALL WORK SHALL CONFORM TO THE TOWN OF ROCKLAND EXCAVATION AND CONSTRUCTION SPECIFICATIONS, STANDARD SPECIFICATIONS AND WITH THE COMMONWEALTH OF MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES," 1988 EDITION AS AMENDED.
10. CONTRACTOR TO SUBMIT AS-BUILT PLANS IN DIGITAL FORMAT (.DWG AND .PDF FILES) ON DISK TO THE OWNER AND ENGINEER UPON COMPLETION OF THE PROJECT. AS-BUILTS SHALL BE PREPARED AND CERTIFIED BY A MASSACHUSETTS LICENSED LAND SURVEYOR.
11. CONTRACTOR SHALL THOROUGHLY CLEAN ALL CATCH BASINS AND DRAIN LINES, WITHIN THE LIMIT OF WORK, OF SEDIMENT IMMEDIATELY UPON COMPLETION OF CONSTRUCTION.
12. SEE EXISTING CONDITIONS PLANS FOR BENCH MARK INFORMATION.

EXISTING CONDITIONS PLAN NOTES:

1. TOPOGRAPHIC INFOMATION IS A RESULT OF A COMBINATION OF LIDAR TERRAIN AND ELEVATION DATA FROM MASSGIS, AND AN ON THE GROUND TOPOGRAPHIC SURVEY PERFORMED BY CONECO ENGINEERS & SCIENTISTS.
2. WETLAND DELINEATED BY WETLANDS STRATEGIES, INC. MAY & SEPTEMBER 2018 AND FIELD LOCATED BY ATLANTIC DESIGN ENGINEERS, INC.
3. ORDER OF RESOURCE AREA DELINEATION WAS APPROVED BY THE TOWN OF ROCKLAND CONSERVATION COMMISSION ON OCTOBER 23, 2018
4. ELEVATIONS REFER TO NAVD 88.
5. LOCUS PROPERTY IN ZONE X AND ZONE A, AS SHOWN ON FLOOD INSURANCE RATE MAP NO. 25023C0092J DATED JULY 17, 2012.
6. FLOOD PLAIN LINES SHOWN ON THESE PLANS WERE DIGITIZED FROM THE "REQUEST FOR LETTER OF MAP REVISION, 1 POND STREET, ROCKLAND, MA" DATED JUNE 11, 2013 BY BSC GROUP. THE LETTER OF MAP REVISION CASE. NO. 12-01-2134P WAS ISSUED NOVEMBER 21, 2013 AND EFFECTIVE ON THE FEMA MAP APRIL 14, 2014.

DEMOLITION NOTES:

1. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF ANY CLEARING OR DEMOLITION ACTIVITIES.
2. ALL MATERIALS SCHEDULED TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE SPECIFIED. THE CONTRACTOR SHALL DISPOSE OF ALL MATERIALS OFF-SITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS, ORDINANCES AND CODES.
3. COORDINATE REMOVAL, RELOCATION, DISPOSAL OR SALVAGE OF UTILITIES WITH THE OWNER AND APPROPRIATE UTILITY COMPANY.
4. ANY EXISTING WORK OR PROPERTY DAMAGED OR DISRUPTED BY CONSTRUCTION/ DEMOLITION ACTIVITIES SHALL BE REPLACED OR REPAIRED TO MATCH ORIGINAL EXISTING CONDITIONS BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
5. SAW CUT AND REMOVE PAVEMENT ONE (1) FOOT OFF PROPOSED EDGE OF PAVEMENT OR EXISTING CURB LINE IN ALL AREAS WHERE PAVEMENT TO BE REMOVED ABUTS EXISTING PAVEMENT OR CONCRETE TO REMAIN.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMOLITION AND OFF-SITE DISPOSAL OF MATERIALS REQUIRED TO COMPLETE THE WORK, EXCEPT FOR WORK NOTED TO BE COMPLETED BY OTHERS.
7. UTILITIES SHALL BE TERMINATED AT THE MAIN LINE PER UTILITY COMPANY AND TOWN OF ROCKLAND STANDARDS. THE CONTRACTOR SHALL REMOVE ALL ABANDONED UTILITIES LOCATED WITHIN THE LIMITS OF WORK UNLESS OTHERWISE NOTED.
8. CONTRACTOR SHALL VERIFY ORIGIN OF ALL DRAINS AND UTILITIES PRIOR TO REMOVAL/TERMINATION TO DETERMINE IF DRAINS OR UTILITY IS ACTIVE, AND SERVICES ANY ON OR OFF-SITE STRUCTURE TO REMAIN. THE CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY SUCH UTILITY FOUND AND SHALL MAINTAIN THESE UTILITIES UNTIL PERMANENT SOLUTION IS IN PLACE.
9. PAVEMENT REMOVAL LIMITS ARE SHOWN FOR CONTRACTOR'S CONVENIENCE. ADDITIONAL PAVEMENT REMOVAL MAY BE REQUIRED DEPENDING ON THE CONTRACTOR'S OPERATION. CONTRACTOR TO VERIFY FULL LIMITS OF PAVEMENT REMOVAL PRIOR TO BID.
10. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING STRUCTURES, CONCRETE PADS, UTILITIES AND PAVEMENT WITHIN THE WORK LIMITS SHOWN UNLESS SPECIFICALLY IDENTIFIED TO REMAIN. ITEMS TO BE REMOVED INCLUDE BUT ARE NOT LIMITED TO: PAVEMENT, UNDER GROUND PIPING, TREES AND LANDSCAPING.
11. REMOVE TREES AND BRUSH AS REQUIRED FOR COMPLETION OF WORK. CONTRACTOR SHALL GRUB AND REMOVE ALL STUMPS WITHIN LIMITS OF WORK AND DISPOSE OF OFF SITE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS.
12. CONTRACTOR SHALL PROTECT ALL PROPERTY MONUMENTATION THROUGHOUT DEMOLITION AND CONSTRUCTION OPERATIONS. SHOULD ANY MONUMENTATION BE DISTURBED BY THE CONTRACTOR, THE CONTRACTOR SHALL EMPLOY A MASSACHUSETTS LICENSED SURVEYOR TO REPLACE DISTURBED MONUMENTS.
13. PROVIDE INLET PROTECTION BARRIERS AT ALL CATCH BASINS/CURB INLETS WITHIN CONSTRUCTION LIMITS AS WELL AS CATCH BASINS/CURB INLETS THAT RECEIVE RUNOFF FROM CONSTRUCTION ACTIVITIES. INLET PROTECTION BARRIERS SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT. INLET PROTECTION BARRIERS SHALL BE "HIGH FLOW SILT SACK" BY ACF ENVIRONMENTAL OR EQUAL. INSPECT BARRIERS WEEKLY AND AFTER EACH RAIN EVENT OF 0.25 INCHES OR GREATER. CONTRACTOR SHALL COMPLETE A MAINTENANCE INSPECTION REPORT AFTER EACH INSPECTION. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT OR MORE OFTEN IF THE FABRIC BECOMES CLOGGED OR SEDIMENT HAS ACCUMULATED TO 1/3 THE DESIGN DEPTH OF THE BARRIER.
14. THE CONTRACTOR SHALL PAY ALL COSTS NECESSARY FOR TEMPORARY PARTITIONING, BARRICADING, FENCING, SECURITY AND SAFETY DEVICES REQUIRED FOR THE MAINTENANCE OF A CLEAN AND SAFE CONSTRUCTION SITE.
15. SAW CUT AND REMOVE PAVEMENT AND CONSTRUCT PAVEMENT TRENCH PATCH FOR ALL UTILITIES TO BE REMOVED AND PROPOSED UTILITIES LOCATED IN EXISTING PAVEMENT AREAS TO REMAIN.

SITE NOTES:

1. PAVEMENT MARKINGS SHALL BE INSTALLED AS SHOWN, INCLUDING PARKING SPACES, STOP BARS, ADA SYMBOLS, PAINTED ISLANDS, FIRE LANES, CROSS WALKS, ARROWS, LEGENDS AND CENTERLINES. ALL MARKINGS EXCEPT CENTERLINE AND MEDIAN ISLANDS TO BE CONSTRUCTED USING WHITE PAVEMENT MARKINGS. ALL THERMOPLASTIC PAVEMENT MARKINGS INCLUDING LEGENDS, ARROWS, CROSSWALKS AND STOP BARS SHALL MEET THE REQUIREMENTS OF AASHTO M249. ALL PAINTED PAVEMENT MARKINGS INCLUDING CENTERLINES, LANE LINES AND PAINTED MEDIANS SHALL MEET THE REQUIREMENTS OF AASHTO M248 TYPE "F".
2. ALL PAVEMENT MARKINGS AND SIGNS TO CONFORM TO "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS", AND THE AMERICANS WITH DISABILITIES ACT REQUIREMENTS, LATEST EDITIONS.
3. SEE DETAILS FOR PAVEMENT MARKINGS, ADA SYMBOLS, SIGNS AND SIGN POSTS.
4. CENTERLINES SHALL BE FOUR (4) INCH WIDE YELLOW LINES.
5. PAINTED ISLANDS SHALL BE FOUR (4) INCH WIDE DIAGONAL LINES AT 3'-0" O.C. BORDERED BY FOUR (4) INCH WIDE LINES.
6. STOP BARS SHALL BE EIGHTEEN (18) INCHES WIDE, WHITE THERMOPLASTIC AND CONFORM TO CURRENT MUTCD STANDARDS.
7. CLEAN AND COAT VERTICAL FACE OF EXISTING PAVEMENT AT SAW CUT LINE WITH RS-1 EMULSION IMMEDIATELY PRIOR TO PLACING NEW BITUMINOUS CONCRETE.
8. SEE ARCHITECTURAL/BUILDING DRAWINGS FOR ALL CONCRETE PADS & SIDEWALKS ADJACENT TO BUILDING.
9. CONTRACTOR TO PROVIDE BACKFILL AND COMPACTION AT CURB LINE AFTER CONCRETE FORMS FOR SIDEWALKS AND PADS HAVE BEEN STRIPPED. COORDINATE WITH BUILDING CONTRACTOR.
10. ALL LIGHT POLE BASES NOT PROTECTED BY A RAISED CURB SHALL BE PAINTED YELLOW.
11. COORDINATE ALL WORK ADJACENT TO BUILDING WITH BUILDING CONTRACTOR.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING RETAINING WALL DESIGN FROM STRUCTURAL ENGINEER AND/OR WALL MANUFACTURER. CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO CONSTRUCT WALL IN ACCORDANCE WITH DESIGN APPROVED BY THE ENGINEER.
13. ALL DIMENSIONS ARE TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
14. PROPERTY MANAGER WILL BE RESPONSIBLE FOR TIMELY SNOW REMOVAL FROM ALL PRIVATE SIDEWALKS, DRIVEWAYS, AND PARKING AREAS. SNOW REMOVAL WILL BE HAULED OFF-SITE AND LEGALLY DISPOSED OF WHEN NECESSARY.

GRADING AND DRAINAGE NOTES:

1. COMPACTION REQUIREMENTS:

BELOW PAVED OR CONCRETE AREAS	95%
TRENCH BEDDING MATERIAL AND SAND BLANKET BACKFILL	95%
BELOW LOAM AND SEED AREAS	90%

* ALL PERCENTAGES OF COMPACTION SHALL BE OF THE MAXIMUM DRY DENSITY AT THE OPTIMUM MOISTURE CONTENT AS DETERMINED AND CONTROLLED IN ACCORDANCE WITH ASTM D-1557, METHOD C FIELD DENSITY TESTS SHALL BE MADE IN ACCORDANCE WITH ASTM D-1556 OR ASTM-2922.

2. ADJUST ALL MANHOLES, CATCH BASINS, CURB BOXES, ETC. WITHIN LIMITS OF WORK TO FINISH GRADE.
3. CONTRACTOR SHALL PROVIDE A FINISH PAVEMENT SURFACE AND LAWN AREAS FREE OF LOW SPOTS AND PONDING AREAS. CRITICAL AREAS INCLUDE BUILDING ENTRANCES, EXITS, RAMPS AND LOADING DOCK AREAS ADJACENT TO THE BUILDING.
4. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED SHALL RECEIVE 6" LOAM, SEED FERTILIZER AND MULCH.
5. ALL STORM DRAIN CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE COMMONWEALTH OF MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES," 1988 EDITION AS AMENDED.
6. ALL PROPOSED CATCH BASINS SHALL BE EQUIPPED WITH OIL/GAS SEPARATOR HOODS AND 4' SUMPS.

EROSION CONTROL NOTES:

1. SEE SHEET C-501 FOR GENERAL EROSION CONTROL NOTES AND DETAILS.

UTILITY NOTES:

1. COORDINATE ALL UTILITY WORK WITH APPROPRIATE UTILITY COMPANY.
   - NATURAL GAS - NATIONAL GRID
   - WATER - ABINGTON ROCKLAND JOINT WATER WORKS DEPARTMENT
   - SEWER - ROCKLAND SEWER DEPARTMENT
   - ELECTRIC - NATIONAL GRID
   - COMMUNICATIONS - COMCAST
2. ALL WATER MAIN INSTALLATIONS SHALL BE CLASS 52, CEMENT LINED DUCTILE IRON PIPE.
3. ALL WATER MAIN INSTALLATIONS SHALL BE PRESSURE TESTED AND CHLORINATED AFTER CONSTRUCTION PRIOR TO ACTIVATING THE SYSTEM. CONTRACTOR SHALL COORDINATE CHLORINATION AND TESTING WITH THE ROCKLAND WATER DEPARTMENT.
4. ALL SEWER PIPE SHALL BE PVC SDR 35 UNLESS OTHERWISE STATED.
5. CONNECTION TO EXISTING WATER MAIN SHALL BE CONSTRUCTED TO ABINGTON & ROCKLAND JOINT WATER WORKS DEPARTMENT STANDARDS.
6. EXISTING UTILITIES TO BE REMOVED SHALL BE CAPPED AT THE MAIN AND MEET THE DEPARTMENT OF PUBLIC WORKS STANDARDS FOR CAPPING OF WATER AND SEWER SERVICES.
7. ALL ELECTRICAL MATERIAL WORKMANSHIP SHALL CONFORM TO THE NATIONAL ELECTRIC CODE, LATEST EDITION, AND ALL APPLICABLE STATE AND LOCAL CODES.
8. THE EXACT LOCATION OF NEW UTILITY SERVICES AND CONNECTIONS SHALL BE COORDINATED WITH THE BUILDING DRAWINGS AND THE APPLICABLE UTILITY COMPANIES.
9. ALL UNDERGROUND CONDUITS SHALL HAVE NYLON PULL ROPES TO FACILITATE PULLING CABLES.
10. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANHOLES, BOXES, FITTINGS, CONNECTORS, COVER PLATES, AND OTHER MISCELLANEOUS ITEMS NOT NECESSARILY DETAILED ON THESE DRAWINGS TO RENDER INSTALLATION OF UTILITIES COMPLETE AND OPERATIONAL.
11. CONTRACTOR SHALL PROVIDE EXCAVATION, BEDDING, BACKFILL AND COMPACTION FOR NATURAL GAS SERVICES.
12. A 10-FOOT MINIMUM EDGE TO EDGE HORIZONTAL SEPARATION SHALL BE PROVIDED BETWEEN ALL WATER AND SANITARY SEWER LINES. AN 18-INCH MINIMUM OUTSIDE TO OUTSIDE VERTICAL SEPARATION SHALL BE PROVIDED AT ALL WATER/SANITARY SEWER CROSSINGS.
13. SAW CUT AND REMOVE PAVEMENT AND CONSTRUCT PAVEMENT TRENCH PATCH FOR ALL PROPOSED UTILITIES LOCATED IN EXISTING PAVEMENT AREAS TO REMAIN
14. HYDRANTS, GATE VALVES, FITTINGS, ETC. SHALL MEET THE REQUIREMENTS OF THE TOWN OF ROCKLAND.
15. COORDINATE TESTING OF SEWER CONSTRUCTION WITH THE TOWN OF ROCKLAND.
16. ALL SEWER PIPE WITH LESS THAN 6' OF COVER IN PAVED AREAS OR LESS THAT 4' OF COVER IN UNPAVED AREAS SHALL BE INSULATED.
17. CONTRACTOR SHALL COORDINATE ALL ELECTRIC WORK INCLUDING BUT NOT LIMITED TO: CONDUIT CONSTRUCTION, MANHOLE CONSTRUCTION, AND TRANSFORMER CONSTRUCTION WITH POWER COMPANY.
18. SITE LIGHTING SPECIFICATIONS, CONDUIT LAYOUT AND CIRCUITRY FOR PROPOSED SITE LIGHTING AND SIGN ILLUMINATION SHALL BE PROVIDED BY THE PROJECT ELECTRICAL ENGINEER.
19. CONTRACTOR SHALL CONSTRUCT ALL UTILITIES AND DRAINS TO WITHIN 10' OF THE FOUNDATION WALLS AND CONNECT THESE TO SERVICE STUBS FROM THE BUILDING.

LANDSCAPE NOTES:

1. SEE LANDSCAPE PLANS.

REFERENCE PLANS:

1. "SHINGLEMILL APARTMENTS COMPREHENSIVE PERMIT PLANS" PREPARED BY CONECO ENGINEERS & SCIENTISTS, DATED MAY 14, 2020.
2. "WETLAND LOCATION PLAN" PREPARED BY ATLANTIC DESIGN ENGINEERS LAST REVISED OCTOBER 1, 2018.

ABBREVIATIONS

AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
AC	ACRES
ADA	AMERICANS WITH DISABILITIES ACT
AGGR	AGGREGATE
BLDG	BUILDING
BMP(S)	BEST MANAGEMENT PRACTICE(S)
BOC	BOTTOM OF CURB
BOW	BOTTOM OF WALL
CB	CATCH BASIN
CCB	CAPE COD BERM
CMP	CORRUGATED METAL PIPE
CONST	CONSTRUCT
COORD	COORDINATE
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DMH	DRAINAGE MANHOLE
DWG	DRAWING
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
FES	FLARED END SECTION
FF	FINISHED FLOOR
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIX ASPHALT
HW	HEADWALL
HYD	HYDRANT
ID	INSIDE DIAMETER
INV	INVERT
L	LENGTH
LF	LINEAR FEET
MAX	MAXIMUM
MIN	MINIMUM
MSC	MONOLITHIC SIDEWALK / CURB
NCSS	NATIONAL COOPERATIVE SURVEY
NRCC	NORTHEAST REGIONAL CLIMATE CENTER
NRCS	NATURAL RESOURCES CONSERVATION SERVICE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PC	POINT OF CURVATURE
PCB	PROPOSED CATCH BASIN
PDMH	PROPOSED DRAINAGE MANHOLE
PI	POINT OF INTERSECTION
POS	PROPOSED OUTLET STRUCTURE
PROP	PROPOSED
PSMH	PROPOSED SEWER MANHOLE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
R	RADIUS
RL	ROOF LEADER
ROW	RIGHT OF WAY
SF	SQUARE FEET
SSSNNE	SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND
STD	STANDARD
TBR	TO BE REMOVED
TOC	TOP OF CURB
TOW	TOP OF WALL
TYP	TYPICAL
USCS	UNIFIED SOIL CLASSIFICATION SYSTEM
USDA	UNITED STATES DEPARTMENT OF AGRICULTURE
W	WIDTH
W/	WITH

LEGEND

	EXISTING PROPERTY LINE
— o — o — o —	EXISTING CHAINLINK FENCE
	PROPOSED FENCE
OHW	EXISTING OVERHEAD WIRES
POHW POHW	PROPOSED OVERHEAD WIRES
E	EXISTING UNDERGROUND ELECTRIC LINE
PE	PROPOSED UNDERGROUND ELECTRIC LINE
T	EXISTING UNDERGROUND TELECOMMUNICATION LINE
PE&C PE&C	PROPOSED UNDERGROUND ELECTRIC & COMMUNICATION LINE
D	EXISTING DRAIN LINE
PD PD	PROPOSED DRAIN LINE
G	EXISTING GAS LINE
PG PG	PROPOSED GAS LINE
W	EXISTING WATER LINE
PW PW	PROPOSED WATER LINE
SS	EXISTING SEWER LINE
	PROPOSED SEWER LINE
100	EXISTING MAJOR CONTOUR LINE
98	EXISTING MINOR CONTOUR LINE
100	PROPOSED CONTOUR LINE
	APPROXIMATE LIMIT OF WORK
	APPROXIMATE LIMIT OF SAWCUT
	PROPOSED PERIMETER EROSION CONTROL
	APPROXIMATE LIMIT OF EXISTING PAVEMENT/CONCRETE TO BE REMOVED
	APPROXIMATE LIMIT OF CLEARING AND GRUBBING
	EXISTING CONCRETE
	PROPOSED CONCRETE
	PROPOSED STANDARD DUTY PAVEMENT SECTION
	EXISTING UTILITY POLE
	EXISTING UTILITY POLE & GUY WIRE
	EXISTING UTILITY POLE W/ LIGHT
	EXISTING LIGHT POLE (ONE ARM)
	EXISTING SIGN
	PROPOSED SIGN
	EXISTING POST
	EXISTING BOLLARD
	EXISTING FIRE HYDRANT
	PROPOSED FIRE HYDRANT
	EXISTING WATER GATE VALVE
	PROPOSED WATER GATE VALVE
	EXISTING WATER SHUTOFF VALVE
	PROPOSED WATER SHUTOFF VALVE
	PROPOSED THRUST BLOCK
	EXISTING GAS GATE VALVE
	PROPOSED GAS GATE VALVE
	EXISTING ELECTRIC BOX
	PROPOSED ELECTRIC MANHOLE
	EXISTING CATCH BASIN
	PROPOSED CATCH BASIN
	EXISTING DRAIN MANHOLE
	PROPOSED DRAIN MANHOLE
	EXISTING MANHOLE
	EXISTING TELEPHONE MANHOLE
	EXISTING SEWER MANHOLE
	PROPOSED SEWER MANHOLE
	EXISTING CLEANOUT
	PROPOSED CLEANOUT
	EXISTING HAND HOLE
	EXISTING CONIFEROUS TREE
	EXISTING DECIDUOUS TREE
	EXISTING CONIFEROUS SHRUB
	EXISTING DECIDUOUS BUSH
	EXISTING BOUND FOUND
	EXISTING IRON PIPE FOUND
#.#%	PROPOSED FLOW DIRECTION/SLOPE
44.45	EXISTING SPOT SHOT ELEVATION
44.45	PROPOSED SPOT SHOT ELEVATION
B-1	APPROXIMATE BORING LOCATIONS
B-XX	APPROXIMATE EXISTING BORING LOCATIONS

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS — BRADLEE M. COLOMA — CIVIL — No. 42446 — REGISTERED PROFESSIONAL ENGINEER — 9.2.20

COMMONWEALTH OF MASSACHUSETTS — PATRICK CRIMMINS — PE Civil — No. 55629 — REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

GENERAL NOTES, ABBREVIATIONS, & LEGEND SHEET

SCALE: AS SHOWN

G-101

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:40 PM By: Craig M. Langton
T&B File Location: I:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: G-101

SHEET 1

SHEET 2

SHEET 3

SHEET 4

N/F
MAP 4 PLOT 14
JUMBO CAPITAL
MANAGEMENT LLC

HOME DEPOT

N/F
MAP 4 PLOT 17
HOME DEPOT USA INC

N/F
MAP 4 PLOT 18
MASS DEPT. OF
TRANSPORTATION

N/F
MAP 9 PLOT 36
ROCKLAND TBL
INV GROUP LLC

N/F
MAP 9 PLOT 9
DELUCA PROPERTIES

N/F
MAP 9 PLOT 12
OWNER UNKNOWN

N/F
MAP 9
PLOT 40
OWNER
UNKNOWN

N/F
MAP 9 PLOT 34
TOWN OF ROCKLAND &
TOWN OF ABINGTON
JOINT WATER WORKS

N/F
MAP 9 PLOT 20
JANET M. &
CHRISTINA MCCAULEY

N/F
MAP 9 PLOT 19
JOHN J. &
JEAN L. WOJNER

N/F
MAP 9 PLOT 18
SALVATORIE
& JOAN
FALCO M.

N/F
MAP 9 PLOT 17
RUSSELL K. &
JUDITH
A. ERIKSON

N/F
MAP 9 PLOT 16
RUSSELL &
KRISTIN M. SWAN

N/F
MAP 9 PLOT 15
JEREMIAH J. &
KIMBERLY COLLIN

N/F
MAP 10 PLOT 78
DOMINIC J.
&
MARGARET
BERNABEI

N/F
MAP 10 PLOT 77
MATTHEW JR. &
MARIANNE L.
PALAZZOLO

N/F
MAP 10 PLOT 53
VIRGINIA HOFFMAN

N/F
MAP 10 PLOT 68
SHINGLEMILL, LLC

N/F
MAP 10 PLOT 66
GARY & KIM QUAM.

N/F
MAP 10 PLOT 65
SHEILA M.
DUQUETTE.

N/F
MAP 10
PLOT 69
DAVID J. &
HALLISEY
NANCY L.

N/F
MAP 5
PLOT 55
FRED &
JOAN
LOCKHART

N/F
MAP 5
PLOT 42
GEORGE W.
STUDDARD JR

N/F
MAP 5 PLOT 22
NEW ENGLAND
TELEPHONE CO.

N/F
MAP 5
PLOT 27
GEORGE J.
&
LISA E.
FITZGERALD

N/F
MAP 5
PLOT 31
THOMAS W. DALY

N/F
MAP 5
PLOT 33
PATRICIA MCKERRELL
TRUSTEE

N/F
MAP 5
PLOT 30
DENNIS J. &
SUSAN A. O'BRIEN

N/F
MAP 5
PLOT 28
JOHN B. O'BRIEN

N/F
MAP 5
PLOT 39
LINCOLN DARRANCE
&
MAUREEN MONTARIO

N/F
MAP 5
PLOT 44
LOUIS N. RUBBO

N 68°49'38" E
1522.67'

N 36°35'00" W
435.81'

N 21°19'56" E
136.38'

N 18°16'52" W
60.17'

N 18°50'22" W
182.44'

N 21°15'08" W
382.51'

S 65°50'35" W
882.29'

S 0°40'53" E
164.96'

S 66°59'21" W
100.00'

S 23°00'39" E
159.92'

S 66°59'21" W
16.96'

N 23°00'39" W
28.50'

S 66°59'21" W
50.00'

S 23°00'39" E
190.00'

S 66°59'21" W
100.00'

S 23°00'39" E
100.00'

S 66°59'21" W
130.00'

S 23°00'39" E
100.00'

S 66°59'21" W
240.00'

N 66°59'21" E
160.00'

S 23°00'39" E
100.00'

N 23°00'39" W
170.00'

S 66°59'21" W
40.00'

S 23°00'39" E
70.00'

S 66°59'21" W
200.00'

S 23°00'39" E
450.80'

AREA:
1,247,642 S.F.
28.64± ACRES

APPROXIMATE 100' VERNAL
POOL BUFFER

100' WETLAND BUFFER

POND STREET
(PUBLIC WAY)

PILOT STREET
(PUBLIC WAY)

CONECO

I CERTIFY THAT THIS SURVEY AND PLAN CONFORMS TO THE ETHICAL, PROCEDURAL, AND TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE COMMONWEALTH OF MASSACHUSETTS.

TIMOTHY S. BODAH, PLS

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY S BODAH
#46110
PROFESSIONAL LAND SURVEYOR

80' 0 80' 160'
SCALE IN FEET

REVISIONS

NO.	DATE	DESCRIPTION	DR/CK

PREPARED FOR:
SHINGLEMILL, LLC
4 FIRST STREET
BRIDGEWATER, MASSACHUSETTS 02324

DRAWING:
EXISTING CONDITIONS KEY PLAN

PROJECT:
SHINGLEMILL APARTMENTS
POND STREET
ROCKLAND, MASSACHUSETTS 02370

PLAN SET:
SITE PLANS

CONECO
Engineers & Scientists
4 FIRST STREET, BRIDGEWATER, MASSACHUSETTS 02324
PHONE 508-697-3191 OR 800-548-3355; FAX 508-697-5996
WEBSITE: www.coneco.com

DATE	05/14/2020
DESIGNED: DJD	CHECKED: TSB
DRAFTED: DJD	IN CHARGE: JEN
SCALE:	1" = 80'
PROJECT NO.	3395.1
SHEET NO.	3 OF 24

N/F
MAP 4 PLOT 14
JUMBO CAPITAL
MANAGEMENT LLC

N/F
MAP 4 PLOT 17
HOME DEPOT USA INC

CONC CURB

ZONE X
ZONE A

N 68°49'38" E
1522.67'

E-2
E-4
E-3
E-5
E-6
E-7

B-36
B-35
B-34
B-37
B-38
B-39
B-40
B-41
B-42
B-33
B-32
B-31
B-30
B-51
B-50
B-49
B-48
B-47
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B-43
B-54
B-55
B-56
B-57
B-58
B-59
B-60
B-61
B-62
B-63
B-64
B-65
B-66
B-67
B-68A
B-68
B-69
B-70A
B-27
B-26
B-25

ZONE A
ZONE X

TP-3
TP-4
TP-5
TP-6
TP-8
TP-9
TP-10

GRAVEL PILE

N 36°32'30" W
434.81'

CONECO

N 21°19'56" E
136.58'

N 18°16'52" W
60.17'

30' 0 30' 60'
SCALE IN FEET

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY S. BOOAH
#40170
PROFESSIONAL LAND SURVEYOR

05/14/2020

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4 FIRST STREET
BRIDGEWATER, MASSACHUSETTS 02324

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SHEET 1 OF 4

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SHEET NO.	4 OF 24

N 18°16'
60.1'

N 18°50'22" W
182.44'

N/F
MAP 9
PLOT 40
OWNER
UNKNOWN

382.51'
N 21°51'08" W

S 65°50'35" E
49.85'

N/F
MAP 9 PLOT 20
JANET M. &
CHRISTINA MCCAULEY

AREA:
1,247,642 S.F.
28.64± ACRES

ZONE A
ZONE X

APPROXIMATE 100'
VERNAL POOL BUFFER

ACCESS ROAD

100' WETLAND BUFFER

S 23°00'39" E
450.80'

APPROXIMATE LOCATION OF
CERTIFIED VERNAL POOL
CERTIFICATION #20170104
(BOUNDARIES NOT YET
DETERMINED)

882.29'
S 65°50'35" W

STOCKADE FENCE

POST & RAIL
FENCE

N/F
MAP 9 PLOT 19
JOHN J. &
JEAN L. WOJNER

N/F
MAP 9 PLOT 18
SALVATORIE
& JOAN
FALCO M.

N/F
MAP 9 PLOT 17
RUSSELL K. &
JUDITH
A. ERIKSON

N/F
MAP 9 PLOT 16
RUSSELL &
KRISTIN M. SWAN

N/F
MAP 9 PLOT 15
JEREMIAH J. &
KIMBERLY COLLIN

N/F
MAP 10 PLOT 78
DOMINIC J.
&
MARGARET
BERNABEI

30' 0 30' 60'
SCALE IN FEET

TIMOTHY S. BOOAH #40170 PROFESSIONAL LAND SURVEYOR
COMMONWEALTH OF MASSACHUSETTS

05/14/2020

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SHINGLEMILL, LLC
4 FIRST STREET
BRIDGEWATER, MASSACHUSETTS 02324

DRAWING:
EXISTING CONDITIONS
SHEET 2 OF 4

PROJECT:
SHINGLEMILL APARTMENTS
POND STREET
ROCKLAND, MASSACHUSETTS 02370

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SHEET NO.	5 OF 24

CONC RETAINING WALL
CONC CURB
CBDH FOUND
CHAIN LINK FENCE
20' WIDE DRAIN EASEMENT PARCEL 1-D-8 PLAN 353 OF 1961
ZONE X
ZONE A
18" RCP I=135.18'
30" RCP I=134.52'
POND STREET (Public - 50' wide)
BENCH MARK NAIL IN POLE #39 ELEV.=148.99 (NAVD 88)
CONECO
N/F MAP 4 PLOT 18 MASS DEPT. OF TRANSPORTATION
METAL GUARDRAIL
S 10°20'35" E 164.36'
N/F MAP 5 PLOT 22 NEW ENGLAND TELEPHONE CO.
R=140.64 l(IN)=136.57 l(OUT)=135.48
BRUSH
UTILITY POLE NO. 38
18" RCP I=135.72'
TP-15
12" TREE
SWALE
100.00' S 66°59'21" W
N 23°00'39" W 28.50'
159.92' S 66°59'21" W
10" TREE
N/F MAP 5 PLOT 27 GEORGE J. & LISA E. FITZGERALD
GUY POLE NO. 38-34
"STOP"
STOP LINE
N/F MAP 5 PLOT 31 THOMAS W. DALY
S 23°00'39" E 150.00'
18" RCP I=134.20'
50.00' S 66°59'21" W
WRIGHT STREET (Private - 50' wide)
UTILITY POLE NO. 37
N/F MAP 5 PLOT 33 PATRICIA MCKERRELL TRUSTEE
GRAVEL
6" CMP EXPOS.
N/F MAP 5 PLOT 30 DENNIS J. & SUSAN A. O'BRIEN
N/F MAP 5 PLOT 28 JOHN B. O'BRIEN
S 23°00'39" E 100.00'
LEAD PLUG IN ROCK FOUND
BIT. CONC. PATH
CURRY STREET
DH IN ROCK FOUND
24" RCP I=134.01
TP-2
TP-1
100.00' S 66°59'21" W
N/F MAP 5 PLOT 39 LINCOLN DARRANCE & MAUREEN MONTARIO
S 23°00'39" E 100.00'
130.00' S 66°59'21" W
N/F MAP 5

30' 0 30' 60'
SCALE IN FEET

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY S. BOOAH #40170 REGISTERED PROFESSIONAL LAND SURVEYOR
05/14/2020

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4 FIRST STREET
BRIDGEWATER, MASSACHUSETTS 02324

DRAWING:
EXISTING CONDITIONS
SHEET 3 OF 4

PROJECT:
SHINGLEMILL APARTMENTS
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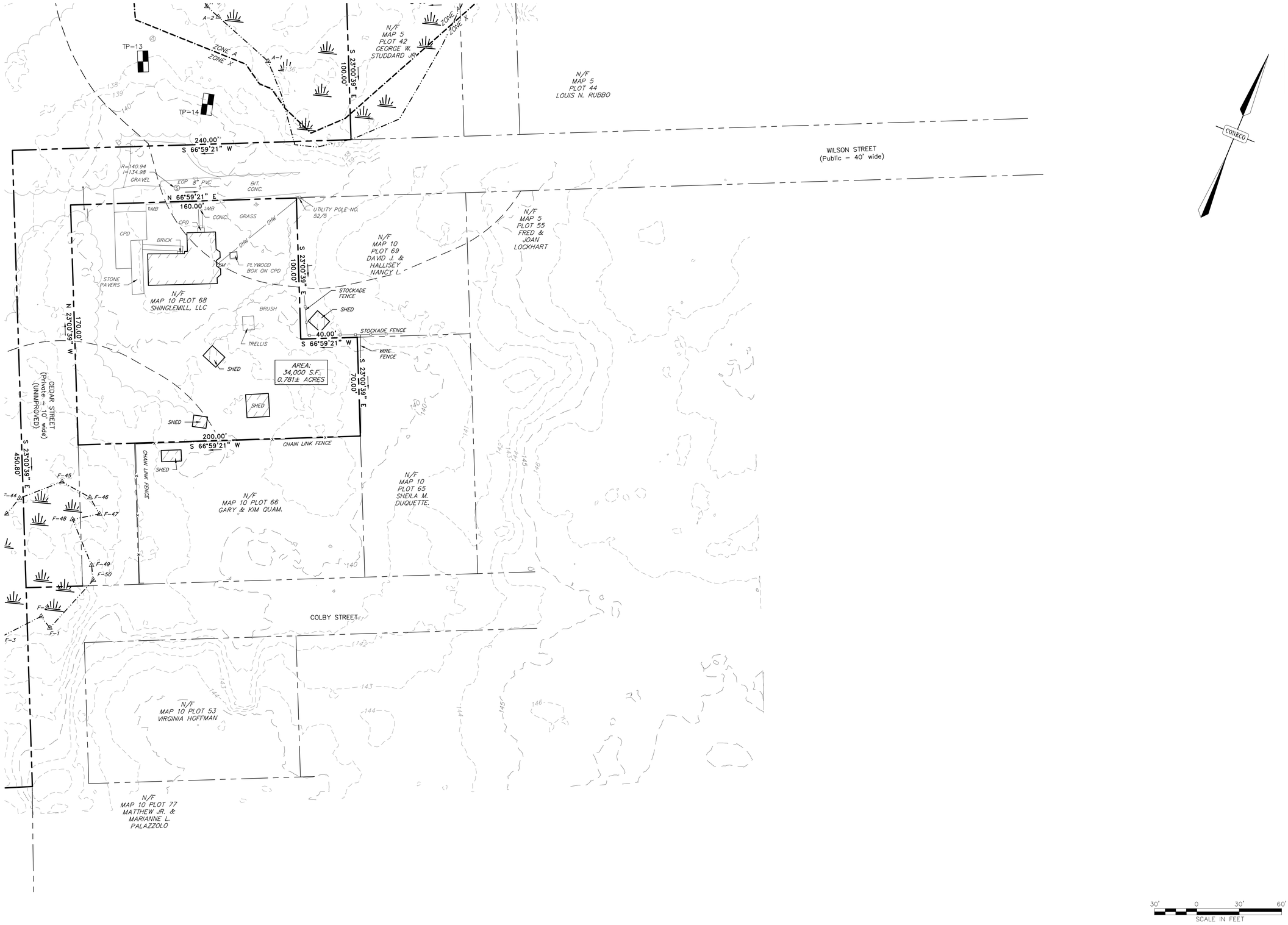
SHEET NO.	6 OF 24



COMMONWEALTH OF MASSACHUSETTS
TIMOTHY S. BOOAH #40170 REGISTERED PROFESSIONAL LAND SURVEYOR

05/14/2020

REVISIONS

NO.	DATE	DESCRIPTION	DR/CK

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SHINGLEMILL, LLC
4 FIRST STREET
BRIDGEWATER, MASSACHUSETTS 02324

DRAWING:
EXISTING CONDITIONS
SHEET 4 OF 4

PROJECT:
SHINGLEMILL APARTMENTS
POND STREET
ROCKLAND, MASSACHUSETTS 02370

PLAN SET:
SITE PLANS

CONECO
Engineers & Scientists
4 FIRST STREET, BRIDGEWATER, MASSACHUSETTS 02324
PHONE 508-697-3191 OR 800-548-3355; FAX 508-697-5996
WEBSITE: www.coneco.com

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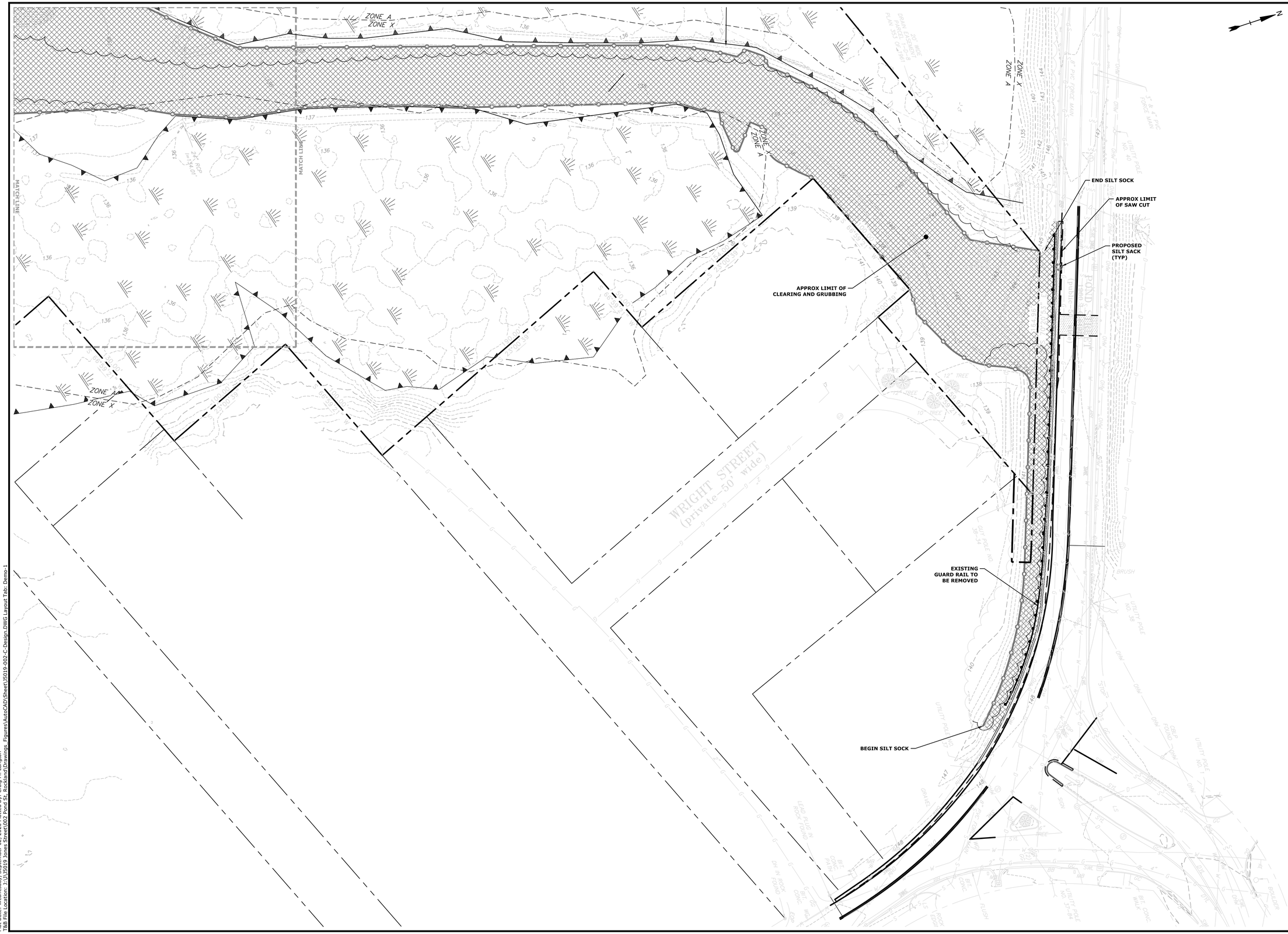
SCALE:	1" = 30'
PROJECT NO.	3395.1
SHEET NO.	7 OF 24



Tighe&Bond

BRADLEE M. COLVIN CIVIL No. 42446 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

PATRICK CRIMMINS PE Civil No. 55629 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

EXISTING CONDITIONS / DEMOLITION PLAN

SCALE: AS SHOWN

C-101.1

Last Save Date: September 2, 2020 1:40 PM By: CML
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Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. CRUMB
CIVIL
No. 42448
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

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A	7/13/2020	Submitted for Comprehensive Permit

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DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

EXISTING CONDITIONS / DEMOLITION PLAN

SCALE: AS SHOWN

C-101.2

Last Save Date: September 2, 2020 1:40 PM By: CML
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Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. CROWE
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	9/4/2020	Rev Comprehensive ZBA Permit Submission

PROJECT NO:	J5019-002
DATE:	9/4/2020
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

EXISTING CONDITIONS / DEMOLITION PLAN

SCALE: AS SHOWN

C-101.3

Last Save Date: September 2, 2020 1:40 PM By: CML
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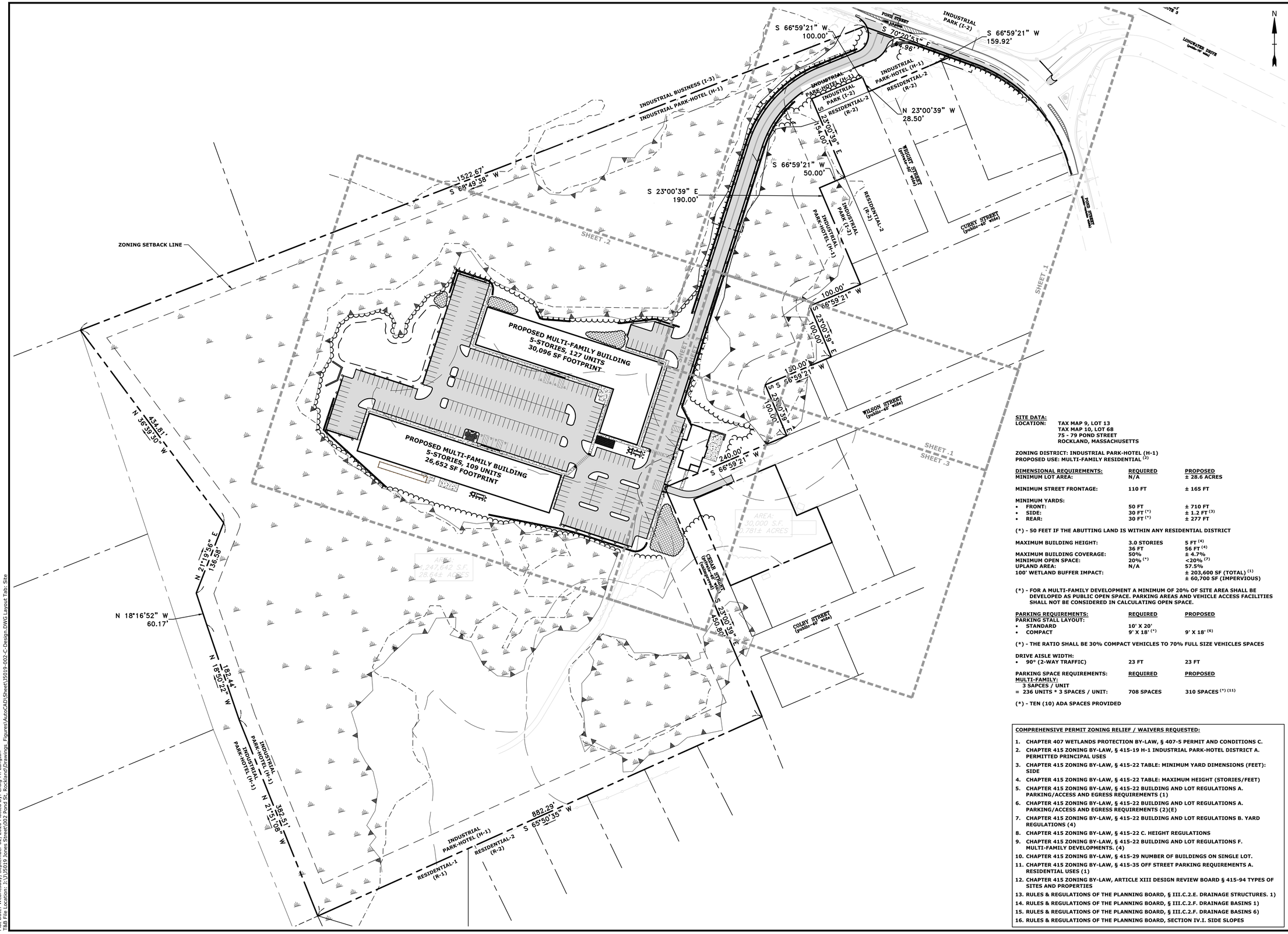

SITE DATA:
LOCATION: TAX MAP 9, LOT 13
TAX MAP 10, LOT 68
75 - 79 POND STREET
ROCKLAND, MASSACHUSETTS

ZONING DISTRICT: INDUSTRIAL PARK-HOTEL (H-1)
PROPOSED USE: MULTI-FAMILY RESIDENTIAL (2)

DIMENSIONAL REQUIREMENTS:	REQUIRED	PROPOSED
MINIMUM LOT AREA:	N/A	± 28.6 ACRES
MINIMUM STREET FRONTAGE:	110 FT	± 165 FT
MINIMUM YARDS:		
• FRONT:	50 FT	± 710 FT
• SIDE:	30 FT (*)	± 1.2 FT (3)
• REAR:	30 FT (*)	± 277 FT

(*) - 50 FEET IF THE ABUTTING LAND IS WITHIN ANY RESIDENTIAL DISTRICT

MAXIMUM BUILDING HEIGHT:	3.0 STORIES	5 FT (4)
	36 FT	56 FT (4)
MAXIMUM BUILDING COVERAGE:	50%	± 4.7%
MINIMUM OPEN SPACE:	20% (*)	<20% (7)
UPLAND AREA:	N/A	57.5%
100' WETLAND BUFFER IMPACT:		± 203,600 SF (TOTAL) (1)
		± 60,700 SF (IMPERVIOUS)

(*) - FOR A MULTI-FAMILY DEVELOPMENT A MINIMUM OF 20% OF SITE AREA SHALL BE DEVELOPED AS PUBLIC OPEN SPACE. PARKING AREAS AND VEHICLE ACCESS FACILITIES SHALL NOT BE CONSIDERED IN CALCULATING OPEN SPACE.

PARKING REQUIREMENTS:	REQUIRED	PROPOSED
PARKING STALL LAYOUT:		
• STANDARD	10' X 20'	
• COMPACT	9' X 18' (*)	9' X 18' (6)

(*) - THE RATIO SHALL BE 30% COMPACT VEHICLES TO 70% FULL SIZE VEHICLES SPACES

DRIVE AISLE WIDTH:		
• 90° (2-WAY TRAFFIC)	23 FT	23 FT

PARKING SPACE REQUIREMENTS:	REQUIRED	PROPOSED
MULTI-FAMILY:		
3 SAPCES / UNIT		
= 236 UNITS * 3 SPACES / UNIT:	708 SPACES	310 SPACES (*) (11)

(*) - TEN (10) ADA SPACES PROVIDED

COMPREHENSIVE PERMIT ZONING RELIEF / WAIVERS REQUESTED:

1. CHAPTER 407 WETLANDS PROTECTION BY-LAW, § 407-5 PERMIT AND CONDITIONS C.
2. CHAPTER 415 ZONING BY-LAW, § 415-19 H-1 INDUSTRIAL PARK-HOTEL DISTRICT A. PERMITTED PRINCIPAL USES
3. CHAPTER 415 ZONING BY-LAW, § 415-22 TABLE: MINIMUM YARD DIMENSIONS (FEET): SIDE
4. CHAPTER 415 ZONING BY-LAW, § 415-22 TABLE: MAXIMUM HEIGHT (STORIES/FEET)
5. CHAPTER 415 ZONING BY-LAW, § 415-22 BUILDING AND LOT REGULATIONS A. PARKING/ACCESS AND EGRESS REQUIREMENTS (1)
6. CHAPTER 415 ZONING BY-LAW, § 415-22 BUILDING AND LOT REGULATIONS A. PARKING/ACCESS AND EGRESS REQUIREMENTS (2)(E)
7. CHAPTER 415 ZONING BY-LAW, § 415-22 BUILDING AND LOT REGULATIONS B. YARD REGULATIONS (4)
8. CHAPTER 415 ZONING BY-LAW, § 415-22 C. HEIGHT REGULATIONS
9. CHAPTER 415 ZONING BY-LAW, § 415-22 BUILDING AND LOT REGULATIONS F. MULTI-FAMILY DEVELOPMENTS. (4)
10. CHAPTER 415 ZONING BY-LAW, § 415-29 NUMBER OF BUILDINGS ON SINGLE LOT.
11. CHAPTER 415 ZONING BY-LAW, § 415-35 OFF STREET PARKING REQUIREMENTS A. RESIDENTIAL USES (1)
12. CHAPTER 415 ZONING BY-LAW, ARTICLE XIII DESIGN REVIEW BOARD § 415-94 TYPES OF SITES AND PROPERTIES
13. RULES & REGULATIONS OF THE PLANNING BOARD, § III.C.2.E. DRAINAGE STRUCTURES. 1)
14. RULES & REGULATIONS OF THE PLANNING BOARD, § III.C.2.F. DRAINAGE BASINS 1)
15. RULES & REGULATIONS OF THE PLANNING BOARD, § III.C.2.F. DRAINAGE BASINS 6)
16. RULES & REGULATIONS OF THE PLANNING BOARD, SECTION IV.I. SIDE SLOPES

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. COLVIN
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9.2.20

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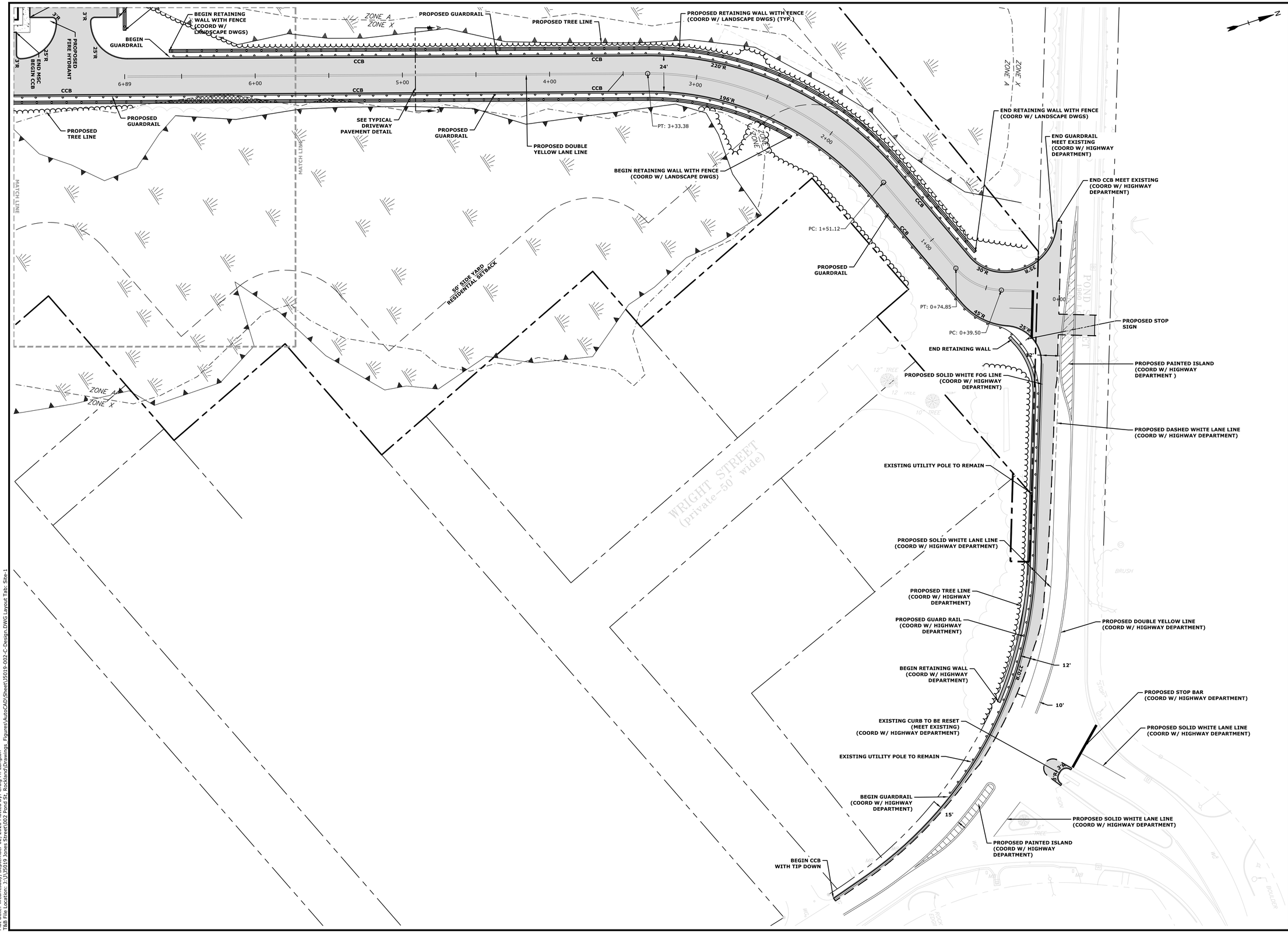
OVERLAY SITE PLAN

SCALE: AS SHOWN

C-102

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 2, 2020 Plotted By: Craig M Langton
T&B File Location: I:\J5019 Jones Street\002 Pond St, Rockland\Drawings_Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Site



Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLVIN
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

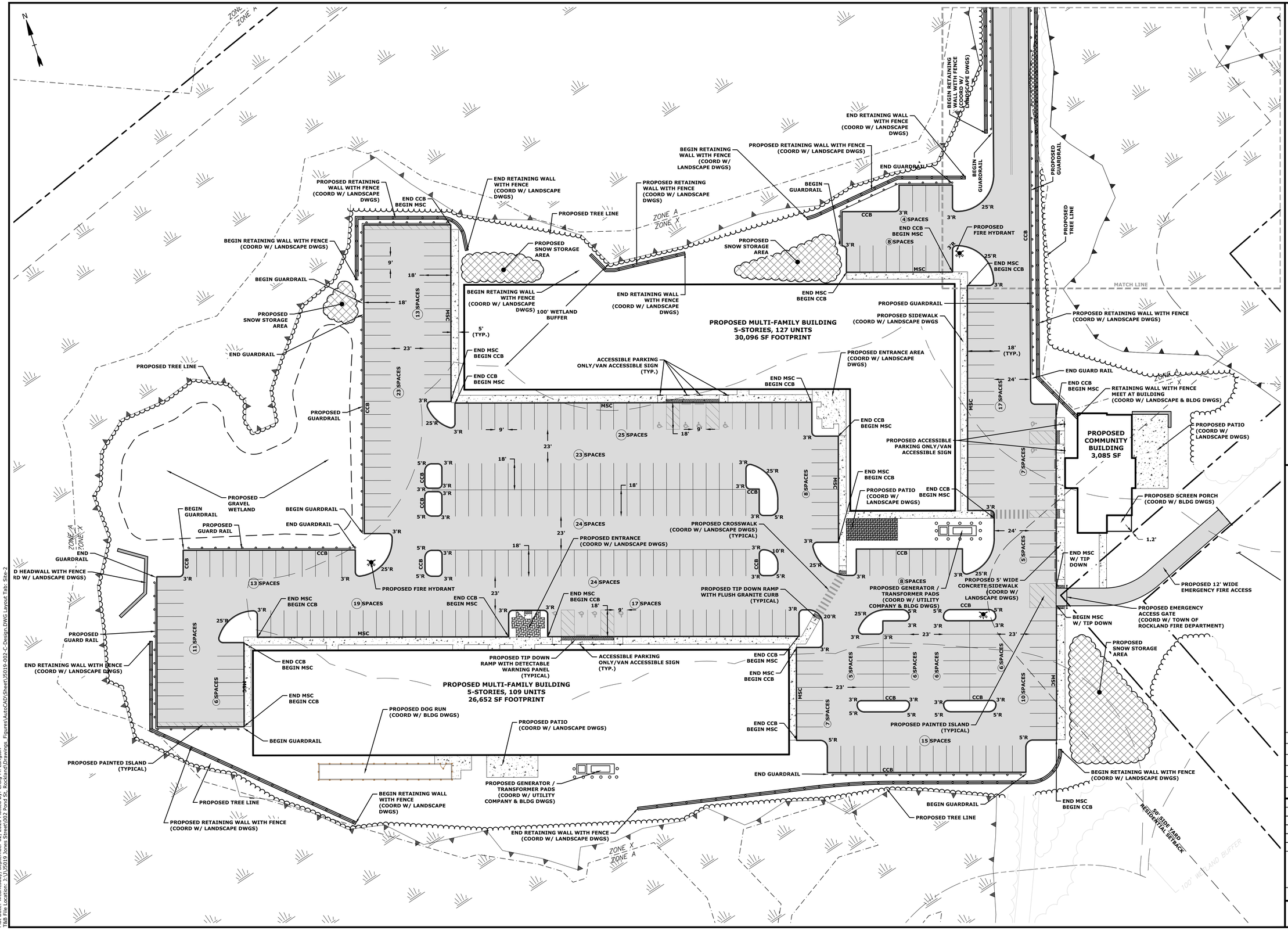
PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

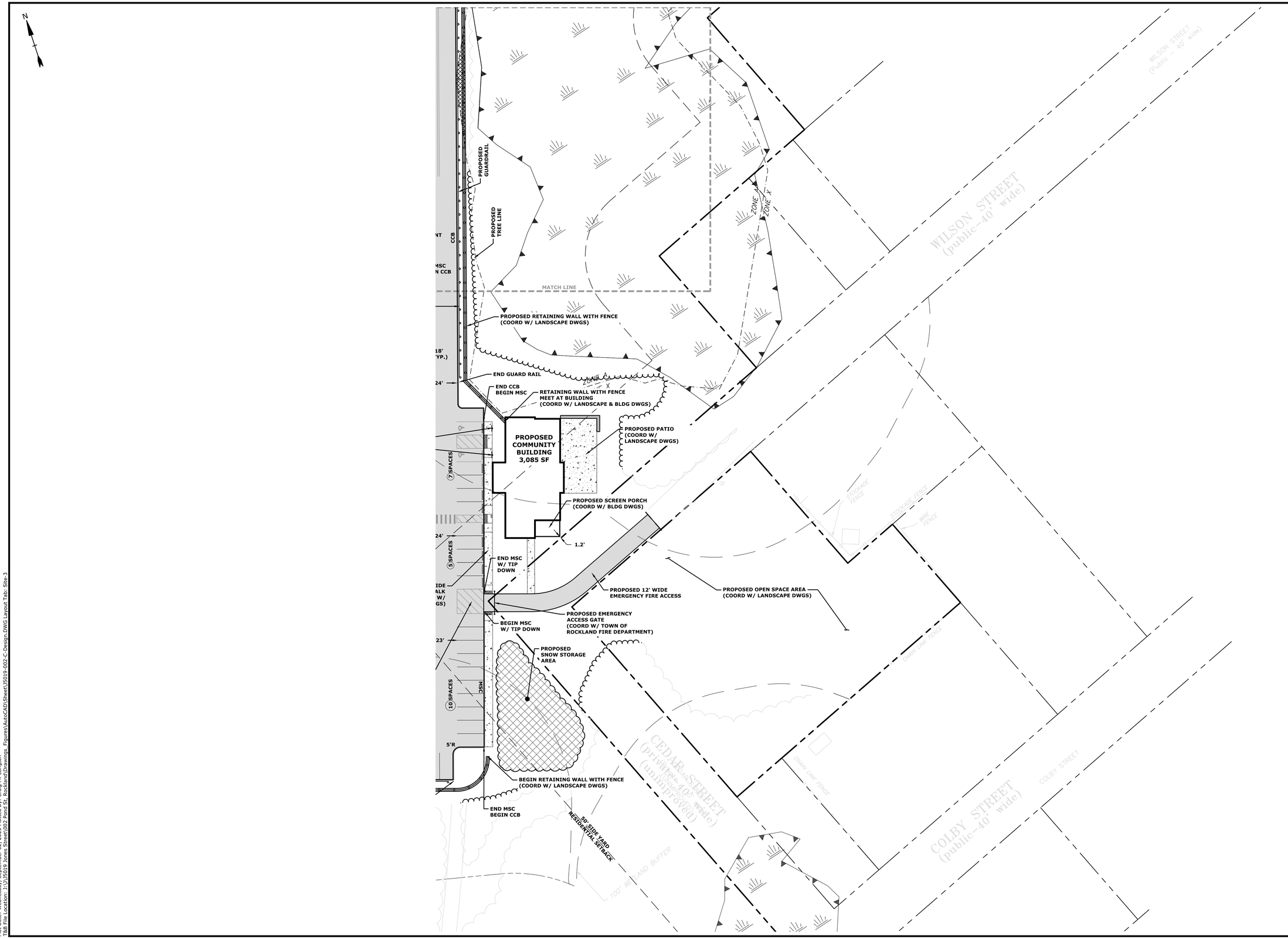
SITE PLAN

SCALE: AS SHOWN

C-102.1

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 Plotted By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Site-1


PROPOSED MULTI-FAMILY BUILDING
5-STORIES, 127 UNITS
30,096 SF FOOTPRINT
PROPOSED MULTI-FAMILY BUILDING
5-STORIES, 109 UNITS
26,652 SF FOOTPRINT
PROPOSED COMMUNITY BUILDING
3,085 SF
MATCH LINE
ZONE A
ZONE X
100' WETLAND BUFFER
50' SIDE YARD RESIDENTIAL SETBACK
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED TREE LINE
PROPOSED SNOW STORAGE AREA
END CCB BEGIN MSC
END MSC BEGIN CCB
BEGIN GUARDRAIL
END GUARDRAIL
PROPOSED GUARDRAIL
PROPOSED GUARD RAIL
PROPOSED SIDEWALK (COORD W/ LANDSCAPE DWGS
PROPOSED ENTRANCE AREA (COORD W/ LANDSCAPE DWGS)
ACCESSIBLE PARKING ONLY/VAN ACCESSIBLE SIGN (TYP.)
PROPOSED ACCESSIBLE PARKING ONLY/VAN ACCESSIBLE SIGN
PROPOSED FIRE HYDRANT
PROPOSED GRAVEL WETLAND
PROPOSED PATIO (COORD W/ LANDSCAPE DWGS)
PROPOSED DOG RUN (COORD W/ BLDG DWGS)
PROPOSED GENERATOR / TRANSFORMER PADS (COORD W/ UTILITY COMPANY & BLDG DWGS)
PROPOSED TIP DOWN RAMP WITH DETECTABLE WARNING PANEL (TYPICAL)
PROPOSED TIP DOWN RAMP WITH FLUSH GRANITE CURB (TYPICAL)
PROPOSED CROSSWALK (COORD W/ LANDSCAPE DWGS) (TYPICAL)
PROPOSED ENTRANCE (COORD W/ LANDSCAPE DWGS)
PROPOSED PAINTED ISLAND (TYPICAL)
PROPOSED GENERATOR / TRANSFORMER PADS (COORD W/ UTILITY COMPANY & BLDG DWGS)
PROPOSED 5' WIDE CONCRETE SIDEWALK (COORD W/ LANDSCAPE DWGS)
PROPOSED EMERGENCY ACCESS GATE (COORD W/ TOWN OF ROCKLAND FIRE DEPARTMENT)
PROPOSED 12' WIDE EMERGENCY FIRE ACCESS
PROPOSED SCREEN PORCH (COORD W/ BLDG DWGS)
PROPOSED PATIO (COORD W/ LANDSCAPE DWGS)
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
RETAINING WALL WITH FENCE MEET AT BUILDING (COORD W/ LANDSCAPE & BLDG DWGS)
BEGIN MSC W/ TIP DOWN
END MSC W/ TIP DOWN
END GUARD RAIL
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED PAINTED ISLAND (TYPICAL)
PROPOSED TREE LINE
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
100' WETLAND BUFFER
BEGIN GUARDRAIL
END GUARDRAIL
BEGIN GUARD RAIL
END GUARD RAIL
PROPOSED GUARDRAIL
PROPOSED TREE LINE
PROPOSED FIRE HYDRANT
PROPOSED SNOW STORAGE AREA
PROPOSED GUARD RAIL
PROPOSED GUARDRAIL
PROPOSED TREE LINE
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END GUARDRAIL
BEGIN GUARDRAIL
PROPOSED GUARDRAIL
PROPOSED TREE LINE
PROPOSED FIRE HYDRANT
PROPOSED SNOW STORAGE AREA
END CCB BEGIN MSC
END MSC BEGIN CCB
BEGIN GUARDRAIL
END GUARDRAIL
PROPOSED TREE LINE
PROPOSED GUARD RAIL
PROPOSED GUARDRAIL
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED TREE LINE
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN GUARDRAIL
END GUARDRAIL
PROPOSED GUARD RAIL
PROPOSED GUARDRAIL
PROPOSED TREE LINE
END RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
BEGIN RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)
PROPOSED RETAINING WALL WITH FENCE (COORD W/ LANDSCAPE DWGS)



Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. CRIMMINS
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	9/4/2020	Rev Comprehensive ZBA Permit Submission

PROJECT NO:	J5019-002
DATE:	9/4/2020
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

SITE PLAN

SCALE: AS SHOWN

C-102.3

Last Save Date: September 2, 2020 1:40 PM By: CML
Plotted: Wednesday, September 02, 2020 By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Site-3

Last Save Date: September 2, 2020 1:40 PM By: CML
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T&B File Location: J:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Grade-1

Tighe&Bond

BRADLEE M. COLOMA CIVIL No. 52448 REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS PATRICK CRIMMINS PE Civil No. 55629 REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

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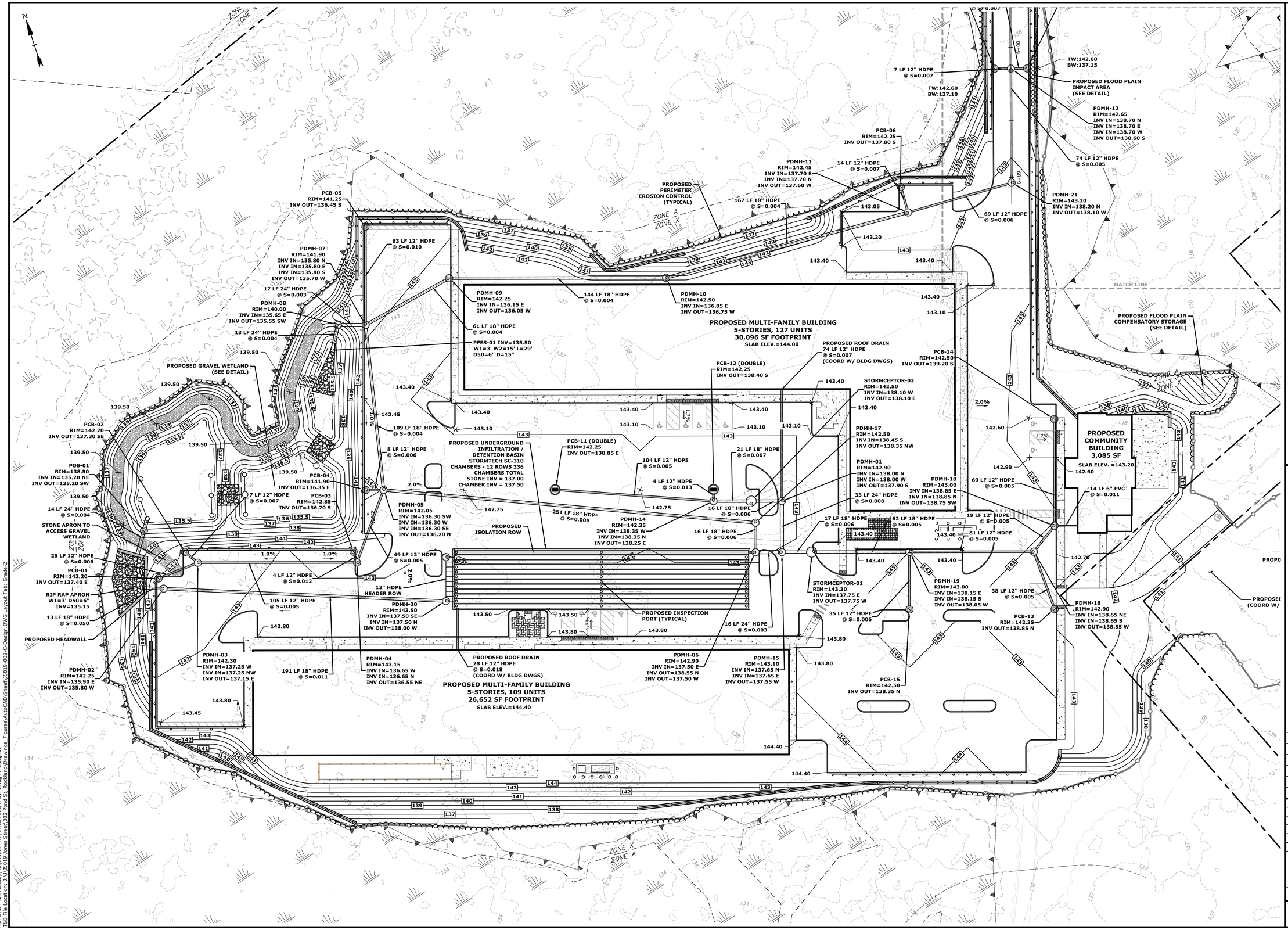
CHECKED:	PMC
APPROVED:	BLM

GRADING, DRAINAGE, & EROSION CONTROL PLAN

SCALE: AS SHOWN

C-103.1



Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. CORMIER
No.32,094
CIVIL
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

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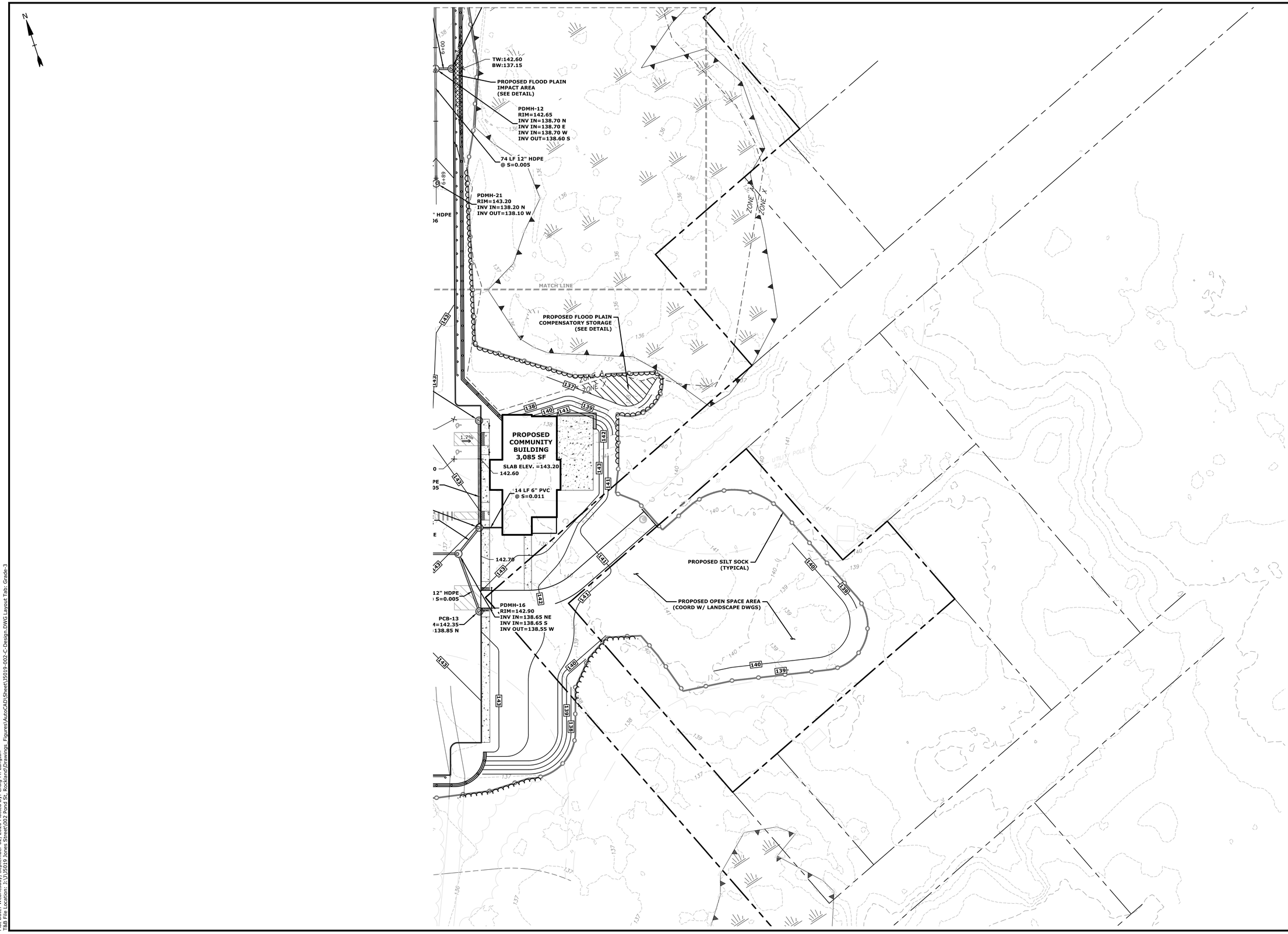
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

GRADING, DRAINAGE, & EROSION CONTROL PLAN

SCALE: AS SHOWN

C-103.2

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: September 02, 2020 1:20 PM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Grade-2



Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDEE M. COMA
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

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APPROVED:	BLM

GRADING, DRAINAGE, & EROSION CONTROL PLAN

SCALE: AS SHOWN

C-103.3

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 Plotted By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Grade-3

PROPOSED ELECTRICAL AND TELECOMUNICATION DUCT BANK (COORD W/ BLDG DWGS AND UTILITY COMPANY)

PROPOSED GAS SERVICE LINE (COORD W/ NATIONAL GRID)

PROPOSED 8" DI WATER SERVICE

PROPOSED CONNECTION TO EXISTING GAS MAIN (COORD W/ NATIONAL GRID)

PROPOSED 8" TEE CONNECTION TO EXISTING WATER MAIN FOR SITE SERVICE (COORD WATER DEPARTMENT)

PROPOSED OVER HEAD WIRE WITH RISER TO UNDERGROUND DUCT BANK (COORD W/ NATIONAL GRID)

ZONE A
ZONE X

MATCH LINE

UTILITY POLE NO. 38

UTILITY POLE NO. 37

GUY POLE NO. 38-34

LEAD PLUG IN ROCK FOUND

DH IN ROCK FOUND

CB FOUND

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLVIN
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

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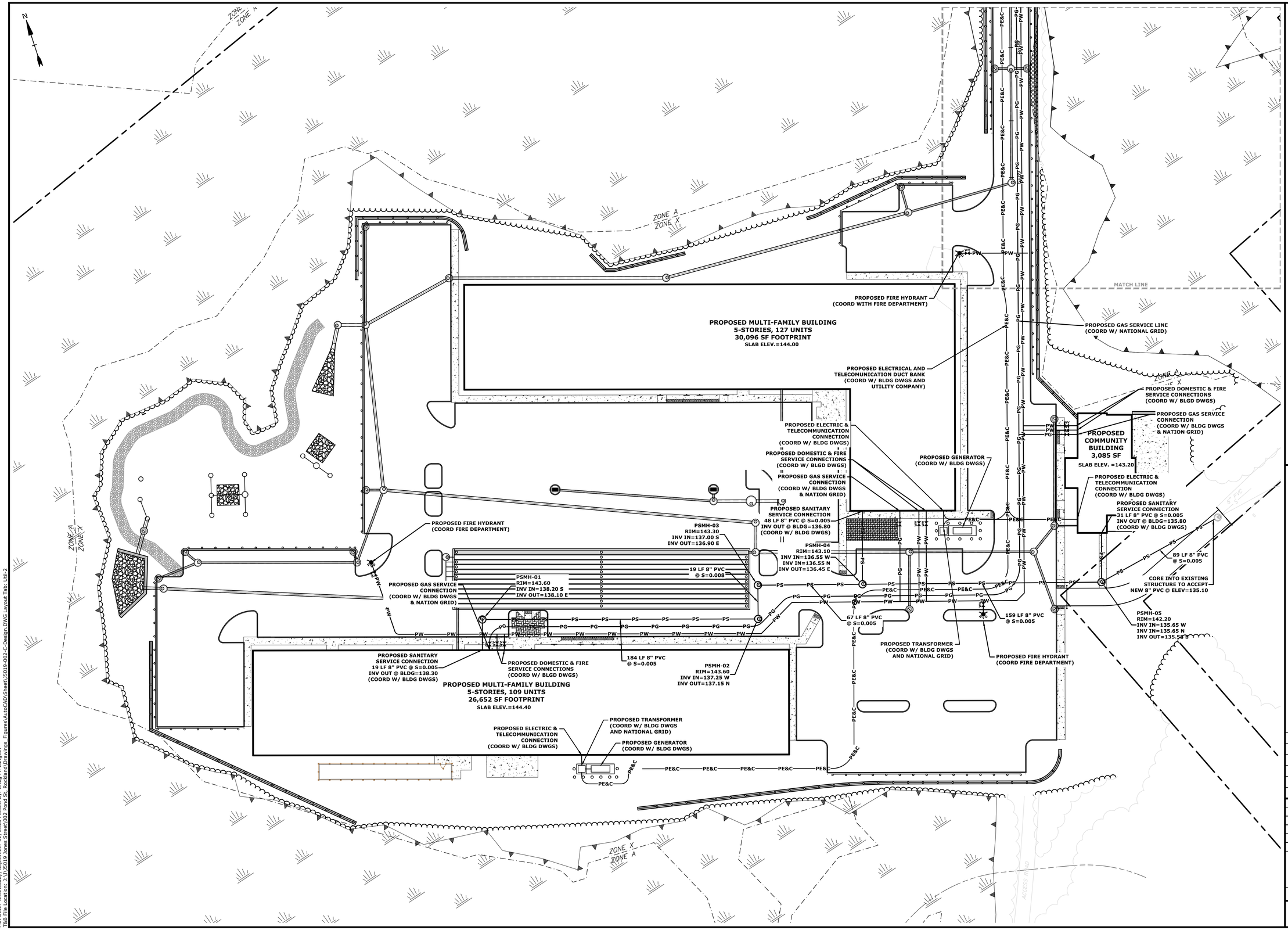
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

UTILITY PLAN

SCALE: AS SHOWN

C-104.1

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:40 PM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Util-1



Tighe&Bond

BRADLEE M. COLVIN
CIVIL
No. 42445
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
9.2.20

PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
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Massachusetts

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CHECKED:	PMC
APPROVED:	BLM

UTILITY PLAN

SCALE: AS SHOWN

C-104.2

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:40 PM By: Craig M. Langton
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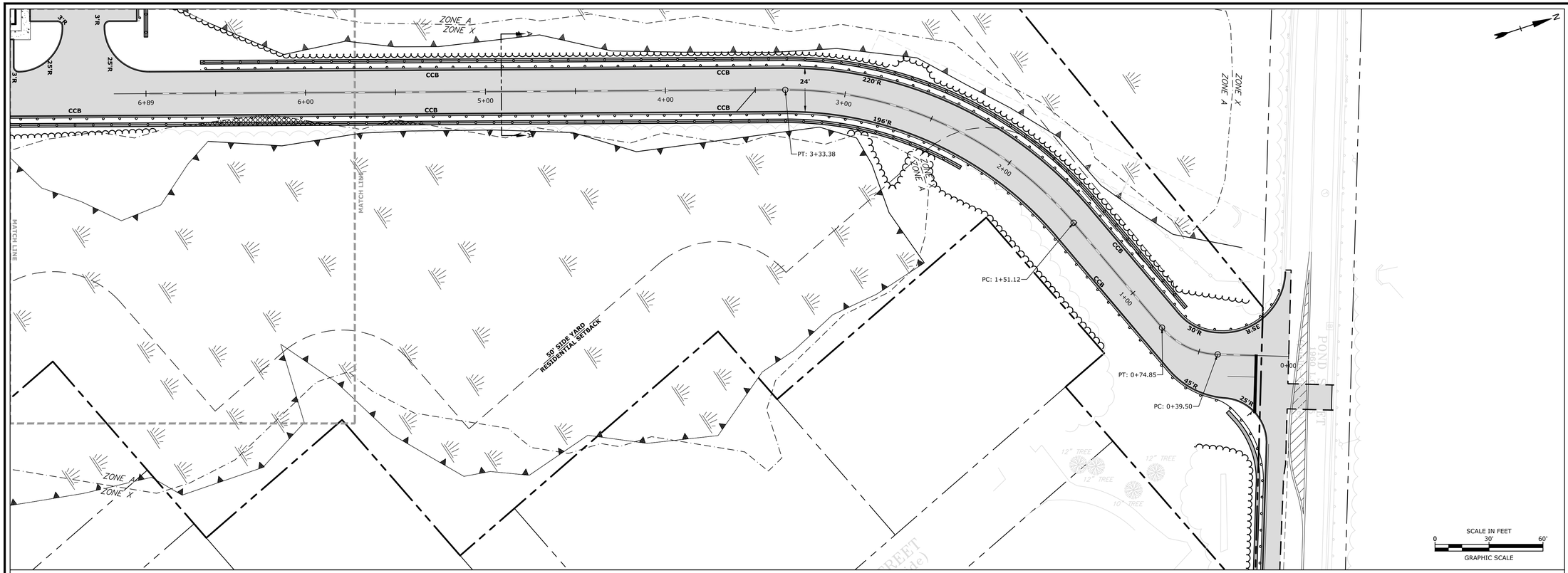

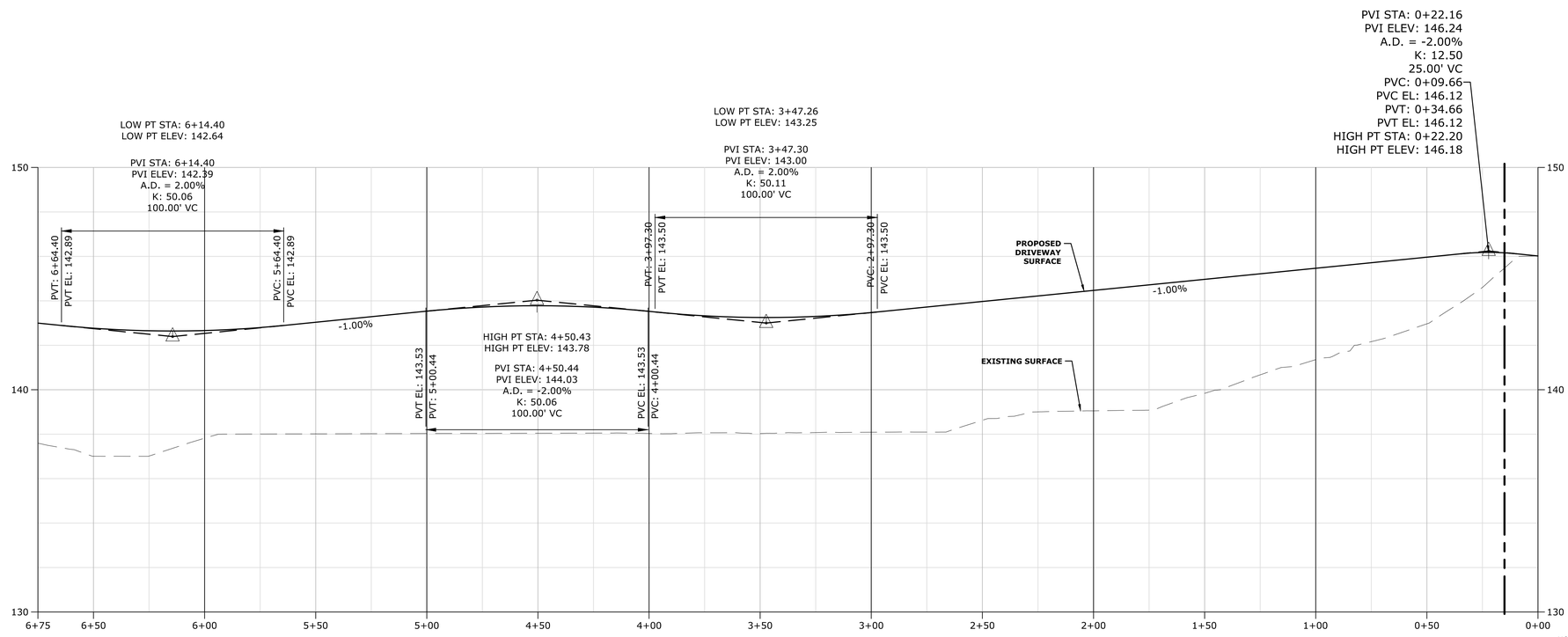

PROPOSED ROADWAY PROFILE

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. CRIMMINS
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
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PROJECT NO:	J5019-002
DATE:	9/4/20200
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DRIVEWAY PLAN & PROFILE

SCALE: AS SHOWN

C-201

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:40:47 PM By: Craig M. Langton
File: T:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Profile-1
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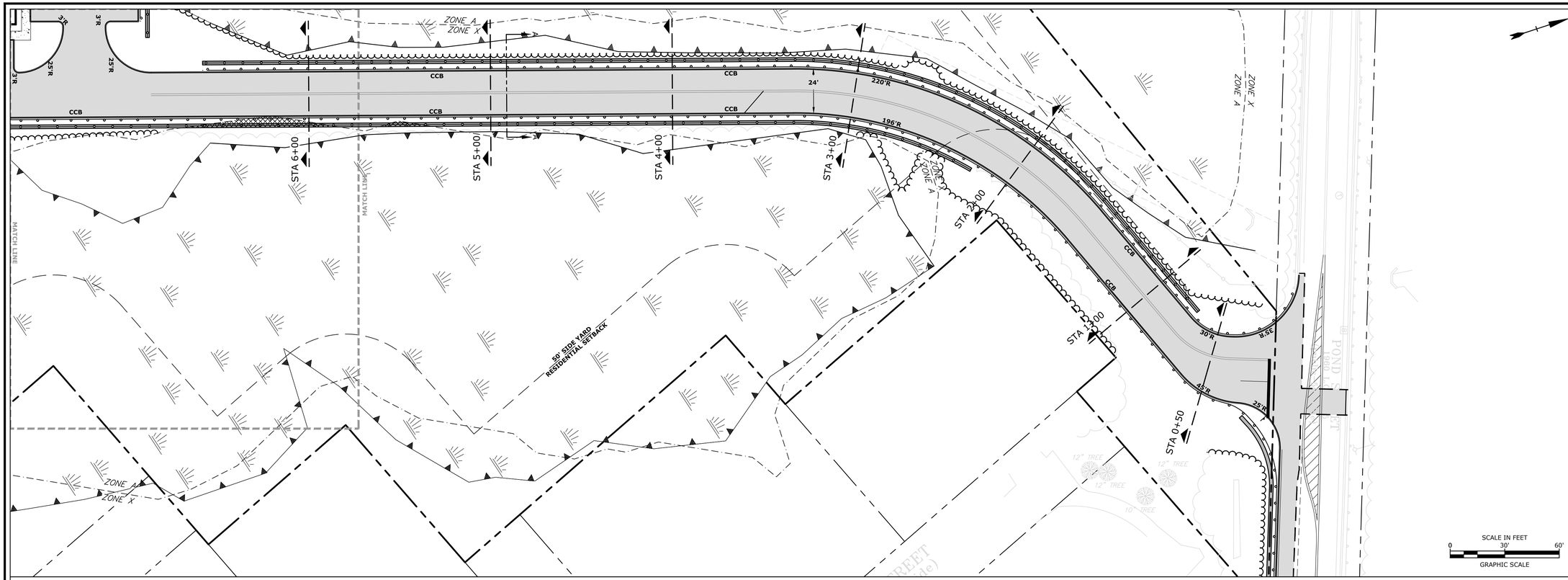

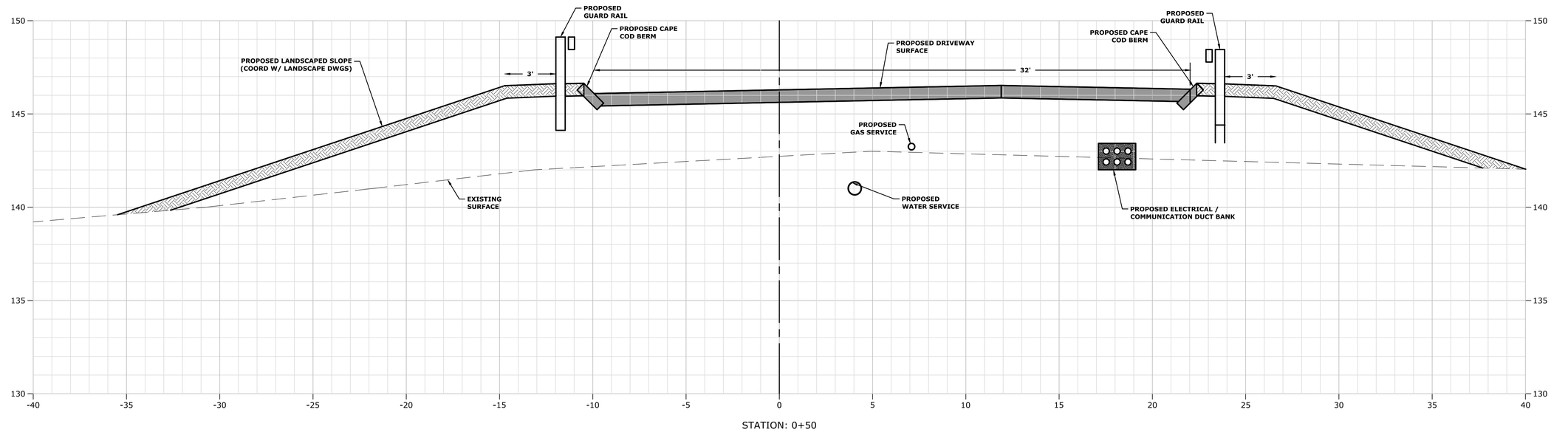

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLVIN
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

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Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

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Massachusetts

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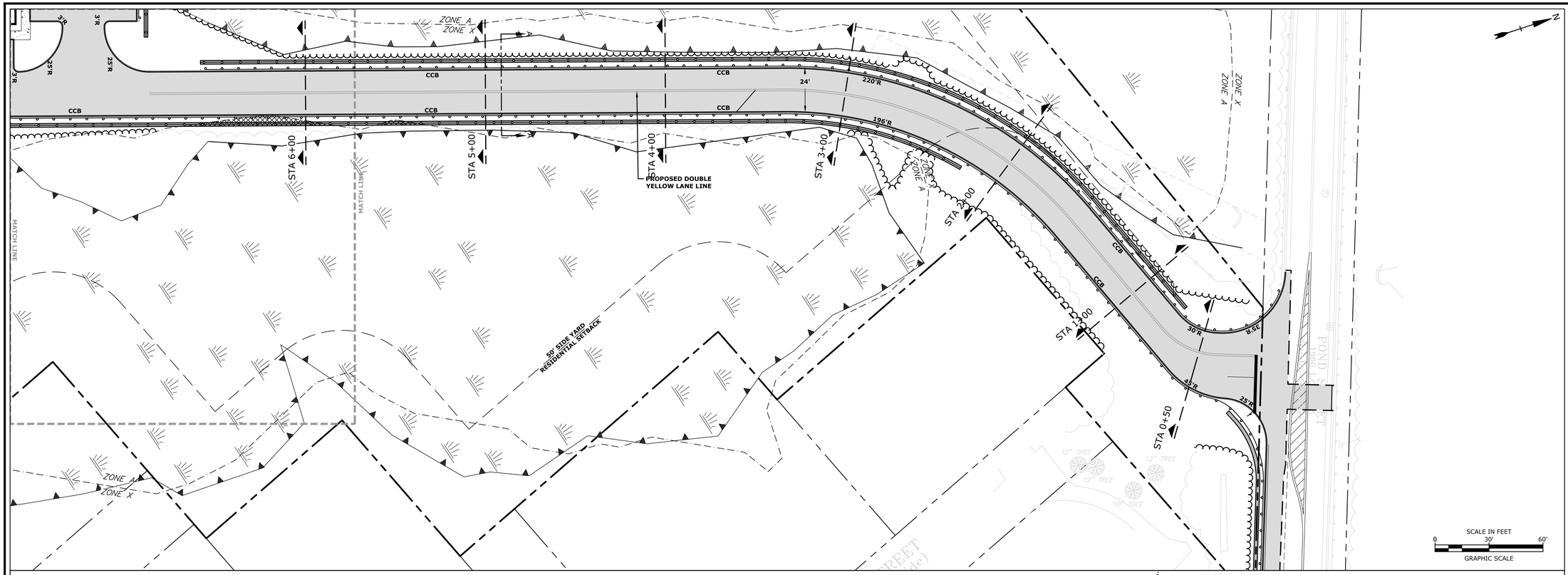
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

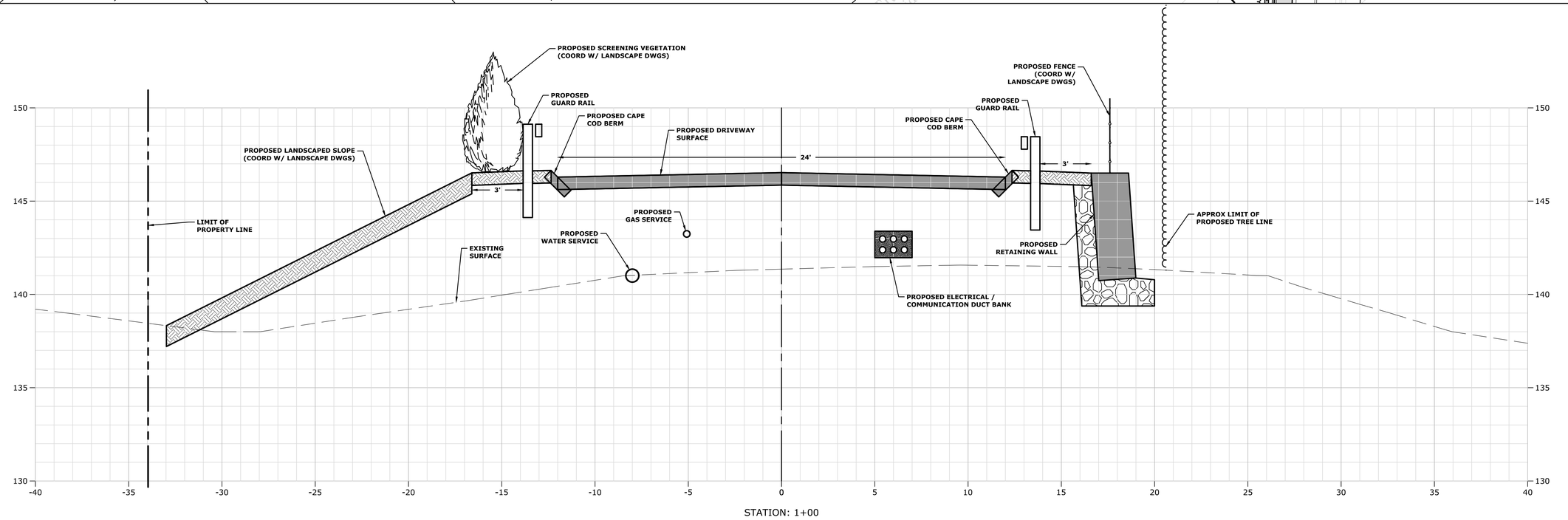
DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-202

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 1:40 PM By: Craig M. Langton
T&B File Location: J:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Section-0





Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLOMA
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	9/4/2020	Rev Comprehensive ZBA Permit Submission

PROJECT NO:	J5019-002
DATE:	9/4/20200
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-203

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date/Time: September 02, 2020 01:40 PM By: Craig M. Langton
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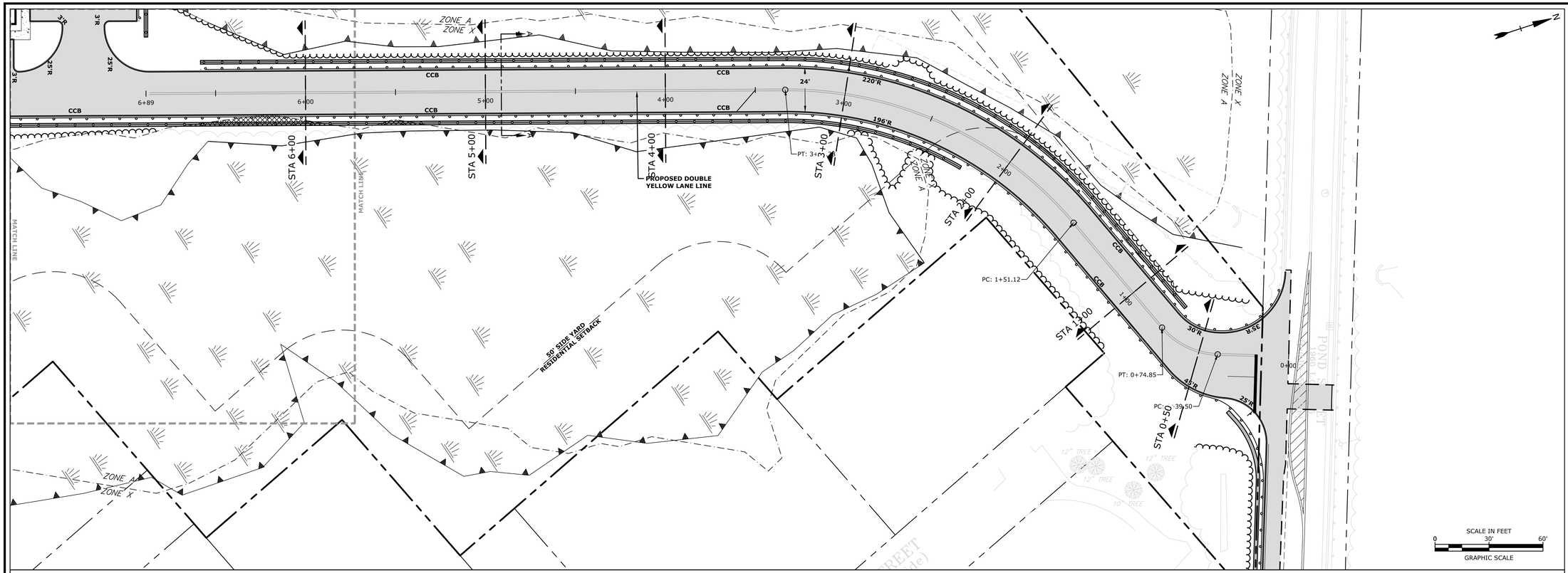

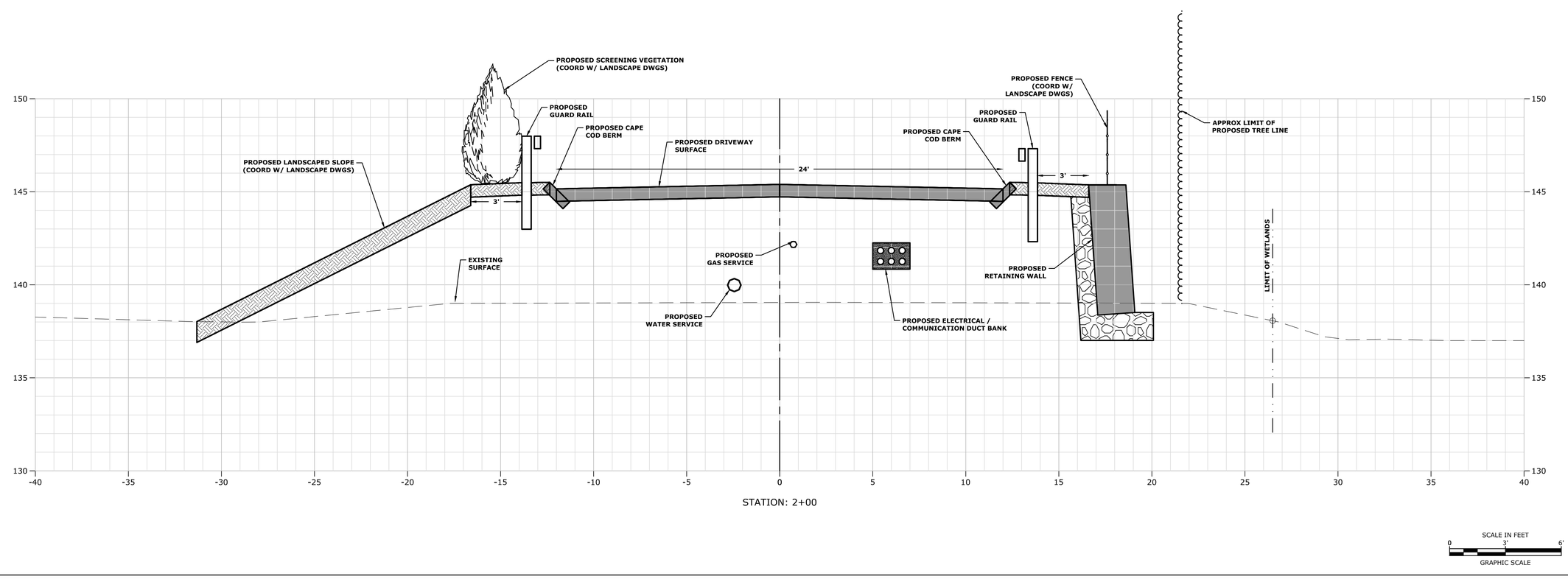

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLVIN
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
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PE Civil
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Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

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Massachusetts

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CHECKED:	PMC
APPROVED:	BLM

DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-204

Last Save Date: September 2, 2020, 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 - 1:41pm By: Craig M. Langton
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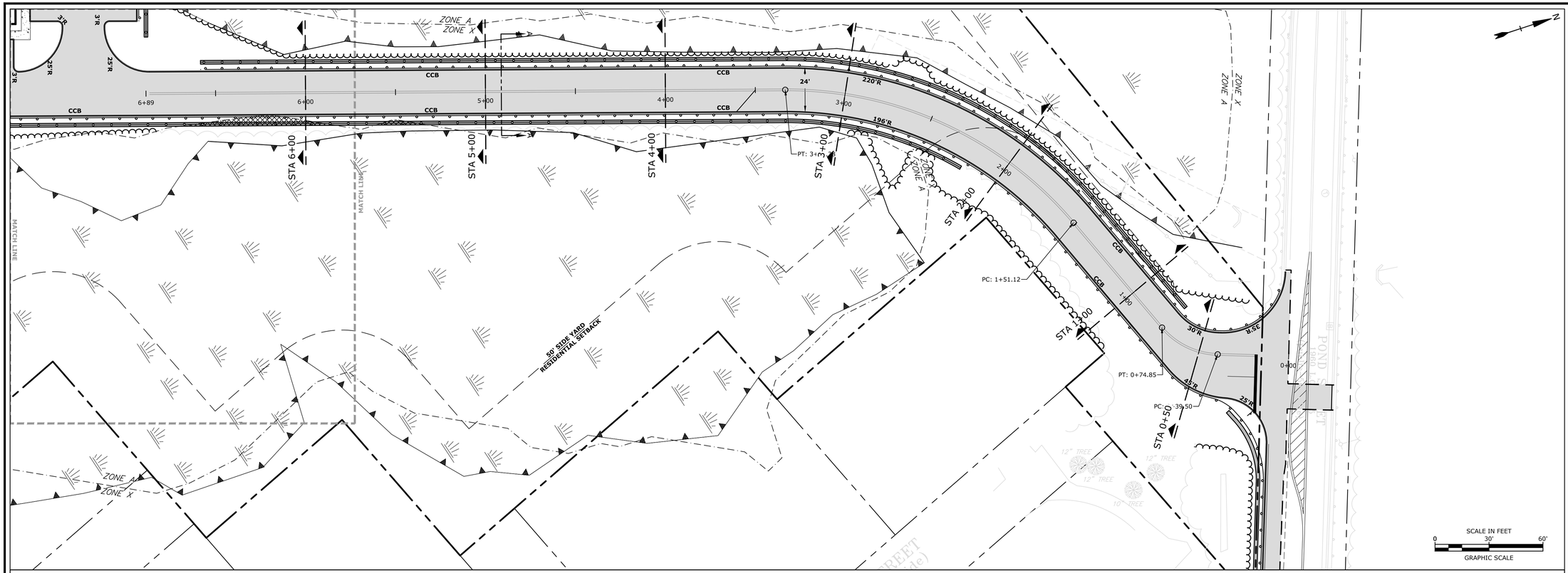
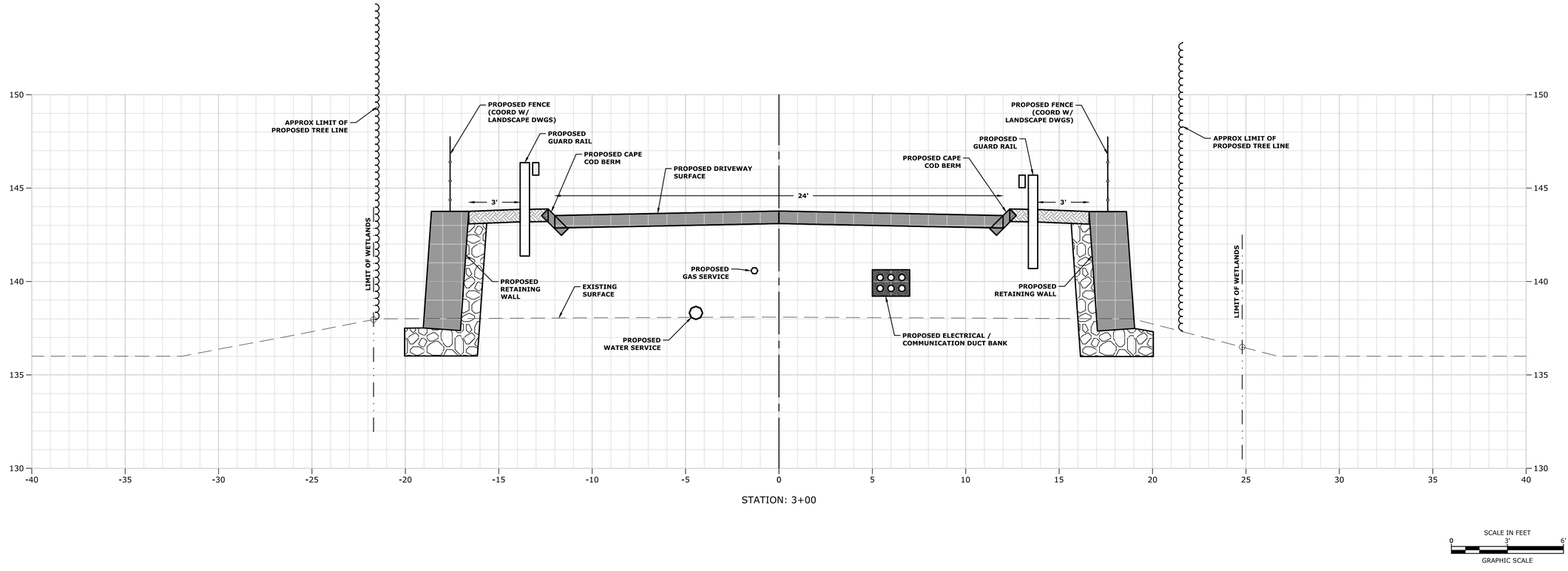




Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. LANGLOIS
CIVIL
No. 52448
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	9/4/2020	Rev Comprehensive ZBA Permit Submission

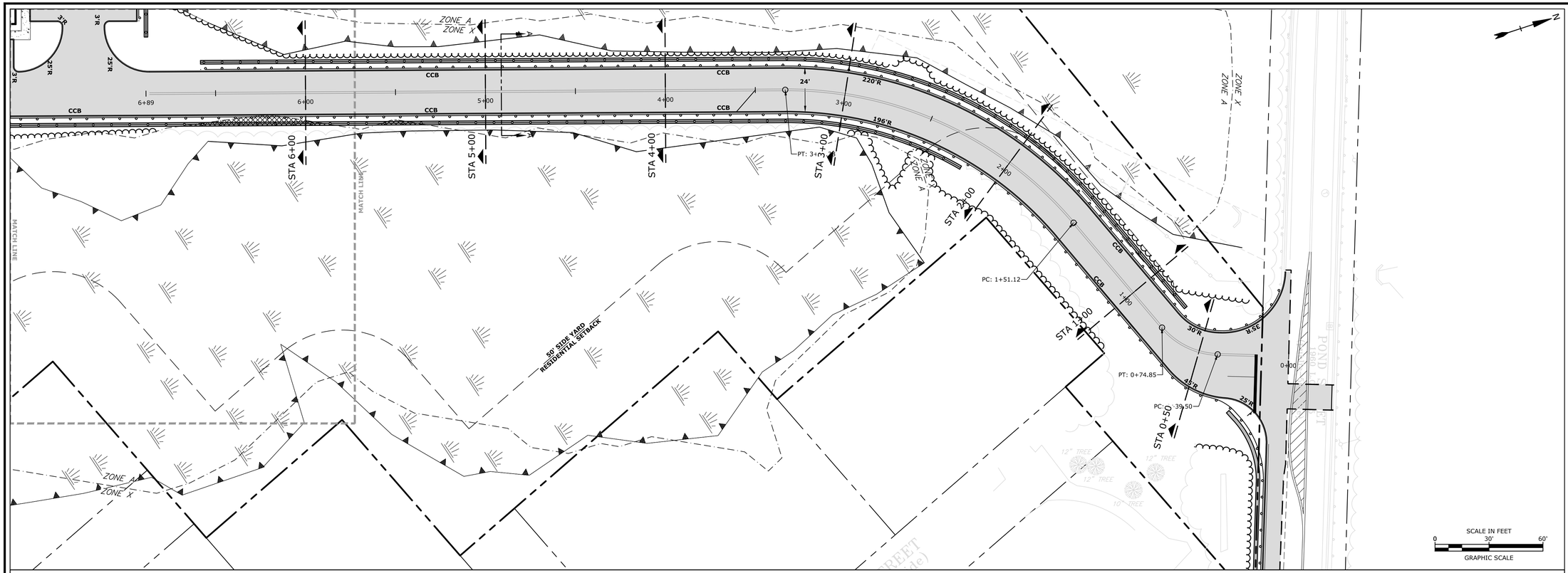
PROJECT NO:	J5019-002
DATE:	9/4/20200
FILE:	J5019-002-C-DESIGN.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

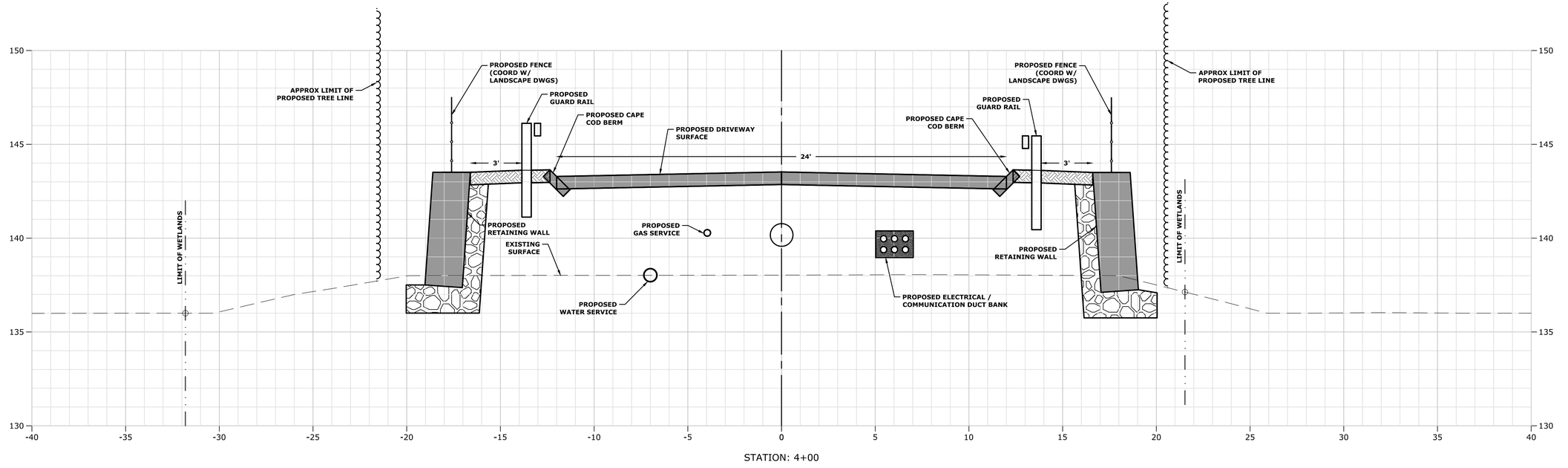
DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-205

Last Save Date: September 2, 2020 1:40 PM By: CML
Plot Date: Wednesday, September 02, 2020 - 1:40pm By: Craig M. Langton
T&B File Location: J:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Design.DWG Layout Tab: Section-3





Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. CROMA
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
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Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
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DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-206

Last Save Date: September 2, 2020 1:40 PM By: CML
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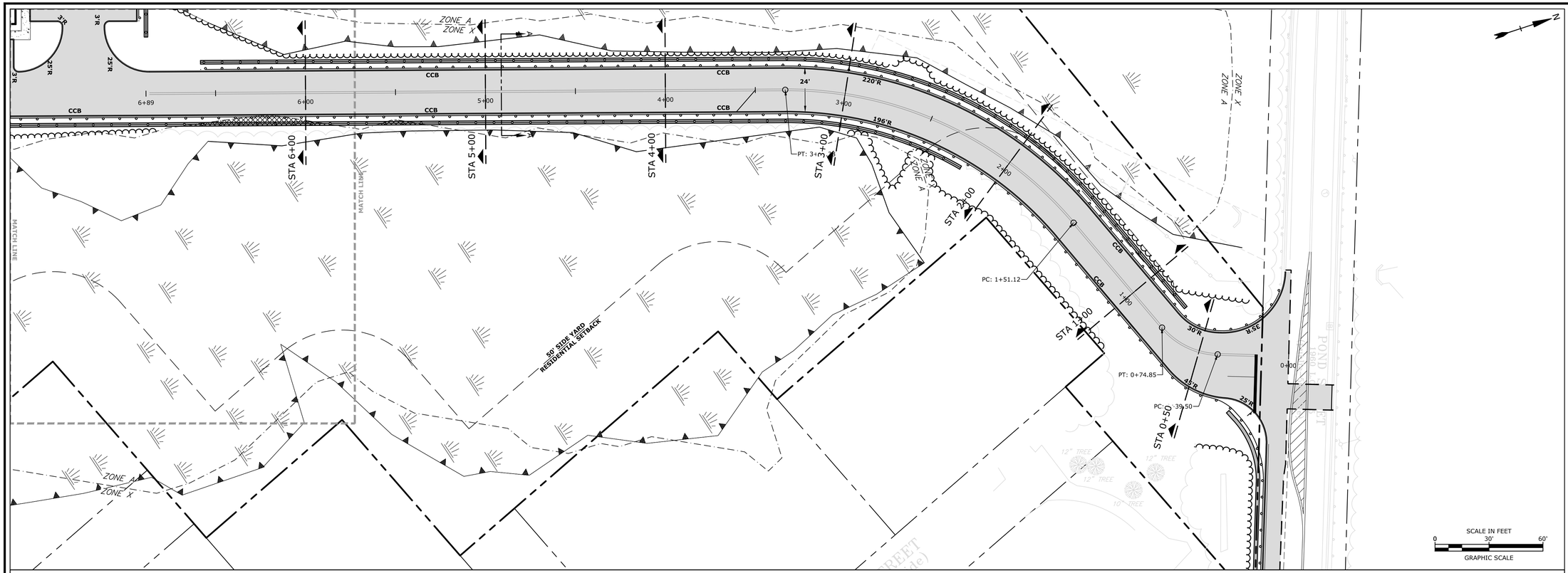

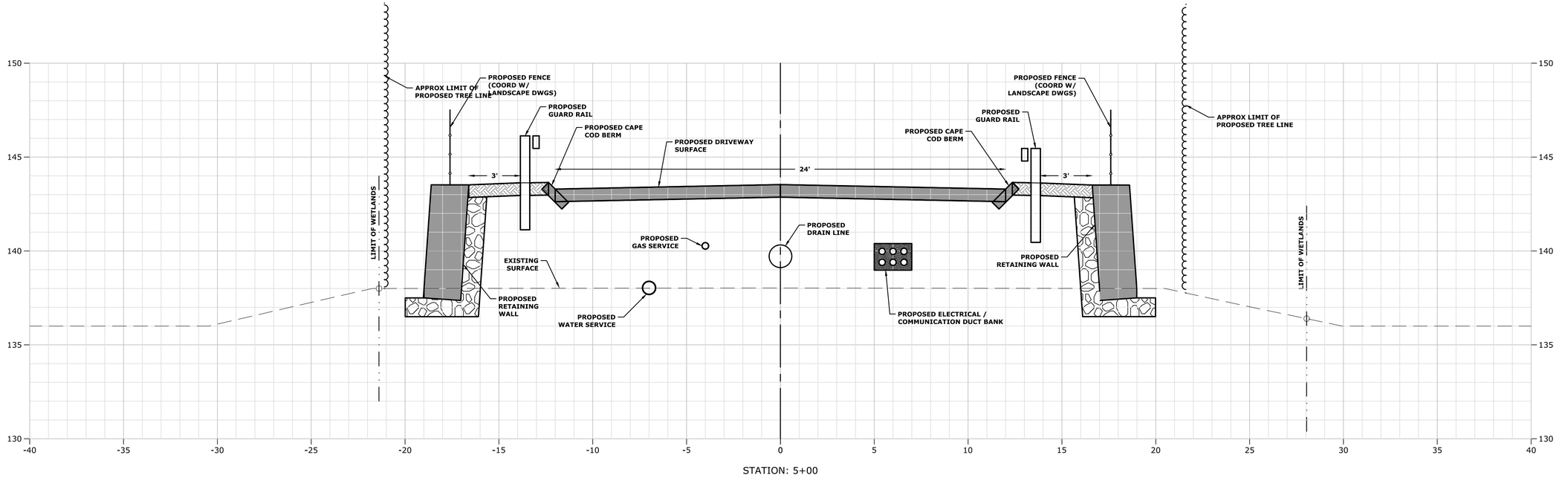

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Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
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DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-207

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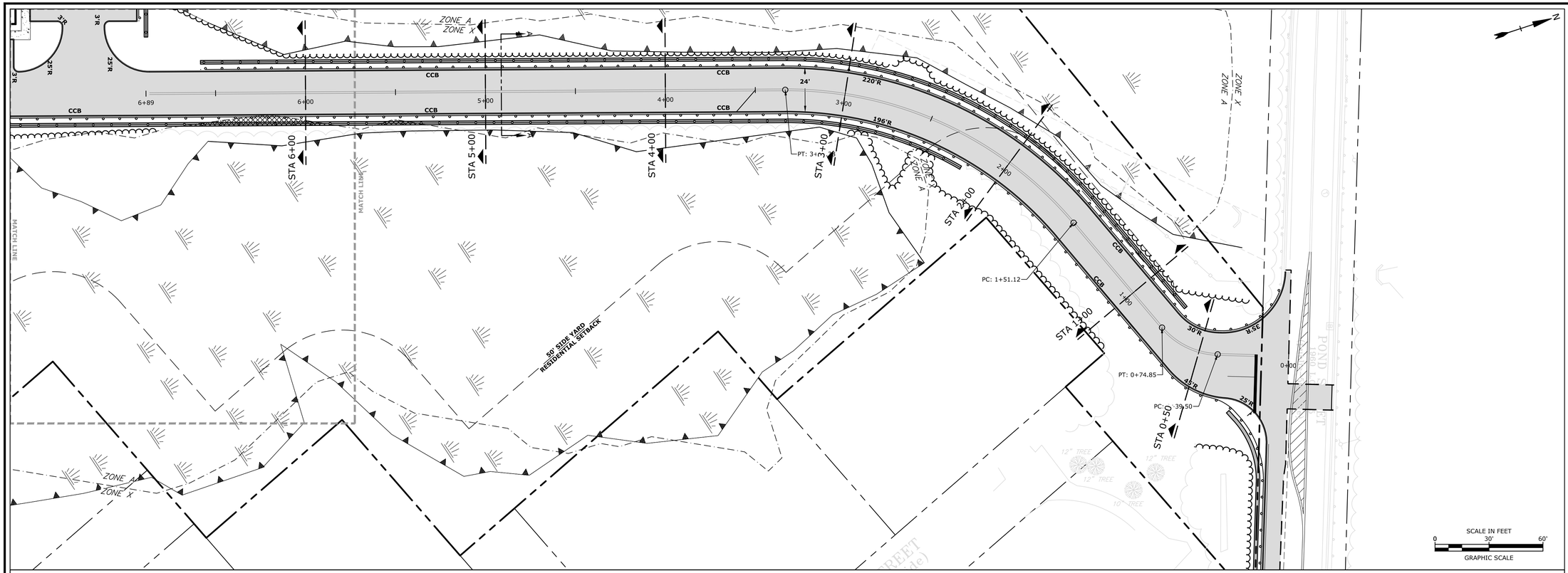

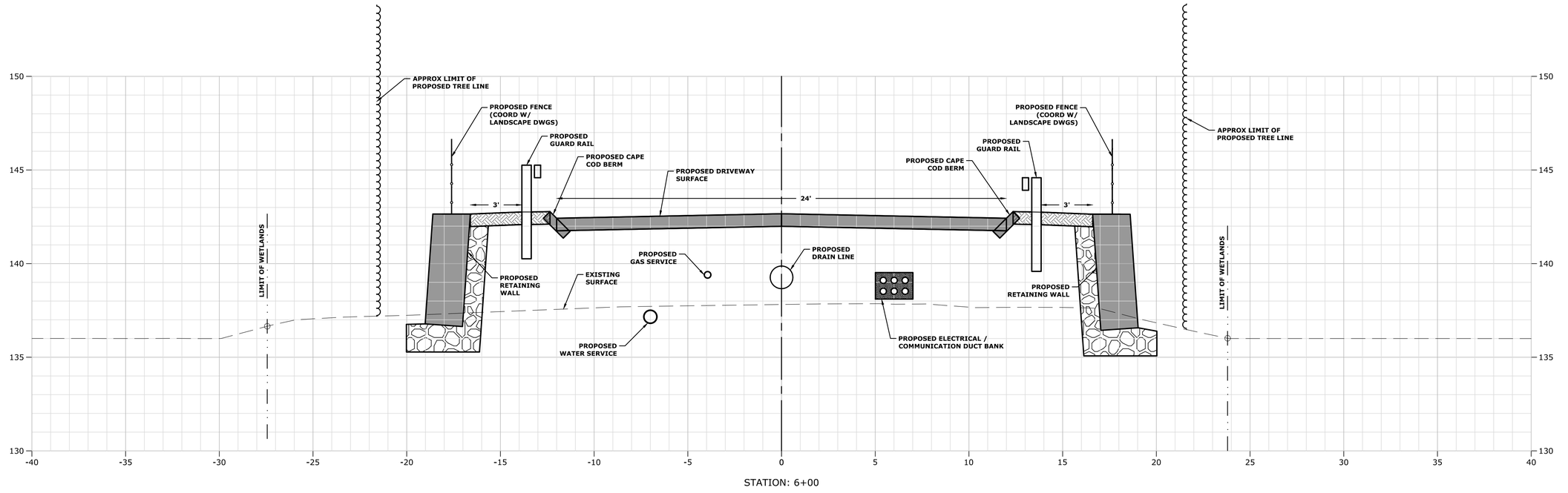

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Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
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DATE:	9/4/20200
FILE:	J5019-002-C-DESIGN.DWG
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CHECKED:	PMC
APPROVED:	BLM

DRIVEWAY SECTION VIEW

SCALE: AS SHOWN

C-208

Last Save Date: September 2, 2020, 1:40 PM By: CML
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GENERAL PROJECT INFORMATION

1. PROJECT APPLICANT: JONES STREET RESIDENTIAL
   100 HIGH STREET, SUITE 2500
   BOSTON, MASSACHUSETTS 02110
2. PROJECT NAME: SHINGLE MILLS MULTI-FAMILY DEVELOPMENT
   PROJECT ADDRESS: 75 - 79 POND STREET
   ROCKLAND, MASSACHUSETTS

PROJECT DESCRIPTION

THE PROJECT CONSISTS OF A MULTI-FAMILY DEVELOPMENT WITH ASSOCIATED SITE IMPROVEMETNS.

DISTURBED AREA

THE TOTAL AREA TO BE DISTURBED IS APPROXIMATELY 7.55 ACRES.

SOIL CHARACTERISTICS

BASED ON THE NRCS WEB SOIL SURVEY FOR PLYMOUTH COUNTY - MASSACHUSETTS, THE SOILS ON SITE CONSIST OF TIHONET COURSE SOAD AND FREETOWN MUCH WHICH ARE EXCESSIVELY WELL DRAINED TO MODERALTLY WELL DRAINED SOILS WITH HYDROLOGIC SOIL GROUP RATING(S) OF A/D AND B/DRESPECTIVELY.

NAME OF RECEIVING WATERS

THE STORMWATER RUNOFF FROM THE PROPOSED SITE WILL DISCHARGE VIA OVERLAND FLOW THROUGH THE PROPOSED ON-SITE DRAINAGE SYSTEMS TO THE EXISTING WETLAND.

CONSTRUCTION SEQUENCE OF MAJOR ACTIVITIES:

1. CONSTRUCT TEMPORARY AND PERMANENT SEDIMENT, EROSION AND DETENTION CONTROL FACILITIES. EROSION, SEDIMENT AND DETENTION MEASURES SHALL BE INSTALLED PRIOR TO ANY EARTH MOVING OPERATIONS THAT WILL INFLUENCE STORMWATER RUNOFF SUCH AS:
   1.1. NEW CONSTRUCTION
   1.2. DISPOSAL OF SEDIMENT SPOIL, STUMP AND OTHER SOLID WASTE
   1.3. FLOOD PLAIN EXCAVATION WORK
   1.4. CONTROL OF DUST
   1.5. NEARNESS OF CONSTRUCTION SITE TO RECEIVING WATERS
   1.6. CONSTRUCTION DURING LATE WINTER AND EARLY SPRING
2. ALL PERMANENT DITCHES, SWALES, DETENTION, RETENTION AND SEDIMENTATION BASINS TO BE STABILIZED USING THE VEGETATIVE AND NON-STRUCTURAL BMPS PRIOR TO DIRECTING RUNOFF TO THEM.
3. CLEAR AND DISPOSE OF DEBRIS.
4. CONSTRUCT TEMPORARY CULVERTS AND DIVERSION CHANNELS AS REQUIRED.
5. GRADE AND GRAVEL ROADWAYS AND PARKING AREAS - ALL ROADS AND PARKING AREA SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
6. BEGIN PERMANENT AND TEMPORARY SEEDING AND MULCHING. ALL CUT AND FILL SLOPES SHALL BE SEEDED AND MULCHED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
7. DAILY, OR AS REQUIRED, CONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, PERIMETER EROSION CONTROL MEASURES, SEDIMENT TRAPS, ETC., MULCH AND SEED AS REQUIRED.
8. SEDIMENT TRAPS AND/OR BASINS SHALL BE USED AS NECESSARY TO CONTAIN RUNOFF UNTIL SOILS ARE STABILIZED.
9. FINISH PAVING ALL ROADWAYS AND PARKING LOTS.
10. INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES.
11. COMPLETE PERMANENT SEEDING AND LANDSCAPING.
12. REMOVE TRAPPED SEDIMENTS FROM COLLECTOR DEVICES AS APPROPRIATE AND THEN REMOVE TEMPORARY EROSION CONTROL MEASURES.

SPECIAL CONSTRUCTION NOTES:

1. THE CONSTRUCTION SEQUENCE MUST LIMIT THE DURATION AND AREA OF DISTURBANCE.

EROSION CONTROL NOTES:

1. ALL EROSION CONTROL MEASURES AND PRACTICES SHALL CONFORM TO THE "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS" PREPARED BY THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION.
2. PRIOR TO ANY WORK OR SOIL DISTURBANCE, CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR EROSION CONTROL MEASURES AS REQUIRED IN THE PROJECT MANUAL.
3. CONTRACTOR SHALL INSTALL TEMPORARY EROSION CONTROL BARRIERS, INCLUDING HAY BALES, SILT FENCES, MULCH BERMS, SILT SACKS AND SILT SOCKS AS SHOWN IN THESE DRAWINGS AS THE FIRST ORDER OF WORK.
4. SILT SACK INLET PROTECTION SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASIN INLETS WITHIN THE WORK LIMITS AND BE MAINTAINED FOR THE DURATION OF THE PROJECT.
5. PERIMETER CONTROLS INCLUDING SILT FENCES, MULCH BERM, SILT SOCK, AND/OR HAY BALE BARRIERS SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT UNTIL NON-PAVED AREAS HAVE BEEN STABILIZED.
6. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION.
7. ALL DISTURBED AREAS NOT OTHERWISE BEING TREATED SHALL RECEIVE 6" LOAM, SEED AND FERTILIZER.
8. INSPECT ALL INLET PROTECTION AND PERIMETER CONTROLS WEEKLY AND AFTER EACH RAIN STORM OF 0.25 INCH OR GREATER. REPAIR/MODIFY PROTECTION AS NECESSARY TO MAXIMIZE EFFICIENCY OF FILTER. REPLACE ALL FILTERS WHEN SEDIMENT IS 1/3 THE FILTER HEIGHT.
9. CONSTRUCT EROSION CONTROL BLANKETS ON ALL SLOPES STEEPER THAN 3:1.

STABILIZATION:

1. AN AREA SHALL BE CONSIDERED STABLE WHEN ONE OF THE FOLLOWING HAS OCCURRED:
   1.1. BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
   1.2. A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
   1.3. A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIPRAP HAS BEEN INSTALLED;
   1.4. EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED.;
   1.5. IN AREAS TO BE PAVED, "STABLE" MEANS THAT BASE COURSE GRAVELS MEETING THE REQUIREMENTS OF COMMONWEALTH OF MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES," 1988 EDITION AS AMENDED.
2. WINTER STABILIZATION PRACTICES:
   2.1. ALL PROPOSED VEGETATED AREAS THAT DO NOT EXHIBIT A MINIMUM OF 85 PERCENT VEGETATIVE GROWTH BY OCTOBER 15, OR WHICH ARE DISTURBED AFTER OCTOBER 15, SHALL BE STABILIZED BY SEEDING AND INSTALLING EROSION CONTROL BLANKETS ON SLOPES GREATER THAN 3:1, AND SEEDING AND PLACING 3 TO 4 TONS OF MULCH PER ACRE, SECURED WITH ANCHORED NETTING, ELSEWHERE. THE INSTALLATION OF EROSION CONTROL BLANKETS OR MULCH AND NETTING SHALL NOT OCCUR OVER ACCUMULATED SNOW OR ON FROZEN GROUND AND SHALL BE COMPLETED IN ADVANCE OF THAW OR SPRING MELT EVENTS;
   2.2. ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85 PERCENT VEGETATIVE GROWTH BY OCTOBER 15, OR WHICH ARE DISTURBED AFTER OCTOBER 15, SHALL BE STABILIZED TEMPORARILY WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITIONS;
   2.3. AFTER OCTOBER 15, INCOMPLETE ROAD OR PARKING SURFACES, WHERE WORK HAS STOPPED FOR THE WINTER SEASON, SHALL BE PROTECTED WITH A MINIMUM OF 3 INCHES OF CRUSHED GRAVEL, OR IF CONSTRUCTION IS TO CONTINUE THROUGH THE WINTER SEASON BE CLEARED OF ANY ACCUMULATED SNOW AFTER EACH STORM EVENT;
3. STABILIZATION SHALL BE INITIATED ON ALL LOAM STOCKPILES, AND DISTURBED AREAS, WHERE CONSTRUCTION ACTIVITY SHALL NOT OCCUR FOR MORE THAN TWENTY-ONE (21) CALENDAR DAYS BY THE FOURTEENTH (14TH) DAY AFTER CONSTRUCTION ACTIVITY HAS PERMANENTLY OR TEMPORARILY CEASED IN THAT AREA. STABILIZATION MEASURES TO BE USED INCLUDE:
   3.1. TEMPORARY SEEDING;
   3.2. MULCHING.
4. ALL AREAS SHALL BE STABILIZED WITHIN 45 DAYS OF INITIAL DISTURBANCE.
5. WHEN CONSTRUCTION ACTIVITY PERMANENTLY OR TEMPORARILY CEASES WITHIN 100 FEET OF NEARBY SURFACE WATERS OR DELINEATED WETLANDS, THE AREA SHALL BE STABILIZED WITHIN SEVEN (7) DAYS OR PRIOR TO A RAIN EVENT. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN THESE AREAS, SILT FENCES, MULCH BERMS, HAY BALE BARRIERS AND ANY EARTH/DIKES SHALL BE REMOVED ONCE PERMANENT MEASURES ARE ESTABLISHED.
6. DURING CONSTRUCTION, RUNOFF WILL BE DIVERTED AROUND THE SITE WITH EARTH DIKES, PIPING OR STABILIZED CHANNELS WHERE POSSIBLE. SHEET RUNOFF FROM THE SITE WILL BE FILTERED THROUGH SILT FENCES, MULCH BERMS, HAY BALE BARRIERS, OR SILT SOCKS. ALL STORM DRAIN BASIN INLETS SHALL BE PROVIDED WITH FLARED END SECTIONS AND TRASH RACKS. THE SITE SHALL BE STABILIZED FOR THE WINTER BY OCTOBER 15.

DUST CONTROL:

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST THROUGHOUT THE CONSTRUCTION PERIOD.
2. DUST CONTROL METHODS SHALL INCLUDE, BUT BE NOT LIMITED TO SPRINKLING WATER ON EXPOSED AREAS, COVERING LOADED DUMP TRUCKS LEAVING THE SITE, AND TEMPORARY MULCHING.

STOCKPILES:

1. LOCATE STOCKPILES A MINIMUM OF 50 FEET AWAY FROM CATCH BASINS, SWALES, AND CULVERTS.
2. ALL STOCKPILES SHOULD BE SURROUNDED WITH TEMPORARY EROSION CONTROL MEASURES PRIOR TO THE ONSET OF PRECIPITATION.
3. PERIMETER BARRIERS SHOULD BE MAINTAINED AT ALL TIMES, AND ADJUSTED AS NEEDED TO ACCOMMODATE THE DELIVERY AND REMOVAL OF MATERIALS FROM THE STOCKPILE. THE INTEGRITY OF THE BARRIER SHOULD BE INSPECTED AT THE END OF EACH WORKING DAY.
4. PROTECT ALL STOCKPILES FROM STORMWATER RUN-OFF USING TEMPORARY EROSION CONTROL MEASURES SUCH AS BERMS, SILT SOCK, OR OTHER APPROVED PRACTICE TO PREVENT MIGRATION OF MATERIAL BEYOND THE IMMEDIATE CONFINES OF THE STOCKPILES.

OFF SITE VEHICLE TRACKING:

THE CONTRACTOR SHALL CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE(S) PRIOR TO ANY EXCAVATION ACTIVITIES.

VEGETATION:

1. SEE LANDSCAPE PLANS FOR SITE VEGETATION NOTES.

CONCRETE WASHOUT AREA:

1. THE FOLLOWING ARE THE ONLY NON-STORMWATER DISCHARGES ALLOWED. ALL OTHER NON-STORMWATER DISCHARGES ARE PROHIBITED ON SITE:
   1.1. THE CONCRETE DELIVERY TRUCKS SHALL, WHENEVER POSSIBLE, USE WASHOUT FACILITIES AT THEIR OWN PLANT OR DISPATCH FACILITY;
   1.2. IF IT IS NECESSARY, SITE CONTRACTOR SHALL DESIGNATE SPECIFIC WASHOUT AREAS AND DESIGN FACILITIES TO HANDLE ANTICIPATED WASHOUT WATER;
   1.3. CONTRACTOR SHALL LOCATE WASHOUT AREAS AT LEAST 150 FEET AWAY FROM STORM DRAINS, SWALES AND SURFACE WATERS OR DELINEATED WETLANDS;
   1.4. INSPECT WASHOUT FACILITIES DAILY TO DETECT LEAKS OR TEARS AND TO IDENTIFY WHEN MATERIALS NEED TO BE REMOVED.

ALLOWABLE NON-STORMWATER DISCHARGES:

1. FIRE-FIGHTING ACTIVITIES;
2. FIRE HYDRANT FLUSHING;
3. WATERS USED TO WASH VEHICLES WHERE DETERGENTS ARE NOT USED;
4. WATER USED TO CONTROL DUST;
5. POTABLE WATER INCLUDING UNCONTAMINATED WATER LINE FLUSHING;
6. PAVEMENT WASH WATERS WHERE DETERGENTS ARE NOT USED;
7. UNCONTAMINATED AIR CONDITIONING/COMPRESSOR CONDENSATION;
8. UNCONTAMINATED GROUND WATER OR SPRING WATER;
9. UNCONTAMINATED EXCAVATION DEWATERING;
10. LANDSCAPE IRRIGATION.

WASTE DISPOSAL:

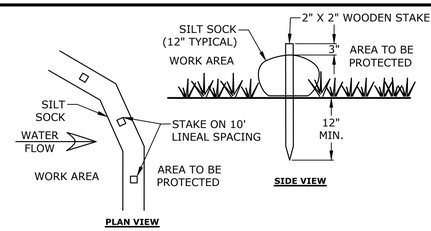
1. WASTE MATERIAL:
   1.1. ALL WASTE MATERIALS SHALL BE COLLECTED AND STORED IN SECURELY LIDDED RECEPTACLES. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE SHALL BE DEPOSITED IN A DUMPSTER;
   1.2. NO CONSTRUCTION WASTE MATERIALS SHALL BE BURIED ON SITE;
   1.3. ALL PERSONNEL SHALL BE INSTRUCTED REGARDING THE CORRECT PROCEDURE FOR WASTE DISPOSAL BY THE SUPERINTENDENT.
2. HAZARDOUS WASTE:
   2.1. ALL HAZARDOUS WASTE MATERIALS SHALL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATION OR BY THE MANUFACTURER;
   2.2. SITE PERSONNEL SHALL BE INSTRUCTED IN THESE PRACTICES BY THE SUPERINTENDENT.
3. SANITARY WASTE:
   3.1. ALL SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS A MINIMUM OF ONCE PER WEEK BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

SPILL PREVENTION:

1. CONTRACTOR SHALL BE FAMILIAR WITH SPILL PREVENTION MEASURES REQUIRED BY LOCAL, STATE AND FEDERAL AGENCIES. AT A MINIMUM, CONTRACTOR SHALL FOLLOW THE BEST MANAGEMENT SPILL PREVENTION PRACTICES OUTLINED BELOW.
2. THE FOLLOWING ARE THE MATERIAL MANAGEMENT PRACTICES THAT SHALL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES DURING CONSTRUCTION TO STORMWATER RUNOFF:
   2.1. GOOD HOUSEKEEPING - THE FOLLOWING GOOD HOUSEKEEPING PRACTICE SHALL BE FOLLOWED ON SITE DURING CONSTRUCTION:
      2.1.1. ONLY SUFFICIENT AMOUNTS OF PRODUCTS TO DO THE JOB SHALL BE STORED ON SITE;
      2.1.2. ALL REGULATED MATERIALS STORED ON SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR PROPER (ORIGINAL IF POSSIBLE) CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE, ON AN IMPERVIOUS SURFACE;
      2.1.3. MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL SHALL BE FOLLOWED;
      2.1.4. THE SITE SUPERINTENDENT SHALL INSPECT DAILY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS;
      2.1.5. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER;
      2.1.6. WHENEVER POSSIBLE ALL OF A PRODUCT SHALL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
      2.1.7. THE TRAINING OF ON-SITE EMPLOYEES AND THE ON-SITE POSTING OF RELEASE RESPONSE INFORMATION DESCRIBING WHAT TO DO IN THE EVENT OF A SPILL OF REGULATED SUBSTANCES.
3. HAZARDOUS PRODUCTS - THE FOLLOWING PRACTICES SHALL BE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS:
   3.1. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE;
   3.2. ORIGINAL LABELS AND MATERIAL SAFETY DATA SHALL BE RETAINED FOR IMPORTANT PRODUCT INFORMATION;
   3.3. SURPLUS PRODUCT THAT MUST BE DISPOSED OF SHALL BE DISCARDED ACCORDING TO THE MANUFACTURER'S RECOMMENDED METHODS OF DISPOSAL.
4. PRODUCT SPECIFIC PRACTICES - THE FOLLOWING PRODUCT SPECIFIC PRACTICES SHALL BE FOLLOWED ON SITE:
   4.1. PETROLEUM PRODUCTS:
      4.1.1. ALL ON SITE VEHICLES SHALL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE LEAKAGE;
      4.1.2. PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT BASED SUBSTANCES USED ON SITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
      4.1.3. SECURE FUEL STORAGE AREAS AGAINST UNAUTHORIZED ENTRY;
      4.1.4. INSPECT FUEL STORAGE AREAS WEEKLY;
      4.1.5. WHEREVER POSSIBLE, KEEP REGULATED CONTAINERS THAT ARE STORED OUTSIDE MORE THAN 50 FEET FROM SURFACE WATER AND STORM DRAINS, 75 FEET FROM PRIVATE WELLS, AND 400 FEET FROM PUBLIC WELLS;
      4.1.6. COVER REGULATED CONTAINERS IN OUTSIDE STORAGE AREAS;
      4.1.7. SECONDARY CONTAINMENT IS REQUIRED FOR CONTAINERS CONTAINING REGULATED SUBSTANCES STORED OUTSIDE, EXCEPT FOR ON PREMISE USE HEATING FUEL TANKS, OR ABOVEGROUND OR UNDERGROUND STORAGE TANKS OTHERWISE REGULATED.
      4.1.8. THE FUEL HANDLING REQUIREMENTS SHALL INCLUDE:
         4.1.8.1. EXCEPT WHEN IN USE, KEEP CONTAINERS CONTAINING REGULATED SUBSTANCES CLOSED AND SEALED;
         4.1.8.2. PLACE DRIP PANS UNDER SPIGOTS, VALVES, AND PUMPS;
         4.1.8.3. HAVE SPILL CONTROL AND CONTAINMENT EQUIPMENT READILY AVAILABLE IN ALL WORK AREAS;
         4.1.8.4. USE FUNNELS AND DRIP PANS WHEN TRANSFERRING REGULATED SUBSTANCES;
         4.1.8.5. PERFORM TRANSFERS OF REGULATED SUBSTANCES OVER AN IMPERVIOUS SURFACE.
      4.1.9. FUELING AND MAINTENANCE OF EXCAVATION, EARTHMOVING AND OTHER CONSTRUCTION RELATED EQUIPMENT SHALL COMPLY WITH THE REGULATIONS OF THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION.
   4.2. FERTILIZERS:
      4.2.1. FERTILIZERS USED SHALL BE APPLIED ONLY IN THE MINIMUM AMOUNTS DIRECTED BY THE SPECIFICATIONS;
      4.2.2. ONCE APPLIED FERTILIZER SHALL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORMWATER;
      4.2.3. STORAGE SHALL BE IN A COVERED SHED OR ENCLOSED TRAILERS. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER SHALL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.
   4.3. PAINTS:
      4.3.1. ALL CONTAINERS SHALL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE;
      4.3.2. EXCESS PAINT SHALL NOT BE DISCHARGED TO THE STORM SEWER SYSTEM;
      4.3.3. EXCESS PAINT SHALL BE DISPOSED OF PROPERLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.
5. SPILL CONTROL PRACTICES - IN ADDITION TO GOOD HOUSEKEEPING AND MATERIAL MANAGEMENT PRACTICES DISCUSSED IN THE PREVIOUS SECTION, THE FOLLOWING PRACTICES SHALL BE FOLLOWED FOR SPILL PREVENTION AND CLEANUP:
   5.1. MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE CLEARLY POSTED AND SITE PERSONNEL SHALL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES;
   5.2. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP SHALL BE KEPT IN THE MATERIAL STORAGE AREA ON SITE. EQUIPMENT AND MATERIALS SHALL INCLUDE BUT NOT BE LIMITED TO BROOMS, DUSTPANS, MOPS, RAGS, GLOVES, GOGGLES, KITTY LITTER, SAND, SAWDUST AND PLASTIC OR METAL TRASH CONTAINERS SPECIFICALLY FOR THIS PURPOSE;
   5.3. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY;
   5.4. THE SPILL AREA SHALL BE KEPT WELL VENTILATED AND PERSONNEL SHALL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE;
   5.5. SPILLS OF TOXIC OR HAZARDOUS MATERIAL SHALL BE REPORTED TO THE APPROPRIATE LOCAL, STATE OR FEDERAL AGENCIES AS REQUIRED;
   5.6. THE SITE SUPERINTENDENT RESPONSIBLE FOR DAY-TO-DAY SITE OPERATIONS SHALL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR.
6. VEHICLE FUELING AND MAINTENANCE PRACTICE:
   6.1. CONTRACTOR SHALL MAKE AN EFFORT TO PERFORM EQUIPTMENT/VEHICAL FUELING AND MAINTENANCE AT AN OFF-SITE FACILITY;
   6.2. CONTRACTOR SHALL PROVIDE AN ON-SITE FUELING AND MAINTENANCE AREA THAT IS CLEAN AND DRY;
   6.3. IF POSSIBLE THE CONTRACTOR SHALL KEEP AREA COVERED;
   6.4. CONTRACTOR SHALL KEEP A SPILL KIT AT THE FUELING AND MAINTENANCE AREA;
   6.5. CONTRACTOR SHALL REGULARLY INSPECT VEHICLES FOR LEAKS AND DAMAGE;
   6.6. CONTRACTOR SHALL USE DRIP PANS, DRIP CLOTHS, OR ABSORBENT PADS WHEN REPLACING SPENT FLUID.

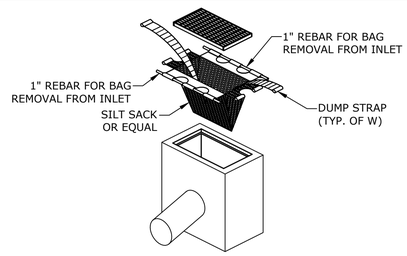
EROSION CONTROL OBSERVATIONS AND MAINTENANCE PRACTICES

1. THIS PROJECT EXCEEDS ONE (1) ACRE OF DISTURBANCE AND THUS REQUIRES A SWPPP. THE SWPPP SHALL BE PREPARED BY THE ENGINEER CONTRACTOR. THE CONTRACTOR SHALL BE FAMILIAR WITH THE SWPPP AND KEEP AN UPDATED COPY OF THE SWPPP ONSITE AT ALL TIMES.
2. THE FOLLOWING REPRESENTS THE GENERAL OBSERVATION AND REPORTING PRACTICES THAT SHALL BE FOLLOWED AS PART OF THIS PROJECT
   2.1. OBSERVATIONS OF THE PROJECT FOR COMPLIANCE WITH THE SWPPP SHALL BE MADE BY THE CONTRACTOR AT LEAST ONCE A WEEK OR WITHIN 24 HOURS OF A STORM 0.25 INCHES OR GREATER;
   2.2. AN OBSERVATION REPORT SHALL BE MADE AFTER EACH OBSERVATION AND DISTRIBUTED TO THE ENGINEER, THE OWNER, AND THE CONTRACTOR;
   2.3. A REPRESENTATIVE OF THE SITE CONTRACTOR, SHALL BE RESPONSIBLE FOR MAINTENANCE AND REPAIR ACTIVITIES;
   2.4. IF A REPAIR IS NECESSARY, IT SHALL BE INITIATED WITHIN 24 HOURS OF REPORT.

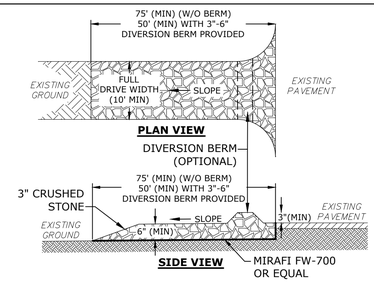


NOTES:
1. SILT SOCK SHALL BE SILT SOXX BY FILTREXX OR APPROVED EQUAL
2. INSTALL SILT SOCK IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS

SILT SOCK
NO SCALE

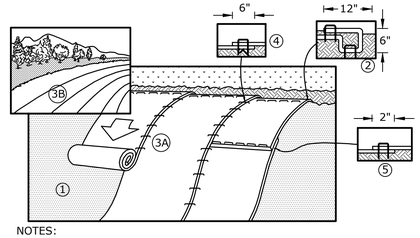


SILT SACK
NO SCALE



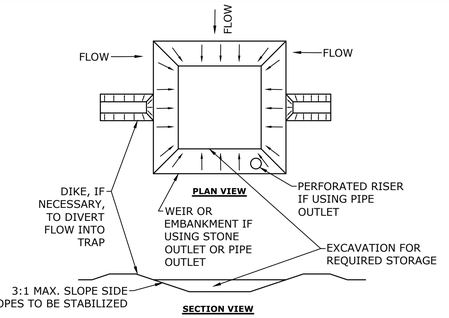
NOTE:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT FROM THE SITE. WHEN WASHING IS REQUIRED, IT SHALL BE DONE SO RUNOFF DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING STORM DRAINS, DITCHES, OR WATERWAYS

STABILIZED CONSTRUCTION EXIT
NO SCALE



NOTES:
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE, 36" OVER THE GRADE BREAK, BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF TAPLES/STAKES 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS DOWN THE SLOPE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAPLE PATTERN GUIDE.
4. STAPLE LENGTHS SHALL BE A MINIMUM OF 8 INCHES.

EROSION CONTROL BLANKET FOR SLOPE PROTECTION
NO SCALE



NOTES:
1. THE TRAP SHALL BE INSTALLED AS CLOSE TO THE DISTURBED AREA AS POSSIBLE.
2. THE MAXIMUM CONTRIBUTING AREA TO A SINGLE TRAP SHALL BE LESS THAN 5 ACRES.
3. THE MINIMUM VOLUME OF THE TRAP SHALL BE 3,600 CUBIC FEET OF STORAGE FOR EACH ACRE OF DRAINAGE AREA.
4. TRAP OUTLET SHALL BE MINIMUM OF ONE FOOT BELOW THE CREST OF THE TRAP.
5. TRAP SHALL DISCHARGE TO A STABILIZED AREA.
6. TRAP SHALL BE CLEANED WHEN 50 PERCENT OF THE ORIGINAL VOLUME IS FILLED.
7. MATERIALS REMOVED FROM THE TRAP SHALL BE PROPERLY DISPOSED OF AND STABILIZED.
8. SEDIMENT TRAPS MUST BE USED AS NEEDED TO CONTAIN RUNOFF UNTIL SOILS ARE STABILIZED.

SEDIMENT TRAP
NO SCALE

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRADLEE M. COLOMA
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55625
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

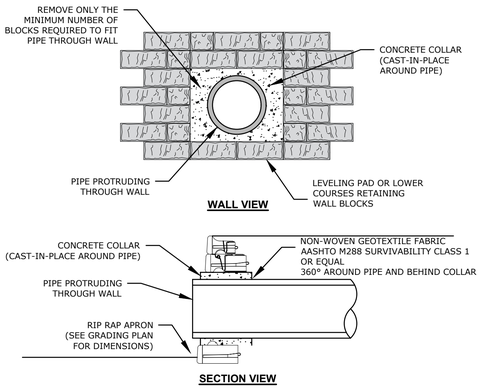
PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DETAILS.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

EROSION CONTROL NOTES AND DETAILS SHEET

SCALE: AS SHOWN

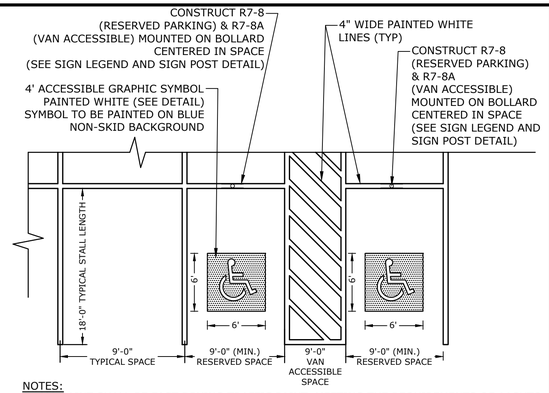
C-501

Last Save Date: September 2, 2020 9:58 AM By: CML
Date Plotted: September 2, 2020 9:58 AM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Details.dwg Layout Tab: C-501



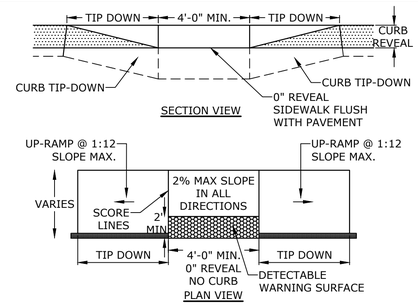
NOTES:
1. THIS DETAIL IS FOR REFERENCE PURPOSES ONLY FINAL PIPE THROUGH WALL DETAIL SHALL BE PROVIDED WITH RETAINING WALL DESIGN

TYPICAL PIPE THROUGH RETAINING WALL DETAIL
NO SCALE



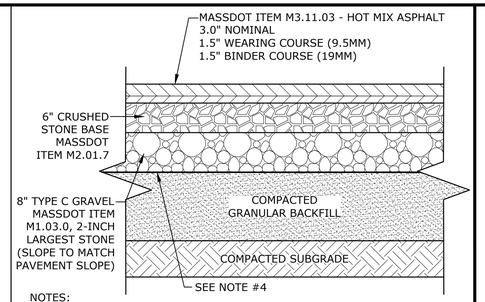
NOTES:
1. ALL PAINT SHALL BE FAST DRYING TRAFFIC PAINT, MEETING THE REQUIREMENTS OF AASHTO M248-TYPE F. PAINT SHALL BE APPLIED AS SPECIFIED BY MANUFACTURER.
2. SYMBOLS & PARKING STALLS SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT AND LOCAL AND STATE REQUIREMENTS.
3. FINISH PAVEMENT GRADES AT ALL HANDICAP ACCESSIBLE STALLS AND PAINTED ACCESS AISLES SHALL NOT EXCEED 2% IN ANY DIRECTION.

STALL STRIPING - SINGLE STRIPE
NO SCALE



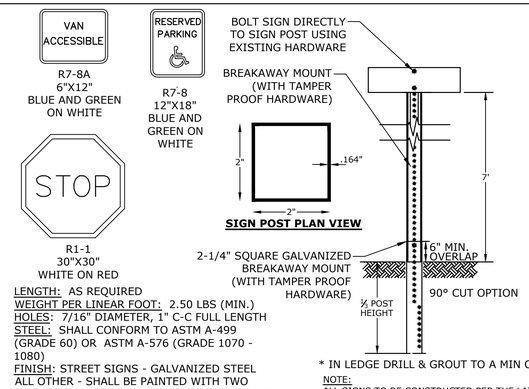
NOTES:
1. RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT AND LOCAL AND STATE REQUIREMENTS.
2. AN 8" COMPACTED BANK GRAVEL BASE SHALL BE PROVIDED BENEATH RAMPS.
3. DETECTABLE WARNING PANEL SHALL BE ADA SOLUTIONS, INC. OR EQUAL, INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. (CONTRACTOR SHALL COORDINATE WITH OWNER FOR WARNING PANEL MATERIAL AND COLOR.)

CONCRETE WHEELCHAIR ACCESSIBLE RAMP
NO SCALE



NOTES:
1. SEE SITE PLAN FOR PAVEMENT WIDTH AND LOCATION.
2. SEE GRADING, DRAINAGE AND EROSION CONTROL PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.
3. A TACK COAT SHALL BE PLACED ON TOP OF BINDER COURSE PAVEMENT PRIOR TO PLACING WEARING COURSE.
4. A GEOSYNTHETIC REINFORCEMENT, SUCH AS MIRAFI RSI SERIES, TENSAR TRIAX TR SERIES, OR SIMILAR, SHOULD BE USED TO IMPROVE DISTRIBUTION OF THE EXPECTED VEHICULAR LOADS, IN PAVED AREAS OF THE SITE WHERE GRADES ARE NOT EXPECTED TO BE RAISED BY MORE THAN 18 INCHES, IF UNSUITABLE SOILS ARE ENCOUNTERED AT THE PROPOSED PAVEMENT SUBGRADE.
5. CRUSHED STONE BASE CAN BE REDUCED TO 4-INCHES THICK AND GRAVEL SUB BASE CAN BE REDUCED TO 6-INCHES THICK WITH USE OF MIRAFI RSI SERIES, TENSAR TRIAX TR SERIES, OR EQUAL, BELOW SUBGRADE.

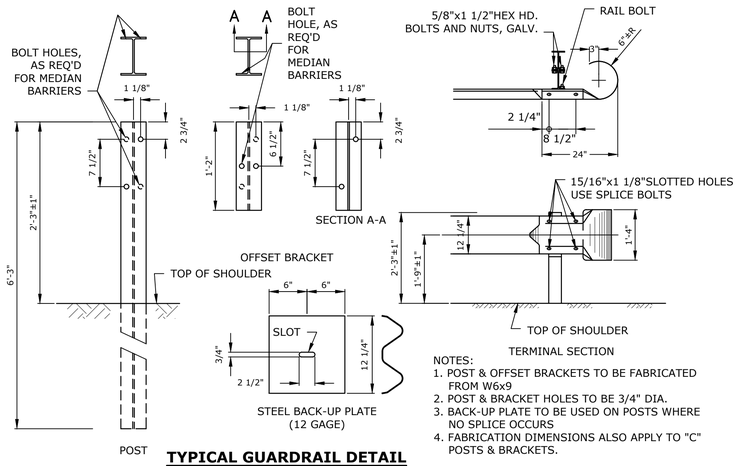
PARKING LOT PAVEMENT SECTION
NO SCALE



LENGTH: AS REQUIRED
WEIGHT PER LINEAR FOOT: 2.50 LBS (MIN.)
HOLES: 7/16" DIAMETER, 1" C-C FULL LENGTH
STEEL: SHALL CONFORM TO ASTM A-499 (GRADE 60) OR ASTM A-576 (GRADE 1070 - 1080)
FINISH: STREET SIGNS - GALVANIZED STEEL ALL OTHER - SHALL BE PAINTED WITH TWO COATS OF AN APPROVED MEDIUM GREEN BAKED ON OR DRIED, PAINT OF WEATHER RESISTANT QUALITY. ALL FABRICATION SHALL BE COMPLETE BEFORE PAINTING.

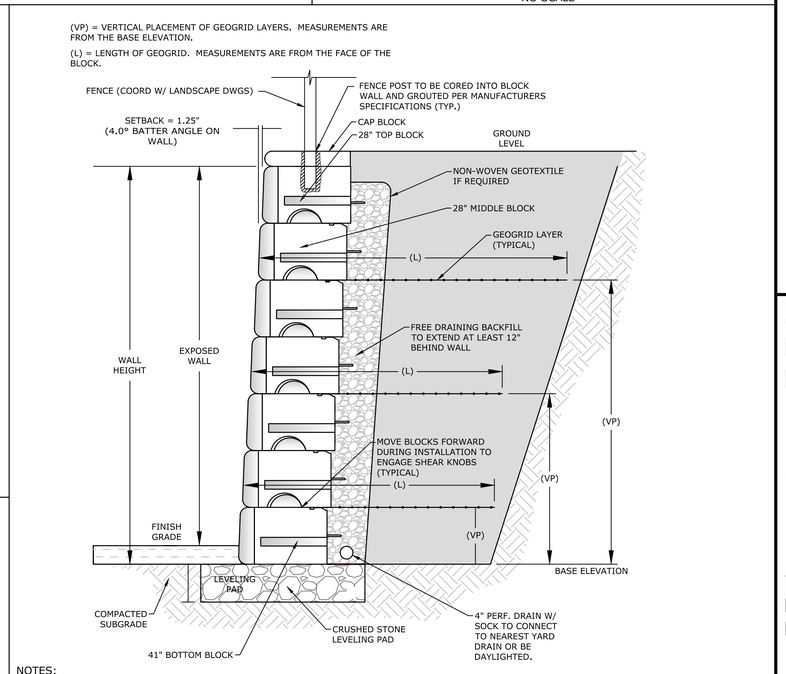
NOTE:
ALL SIGNS TO BE CONSTRUCTED PER THE LATEST EDITION OF THE FHWA STANDARD HIGHWAY SIGNS MANUAL AND INSTALLED AS INDICATED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.

SIGN LEGEND & SIGN POST
NO SCALE



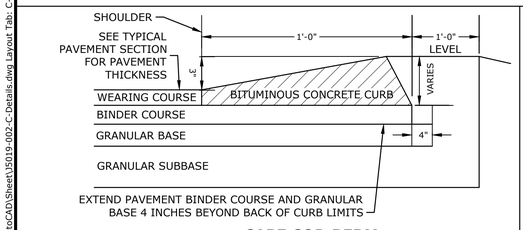
NOTES:
1. POST & OFFSET BRACKETS TO BE FABRICATED FROM W6x9
2. POST & BRACKET HOLES TO BE 3/4" DIA.
3. BACK-UP PLATE TO BE USED ON POSTS WHERE NO SPLICE OCCURS
4. FABRICATION DIMENSIONS ALSO APPLY TO "C" POSTS & BRACKETS.

TYPICAL GUARDRAIL DETAIL
NO SCALE

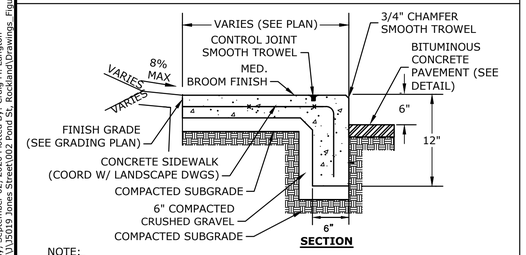


NOTES:
1. RETAINING WALL SHALL BE REDI ROCK OR APPROVED EQUAL.
2. THE CONTRACTOR SHALL SUBMIT DESIGN AND CALCULATIONS FOR THE RETAINING WALL THAT SHALL BE STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF MASSACHUSETTS. CALCULATIONS SHALL INCLUDE A GLOBAL STABILITY ANALYSIS.
3. MINIMUM DESIGN PARARMETERS:
   - GLOBAL STABILITY FACTOR OF SAFETY = 1.3
   - OVERTURNING FACTOR OF SAFETY = 2.0
   - SLIDING FACTOR OF SAFETY = 1.5
   - GEOGRID PULLOUT FACTOR OF SAFETY = 1.5
   - SEISMIC FACTOR OF SAFETY = 1.1
4. WALL DESIGNS SHALL CONSIDER EFFECTS OF SLOPE, TRAFFIC LOADS, BUILDING LOADS, GUARDRAIL AND/OR FENCING AS REQUIRED.
5. WALL DESIGN ENGINEER SHALL CONSIDER HEIGHT AND SPECIFY SAFETY RAIL WHERE REQUIRED
6. ALL INSTALLATION PROCEDURES SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION MANUAL AND THE WALL DESIGN ENGINEER'S DESIGN PLANS AND SPECIFICATIONS.
7. THE WALL DESIGN ENGINEER SHALL COMPLETE SUFFICIENT INSPECTIONS DURING CONSTRUCTION TO CERTIFY WORK IS COMPLETED IN ACCORDANCE WITH DESIGN.
8. CONTRACTOR SHALL DIRECT SURFACE RUNOFF AWAY FROM THE WALL DURING CONSTRUCTION.
9. ANY SURFACE DRAINAGE FEATURES, FINISH GRADING, PAVEMENT OR OTHER SURFACE TREATMENT SHALL BE INSTALLED IN THE AREA OF THE WALL IMMEDIATELY AFTER THE WALL IS COMPLETE OR OTHER MEASURES SHALL BE TAKEN TO PROTECT THE WALL FROM RUNOFF.
10. CONTRACTOR SHALL SUPPLY SAMPLE TO THE OWNER FOR APPROVAL PRIOR TO WALL CONSTRUCTION.
11. FINAL DESIGN PLANS OF WALL SHOWING FENCING, GUARDRAIL ETC. SHALL BE SUBMITTED WITH THE FINAL DESIGN PLANS.
12. RETAINING WALL DESIGN SHALL BE FROM THE WALL MANUFACTURER AND SHALL INCLUDE A GLOBAL STABILITY ANALYSIS.
13. FINAL STRUCTURAL DESIGN TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL WILL ALL CALCULATIONS AND PLANS.
14. STRUCTURAL DESIGN TO BE COMPLETED AND STAMPED BY A MASSACHUSETTS LICENSED STRUCTURAL ENGINEER. DESIGN ENGINEER SHALL INSPECT WALL DURING CONSTRUCTION AND CERTIFY THAT IT HAS BEEN INSTALLED IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS SUBMITTED AS PART OF THE BUILDING PERMIT.
15. AN AS-BUILT PLAN SHOWING WALL LOCATION AND DIMENSIONS SHALL BE SUBMITTED TO THE OWNER UPON COMPLETION.

TYPICAL RETAINING WALL
NOT TO SCALE

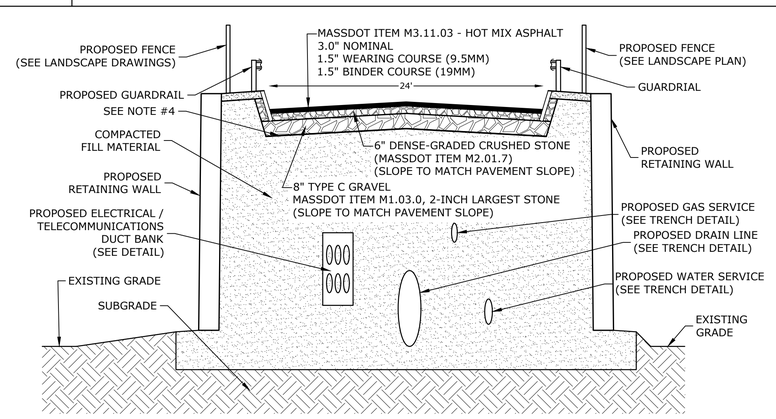


CAPE COD BERM
NO SCALE



NOTE:
1. SIDEWALK DESIGN SHALL BE COORDINATED WITH THE LANDSCAPE DRAWINGS.
2. SIDEWALKS SHALL HAVE 2% MAX CROSS SLOPE

CONCRETE SIDEWALK WITH MONOLITHIC CURB
NOT TO SCALE



NOTES:
1. SEE SITE PLAN FOR PAVEMENT WIDTH AND LOCATION.
2. SEE GRADING, DRAINAGE AND EROSION CONTROL PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.
3. A TACK COAT SHALL BE PLACED ON TOP OF BINDER COURSE PAVEMENT PRIOR TO PLACING WEARING COURSE.
4. A GEOSYNTHETIC REINFORCEMENT, SUCH AS MIRAFI RSI SERIES, TENSAR TRIAX TR SERIES, OR SIMILAR, SHOULD BE USED TO IMPROVE DISTRIBUTION OF THE EXPECTED VEHICULAR LOADS, IN PAVED AREAS OF THE SITE WHERE GRADES ARE NOT EXPECTED TO BE RAISED BY MORE THAN 18 INCHES, IF UNSUITABLE SOILS ARE ENCOUNTERED AT THE PROPOSED PAVEMENT SUBGRADE.
5. CRUSHED STONE BASE CAN BE REDUCED TO 4-INCHES THICK AND GRAVEL SUB BASE CAN BE REDUCED TO 6-INCHES THICK WITH USE OF MIRAFI RSI SERIES, TENSAR TRIAX TR SERIES, OR EQUAL, BELOW SUBGRADE.

TYPICAL DRIVEWAY PAVEMENT SECTION
NOT TO SCALE

Tighe&Bond

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
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DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEET

SCALE: AS SHOWN

C-502

Last Save Date: September 2, 2020 9:58 AM By: CML
Plot Date: September 2, 2020 9:58 AM By: Craig M. Langton
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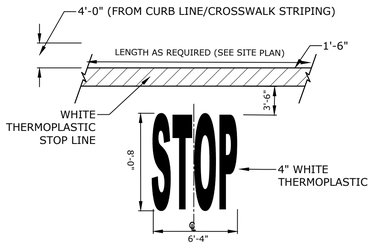
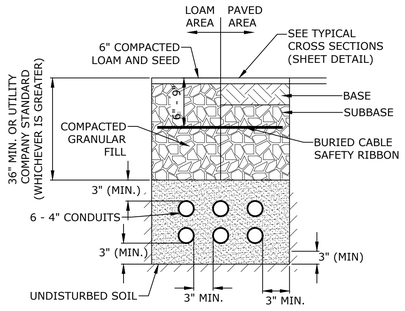


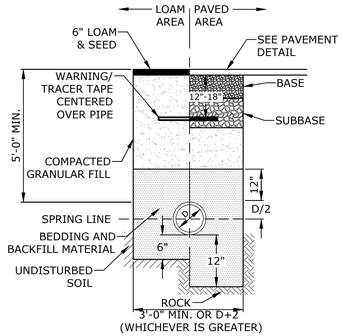
NOTES:
1. PAVEMENT MARKINGS TO BE INSTALLED IN LOCATIONS AS SHOWN ON SITE PLAN.
2. STRIPING SHALL BE CONSTRUCTED USING WHITE THERMO PLASTIC, REFLECTERIZED PAVEMENT MARKING MATERIAL MEETING THE REQUIREMENTS OF ASTM D 4505.

STOP BAR AND LEGEND
NO SCALE



TYPICAL ELECTRICAL AND COMMUNICATION CONDUIT
NO SCALE

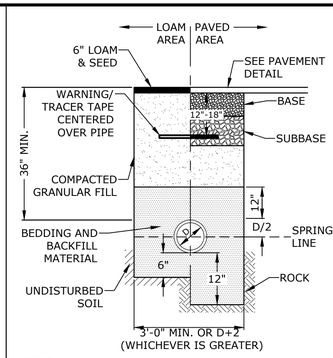
NOTE:
1. NUMBER, MATERIAL, AND SIZE OF UTILITY CONDUITS TO BE DETERMINED BY LOCAL UTILITY.
2. DIMENSIONS SHOWN REPRESENT OWNERS MINIMUM REQUIREMENTS. ACTUAL DIMENSIONS MAY BE GREATER BASED ON UTILITY COMPANY STANDARDS, BUT SHALL NOT BE LESS THAN THOSE SHOWN.
3. NO CONDUIT RUN SHALL EXCEED 360 DEGREES IN TOTAL BENDS.
4. A SUITABLE PULLING STRING, CAPABLE OF 200 POUNDS OF PULL, MUST BE INSTALLED IN THE CONDUIT BEFORE UTILITY COMPANY IS NOTIFIED TO INSTALL CABLE. THE STRING SHOULD BE BLOWN INTO THE CONDUIT AFTER THE RUN IS ASSEMBLED TO AVOID BONDING THE STRING TO THE CONDUIT.
5. UTILITY COMPANY MUST BE GIVEN THE OPPORTUNITY TO INSPECT THE CONDUIT PRIOR TO BACKFILL. THE CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS SHOULD THE UTILITY COMPANY BE UNABLE TO INSTALL ITS CABLE IN A SUITABLE MANNER.
6. ALL CONDUIT INSTALLATIONS MUST CONFORM TO THE CURRENT EDITION OF THE NATIONAL ELECTRIC SAFETY CODE, STATE AND LOCAL CODES AND ORDINANCES, AND, WHERE APPLICABLE, THE NATIONAL ELECTRIC CODE.
7. ALL 90º SWEEPS WILL BE MADE USING RIGID GALVANIZED STEEL. SWEEPS WITH A 36 TO 48 INCH RADIUS.



(WHICHEVER IS GREATER)

NOTES:
1. SAND BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.
2. WATER MAIN SHALL BE INSTALLED PER TOWN OF ROCKLAND STANDARD.

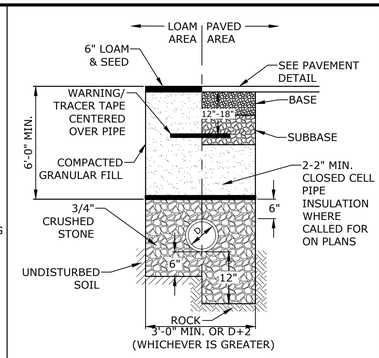
WATER TRENCH
NO SCALE



(WHICHEVER IS GREATER)

NOTE:
1. SAND BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.
2. GAS SHALL BE INSTALLED PER NATIONAL GRID STANDARDS. COORDINATE ALL INSTALLATIONS WITH NATIONAL GRID AND THE TOWN OF ROCKLAND.

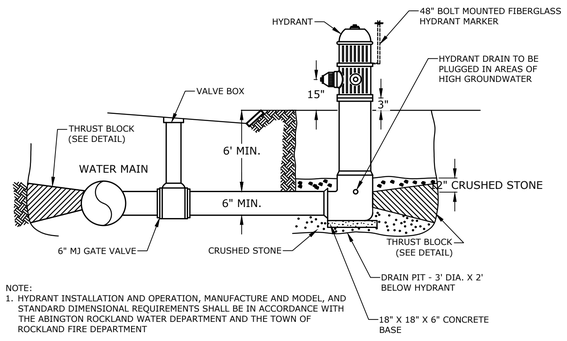
GAS TRENCH
NO SCALE



(WHICHEVER IS GREATER)

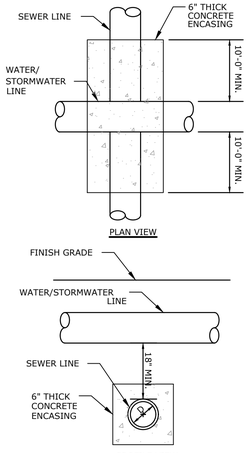
NOTE:
1. CRUSHED STONE BEDDING FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK. CRUSHED STONE SHALL ALSO COMPLETELY ENCASE THE PIPE AND COVER THE PIPE TO A GRADE 6" OVER THE TOP OF THE PIPE FOR THE ENTIRE WIDTH OF THE TRENCH.
2. COORDINATE ALL INSTALLATIONS WITH THE TOWN OF ROCKLAND.

SEWER SERVICE TRENCH
NO SCALE



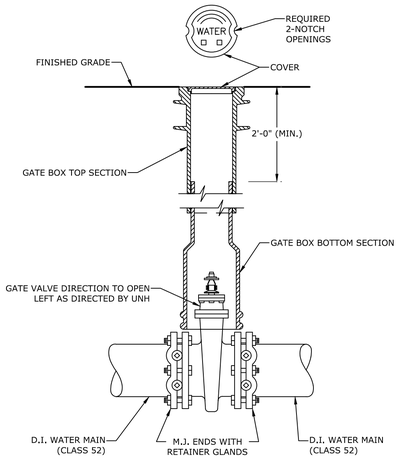
NOTE:
1. HYDRANT INSTALLATION AND OPERATION, MANUFACTURE AND MODEL, AND STANDARD DIMENSIONAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE ABINGTON ROCKLAND WATER DEPARTMENT AND THE TOWN OF ROCKLAND FIRE DEPARTMENT

TYPICAL FIRE HYDRANT
NO SCALE

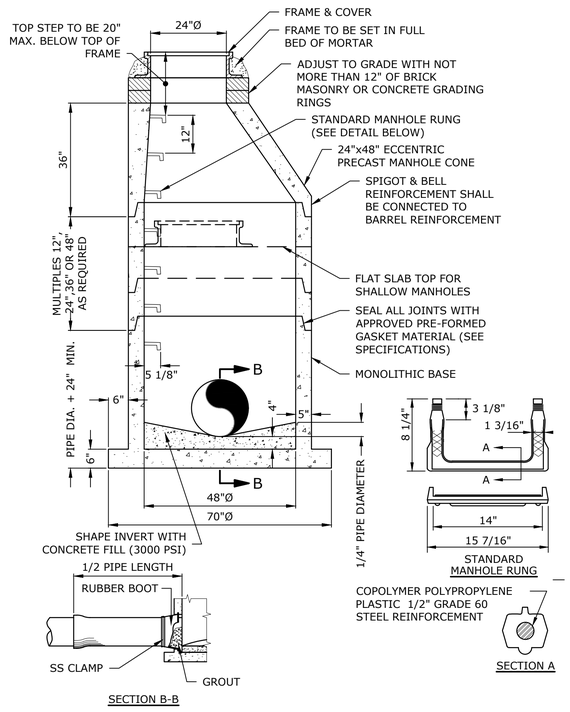


NOTE:
1. A 10 FOOT MINIMUM EDGE TO EDGE HORIZONTAL SEPERATION SHALL BE PROVIDED BETWEEN ALL WATER/STORMAWTER AND SANITARY SEWER LINES. AN 18" MINIMUM OUTSIDE TO OUTSIDE VERTICAL SEPARATION SHALL BE PROVIDED AT ALL WATER/STORMWATER AND SANITARY SEWER CROSSINGS. WHERE SEWER AND WATER CROSS, ENCASE SEWER IN CONCRETE 6" THICK OR SUBSTITUTE RUBBER GASKETED PRESSURE PIPE WITH JOINTS FOR A MINIMUM DISTANCE OF 10 FEET EACH SIDE OF THE CROSSING. CROSSING SHALL CONFORM TO TOWN OF ROCKLAND WATER DEPARTMENT STANDARDS AND SPECIFICATIONS.

WATER & SEWER CROSSING
NOT TO SCALE

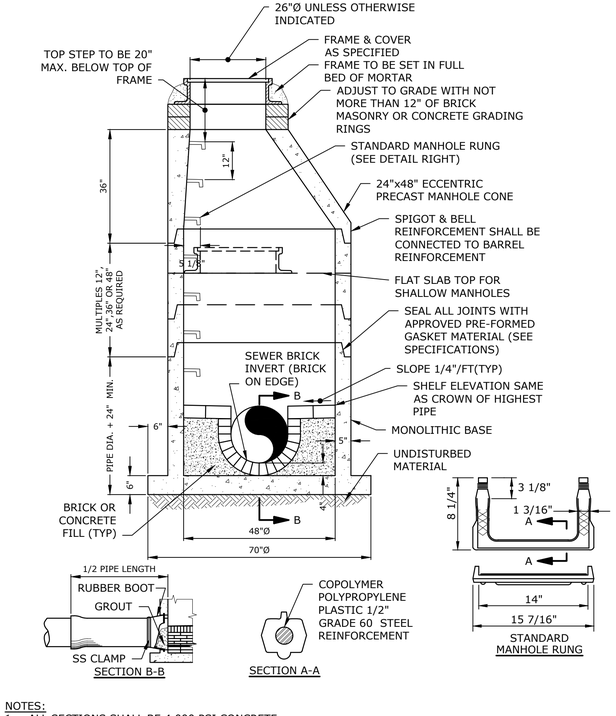


WATER GATE VALVE
NO SCALE



NOTES:
1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE.
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE AND THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. CONSTRUCT CRUSHED STONE BEDDING AND BACKFILL UNDER (6" MINIMUM THICKNESS)
6. THE TONGUE AND GROOVE JOINT SHALL BE SEALED WITH ONE STRIP OF BUTYL RUBBER SEALANT.
7. PIPE ELEVATIONS SHOWN ON PLANS SHALL BE FIELD VERIFIED PRIOR TO PRECASTING.
8. OUTSIDE EDGES OF PIPES SHALL PROJECT NO MORE THAN 3" BEYOND INSIDE WALL OF STRUCTURE.
9. PRECAST SECTIONS SHALL HAVE A TONGUE AND GROOVE JOINT 4" HIGH AT AN 11º ANGLE CENTERED IN THE WIDTH OF THE WALL AND SHALL BE ASSEMBLED USING AN APPROVED FLEXIBLE SEALANT IN JOINTS.
10. ALL STRUCTURES WITH MULTIPLE PIPES SHALL HAVE A MINIMUM OF 12" OF INSIDE SURFACE BETWEEN HOLES, NO MORE THAN 75% OF A HORIZNTAL CROSS SECTION SHALL BE HOLES, AND THERE SHALL BE NO HOLES CLOSER THAN 3" TO JOINTS.

48" PRECAST DRAIN MANHOLE
NO SCALE



NOTES:
1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE.
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE AND THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. CONSTRUCT CRUSHED STONE BEDDING AND BACKFILL UNDER (6" MINIMUM THICKNESS)
6. THE TONGUE AND GROOVE JOINT SHALL BE SEALED WITH ONE STRIP OF BUTYL RUBBER SEALANT.
7. PIPE ELEVATIONS SHOWN ON PLANS SHALL BE FIELD VERIFIED PRIOR TO PRECASTING.
8. OUTSIDE EDGES OF PIPES SHALL PROJECT NO MORE THAN 3" BEYOND INSIDE WALL OF STRUCTURE.
9. PRECAST SECTIONS SHALL HAVE A TONGUE AND GROOVE JOINT 4" HIGH AT AN 11º ANGLE CENTERED IN THE WIDTH OF THE WALL AND SHALL BE ASSEMBLED USING AN APPROVED FLEXIBLE SEALANT IN JOINTS.
10. ALL STRUCTURES WITH MULTIPLE PIPES SHALL HAVE A MINIMUM OF 12" OF INSIDE SURFACE BETWEEN HOLES, NO MORE THAN 75% OF A HORIZNTAL CROSS SECTION SHALL BE HOLES, AND THERE SHALL BE NO HOLES CLOSER THAN 3" TO JOINTS.

48" PRECAST SANITARY SEWER MANHOLE
NO SCALE

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS BRANDEE M. CORMIER No. 52448 REGISTERED PROFESSIONAL ENGINEER 9.2.20

COMMONWEALTH OF MASSACHUSETTS PATRICK CRIMMINS PE Civil No. 55629 REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

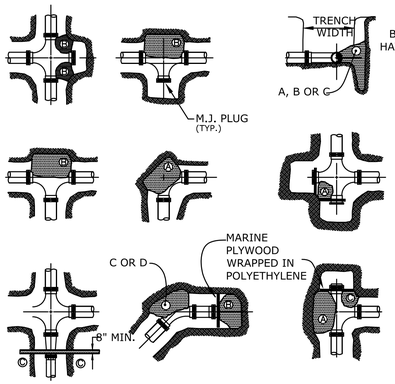
PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DETAILS.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEET

SCALE: AS SHOWN

C-503

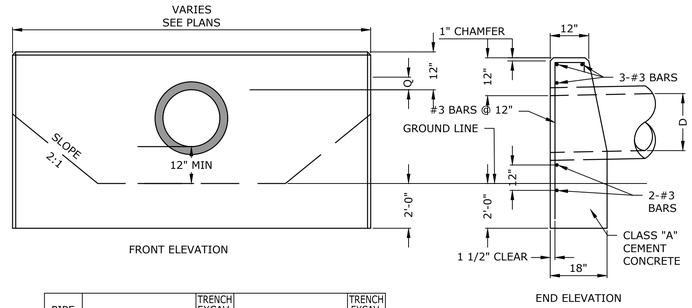
Last Save Date: September 2, 2020 9:58 AM By: CML
Plot Date/Time: Wednesday, September 02, 2020 9:58:29 AM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Details.dwg Layout Tab: C-503



TEST PRESSURE = 200psi	SQUARE FEET OF CONCRETE THRUST BLOCKING BEARING ON UNDISTURBED MATERIAL					
	REACTION TYPE	PIPE SIZE				
		6"	8"	10"	12"	16"
	A 90°	2.19	3.82	11.14	17.24	22.42
	B 180°	1.55	2.78	8.38	12.00	17.00
	C 45°	1.19	2.12	6.02	9.32	12.13
	D 22-1/2°	0.60	1.06	3.08	4.74	6.19
	E 11-1/4°	0.30	0.54	1.54	2.38	3.11

NOTES:
1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL, WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL. NO JOINTS SHALL BE COVERED WITH CONCRETE.
2. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
3. PLACE BOARD IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCKS.
4. WHERE M.J. PIPE IS USED, M.J. PLUG WITH RETAINER GLAND MAY BE SUBSTITUTED FOR END BLOCKINGS.
5. INSTALLATION AND STANDARD DIMENSIONAL REQUIREMENTS SHALL BE PER ROCKLAND WATER DEPARTMENT STANDARDS.

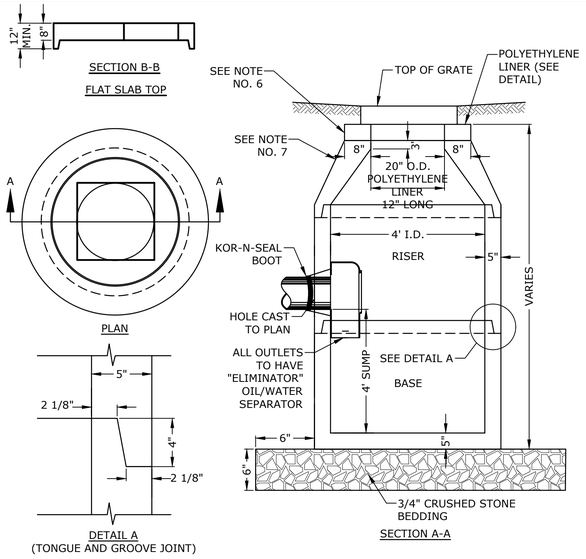
THRUST BLOCKING DETAIL
NOT TO SCALE



PIPE DIAM.	1 1/2:1 SLOPE			TRENCH EXCAV. 1'-0" DEPTH	2:1 SLOPE			TRENCH EXCAV. 1'-0" DEPTH
D	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	CU. FT.	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	CU. FT.
8"	4'-2"	0.77	15	21.60	5'-10"	1.08	21	27.40
10"	4'-10"	0.92	20	23.91	6'-8"	1.28	23	30.35
12"	5'-6"	1.08	21	26.25	7'-6"	1.49	29	33.25
15"	6'-6"	1.34	24	29.75	8'-9"	1.82	32	37.63
18"	7'-6"	1.61	30	33.25	10'-0"	2.18	39	42.00
21"	8'-6"	1.95	34	37.35	11'-6"	2.62	43	47.25
24"	9'-3"	2.16	35	39.38	12'-6"	2.97	50	50.75
30"	10'-6"	2.63	44	43.75	15'-0"	3.86	62	59.50
Q	4" FOR 1 1/2:1 SLOPE				6" FOR 2:1 SLOPE			

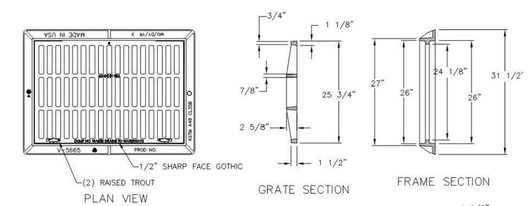
NOTES:
1. PORTLAND CEMENT CONCRETE SHALL BE 3000 PSI, 1 1/2" MAX AGGREGATE.
2. STEEL REINFORCEMENT SHALL CONFORM TO AASHTO M-31, GRADE 400.
3. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
4. FOR ADDITIONAL DETAILS SEE MHD 206.4.0

TYPICAL HEADWALL DETAIL
NO SCALE

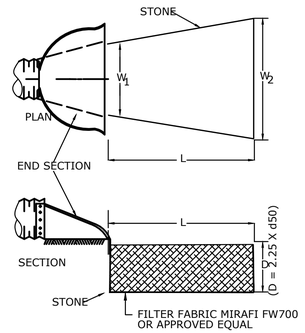


NOTES:
1. ALL SECTIONS SHALL BE CONCRETE CLASS AA(4000 psi).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQ.IN. PER LINEAR FT. IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE AND GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ. IN. PER LINEAR FT.
4. RISERS OF 1', 2', 3' & 4' CAN BE USED TO REACH DESIRED DEPTH.
5. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
6. FITTING FRAME TO GRADE MAY BE DONE WITH PREFABRICATED ADJUSTMENT RINGS OR CLAY BRICKS (2 COURSES MAX.).
7. CONE SECTIONS MAY BE EITHER CONCENTRIC OR ECCENTRIC, OR FLAT SLAB TOPS MAY BE USED WHERE PIPE WOULD OTHERWISE ENTER INTO THE CONE SECTION OF THE STRUCTURE AND WHERE PERMITTED.
8. PIPE ELEVATIONS SHOWN ON PLANS SHALL BE FIELD VERIFIED PRIOR TO PRECASTING.
9. OUTSIDE EDGES OF PIPES SHALL PROJECT NO MORE THAN 3" BEYOND INSIDE WALL OF STRUCTURE.
10. PRECAST SECTIONS SHALL HAVE A TONGUE AND GROOVE JOINT 4" HIGH AT AN 11° ANGLE CENTERED IN THE WIDTH OF THE WALL AND SHALL BE ASSEMBLED USING AN APPROVED FLEXIBLE SEALANT IN JOINTS.
11. THE TONGUE AND GROOVE JOINT SHALL BE SEALED WITH ONE STRIP OF BUTYL RUBBER SEALANT.
12. "ELIMINATOR" OIL/WATER SEPARATOR SHALL BE INSTALLED TIGHT TO INSIDE OF CATCHBASIN.

4' DIAMETER CATCHBASIN
NO SCALE

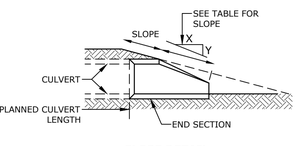


TYPICAL DOUBLE CATCH BASIN FRAME & GRATE DETAIL
NO SCALE



NOTES:
1. STONE SHALL CONSIST OF SUB-ANGULAR FIELD STONE OR ROUGH UNHEWN QUARRY STONE OF APPROXIMATELY RECTANGULAR SHAPE. FLAT OR ROUND ROCKS ARE NOT ACCEPTABLE. THE STONE SHALL BE HARD AND OF SUCH QUALITY THAT IT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING, BE CHEMICALLY STABLE AND IT SHALL BE SUITABLE IN ALL OTHER RESPECTS FOR THE PURPOSE INTENDED. THE BULK SPECIFIC GRAVITY (SATURATED SURFACE-DRY BASIS) OF THE INDIVIDUAL STONES SHALL BE AT LEAST 2.5.
2. RIP RAP STONE SHALL MEET THE REQUIREMENTS OF MASSDOT ITEM M2.02.3.

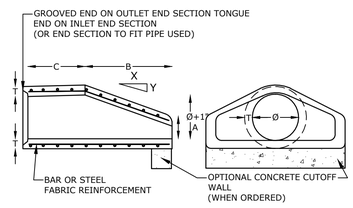
RIP-RAP APRON
NO SCALE

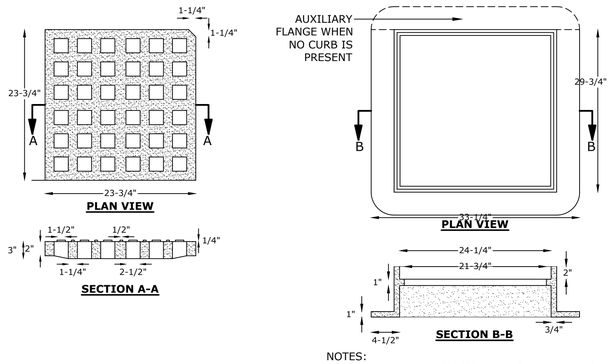


NOTES:
1. DESIGN OF END SECTION SHALL CONFORM TO STANDARD REINFORCED CONCRETE PIPE.
2. CUT OFF WALL TO BE POURED IN FIELD, IF NECESSARY, AS DIRECTED BY THE ENGINEER.

CONCRETE END SECTION
NOT TO SCALE

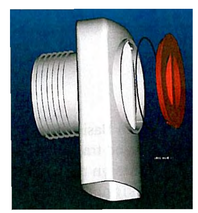
PIPE Ø	APPROX. SLOPE X to Y	A	B	C	D	R	T
12"	3 to 1	4"	24"	48-7/8"	24"	9"	2"
15"	3 to 1	6"	27"	46"	30"	11"	2-1/4"
18"	3 to 1	9"	27"	46"	36"	12"	2-1/2"
24"	3 to 1	9-1/2"	43-1/2"	30"	48"	14"	3"
30"	3 to 1	12"	54"	19-3/4"	60"	15"	3-1/2"
36"	3 to 1	15"	63"	33"	72"	20"	4"
42"	3 to 1	21"	63"	33"	78"	22"	4-1/2"
48"	3 to 1	24"	72"	24"	84"	22"	5"





NOTES:
1. MINIMUM WEIGHT OF GRATE AND FRAME - 480lbs.

CATCHBASIN FRAME & GRATE
NO SCALE



NOTES:
1. ALL CATCH BASIN OUTLETS TO HAVE "ELIMINATOR" OIL AND FLOATING DEBRIS TRAP MANUFACTURED BY KLEANSTREAM (NO EQUAL)
2. INSTALL DEBRIS TRAP TIGHT TO INSIDE OF STRUCTURE.
3. 1/4" HOLE SHALL BE DRILLED IN TOP OF DEBRIS TRAP

"ELIMINATOR" OIL FLOATING DEBRIS TRAP

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS BRADLEE M. COLVIN CIVIL No. 42446 REGISTERED PROFESSIONAL ENGINEER 9.2.20

COMMONWEALTH OF MASSACHUSETTS PATRICK CRIMMINS PE Civil No. 55629 REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
B	9/4/2020	Supplemental Comprehensive Permit
A	7/13/2020	Submitted for Comprehensive Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-DETAILS.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEET

SCALE: AS SHOWN

C-504

Last Save Date: September 2, 2020 9:58 AM By: CML
Plot Date: Wednesday, September 2, 2020 10:20 AM By: Craig M. Langton
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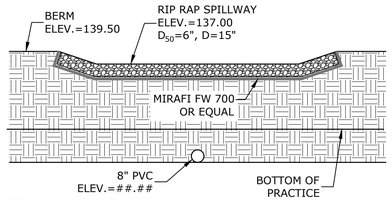
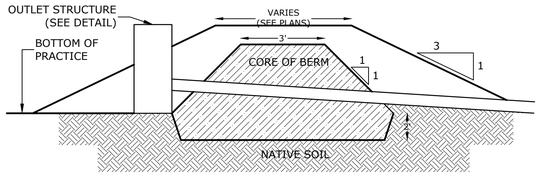


NOTE:
1. SEE GRADING & DRAINAGE PLAN(S) FOR LOCATION(S) AND DIMENSIONS.

RIP RAP SPILLWAY
NO SCALE

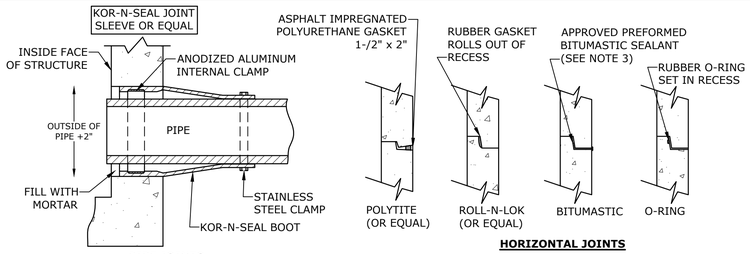


NOTES:
1. CORE MATERIAL SHALL MEET USGS CLASSIFICATION SC, SM, CL OR ML AND HAVE A MAXIMUM PARTICLE SIZE OF 3" AND A PERMEABILITY LESS THAN 0.000005 CM/S, AND MEET THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT FINER BY WEIGHT
3 INCH	100
# 200	50 -100.

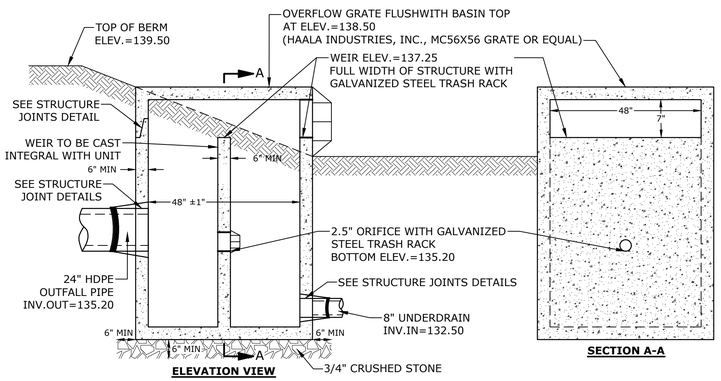
2. PIPE SHALL BE FULLY EMBEDDED IN CORE TO ELIMINATE SEEPAGE

CLAY CORE BERM
NO SCALE



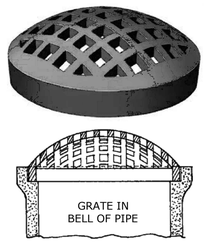
NOTES:
1. HORIZONTAL JOINTS BETWEEN THE SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE PER TOWN OF ROCKLAND DPW STANDARD AND SHALL BE SEALED FOR WATER TIGHTNESS USING A DOUBLE ROW ELASTOMERIC OR MASTIC-LIKE GASKET.
2. PIPE TO MANHOLE JOINTS SHALL BE PER TOWN OF ROCKLAND STANDARD.
3. FOR BITUMASTIC TYPE JOINTS THE AMOUNT OF SEALANT SHALL BE SUFFICIENT TO FILL AT LEAST 75% OF THE JOINT CAVITY.
4. ALL GASKETS, SEALANTS, MORTAR, ETC. SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS.

STRUCTURE JOINTS
NO SCALE



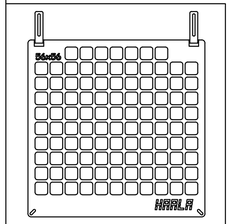
NOTES:
1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE (TYPE II CEMENT).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE OR THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. ALL JOINTS ON THE STRUCTURE AND PIPING SHALL BE WATERTIGHT.

OUTLET STRUCTURE
NO SCALE



NOTES:
1. 8" GRAVEL WETLAND GRATES SHALL NEENAH R-4350-1 GRATE OR EQUAL.
2. 24" GRAVEL WETLAND GRATES SHALL NEENAH R-4350-E GRATE OR EQUAL.

NEENAH R-4350 SERIES GRATE
NO SCALE



NOTES:
1. OUTLET STRUCTURE GRATE SHALL BE HAALA INDUSTRIES, INC. MC56X56 TOP MOUNT GRATE OR EQUAL.
2. GRATE TO BE SECURED TO CONCRETE STRUCTURE.

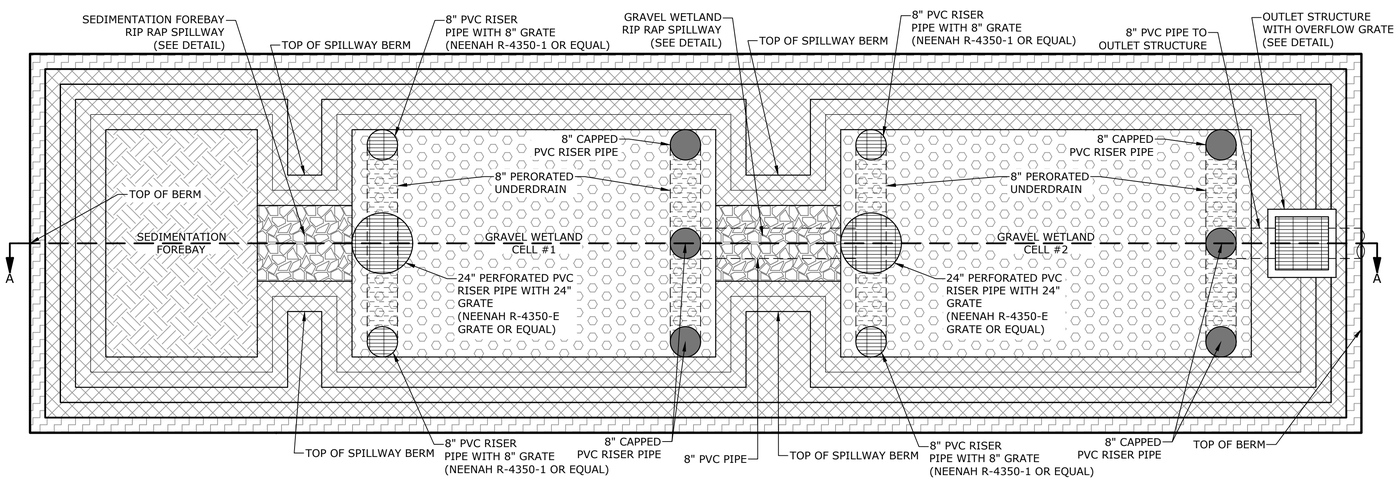
HAALA MC56X56 GRATE
NO SCALE

GRAVEL WETLAND INSPECTION / MAINTENANCE REQUIREMENTS

INSPECTION / MAINTENANCE	FREQUENCY	ACTION
MONITOR TO ENSURE THAT GRAVEL WETLAND FUNCTIONS EFFECTIVELY AFTER STORMS	FOUR (4) TIMES ANNUALLY (QUARTERLY) AND AFTER ANY RAINFALL EVENT EXCEEDING 2.5" IN A 24-HR PERIOD	- TRASH AND DEBRIS TO BE REMOVED - ANY REQUIRED MAINTENANCE SHALL BE ADDRESSED - INSPECT SOIL AND REPAIR ERODED AREAS, ESPECIALLY ON SLOPES. - CHECK INLETS, OUTLETS, AND OVERFLOW SPILLWAY FOR BLOCKAGE, STRUCTURAL INTEGRITY AND EVIDENCE OF EROSION.
INSPECT VEGETATION	ANNUALLY	- INSPECT THE CONDITION OF ALL GRAVEL WETLAND VEGETATION - PRUNE BACK OVERGROWTH - REPLACE DEAD VEGETATION - REMOVE ANY INVASIVE SPECIES - COORDINATE WITH UNH STORMWATER CENTER FOR FURTHER VEGETATION MANAGEMENT GUIDELINES
INSPECT DRAWDOWN TIME - THE SYSTEM SHALL DRAWDOWN WITHIN 48-HOURS FOLLOWING A RAINFALL EVENT.	ANNUALLY	- HIRE QUALIFIED PROFESSIONAL TO ASSESS THE CONDITION OF THE FACILITY TO DETERMINE MEASURES REQUIRED TO RESTORE THE FILTRATION FUNCTION, INCLUDING BUT NOT LIMITED TO REMOVAL OF ACCUMULATED SEDIMENTS OR RECONSTRUCTION OF THE FILTER.

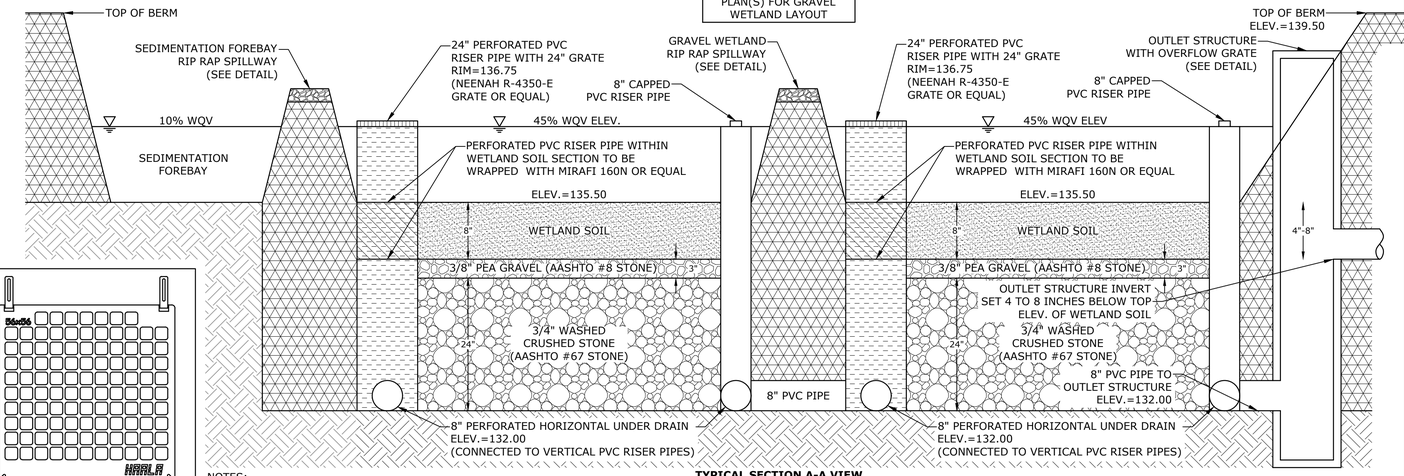
GRAVEL WETLAND PLANTING PLAN

SPECIES	PLANT SIZE	QUANTITY/SPACING
NEW ENGLAND EROSION CONTROL/RESTORATION MIX OR EQUIVALENT		35LB/ACRE
"RED OSIER DOGWOOD" CORNUS SERICEA	2'-3'	8'-10' ON CENTER
"SILKY DOGWOOD" CORNUS AMMOMUM AND "HIGHBUSH BLUEBERRY" VACCINUM CORYBOSSUSUM	2'-3'	8'-10' ON CENTER



TYPICAL PLAN VIEW

SEE GRADING & DRAINAGE PLAN(S) FOR GRAVEL WETLAND LAYOUT



TYPICAL SECTION A-A VIEW

NOTES:
1. WETLAND SOIL SHALL BE A SANDY CLAY LOAM WITH A HYDRAULIC CONDUCTIVITY OF 0.1-0.01 FT/DAY. ORGANIC CONTENT SHALL BE GREATER THAN 15% BY VOLUME. CLAY CONTENT SHALL BE LESS THAN 15% BY VOLUME.
2. INFILTRATION TESTING OF THE NATIVE SOILS AT THE SUBGRADE OF THE PROPOSED GRAVEL WETLAND SHALL OCCUR PRIOR TO THE INSTALLATION OF THE GRAVEL WETLAND AND SHALL BE COORDINATED WITH THE ENGINEER. IF THE NATIVE SOILS EXCEED A PERMEABILITY RATE OF 0.03 FT/DAY THE SOILS SHOULD BE AMENDED OR LINER ADDED AS DETERMINED BY THE ENGINEER. THE INFILTRATION TESTING SHALL BE WITNESSED BY THE BOARD'S CONSULTANT ENGINEER AND THE SOIL AMENDMENT OR LINER SHALL BE SUBJECT TO APPROVAL BY THE BOARD'S CONSULTANT ENGINEER.
3. PERFORATED PVC RISERS SHALL HAVE VERTICAL SLOTS CUT INTO PVC RISERS ABOVE GRADE MEASURING 3"X1/8".

GRAVEL WETLAND DETAIL SHEET
NO SCALE

GRAVEL WETLAND
NO SCALE

Tighe&Bond

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
Rockland,
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DETAILS SHEET

SCALE: AS SHOWN

C-505

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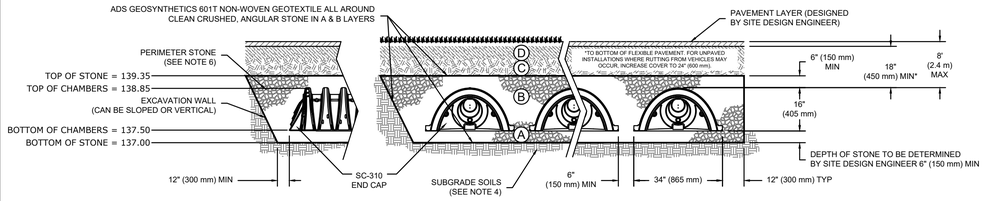
ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

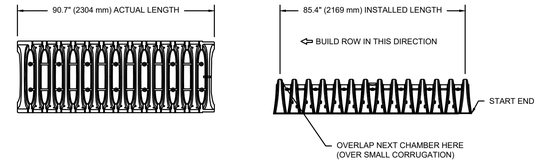
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2 3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:
1. STORMTECH CHAMBERS ARE DESIGNED IN ACCORDANCE WITH SECTION 12.12 OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) LRFD BRIDGE DESIGN SPECIFICATIONS. THIS DOCUMENT ESTABLISHES REQUIREMENTS FOR DESIGN OF PROFILE WALL THERMOPLASTIC STRUCTURES FOR BOTH LIVE LOADS AND PERMANENT EARTH LOADS. PROPER USE OF THE AASHTO DESIGN METHOD REQUIRES THAT LOAD MULTIPLIERS FOR IMPACT AND MULTIPLE PRESENCES ARE APPLIED TO THE AASHTO DESIGN TRUCK (HS20) LIVE LOAD. ADDITIONAL FACTORS ARE APPLIED TO THE LOAD AND EARTH LOADS TO PROVIDE THE FULL SAFETY FACTORS FOR BOTH LIVE AND EARTH LOADS. WHEN INSTALLED IN ACCORDANCE WITH THE MINIMUM REQUIREMENTS SPECIFIED IN THE STORMTECH INSTALLATION INSTRUCTIONS, STORMTECH CHAMBERS MEET OR EXCEED THE AASHTO REQUIREMENTS FOR BOTH LIVE LOAD AND EARTH LOAD DESIGN.
2. SC-310 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

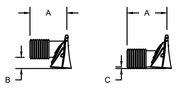
SC-310 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

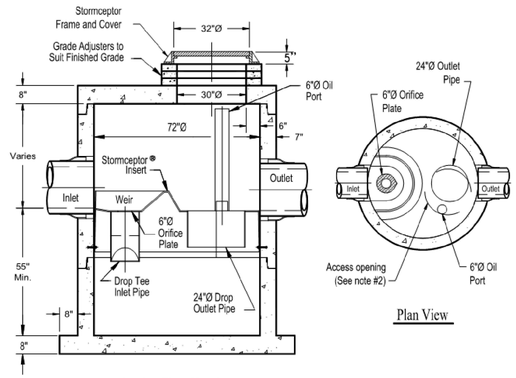
PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310EPE12B*	12" (300 mm)	15.2" (386 mm)	1.9" (49 mm)	0.8" (20 mm)

ALL STUBS, EXCEPT FOR THE SC310EPE12B, ARE CENTERED ACROSS THE END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310EPE12B THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

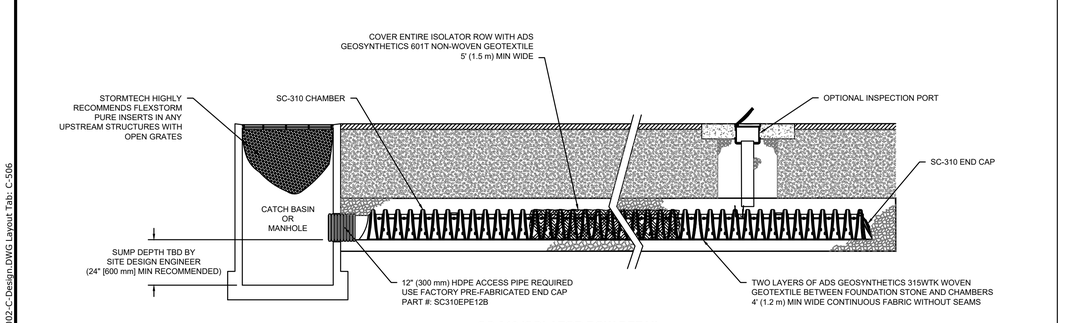
NOTE: ALL DIMENSIONS ARE NOMINAL

STC 900 Precast Concrete Stormceptor ®
(900 U.S. Gallon Capacity)



NOTES:
1. STORMCEPTOR SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.

STORMCEPTOR
NOT TO SCALE



SC-310 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

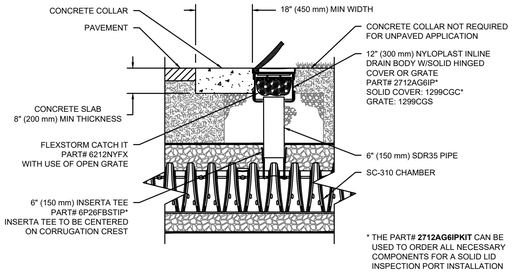
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

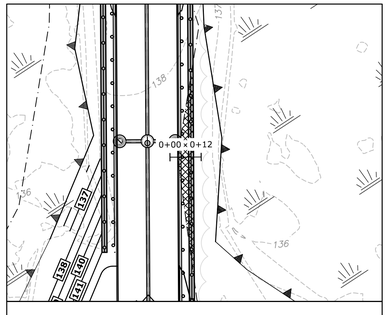
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

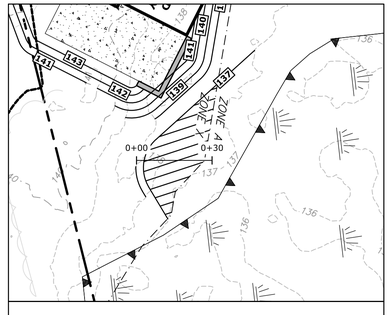


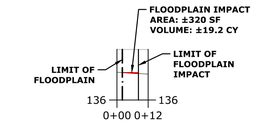
* THE PART# **2712AG6IPKIT** CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

SC-310 6" INSPECTION PORT DETAIL
NTS

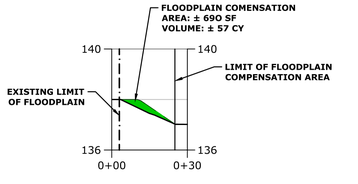
STORMTECH SC-310 CHAMBER SYSTEM
NOT TO SCALE







FLOODPLAIN IMPACT



FLOODPLAIN COMPENSATION

HORIZONTAL SCALE 1" = 30'
VERTICAL SCALE 1" = 3'

FLOODPLAIN IMPACT AND REPLICATION SUMMARY		
	IMPACTED	REPLICATION
AREA	±320 SF	±690 SF
VOLUME	±19.2 CY	±57 CY

FLOODPLAIN IMPACT & REPLICATION DETIAL
NO SCALE

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shingle Mill Multi-Family Development

Shinglemill, LLC

75 - 79 Pond Street
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MARK	DATE	DESCRIPTION
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DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEET

SCALE: AS SHOWN

C-506

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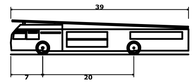
PROPOSED MULTI-FAMILY BUILDING
5-STORIES, 127 UNITS
30,096 SF FOOTPRINT

PROPOSED MULTI-FAMILY BUILDING
5-STORIES, 109 UNITS
26,652 SF FOOTPRINT

PROPOSED COMMUNITY BUILDING
3,085 SF

Aerial Fire Truck



Aerial Fire Truck	
Overall Length	39.000ft
Overall Width	8.167ft
Overall Body Height	7.500ft
Min Body Ground Clearance	0.750ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Max Wheel Angle	45.00°

100' WETLAND BUFFER

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
BRANDON L. MCCORMICK
CIVIL
No. 42446
REGISTERED PROFESSIONAL ENGINEER
9.2.20

COMMONWEALTH OF MASSACHUSETTS
PATRICK CRIMMINS
PE Civil
No. 55629
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

SCALE IN FEET
0 30' 60'
GRAPHIC SCALE

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Shinglemill, LLC

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FIRE TRUCK TURNING PLAN

SCALE: AS SHOWN

C-701

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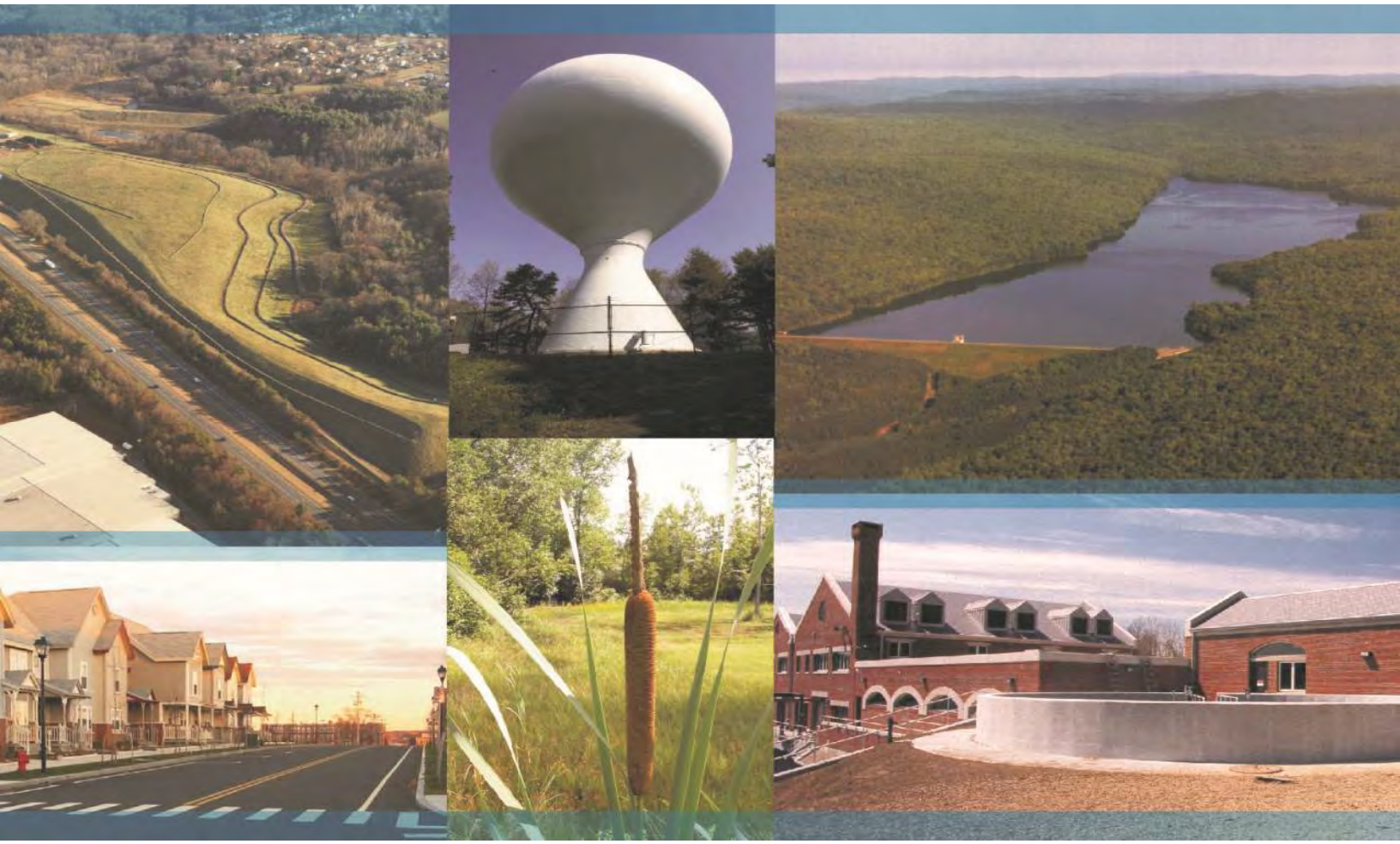
Exhibit 6

Storm Water Management Plan



COMMONWEALTH OF MASSACHUSETTS
BRADLEE MEZQUITA
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9-2-20

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Digitally signed by Patrick Crimmins
Date: 2020.09.02 13:20:37-04'00'

Shinglemill Multifamily Development
75 - 79 Pond Street
Rockland, Massachusetts 02370

STORMWATER MANAGEMENT REPORT

Jones Street Residential
100 High Street, Suite 2500
Boston, Massachusetts 02110

July 13, 2020

Last Revised: September 2, 2020

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DEP Stormwater Checklist

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Standard 2: Peak Rate Attenuation

Standard 3: Recharge

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- Water Quality Volume

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

Standard 6: Critical Areas

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

Standard 9: Operation and Maintenance Plan

Standard 10: Prohibition of Illicit Discharges

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Figure 6 Soil Survey Map

Appendices

Appendix A Test Pit Logs
Appendix B NRCS Web Soils Map
Appendix C Pipe Sizing Calculations

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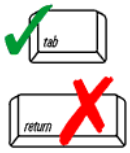
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

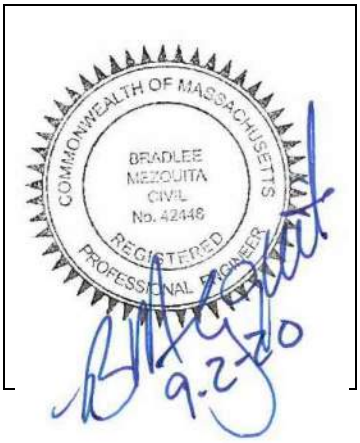
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☒ Bioretention Cells (includes Rain Gardens)

☒ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Project Description

The proposed project is located on a parcel at 0 Pond Street in Rockland, Massachusetts. The existing site is mostly wetlands that nearly surround an undeveloped, partially cleared upland area.The proposed project is to construct two new apartment buildings with their associated parking lot, walkways, landscaping, utilities, and stormwater management system. This project is being filed under the Chapter 40B Comprehensive Permit Projects and will follow all Massachusetts Stormwater Management Standards.

The proposed development consists of two apartment buildings, a community building, and recreational open space areas. In addition to these new structures, associated access drives, parking areas, walkways, utilities, and drainage systems will be installed throughout the site. These changes increase the overall impervious area found at the site. However, the proposed drainage system has been designed to capture the previously uncontrolled stormwater runoff and direct flows to storage and infiltration facilities, which results in a reduction of the peak rate of runoff. Furthermore, with the addition of the deep sump catch basins with oil/gas hoods, gravel wetland and an infiltration facility the runoff from the impervious areas will be treated appropriately prior to discharge.

Section 1
Compliance with Stormwater Management Standards

The proposed project is located on a parcel at 75 - 79 Pond Street in Rockland, Massachusetts. The existing site is mostly wetlands that nearly surround an undeveloped, partially cleared upland area. As part of this drainage analysis, an in-depth review of the subject site for conformance with the Massachusetts Department of Environmental Protection's Stormwater Management Standards has been performed. The project is not considered a redevelopment project (as defined in Standard 7) and is therefore required to meet all of the Massachusetts Stormwater Management Standards. The following is a summary of our findings relative to our review of each of the standards.

Standard 1: No New Untreated Discharges

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The stormwater shall be treated prior to release with deep sump catch basins with hoods, gravel wetland, and an infiltration facility with proprietary separators for pre-treatment. The deep sump will provide an area for sediment to settle out and the hood will provide oil and gas separation. Stormwater being directed to the infiltration system flows through a proprietary separator for pre-treatment prior to infiltrating. Outlets of the infiltration facilities have been designed to reduce erosion and eliminate scouring within the wetland areas. The gravel wetland is designed with a wetland soil mix and will be vegetated to clean stormwater prior to being discharged. A rip rap apron shall be installed at each discharge point. The rip rap apron slows down the velocity and therefore reduces scour.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The existing and proposed site conditions were analyzed for the 2, 10, 25 and 100-year 24-hour storm events using the methodology discussed in Section 2. Due to the introduction of stormwater being captured, controlled, attenuated, and infiltrated there is no increase in peak discharge rates for all storm events analyzed (refer to Table 1.2), even though there is an increase in the overall impervious area on site.

To analyze the pre- and post-development conditions a single discharge point of analysis (PA-1) was determined. The pre- and post-development watersheds, the point of analysis, and longest flow paths are depicted on the plans entitled "Pre-Development Watershed Plan" (Sheet C-801) and "Post- Development Watershed Plan" (Sheet C-802). The following table summarizes and compares the pre- and post-development peak runoff rates for the 2-year, 10-year, 25-year and 100-year storm events at the point of analysis.

Table 1.2 – Comparison of Peak Flow Rates & Total Volume						
	Existing Conditions		Proposed Conditions		Net Change	
Storm Frequency	Peak Runoff (CFS)	Total Volume (CF)	Peak Runoff (CFS)	Total Volume (CF)	Peak Runoff (CFS)	Total Volume (CF)
2-Year	16.06	143,234	14.56	142,235	-1.50	-999
10-Year	32.35	280,070	29.88	279,729	-2.47	-341
25-Year	45.95	395,550	42.19	395,041	-3.76	-509
100-Year	74.10	640,341	68.12	638,943	-5.98	-1,398

As depicted in above table, the post-development peak runoff rates are less than the pre-development rates. The overall time span used for the calculations is 5 - 48 hours to demonstrate that the overall runoff volumes are not increased and that the Gravel Wetland is fully drained within 48 hours.

The closed drainage system was sized using the 25-year storm event and as designed can handle the design flow as calculated, as well as maintaining a design velocity of between 2.0 feet per second (fps) and 10.0 fps. Two feet per second is considered "self-cleansing velocity" and will prevent the pipes from accumulating sediment. Ten feet per second is considered a safe maximum velocity, to reduce scouring of the pipes.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Standard 3 requires that a certain volume of water be recharged to the site depending on existing soil types and square feet of total impervious area over each soil type. The on-site infiltration system must be designed with a minimum infiltration capacity of 1,785 cubic feet. The proposed design directs 67% of the proposed impervious on site to recharge facilities. The resulting adjustment factor and increases the required recharge volume to 2,667 cf. Soils in the proposed area of the infiltration facility are adequate for infiltration, which was confirmed with onsite soil evaluation. Additionally, the bottom of the infiltration facility was placed 4 feet above seasonal high groundwater as determined by the soil evaluation. Please refer to Appendix A for the test pit soil logs.

The infiltration facility proposed for the site will provide a total recharge volume of 4,976 cubic feet, which exceeds the required recharge volume. It should be noted that the proposed Infiltration BMPs do not adversely impact nearby wetland resource areas.

Table 1.3 - Recharge Volume

STORMWATER MANAGEMENT STANDARD 3 - RECHARGE VOLUME					
	Hydrologic Soil Group				Total
	A	B	C	D	
Impervious Area	270 SF	0 SF	0 SF	212,587 SF	212,857 SF
Inches of Runoff to be Recharged	0.6	0.35	0.25	0.1	
Required Recharge Volume	14 CF	0 CF	0 CF	1,772 CF	1,785 CF

CAPTURE AREA ADJUSTMENT - ADJUSTED MINIMUM REQUIRED RECHARGE VOLUME			
Total Impervious Area	212,857 SF		
65% Impervious Area, Required to be Infiltrated	136,407 SF		
Impervious Area Draining to BMP	140,465 SF	67%	Percent Directed to Recharge BMP
Ratio of Total Impervious Area to Impervious Area Draining to Recharge BMP	1.49		
Adjusted Required Recharge Volume	2,667 CF		
Proposed Recharge Volume	4,976 CF		

Standard 4: Water Quality

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The proposed stormwater management system will achieve the 80% TSS removal requirement for all surface water entering the system. Table 1.4 includes a TSS removal summary for each treatment practice. The Long-term Operations and Maintenance Plan has been developed as part of the analysis and can be found in Section 3.

Treatment of Suspended Solids

Catch basins will be equipped with hoods and four-foot sumps to limit sediment, oils, and grease from being discharged to the drainage system. The proprietary separators will further reduce total suspended solids (TSS) entering the infiltration facility, achieving 44% TSS removal pretreatment required to achieve the 80% removal rate within the infiltration facility. All other proposed impervious areas will be collected in the closed drainage system which is routed through a sedimentation forebay and gravel wetland.

Table 1.4 – Total Suspended Solids Removal				
Subsurface Infiltration Chambers				
BMP	TSS Removal Rate	Starting TSS Load	TSS Removed	Remaining TSS Load
Deep Sump Catchbasin w/Hood	0.25	1.00	0.25	0.75
Proprietary Separator	0.52	0.75	0.39	0.36
Subsurface Chambers	0.80	0.36	0.29	0.07
	Total Suspended Solids Removed:			**93%**
Gravel Wetland				
Deep Sump Catchbasin w/Hood	0.25	1.00	0.25	0.75
Gravel Wetland	0.80	0.75	0.60	0.15
	Total Suspended Solids Removed:			**85%**

Water Quality Volume

See Section 2.5.3 for required water quality volume calculations based on impervious area. The equation is as follows:

Water Quality Volume = Total impervious area of post-development project x 1 inch as required by the Stormwater Standards.

Water Quality Volume = 212,857 SF impervious area x 1.0 inches/12 inches per foot = 17,738 cubic feet.

The two onsite drainage components provide 18,826 CF of treatment volume, which is in excess of the required 17,738 CF.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed project does not qualify as a land use with higher potential pollutant loads, thus is not required to meet the requirements of standard 5. However, as stated above the proposed Operations and Maintenance Plan & Long-Term Pollution Prevention Plan includes measures to help increase the water quality of stormwater runoff.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures.

The project site discharges into an Outstanding Resource Water protection area. Due to these site conditions the proposed discharge is subject to greater stormwater discharge standards. The site is not within or discharge near or to any other critical areas. See Figure 5, Critical Areas.

Due to the project site discharging into an Outstanding Resource Water protection area the use of BMPs are limited to those approved by MassDEP for that protection area. In addition, the Stormwater Standards requires at least 44% TSS pretreatment prior to discharging into an infiltration facility. The primary source of pollution for the site will be the roadway, which is a necessary and integral part of the overall project. The stormwater treatment trains have been designed to meet all DEP stormwater standards.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The project involves new development of an undeveloped site, and therefore is required to fully meet all the Stormwater Management Standards.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A Stormwater Pollution Prevention Plan (SWPPP) will be prepared before the disturbance of any earth commences on the project site. The SWPPP will be prepared by others per EPA NPDES NOI guidelines and submitted under a separate cover.

Standard 9: Operation and Maintenance Plan

A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Please refer to Section 3 for the Operation and Maintenance Plan for the proposed Stormwater Management System.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

There are no known or suspected illicit discharges to the stormwater management system at the redevelopment project site.

Illicit Discharge Compliance Statement: Based on visual observations prior to construction no illicit discharges to the stormwater management system exist within the project area.

Section 2
Drainage Analysis

2.1 Calculation Methods

The design storms analyzed in this study are the 2-year, 10-year, 25-year and 100-year, 24-hour duration storm events. The stormwater modeling system, HydroCAD 10.0, was utilized to predict the peak runoff rates and total volume from these storm events. The peak discharge rates were determined by analyzing Type III, 24-hour storm events. The rainfall data for these storm events was obtained from the data published by the Northeast Regional Climate Center at Cornell University.

The time of concentration was computed using the TR-55 Method, which provides a means of determining the time for an entire watershed to contribute runoff to a specific location via sheet flows, shallow concentrated flow and channel flow. Runoff curve numbers were calculated by determining the coverage areas and then summing the curve number for the coverage area as a percent of the entire watershed.

References:

1. HydroCAD Stormwater Modeling System, by HydroCAD Software Solutions LLC, Chocorua, New Hampshire.
2. "Extreme Precipitation in New York & New England." Extreme Precipitation in New York & New England by Northeast Regional Climate Center (NRCC).

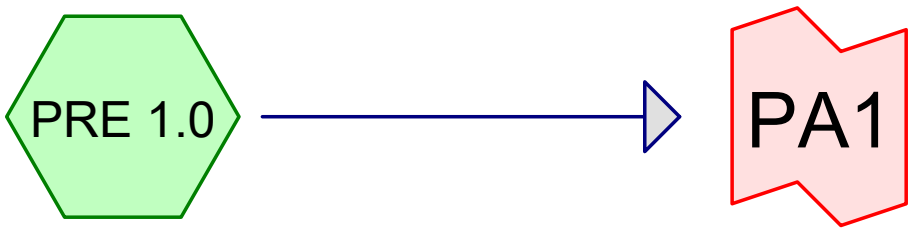
2.2 Pre-Development Conditions

The site is located on the southwest side of Pond Street in Rockland, Massachusetts. The property is mostly wetlands that nearly surround an undeveloped upland area. The upland area is mostly wooded but also has some cleared and brush areas brush. There are access paths that connect the two major upland areas separating the wetland areas. There are existing culverts providing a hydraulic connection between the wetlands beneath the upland access paths. Topography generally slopes from the upland area to the surrounding wetlands. The wetlands generally slope from the northeast discharging flows along southwestern edge of the property. Grades range from approximately 0.5 to 8 percent.

In order to analyze the pre-development condition, one (1) watershed area was modeled at one (1) point of analysis. This point of analysis and watershed area is depicted on the plan entitled "Pre-Development Drainage Plan", Sheet C-801.

2.2.1 Pre-Development Calculations

2.2.2 Pre-Development Watershed Plans



Subcat Reach Pond Link

Routing Diagram for J5019-002_PRE-Rev-1
Prepared by Tighe & Bond, Printed 8/31/2020
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,761	30	Brush, Good, HSG A (PRE 1.0)
1,173	48	Brush, Good, HSG B (PRE 1.0)
32,809	73	Brush, Good, HSG D (PRE 1.0)
74,635	89	Dirt roads, HSG D (PRE 1.0)
1,363	91	Gravel roads, HSG D (PRE 1.0)
192	98	Paved roads w/curbs & sewers, HSG A (PRE 1.0)
5,469	98	Paved roads w/curbs & sewers, HSG D (PRE 1.0)
173	78	Wetlands, HSG A (PRE 1.0)
720,013	78	Wetlands, HSG D (PRE 1.0)
14,765	30	Woods, Good, HSG A (PRE 1.0)
501	55	Woods, Good, HSG B (PRE 1.0)
444,183	77	Woods, Good, HSG D (PRE 1.0)
1,302,037	**77**	**TOTAL AREA**

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPRE 1.0: Runoff Area=1,302,037 sf 0.43% Impervious Runoff Depth=1.32"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=16.06 cfs 143,234 cf

Link PA1: Inflow=16.06 cfs 143,234 cf
Primary=16.06 cfs 143,234 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 143,234 cf Average Runoff Depth = 1.32"
99.57% Pervious = 1,296,376 sf 0.43% Impervious = 5,661 sf

Summary for Subcatchment PRE 1.0:

Runoff = 16.06 cfs @ 12.97 hrs, Volume= 143,234 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	1,173	48	Brush, Good, HSG B
	32,809	73	Brush, Good, HSG D
	74,635	89	Dirt roads, HSG D
	1,363	91	Gravel roads, HSG D
	192	98	Paved roads w/curbs & sewers, HSG A
	5,469	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,765	30	Woods, Good, HSG A
	501	55	Woods, Good, HSG B
	444,183	77	Woods, Good, HSG D
	1,302,037	77	Weighted Average
	1,296,376		99.57% Pervious Area
	5,661		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 0.43% Impervious, Inflow Depth = 1.32" for 2-year event
Inflow = 16.06 cfs @ 12.97 hrs, Volume= 143,234 cf
Primary = 16.06 cfs @ 12.97 hrs, Volume= 143,234 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPRE 1.0: Runoff Area=1,302,037 sf 0.43% Impervious Runoff Depth=2.58"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=32.35 cfs 280,070 cf

Link PA1: Inflow=32.35 cfs 280,070 cf
Primary=32.35 cfs 280,070 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 280,070 cf Average Runoff Depth = 2.58"
99.57% Pervious = 1,296,376 sf 0.43% Impervious = 5,661 sf

Summary for Subcatchment PRE 1.0:

Runoff = 32.35 cfs @ 12.93 hrs, Volume= 280,070 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	1,173	48	Brush, Good, HSG B
	32,809	73	Brush, Good, HSG D
	74,635	89	Dirt roads, HSG D
	1,363	91	Gravel roads, HSG D
	192	98	Paved roads w/curbs & sewers, HSG A
	5,469	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,765	30	Woods, Good, HSG A
	501	55	Woods, Good, HSG B
	444,183	77	Woods, Good, HSG D
	1,302,037	77	Weighted Average
	1,296,376		99.57% Pervious Area
	5,661		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 0.43% Impervious, Inflow Depth = 2.58" for 10-year event
Inflow = 32.35 cfs @ 12.93 hrs, Volume= 280,070 cf
Primary = 32.35 cfs @ 12.93 hrs, Volume= 280,070 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPRE 1.0: Runoff Area=1,302,037 sf 0.43% Impervious Runoff Depth=3.65"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=45.95 cfs 395,550 cf

Link PA1: Inflow=45.95 cfs 395,550 cf
Primary=45.95 cfs 395,550 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 395,550 cf Average Runoff Depth = 3.65"
99.57% Pervious = 1,296,376 sf 0.43% Impervious = 5,661 sf

Summary for Subcatchment PRE 1.0:

Runoff = 45.95 cfs @ 12.92 hrs, Volume= 395,550 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	1,173	48	Brush, Good, HSG B
	32,809	73	Brush, Good, HSG D
	74,635	89	Dirt roads, HSG D
	1,363	91	Gravel roads, HSG D
	192	98	Paved roads w/curbs & sewers, HSG A
	5,469	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,765	30	Woods, Good, HSG A
	501	55	Woods, Good, HSG B
	444,183	77	Woods, Good, HSG D
	1,302,037	77	Weighted Average
	1,296,376		99.57% Pervious Area
	5,661		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 0.43% Impervious, Inflow Depth = 3.65" for 25-year event
Inflow = 45.95 cfs @ 12.92 hrs, Volume= 395,550 cf
Primary = 45.95 cfs @ 12.92 hrs, Volume= 395,550 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPRE 1.0: Runoff Area=1,302,037 sf 0.43% Impervious Runoff Depth=5.90"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=74.10 cfs 640,341 cf

Link PA1: Inflow=74.10 cfs 640,341 cf
Primary=74.10 cfs 640,341 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 640,341 cf Average Runoff Depth = 5.90"
99.57% Pervious = 1,296,376 sf 0.43% Impervious = 5,661 sf

Summary for Subcatchment PRE 1.0:

Runoff = 74.10 cfs @ 12.91 hrs, Volume= 640,341 cf, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	1,173	48	Brush, Good, HSG B
	32,809	73	Brush, Good, HSG D
	74,635	89	Dirt roads, HSG D
	1,363	91	Gravel roads, HSG D
	192	98	Paved roads w/curbs & sewers, HSG A
	5,469	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,765	30	Woods, Good, HSG A
	501	55	Woods, Good, HSG B
	444,183	77	Woods, Good, HSG D
	1,302,037	77	Weighted Average
	1,296,376		99.57% Pervious Area
	5,661		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 0.43% Impervious, Inflow Depth = 5.90" for 100-year event
Inflow = 74.10 cfs @ 12.91 hrs, Volume= 640,341 cf
Primary = 74.10 cfs @ 12.91 hrs, Volume= 640,341 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

655A
HSG B/D

626B
HSG A

23A
HSG A/D

PRE
1.0

52A
HSG B/D

23A
HSG A/D

PA-1

FRIGHT STREET
(previous 30' wide)

CURRY STREET
(public-40' wide)

WILSON STREET
(public-40' wide)

FRIAR STREET
(previous 30' wide)

COLBY STREET
(public-40' wide)

LEGEND

- PRE-DEVELOPMENT WATERSHED BOUNDARY
- WEB SOIL SURVEY BOUNDARIES
- LONGEST FLOW PATH
- PRE 1.0 — PRE DEVELOPMENT WATERSHED AREA DESIGNATION
- PRE POND 1 — PRE-DEVELOPMENT POND DESIGNATION
- PA-1 — POINT OF ANALYSIS

Tighe&Bond

N

SCALE IN FEET
0 80' 160'
GRAPHIC SCALE

Shinglemill Multi-Family Development

Jones Street Residential

Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	7/13/2020	Submitted for Special ZBA Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-WSHD.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

PRE-DEVELOPMENT WATERSHED PLAN

SCALE: AS SHOWN

C-801

Last Save Date: July 13, 2020 12:22 PM By: NAHANSEN
Plot Date/Time: July 13, 2020 12:23 PM Plotted By: Neal Hansen
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings_Figures\AutoCAD\Sheet\J5019-002-C-WSHD.DWG Layout Tab: Pre

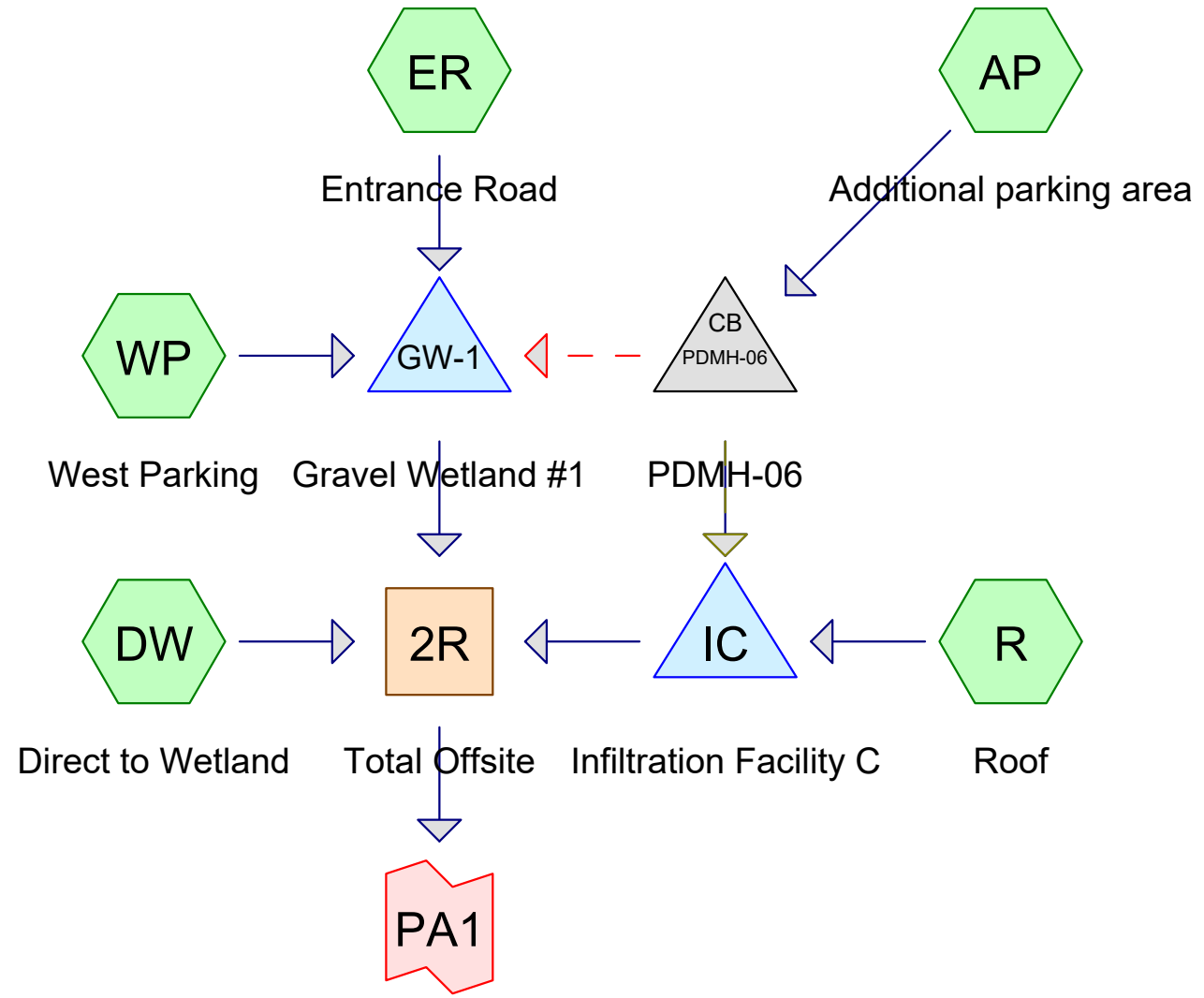
2.3 Post Development Conditions

The post-development condition consists of the two apartment buildings, a community building, and recreational open space areas. In addition to these new structures, associated access drives, parking areas, walkways, utilities, and drainage systems will be installed throughout the site. These changes increase the overall impervious area found at the site. However, the proposed drainage system has been designed to capture the previously uncontrolled stormwater runoff and direct flows to storage and infiltration facilities, which results in a reduction of the peak rate and total volume of runoff. Furthermore, with the addition of the deep sump catch basins with oil/gas hoods, proprietary separators, gravel wetland and an infiltration facility the runoff from the impervious areas will be cleaned appropriately prior to discharge.

The post-development condition was analyzed by dividing the site into five (5) watershed areas. Stormwater runoff from these areas flow mostly by underground drainage to the gravel wetland or subsurface chamber system prior to being discharged into the onsite wetlands. Flows from these sub-catchment areas are modeled at the same point of analysis that was modeled in the pre-development analysis, PA-1. This point of analysis and sub-catchment areas are depicted on the plan entitled "Post-Development Drainage Plan", Sheet C-802.

2.3.1 Post-Development Calculations

2.3.2 Post-Development Watershed Plans



Subcat Reach Pond Link

Routing Diagram for J5019-002_Post_Rev-1
Prepared by Tighe & Bond, Printed 8/31/2020
HydroCAD® 10.00-20 s/n 03436 © 2017 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
596	61	>75% Grass cover, Good, HSG B (DW)
83,294	80	>75% Grass cover, Good, HSG D (AP, DW, ER, WP)
6,761	30	Brush, Good, HSG A (DW)
878	48	Brush, Good, HSG B (DW)
15,473	73	Brush, Good, HSG D (DW)
13,695	89	Dirt roads, HSG D (DW)
1,434	91	Gravel roads, HSG D (DW)
84,164	98	Paved parking, HSG D (AP)
270	98	Paved roads w/curbs & sewers, HSG A (DW)
52,265	98	Paved roads w/curbs & sewers, HSG D (DW, ER, WP)
59,482	98	Roofs, HSG D (AP, R)
1,547	98	Unconnected roofs, HSG D (DW)
173	78	Wetlands, HSG A (DW)
720,013	78	Wetlands, HSG D (DW)
14,687	30	Woods, Good, HSG A (DW)
200	55	Woods, Good, HSG B (DW)
247,105	77	Woods, Good, HSG D (DW)
1,302,037	**80**	**TOTAL AREA**

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentAP: Additional parking Runoff Area=122,014 sf 96.13% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=97 Runoff=8.78 cfs 30,205 cf

SubcatchmentDW: Direct to Wetland Runoff Area=1,084,691 sf 0.43% Impervious Runoff Depth=1.32"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=13.38 cfs 119,324 cf

SubcatchmentER: Entrance Road Runoff Area=23,348 sf 98.74% Impervious Runoff Depth>3.06"
Tc=6.0 min CN=98 Runoff=1.70 cfs 5,949 cf

SubcatchmentR: Roof Runoff Area=26,352 sf 100.00% Impervious Runoff Depth>3.06"
Tc=6.0 min CN=98 Runoff=1.92 cfs 6,715 cf

SubcatchmentWP: West Parking Runoff Area=45,632 sf 57.82% Impervious Runoff Depth=2.31"
Tc=6.0 min CN=90 Runoff=2.74 cfs 8,776 cf

Reach 2R: Total Offsite Inflow=14.56 cfs 142,235 cf
Outflow=14.56 cfs 142,235 cf

Pond GW-1: Gravel Wetland #1 Peak Elev=136.80' Storage=14,234 cf Inflow=8.85 cfs 19,024 cf
Outflow=0.20 cfs 13,990 cf

Pond IC: Infiltration Facility C Peak Elev=138.74' Storage=8,823 cf Inflow=6.33 cfs 32,621 cf
Discarded=0.44 cfs 23,716 cf Primary=2.57 cfs 8,921 cf Outflow=3.01 cfs 32,636 cf

Pond PDMH-06: PDMH-06 Peak Elev=139.57' Inflow=8.78 cfs 30,205 cf
Primary=4.45 cfs 25,907 cf Secondary=4.41 cfs 4,298 cf Outflow=8.78 cfs 30,205 cf

Link PA1: Inflow=14.56 cfs 142,235 cf
Primary=14.56 cfs 142,235 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 170,969 cf Average Runoff Depth = 1.58"
84.81% Pervious = 1,104,309 sf 15.19% Impervious = 197,728 sf

Summary for Subcatchment AP: Additional parking area

Runoff = 8.78 cfs @ 12.09 hrs, Volume= 30,205 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

Area (sf)	CN	Description
4,720	80	>75% Grass cover, Good, HSG D
84,164	98	Paved parking, HSG D
33,130	98	Roofs, HSG D
122,014	97	Weighted Average
4,720		3.87% Pervious Area
117,294		96.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment DW: Direct to Wetland

Runoff = 13.38 cfs @ 12.97 hrs, Volume= 119,324 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	878	48	Brush, Good, HSG B
	15,473	73	Brush, Good, HSG D
	13,695	89	Dirt roads, HSG D
	1,434	91	Gravel roads, HSG D
	270	98	Paved roads w/curbs & sewers, HSG A
	2,827	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,687	30	Woods, Good, HSG A
	200	55	Woods, Good, HSG B
	247,105	77	Woods, Good, HSG D
	596	61	>75% Grass cover, Good, HSG B
	59,032	80	>75% Grass cover, Good, HSG D
	1,547	98	Unconnected roofs, HSG D
	1,084,691	77	Weighted Average
	1,080,047		99.57% Pervious Area
	4,644		0.43% Impervious Area
	1,547		33.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Subcatchment ER: Entrance Road

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 5,949 cf, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

Area (sf)	CN	Description
295	80	>75% Grass cover, Good, HSG D
23,053	98	Paved roads w/curbs & sewers, HSG D
23,348	98	Weighted Average
295		1.26% Pervious Area
23,053		98.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment R: Roof

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 6,715 cf, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

Area (sf)	CN	Description
26,352	98	Roofs, HSG D
26,352		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment WP: West Parking

Runoff = 2.74 cfs @ 12.09 hrs, Volume= 8,776 cf, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.35"

Area (sf)	CN	Description
19,247	80	>75% Grass cover, Good, HSG D
26,385	98	Paved roads w/curbs & sewers, HSG D
45,632	90	Weighted Average
19,247		42.18% Pervious Area
26,385		57.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 2R: Total Offsite

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 1.31" for 2-year event
Inflow = 14.56 cfs @ 12.94 hrs, Volume= 142,235 cf
Outflow = 14.56 cfs @ 12.94 hrs, Volume= 142,235 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond GW-1: Gravel Wetland #1

Inflow Area = 68,980 sf, 71.67% Impervious, Inflow Depth > 3.31" for 2-year event
Inflow = 8.85 cfs @ 12.09 hrs, Volume= 19,024 cf
Outflow = 0.20 cfs @ 14.88 hrs, Volume= 13,990 cf, Atten= 98%, Lag= 167.5 min
Primary = 0.20 cfs @ 14.88 hrs, Volume= 13,990 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 136.80' @ 14.88 hrs Surf.Area= 8,127 sf Storage= 14,234 cf
Flood Elev= 139.50' Surf.Area= 13,553 sf Storage= 43,583 cf

Plug-Flow detention time= 668.8 min calculated for 13,972 cf (73% of inflow)
Center-of-Mass det. time= 597.1 min (1,372.7 - 775.7)

Volume	Invert	Avail.Storage	Storage Description
#1	132.50'	43,583 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
132.50	5,152	0.0	0	0
134.85	5,152	40.0	4,843	4,843
135.50	5,836	10.0	357	5,200
136.00	6,681	100.0	3,129	8,329
137.00	8,494	100.0	7,588	15,917
138.00	10,525	100.0	9,510	25,426
139.00	12,675	100.0	11,600	37,026
139.50	13,553	100.0	6,557	43,583

Device	Routing	Invert	Outlet Devices
#1	Primary	135.20'	**24.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.20' / 135.15' S= 0.0026 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	135.20'	**2.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	137.25'	**4.0' long x 0.60' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	138.50'	**4.0" x 4.0" Horiz. Orifice/Grate X 106.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 14.88 hrs HW=136.80' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.20 cfs of 8.09 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 5.88 fps)
  ├─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond IC: Infiltration Facility C

Inflow Area = 148,366 sf, 96.82% Impervious, Inflow Depth > 2.64" for 2-year event
Inflow = 6.33 cfs @ 12.08 hrs, Volume= 32,621 cf
Outflow = 3.01 cfs @ 12.30 hrs, Volume= 32,636 cf, Atten= 53%, Lag= 13.7 min
Discarded = 0.44 cfs @ 10.25 hrs, Volume= 23,716 cf
Primary = 2.57 cfs @ 12.30 hrs, Volume= 8,921 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 138.74' @ 12.30 hrs Surf.Area= 8,406 sf Storage= 8,823 cf
Flood Elev= 139.30' Surf.Area= 8,406 sf Storage= 10,706 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 86.4 min (861.9 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	137.00'	5,865 cf	**41.50'W x 202.56'L x 2.33'H Field A** 19,615 cf Overall - 4,953 cf Embedded = 14,661 cf x 40.0% Voids
#2A	137.50'	4,953 cf	**ADS_StormTech SC-310 +Cap** x 336 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Rows of 28 Chambers
		10,818 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	138.00'	**18.0" Round Culvert** L= 130.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.00' / 136.00' S= 0.0154 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	137.00'	**2.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.44 cfs @ 10.25 hrs HW=137.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=2.56 cfs @ 12.30 hrs HW=138.74' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.56 cfs @ 2.94 fps)

Pond IC: Infiltration Facility C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

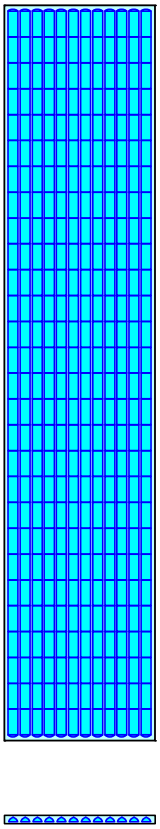
28 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 200.56' Row Length +12.0" End Stone x 2 = 202.56' Base Length
12 Rows x 34.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 41.50' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

336 Chambers x 14.7 cf = 4,953.3 cf Chamber Storage

19,614.6 cf Field - 4,953.3 cf Chambers = 14,661.3 cf Stone x 40.0% Voids = 5,864.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,817.8 cf = 0.248 af
Overall Storage Efficiency = 55.2%
Overall System Size = 202.56' x 41.50' x 2.33'

336 Chambers
726.5 cy Field
543.0 cy Stone



Summary for Pond PDMH-06: PDMH-06

Inflow Area = 122,014 sf, 96.13% Impervious, Inflow Depth > 2.97" for 2-year event
Inflow = 8.78 cfs @ 12.09 hrs, Volume= 30,205 cf
Outflow = 8.78 cfs @ 12.09 hrs, Volume= 30,205 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.45 cfs @ 12.07 hrs, Volume= 25,907 cf
Secondary = 4.41 cfs @ 12.09 hrs, Volume= 4,298 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 139.57' @ 12.09 hrs
Flood Elev= 143.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.50'	**12.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.50' / 137.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	138.55'	**18.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 137.50' S= 0.0420 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.10 cfs @ 12.07 hrs HW=139.51' TW=138.33' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.10 cfs @ 5.22 fps)

Secondary OutFlow Max=4.29 cfs @ 12.09 hrs HW=139.55' TW=135.87' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 4.29 cfs @ 3.41 fps)

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 1.31" for 2-year event
Inflow = 14.56 cfs @ 12.94 hrs, Volume= 142,235 cf
Primary = 14.56 cfs @ 12.94 hrs, Volume= 142,235 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentAP: Additional parking Runoff Area=122,014 sf 96.13% Impervious Runoff Depth>4.51"
Tc=6.0 min CN=97 Runoff=13.15 cfs 45,876 cf

SubcatchmentDW: Direct to Wetland Runoff Area=1,084,691 sf 0.43% Impervious Runoff Depth=2.58"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=26.95 cfs 233,318 cf

SubcatchmentER: Entrance Road Runoff Area=23,348 sf 98.74% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=98 Runoff=2.53 cfs 8,931 cf

SubcatchmentR: Roof Runoff Area=26,352 sf 100.00% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=98 Runoff=2.86 cfs 10,080 cf

SubcatchmentWP: West Parking Runoff Area=45,632 sf 57.82% Impervious Runoff Depth>3.83"
Tc=6.0 min CN=90 Runoff=4.44 cfs 14,549 cf

Reach 2R: Total Offsite Inflow=29.88 cfs 279,729 cf
Outflow=29.88 cfs 279,729 cf

Pond GW-1: Gravel Wetland #1 Peak Elev=137.63' Storage=21,707 cf Inflow=15.56 cfs 33,748 cf
Outflow=3.30 cfs 28,709 cf

Pond IC: Infiltration Facility C Peak Elev=139.12' Storage=10,097 cf Inflow=7.43 cfs 45,688 cf
Discarded=0.44 cfs 28,006 cf Primary=5.09 cfs 17,701 cf Outflow=5.53 cfs 45,707 cf

Pond PDMH-06: PDMH-06 Peak Elev=140.32' Inflow=13.15 cfs 45,876 cf
Primary=4.58 cfs 35,608 cf Secondary=8.60 cfs 10,269 cf Outflow=13.15 cfs 45,876 cf

Link PA1: Inflow=29.88 cfs 279,729 cf
Primary=29.88 cfs 279,729 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 312,754 cf Average Runoff Depth = 2.88"
84.81% Pervious = 1,104,309 sf 15.19% Impervious = 197,728 sf

Summary for Subcatchment AP: Additional parking area

Runoff = 13.15 cfs @ 12.09 hrs, Volume= 45,876 cf, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

Area (sf)	CN	Description
4,720	80	>75% Grass cover, Good, HSG D
84,164	98	Paved parking, HSG D
33,130	98	Roofs, HSG D
122,014	97	Weighted Average
4,720		3.87% Pervious Area
117,294		96.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment DW: Direct to Wetland

Runoff = 26.95 cfs @ 12.93 hrs, Volume= 233,318 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	878	48	Brush, Good, HSG B
	15,473	73	Brush, Good, HSG D
	13,695	89	Dirt roads, HSG D
	1,434	91	Gravel roads, HSG D
	270	98	Paved roads w/curbs & sewers, HSG A
	2,827	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,687	30	Woods, Good, HSG A
	200	55	Woods, Good, HSG B
	247,105	77	Woods, Good, HSG D
	596	61	>75% Grass cover, Good, HSG B
	59,032	80	>75% Grass cover, Good, HSG D
	1,547	98	Unconnected roofs, HSG D
	1,084,691	77	Weighted Average
	1,080,047		99.57% Pervious Area
	4,644		0.43% Impervious Area
	1,547		33.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Subcatchment ER: Entrance Road

Runoff = 2.53 cfs @ 12.09 hrs, Volume= 8,931 cf, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

Area (sf)	CN	Description
295	80	>75% Grass cover, Good, HSG D
23,053	98	Paved roads w/curbs & sewers, HSG D
23,348	98	Weighted Average
295		1.26% Pervious Area
23,053		98.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment R: Roof

Runoff = 2.86 cfs @ 12.09 hrs, Volume= 10,080 cf, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

Area (sf)	CN	Description
26,352	98	Roofs, HSG D
26,352		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment WP: West Parking

Runoff = 4.44 cfs @ 12.09 hrs, Volume= 14,549 cf, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.95"

Area (sf)	CN	Description
19,247	80	>75% Grass cover, Good, HSG D
26,385	98	Paved roads w/curbs & sewers, HSG D
45,632	90	Weighted Average
19,247		42.18% Pervious Area
26,385		57.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 2R: Total Offsite

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 2.58" for 10-year event
Inflow = 29.88 cfs @ 12.90 hrs, Volume= 279,729 cf
Outflow = 29.88 cfs @ 12.90 hrs, Volume= 279,729 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond GW-1: Gravel Wetland #1

Inflow Area = 68,980 sf, 71.67% Impervious, Inflow Depth > 5.87" for 10-year event
Inflow = 15.56 cfs @ 12.09 hrs, Volume= 33,748 cf
Outflow = 3.30 cfs @ 12.46 hrs, Volume= 28,709 cf, Atten= 79%, Lag= 22.1 min
Primary = 3.30 cfs @ 12.46 hrs, Volume= 28,709 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 137.63' @ 12.46 hrs Surf.Area= 9,781 sf Storage= 21,707 cf
Flood Elev= 139.50' Surf.Area= 13,553 sf Storage= 43,583 cf

Plug-Flow detention time= 572.7 min calculated for 28,706 cf (85% of inflow)
Center-of-Mass det. time= 519.5 min (1,284.2 - 764.7)

Volume	Invert	Avail.Storage	Storage Description
#1	132.50'	43,583 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
132.50	5,152	0.0	0	0
134.85	5,152	40.0	4,843	4,843
135.50	5,836	10.0	357	5,200
136.00	6,681	100.0	3,129	8,329
137.00	8,494	100.0	7,588	15,917
138.00	10,525	100.0	9,510	25,426
139.00	12,675	100.0	11,600	37,026
139.50	13,553	100.0	6,557	43,583

Device	Routing	Invert	Outlet Devices
#1	Primary	135.20'	**24.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.20' / 135.15' S= 0.0026 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	135.20'	**2.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	137.25'	**4.0' long x 0.60' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	138.50'	**4.0" x 4.0" Horiz. Orifice/Grate X 106.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.29 cfs @ 12.46 hrs HW=137.63' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.29 cfs of 15.06 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 7.35 fps)
  ├─**3=Sharp-Crested Rectangular Weir** (Weir Controls 3.04 cfs @ 2.02 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond IC: Infiltration Facility C

Inflow Area = 148,366 sf, 96.82% Impervious, Inflow Depth > 3.70" for 10-year event
Inflow = 7.43 cfs @ 12.08 hrs, Volume= 45,688 cf
Outflow = 5.53 cfs @ 12.16 hrs, Volume= 45,707 cf, Atten= 26%, Lag= 4.9 min
Discarded = 0.44 cfs @ 8.90 hrs, Volume= 28,006 cf
Primary = 5.09 cfs @ 12.16 hrs, Volume= 17,701 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 139.12' @ 12.16 hrs Surf.Area= 8,406 sf Storage= 10,097 cf
Flood Elev= 139.30' Surf.Area= 8,406 sf Storage= 10,706 cf

Plug-Flow detention time= 84.6 min calculated for 45,653 cf (100% of inflow)
Center-of-Mass det. time= 84.8 min (858.4 - 773.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	137.00'	5,865 cf	**41.50'W x 202.56'L x 2.33'H Field A** 19,615 cf Overall - 4,953 cf Embedded = 14,661 cf x 40.0% Voids
#2A	137.50'	4,953 cf	**ADS_StormTech SC-310 +Cap** x 336 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Rows of 28 Chambers
		10,818 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	138.00'	**18.0" Round Culvert** L= 130.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.00' / 136.00' S= 0.0154 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	137.00'	**2.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.44 cfs @ 8.90 hrs HW=137.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=5.03 cfs @ 12.16 hrs HW=139.11' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 5.03 cfs @ 3.59 fps)

Pond IC: Infiltration Facility C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

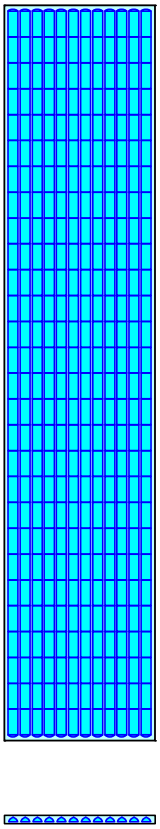
28 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 200.56' Row Length +12.0" End Stone x 2 = 202.56' Base Length
12 Rows x 34.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 41.50' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

336 Chambers x 14.7 cf = 4,953.3 cf Chamber Storage

19,614.6 cf Field - 4,953.3 cf Chambers = 14,661.3 cf Stone x 40.0% Voids = 5,864.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,817.8 cf = 0.248 af
Overall Storage Efficiency = 55.2%
Overall System Size = 202.56' x 41.50' x 2.33'

336 Chambers
726.5 cy Field
543.0 cy Stone



Summary for Pond PDMH-06: PDMH-06

Inflow Area = 122,014 sf, 96.13% Impervious, Inflow Depth > 4.51" for 10-year event
Inflow = 13.15 cfs @ 12.09 hrs, Volume= 45,876 cf
Outflow = 13.15 cfs @ 12.09 hrs, Volume= 45,876 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.58 cfs @ 12.08 hrs, Volume= 35,608 cf
Secondary = 8.60 cfs @ 12.09 hrs, Volume= 10,269 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 140.32' @ 12.09 hrs
Flood Elev= 143.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.50'	**12.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.50' / 137.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	138.55'	**18.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 137.50' S= 0.0420 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.22 cfs @ 12.08 hrs HW=140.23' TW=138.98' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.22 cfs @ 5.37 fps)

Secondary OutFlow Max=8.39 cfs @ 12.09 hrs HW=140.27' TW=136.75' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 8.39 cfs @ 4.75 fps)

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 2.58" for 10-year event
Inflow = 29.88 cfs @ 12.90 hrs, Volume= 279,729 cf
Primary = 29.88 cfs @ 12.90 hrs, Volume= 279,729 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment AP: Additional parking Runoff Area=122,014 sf 96.13% Impervious Runoff Depth>5.70"
Tc=6.0 min CN=97 Runoff=16.52 cfs 57,971 cf

Subcatchment DW: Direct to Wetland Runoff Area=1,084,691 sf 0.43% Impervious Runoff Depth=3.65"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=38.28 cfs 329,522 cf

Subcatchment ER: Entrance Road Runoff Area=23,348 sf 98.74% Impervious Runoff Depth>5.77"
Tc=6.0 min CN=98 Runoff=3.18 cfs 11,233 cf

Subcatchment R: Roof Runoff Area=26,352 sf 100.00% Impervious Runoff Depth>5.77"
Tc=6.0 min CN=98 Runoff=3.58 cfs 12,678 cf

Subcatchment WP: West Parking Runoff Area=45,632 sf 57.82% Impervious Runoff Depth>5.02"
Tc=6.0 min CN=90 Runoff=5.74 cfs 19,088 cf

Reach 2R: Total Offsite Inflow=42.19 cfs 395,041 cf
Outflow=42.19 cfs 395,041 cf

Pond GW-1: Gravel Wetland #1 Peak Elev=137.96' Storage=25,038 cf Inflow=20.11 cfs 45,471 cf
Outflow=7.42 cfs 40,430 cf

Pond IC: Infiltration Facility C Peak Elev=139.30' Storage=10,717 cf Inflow=8.92 cfs 55,499 cf
Discarded=0.44 cfs 30,427 cf Primary=6.34 cfs 25,088 cf Outflow=6.78 cfs 55,515 cf

Pond PDMH-06: PDMH-06 Peak Elev=141.03' Inflow=16.52 cfs 57,971 cf
Primary=5.34 cfs 42,821 cf Secondary=11.19 cfs 15,150 cf Outflow=16.52 cfs 57,971 cf

Link PA1: Inflow=42.19 cfs 395,041 cf
Primary=42.19 cfs 395,041 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 430,492 cf Average Runoff Depth = 3.97"
84.81% Pervious = 1,104,309 sf 15.19% Impervious = 197,728 sf

Summary for Subcatchment AP: Additional parking area

Runoff = 16.52 cfs @ 12.09 hrs, Volume= 57,971 cf, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
4,720	80	>75% Grass cover, Good, HSG D
84,164	98	Paved parking, HSG D
33,130	98	Roofs, HSG D
122,014	97	Weighted Average
4,720		3.87% Pervious Area
117,294		96.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment DW: Direct to Wetland

Runoff = 38.28 cfs @ 12.92 hrs, Volume= 329,522 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	878	48	Brush, Good, HSG B
	15,473	73	Brush, Good, HSG D
	13,695	89	Dirt roads, HSG D
	1,434	91	Gravel roads, HSG D
	270	98	Paved roads w/curbs & sewers, HSG A
	2,827	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,687	30	Woods, Good, HSG A
	200	55	Woods, Good, HSG B
	247,105	77	Woods, Good, HSG D
	596	61	>75% Grass cover, Good, HSG B
	59,032	80	>75% Grass cover, Good, HSG D
	1,547	98	Unconnected roofs, HSG D
	1,084,691	77	Weighted Average
	1,080,047		99.57% Pervious Area
	4,644		0.43% Impervious Area
	1,547		33.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Subcatchment ER: Entrance Road

Runoff = 3.18 cfs @ 12.09 hrs, Volume= 11,233 cf, Depth> 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
295	80	>75% Grass cover, Good, HSG D
23,053	98	Paved roads w/curbs & sewers, HSG D
23,348	98	Weighted Average
295		1.26% Pervious Area
23,053		98.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment R: Roof

Runoff = 3.58 cfs @ 12.09 hrs, Volume= 12,678 cf, Depth> 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
26,352	98	Roofs, HSG D
26,352		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment WP: West Parking

Runoff = 5.74 cfs @ 12.09 hrs, Volume= 19,088 cf, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
19,247	80	>75% Grass cover, Good, HSG D
26,385	98	Paved roads w/curbs & sewers, HSG D
45,632	90	Weighted Average
19,247		42.18% Pervious Area
26,385		57.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 2R: Total Offsite

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 3.64" for 25-year event
Inflow = 42.19 cfs @ 12.89 hrs, Volume= 395,041 cf
Outflow = 42.19 cfs @ 12.89 hrs, Volume= 395,041 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond GW-1: Gravel Wetland #1

Inflow Area = 68,980 sf, 71.67% Impervious, Inflow Depth > 7.91" for 25-year event
Inflow = 20.11 cfs @ 12.09 hrs, Volume= 45,471 cf
Outflow = 7.42 cfs @ 12.32 hrs, Volume= 40,430 cf, Atten= 63%, Lag= 14.1 min
Primary = 7.42 cfs @ 12.32 hrs, Volume= 40,430 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 137.96' @ 12.32 hrs Surf.Area= 10,450 sf Storage= 25,038 cf
Flood Elev= 139.50' Surf.Area= 13,553 sf Storage= 43,583 cf

Plug-Flow detention time= 442.8 min calculated for 40,378 cf (89% of inflow)
Center-of-Mass det. time= 400.0 min (1,160.2 - 760.3)

Volume	Invert	Avail.Storage	Storage Description
#1	132.50'	43,583 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
132.50	5,152	0.0	0	0
134.85	5,152	40.0	4,843	4,843
135.50	5,836	10.0	357	5,200
136.00	6,681	100.0	3,129	8,329
137.00	8,494	100.0	7,588	15,917
138.00	10,525	100.0	9,510	25,426
139.00	12,675	100.0	11,600	37,026
139.50	13,553	100.0	6,557	43,583

Device	Routing	Invert	Outlet Devices
#1	Primary	135.20'	**24.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.20' / 135.15' S= 0.0026 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	135.20'	**2.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	137.25'	**4.0' long x 0.60' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	138.50'	**4.0" x 4.0" Horiz. Orifice/Grate X 106.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.39 cfs @ 12.32 hrs HW=137.96' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 7.39 cfs of 17.21 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 7.85 fps)
  - **3=Sharp-Crested Rectangular Weir** (Orifice Controls 7.13 cfs @ 3.06 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond IC: Infiltration Facility C

Inflow Area = 148,366 sf, 96.82% Impervious, Inflow Depth > 4.49" for 25-year event
Inflow = 8.92 cfs @ 12.08 hrs, Volume= 55,499 cf
Outflow = 6.78 cfs @ 12.16 hrs, Volume= 55,515 cf, Atten= 24%, Lag= 4.4 min
Discarded = 0.44 cfs @ 8.20 hrs, Volume= 30,427 cf
Primary = 6.34 cfs @ 12.16 hrs, Volume= 25,088 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 139.30' @ 12.16 hrs Surf.Area= 8,406 sf Storage= 10,717 cf
Flood Elev= 139.30' Surf.Area= 8,406 sf Storage= 10,706 cf

Plug-Flow detention time= 84.1 min calculated for 55,451 cf (100% of inflow)
Center-of-Mass det. time= 84.3 min (857.3 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	137.00'	5,865 cf	**41.50'W x 202.56'L x 2.33'H Field A** 19,615 cf Overall - 4,953 cf Embedded = 14,661 cf x 40.0% Voids
#2A	137.50'	4,953 cf	**ADS_StormTech SC-310 +Cap** x 336 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Rows of 28 Chambers
		10,818 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	138.00'	**18.0" Round Culvert** L= 130.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.00' / 136.00' S= 0.0154 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	137.00'	**2.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.44 cfs @ 8.20 hrs HW=137.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=6.30 cfs @ 12.16 hrs HW=139.30' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 6.30 cfs @ 3.88 fps)

Pond IC: Infiltration Facility C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

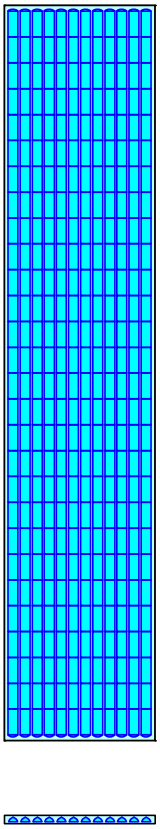
28 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 200.56' Row Length +12.0" End Stone x 2 = 202.56' Base Length
12 Rows x 34.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 41.50' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

336 Chambers x 14.7 cf = 4,953.3 cf Chamber Storage

19,614.6 cf Field - 4,953.3 cf Chambers = 14,661.3 cf Stone x 40.0% Voids = 5,864.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,817.8 cf = 0.248 af
Overall Storage Efficiency = 55.2%
Overall System Size = 202.56' x 41.50' x 2.33'

336 Chambers
726.5 cy Field
543.0 cy Stone



Summary for Pond PDMH-06: PDMH-06

Inflow Area = 122,014 sf, 96.13% Impervious, Inflow Depth > 5.70" for 25-year event
Inflow = 16.52 cfs @ 12.09 hrs, Volume= 57,971 cf
Outflow = 16.52 cfs @ 12.09 hrs, Volume= 57,971 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.34 cfs @ 12.08 hrs, Volume= 42,821 cf
Secondary = 11.19 cfs @ 12.09 hrs, Volume= 15,150 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 141.03' @ 12.09 hrs
Flood Elev= 143.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.50'	**12.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.50' / 137.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	138.55'	**18.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 137.50' S= 0.0420 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.98 cfs @ 12.08 hrs HW=140.91' TW=139.18' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.98 cfs @ 6.33 fps)

Secondary OutFlow Max=10.92 cfs @ 12.09 hrs HW=140.95' TW=137.36' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 10.92 cfs @ 6.18 fps)

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 3.64" for 25-year event
Inflow = 42.19 cfs @ 12.89 hrs, Volume= 395,041 cf
Primary = 42.19 cfs @ 12.89 hrs, Volume= 395,041 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment AP: Additional parking Runoff Area=122,014 sf 96.13% Impervious Runoff Depth>8.08"
Tc=6.0 min CN=97 Runoff=23.26 cfs 82,166 cf

Subcatchment DW: Direct to Wetland Runoff Area=1,084,691 sf 0.43% Impervious Runoff Depth=5.90"
Flow Length=2,362' Slope=0.0017 '/' Tc=69.5 min CN=77 Runoff=61.73 cfs 533,451 cf

Subcatchment ER: Entrance Road Runoff Area=23,348 sf 98.74% Impervious Runoff Depth>8.14"
Tc=6.0 min CN=98 Runoff=4.46 cfs 15,841 cf

Subcatchment R: Roof Runoff Area=26,352 sf 100.00% Impervious Runoff Depth>8.14"
Tc=6.0 min CN=98 Runoff=5.04 cfs 17,880 cf

Subcatchment WP: West Parking Runoff Area=45,632 sf 57.82% Impervious Runoff Depth>7.43"
Tc=6.0 min CN=90 Runoff=8.34 cfs 28,246 cf

Reach 2R: Total Offsite Inflow=68.12 cfs 638,943 cf
Outflow=68.12 cfs 638,943 cf

Pond GW-1: Gravel Wetland #1 Peak Elev=138.58' Storage=31,871 cf Inflow=28.66 cfs 69,704 cf
Outflow=21.92 cfs 64,657 cf

Pond IC: Infiltration Facility C Peak Elev=142.34' Storage=10,818 cf Inflow=12.57 cfs 74,428 cf
Discarded=0.44 cfs 33,607 cf Primary=15.85 cfs 40,835 cf Outflow=16.28 cfs 74,441 cf

Pond PDMH-06: PDMH-06 Peak Elev=142.85' Inflow=23.26 cfs 82,166 cf
Primary=7.55 cfs 56,548 cf Secondary=16.04 cfs 25,617 cf Outflow=23.26 cfs 82,166 cf

Link PA1: Inflow=68.12 cfs 638,943 cf
Primary=68.12 cfs 638,943 cf

Total Runoff Area = 1,302,037 sf Runoff Volume = 677,583 cf Average Runoff Depth = 6.24"
84.81% Pervious = 1,104,309 sf 15.19% Impervious = 197,728 sf

Summary for Subcatchment AP: Additional parking area

Runoff = 23.26 cfs @ 12.09 hrs, Volume= 82,166 cf, Depth> 8.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

Area (sf)	CN	Description
4,720	80	>75% Grass cover, Good, HSG D
84,164	98	Paved parking, HSG D
33,130	98	Roofs, HSG D
122,014	97	Weighted Average
4,720		3.87% Pervious Area
117,294		96.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment DW: Direct to Wetland

Runoff = 61.73 cfs @ 12.91 hrs, Volume= 533,451 cf, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

	Area (sf)	CN	Description
	6,761	30	Brush, Good, HSG A
	878	48	Brush, Good, HSG B
	15,473	73	Brush, Good, HSG D
	13,695	89	Dirt roads, HSG D
	1,434	91	Gravel roads, HSG D
	270	98	Paved roads w/curbs & sewers, HSG A
	2,827	98	Paved roads w/curbs & sewers, HSG D
*	173	78	Wetlands, HSG A
*	720,013	78	Wetlands, HSG D
	14,687	30	Woods, Good, HSG A
	200	55	Woods, Good, HSG B
	247,105	77	Woods, Good, HSG D
	596	61	>75% Grass cover, Good, HSG B
	59,032	80	>75% Grass cover, Good, HSG D
	1,547	98	Unconnected roofs, HSG D
	1,084,691	77	Weighted Average
	1,080,047		99.57% Pervious Area
	4,644		0.43% Impervious Area
	1,547		33.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	5	0.0017	0.01		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.35"
3.6	45	0.0017	0.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.6	341	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	51	0.0017	3.51	11.02	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
48.2	1,920	0.0017	0.66		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
69.5	2,362	Total			

Summary for Subcatchment ER: Entrance Road

Runoff = 4.46 cfs @ 12.09 hrs, Volume= 15,841 cf, Depth> 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

Area (sf)	CN	Description
295	80	>75% Grass cover, Good, HSG D
23,053	98	Paved roads w/curbs & sewers, HSG D
23,348	98	Weighted Average
295		1.26% Pervious Area
23,053		98.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment R: Roof

Runoff = 5.04 cfs @ 12.09 hrs, Volume= 17,880 cf, Depth> 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

Area (sf)	CN	Description
26,352	98	Roofs, HSG D
26,352		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment WP: West Parking

Runoff = 8.34 cfs @ 12.09 hrs, Volume= 28,246 cf, Depth> 7.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.68"

Area (sf)	CN	Description
19,247	80	>75% Grass cover, Good, HSG D
26,385	98	Paved roads w/curbs & sewers, HSG D
45,632	90	Weighted Average
19,247		42.18% Pervious Area
26,385		57.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach 2R: Total Offsite

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 5.89" for 100-year event
Inflow = 68.12 cfs @ 12.86 hrs, Volume= 638,943 cf
Outflow = 68.12 cfs @ 12.86 hrs, Volume= 638,943 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond GW-1: Gravel Wetland #1

Inflow Area = 68,980 sf, 71.67% Impervious, Inflow Depth > 12.13" for 100-year event
Inflow = 28.66 cfs @ 12.10 hrs, Volume= 69,704 cf
Outflow = 21.92 cfs @ 12.20 hrs, Volume= 64,657 cf, Atten= 24%, Lag= 6.4 min
Primary = 21.92 cfs @ 12.20 hrs, Volume= 64,657 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 138.58' @ 12.20 hrs Surf.Area= 11,768 sf Storage= 31,871 cf
Flood Elev= 139.50' Surf.Area= 13,553 sf Storage= 43,583 cf

Plug-Flow detention time= 315.8 min calculated for 64,573 cf (93% of inflow)
Center-of-Mass det. time= 283.8 min (1,038.9 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	132.50'	43,583 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
132.50	5,152	0.0	0	0
134.85	5,152	40.0	4,843	4,843
135.50	5,836	10.0	357	5,200
136.00	6,681	100.0	3,129	8,329
137.00	8,494	100.0	7,588	15,917
138.00	10,525	100.0	9,510	25,426
139.00	12,675	100.0	11,600	37,026
139.50	13,553	100.0	6,557	43,583

Device	Routing	Invert	Outlet Devices
#1	Primary	135.20'	**24.0" Round Culvert** L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.20' / 135.15' S= 0.0026 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	135.20'	**2.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	137.25'	**4.0' long x 0.60' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 1	138.50'	**4.0" x 4.0" Horiz. Orifice/Grate X 106.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=21.54 cfs @ 12.20 hrs HW=138.58' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 21.54 cfs of 22.85 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.30 cfs @ 8.71 fps)
  - **3=Sharp-Crested Rectangular Weir** (Orifice Controls 11.53 cfs @ 4.95 fps)
  - **4=Orifice/Grate** (Weir Controls 9.72 cfs @ 0.90 fps)

Summary for Pond IC: Infiltration Facility C

Inflow Area = 148,366 sf, 96.82% Impervious, Inflow Depth > 6.02" for 100-year event
Inflow = 12.57 cfs @ 12.08 hrs, Volume= 74,428 cf
Outflow = 16.28 cfs @ 12.10 hrs, Volume= 74,441 cf, Atten= 0%, Lag= 1.2 min
Discarded = 0.44 cfs @ 6.75 hrs, Volume= 33,607 cf
Primary = 15.85 cfs @ 12.10 hrs, Volume= 40,835 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 142.34' @ 12.10 hrs Surf.Area= 8,406 sf Storage= 10,818 cf
Flood Elev= 139.30' Surf.Area= 8,406 sf Storage= 10,706 cf

Plug-Flow detention time= 81.5 min calculated for 74,355 cf (100% of inflow)
Center-of-Mass det. time= 81.7 min (854.6 - 772.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	137.00'	5,865 cf	**41.50'W x 202.56'L x 2.33'H Field A** 19,615 cf Overall - 4,953 cf Embedded = 14,661 cf x 40.0% Voids
#2A	137.50'	4,953 cf	**ADS_StormTech SC-310 +Cap** x 336 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Rows of 28 Chambers
		10,818 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	138.00'	**18.0" Round Culvert** L= 130.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.00' / 136.00' S= 0.0154 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	137.00'	**2.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.44 cfs @ 6.75 hrs HW=137.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=15.76 cfs @ 12.10 hrs HW=142.29' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 15.76 cfs @ 8.92 fps)

Pond IC: Infiltration Facility C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

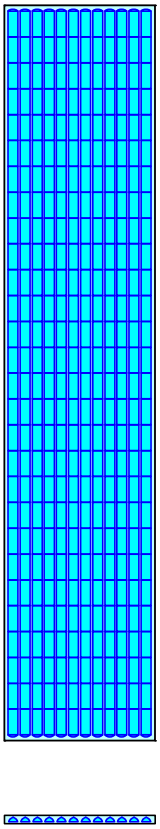
28 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 200.56' Row Length +12.0" End Stone x 2 = 202.56' Base Length
12 Rows x 34.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 41.50' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

336 Chambers x 14.7 cf = 4,953.3 cf Chamber Storage

19,614.6 cf Field - 4,953.3 cf Chambers = 14,661.3 cf Stone x 40.0% Voids = 5,864.5 cf Stone Storage

Chamber Storage + Stone Storage = 10,817.8 cf = 0.248 af
Overall Storage Efficiency = 55.2%
Overall System Size = 202.56' x 41.50' x 2.33'

336 Chambers
726.5 cy Field
543.0 cy Stone



Summary for Pond PDMH-06: PDMH-06

Inflow Area = 122,014 sf, 96.13% Impervious, Inflow Depth > 8.08" for 100-year event
Inflow = 23.26 cfs @ 12.09 hrs, Volume= 82,166 cf
Outflow = 23.26 cfs @ 12.09 hrs, Volume= 82,166 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.55 cfs @ 12.08 hrs, Volume= 56,548 cf
Secondary = 16.04 cfs @ 12.12 hrs, Volume= 25,617 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 142.85' @ 12.12 hrs
Flood Elev= 143.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.50'	**12.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.50' / 137.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	138.55'	**18.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 137.50' S= 0.0420 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.77 cfs @ 12.08 hrs HW=142.60' TW=141.02' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.77 cfs @ 6.07 fps)

Secondary OutFlow Max=15.89 cfs @ 12.12 hrs HW=142.79' TW=138.36' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 15.89 cfs @ 8.99 fps)

Summary for Link PA1:

Inflow Area = 1,302,037 sf, 15.19% Impervious, Inflow Depth = 5.89" for 100-year event
Inflow = 68.12 cfs @ 12.86 hrs, Volume= 638,943 cf
Primary = 68.12 cfs @ 12.86 hrs, Volume= 638,943 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Hydrograph for Pond GW-1: Gravel Wetland #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
5.00	0.11	10	132.50	0.00
6.00	0.13	443	132.71	0.00
7.00	0.20	1,030	133.00	0.00
8.00	0.27	1,860	133.40	0.00
9.00	0.41	3,062	133.99	0.00
10.00	0.57	4,829	134.84	0.00
11.00	0.97	7,175	135.82	0.12
12.00	**18.47**	**21,812**	**137.64**	**3.43**
13.00	**1.50**	**21,719**	**137.63**	**3.31**
14.00	0.72	19,420	137.39	0.95
15.00	0.53	18,955	137.34	0.61
16.00	0.37	18,688	137.31	0.45
17.00	0.29	18,478	137.29	0.34
18.00	0.23	18,309	137.27	0.28
19.00	0.20	18,161	137.26	0.24
20.00	0.18	18,019	137.24	0.23
21.00	0.16	17,819	137.22	0.23
22.00	0.15	17,568	137.19	0.23
23.00	0.13	17,269	137.16	0.22
24.00	0.12	16,922	137.12	0.22
25.00	0.00	16,175	137.03	0.22
26.00	0.00	15,409	136.94	0.21
27.00	0.00	14,664	136.85	0.20
28.00	0.00	13,940	136.76	0.20
29.00	0.00	13,238	136.67	0.19
30.00	0.00	12,557	136.59	0.19
31.00	0.00	11,900	136.50	0.18
32.00	0.00	11,265	136.42	0.17
33.00	0.00	10,654	136.33	0.17
34.00	0.00	10,067	136.25	0.16
35.00	0.00	9,504	136.17	0.15
36.00	0.00	8,966	136.09	0.15
37.00	0.00	8,454	136.02	0.14
38.00	0.00	7,967	135.95	0.13
39.00	0.00	7,507	135.88	0.12
40.00	0.00	7,075	135.81	0.12
41.00	0.00	6,669	135.74	0.11
42.00	0.00	6,292	135.68	0.10
43.00	0.00	5,943	135.62	0.09
44.00	0.00	5,622	135.57	0.08
45.00	0.00	5,332	135.52	0.08
46.00	0.00	5,106	135.34	0.03
47.00	0.00	5,059	135.25	0.01
48.00	0.00	5,047	135.23	0.00

655A
HSG B/D

626B
HSG A

23A
HSG A/D

52A
HSG B/D

23A
HSG A/D

POST
ER

POST
POND
GW-1

POST
WP

POST
POND
IC

POST
POND
PDMH-06

POST
AP

POST
R

POST
DW

PA-1

FRIGHT STREET
(private-40' wide)

CURRY STREET
(public-60' wide)

WILSON STREET
(public-40' wide)

COLBY STREET
(public-40' wide)

LEGEND

- POST-DEVELOPMENT WATERSHED BOUNDARY
- WEB SOIL SURVEY BOUNDARIES
- LONGEST FLOW PATH
- POST 1.0 — PRE DEVELOPMENT WATERSHED AREA DESIGNATION
- POST POND 1 — POST-DEVELOPMENT POND DESIGNATION
- PA-1 — POINT OF ANALYSIS
- POST REACH 1 — POST-DEVELOPMENT REACH DESIGNATION

Tighe&Bond

N

SCALE IN FEET
0 80' 160'
GRAPHIC SCALE

Shinglemill Multi-Family Development

Jones Street Residential

Pond Street
Rockland,
Massachusetts

MARK	DATE	DESCRIPTION
A	7/13/2020	Submitted for Special ZBA Permit

PROJECT NO:	J5019-002
DATE:	7/13/2020
FILE:	J5019-002-C-WSHD.DWG
DRAWN BY:	CML
CHECKED:	PMC
APPROVED:	BLM

POST-DEVELOPMENT WATERSHED PLAN

SCALE: AS SHOWN

C-802

Last Save Date: July 13, 2020 12:22 PM By: NAHANSEN
Plot Date: Monday, July 13, 2020 12:22 PM By: Neil A. Hansen
File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-WSHD.DWG Layout Tab: Post

2.4 Peak Rate Comparisons

The following table summarizes and compares the pre- and post-development peak runoff rates and total volume for the 2-year, 10-year, 25-year and 100-year storm events.

Table 1.2 – Comparison of Peak Flow Rates & Total Volume						
	Existing Conditions		Proposed Conditions		Net Change	
Storm Frequency	Peak Runoff (CFS)	Total Volume (CF)	Peak Runoff (CFS)	Total Volume (CF)	Peak Runoff (CFS)	Total Volume (CF)
2-Year	16.06	143,234	14.56	142,235	-1.50	-999
10-Year	32.35	280,070	29.88	279,729	-2.47	-341
25-Year	45.95	395,550	42.19	395,041	-3.76	-509
100-Year	74.10	640,341	68.12	638,943	-5.98	-1,398

2.5 Mitigation Description

2.0.1 Mitigation Calculations

The proposed project area has been evaluated to provide treatment for the required water quality volume (WQV) and groundwater recharge volume (GRV) per the requirements of the Massachusetts DEP Stormwater Handbook. These calculations have been provided above. The required groundwater recharge volumes (GRV) and water quality volumes (WQV) have been provided below outlets.

2.0.2 Pre-Treatment Methods for Protecting Water Quality

Pre-treatment for the proposed gravel wetland is provided by deep sump catchbasins with hoods and a sediment forebay. Pre-treatment for the underground infiltration chamber system includes deep sump catchbasins with hoods and proprietary separators.

2.0.3 Treatment Methods for Protecting Water Quality

Treatment for the increased impervious area comes from one gravel wetland and one subsurface infiltration chamber system. Water quality volume (WQV) calculations for each treatment system are below:

Table 2.5.1 – Proposed Treatment Areas Water Quality Volume Calculations	
DESCRIPTION	VALUE
On-Site Required Water Quality Volume	**17,738 CF**
Water Quality Volume, Gravel Wetland	**13,850 CF**
Water Quality Volume, Infiltration Chambers	**4,976 CF**
Total Water Quality Volume	**18,826 CF**

Stage-Area-Storage for Pond GW-1: Gravel Wetland #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
132.50	5,152	0
132.52	5,152	41
132.54	5,152	82
132.56	5,152	124
132.58	5,152	165
132.60	5,152	206
132.62	5,152	247
132.64	5,152	289
132.66	5,152	330
132.68	5,152	371
132.70	5,152	412
132.72	5,152	453
132.74	5,152	495
132.76	5,152	536
132.78	5,152	577
132.80	5,152	618
132.82	5,152	659
132.84	5,152	701
132.86	5,152	742
132.88	5,152	783
132.90	5,152	824
132.92	5,152	866
132.94	5,152	907
132.96	5,152	948
132.98	5,152	989
133.00	5,152	1,030
133.02	5,152	1,072
133.04	5,152	1,113
133.06	5,152	1,154
133.08	5,152	1,195
133.10	5,152	1,236
133.12	5,152	1,278
133.14	5,152	1,319
133.16	5,152	1,360
133.18	5,152	1,401
133.20	5,152	1,443
133.22	5,152	1,484
133.24	5,152	1,525
133.26	5,152	1,566
133.28	5,152	1,607
133.30	5,152	1,649
133.32	5,152	1,690
133.34	5,152	1,731
133.36	5,152	1,772
133.38	5,152	1,814
133.40	5,152	1,855
133.42	5,152	1,896
133.44	5,152	1,937
133.46	5,152	1,978
133.48	5,152	2,020
133.50	5,152	2,061
133.52	5,152	2,102
133.54	5,152	2,143
133.56	5,152	2,184
133.58	5,152	2,226
133.60	5,152	2,267
133.62	5,152	2,308
133.64	5,152	2,349
133.66	5,152	2,391
133.68	5,152	2,432
133.70	5,152	2,473
133.72	5,152	2,514
133.74	5,152	2,555
133.76	5,152	2,597
133.78	5,152	2,638
133.80	5,152	2,679
133.82	5,152	2,720
133.84	5,152	2,761
133.86	5,152	2,803
133.88	5,152	2,844
133.90	5,152	2,885
133.92	5,152	2,926
133.94	5,152	2,968
133.96	5,152	3,009
133.98	5,152	3,050
134.00	5,152	3,091
134.02	5,152	3,132
134.04	5,152	3,174
134.06	5,152	3,215
134.08	5,152	3,256
134.10	5,152	3,297
134.12	5,152	3,338
134.14	5,152	3,380
134.16	5,152	3,421
134.18	5,152	3,462
134.20	5,152	3,503
134.22	5,152	3,545
134.24	5,152	3,586
134.26	5,152	3,627
134.28	5,152	3,668
134.30	5,152	3,709
134.32	5,152	3,751
134.34	5,152	3,792
134.36	5,152	3,833
134.38	5,152	3,874
134.40	5,152	3,916
134.42	5,152	3,957
134.44	5,152	3,998
134.46	5,152	4,039
134.48	5,152	4,080
134.50	5,152	4,122
134.52	5,152	4,163
134.54	5,152	4,204
134.56	5,152	4,245

Stage-Area-Storage for Pond GW-1: Gravel Wetland #1 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
134.58	5,152	4,286
134.60	5,152	4,328
134.62	5,152	4,369
134.64	5,152	4,410
134.66	5,152	4,451
134.68	5,152	4,493
134.70	5,152	4,534
134.72	5,152	4,575
134.74	5,152	4,616
134.76	5,152	4,657
134.78	5,152	4,699
134.80	5,152	4,740
134.82	5,152	4,781
134.84	5,152	4,822
134.86	5,163	4,848
134.88	5,184	4,858
134.90	5,205	4,869
134.92	5,226	4,879
134.94	5,247	4,890
134.96	5,268	4,900
134.98	5,289	4,911
135.00	5,310	4,921
135.02	5,331	4,932
135.04	5,352	4,943
135.06	5,373	4,953
135.08	5,394	4,964
135.10	5,415	4,975
135.12	5,436	4,986
135.14	5,457	4,997
135.16	5,478	5,008
135.18	5,499	5,019
135.20	5,520	5,030
135.22	5,541	5,041
135.24	5,562	5,052
135.26	5,583	5,063
135.28	5,604	5,074
135.30	5,626	5,085
135.32	5,647	5,097
135.34	5,668	5,108
135.36	5,689	5,119
135.38	5,710	5,131
135.40	5,731	5,142
135.42	5,752	5,154
135.44	5,773	5,165
135.46	5,794	5,177
135.48	5,815	5,188
135.50	5,836	5,200
135.52	5,870	5,317
135.54	5,904	5,435
135.56	5,937	5,553
135.58	5,971	5,672
135.60	6,005	5,792
135.62	6,039	5,912
135.64	6,073	6,034
135.66	6,106	6,155
135.68	6,140	6,278
135.70	6,174	6,401
135.72	6,208	6,525
135.74	6,242	6,649
135.76	6,275	6,774
135.78	6,309	6,900
135.80	6,343	7,027
135.82	6,377	7,154
135.84	6,411	7,282
135.86	6,444	7,410
135.88	6,478	7,540
135.90	6,512	7,670
135.92	6,546	7,800
135.94	6,580	7,931
135.96	6,613	8,063
135.98	6,647	8,196
136.00	6,681	8,329
136.02	6,717	8,463
136.04	6,754	8,598
136.06	6,790	8,733
136.08	6,826	8,870
136.10	6,862	9,006
136.12	6,899	9,144
136.14	6,935	9,282
136.16	6,971	9,421
136.18	7,007	9,561
136.20	7,044	9,702
136.22	7,080	9,843
136.24	7,116	9,985
136.26	7,152	10,128
136.28	7,189	10,271
136.30	7,225	10,415
136.32	7,261	10,560
136.34	7,297	10,706
136.36	7,334	10,852
136.38	7,370	10,999
136.40	7,406	11,147
136.42	7,442	11,295
136.44	7,479	11,444
136.46	7,515	11,594
136.48	7,551	11,745
136.50	7,588	11,896
136.52	7,624	12,048
136.54	7,660	12,201
136.56	7,696	12,355
136.58	7,733	12,509
136.60	7,769	12,664
136.62	7,805	12,820
136.64	7,841	12,976

Stage-Area-Storage for Pond GW-1: Gravel Wetland #1 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
136.66	7,878	13,134
136.68	7,914	13,291
136.70	7,950	13,450
136.72	7,986	13,609
136.74	8,023	13,770
136.76	8,059	13,930
136.78	8,095	14,092
136.80	8,131	14,254
136.82	8,168	14,417
136.84	8,204	14,581
136.86	8,240	14,745
136.88	8,276	14,911
136.90	8,313	15,076
136.92	8,349	15,243
136.94	8,385	15,410
136.96	8,421	15,578
136.98	8,458	15,747
137.00	8,494	15,917
137.02	8,535	16,087
137.04	8,575	16,258
137.06	8,616	16,430
137.08	8,656	16,603
137.10	8,697	16,776
137.12	8,738	16,951
137.14	8,778	17,126
137.16	8,819	17,302
137.18	8,860	17,479
137.20	8,900	17,656
137.22	8,941	17,835
137.24	8,981	18,014
137.26	9,022	18,194
137.28	9,063	18,375
137.30	9,103	18,556
137.32	9,144	18,739
137.34	9,185	18,922
137.36	9,225	19,106
137.38	9,266	19,291
137.40	9,306	19,477
137.42	9,347	19,663
137.44	9,388	19,851
137.46	9,428	20,039
137.48	9,469	20,228
137.50	9,510	20,418
137.52	9,550	20,608
137.54	9,591	20,800
137.56	9,631	20,992
137.58	9,672	21,185
137.60	9,713	21,379
137.62	9,753	21,573
137.64	9,794	21,769
137.66	9,834	21,965
137.68	9,875	22,162
137.70	9,916	22,360
137.72	9,956	22,559
137.74	9,997	22,758
137.76	10,038	22,959
137.78	10,078	23,160
137.80	10,119	23,362
137.82	10,159	23,565
137.84	10,200	23,768
137.86	10,241	23,973
137.88	10,281	24,178
137.90	10,322	24,384
137.92	10,363	24,591
137.94	10,403	24,798
137.96	10,444	25,007
137.98	10,484	25,216
138.00	10,525	25,426
138.02	10,568	25,637
138.04	10,611	25,849
138.06	10,654	26,062
138.08	10,697	26,275
138.10	10,740	26,489
138.12	10,783	26,705
138.14	10,826	26,921
138.16	10,869	27,138
138.18	10,912	27,356
138.20	10,955	27,574
138.22	10,998	27,794
138.24	11,041	28,014
138.26	11,084	28,235
138.28	11,127	28,458
138.30	11,170	28,680
138.32	11,213	28,904
138.34	11,256	29,129
138.36	11,299	29,355
138.38	11,342	29,581
138.40	11,385	29,808
138.42	11,428	30,036
138.44	11,471	30,265
138.46	11,514	30,495
138.48	11,557	30,726
138.50	11,600	30,957
138.52	11,643	31,190
138.54	11,686	31,423
138.56	11,729	31,657
138.58	11,772	31,892
138.60	11,815	32,128
138.62	11,858	32,365
138.64	11,901	32,603
138.66	11,944	32,841
138.68	11,987	33,080
138.70	12,030	33,320
138.72	12,073	33,562

Stage-Area-Storage for Pond GW-1: Gravel Wetland #1 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
138.74	12,116	33,803
138.76	12,159	34,046
138.78	12,202	34,290
138.80	12,245	34,534
138.82	12,288	34,780
138.84	12,331	35,026
138.86	12,374	35,273
138.88	12,417	35,521
138.90	12,460	35,769
138.92	12,503	36,019
138.94	12,546	36,270
138.96	12,589	36,521
138.98	12,632	36,773
139.00	12,675	37,026
139.02	12,710	37,280
139.04	12,745	37,535
139.06	12,780	37,790
139.08	12,815	38,046
139.10	12,851	38,303
139.12	12,886	38,560
139.14	12,921	38,818
139.16	12,956	39,077
139.18	12,991	39,336
139.20	13,026	39,596
139.22	13,061	39,857
139.24	13,096	40,119
139.26	13,132	40,381
139.28	13,167	40,644
139.30	13,202	40,908
139.32	13,237	41,172
139.34	13,272	41,437
139.36	13,307	41,703
139.38	13,342	41,970
139.40	13,377	42,237
139.42	13,413	42,505
139.44	13,448	42,773
139.46	13,483	43,043
139.48	13,518	43,313
139.50	**13,553**	**43,583**

Stage-Area-Storage for Pond IC: Infiltration Facility C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
137.00	**8,406**	0	138.04	8,406	5,223
137.02	8,406	67	138.06	8,406	5,346
137.04	8,406	134	138.08	8,406	5,468
137.06	8,406	202	138.10	8,406	5,590
137.08	8,406	269	138.12	8,406	5,710
137.10	8,406	336	138.14	8,406	5,830
137.12	8,406	403	138.16	8,406	5,949
137.14	8,406	471	138.18	8,406	6,068
137.16	8,406	538	138.20	8,406	6,185
137.18	8,406	605	138.22	8,406	6,301
137.20	8,406	672	138.24	8,406	6,416
137.22	8,406	740	138.26	8,406	6,531
137.24	8,406	807	138.28	8,406	6,644
137.26	8,406	874	138.30	8,406	6,756
137.28	8,406	941	138.32	8,406	6,867
137.30	8,406	1,009	138.34	8,406	6,976
137.32	8,406	1,076	138.36	8,406	7,085
137.34	8,406	1,143	138.38	8,406	7,192
137.36	8,406	1,210	138.40	8,406	7,298
137.38	8,406	1,278	138.42	8,406	7,403
137.40	8,406	1,345	138.44	8,406	7,506
137.42	8,406	1,412	138.46	8,406	7,608
137.44	8,406	1,479	138.48	8,406	7,708
137.46	8,406	1,547	138.50	8,406	7,806
137.48	8,406	1,614	138.52	8,406	7,902
137.50	8,406	1,681	138.54	8,406	7,996
137.52	8,406	1,818	138.56	8,406	8,087
137.54	8,406	1,954	138.58	8,406	8,176
137.56	8,406	2,090	138.60	8,406	8,262
137.58	8,406	2,226	138.62	8,406	8,346
137.60	8,406	2,362	138.64	8,406	8,427
137.62	8,406	2,497	138.66	8,406	8,507
137.64	8,406	2,632	138.68	8,406	8,584
137.66	8,406	2,766	138.70	8,406	8,660
137.68	8,406	2,901	138.72	8,406	8,735
137.70	8,406	3,034	138.74	8,406	8,809
137.72	8,406	3,168	138.76	8,406	8,881
137.74	8,406	3,300	138.78	8,406	8,952
137.76	8,406	3,433	138.80	8,406	9,022
137.78	8,406	3,565	138.82	8,406	9,091
137.80	8,406	3,696	138.84	8,406	9,159
137.82	8,406	3,827	138.86	8,406	9,226
137.84	8,406	3,957	138.88	8,406	9,293
137.86	8,406	4,086	138.90	8,406	9,361
137.88	8,406	4,215	138.92	8,406	9,428
137.90	8,406	4,344	138.94	8,406	9,495
137.92	8,406	4,471	138.96	8,406	9,562
137.94	8,406	4,599	138.98	8,406	9,630
137.96	8,406	4,725	139.00	8,406	9,697
137.98	8,406	4,851	139.02	8,406	9,764
138.00	8,406	4,976	139.04	8,406	9,831
138.02	8,406	5,100	139.06	8,406	9,899

Stage-Area-Storage for Pond IC: Infiltration Facility C (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
139.08	8,406	9,966
139.10	8,406	10,033
139.12	8,406	10,100
139.14	8,406	10,168
139.16	8,406	10,235
139.18	8,406	10,302
139.20	8,406	10,369
139.22	8,406	10,437
139.24	8,406	10,504
139.26	8,406	10,571
139.28	8,406	10,638
139.30	8,406	10,706
139.32	8,406	10,773
139.34	8,406	**10,818**
139.36	8,406	10,818
139.38	8,406	10,818
139.40	8,406	10,818
139.42	8,406	10,818
139.44	8,406	10,818
139.46	8,406	10,818
139.48	8,406	10,818
139.50	8,406	10,818
139.52	8,406	10,818
139.54	8,406	10,818
139.56	8,406	10,818
139.58	8,406	10,818
139.60	8,406	10,818
139.62	8,406	10,818
139.64	8,406	10,818
139.66	8,406	10,818
139.68	8,406	10,818
139.70	8,406	10,818
139.72	8,406	10,818
139.74	8,406	10,818
139.76	8,406	10,818
139.78	8,406	10,818
139.80	8,406	10,818
139.82	8,406	10,818
139.84	8,406	10,818
139.86	8,406	10,818
139.88	8,406	10,818
139.90	8,406	10,818
139.92	8,406	10,818
139.94	8,406	10,818
139.96	8,406	10,818
139.98	8,406	10,818
140.00	8,406	10,818
140.02	8,406	10,818
140.04	8,406	10,818
140.06	8,406	10,818
140.08	8,406	10,818
140.10	8,406	10,818
140.12	8,406	10,818
140.14	8,406	10,818
140.16	8,406	10,818
140.18	8,406	10,818
140.20	8,406	10,818
140.22	8,406	10,818
140.24	8,406	10,818
140.26	8,406	10,818
140.28	8,406	10,818
140.30	8,406	10,818
140.32	8,406	10,818
140.34	8,406	10,818
140.36	8,406	10,818
140.38	8,406	10,818
140.40	8,406	10,818
140.42	8,406	10,818
140.44	8,406	10,818
140.46	8,406	10,818
140.48	8,406	10,818
140.50	8,406	10,818
140.52	8,406	10,818
140.54	8,406	10,818
140.56	8,406	10,818
140.58	8,406	10,818
140.60	8,406	10,818
140.62	8,406	10,818
140.64	8,406	10,818
140.66	8,406	10,818
140.68	8,406	10,818
140.70	8,406	10,818
140.72	8,406	10,818
140.74	8,406	10,818
140.76	8,406	10,818
140.78	8,406	10,818
140.80	8,406	10,818
140.82	8,406	10,818
140.84	8,406	10,818
140.86	8,406	10,818
140.88	8,406	10,818
140.90	8,406	10,818
140.92	8,406	10,818
140.94	8,406	10,818
140.96	8,406	10,818
140.98	8,406	10,818
141.00	8,406	10,818
141.02	8,406	10,818
141.04	8,406	10,818
141.06	8,406	10,818
141.08	8,406	10,818
141.10	8,406	10,818
141.12	8,406	10,818
141.14	8,406	10,818

Stage-Area-Storage for Pond IC: Infiltration Facility C (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
141.16	8,406	10,818
141.18	8,406	10,818
141.20	8,406	10,818
141.22	8,406	10,818
141.24	8,406	10,818
141.26	8,406	10,818
141.28	8,406	10,818
141.30	8,406	10,818
141.32	8,406	10,818
141.34	8,406	10,818
141.36	8,406	10,818
141.38	8,406	10,818
141.40	8,406	10,818
141.42	8,406	10,818
141.44	8,406	10,818
141.46	8,406	10,818
141.48	8,406	10,818
141.50	8,406	10,818
141.52	8,406	10,818
141.54	8,406	10,818
141.56	8,406	10,818
141.58	8,406	10,818
141.60	8,406	10,818
141.62	8,406	10,818
141.64	8,406	10,818
141.66	8,406	10,818
141.68	8,406	10,818
141.70	8,406	10,818
141.72	8,406	10,818
141.74	8,406	10,818
141.76	8,406	10,818
141.78	8,406	10,818
141.80	8,406	10,818
141.82	8,406	10,818
141.84	8,406	10,818
141.86	8,406	10,818
141.88	8,406	10,818
141.90	8,406	10,818
141.92	8,406	10,818
141.94	8,406	10,818
141.96	8,406	10,818
141.98	8,406	10,818
142.00	8,406	10,818
142.02	8,406	10,818
142.04	8,406	10,818
142.06	8,406	10,818
142.08	8,406	10,818
142.10	8,406	10,818
142.12	8,406	10,818
142.14	8,406	10,818
142.16	8,406	10,818
142.18	8,406	10,818
142.20	8,406	10,818
142.22	8,406	10,818
142.24	8,406	10,818
142.26	8,406	10,818
142.28	8,406	10,818
142.30	8,406	10,818
142.32	8,406	10,818
142.34	8,406	10,818

2.6 Conclusion

Based on the HydroCAD analysis for the 2, 10, 25 and 100-year storm events, the peak rate of runoff and total runoff volume has decreased from the existing to the proposed condition. Furthermore, the required Water Quality Volume and Recharge Volume have been and infiltrated and treated thereby promoting/preserving the natural hydrologic conditions. In addition to these improvements, all 10 of the DEP Stormwater Standards have been met.

Section 3
Long Term Pollution Prevention, Operation & Maintenance Plan

It is the intent of this Long-Term Pollution Prevention, Operation and Maintenance Plan to identify the areas of this site that need special attention and consideration, as well as implementing a plan to assure routine maintenance. By identifying the areas of concern as well as implementing a frequent and routine maintenance schedule the site will maintain a high-quality stormwater runoff.

To keep the Stormwater Management System functioning properly and to ensure that the stormwater Total Suspended Solids (TSS) are reduced, a long-term pollution prevention is required. The owner/operator of the facility is responsible for the adherence to this long-term plan. The following is a guideline of the specific requirements of the plan to maintain the long-term viability of the stormwater management system.

3.1 Contact/Responsible Party

Jones Street Residential
100 High Street, Suite 2500
Boston, Massachusetts 02110

(Note: The contact information for the Contact/Responsible Party shall be kept current. If ownership changes, the Operation and Maintenance Plan must be transferred to the new party.)

3.2 Maintenance Items

Maintenance of the following items shall be recorded:

- Litter/Debris Removal
- Landscaping
- Catch basin Cleaning
- Pavement Sweeping
- Gravel Wetland Maintenance
- Underground Chamber System

The following maintenance items and schedule represent the minimum action required. Monthly site inspections shall be conducted, and all measures must be maintained in effective operating condition. The following items shall be observed during site inspection and maintenance:

- Inspect vegetated areas, particularly slopes and embankments for areas of erosion. Replant and restore as necessary
- Inspect catch basins for sediment buildup
- Inspect site for trash and debris

3.3 Overall Site Operation & Maintenance Schedule

Overall Site Operation and Maintenance Schedule		
Maintenance Item	**Frequency of Maintenance**	**Operation**
Litter/Debris Removal	Weekly	Management Company
Pavement Sweeping - Sweep impervious areas to remove sand and litter.	Annually	Parking Lot Sweeper
Sediment Forebay - Trash and debris to be removed including at check dam. - Embankment to be mowed. - Any required maintenance shall be addressed. - Inspect sediment accumulation and clean as needed.	Periodically (At least two (2) times annually)	Management Company
Gravel wetland - Trash and debris to be removed including at outlet structure. - Embankment to be mowed. - Any required maintenance shall be addressed.	Periodically (At least two (2) times annually)	Management Company
Rip Rap Aprons - Trash and debris to be removed. - Any required maintenance shall be addressed.	Annually	Management Company
Catch Basin (CB) Cleaning - CB to be cleaned of solids and oils. - Remove any accumulated debris from the grates - Inspect hood to ensure that it is properly secured.	Quarterly Inspect sumps for accumulated sediment. If sediment has reached a depth of eighteen inches (18”), remove via clamshell bucket or vacuum truck.	Vacuum Truck
Landscaping - Landscaped islands to be maintained and mulched.	Maintained as required and mulched each Spring	Management Company

Sediment Forebay Inspection/Maintenance Requirements		
Inspection/ Maintenance	**Frequency**	**Action**
Monitor Sediment Accumulation	Annually	- Install and maintain a staff gage or other measuring devise, to indicate depth of sediment accumulation and level at which clean-out is required
Visual inspection	Annually	- Remove trash and debris as needed - Remove any woody vegetation - Inspect and repair embankments - Inspect check dam
Mowing	Periodically (At least two (2) times annually)	- Embankments shall be mowed

Proprietary Separators Inspection/Maintenance Requirements		
Inspection/ Maintenance	**Frequency**	**Action**
- All operation and maintenance to follow Proprietary Separator Manufacturer's guidelines. - Sediment to be removed once it reaches approximately 15% of unit storage capacity. - Units to be cleaned immediately after an oil, fuel, or chemical spill.		
Monitor Sediment Accumulation	Quarterly	- Inspect structure for accumulated sediment and oil. Remove sediment if sediment has reached maximum depth. If oil is present, pump off oil layer.
Visual inspection	Annually	- Inspect structure for accumulated sediment and oil. Remove sediment if sediment has reached maximum depth. If oil is present, pump off oil layer.

Gravel Wetland Inspection/Maintenance Requirements		
Inspection/ Maintenance	**Frequency**	**Action**
Monitor to ensure that Gravel Wetland functions effectively after storms	Four (4) times annually (quarterly) and after any rainfall event exceeding 2.5" in a 24-hr period	- Trash and debris to be removed - Any required maintenance shall be addressed
Inspect Vegetation	Annually	- Inspect the condition of all gravel wetland vegetation - Prune back overgrowth - Replace dead vegetation - Remove any invasive species -Coordinate with UNH Stormwater Center for further vegetation management guidelines
Inspect Drawdown Time - The system shall drawdown within 48-hours following a rainfall event.	Annually	- Hire qualified professional to assess the condition of the facility to determine measures required to restore the filtration function, including but not limited to removal of accumulated sediments or reconstruction of the filter.

Additional Gravel Wetland Operation and Maintenance Requirements:

- ***1st Year Post-Construction:*** Inspection frequency shall be after every storm in the first year following construction.
- Inspect to be certain system drains within 24 - 48 hours (within the design period, but also not so quickly as to minimize stormwater treatment).
- Watering plants as necessary during the first growing season.
- Re-vegetating poorly established areas as necessary.
- Treating diseased vegetation as necessary.
- Inspect soil and repair eroded areas, especially on slopes, at a minimum quarterly.
- Check inlets, outlets, and overflow spillway for blockage, structural integrity and evidence of erosion.

Cleaning Criteria for Gravel Wetland Treatment Cells: Sediment shall be removed from the gravel wetland surface when it accumulates to a depth of several inches (>10 cm) across the wetland surface. Materials shall be removed with rakes rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment may be used if the equipment is located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments shall be dewatered (if necessary) and disposed of in accordance with all local, state and federal requirements. Removal of vegetation within the gravel wetland shall

occur every three (3) growing seasons, or the end of the summer of the third year. This is to prevent decay and release of nutrients from accumulated biomass.

Underground Chamber System Inspection/Maintenance Requirements		
Inspection/ Maintenance	**Frequency**	**Action**
Monitor inlet and outlet structures for sediment accumulation	Two (2) times annually	- Trash, debris and sediment to be removed - Any required maintenance shall be addressed
Deep Sump Catchbasins	Two (2) times annually	- Removal of sediment as warranted by inspection - No less than once annually
Monitor detention system for sediment accumulation	Two (2) times annually	- Trash, debris and sediment to be removed via vacuum truck. - Any required maintenance shall be addressed

Rip Rap Inspection/Maintenance Requirements		
Inspection/ Maintenance	**Frequency**	**Action**
General Maintenance	Two (2) times annually	- During the fall and the spring remove any accumulated leaves or large debris.
Visual Inspection	Annually	- Visually inspect for damage and deterioration - Remove any branches, trash or other large debris that could interfere with the proper operation of the inlet or outlet of the basin. Remove any accumulated sediment, by the use of hand tools (shovels, rakes, wheelbarrows, etc.) when it exceeds three-inches (3") but not less than annually. - Repair damages immediately

3.3.1 Good Housekeeping Practices

Employees shall be instructed in the importance of not spilling fluids and chemicals such as oil, antifreeze, etc. onto the bare ground. All areas exposed to the weather shall be kept clean.

3.3.2 Provisions for Storing Materials and Waste Products Inside or Under Cover

Liquid waste products shall be captured when draining from vehicles and stored in sealed containers under cover until they are disposed of. Waste products shall be disposed of in a legal manner, at a state licensed recycling center or landfill.

3.3.3 Requirements for Storage and Use of Fertilizers, Herbicides, and Pesticides

Fertilizers shall not be used within 25 feet of the wetland resource areas. Excess fertilizers shall be swept up from all impervious surfaces and not allowed to run into the drainage system.

All fertilizer, herbicides, and pesticides shall be stored at least 100 feet away from the wetland line. If stored on site, these materials should be kept in a wrapped or sealed container and kept under cover out of the rain and snow.

3.3.4 Spill Prevention and Response Plan

Oil booms shall be kept on site in a readily accessible area in the event of an oil spill. If an oil spill occurs, the booms shall be placed and secured at the overflow spillway and in front of the entrance to the Stormceptors.

First responders	Phone Numbers
Rockland Fire Department	911 if emergency or (781) 878-2123
Rockland Police Department	911 if emergency or (781) 871-3890
Mass Department of Environmental Protection Emergency Response	1-888-304-1133

3.3.5 Disposal Requirements

Disposal of debris, trash, sediment and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.

Solid waste shall be collected at a minimum of once per week and disposed of in an appropriate dumpster or garbage truck. Waste shall be disposed of in a legal manner, at a state licensed recycling center or landfill.

3.3.6 Snow & Ice Management for Standard Asphalt and Walkways

Snow storage areas shall be located such that no direct untreated discharges are possible to receiving waters from the storage site (snow storage areas have been shown on the Site Plan).

Salt shall not be used at this site.

3.3.7 Annual Updates and Log Requirements

The Owner and/or Contact/Responsible Party shall review this Operation and Maintenance Plan once per year for its effectiveness and adjust the plan and deed as necessary.

A log of all preventative and corrective measures for the stormwater system shall be kept on-site and be made available upon request by any public entity with administrative, health environmental or safety authority over the site.

Stormwater Management Report						
Project Name		**Shinglemill Apartments**				
BMP Description	**Date of Inspection**	**Inspector**	**BMP Installed and Operating Properly?**	**Cleaning / Corrective Action Needed**	**Date of Cleaning / Repair**	**Performed By**
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			
			❑Yes ❑No			

List of Figures

Figure 1 Aerial Map

Figure 2 USGS Topographic Map

Figure 3 Flood Insurance Rate Map

Figure 4 Natural Heritage Map

Figure 5 Critical Areas

Figure 6 Soil Survey Map

NOTE:
INFORMATION ON THIS PLAN WAS OBTAINED FROM MASSGIS DATABASE AERIAL PHOTOGRAPHIC IMAGES, APRIL 2008/2009.

N

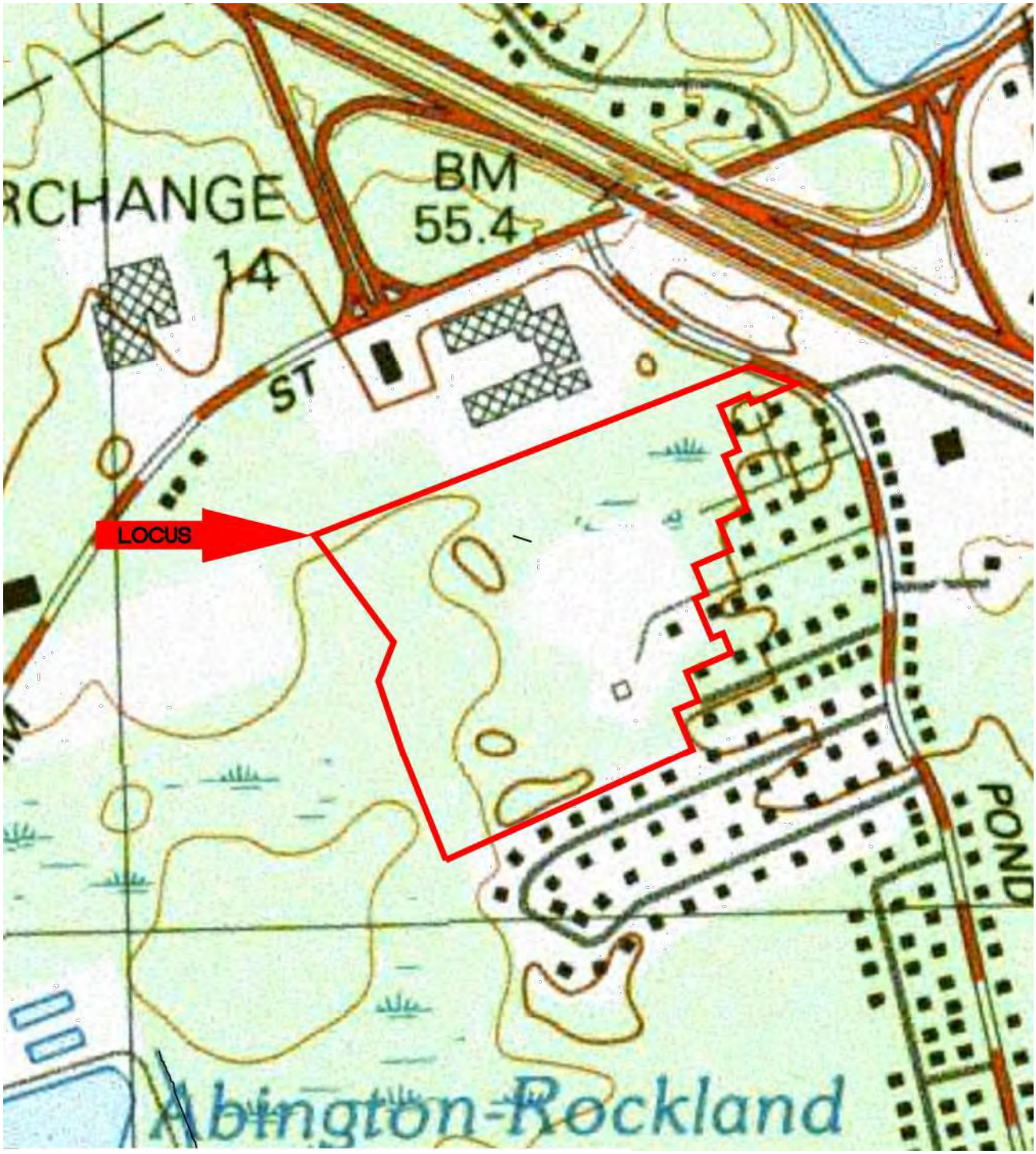
0 250' 500'

Tighe&Bond

FIGURE 1
AERIAL MAP

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020



NOTE:
INFORMATION ON THIS PLAN WAS OBTAINED FROM MASSGIS DATABASE OF SCANNED 1:25,000 USGS TOPOGRAPHIC QUAD IMAGES, JUNE 2001.

N

0 250' 500'

Tighe&Bond

FIGURE 2
USGS TOPOGRAPHIC MAP

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020

FLOOD ZONE X, AREAS BETWEEN THE LIMITS OF 100–YEAR AND 500–YEAR FLOODS

FLOODWAY AREAS IN ZONE AE

FLOOD ZONE AE, AREAS OF 100–YEAR FLOOD, BASE FLOOD ELEVATIONS DETERMINED

FLOOD ZONE A, AREAS OF 100–YEAR FLOOD, BASE FLOOD ELEVATIONS NOT DETERMINED

NOTE:
FLOOD BOUNDARY INFORMATION ON THIS PLAN WAS FOUND ON FEMA FLOOD INSURANCE RATE MAP FOR PLYMOUTH COUNTY COMMUNITY MAP NO. 25023C0092J, EFFECTIVE JULY 17, 2012, ALONG WITH UPDATED PER LETTER OF MAP REVISION 13-01-2134P EFFECTIVE APRIL 14, 2014.

N

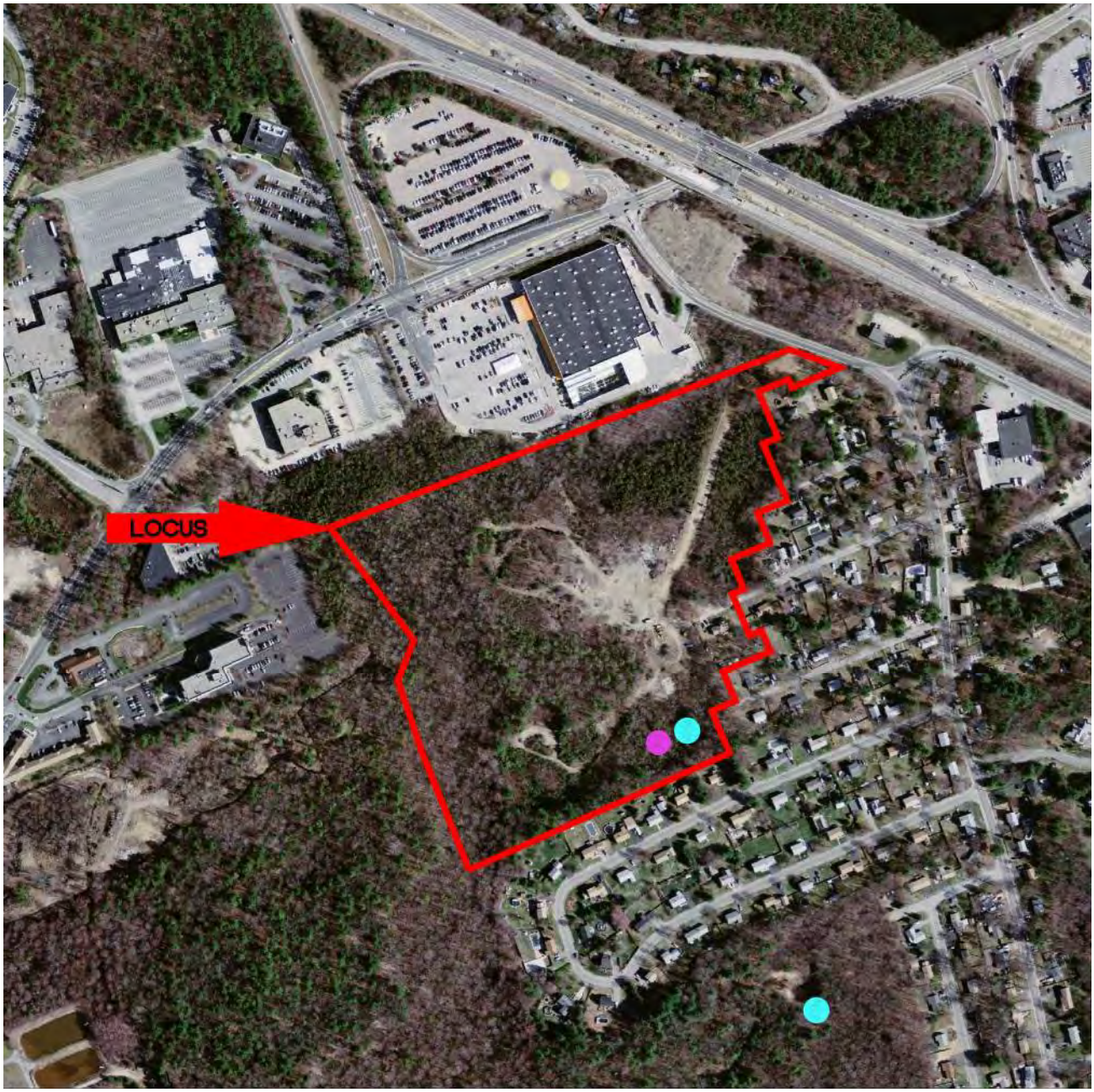
0 250' 500'

Tighe&Bond

FIGURE 3
FLOOD INSURANCE RATE MAP

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020



PRIORITY HABITAT OF RARE SPECIES

ESTIMATED HABITATS OF RARE WILDLIFE

CERTIFIED VERNAL POOLS

POTENTIAL VERNAL POOLS

NOTES:

1. **ESTIMATED HABITATS OF RARE WILDLIFE AND PRIORITY HABITATS OF RARE SPECIES CAME FROM MASSGIS DATABASE LAST UPDATED AUGUST 2017.**
2. **CERTIFIED VERNAL POOL LOCATIONS WERE TAKEN FROM MASSGIS DATABASE ON OCTOBER 4, 2019. THIS DATA IS UPDATED CONTINUALLY AND SHOWN CONDITIONS MAY VARY FROM THIS DATA.**
3. **POTENTIAL VERNAL POOL LOCATIONS WERE TAKEN FROM MASSGIS DATABASE LAST UPDATED DECEMBER 2000.**
4. **THERE ARE NO ESTIMATED HABITATS OF RARE WILDLIFE OR PRIORITY HABITATS OF RARE SPECIES ON THE PROJECT SITE.**

N

0 250' 500'

Tighe&Bond

FIGURE 4
NATURAL HERITAGE MAP

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

WELLHEAD PROTECTION AREAS

OUTSTANDING RESOURCE WATERS

SURFACE WATER SUPPLY PROTECTION

NOTES:

1. **AREAS OF CRITICAL ENVIRONMENTAL CONCERN WERE TAKEN FROM MASSGIS DATABASE, LAST UPDATED APRIL 2009.**
2. **WELLHEAD PROTECTION AREAS WERE TAKEN FROM MASSGIS DATABASE, LAST UPDATED APRIL 2019.**
3. **OUTSTANDING RESOURCE WATERS WERE TAKEN FROM MASSGIS DATABASE, LAST UPDATED MARCH 2010.**
4. **SURFACE WATER SUPPLY PROTECTION AREAS WERE TAKEN FROM MASSGIS DATABASE, LAST UPDATED APRIL 2017.**
5. **THERE ARE NO AREAS OF CRITICAL ENVIRONMENTAL CONCERN OR WELLHEAD PROTECTION AREAS ON THIS PROJECT SITE.**

N

0 250' 500'

Tighe&Bond

FIGURE 5
CRITICAL AREAS

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020

NOTE:
INFORMATION ON THIS PLAN WAS OBTAINED FROM MASSGIS DATABASE, NRCS SSURGO - CERTIFIED SOILS WHICH WAS LAST UPDATED NOVEMBER 2012.

N

0 250' 500'

FIGURE 6
SOIL SURVEY MAP

Proposed Multi-Family Development
Jones Street
Rockland, Massachusetts

July 2020

Tighe&Bond

Appendices

Appendix A Test Pit Logs

Appendix B NRCS Web Soils Map

Appendix C Pipe Sizing Calculations

PROPOSED GRAVEL WETLAND

PROPOSED RETAINING WALL

PROPOSED 5 STORY 127 UNIT BUILDING

PROPOSED RETAINING WALL

PROPOSED RETAINING WALL

PROPOSED 5 STORY 109 UNIT BUILDING

PROPOSED UNDERGROUND INFILTRATION SYSTEM

PROPOSED COMMUNITY BUILDING

B-9 TB-1 TB-2 TB-3 TB-4 TB-5 TB-6 TB-7 TB-8 TB-9 TB-10 TB-11 TB-12 TB-13 TB-14

TP-1 TP-2 TP-3 TP-4 TP-5 TP-6 TP-7 TP-8 TP-9 TP-10 TP-11 TP-12 TP-13 TP-14 TP-15 TP-16 TP-17

MGA-1 MGA-2 MGA-3 MGA-4 MGA-5 MGA-6 MGA-7 MGA-8 MGA-9 MGA-10 MGA-11 MGA-12/12A

SH-1 SH-2 SH-3 SH-4

LEGEND

TB-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY TIGHE & BOND
TP-1	APPROXIMATE LOCATION OF TEST PITS PERFORMED BY TIGHE & BOND
SH-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY SANBORN HEAD
MGA-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY McARDLE GANNON ASSOCIATES
	APPROXIMATE EXTENT OF AREA OF LIQUEFACTION SUSCEPTIBLE SOIL (NATURALLY DEPOSITED SOIL WITH FACTOR OF SAFETY AGAINST LIQUEFACTION LESS THAN, OR EQUAL TO ONE)

NOTES:

1. PLAN OBTAINED AND PREPARED BY CONECO ENGINEERS & SCIENTISTS TITLED "SITE LAYOUT PLAN" DATED MAY 14, 2020.
2. HORIZONTAL DATUM IS NAD83. VERTICAL DATUM IS NAVD88.
3. CONTOUR LINES INDICATE EXISTING GROUND SURFACE.
4. BORINGS LOCATIONS BASED ON TAPING AND LINE OF SIGHT FROM EXISTING SITE FEATURES. LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
5. TIGHE & BOND BORINGS DRILLED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH, BETWEEN JUNE 3 AND JUNE 10, 2020. BORINGS WERE OBSERVED BY A TIGHE & BOND REPRESENTATIVE ON A FULL TIME BASIS. REFER TO BORING LOGS IN APPENDIX B FOR MORE DETAILED INFORMATION.
6. TIGHE & BOND TEST PITS EXCAVATED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH, BETWEEN JUNE 3 AND JUNE 5, 2020. TEST PITS WERE OBSERVED BY A TIGHE & BOND REPRESENTATIVE ON A FULL TIME BASIS. REFER TO TEST PIT LOGS IN APPENDIX C FOR MORE DETAILED INFORMATION.
7. SOIL LIQUEFACTION SUSCEPTIBILITY EVALUATED BASED ON EXPLORATIONS BY TIGHE & BOND AS WELL AS PREVIOUS BORINGS.

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

PROPOSED MULTIFAMILY RESIDENTIAL DEVELOPMENT
ROCKLAND, MASSACHUSETTS

EXPLORATION LOCATION PLAN

FIGURE:	2
DATE:	8/31/2020
DRAWN BY:	CML
CHECKED BY:	MR
APPROVED BY:	MAA

Tighe&Bond
Engineers | Environmental Specialists

Last Save Date: September 1, 2020 12:19 AM By: CML
Plot Date: September 01, 2020 7:19 AM By: Craig M. Langton
File Location: J:\J\J5019 Jones Street\002 Pond St, Rockland\Drawings, Figures\AutoCAD\Sheet\J5019-002-C-Borings.dwg Layout Tab: Borings

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-8**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	138±
Weather	77 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	15:40
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	16:15

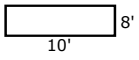
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5%)	
1'				E	A (5%)	
2'	Light brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, dry	S-1	0.0	E	A (5%)	
3'				E	A (5-10%)	
4'				E	A (5%)	1
5'	4.9'					
	Light brown, fine to coarse SAND and SILT, trace fine Gravel, wet	S-2		E	A (5%)	
6'			0.0	E	A (5%)	
7'				E	A (5%)	2
8'	8'					
	Bottom of exploration at 8 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

2) Bottom of exploration at 8 feet below grade due to sidewall collapse.

Test Pit Plan



Volume = 22.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

J:\J\J5019 Jones Street\002 Pond St, Rockland\Environmental\Test Pits\Explorations\[Test Pit Log TP-7.xls]TP-8

Map Scale: 1:3,980 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 0.0050
- > 0.0050 and <= 1.4588
- > 1.4588 and <= 5.6865
- > 5.6865 and <= 10.0000
- > 10.0000 and <= 31.9144
- Not rated or not available

Soil Rating Lines

- <= 0.0050
- > 0.0050 and <= 1.4588
- > 1.4588 and <= 5.6865
- > 5.6865 and <= 10.0000
- > 10.0000 and <= 31.9144
- Not rated or not available

Soil Rating Points

- <= 0.0050
- > 0.0050 and <= 1.4588
- > 1.4588 and <= 5.6865
- > 5.6865 and <= 10.0000
- > 10.0000 and <= 31.9144
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 12, Sep 12, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 26, 2014—Sep 4, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
23A	Tihonet coarse sand, 0 to 3 percent slopes	31.9144	9.8	16.5%
52A	Freetown muck, 0 to 1 percent slopes	1.4588	21.4	35.8%
427B	Newfields fine sandy loam, 3 to 8 percent slopes, extremely stony	5.6865	2.5	4.1%
453B	Gloucester - Canton complex, 3 to 8 percent slopes, extremely bouldery	4.4243	0.1	0.2%
619A	Deerfield-Urban land complex, 0 to 3 percent slopes	0.0050	2.1	3.4%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.0050	11.6	19.4%
640B	Urban land, till substratum, 0 to 8 percent slopes		6.7	11.2%
655A	Udorthents, wet substratum, 0 to 3 percent slopes	10.0000	5.0	8.3%
659B	Udorthents, 0 to 8 percent slopes, gravelly	10.0000	0.7	1.1%
Totals for Area of Interest			**59.8**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

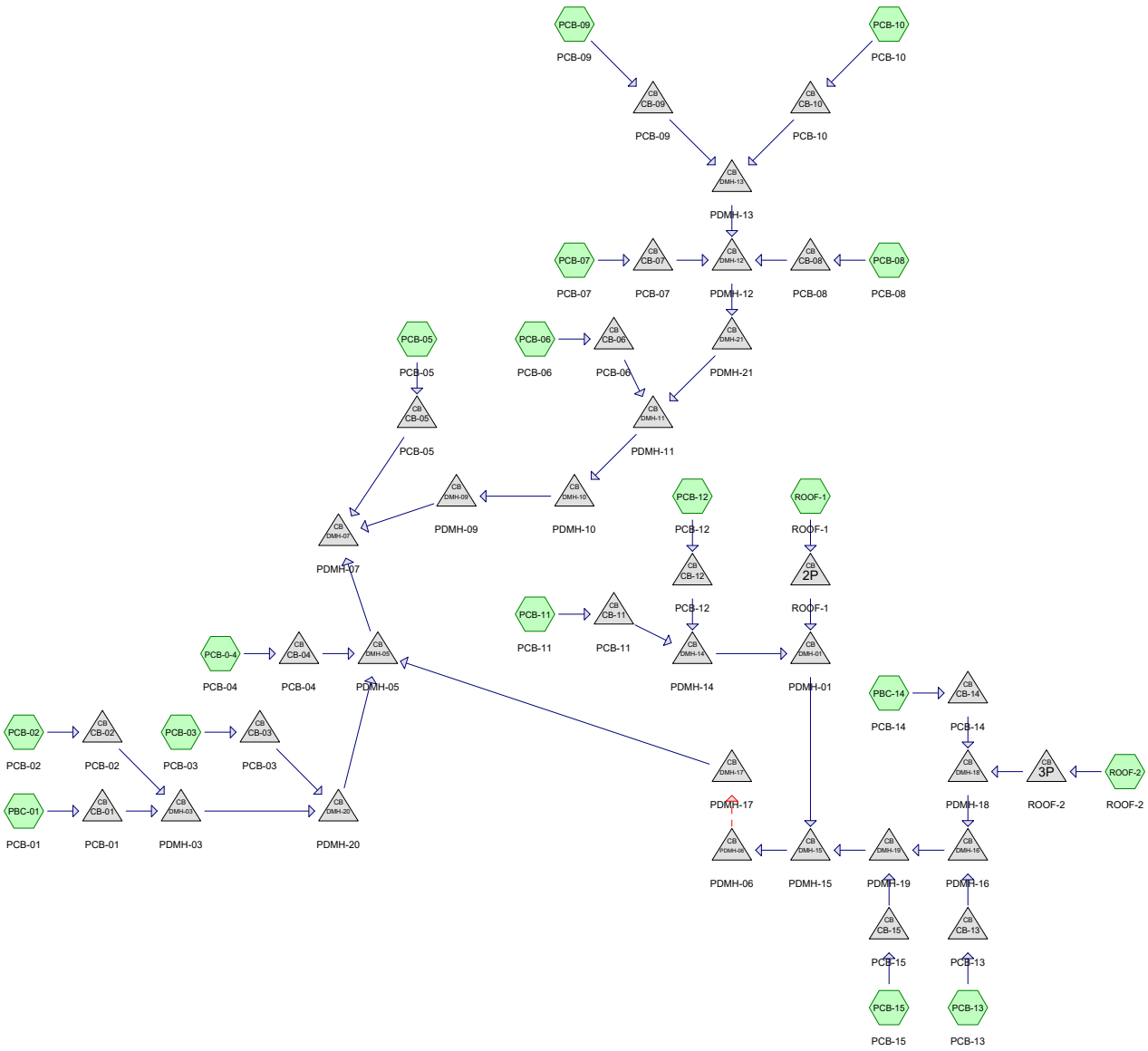
Aggregation Method: Minimum or Maximum

Component Percent Cutoff: None Specified

Tie-break Rule: Slowest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)



Subcat Reach Pond Link

Routing Diagram for J5019-002_Pipe Sizing
Prepared by Tighe & Bond, Printed 9/1/2020
HydroCAD® 10.00-20 s/n 03436 © 2017 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.10 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPBC-01: PCB-01 Runoff Area=5,500 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.70 cfs 2,728 cf

SubcatchmentPBC-14: PCB-14 Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=1.27 cfs 4,960 cf

SubcatchmentPCB-0-4: PCB-04 Runoff Area=7,400 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.94 cfs 3,670 cf

SubcatchmentPCB-02: PCB-02 Runoff Area=3,400 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.43 cfs 1,686 cf

SubcatchmentPCB-03: PCB-03 Runoff Area=4,300 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.55 cfs 2,133 cf

SubcatchmentPCB-05: PCB-05 Runoff Area=7,600 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.97 cfs 3,769 cf

SubcatchmentPCB-06: PCB-06 Runoff Area=5,250 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.67 cfs 2,604 cf

SubcatchmentPCB-07: PCB-07 Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.45 cfs 1,736 cf

SubcatchmentPCB-08: PCB-08 Runoff Area=3,350 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.43 cfs 1,662 cf

SubcatchmentPCB-09: PCB-09 Runoff Area=5,150 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.66 cfs 2,554 cf

SubcatchmentPCB-10: PCB-10 Runoff Area=5,750 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.73 cfs 2,852 cf

SubcatchmentPCB-11: PCB-11 Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=2.55 cfs 9,919 cf

SubcatchmentPCB-12: PCB-12 Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=2.55 cfs 9,919 cf

SubcatchmentPCB-13: PCB-13 Runoff Area=10,400 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=1.32 cfs 5,158 cf

SubcatchmentPCB-15: PCB-15 Runoff Area=15,000 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=1.91 cfs 7,440 cf

SubcatchmentROOF-1: ROOF-1 Runoff Area=30,096 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=3.83 cfs 14,927 cf

SubcatchmentROOF-2: ROOF-2 Runoff Area=3,085 sf 100.00% Impervious Runoff Depth=5.95"
Tc=3.0 min CN=98 Runoff=0.39 cfs 1,530 cf

Pond 2P: ROOF-1 Peak Elev=141.04' Inflow=3.83 cfs 14,927 cf
12.0" Round Culvert n=0.013 L=33.0' S=0.0152 '/' Outflow=3.83 cfs 14,927 cf

Pond 3P: ROOF-2 Peak Elev=141.05' Inflow=0.39 cfs 1,530 cf
6.0" Round Culvert n=0.013 L=14.0' S=0.0107 '/' Outflow=0.39 cfs 1,530 cf

Pond CB-01: PCB-01 Peak Elev=139.57' Inflow=0.70 cfs 2,728 cf
12.0" Round Culvert n=0.013 L=25.0' S=0.0060 '/' Outflow=0.70 cfs 2,728 cf

Pond CB-02: PCB-02 Peak Elev=139.57' Inflow=0.43 cfs 1,686 cf
12.0" Round Culvert n=0.013 L=7.0' S=0.0071 '/' Outflow=0.43 cfs 1,686 cf

Pond CB-03: PCB-03 Peak Elev=139.54' Inflow=0.55 cfs 2,133 cf
12.0" Round Culvert n=0.013 L=4.0' S=0.0125 '/' Outflow=0.55 cfs 2,133 cf

Pond CB-04: PCB-04 Peak Elev=139.47' Inflow=0.94 cfs 3,670 cf
12.0" Round Culvert n=0.013 L=8.0' S=0.0062 '/' Outflow=0.94 cfs 3,670 cf

Pond CB-05: PCB-05 Peak Elev=138.09' Inflow=0.97 cfs 3,769 cf
12.0" Round Culvert n=0.013 L=63.0' S=0.0103 '/' Outflow=0.97 cfs 3,769 cf

Pond CB-06: PCB-06 Peak Elev=138.57' Inflow=0.67 cfs 2,604 cf
12.0" Round Culvert n=0.013 L=14.0' S=0.0071 '/' Outflow=0.67 cfs 2,604 cf

Pond CB-07: PCB-07 Peak Elev=139.62' Inflow=0.45 cfs 1,736 cf
12.0" Round Culvert n=0.013 L=7.0' S=0.0071 '/' Outflow=0.45 cfs 1,736 cf

Pond CB-08: PCB-08 Peak Elev=139.62' Inflow=0.43 cfs 1,662 cf
12.0" Round Culvert n=0.013 L=7.0' S=0.0071 '/' Outflow=0.43 cfs 1,662 cf

Pond CB-09: PCB-09 Peak Elev=140.61' Inflow=0.66 cfs 2,554 cf
12.0" Round Culvert n=0.013 L=14.0' S=0.0071 '/' Outflow=0.66 cfs 2,554 cf

Pond CB-10: PCB-10 Peak Elev=140.63' Inflow=0.73 cfs 2,852 cf
12.0" Round Culvert n=0.013 L=14.0' S=0.0071 '/' Outflow=0.73 cfs 2,852 cf

Pond CB-11: PCB-11 Peak Elev=141.01' Inflow=2.55 cfs 9,919 cf
12.0" Round Culvert n=0.013 L=104.0' S=0.0048 '/' Outflow=2.55 cfs 9,919 cf

Pond CB-12: PCB-12 Peak Elev=140.99' Inflow=2.55 cfs 9,919 cf
12.0" Round Culvert n=0.013 L=4.0' S=0.0125 '/' Outflow=2.55 cfs 9,919 cf

Pond CB-13: PCB-13 Peak Elev=141.04' Inflow=1.32 cfs 5,158 cf
12.0" Round Culvert n=0.013 L=38.0' S=0.0053 '/' Outflow=1.32 cfs 5,158 cf

Pond CB-14: PCB-14 Peak Elev=141.05' Inflow=1.27 cfs 4,960 cf
12.0" Round Culvert n=0.013 L=69.0' S=0.0051 '/' Outflow=1.27 cfs 4,960 cf

Pond CB-15: PCB-15 Peak Elev=140.94' Inflow=1.91 cfs 7,440 cf
12.0" Round Culvert n=0.013 L=35.0' S=0.0057 '/' Outflow=1.91 cfs 7,440 cf

Pond DMH-01: PDMH-01 Peak Elev=140.91' Inflow=8.93 cfs 34,766 cf
24.0" Round Culvert n=0.013 L=33.0' S=0.0076 '/' Outflow=8.93 cfs 34,766 cf

Pond DMH-03: PDMH-03 Peak Elev=139.56' Inflow=1.13 cfs 4,414 cf
12.0" Round Culvert n=0.013 L=105.0' S=0.0048 '/' Outflow=1.13 cfs 4,414 cf

Pond DMH-05: PDMH-05 Peak Elev=139.45' Inflow=10.68 cfs 17,892 cf
18.0" Round Culvert n=0.013 L=109.0' S=0.0037 '/' Outflow=10.68 cfs 17,892 cf

Pond DMH-07: PDMH-07 Peak Elev=138.05' Inflow=14.58 cfs 33,068 cf
24.0" Round Culvert n=0.013 L=17.0' S=0.0029 '/' Outflow=14.58 cfs 33,068 cf

Pond DMH-09: PDMH-09 Peak Elev=138.11' Inflow=2.93 cfs 11,407 cf
18.0" Round Culvert n=0.013 L=60.0' S=0.0042 '/' Outflow=2.93 cfs 11,407 cf

Pond DMH-10: PDMH-10 Peak Elev=138.15' Inflow=2.93 cfs 11,407 cf
18.0" Round Culvert n=0.013 L=144.0' S=0.0042 '/' Outflow=2.93 cfs 11,407 cf

Pond DMH-11: PDMH-11 Peak Elev=138.54' Inflow=2.93 cfs 11,407 cf
18.0" Round Culvert n=0.013 L=167.0' S=0.0045 '/' Outflow=2.93 cfs 11,407 cf

Pond DMH-12: PDMH-12 Peak Elev=139.62' Inflow=2.26 cfs 8,803 cf
12.0" Round Culvert n=0.013 L=74.0' S=0.0054 '/' Outflow=2.26 cfs 8,803 cf

Pond DMH-13: PDMH-13 Peak Elev=140.57' Inflow=1.39 cfs 5,406 cf
12.0" Round Culvert n=0.013 L=242.0' S=0.0045 '/' Outflow=1.39 cfs 5,406 cf

Pond DMH-14: PDMH-14 Peak Elev=140.96' Inflow=5.09 cfs 19,839 cf
18.0" Round Culvert n=0.013 L=37.0' S=0.0068 '/' Outflow=5.09 cfs 19,839 cf

Pond DMH-15: PDMH-15 Peak Elev=140.86' Inflow=13.83 cfs 53,853 cf
24.0" Round Culvert n=0.013 L=16.0' S=0.0031 '/' Outflow=13.83 cfs 53,853 cf

Pond DMH-16: PDMH-16 Peak Elev=141.03' Inflow=2.99 cfs 11,648 cf
12.0" Round Culvert n=0.013 L=81.0' S=0.0049 '/' Outflow=2.99 cfs 11,648 cf

Pond DMH-17: PDMH-17 Peak Elev=140.31' Inflow=8.06 cfs 7,675 cf
18.0" Round Culvert n=0.013 L=251.0' S=0.0082 '/' Outflow=8.06 cfs 7,675 cf

Pond DMH-18: PDMH-18 Peak Elev=141.04' Inflow=1.67 cfs 6,490 cf
12.0" Round Culvert n=0.013 L=19.0' S=0.0053 '/' Outflow=1.67 cfs 6,490 cf

Pond DMH-19: PDMH-19 Peak Elev=140.91' Inflow=4.90 cfs 19,087 cf
18.0" Round Culvert n=0.013 L=79.0' S=0.0051 '/' Outflow=4.90 cfs 19,087 cf

Pond DMH-20: PDMH-20 Peak Elev=139.54' Inflow=1.68 cfs 6,547 cf
12.0" Round Culvert n=0.013 L=49.0' S=0.0051 '/' Outflow=1.68 cfs 6,547 cf

Pond DMH-21: PDMH-21 Peak Elev=139.09' Inflow=2.26 cfs 8,803 cf
12.0" Round Culvert n=0.013 L=69.0' S=0.0058 '/' Outflow=2.26 cfs 8,803 cf

Pond PDMH-06: PDMH-06 Peak Elev=140.51' Inflow=13.83 cfs 53,853 cf
Primary=5.99 cfs 46,178 cf Secondary=8.06 cfs 7,675 cf Outflow=13.83 cfs 53,853 cf

Total Runoff Area = 159,781 sf Runoff Volume = 79,247 cf Average Runoff Depth = 5.95"
0.00% Pervious = 0 sf 100.00% Impervious = 159,781 sf

Summary for Subcatchment PBC-01: PCB-01

Runoff = 0.70 cfs @ 12.04 hrs, Volume= 2,728 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
5,500	98	Paved roads w/curbs & sewers, HSG D
5,500	98	Weighted Average
5,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PBC-14: PCB-14

Runoff = 1.27 cfs @ 12.04 hrs, Volume= 4,960 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
10,000	98	Paved roads w/curbs & sewers, HSG D
10,000	98	Weighted Average
10,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-0-4: PCB-04

Runoff = 0.94 cfs @ 12.04 hrs, Volume= 3,670 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
7,400	98	Paved roads w/curbs & sewers, HSG D
7,400	98	Weighted Average
7,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-02: PCB-02

Runoff = 0.43 cfs @ 12.04 hrs, Volume= 1,686 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
3,400	98	Paved roads w/curbs & sewers, HSG D
3,400	98	Weighted Average
3,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-03: PCB-03

Runoff = 0.55 cfs @ 12.04 hrs, Volume= 2,133 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
4,300	98	Paved roads w/curbs & sewers, HSG D
4,300	98	Weighted Average
4,300		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-05: PCB-05

Runoff = 0.97 cfs @ 12.04 hrs, Volume= 3,769 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
7,600	98	Paved roads w/curbs & sewers, HSG D
7,600	98	Weighted Average
7,600		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-06: PCB-06

Runoff = 0.67 cfs @ 12.04 hrs, Volume= 2,604 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
5,250	98	Paved roads w/curbs & sewers, HSG D
5,250	98	Weighted Average
5,250		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-07: PCB-07

Runoff = 0.45 cfs @ 12.04 hrs, Volume= 1,736 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
3,500	98	Paved roads w/curbs & sewers, HSG D
3,500	98	Weighted Average
3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-08: PCB-08

Runoff = 0.43 cfs @ 12.04 hrs, Volume= 1,662 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
3,350	98	Paved roads w/curbs & sewers, HSG D
3,350	98	Weighted Average
3,350		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-09: PCB-09

Runoff = 0.66 cfs @ 12.04 hrs, Volume= 2,554 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
5,150	98	Paved roads w/curbs & sewers, HSG D
5,150	98	Weighted Average
5,150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-10: PCB-10

Runoff = 0.73 cfs @ 12.04 hrs, Volume= 2,852 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
5,750	98	Paved roads w/curbs & sewers, HSG D
5,750	98	Weighted Average
5,750		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-11: PCB-11

Runoff = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
20,000	98	Paved roads w/curbs & sewers, HSG D
20,000	98	Weighted Average
20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-12: PCB-12

Runoff = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
20,000	98	Paved roads w/curbs & sewers, HSG D
20,000	98	Weighted Average
20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-13: PCB-13

Runoff = 1.32 cfs @ 12.04 hrs, Volume= 5,158 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
10,400	98	Paved roads w/curbs & sewers, HSG D
10,400	98	Weighted Average
10,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment PCB-15: PCB-15

Runoff = 1.91 cfs @ 12.04 hrs, Volume= 7,440 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
15,000	98	Paved roads w/curbs & sewers, HSG D
15,000	98	Weighted Average
15,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment ROOF-1: ROOF-1

Runoff = 3.83 cfs @ 12.04 hrs, Volume= 14,927 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
30,096	98	Paved roads w/curbs & sewers, HSG D
30,096	98	Weighted Average
30,096		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Subcatchment ROOF-2: ROOF-2

Runoff = 0.39 cfs @ 12.04 hrs, Volume= 1,530 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-year Rainfall=6.19"

Area (sf)	CN	Description
0	80	>75% Grass cover, Good, HSG D
3,085	98	Paved roads w/curbs & sewers, HSG D
3,085	98	Weighted Average
3,085		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry,**

Summary for Pond 2P: ROOF-1

Inflow Area = 30,096 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 3.83 cfs @ 12.04 hrs, Volume= 14,927 cf
Outflow = 3.83 cfs @ 12.04 hrs, Volume= 14,927 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.83 cfs @ 12.04 hrs, Volume= 14,927 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.04' @ 12.32 hrs
Flood Elev= 144.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.50'	**12.0" Round Culvert** L= 33.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.50' / 138.00' S= 0.0152 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.36 cfs @ 12.04 hrs HW=140.40' TW=140.01' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.36 cfs @ 3.01 fps)

Summary for Pond 3P: ROOF-2

Inflow Area = 3,085 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.39 cfs @ 12.04 hrs, Volume= 1,530 cf
Outflow = 0.39 cfs @ 12.04 hrs, Volume= 1,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 12.04 hrs, Volume= 1,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.05' @ 12.51 hrs
Flood Elev= 143.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert**

L= 14.0' CMP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 139.00' / 138.85' S= 0.0107 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.66' TW=139.92' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond CB-01: PCB-01

Inflow Area = 5,500 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.70 cfs @ 12.04 hrs, Volume= 2,728 cf
Outflow = 0.70 cfs @ 12.04 hrs, Volume= 2,728 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.04 hrs, Volume= 2,728 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.57' @ 12.35 hrs
Flood Elev= 142.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.40'	**12.0" Round Culvert**
			L= 25.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 137.40' / 137.25' S= 0.0060 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.33 cfs @ 12.04 hrs HW=137.92' TW=137.87' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.33 cfs @ 1.16 fps)

Summary for Pond CB-02: PCB-02

Inflow Area = 3,400 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.43 cfs @ 12.04 hrs, Volume= 1,686 cf
Outflow = 0.43 cfs @ 12.04 hrs, Volume= 1,686 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.04 hrs, Volume= 1,686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.57' @ 12.35 hrs
Flood Elev= 142.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.30'	**12.0" Round Culvert**
			L= 7.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 137.30' / 137.25' S= 0.0071 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=137.78' TW=137.87' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond CB-03: PCB-03

Inflow Area = 4,300 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.55 cfs @ 12.04 hrs, Volume= 2,133 cf
Outflow = 0.55 cfs @ 12.04 hrs, Volume= 2,133 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.55 cfs @ 12.04 hrs, Volume= 2,133 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.54' @ 12.25 hrs
Flood Elev= 142.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.70' / 136.65' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=137.45' TW=138.26' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-04: PCB-04

Inflow Area = 7,400 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.94 cfs @ 12.04 hrs, Volume= 3,670 cf
Outflow = 0.94 cfs @ 12.04 hrs, Volume= 3,670 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.04 hrs, Volume= 3,670 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.47' @ 12.16 hrs
Flood Elev= 141.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.35'	**12.0" Round Culvert** L= 8.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.35' / 136.30' S= 0.0062 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=138.10' TW=139.21' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-05: PCB-05

Inflow Area = 7,600 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.97 cfs @ 12.04 hrs, Volume= 3,769 cf
Outflow = 0.97 cfs @ 12.04 hrs, Volume= 3,769 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 12.04 hrs, Volume= 3,769 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.09' @ 12.13 hrs
Flood Elev= 141.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.45'	**12.0" Round Culvert** L= 63.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.45' / 135.80' S= 0.0103 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=137.53' TW=137.90' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-06: PCB-06

Inflow Area = 5,250 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.67 cfs @ 12.04 hrs, Volume= 2,604 cf
Outflow = 0.67 cfs @ 12.04 hrs, Volume= 2,604 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.04 hrs, Volume= 2,604 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.57' @ 12.14 hrs
Flood Elev= 142.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	**12.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.80' / 137.70' S= 0.0071 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=138.43' TW=138.51' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-07: PCB-07

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.45 cfs @ 12.04 hrs, Volume= 1,736 cf
Outflow = 0.45 cfs @ 12.04 hrs, Volume= 1,736 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.04 hrs, Volume= 1,736 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.62' @ 12.15 hrs
Flood Elev= 142.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.75'	**12.0" Round Culvert** L= 7.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.75' / 138.70' S= 0.0071 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.40' TW=139.58' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-08: PCB-08

Inflow Area = 3,350 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.43 cfs @ 12.04 hrs, Volume= 1,662 cf
Outflow = 0.43 cfs @ 12.04 hrs, Volume= 1,662 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.04 hrs, Volume= 1,662 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.62' @ 12.15 hrs
Flood Elev= 142.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.75'	**12.0" Round Culvert** L= 7.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.75' / 138.70' S= 0.0071 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.40' TW=139.58' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-09: PCB-09

Inflow Area = 5,150 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.66 cfs @ 12.04 hrs, Volume= 2,554 cf
Outflow = 0.66 cfs @ 12.04 hrs, Volume= 2,554 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 12.04 hrs, Volume= 2,554 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.61' @ 12.13 hrs
Flood Elev= 143.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	**12.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.00' / 139.90' S= 0.0071 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.04 hrs HW=140.53' TW=140.53' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.08 cfs @ 0.27 fps)

Summary for Pond CB-10: PCB-10

Inflow Area = 5,750 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 0.73 cfs @ 12.04 hrs, Volume= 2,852 cf
Outflow = 0.73 cfs @ 12.04 hrs, Volume= 2,852 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 12.04 hrs, Volume= 2,852 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.63' @ 12.13 hrs
Flood Elev= 143.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	**12.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.00' / 139.90' S= 0.0071 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.04 hrs HW=140.55' TW=140.53' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.25 cfs @ 0.80 fps)

Summary for Pond CB-11: PCB-11

Inflow Area = 20,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf
Outflow = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.01' @ 12.42 hrs
Flood Elev= 142.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.85'	**12.0" Round Culvert** L= 104.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.85' / 138.35' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.64 cfs @ 12.04 hrs HW=140.14' TW=139.84' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.64 cfs @ 2.10 fps)

Summary for Pond CB-12: PCB-12

Inflow Area = 20,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf
Outflow = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.04 hrs, Volume= 9,919 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.99' @ 12.42 hrs
Flood Elev= 142.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.40'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.40' / 138.35' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.04 hrs HW=139.86' TW=139.84' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.47 cfs @ 0.60 fps)

Summary for Pond CB-13: PCB-13

Inflow Area = 10,400 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.32 cfs @ 12.04 hrs, Volume= 5,158 cf
Outflow = 1.32 cfs @ 12.04 hrs, Volume= 5,158 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.32 cfs @ 12.04 hrs, Volume= 5,158 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.04' @ 12.42 hrs
Flood Elev= 142.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.85'	**12.0" Round Culvert** L= 38.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.85' / 138.65' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.90' TW=140.27' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB-14: PCB-14

Inflow Area = 10,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.27 cfs @ 12.04 hrs, Volume= 4,960 cf
Outflow = 1.27 cfs @ 12.04 hrs, Volume= 4,960 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.04 hrs, Volume= 4,960 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.05' @ 12.51 hrs
Flood Elev= 142.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.20'	**12.0" Round Culvert** L= 69.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.20' / 138.85' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.18 cfs @ 12.04 hrs HW=139.93' TW=139.92' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.18 cfs @ 0.42 fps)

Summary for Pond CB-15: PCB-15

Inflow Area = 15,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.91 cfs @ 12.04 hrs, Volume= 7,440 cf
Outflow = 1.91 cfs @ 12.04 hrs, Volume= 7,440 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.91 cfs @ 12.04 hrs, Volume= 7,440 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.94' @ 12.32 hrs
Flood Elev= 142.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.35'	**12.0" Round Culvert** L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.35' / 138.15' S= 0.0057 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.70' TW=139.99' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-01: PDMH-01

Inflow Area = 70,096 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 8.93 cfs @ 12.04 hrs, Volume= 34,766 cf
Outflow = 8.93 cfs @ 12.04 hrs, Volume= 34,766 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.93 cfs @ 12.04 hrs, Volume= 34,766 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.91' @ 12.23 hrs
Flood Elev= 142.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.90'	**24.0" Round Culvert** L= 33.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.90' / 137.65' S= 0.0076 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=140.01' TW=140.39' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-03: PDMH-03

Inflow Area = 8,900 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.13 cfs @ 12.04 hrs, Volume= 4,414 cf
Outflow = 1.13 cfs @ 12.04 hrs, Volume= 4,414 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.04 hrs, Volume= 4,414 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.56' @ 12.25 hrs
Flood Elev= 142.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.15'	**12.0" Round Culvert** L= 105.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.15' / 136.65' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=137.87' TW=138.26' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-05: PDMH-05

Inflow Area = 20,600 sf,100.00% Impervious, Inflow Depth = 10.42" for 25-year event
Inflow = 10.68 cfs @ 12.03 hrs, Volume= 17,892 cf
Outflow = 10.68 cfs @ 12.03 hrs, Volume= 17,892 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.68 cfs @ 12.03 hrs, Volume= 17,892 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.45' @ 12.06 hrs
Flood Elev= 142.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.20'	**18.0" Round Culvert** L= 109.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.20' / 135.80' S= 0.0037 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=8.58 cfs @ 12.03 hrs HW=139.20' TW=137.92' (Dynamic Tailwater)
1=Culvert (Outlet Controls 8.58 cfs @ 4.86 fps)

Summary for Pond DMH-07: PDMH-07

Inflow Area = 51,200 sf,100.00% Impervious, Inflow Depth = 7.75" for 25-year event
Inflow = 14.58 cfs @ 12.03 hrs, Volume= 33,068 cf
Outflow = 14.58 cfs @ 12.03 hrs, Volume= 33,068 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.58 cfs @ 12.03 hrs, Volume= 33,068 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.05' @ 12.03 hrs
Flood Elev= 141.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	135.70'	**24.0" Round Culvert** L= 17.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.70' / 135.65' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=13.48 cfs @ 12.03 hrs HW=137.91' (Free Discharge)
1=Culvert (Barrel Controls 13.48 cfs @ 4.83 fps)

Summary for Pond DMH-09: PDMH-09

Inflow Area = 23,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf
Outflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.11' @ 12.13 hrs
Flood Elev= 142.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.05'	**18.0" Round Culvert** L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.05' / 135.80' S= 0.0042 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=137.56' TW=137.90' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-10: PDMH-10

Inflow Area = 23,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf
Outflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.15' @ 12.21 hrs
Flood Elev= 142.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.75'	**18.0" Round Culvert** L= 144.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.75' / 136.15' S= 0.0042 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.36 cfs @ 12.04 hrs HW=137.73' TW=137.56' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.36 cfs @ 1.59 fps)

Summary for Pond DMH-11: PDMH-11

Inflow Area = 23,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf
Outflow = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.04 hrs, Volume= 11,407 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 138.54' @ 12.06 hrs
Flood Elev= 142.45'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.60'	**18.0" Round Culvert** L= 167.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.60' / 136.85' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.54 cfs @ 12.04 hrs HW=138.51' TW=137.73' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.54 cfs @ 3.24 fps)

Summary for Pond DMH-12: PDMH-12

Inflow Area = 17,750 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf
Outflow = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.62' @ 12.06 hrs
Flood Elev= 142.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.60'	**12.0" Round Culvert** L= 74.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.60' / 138.20' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.97 cfs @ 12.04 hrs HW=139.58' TW=139.06' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.97 cfs @ 3.18 fps)

Summary for Pond DMH-13: PDMH-13

Inflow Area = 10,900 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.39 cfs @ 12.04 hrs, Volume= 5,406 cf
Outflow = 1.39 cfs @ 12.04 hrs, Volume= 5,406 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.39 cfs @ 12.04 hrs, Volume= 5,406 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.57' @ 12.06 hrs
Flood Elev= 143.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.80'	**12.0" Round Culvert** L= 242.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.80' / 138.70' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.18 cfs @ 12.04 hrs HW=140.53' TW=139.58' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.18 cfs @ 2.67 fps)

Summary for Pond DMH-14: PDMH-14

Inflow Area = 40,000 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 5.09 cfs @ 12.04 hrs, Volume= 19,839 cf
Outflow = 5.09 cfs @ 12.04 hrs, Volume= 19,839 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.09 cfs @ 12.04 hrs, Volume= 19,839 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.96' @ 12.32 hrs
Flood Elev= 142.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.25'	**18.0" Round Culvert** L= 37.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.25' / 138.00' S= 0.0068 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.84' TW=140.01' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-15: PDMH-15

Inflow Area = 108,581 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 13.83 cfs @ 12.04 hrs, Volume= 53,853 cf
Outflow = 13.83 cfs @ 12.04 hrs, Volume= 53,853 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.83 cfs @ 12.04 hrs, Volume= 53,853 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.86' @ 12.14 hrs
Flood Elev= 143.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.55'	**24.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.55' / 137.50' S= 0.0031 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.02 cfs @ 12.04 hrs HW=140.39' TW=140.28' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.02 cfs @ 1.60 fps)

Summary for Pond DMH-16: PDMH-16

Inflow Area = 23,485 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.99 cfs @ 12.04 hrs, Volume= 11,648 cf
Outflow = 2.99 cfs @ 12.04 hrs, Volume= 11,648 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.99 cfs @ 12.04 hrs, Volume= 11,648 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.03' @ 12.32 hrs
Flood Elev= 142.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.55'	**12.0" Round Culvert** L= 81.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 138.15' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.67 cfs @ 12.04 hrs HW=140.27' TW=139.99' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.67 cfs @ 2.12 fps)

Summary for Pond DMH-17: PDMH-17

Inflow = 8.06 cfs @ 12.03 hrs, Volume= 7,675 cf
Outflow = 8.06 cfs @ 12.03 hrs, Volume= 7,675 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.06 cfs @ 12.03 hrs, Volume= 7,675 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.31' @ 12.08 hrs
Flood Elev= 142.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.35'	**18.0" Round Culvert** L= 251.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.35' / 136.30' S= 0.0082 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.22 cfs @ 12.03 hrs HW=140.04' TW=139.19' (Dynamic Tailwater)
1=Culvert (Outlet Controls 5.22 cfs @ 3.28 fps)

Summary for Pond DMH-18: PDMH-18

Inflow Area = 13,085 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.67 cfs @ 12.04 hrs, Volume= 6,490 cf
Outflow = 1.67 cfs @ 12.04 hrs, Volume= 6,490 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.67 cfs @ 12.04 hrs, Volume= 6,490 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 141.04' @ 12.42 hrs
Flood Elev= 143.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.75'	**12.0" Round Culvert** L= 19.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.75' / 138.65' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.92' TW=140.27' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-19: PDMH-19

Inflow Area = 38,485 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 4.90 cfs @ 12.04 hrs, Volume= 19,087 cf
Outflow = 4.90 cfs @ 12.04 hrs, Volume= 19,087 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.90 cfs @ 12.04 hrs, Volume= 19,087 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.91' @ 12.23 hrs
Flood Elev= 143.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.05'	**18.0" Round Culvert** L= 79.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.05' / 137.65' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=139.99' TW=140.39' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-20: PDMH-20

Inflow Area = 13,200 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 1.68 cfs @ 12.04 hrs, Volume= 6,547 cf
Outflow = 1.68 cfs @ 12.04 hrs, Volume= 6,547 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.04 hrs, Volume= 6,547 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.54' @ 12.15 hrs
Flood Elev= 143.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	136.55'	**12.0" Round Culvert** L= 49.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 136.55' / 136.30' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=138.26' TW=139.21' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond DMH-21: PDMH-21

Inflow Area = 17,750 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf
Outflow = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.26 cfs @ 12.04 hrs, Volume= 8,803 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 139.09' @ 12.05 hrs
Flood Elev= 143.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	138.10'	**12.0" Round Culvert** L= 69.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.10' / 137.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.02 cfs @ 12.04 hrs HW=139.06' TW=138.51' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.02 cfs @ 3.32 fps)

Summary for Pond PDMH-06: PDMH-06

Inflow Area = 108,581 sf,100.00% Impervious, Inflow Depth = 5.95" for 25-year event
Inflow = 13.83 cfs @ 12.04 hrs, Volume= 53,853 cf
Outflow = 13.83 cfs @ 12.04 hrs, Volume= 53,853 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.99 cfs @ 12.11 hrs, Volume= 46,178 cf
Secondary = 8.06 cfs @ 12.03 hrs, Volume= 7,675 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.10 hrs
Peak Elev= 140.51' @ 12.11 hrs
Flood Elev= 142.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.50'	**12.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.50' / 137.50' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	138.55'	**18.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.55' / 137.50' S= 0.0420 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.95 cfs @ 12.11 hrs HW=140.47' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.95 cfs @ 7.57 fps)

Secondary OutFlow Max=3.87 cfs @ 12.03 hrs HW=140.24' TW=140.04' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 3.87 cfs @ 2.19 fps)

Exhibit 7

Soil Management Plan Summary

19-5019-02
September 2, 2020

Mr. David C. Andronico
Director of Facilities & Project Management
Jones Street Residential
100 High Street, Suite 2500
Boston, MA 02110

Re: Site Specific Soil Management Plan Summary
0 Pond Street Parcel
Rockland, Massachusetts

Dear Mr. Andronico,

The following summary outlines the general procedures that will be further detailed in Tighe & Bonds Soil Management Plan (SMP) for the proposed import of off-site soils at the 0 Pond Street Parcel located in Rockland, Massachusetts (herein referred to as the "Site"). This summary provides an overview of the general requirements to be implemented to regulate the proposed import and placement of fill soils at the Site.

Applicable Experience

Tighe & Bond has prepared SMPs for the import of soil to similar residential development projects in Amesbury and other municipalities in Massachusetts and for Similar Soil Facilities in Peabody, Massachusetts. In addition, Tighe & Bond has extensive experience permitting and preparing similar Massachusetts Department of Environmental Protection (MassDEP) approved SMPs for Massachusetts Landfills in Haverhill and Peabody. Tighe & Bond has also served as the License Site Professional (LSP) that conducts the compliance reviews of Soil Reuse Submittals for Landfills and Similar Soil Facilities.

Project Understanding

The proposed redevelopment plan calls for two multi-family residential buildings and associated parking. The redevelopment of the Site will require the import of up to approximately 50,000 cubic yards of soil to raise Site elevation.

Tighe & Bond will prepare the SMP to be protective of both human health and the environment and the soils acceptance protocols will be developed with the standard procedures for similar facilities and reflect the requirements of the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000) and the Massachusetts Department of Environmental Protection (MassDEP) Similar Soils Provision Guidance (MassDEP Policy WSC#-13-500).

Implementation of Site Specific Soil Management Plan

Tighe & Bond will develop a site-specific SMP to facilitate the import of unregulated fill soils to the Site. This SMP will include the following:

- Site figure with proposed areas requiring import of soil;
- Summary of Site specific soil and groundwater data;
- List of applicable local and state regulations and/or guidelines;
- Surrounding resource areas summary;
- Geotechnical and environmental soil testing requirements for soil proposed for import to the Site;

- Site-specific soil acceptance criteria for soil proposed for import to the Site;
- Guidance for the preparation of Soil Reuse Submittals for soil proposed for import to the Site;
- Best Management Practices (BMPs) for onsite management soil.

Review of Soil Reuse Submittals

Soils proposed for reuse at the Site will require preparation of a Soil Reuse Submittal prepared by an LSP or qualified environmental professional (QEP). The submittal shall provide the following information to be considered for soils to be reused at the Site:

- Document location of source soils, the historical Site use(s) of that location by the generator;
- Physical and chemical characterization of the soils by laboratory analysis;
- Estimated quantity of the soil proposed for reuse at the Site;
- Description of the source and type of any known release and the contaminants in soil proposed for reuse at the Site (if applicable);
- Description of the soil characterization sampling program, analytical results summary, and any field screening analytical data used to support the determination;
- Comparison table of the analytical data to the Site specific Soil Acceptance Criteria;
- A statement from the generator as to whether the site is a listed Disposal Site, as defined in the MCP, or if any releases or spills have occurred on or in the vicinity of the site which may have affected the site, including the types of oils and hazardous materials spilled/released;
- A statement that the generator has used due diligence, as described in MassDEP's Policy HW93-01 to characterize that the soil does not contain a listed hazardous waste and/or is itself a characteristic hazardous waste.

A Tighe & Bond LSP will review the Soil Reuse Submittals for soil proposed for reuse at the Site. The review process will include a preliminary review to address if the applicant has prepared the submittal in accordance with the applicable facility specific SMP. If the submittal does not meet the acceptance criteria outlined in the facility specific SMP, an itemized checklist will be provided to the applicant for resubmittal. Upon resubmittal, we will review the revised package to confirm that the candidate soils meet the facility specific SMP. Following the review of each soil package, Tighe & Bond will prepare a Letter Response for Jones Street Residential recommending that the soils are Approved, Rejected or Approved with Conditions.

Based on our previous experience with similar projects, it is our opinion that that is the most viable way to accommodate filling at the Site. This method provides a cost-effective method to accommodate project goals and also establishes a means to document the geotechnical and environmental integrity of fill soils at the Site. If you require additional information or have any questions, please do not hesitate to contact Bryan Gammons of Tighe & Bond at (617)413-1693.

Very truly yours,

TIGHE & BOND, INC.

Bryan O. Gammons
Senior Environmental Scientist

Marc J. Richards, PE, LSP
Senior Vice President

Exhibit 8

ORAD & Wetland Location Plan

For Registry of Deeds Use Only

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

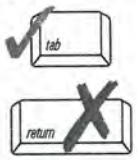
Provided by MassDEP:
SE 273-0399
MassDEP File Number

eDEP Transaction Number

Rockland
City/Town

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

From: Rockland
1. Conservation Commission

2. This Issuance is for (check one):

a. ☒ Order of Resource Area Delineation

b. ☐ Amended Order of Resource Area Delineation

3. Applicant:

Maurizio
a. First Name

Caparrotta, Trustee
b. Last Name

Seven Hills Holding Trust
c. Organization

195 Libbey Parkway, Unit 2
d. Mailing Address

Weymouth
e. City/Town

MA
f. State

02370
g. Zip Code

4. Property Owner (if different from applicant):

a. First Name

b. Last Name

c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

5. Project Location:

Off Pond Street
a. Street Address

Rockland
b. City/Town

02370
c. Zip Code

Map 9
d. Assessors Map/Plat Number

Lot 13
e. Parcel/Lot Number

Latitude and Longitude (in degrees, minutes, seconds):

d m s
f. Latitude

d m s
g. Longitude

6. Dates:

August 3, 2018
a. Date ANRAD filed

October 23, 2018
b. Date Public Hearing Closed

October 23, 2018
c. Date of Issuance

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
SE 273-0399
MassDEP File Number

eDEP Transaction Number

Rockland
City/Town

A. General Information (cont.)

7. Title and Date (or Revised Date if applicable) of Final Plans and Other Documents:

Wetland Location Plan for Pond Street, Rockland, MA - Stamped and signed by Richard J. Tabaczynski, P.E. & Timothy R. Callahan, P.L.S

a. Title

October 1, 2018
b. Date

c. Title

d. Date

B. Order of Delineation

1. The Conservation Commission has determined the following (check whichever is applicable):

a. ☐ **Accurate**: The boundaries described on the referenced plan(s) above and in the Abbreviated Notice of Resource Area Delineation are accurately drawn for the following resource area(s):

1. ☐ Bordering Vegetated Wetlands

2. ☐ Other resource area(s), specifically:

a.

b. ☒ **Modified**: The boundaries described on the plan(s) referenced above, as modified by the Conservation Commission from the plans contained in the Abbreviated Notice of Resource Area Delineation, are accurately drawn from the following resource area(s):

1. ☒ Bordering Vegetated Wetlands

2. ☐ Other resource area(s), specifically:

a. *ANRAD only requested confirmation of Bordering Vegetated Wetlands.

c. ☐ **Inaccurate**: The boundaries described on the referenced plan(s) and in the Abbreviated Notice of Resource Area Delineation were found to be inaccurate and cannot be confirmed for the following resource area(s):

1. ☐ Bordering Vegetated Wetlands

2. ☐ Other resource area(s), specifically:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
SE 273-0399
MassDEP File Number

eDEP Transaction Number

Rockland
City/Town

B. Order of Delineation (cont.)

3. ☐ The boundaries were determined to be inaccurate because:

C. Findings

This Order of Resource Area Delineation determines that the boundaries of those resource areas noted above, have been delineated and approved by the Commission and are binding as to all decisions rendered pursuant to the Massachusetts Wetlands Protection Act (M.G.L. c.131, § 40) and its regulations (310 CMR 10.00). This Order does not, however, determine the boundaries of any resource area or Buffer Zone to any resource area not specifically noted above, regardless of whether such boundaries are contained on the plans attached to this Order or to the Abbreviated Notice of Resource Area Delineation.

This Order must be signed by a majority of the Conservation Commission. The Order must be sent by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate DEP Regional Office (see http://www.mass.gov/eea/agencies/massdep/about/contacts/find-the-massdep-regional-office-for-your-city-or-town.html).

D. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate DEP Regional Office to issue a Superseding Order of Resource Area Delineation. When requested to issue a Superseding Order of Resource Area Delineation, the Department's review is limited to the objections to the resource area delineation(s) stated in the appeal request. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order of Resource Area Delineation will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order or Determination, or providing written information to the Department prior to issuance of a Superseding Order or Determination.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act, (M.G.L. c. 131, § 40) and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal bylaw or ordinance, and not on the Massachusetts Wetlands Protection Act or regulations, the Department of Environmental Protection has no appellate jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
SE 273-0399
MassDEP File Number

eDEP Transaction Number

Rockland
City/Town

E. Signatures

October 23, 2018
Date of Issuance

Please indicate the number of members who will sign this form.

4
1. Number of Signers

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

This Order is valid for three years from the date of issuance.

If this Order constitutes an Amended Order of Resource Area Delineation, this Order does not extend the issuance date of the original Final Order, which expires on unless extended in writing by the issuing authority.

This Order is issued to the applicant and the property owner (if different) as follows:

2. ☒ By hand delivery on

October 23, 2018
a. Date

3. ☐ By certified mail, return receipt requested on

a. Date

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

SE 273-0399
Provided by DEP

A. Request Information

1. Location of Project

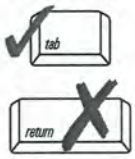
a. Street Address

b. City/Town, Zip

c. Check number

d. Fee amount

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Person or party making request (if appropriate, name the citizen group's representative):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

3. Applicant (as shown on Determination of Applicability (Form 2), Order of Resource Area Delineation (Form 4B), Order of Conditions (Form 5), Restoration Order of Conditions (Form 5A), or Notice of Non-Significance (Form 6)):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

4. DEP File Number:

B. Instructions

1. When the Departmental action request is for (check one):

☐ Superseding Order of Conditions – Fee: $120.00 (single family house projects) or $245 (all other projects)

☐ Superseding Determination of Applicability – Fee: $120

☐ Superseding Order of Resource Area Delineation – Fee: $120

Send this form and check or money order, payable to the *Commonwealth of Massachusetts,* to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

B. Instructions (cont.)

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see http://www.mass.gov/eea/agencies/massdep/about/contacts/).

4. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
SE 273-0399
MassDEP File Number

eDEP Transaction Number

Rockland
City/Town

Recording Information

Prior to commencement of work, this Order of Resource Area Delineation must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Resource Area Delineation. The recording information on this page shall be submitted to the Conservation Commission listed below.

Rockland
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Resource Area Delineation for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

For: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Resource Area Delineation issued on:

Date

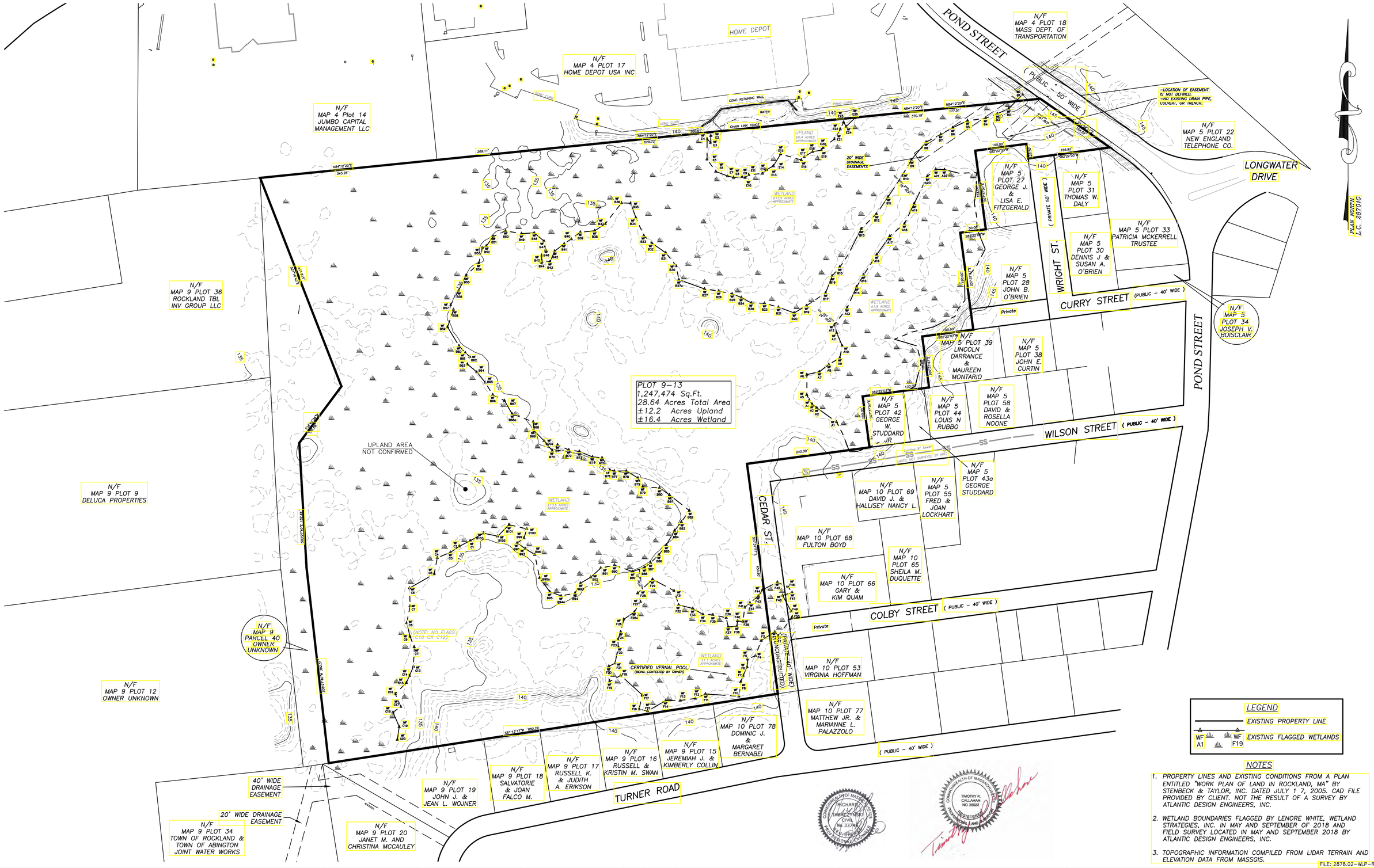
If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant



NOTES

1. PROPERTY LINES AND EXISTING CONDITIONS FROM A PLAN ENTITLED "WORK PLAN OF LAND IN ROCKLAND, MA" BY STENBECK & TAYLOR, INC. DATED JULY 1 7, 2005. CAD FILE PROVIDED BY CLIENT. NOT THE RESULT OF A SURVEY BY ATLANTIC DESIGN ENGINEERS, INC.
2. WETLAND BOUNDARIES FLAGGED BY LENORE WHITE, WETLAND STRATEGIES, INC. IN MAY AND SEPTEMBER OF 2018 AND FIELD SURVEY LOCATED IN MAY AND SEPTEMBER 2018 BY ATLANTIC DESIGN ENGINEERS, INC.
3. TOPOGRAPHIC INFORMATION COMPILED FROM LIDAR TERRAIN AND ELEVATION DATA FROM MASSGIS.

RICHARD J. TABACZYNSKI CIVIL No. 33744 COMMONWEALTH OF MASSACHUSETTS PROFESSIONAL ENGINEER

TIMOTHY R. CALLAHAN NO. 39022 REGISTERED PROFESSIONAL LAND SURVEYOR COMMONWEALTH OF MASSACHUSETTS

FILE: 2878.02-WLP-R2

Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Designed by :
Drawn by :
Checked by :
Survey chk. by :
Approved by :

SCALE
SCALE 1" = 80'
0 20 40 80 160

DATE

NO.	BY	DATE	REVISION
2	SWG	10-1-18	PER REVIEW COMMENTS
1	BA	9-21-18	PER REVIEW COMMENTS

PREPARED FOR:
SEVEN HILLS HOLDING TRUST
195 LIBBEY PARKWAY, UNIT TWO
WEYMOUTH, MASSACHUSETTS 02189

WETLAND LOCATION PLAN
FOR
POND STREET
ROCKLAND, MASSACHUSETTS
JUNE 8, 2018

Sheet 1 of 1
JOB NUMBER 2878.02

Exhibit 9

Cut & Fill Analysis

Cut & Fill Report Worksheet

JOB: R009 DESC: Rockland_ MA - Shinglemill SECTION: 04 DESC: C&F (08-17-2020) - VE Rev

Soils Suitability:

Strata Name	Available From Cut	Available From Stripping	Total Available Material	To Be Exported	Use As Fill	Use As Topsoil Replacement
Top&FM	7	1372	1379	0	0	1379
Fill	1105	0	1105	0	1105	
Org	5	0	5	5	0	
Natural	164	0	164	0	164	

Total Fill Required: 41230
Obtained On Site: 1269
Fill Imported: 39961

Topsoil Replacement Required: 2267
Obtained On Site: 1379
Topsoil Imported: 888

NOTE: All quantities are compacted. Topsoil replacement required has been adjusted to be in terms of fully compacted fill.

Shrinkage and Expansion:

Strata Name	Shrinkage: Used as Fill	Expansion of Cut	Shrinkage: Used as Top Repl
Top&FM	10	10	10
Fill	10	10	
Org	10	10	
Natural	10	10	

Rockland_ MA - Shinglemill

Job: R009 Section: 04 C&F (08-17-2020) - VE Revisions

Cut and Fill Report

08/17/2020 09:21:26

Grid/Subgrid	3.00/1.50
Section size (Ft)	1,239.50 x 1,227.50
Total Work Area (SF)	325,517
Area of Cut (SF)	51,293
Area of Fill (SF)	273,438

Cut Area Threshold 0.01 Ft

Fill Area Threshold 0.01 Ft

All units in Cubic Yards

	Bank	Compacted	Expanded	Comp / Exp (%)
Stripping				
Top&FM	1,525	1,373	1,678	10 / 10
Fill				10 / 10
Org				10 / 10
Natural				10 / 10
Stripping Total	**1,525**	**1,373**	**1,678**	
Export Stripping				
Cut				
Top&FM	8	7	9	10 / 10
Fill	1,228	1,105	1,351	10 / 10
Org	6	5	7	10 / 10
Natural	183	165	201	10 / 10
Cut Total	**1,425**	**1,283**	**1,568**	
Export Cut		**14**	**17**	
Total Export (Stripping and Cut)		**8**	**9**	
Fill				
In Place Fill Required		41,231		
Stripping and/or Cut Used as Fill	1,410	1,269	1,551	
Import Fill		39,962	48,754 + 2,000 (reduced foundation spoils) - 800cy (infiltration) = 49,954 cy	
Topsoil Replacement				
Topsoil Replacement Required		2,268		
Topsoil Replacement Obtained On Site	1,532	1,379	1,685	
Import Topsoil		889	* 1.22 = 1,085 CY	

Stripping and Demolition Report

08/17/2020 09:21:49

#	Desc	Type	Value	Area (SF)	Material	THK (Ft)	CY	Chg/.1 Ft
1	**Topsoil**	**STP**	**Top&FM**	**325,980**	**Topsoil**			**1,207**

Material Totals	CY

#	Desc	Type	Value	Area (SF)	Fill (CY)	Cut (CY) →	Bank	Compacted	Expanded	Chg/.1 Ft
1	Topsoil	TSR	0.5	123,251	11,117		596	536	655	456
2	Bit Pave	DPT	1.67	124,366	17,402		141	127	155	461
3	Conc Walks	DPT	1	11,395	2,157		3	3	3	42
5	Grass Pavers	DPT	1.25	1,148	78		17	15	19	4
9	Wetland Base	DPT	2.75	5,088	0		665	598	731	19
16	FFE 144.40	EL	142.4	26,776	5,377		0	0	0	99
17	FFE 144.00	EL	142	30,762	4,757		3	3	4	114
18	FFE 143.20	EL	141.2	3,193	342		0	0	0	12
All				325,980	41,230		1,425	1,283	1,568	1,207

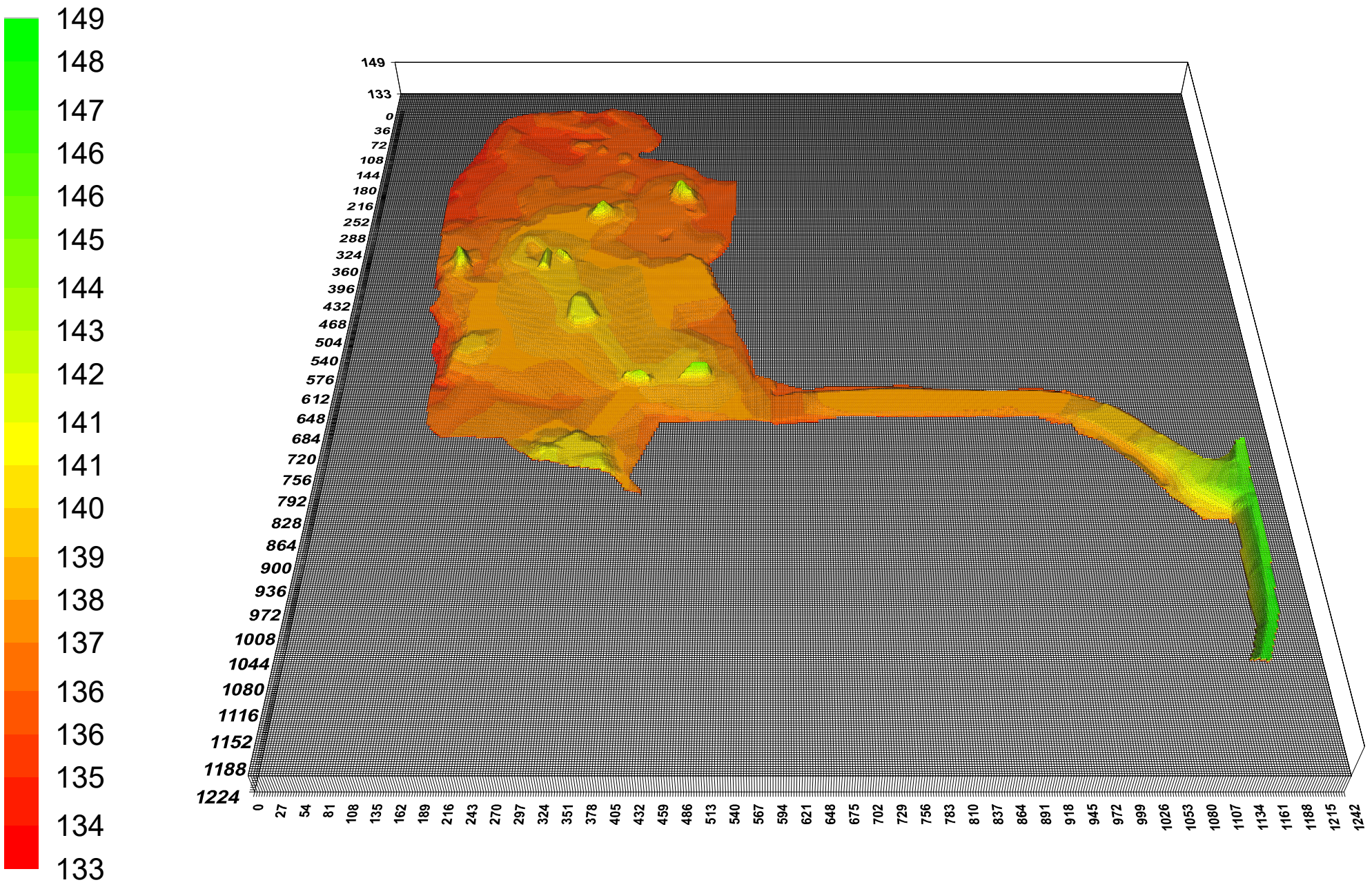
Subgrade Materials Report

08/17/2020 09:25:42

#	Desc	Type	Value	Area (SF)	Material	THK (Ft)	CY
1	Topsoil	TSR	0.5	123,251	Topsoil	.50	2,282
2	Bit Pave	DPT	1.67	124,366	Ashpalt	.50	2,303
					Stone	.50	2,303
						.67	3,086
3	Conc Walks	DPT	1	11,395	Concrete	.33	139
					Gravel	.67	283
5	Grass Pavers	DPT	1.25	1,148	Pavers	.25	11
					Gravel	1.00	43
9	Wetland Base	DPT	2.75	5,088	Wetland Soil	.67	126
					Pea Gravel	.08	15
					Stone	2.00	377
16	FFE 144.40	EL	142.4	26,776	FFE 144.40		
17	FFE 144.00	EL	142	30,762	FFE 144.00		
18	FFE 143.20	EL	141.2	3,193	FFE 143.20		

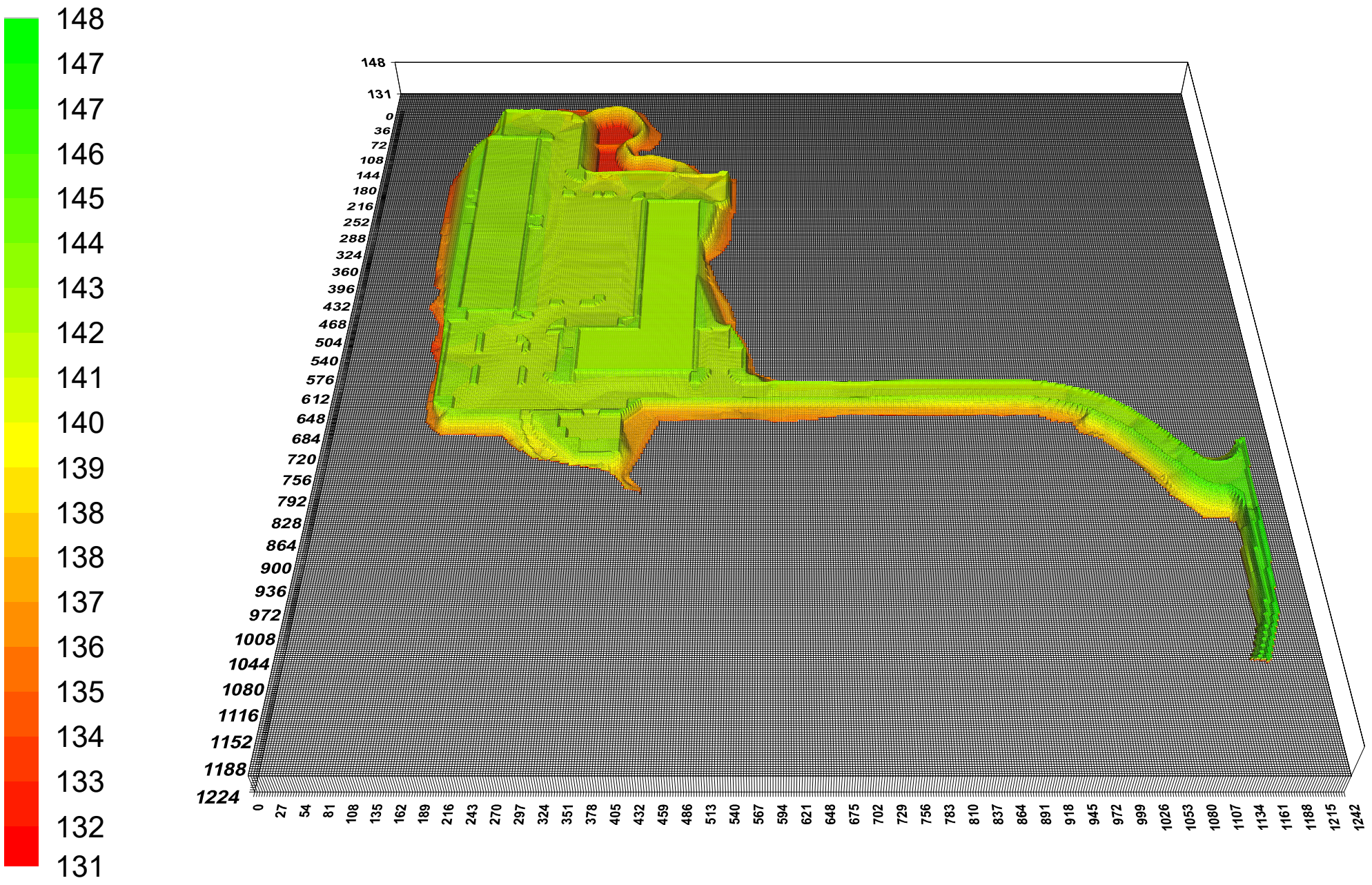
Material Totals	CY
	3,086
Ashpalt	2,303
Concrete	139
Gravel	325
Pavers	11
Pea Gravel	15
Stone	2,680
Topsoil	2,282
Wetland Soil	126

9 Rockland_ MA - Shinglemill SECTION: 04 C&F (08-17-2020) - VE

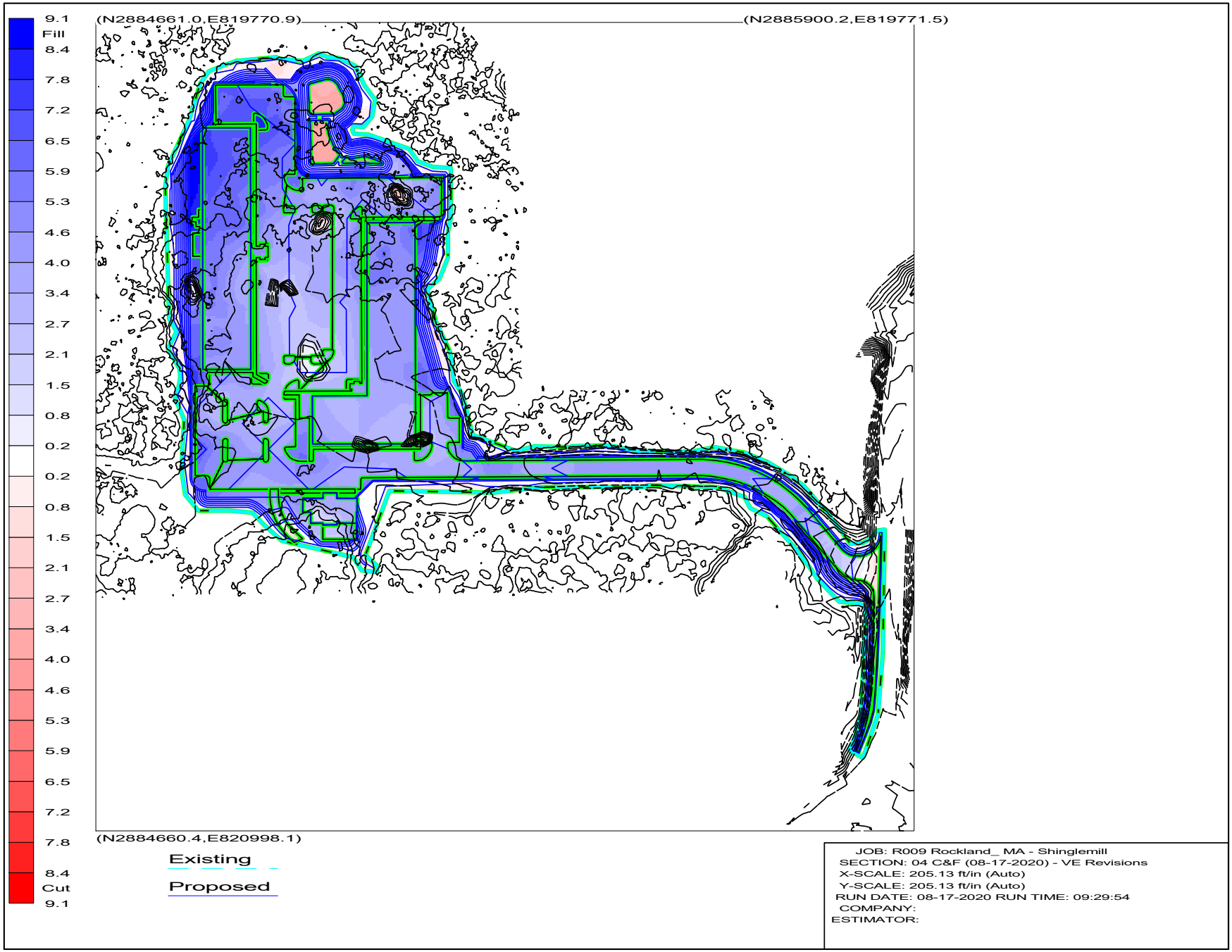


EXISTING GRADES

9 Rockland_ MA - Shinglemill SECTION: 04 C&F (08-17-2020) - VE



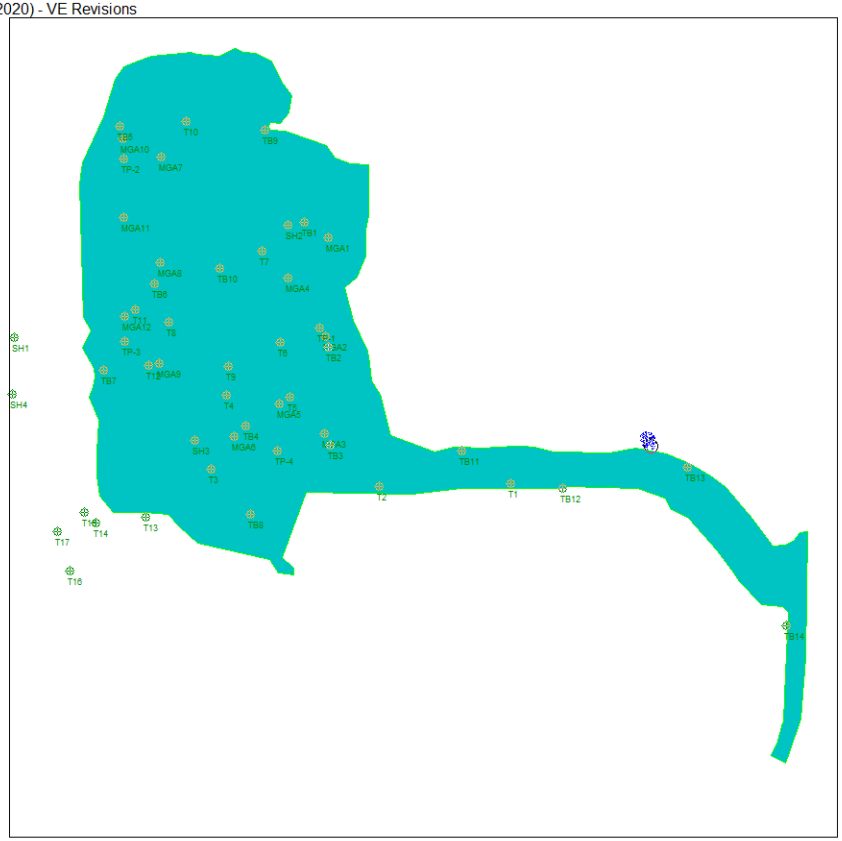
SUBGRADE GRADES


9.1
Fill
8.4
7.8
7.2
6.5
5.9
5.3
4.6
4.0
3.4
2.7
2.1
1.5
0.8
0.2
0.2
0.8
1.5
2.1
2.7
3.4
4.0
4.6
5.3
5.9
6.5
7.2
7.8
8.4
Cut
9.1
(N2884661.0,E819770.9)
(N2885900.2,E819771.5)
(N2884660.4,E820998.1)
Existing
Proposed
JOB: R009 Rockland_ MA - Shinglemill
SECTION: 04 C&F (08-17-2020) - VE Revisions
X-SCALE: 205.13 ft/in (Auto)
Y-SCALE: 205.13 ft/in (Auto)
RUN DATE: 08-17-2020 RUN TIME: 09:29:54
COMPANY:
ESTIMATOR:

Run Time 10:23:09

R009: Rockland_ MA - Shinglemill 04 : C&F (08-17-2020) - VE Revisions

Run Date 08-17-2020



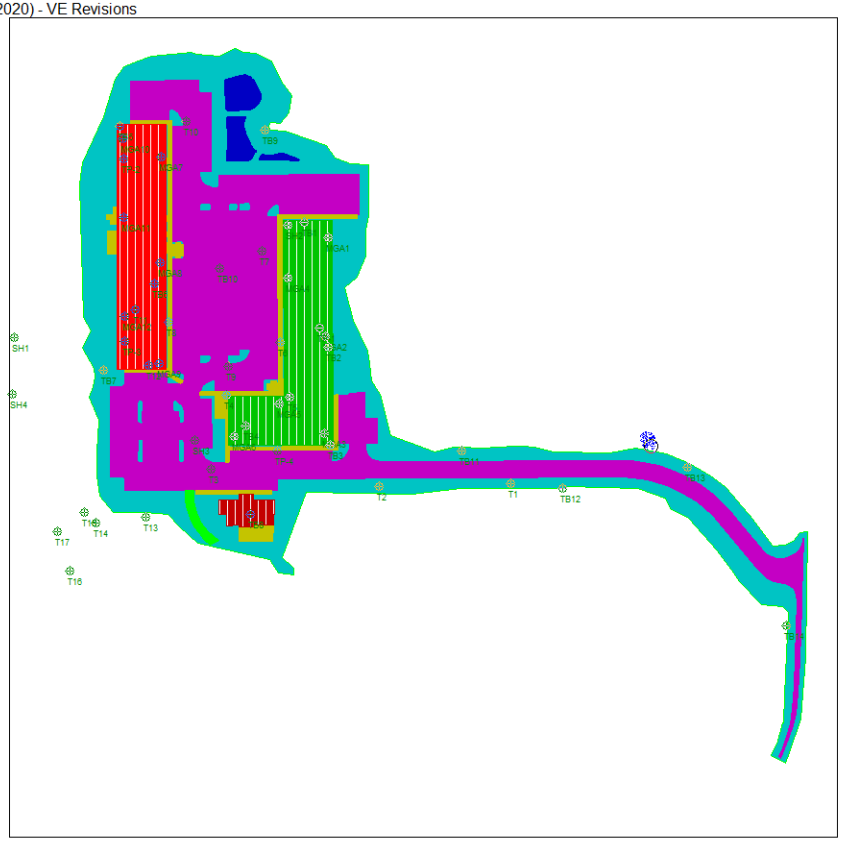

TB9
TB10
SA1
SA2
SH1
SH4
TB7
T1
T2
TB12
TB13
T13
T14
T15
T16
T17

Exhibit 10

Subsurface Conditions Summary

J-5019
July 30, 2020

Mr. David C. Andronico, Director of Facilities & Project Management
Jones Street Residential
100 High Street, Suite 2500
Boston, MA 02110

Re: **Limited Summary of Environmental and Geotechnical Conditions**
0 Pond Street
Rockland, Massachusetts

Dear Mr. Andronico:

Tighe & Bond is pleased to provide you with this Preliminary Subsurface Environmental Investigation Letter for the proposed development of the property identified as 0 Pond Street in Rockland, Massachusetts (the "Site") on behalf of Jones Street Residential (JSR). Environmental and geotechnical services included a limited subsurface investigation including the excavation of shallow test pits and advancement of soils borings in select areas of the Site. Soil sampling was completed as part of the investigations. Groundwater monitoring from newly installed monitoring wells and an existing series of shallow piezometers previously installed at the Site is ongoing.

This preliminary letter summarizes our findings and provides recommendations to support soil and groundwater management for the proposed development. A Massachusetts Geographic Information Systems (MassGIS) Resource Map (Figure 1), and Orthographic Site Plan (Figure 2) are included in Appendix A for reference.

The information provided below was summarized from the Geotechnical Evaluation and Preliminary Subsurface Environmental Investigation Letter prepared for the Site by Tighe & Bond.

Site Conditions

The Site consists an approximate 28.6-acre parcel which is located off Pond Street in Rockland, Massachusetts. The Site location is shown on Figures 1 and 2 in Appendix A.

Historic - Based on a review of historical aerial photography for the Site, the parcel was first developed from an access point off Wilson Street in the early 1950's. One building was present at the Site near the west end of Wilson Street. Portions of the Site appear to have been used as an automotive junkyard / salvage yard from the mid-1950's through the early 1990's. Historic environmental reports prepared for abutting properties reference the subject property as Joe Smith's Scrap Metal Junkyard. Tighe & Bond could not identify any previous environmental conditions or remediation reports for the subject property.

Existing –The Site is currently vacant and not improved with any permanent structures. The site consists primarily of wetlands / filled wetlands with an elevated area in the approximate center of the site, partially cleared from vegetation. An unpaved access road provides access from Pond Street in the northeast portion of the site. Additional access is available from Wilson Street. Based on a review of historical aerial photographs, several portions of the site, including the main access drive, may be filled wetlands. The majority of the property appears to have been cleared of above-grade junkyard debris, however, mounded piles of debris were noted in several areas of the property. In addition, buried consolidated rubber tire debris was noted at the Site as described later in this letter.

Proposed – It is Tighe & Bond's understanding that JSR plans to develop the central portion of the property with multi-unit residential apartment buildings and associated amenities. The

planned buildings are slab-on-grade multi-story wood timber construction. Other features include ground level parking and retaining wall structures to support development. The proposed site grading will generally require substantial fills across the developed areas of the Site.

Surrounding Resource Areas

According to MassGIS mapping (Figure 1, Appendix A), the majority of the parcel is comprised of areas of designated MassDEP Inland Wetlands. The majority of the wetland areas and their buffer are considered part of a Zone A for Public Surface Water Supply Protection Area located to the southwest of the Site. Portions of the southeastern portion of the parcel area are located in a Potentially Productive Medium Yield Aquifer.

A Natural Heritage and Endangered Species Program Certified Vernal Pool and Potential Vernal Pool are also located in the southeast portion of the parcel outside of the area of proposed development.

Tighe & Bond Subsurface Investigations

In June 2020, Tighe & Bond completed the following subsurface investigations.

Test Pits

Two days of shallow test pitting was completed at the Site on June 3 and June 4, 2020. A total of 17 test pits were completed ranging in depths from 6.5 to 9 feet below the ground surface. Environmental samples were collected from select test pits. Test pits were terminated in native soils approximately 2 to 3 feet below the groundwater interface as observed visually in the test pits. The location of the test pits, TP-1 through TP-17 are included on Figure 2 in Appendix A.

General soil descriptions typically included two to nine feet of sand a gravel fill containing varying amounts of debris including glass, metal and plastic (likely associated with former salvage yard operations). Fill in select areas of the Site were underlain with an organic peat layer. In additional, low lying areas of the property near the noted areas of first development at the western end of Wilson Street appear to have been filled prior to historical site operations. Fill in these areas was observed to contain less evidence of debris from usage as an automotive salvage yard.

Test Borings

Between June 3 and June 10, 2020, 14 geotechnical test borings (TB-1 through TB-14) were completed on Site. The locations are shown on Figure 2 in Appendix A. Soil borings were advanced to a maximum explored depth of 60 feet bsg. Shallow soil conditions identified in shallow soils during the advancement of the soil borings are consistent with soil conditions identified during test pit excavation. Test boring TB-4 was completed with groundwater monitoring well MW-1.

Summary of Findings

<u>Geotechnical Summary</u>

In general, subsurface conditions observed in the borings consisted of topsoil and fill underlain by an upper stratum of loose to medium dense sand & gravel, or loose to medium dense sand & silt, a lower stratum of medium dense to dense sand & gravel and glacial till. Borings TB-2, TB-5, TB-7, TB-11, TB-12, and TB-13 had approximately 2-10 feet of peat or organic silt beneath the fill. Boulders, up to approximately 3.5 feet in diameter were encountered within the sand & silt or lower sand & gravel layer, in borings TB-4, TB-5, TB-6 and TB-7, performed within the footprint of the proposed buildings.

Due to the relatively thick unsuitable fill and organics layers and the presence of liquefaction susceptible soils underneath the unsuitable fill and organics, the use of shallow foundations is not recommended without mitigating the potential for settlement and liquefaction in these unsuitable strata. Foundation systems will likely include shallow foundations installed after a ground improvement program has been performed.

The ground improvement alternatives currently being considered consists of ram aggregate piers (RAPs). Additional geotechnical recommendations for retaining walls and parking lots were incorporated into the complete Geotechnical Evaluation completed by Tighe & Bond.

Environmental Conditions Summary of Soil

Eight composite soil samples were collected from fill soil and natural soils from the test pits and submitted for laboratory analysis. Soil analytical results are summarized in Table 1 in Appendix B. As seen in Table 1, only select EPH analyte concentration in TP-14 from 2 to 4.5 feet, specifically polycyclic aromatic hydrocarbon (PAH) concentrations were identified slightly above the applicable RCS-1 Reportable Concentrations and could constitute a 120-day reporting requirement to MassDEP in accordance with 310 CMR 40. 0315 if not addressed.

Based on field observations in this area and the results of additional microscopic analysis, in accordance with 310 CMR 40.0317 (9), the identified PAH concentrations have been attributed to the presence of coal, coal ash or wood ash present in the sample and are being considered except from MassDEP reporting. There were no additional RC exceedances identified in the balance of the soil data collected to date.

Soils Management During Construction

Site development calls for soil fill across the developed portion of the Site. We recommend the reconsolidation and reuse of excavated soil excavated during construction within the boundaries of development.

The following strategies have been proposed for soils management:

- Geotechnically unsuitable soils, including topsoil, should be consolidated and used as as non-structural fill. Existing soils that have visible debris should be placed beneath newly imported fill soils;
- Use of Best Management Practices (BMPs) for soil relocation, including not reusing existing soils with visible debris within the top 12 to 24 inches of ground surface where soils may become accessible to future residents, including not using existing soils for gardening or growing of fruit/vegetables. It should be noted however that MassDEP reportable soil contamination has not been identified to date.
- Fill imported to the Site for construction will be completed under review of a Licensed Site Professional and in compliance with a Site-specific soils management plan. Options being evaluated include the acceptance of clean imported borrow from "like" Sites accompanied by an acceptance package documenting the origin of the soils and analytical data to document the geotechnical and environmental suitability of the soils.

Delineation and Removal of Buried Solid Waste and Solid Waste Piles

Various amounts of buried debris have been identified in the subsurface. Separation of the debris from surficial soils across the majority of the Site is likely infeasible and environmentally not warranted. Larger prices of debris disturbed during earth work should be segregated as identified and recycled off-Site.

We also identified a consolidated area mainly buried rubber tires along the access roadway leading to the southern portion of the parcel (area of TP-15 and TP-17). Multiple mounded areas of consolidated solid waste including metals scraps and rubber tires. The buried tires and mounded areas were generally located outside of the limits of development.

To the extent feasible, we recommend the delineation of the buried tire waste and the off-Site management of the tires and mounded solid waste piles. Mechanical screening of select debris piles way be warranted.

Groundwater Assessment

Groundwater monitoring at the Site is ongoing. Once a complete assessment of groundwater is complete, a summary of findings will be provided.

According to information provided by JSR, the proposed development will be municipally supplied with potable water.

Stormwater and Groundwater Management during Construction

Since site disturbances for construction are greater than 1 acre, compliance with EPA's General Permit for Discharges from Construction Activities will be required, including preparing a Stormwater Pollution Prevention Plan (SWPPP). Tighe & Bond is under agreement with JSR to prepare the SWPPP.

Depth to groundwater as calculated from the existing Site grades in between 4 and 7 feet bsg. Large-scale dewatering and groundwater management is considered unlikely during construction based on the proposed filling to occur in conjunction with construction.

If limited dewatering is necessary to support select deeper excavations, our initial recommendation would be to re-infiltrate on-site in an area upgradient of the dewatering point following best management practices (BMPs) outlined in EPA's NPDES General Permit for Discharges from Construction Activities. If discharges to abutting surface water is required, compliance with the NPDES Remediation General Permit may be required.

The Subsurface Investigation Limitations applicable this letter are included as Appendix c.

Notes:

1. *Subsurface conditions may vary widely across the Site given the former Site usage and the identified presence of buried waste. Actual conditions encountered during construction may vary. Additional disturbance of Site soils may reveal conditions that vary from what has been documented to date.*
2. *As identified above additional groundwater assessment is ongoing at the Site, pending the results of the ongoing groundwater assessment, our management recommendations may change*.

Please contact Matt Abraham at (617)686-2310 if you should have any questions, comments, or require additional information.

Very truly yours,

TIGHE & BOND, INC.

Matt Abraham
Senior Project Manager

Marc Richards, PE, LSP
Senior Vice President

Enclosures: Appendix A – Figures
Figure 1: Priority Resources Map
Figure 2: Orthograph Site Plan
Appendix B – Analytical Data Tables
Table 1: Soil Analytical Data
Appendix C - Subsurface Investigation Limitations

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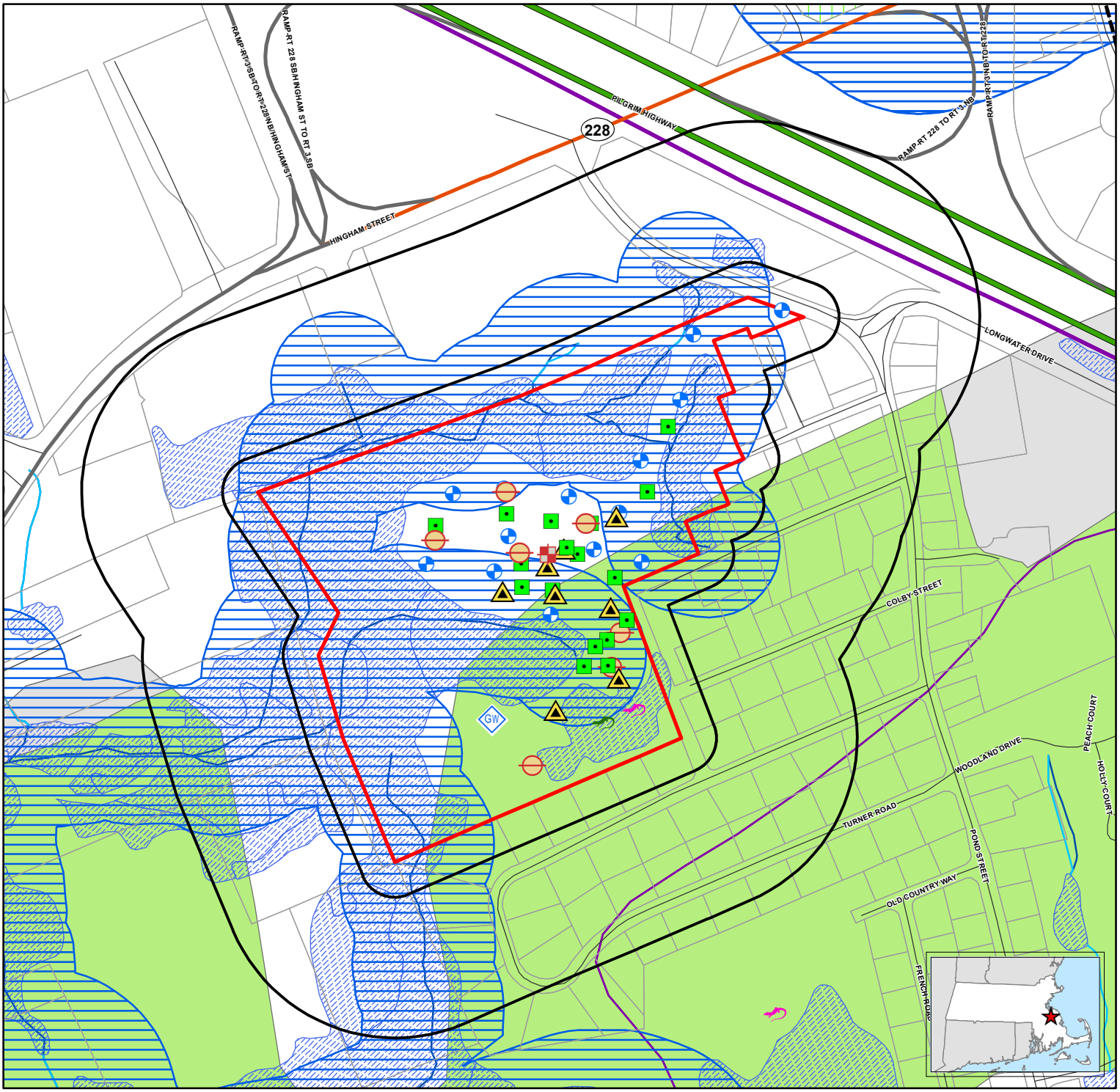
APPENDIX A



Legend

- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- Non-Landfill Solid Waste Sites
- Community Public Water Supply - Surface Water
- Community Public Water Supply - Groundwater
- Non-Community Non-Transient Public Water Supply
- Non-Community Transient Public Water Supply
- Aqueducts
- Hydrologic Connections
- Stream/Intermittent Stream
- Powerline
- Pipeline
- Track or Trail
- Trains
- Public Surface Water Supply Protection Area (Zone A)
- DEP Approved Wellhead Protection Area (Zone I)
- DEP Approved Wellhead Protection Area (Zone II)
- DEP Interim Wellhead Protection Area (IWPA)
- Protected and Recreational Open Space
- Solid Waste Landfill
- Area of Critical Environmental Concern (ACEC)
- NHESP Priority Habitats for Rare Species
- NHESP Estimated Habitats for Rare Wildlife
- EPA Designated Sole Source Aquifer
- Major Drainage Basin
- Sub Drainage Basin
- MassDEP Open Water
- MassDEP Inland Wetlands
- MassDEP Coastal Wetlands
- MassDEP Not Interpreted Wetlands
- Public Surface Water Supply (PSWS)
- Water Bodies
- Non-Potential Drinking Water Source Area - High Yield
- Non-Potential Drinking Water Source Area - Medium Yield
- Potentially Productive Medium Yield Aquifer
- Potentially Productive High Yield Aquifer
- Parcels
- Site Property Boundary
- Debris Pile
- GW Partially Installed Groundwater Supply Well
- Monitoring Well
- Piezometer
- Soil Boring
- Test Pit

N

0 200 400
Feet

FIGURE 1
PRIORITY RESOURCES

Environmental Site Assessment
0 Pond Street
Rockland, Massachusetts

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology
Circles indicate 100-foot and 500-foot radii.
Data valid as of July 2020.

July 2020

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G:\GIS\MA\SiteLocus\Rockland\MassGIS_JonesSt - borings.mxd [Exported By: ABC, 7/29/2020, 3:26:55 PM]

J-5019

FIGURE 2
ORTHOPHOTOGRAPH SITE PLAN

LEGEND

- Debris Pile
- Partially Installed Groundwater Supply Well
- Monitoring Well
- Piezometer
- Soil Boring
- Test Pit
- Approximate Parcel Boundary

LOCUS MAP

0 60 120
Feet

1:1,440

NOTES

1. Based on MassGIS Color Orthophotography (2019)

Pond Street
Rockland, Massachusetts

July 2020

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APPENDIX B

TABLE 1
Summary of Soil Analytical Data
Jones Street Residential
Pond Street,
Rockland, Massachussetts

Sample ID	**MassDEP**	**TP-5**	**TP-6**	**TP-6**	**TP-11**	**TP-12**	**TP-2**	**TP-13**	**TP-14 ***
Sample Depth	Reportable	2-3 ft	2-3 ft	3-5 ft	0-4 ft	0-3 ft	0-2 ft	0-3 ft	2-4.5 ft
Sample Date	Concentration	06/03/2020	06/03/2020	06/03/2020	06/04/2020	06/04/2020	06/03/2020	06/04/2020	06/04/2020
	RCS-1								
MCP 14 Total Metals (mg/Kg)									
Antimony	20	<4.12	<4.56	<4.06	<4.4	<4	<4.91	<4.25	<3.91
Arsenic	20	2.41	3.32	<2.03	<2.2	<2	<2.46	2.9	9.73
Barium	1,000	50.2	34.2	13.9	21.9	43.4	27.5	41.3	21.6
Beryllium	90	0.24	0.31	0.23	0.28	0.21	0.24	0.21	0.22
Cadmium	70	2.73	1.15	<0.41	0.46	0.46	<0.49	0.97	<0.39
Chromium (Total)	100	13.8	12.6	8.49	14.8	6.27	14.2	12.7	12
Lead	200	140	79.5	16.6	15.8	39.2	89.5	115	54
Mercury (7471B)	20	0.032	0.082	<0.029	<0.027	0.037	0.043	0.038	0.043
Nickel	600	15.7	15.5	8.48	13	7.34	11.8	12.8	9.34
Selenium	400	<4.12	<4.56	<4.06	<4.4	<4	<4.91	<4.25	<0.39
Silver	100	<0.41	<0.91	<0.41	<0.88	<0.4	<0.49	<0.85	<1.17
Thallium	8	<4.12	<4.56	<4.06	<4.4	<4	<4.91	<4.25	<3.91
Vanadium	400	15.8	18.7	11.7	19.5	9.94	15	17.5	17
Zinc	1,000	290	152	53.9	107	93	99.4	137	172
TCLP Metals (mg/L)									
Lead	NS	0.267	-	-	-	-	-	0.164	-
Volatile Organic Cmpounds (VOCs) (mg/Kg)									
Acetone	6	<0.0113	0.0314	0.0995	0.368	0.309	0.169	0.0937	0.354
Methyl Ethyl Ketone (MEK; 2-Butanone)	4	<0.0113	<0.0075	<0.0067	<0.0099	<0.0069	<0.0098	<0.0085	0.0183
Naphthalene	4	<0.0056	<0.0038	<0.0033	<0.005	<0.0035	<0.0049	<0.0043	0.0101
Polychlorinated Biphenyls (PCBs) (mg/Kg)									
Aroclor 1260	1	0.1	0.1	<0.06	<0.05	<0.06	0.1	0.2	0.1
Aroclor 1268	1	<0.05	<0.05	<0.06	<0.05	<0.06	<0.05	0.1	<0.06
PCBs (Total)	1	0.1	0.1	<0.06	<0.05	<0.06	0.1	0.3	0.1
Extractable Petroleum Hydrocarbons (EPH) (mg/Kg)									
Aliphatic Hydrocarbons C9-C18	1,000	<15.3	<15.4	<16.4	<16	<16.1	<15.6	<16.4	<16.8
Aliphatic Hydrocarbons C19-C36	3,000	59	28.9	<16.4	<16	<16.1	51.9	<16.4	<16.8
Aromatic Hydrocarbons C11-C22	1,000	<15.3	<15.4	<16.4	<16	<16.1	<15.6	<16.4	80.7
Acenaphthene	4	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	<0.45
Acenaphthylene	1	<0.2	<0.21	<0.22	<0.21	<0.21	<0.21	<0.22	0.58
Anthracene	1,000	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	0.98
Benzo(a)anthracene	7	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	4.47
Benzo(a)pyrene	2	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	**4.58**
Benzo(b)fluoranthene	7	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	6.11
Benzo(g,h,i)perylene	1,000	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	2.02
Benzo(k)fluoranthene	70	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	1.86
Chrysene	70	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	4.38
Dibenz(a,h)anthracene	0.7	<0.2	<0.21	<0.22	<0.21	<0.21	<0.21	<0.22	**0.73**
Fluoranthene	1,000	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	8.94
Fluorene	1,000	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	0.65
Indeno(1,2,3-cd)Pyrene	7	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	2.8
Phenanthrene	10	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	4.28
Pyrene	1,000	<0.41	<0.41	<0.44	<0.43	<0.43	<0.42	<0.44	8.22
Volatile Petroleum Hydrocarbons (VPH) (mg/K	CS	<CS	<CS	<CS	<CS	<CS	<CS	<CS	<CS

MassDEP MCP - Massachusetts Department of Environmental Protection, Massachusetts Contingency Plan,
Effective 12/27/2019
< xx indicates compound was not detected. Detection limit is provided.
Results presented in milligrams per kilogram (mg/kg), are equivalent to parts per million (ppm)
VOCs- Volatile Organic Compounds
PCBs- Polychlorinated Biphenyls
EPH - Extractable Petroleum Hydrocarbons
VPH - Volatile Petroleum Hydrocarbon
NE- Criteria Not Established
Results presented in milligrams per kilogram (mg/kg), are equivalent to parts per million (ppm)
Boxed and Bold values indicate exceedance of at least one standard
CS = compound specific
* Microscopic analysis completed on sample to confirm the presence of coal/coal/wood ash

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APPENDIX C

1. This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in accordance with the Agreement and the provisions thereof. Documents provided on this project shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party without the prior written consent of Tighe & Bond. Reuse of documents by Client or others without Tighe & Bond's written permission and mutual agreement shall be at the user's sole risk, without liability on Tighe & Bond's part and Client agrees to indemnify and hold Tighe & Bond harmless from all claims, damages, and expenses, including attorney's fees, arising out of such unauthorized use or reuse.

2. Tighe & Bond acknowledges and agrees that, subject to the Limitations set forth herein and prior written approval by Tighe & Bond, this report may be provided to specific financial institutions, attorneys, title insurers, lessees and/or governmental agencies identified by Client at or about the time of issuance of the report in connection with the conveyance, mortgaging, leasing, or similar transaction involving the real property which is the subject matter of a report and any work product. Use of this report for any purpose by any persons, firm, entity, or governmental agency shall be deemed acceptance of the restrictions and conditions contained therein, these Limitations and the provisions of Tighe & Bond's Agreement with Client. No warranty, express or implied, is made by way of Tighe & Bond's performance of services or providing an environmental site assessment, including but not limited to any warranty with the contents of a report or with any and all work product.

3. Tighe & Bond performed the subsurface investigation in accordance with our Agreement (including any stated scope and schedule limitations) and used the degree of care and skill ordinarily exercised under similar circumstances by members of the profession practicing in the same or similar locality. The objective of a subsurface investigation is to evaluate the presence or absence of contamination. Where access was denied or conditions obscured, Tighe & Bond provides no opinion or report on such areas. The subsurface investigation may not identify all contaminated media as our scope may be limited to certain locations within a site or due to geologic variability, contamination variability, seasonal conditions, obstructions such as buildings, utilities, or other site features and/or other unknown conditions. Tighe & Bond performed the subsurface investigation using reasonable methods to access and identify the presence of contaminated media. Therefore, additional contaminated media may be present at the site and may be discovered during development and site work, so an appropriate cost contingency should be carried by the Client based on their risk tolerance. Tighe & Bond also makes no opinion or report of contamination that may have migrated off site unless off-site investigations are specifically included in the scope of services.

4. Findings, observations, and conclusions presented in this report, including but not limited to the extent of any subsurface explorations or other tests performed by Tighe & Bond, are limited by the scope of services outlined in the Agreement, which may establish schedule and/or budgetary constraints for an environmental assessment or phase thereof. Furthermore, while it is anticipated that each assessment will be performed in accordance with generally accepted professional practices and applicable standards (such as ASTM, etc.) and applicable state and Federal regulations, as may be further described in the report and/or the Agreement, Tighe & Bond does not assume responsibility for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of its services.

5. In preparing this report, Tighe & Bond, Inc. may have relied on certain information provided by governmental agencies or personnel as well as information and/or representations provided by other persons, firms, or entities, and on information in the files of governmental agencies made available to Tighe & Bond at the time of the site assessment. To the extent that such information, representations, or files may be inaccurate, missing, incomplete or not provided to Tighe & Bond, Tighe & Bond is not responsible. Although there may be some degree of overlap in the information provided by these various sources, Tighe & Bond does not assume responsibility for independently verifying the accuracy, authenticity, or completeness of any and all information reviewed by or received from others during the course of the site assessment.

6. The assessment presented is based solely upon information obtained or received prior to issuance of the report. If additional environmental or other relevant information is developed at a later date, Client agrees to bring such information to the attention of Tighe & Bond promptly. Upon evaluation of such information, Tighe & Bond reserves the right to recommend modification of this report and its conclusions.

7. Emerging contaminants, including per- and poly-fluorinated alkyl substances (PFAS), are hazardous materials or mixtures (including naturally occurring or manmade chemical, microbial, or radiological substances) that are characterized by having a perceived or real threat to human health, public safety, or the environment for which there are no published health standards or guidelines and there is insufficient or limited available toxicological information or toxicity information that is evolving or being re-evaluated; or there is not significant new source, pathway, or detection limit information. The state of these compounds is constantly being updated and therefore, Tighe & Bond cannot be held liable for not including these compounds in the list of analytes that are analyzed when our services are performed. Unless otherwise specified, Tighe & Bond will only analyze for compounds ordinarily included under similar circumstances by members of the profession practicing in the same or similar locality. Tighe & Bond will not be liable for not including these or any other compounds in the list of target analytes if information regarding their use is not made available by current or former operators/owners at the facility being evaluated. We will also not be liable for not analyzing for the presence of an emerging contaminant, even if that compound is detected at a later date.

8. Tighe & Bond makes no guarantee or warranty that this report (if provided to a regulatory agency) will pass a regulatory audit/review. The Licensed Site Professional (LSP), Licensed Environmental Professional (LEP), Professional Geologist (PG), Professional Engineer (PE) or other relevant professional licensure and the applicable regulatory reviewing agency may have differences of opinion on aspects of (and approaches to) the assessment, remediation, risk evaluation or closure and the regulatory agency may request additional information, sampling data, analysis and/or remediation. Such differences of opinion will not be interpreted to imply that Tighe & Bond's services were not performed competently and in accordance with the standard of care. If additional investigations, response action evaluations, or discussions are needed following a regulatory audit/review, Tighe & Bond can provide these services under a separate Agreement.

9. If an Opinion of Probable Construction Costs (OPCC) is provided, Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the contractor's method of pricing, and that the opinion of probable costs

is made on the basis of Tighe & Bond's professional judgment and experience is based on currently available information. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the actual costs of the construction work will not vary from the OPCC.

Exhibit 11

Geotech Evaluation

J-5019-002
July 16, 2020

Mr. David C. Andronico
Director of Facilities & Project Management
Jones Street Residential
100 High Street, suite 2500
Boston, MA 02110

Re: **Geotechnical Evaluation**
Proposed Multi-Family Development
75-79 Pond Street, Rockland, Massachusetts

Dear David:

Tighe & Bond is pleased to present this geotechnical evaluation for the proposed Multi-Family Development on Pond Street in Rockland, Massachusetts. A Site Locus is presented as Figure 1 of Appendix A. This evaluation was completed in accordance with our agreement dated April 22, 2020. The vertical datum referenced in this report is the North American Vertical Datum of 1988 (NAVD88).

Executive Summary

In general, subsurface conditions observed in the borings consisted of topsoil and fill underlain by an upper stratum of loose to medium dense sand & gravel, or loose to medium dense sand & silt, a lower stratum of medium dense to dense sand & gravel and glacial till. Borings TB-2, TB-5, TB-7, TB-11, TB-12, and TB-13 had approximately 2-10 feet of peat or organic silt beneath the fill. Boulders, up to approximately 3.5 feet in diameter were encountered within the sand & silt or lower sand & gravel layer, in borings TB-4, TB-5, TB-6 and TB-7, performed within the footprint of the proposed buildings.

The site soils were assessed for liquefaction susceptibility by evaluating the factor of safety against liquefaction (FS), post-liquefaction volumetric strain (settlement) and lateral displacement, utilizing the methodology described in Idriss & Boulanger (2008).

The FS against liquefaction was less than, or equal to one in recent borings TB-2, TB-3, TB-4 and TB-11 and previous borings MGA-2, MGA-3, MGA-4, MGA-7 and MGA-8. The estimated post-liquefaction volumetric strain and lateral displacement ranged between 1 and 3.5 inches and 3 and 40 inches, respectively.

Site grades will be raised up to approximately eight feet to accommodate site stormwater drainage. Therefore, due to the relatively thick unsuitable fill and organics layers encountered in the recent borings, and the presence of liquefaction susceptible soils underneath the unsuitable fill and organics, an overexcavation and replacement alternative was not considered economically viable.

The use of shallow foundations is not recommended without mitigating the potential for settlement and liquefaction in these unsuitable strata. Recommended foundation systems

consist of deep foundations, or shallow foundations installed after a ground improvement program has been performed.

Feasible ground improvement alternatives include Controlled Modulus Columns (CMCs), Ram Aggregate Piers (RAPs), or Geo-Concrete Columns (GCCs). Deep foundation alternatives include Helical Piles and Ductile Iron Piles (DIPs). Final selection of the foundation support system should be based on building layout, structural design loads, environmental considerations, and cost.

Ground improvement is typically a proprietary process where a specialty contractor provides the final design based on a performance specification. We recommend that ground improvement be designed to achieve a net allowable bearing pressure for shallow foundations founded on improved soil with a minimum allowable bearing pressure of 3 tons per square foot (tsf). Total and differential settlements of foundation on improved soil should be limited to 1 inch and 0.5 inches, respectively. The minimum required bearing capacity of improved soil should be confirmed by the structural engineer based on anticipated column loads.

Feasible deep foundations alternatives include Helical piles or ductile iron piles (DIPs). Helical piles and DIPs should penetrate into the naturally deposited lower sand & gravel or glacial till. We anticipate that helical piles could be installed to achieve an allowable design capacity of up to 25 kips each and that DIPs would achieve allowable design capacities on the order of 40 to 80 kips. These capacities include a minimum factor of safety of 2.0 but do not include downdrag, which will be significant due to the proposed raise in grade. This will need to be address during pile design, if piles are the selected approach.

For ground improvement, the slab may be designed as a slab-on-grade bearing on 12 inches of a Gravel Borrow or Crushed Stone base course placed after removal of existing topsoil and proof compaction of the subgrade. For deep foundation alternative, a structural slab system supported by piles is required.

Site retaining walls that are free to rotate at the top and that are subject to horizontal backfill should be designed using an equivalent fluid pressure of 40 pounds per cubic foot (pcf). Hydrostatic water pressure along the height of the wall below groundwater should be included backfilling the wall design. Walls should also be designed to resist an earthquake force evaluated in accordance with Section 1610.2 of the MSBC 9th edition.

A pavement cross-section including 8-inch gravel subbase, 6-inch crushed stone base and 3-inch bituminous concrete binder/finish course is recommended for the proposed parking lot areas and access driveway, based on the assumption that the paved areas may experience heavy vehicle loads. A geosynthetic reinforcement, such as Mirafi RSi series, Tensar TriAx TR series, or similar, underlain by additional 6 inches of gravel subbase should be used to improve distribution of the expected vehicular loads, in paved areas of the site if unsuitable soils are encountered at the proposed pavement subbase subgrade.

Site Conditions

Existing – The existing site consists of an approximately 29-acre undeveloped parcel located at 75-79 Pond Street in Rockland, Massachusetts. The site is bound by Pond Street

and a commercial development to the north, by wetlands to the west, south and southeast and by residential developments and a wooded area to the east.

The site consists primarily of wetlands with an elevated area in the approximate center of the site, partially cleared from vegetation. An unpaved access road provides access from Pond Street in the northeast portion of the site. Additional access is available from Wilson Street in the southeast. The site was historically used as an automobile junkyard. Based on a review of historical aerial photographs, several portion of the site, including the main access drive, may be filled wetlands.

Site grades range between approximately elevation (El.) 135 to El. 138 feet throughout the site with few isolated peaks at approximately El. 142 to El. 144 feet, in the northern, center and southern portion of the site.

Proposed –The proposed project includes construction of a new residential development composed of two, 5-story apartment buildings, one with an approximate footprint of 27,000 square feet and 109 units, and the other with a footprint of 30,000 square feet and 127 units; a community building approximately 3,200 square feet in area; a paved access road from Pond Street to the residential development and paved parking lot with approximately 300 parking spots. We understand that retaining walls are proposed throughout most of the perimeter of the residential development and access road to limit wetland impacts.

An underground stormwater infiltration system is proposed to be installed underneath the parking lot between the two main residential buildings. Site grades are anticipated to be raised up to approximately 8 feet to accommodate construction of the infiltration system.

Subsurface Conditions

The generalized subsurface conditions described in the text below summarize trends observed in the recent explorations. The boundaries between soil strata are approximate and are based on interpretations of widely spaced explorations and samples. Actual conditions could be more variable.

Two previous subsurface exploration programs were performed by McArdle, Gannon Associates Inc., (MGA) in May 2020, and by Sanborn Head (S&H) in July 2018. A recent subsurface exploration program was performed by Tighe & Bond in June 2020. The approximate locations of the previous and recent subsurface explorations are shown on Figure 2 of Appendix A. Previous test boring logs and test pit logs are included in Appendix B; recent test boring logs are included in Appendix C; recent test pit logs are included in Appendix D.

Previous Subsurface Explorations

Previous Test Borings - Twelve geotechnical test borings (MGA-1 through MGA-12/12A) were drilled by New Hampshire Borings of Derry, NH, between May 27 and May 29, 2020, using an all-terrain vehicle mounted (ATV) drill rig. The borings were advanced to depths ranging between approximately 21 to 26 feet below existing ground surface. The borings were terminated in naturally deposited lower sand & gravel or glacial till soils.

Four geotechnical test borings (SH-1 through SH-4) were drilled by Crawford Drilling LLC of Gardner, MA, on July 10, 2018. The borings were advanced to depths ranging between

approximately 10.5 to 21 feet below existing ground surface. The borings were terminated in naturally deposited sand & gravel or glacial till soils.

Previous Test Pits - Four test pits (TP-1 through TP-4) were performed by SLT Construction Corporation of Clover, MA, on May 29, 2020, using a Komatsu PC228 tracked excavator. The test pits were advanced to depths ranging between approximately 6 to 10 feet below existing ground surface. The test pits were terminated in naturally deposited sand & gravel.

Groundwater monitoring wells were not installed as part of the previous subsurface investigations. However, the geotechnical report by MGA mentioned that "*Stabilized groundwater levels were measured in existing monitoring wells within/near the proposed building areas at about 2± to 4± feet below existing grades on May 26, 2020, corresponding to about Elevation 134± to 134.5± feet*".

Recent Subsurface Explorations

Recent Test Borings – Fourteen geotechnical test borings (TB-1 through TB-14) were drilled by New England Boring Contractors of Derry, New Hampshire between June 3 and June 10, 2020. Test borings were advanced with 4-inch inner diameter flush joint casing using drive and wash methods to depths ranging between approximately 10 and 60 feet below ground surface corresponding to elevations ranging between approximately El. 128 and El 68 feet. Borings were terminated in naturally deposited sand & gravel or glacial till soil.

Split-spoon sampling and Standard Penetration Tests (SPTs) were conducted continuously through fill or organics to a maximum of 12 feet below the existing ground surface and at maximum 5-foot intervals thereafter. A groundwater monitoring well was installed in test boring TB-4 upon completion. Remaining borings were backfilled upon completion with cuttings or silica sand.

Tighe & Bond observed the borings and visually classified the soil in accordance with the Modified Burmister Soil Classification System. Representative soil samples were collected from each boring for geotechnical laboratory testing

Recent Test Pits – Seventeen test pits (TP-1 through TP-17) were excavated by New England Boring Contractors of Derry, New Hampshire on June 3 and June 4, 2020. The test pits were excavated with a small Kubota KX-080-4 excavator. Test pit depths ranged from 6.5 to 9 feet below the ground surface, corresponding to elevations ranging between approximately El. 121 and El 127 feet. Environmental "grab" samples were taken from each soil stratum. Test pits were terminated in native soils and backfilled with excavated material placed in lifts and compacted with the heel of the bucket.

Laboratory Testing – Laboratory tests were performed to aid in soil classifications, evaluate liquefaction potential, and evaluate soil re-use potential. Twelve mechanical Particle Size Analysis tests (ASTM D6913) were performed on samples taken during the explorations. Laboratory test results are included in Appendix E.

Summary of Subsurface Conditions – In general, subsurface conditions observed in the borings consisted of topsoil and fill underlain by an upper stratum of loose to medium dense sand & gravel, or loose to medium dense sand & silt, over a lower stratum of medium dense

to dense sand & gravel, over glacial till. Borings TB-2, TB-5, TB-7, TB-11, TB-12, and TB-13 had approximately 2 to 10 feet of peat or organic silt beneath the fill. Boulders, up to approximately 3.5 feet in diameter were encountered within the sand & silt or lower sand & gravel layer, in borings TB-4, TB-5, TB-6 and TB-7, performed within the footprint of the proposed buildings.

The recent borings encountered up to three inches of topsoil in the borings. However, a forest mat, up to about six inches in thickness, was encountered at select previous explorations locations and should be expected on site.

Table 1 below presents the general stratigraphy encountered during the subsurface exploration program in descending depth from the ground surface.

Table 1
Description of Subsurface Conditions Encountered

Strata (In Descending Depth)	General Description
FILL	Loose to dense, brown to gray, fine to coarse SAND, with up to 50 percent Gravel and up to 35 percent Silt, trace debris (wood, glass, rubber, metal, etc.)
ORGANICS	Soft to stiff, dark brown, PEAT with up to 50 percent Organic Silt and up to 20 percent Sand, or ORGANIC SILT, with up to 20 percent Sand, and up to 10 percent Gravel
SAND & GRAVEL (UPPER and LOWER)	Loose to dense, brown, fine to coarse SAND, with up to 50 percent Gravel and up to 35 percent Silt
SAND & SILT	Loose to medium dense, tan to gray, fine to coarse SAND, with up to 50 percent Silt and up to 20 percent Gravel
GLACIAL TILL	Medium dense to very dense, light brown, fine to coarse SAND, with up to 35 percent Silt and up to 35 percent Gravel

Definition of Soil Description Terms: "trace" = 0-10%, "little" = 10-20%, "some" = 20-35%, "and" = 35-50%, by weight. Approximately 1 to 3 inches of Topsoil encountered at ground surface in borings TB-1 through TB-6 and TB-8 through TB-14. Boulders between approximately 1.5 to 3.5 feet in diameter were encountered during drilling in boring TB-4 through TB-7.

Groundwater was encountered approximately two feet to eight feet below the existing ground surface corresponding to elevations 132 to 136 feet. Groundwater was measured feet below existing ground level in the monitoring well installed in boring TB-4, corresponding to approximately El. 132 feet. Water levels were taken during or immediately after drilling and may not reflect stabilized conditions. Water levels can fluctuate with season, precipitation, and nearby construction or other below grade activities, such as excavation, dewatering, wells, infiltration basins, etc.

Geotechnical Evaluation and Recommendations

The analyses and recommendations submitted in this evaluation are based upon the data obtained from the relatively widely spaced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If significant variations from these descriptions appear during construction, it will be necessary to re-evaluate these recommendations.

These recommendations are generally based on the International Building Code (IBC) 2015 and the Massachusetts State Building Code (MSBC) 9th Edition amendments to the 2015 IBC.

It should be noted that a previous geotechnical engineering report titled "Proposed Apartment Building" dated June 2020, was prepared by MGA. The report found between approximately 2 and 9 feet of unsuitable foundation bearing soils within the footprint of the proposed buildings. The geotechnical report by MGA recommended that "*These soils are not considered suitable for support of the proposed building loads and should be removed from within the proposed building areas. It is anticipated this will likely require excavations of about 2± to 9± feet in depth from the existing site grades based upon the explorations we observed*". Another previous geotechnical engineering report titled "Preliminary Geotechnical Engineering Report" dated July 2018, prepared by Sanborn Head, recommended shallow foundation with removal of organic soil down to the naturally deposited inorganic soil subgrade, if encountered.

The overexcavation and replacement alternative was not considered economically viable for this project because of the disposal of unsuitable soils offsite, excessive volume of imported borrow material needed to replace the unsuitable soil, and the presence of liquefaction susceptible soil underneath existing fill and organics that would remain.

Recommended foundation options consist of shallow foundations installed after a ground improvement program has been performed or deep foundations. Feasible ground improvement alternatives include Controlled Modulus Columns (CMCs), Ram Aggregate Piers (RAPs), or Geo-Concrete Columns (GCCs). Deep foundation alternatives include Helical Piles and Ductile Iron Piles (DIPs). Final selection of the foundation support system should be based on building layout, structural design loads, environmental considerations and cost.

Geotechnical Design Recommendations

General

Frost Protection Depth - Per the Massachusetts State Building Code, footings should bear a minimum of 4 feet below adjacent ground surface exposed to freezing temperatures for frost protection. Interior footings not exposed to freezing temperatures should bear a minimum of 1.5 feet below the slab; however, possible building shut-downs or power failures should be considered in the footing design.

Building Slab - Subgrades and backfill should be prepared, placed, and compacted as recommended later in this letter.

For ground improvement, the slab may be designed as a slab-on-grade bearing on 12 inches of a Gravel Borrow or Crushed Stone base course after removal of the topsoil/subsoil to the top of the fill or naturally deposited upper sand & gravel or sand & silt .

The existing fill, organics and unimproved sand and silt or upper sand & gravel granular soil are considered unsuitable for support of the slab due to excessive consolidation and potential liquefaction-induced settlements during a design earthquake event. Therefore, for a deep foundation alternative, a structural slab system supported by piles is required.

Foundation and Underslab Drainage – Groundwater was encountered approximately 2 to 4 feet below existing grades. We understand that site grades will be raised up to approximately eight feet to accommodate site stormwater drainage. Therefore, a foundation and underslab drainage system will likely not be necessary.

Ground Improvement

Controlled Modulus Columns (CMCs) - CMCs are typically constructed by penetrating a reverse displacement auger into the soil to the designed depth which increases the density, strength, and bearing capacity of surrounding soils. When the auger is extracted, a rigid column is developed by injecting cementitious grout under pressure to improve the surrounding soils. The result is a composite ground improvement matrix with increased stiffness, allowing the CMCs and the surrounding soil to more effectively distribute structural loadings. Little excess soil/spoils are generated during construction of the CMCs. Shallow foundations are designed to transfer load from the structure to the CMC-soil matrix via a load transfer platform consisting of structural fill.

CMCs are typically on the order of 10 to 18 inches in diameter and spac between four to six feet on-center. The actual required CMC locations, depth, diameter, and spacing should be determined by a foundation specialty contractor for their proprietary system and reviewed by the owner's geotechnical and structural engineers.

Ram Aggregate Piers (RAPs) – Aggregate piers are typically constructed by either augering a hole and replacing the spoils with lifts of stone aggregate that are compacted with a down-the-hole ram (replacement method) or using a vibratory casing to displace soils laterally and feed aggregate to the bottom of the casing, which is then systematically compacted during sequential casing withdrawal and advancement (displacement method). An advantage to the displacement method is that it reduces the generation of spoils that need to be managed and disposed. With both installation methods, compaction of the aggregate has the added benefit of densifying loose soils between the pier elements through lateral displacement of the aggregate and surrounding soils. Grout injected through the RAPs may be used to increase the stiffness of the piers, particularly in very loose or organic soils. The result is an engineered soil matrix that is designed to be sufficiently stronger than the unimproved soils, and one that is able to support structural loads using conventional shallow foundations and slab-on-grade floors. Installation of aggregate piers is also relatively fast and is performed with conventional heavy construction equipment, thereby avoiding premium costs associated with more specialized equipment typically required for deep foundation installation.

Aggregate pier diameters typically range from 20 to 36 inches. The center-to-center spacing between piers depends on their design stiffness, but typically ranges from 6 to 8 feet in areas below footings, and 8 to 12 feet in areas below slabs.

Geo-Concrete Columns (GCCs) – Geo-concrete columns are typically constructed using a vibratory mandrel to displace soils laterally and feed concrete to the bottom of the mandrel. The concrete compacted during sequential mandrel withdrawal and advancement. Similar to displacement RAPs, the advantage of GCCs installed with displacement methods is that it reduces the generation of spoils to be disposed. Typical GCCs dimensions and spacing are similar to those of RAPs (20 to 36 inches diameter and six to eight feed spacing, respectively).

Ground improvement is typically a proprietary process where a specialty contractor provides the final design based on a performance specification. The performance specification should identify minimum criteria (allowable bearing capacity, total and differential settlement as indicated herein) that must be achieved by the contractor to satisfy parameters used during design and execution of the ground improvement work. We recommend that ground improvement specialty contractors be consulted to better define ground improvement options and estimate potential construction costs.

Shallow Foundations Design – Ground improvement elements should be installed throughout the foundation and slab areas of the proposed building footprint and underneath site retaining wall foundations. Ground improvement should extend five feet laterally beyond the structure footprint to limit differential settlement between the main structure and other external structure or approach slabs. We anticipate that CMCs, RAPs or GCCs will need to be installed to depths up to approximately 30 feet below existing site grade (i.e. ground improvement elements to penetrate the unsuitable fill, organics and potentially liquefiable soil with bottom of the elements terminating in the lower sand & gravel or glacial till stratum). We recommend that ground improvement be designed to achieve a net allowable bearing pressure for shallow foundations resting on improved soil of at least 3 tons per square foot (tsf). Total and differential settlements of foundation on improved soil should be limited to 1 inch and 0.5 inches, respectively. The minimum bearing capacity of improved soil should be confirmed by the structural engineer based on anticipated column loads.

Boulders up to 3.5 feet in diameter were encountered in select borings within the sand & silt and lower sand & gravel layer. Depending on depth of the ground improvement elements, localized pre-drilling may be required prior to installation.

Liquefaction susceptible soils and soft organic soils were encountered in the explorations. The lack of lateral support in the liquefiable soil and organics should be considered during the ground improvement selection process and should be addressed during design. Portions of the site will have significant raises in grade. Sequencing of fill and ground improvement measures and also potential downdrag loads on ground improvements elements should be considered during design.

Modulus of Subgrade Reaction – Shallow footings will likely be constructed over a footing pad (RAPs or GCCs) or a load transfer platform (CMCs). The recommended modulus of subgrade reaction, k_1, is 250 pci for footings on compacted Gravel Borrow and 300 pci for footings on ¾" Crushed Stone. These values are for Gravel borrow or ¾" crushed stone over unimproved soil and were determined based typical ranges of the modulus of subgrade reaction based on soil type in the borings, and is not based upon a plate load test, or other type of direct test. The specialty contractor should provide the modulus of subgrade reaction for soil with ground improvement based on stiffness of the improved soil.

If required by the specialty contractor, the structural fill base should be placed over a high-strength biaxial geogrid placed on the prepared subgrade to build the load transfer platform. The specialty contractor should perform an analysis to evaluate the base layer thickness and the need for a geogrid below the base layer to help span slab loads between the ground improvement element and to allow the proposed building slabs to perform as intended (i.e. no settlement or cracking).

Deep Foundations

Helical Piles - Helical piles are a steel foundation system consisting of a central shaft with one or more helix-shaped bearing plates welded to the lower portion of the lead shaft section. Extension shafts are used to extend the pile into competent load-bearing soils. Helical piles would derive their support by the bearing of the helices within the sand and gravel or glacial till strata. Helical piles are advanced by rotating the pile into the ground with the torque measured during helical pile installation.

Helical piles are available as both round and square shafts with a range of shaft diameters and helix configurations (number of helices, helix diameters and helix spacing), depending on the design loads and installation considerations. The helices, shafts and installation equipment will vary with different pile manufacturers. An advantage to this installation method is that it reduces the generation of spoils that need to be managed and disposed with low construction vibrations.

Due to special requirements for installation of helical piles and the requirements for proper performance of the structural system, helical piles should be designed and installed by a specialized helical pile contractor. In addition, each contractor typically works with a specific manufacturer and engineer. Thus, the size of the helical pile shaft, the number and diameter of the helices, and the overall design will vary depending on the manufacturer selected by the contractor.

Ductile Iron Piles – Ductile iron piles (DIPs) are also considered a feasible deep foundation support alternative. Ductile iron piles consist of high-strength ductile iron pipes that can be designed to obtain their resistance in either end-bearing or skin friction.

DIPs are installed with a high-frequency percussion hammer and a medium-size excavator. In general, DIPs develop capacity in end-bearing; however, capacity can also be obtained in skin friction by grout-to-ground bond after pressuring grouting the pile such that grout flow out the bottom the pile and up around the outside of the pile back to the ground surface. An advantage to this installation method is that it reduces the generation of spoils that need to be managed and disposed with low construction vibrations. DIP diameters can be as small as 4 inches and usually go up to about 10 inches. DIPs are usually fabricated in 15-foot-long sections that are spliced during installation. DIPs should be installed underneath individual footings and foundation walls and should penetrate the existing unsuitable soils and bear in the lower sand and gravel or glacial till.

Deep Foundations Design - Helical piles or DIPs should penetrate into the lower sand & gravel or glacial till. We anticipate that helical piles could be installed to achieve an allowable design capacity of up to 25 kips each and that DIPs would achieve allowable design capacities on the order of 40 to 80 kips. These capacities include a minimum factor of safety of 2.0 and do not include downdrag, which will be significant due to the proposed

raise in grade. This will need to be address during pile design, if piles are the selected approach.

When checking the helical piles or DIPs for buckling, the pile designer should account for lack of lateral support in the existing organics and potentially liquefiable soil layers at a minimum. Actual unsupported length should be evaluated by means of a lateral analysis.

Due to the presence of boulders encountered in the borings, the feasibility of the proposed deep foundation alternatives for this site should be further evaluated by an experienced specialty contractor familiar with similar site conditions.

Load Test - Based on Section 1810 of the MSBC, load testing of DIPs will likely be required since capacities greater than 40 tons are anticipated. Load testing on helical piles should be performed if design allowable stress exceed limits indicated in Table 1810.3.2.6 of the Code (i.e. allowable stress greater than 0.6 F_y, with F_y yield stress of steel). When static load tests are performed, the IBC requires that the piles be tested to (and support) at least two times the allowable design capacity.

Capacity of helical piles should also be verified by continuously measuring torques during installation of the piles. The contractor's design submittal should be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

If ground improvement is selected in lieu of deep foundations, a sacrificial element should be installed in areas where ground improvement is planned with the Contractor's standard procedures at the start of construction and tested to evaluate the modulus of the element (i.e. load versus deflection). The load testing setup and procedures should be specific for the type of ground improvement used. Installation of production ground improvement elements can begin after successful completion of the load test. The contractor's design submittal should be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

Seismic Design

Seismic Site Class and Seismic Design Parameters - As prescribed by the MSBC 9th edition and 2015 IBC, the seismic Site Class was determined in accordance with Chapter 20 of ASCE 7-10. Loose (possible liquefaction-susceptible) soils were encountered in the recent and historical borings performed at the Site, potentially requiring a site response analysis (in accordance with Chapter 21 of ASCE 7-10). However, a site response analysis was not conducted based on Section 20.3.1 of ASCE 7-10 which contains an exception to the site response analysis for structures having a fundamental period above 0.5 seconds (the structure fundamental period is approximated as the number of stories divided by 10, therefore being about 0.5 seconds for the proposed building). The project structural designer should confirm the fundamental period of the structure used for this evaluation.

The seismic Site Class was evaluated using the average SPT resistance method as described in Chapter 20.4 of ASCE-7-10 using N-values from the recent borings. Based on this procedure and on data from the borings, the Site Class was evaluated to be between Site Class D (N-bar between 15 and 50 blows-per-foot) and Site Class E (N-bar below 15 blows-per-foot). The site was assigned to Site Class E, taking into account that the calculated values of N-bar for borings in Site Class D were found to be closer to the lower end of the range (15 blows-per-foot) as well as the presence of organics on site.

The MSBC tabulated 2 percent probability of exceedance in 50 years with 5 percent critical damping ground motion accelerations at short periods (S_S) and at 1-second period (S_1) for the Town of Rockland are 0.198 and 0.065, respectively. However, the IBC 2015 mapped values for S_s and S_1 were slightly higher (0.202 and 0.066, respectively), therefore, the IBC 2015 mapped values were used un our evaluation. The peak ground acceleration (PGA) was evaluated based on the IBC 2015 mapped values and was 0.108.

The design spectral response accelerations adjusted for Seismic Site Class E are:

$$PGA_M=0.270;\ S_{DS}=0.337;\ S_{D1}=0.154$$

The structural engineer should determine the Seismic Design Category based upon the assumed seismic use group.

Liquefaction Potential - Liquefaction screening performed using Figures 1806.4 a through c of the MSBC indicated that site soils are potentially subject to liquefaction. This type of screening analysis is based on Seismic site Class D and is therefore non-conservative for the Seismic Site Class E evaluated at the proposed site. The preliminary liquefaction screening performed using the MSBC charts indicated thickness of the potentially liquefiable soil to range between approximately 5 to 15 feet.

The liquefaction susceptibility of site soils was assessed by evaluating the factor of safety against liquefaction (FS), post-liquefaction volumetric strain (settlement) and lateral displacement, utilizing the methodology described in Idriss & Boulanger (2008). A design earthquake magnitude of 5.59 was used based on the USGS probabilistic seismic hazard deaggregation, a peak ground acceleration (PGA_M) of 0.263g, and groundwater at two to eight feet below existing grade.

The results of this evaluation indicate that the soils are susceptible to liquefaction under the design earthquake. The results of the liquefaction susceptibility analysis indicated that:

- The FS against liquefaction was less than 1.5 in recent borings TB-2, TB-3, TB-4, TB-6 and TB-11 and previous borings MGA-2, MGA-3, MGA-4, MGA-6, MGA-7 and MGA-8. The FS against liquefaction was less than, or equal to 1 in recent borings TB-2, TB-3, TB-4 and TB-11 and previous borings MGA-2, MGA-3, MGA-4, MGA-7 and MGA-8;

- The estimated post-liquefaction settlement and lateral displacement underneath the northern building range between 1.5 and 3.5 inches and 4 and 40 inches, respectively;

- The estimated post-liquefaction settlement and lateral displacement underneath the southern building range between 1 and 3 inches and 3 and 30 inches, respectively.

Refer to Figure 2 for approximate extent of the area with estimated FS against liquefaction less than, or equal to 1.

Lateral Earth Pressures

We recommend that the design earth pressures for site retaining walls be designed using an equivalent fluid pressure of 40 pounds per cubic foot (pcf), which is applicable for

cantilevered walls above groundwater and walls with toe drains. This pressure applies to walls that are laterally supported at the bottom and are free to rotate at the top and are subject to horizontal backfill.

The existing unsuitable fill and organics should be removed from behind the proposed retaining walls and replaced with free draining backfill such as Granular Fill or Gravel Borrow within at least 3 feet of the walls and be provided with toe drains so that no hydrostatic pressure develops behind the wall. Hydrostatic water pressure along the height of the wall below groundwater should be included for walls with undrained backfill.

Where the calculated earth pressure behind the wall is less than 250 pounds per square foot (psf), it should be increased to 250 psf to account for stresses created by compaction within 5 feet of the wall. Walls should also be designed for appropriate sloping backfill, surcharge and to support the hydrostatic pressure along the entire height of the wall if a toe drain is not installed at the base of the wall.

Walls should also be designed to resist an earthquake force F_w evaluated in accordance with Section 1610.2 of the MSBC as follows:

$$F_w=0.100\ (S_s)(F_a)(\gamma_t)(H^2)$$

Where:

- S_S is the spectral response acceleration parameters at 0.2-second period as described above;
- F_a is the site coefficient from Table 1613.3.3(1) of 2015 IBC (F_a=2.5 for Seismic Site Class E);
- γ_t is the soil total unit weight (γ_t=130 pcf for compacted Gravel Borrow);
- H is the height of the wall.

For deep foundations, lateral loads should be designed based on lateral resistance of the pile foundations, plus passive resistance with consideration for strain compatibility effects and potential future excavation.

Sliding and Overturning Resistance – Retaining walls should be verified for sliding and overturning. For the sliding resistance analysis, a coefficient of friction equal to 0.55 should be used for concrete foundations on Gravel Borrow or Crushed Stone. For sliding and overturning resistance , backfill unit weight should be 130 pcf assuming backfill placed and compacted as described herein. The minimum factors of safety for sliding and overturning under static loads should be 1.5. The minimum factors of safety for sliding and overturning under seismic loads should be reduced to 1.1.

Pavement Design

The following pavement cross-section is recommended for the proposed parking lot areas and access driveway, based on the assumption that the paved areas may experience heavy vehicle loads:

Strata	Minimum Thickness
Bituminous Concrete Finish Course	1 inch
Bituminous Concrete Binder Course	2 inches
Crushed Stone Base Course	6 inches
Gravel Subbase Course	8 inches

A geosynthetic reinforcement, such as Mirafi RSi series, Tensar TriAx TR series, or similar, should be used to improve distribution of the expected vehicular loads, in paved areas of the site where grades are not expected to be raised by more than 18 inches, if unsuitable soils are encountered at the proposed pavement subgrade.

Geotechnical Construction Recommendations

This section provides comments related to foundation construction, earthwork, and other geotechnical aspects of the project that will aid those responsible for preparing construction specifications.

Site Preparation – The surface cover materials, including existing topsoil/subsoil should be removed to the top of the existing fill or naturally deposited upper sand & gravel or sand & silt. Care should be taken to avoid mixing of these materials with other excavated soils. If test pits are performed by the contractor prior to or during construction to further evaluate subsurface conditions across the site, backfill of the test pits should be made using Gravel Borrow placed in controlled, compacted lifts as described herein.

Excavation and Fill – Conventional heavy construction equipment should be suitable for excavation in existing soil materials. Excavation should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest edition.

We anticipate that ground improvement or deep foundation alternatives will be selected in lieu of over excavation and replacement of the existing unsuitable soil. If overexcavation and replacement is performed prior to construction of shallow foundations, unsuitable soil should be removed within the foundation bearing zones of the proposed buildings and replaced with Gravel Borrow. The foundation bearing zone is defined by a 1-horizontal to 1-vertical (1H:1V) plane extending downward and outward from one foot beyond the edge of foundation. Unsuitable soils consist of existing topsoil, fill, naturally deposited peat/organic silt, liquefaction susceptible upper sand and gravel and sand & silt or any other soft/loose, frozen or organic soils.

Subgrades should be excavated in such a way to minimize disturbance, such as using a smooth faced bucket. Compacted Gravel Borrow, Crushed Stone wrapped in a non-woven geotextile separation fabric, or a six-inch lean concrete mud mat should be used for the foundation base course. Table 2 presents the required gradations for imported materials.

Table 2 - Gradation Requirements for Borrow Materials

Sieve Size	Percent Finer by Weight			
	Granular Fill	**Gravel Borrow**	**1-1/2'' Crushed Stone**	**¾" Crushed Stone**
2/3rd lift thickness	100			
2 inch	--	100		
1½ inch	--	--	100	
1¼ inch	--	--	85-100	
1 inch	--	--	--	100
¾ inch	--	--	10-40	90-100
½ inch	--	50-85	0-8	10-50
3/8 inch	--	--	--	0-20
No. 4	--	40-75	--	0-5
No. 10	30-95	--	--	--
No. 40	10-70	--	--	--
No. 50	--	8-28	--	--
No. 200	0-15	0-10	--	--

Backfill should be placed in 12-inch maximum lifts or six-inch maximum lifts in restricted areas and should be compacted to 95 percent of the maximum dry density as determined by the Modified Proctor laboratory test (ASTM D-1557). Thinner lifts may be needed depending on the material placed and the type of compactor used. Crushed Stone should be placed in loose lift thicknesses of maximum 12 inches and be compacted with heavy compaction equipment to achieve an unyielding subgrade.

Boulders may be encountered during site preparation and during foundation excavation. Boulders should be removed from within the zone of influence of the proposed building foundations and slab and replaced with Gravel Borrow placed and compacted as described herein.

Dewatering – Groundwater was encountered between two to eight feet below existing grade. We anticipate minimal excavation for construction of the proposed buildings and walls, due to proposed raise in grade (up to approximately eight feet), therefore dewatering will likely not be needed. If dewatering becomes necessary for foundation excavation or

installation of deep utilities, dewatering can likely be accomplished by pumping from properly filtered sumps and be discharged according to Federal, State, and local regulations. The groundwater level should be temporarily lowered at least two feet below excavations to limit potential "boils", loss of fines, or softening of the ground. Surface water entering the construction area should be diverted away from excavations.

Bearing Surface Preparation – Excavated subgrades should be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 10 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 lbs in trench or pit excavations. Any subgrades that are soft or yielding under proof compaction efforts should be removed below the footprint of the structure as well as in the foundation bearing zone and replaced with compacted Gravel Borrow or compacted Crushed Stone wrapped in a non-woven geotextile. If proof compaction will prove detrimental to the surface due to the presence of groundwater, static rolling may be allowed at the discretion of the Engineer.

Due to the high fine (silt) content of the native soils, bearing surfaces may be easily disturbed during foundation construction activities should they become wet from precipitation or surface water entering the excavation. The base course or lean concrete mat should be placed as soon as practicable after proof compaction to help protect native Glacial Till subgrades.

Time between final excavation and placement of concrete should be minimized to limit disturbance and rainwater/groundwater induced softening of the subgrade. Soil bearing surfaces should be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, the foundation should be backfilled as soon as possible after it is constructed. Alternatively, insulating blankets or other means may be used for protection against freezing

Reuse of Existing Soils – Existing subsurface materials, excluding topsoil and peat/organic silt, may be re-used as Granular Fill, regardless of its gradation, provided it is environmentally appropriate, free of organics, debris, stones greater than two thirds the lift thickness in diameter, or other unsuitable material, and they are placed to the required degree of compaction. It should be noted that the native soils may be difficult to place and compact to the required degree of compaction when excessively wet due to high fine content.

Existing site soils may not be re-used as Gravel Borrow or Crushed Stone unless it meets the gradation requirements presented above, which is unlikely. Existing topsoil and fill may be reused in landscaped areas but should be tested for pH, percent organics, and nutrient content and modified as needed to support vegetative growth. The potential for soil contamination with regard to suitability for reuse under current State regulations is addressed in the Environmental report provided under a separate cover by Tighe & Bond.

Excavation Slopes and Temporary Earth Support – It is anticipated that excavations will be accomplished by sloping or benching the sides of the excavations. Where space is not available to safely lay back excavations, a temporary earth support system will be required. Temporary earth support systems, like slide rail or trench boxes, if required, should be selected by the contractor and be designed by an experienced Professional Engineer registered in the State of Massachusetts and retained by the Contractor.

The Owner and the Contractor should make themselves aware of, and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction Site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations.

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

As a safety measure, it is recommended that vehicles and soil piles be kept a minimum lateral distance from the crest of the slope in accordance with OSHA requirements. Exposed slope faces should also be protected against the elements.

Closing

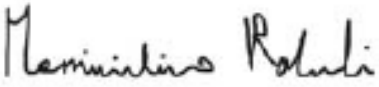
The preceding recommendations provided herein strictly apply to the Proposed Multi-Family Development on Pond Street in Rockland, Massachusetts, in accordance with generally accepted soil engineering practices. No warranty, expressed or implied, is made. In the event of any changes in the design or location of the proposed improvements, the conclusions and recommendations in this report should not be considered valid unless verified in writing.

This report includes design and construction recommendations and may not be sufficient to prepare accurate quantity take-offs. It is discouraged that this report in its entirety be included in the construction documents or be provided to a contractor. Rather, the construction recommendations should be incorporated appropriately into the construction specifications. Exploration locations, exploration logs, and laboratory test results should be made available to the contractor for information only.

We appreciate the opportunity to assist you in this phase of the project and look forward to assisting you as the project progresses toward final design. Should you have any questions, please contact Max Rolandi at (781) 708-9854.

Very truly yours,

TIGHE & BOND, INC.



Massimiliano (Max) Rolandi PhD, PE
Senior Geotechnical Engineer

Attachments: Appendix A – Figures
Appendix B – Historical Exploration Logs
Appendix C – Recent Boring Logs
Appendix D – Recent Test Pit Logs
Appendix E – Laboratory Test Results

\\tighebond.com\Data\Data\Projects\J\J5019 Jones Street\002 Pond St, Rockland\Geotechnical\Report\J5019002 Report

APPENDIX A
Figures

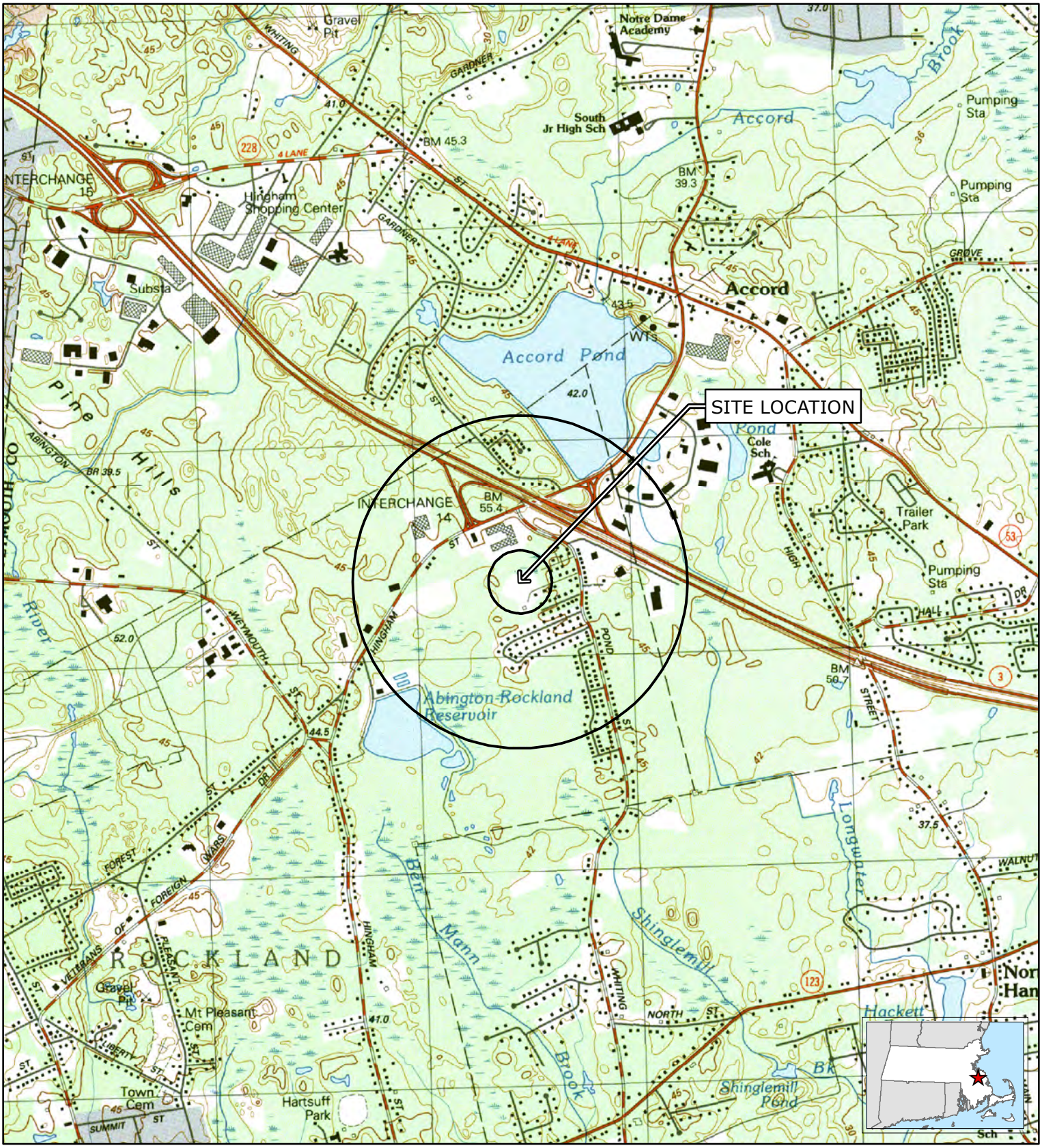


FIGURE 1
SITE LOCATION

Proposed Multifamily
Residential Development
Rockland, Massachusetts

June 2020

Tighe&Bond

Based on USGS Topographic Map for
Weymouth, MA Revised 1984. Contour Equals 3-meters. [Site Quad]
Cohassett, MA Revised 1984. Contour Equals 3-meters.
Circles indicate 500-foot and half-mile radii

1:24,000
0 1,000 2,000
Feet

V:\Projects\J\J5019\Maps\ProposedMultifamilyResidentialDevelopmentMA_Topo.mxd [Exported By: KJW, 6/26/2020, 11:10:03 AM]

J-5019

PROPOSED GRAVEL WETLAND

PROPOSED RETAINING WALL

PROPOSED 5 STORY 127 UNIT BUILDING

PROPOSED RETAINING WALL

PROPOSED RETAINING WALL

PROPOSED 5 STORY 109 UNIT BUILDING

PROPOSED UNDERGROUND INFILTRATION SYSTEM

PROPOSED COMMUNITY BUILDING

TB-1 MGA-1 SH-2 TP-10 TB-9 TB-5 MGA-10 MGA-7 MGA-8 MGA-11 TB-6 TP-8 TP-11 MGA-12/12A MGA-9 TP-12 TB-7 TP-7 MGA-4 MGA-2 TB-2 TB-10 TP-6 TP-5 MGA-3 MGA-5 TB-3 TP-9 TP-4 TB-4 MGA-6 SH-3 TP-3 TB-8 TB-11 TP-2 TP-1 TB-12 TB-13 TB-14 TP-13 TP-15 TP-14 TP-17 TP-16 SH-1 SH-4

N

LEGEND

TB-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY TIGHE & BOND
TP-1	APPROXIMATE LOCATION OF TEST PITS PERFORMED BY TIGHE & BOND
SH-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY SANBORN HEAD
MGA-1	APPROXIMATE LOCATION OF BORINGS PERFORMED BY McARDLE GANNON ASSOCIATES
	APPROXIMATE EXTENT OF AREA OF LIQUEFACTION SUSCEPTIBLE SOIL (NATURALLY DEPOSITED SOIL WITH FACTOR OF SAFETY AGAINST LIQUEFACTION LESS THAN, OR EQUAL TO ONE)

NOTES:

1. PLAN OBTAINED AND PREPARED BY CONECO ENGINEERS & SCIENTISTS TITLED "SITE LAYOUT PLAN" DATED MAY 14, 2020.
2. HORIZONTAL DATUM IS NAD83. VERTICAL DATUM IS NAVD88.
3. CONTOUR LINES INDICATE EXISTING GROUND SURFACE.
4. BORINGS LOCATIONS BASED ON TAPING AND LINE OF SIGHT FROM EXISTING SITE FEATURES. LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
5. TIGHE & BOND BORINGS DRILLED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH, BETWEEN JUNE 3 AND JUNE 10, 2020. BORINGS WERE OBSERVED BY A TIGHE & BOND REPRESENTATIVE ON A FULL TIME BASIS. REFER TO BORING LOGS IN APPENDIX B FOR MORE DETAILED INFORMATION.
6. TIGHE & BOND TEST PITS EXCAVATED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH, BETWEEN JUNE 3 AND JUNE 5, 2020. TEST PITS WERE OBSERVED BY A TIGHE & BOND REPRESENTATIVE ON A FULL TIME BASIS. REFER TO TEST PIT LOGS IN APPENDIX C FOR MORE DETAILED INFORMATION.
7. SOIL LIQUEFACTION SUSCEPTIBILITY EVALUATED BASED ON EXPLORATIONS BY TIGHE & BOND AS WELL AS PREVIOUS BORINGS.

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

PROPOSED MULTIFAMILY RESIDENTIAL DEVELOPMENT
ROCKLAND, MASSACHUSETTS

EXPLORATION LOCATION PLAN

FIGURE:	2
DATE:	7/12/2020
DRAWN BY:	CML
CHECKED BY:	MR
APPROVED BY:	MAA

Tighe&Bond
Engineers | Environmental Specialists

Last Save Date: July 13, 2020 8:47 AM By: CML
Plot Date: Monday, July 13, 2020 8:47 AM By: Craig M. Langton
T&B File Location: J:\J5019 Jones Street\002 Pond St, Rockland\Drawings_Figures\AutoCAD\Sheet\J5019-002-C-Borings.dwg Layout Tab: Borings

APPENDIX B
Historical Exploration Logs

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Pond St. Residential
Location: Rockland, MA
Project No.: 4414.01

Log of Boring SH-1

Ground Elevation: 136 ± feet
Datum: Project Datum

Drilling Method: 4" Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Crawford Drilling Services, LLC
Foreman: T. Martinelli
Date Started: 07/10/18 **Date Finished: 07/10/18**
Logged By: E. Briggs **Checked By: V. Kokosa**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
07/10/18	14:00	4.01'	Ground Surface		20'	1 Hour

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Remarks
0	S-1	0 - 2	2 5 5 5	24/5	PID: ND		-----0'-----	S-1 (0 to 2'): Loose, brown, fine to coarse SAND, some Gravel, trace Silt. Moist.	
4	S-2	4 - 6	5 4 7 19	24/11	PID: ND			S-2 (4 to 6'): Medium dense, brown/orange, SAND, little Gravel, trace Silt, seam of fine to medium Gravel from 5.7 to 5.8 feet. Wet.	
9	S-3	9 - 11	8 21 25 30	24/4	PID: ND		SAND & GRAVEL	S-3 (9 to 11'): Dense, gray, GRAVEL, some Sand, trace Silt. Wet.	
14	S-4	14 - 16	8 10 8 9	24/11	PID: ND			S-4 (14 to 16'): Medium dense, brown, fine to coarse SAND, little Gravel, little Silt. Wet.	
18	S-5	18 - 20	14 18 20 22	24/12	PID: ND			S-5 (18 to 20'): Dense, brown, fine to coarse SAND and Gravel, trace Silt. Wet.	
20							-----20'-----	Boring terminated at 20 feet. No refusal encountered.	

NOTES:

1. Soil samples were screened for volatile organic compounds (VOCs) using a MiniRAE 2000 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.

BORING LOG P:\4400S\4414.01\WORK\LOGS\4414.01 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 7/18/18

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Pond St. Residential
Location: Rockland, MA
Project No.: 4414.01

Log of Boring SH-2

Ground Elevation: 137 ± feet
Datum: Project Datum

Drilling Method: 4" Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Crawford Drilling Services, LLC
Foreman: T. Martinelli
Date Started: 07/10/18 **Date Finished: 07/10/18**
Logged By: E. Briggs **Checked By: V. Kokosa**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
07/10/18	11:30	2.73'	Ground Surface		20'	1 Hour

Depth (ft)	Sample Information					Stratum		Geologic Description	Remarks
	Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Log	Description		
0	S-1	0 - 2	6 8 10 10	24/14	PID: 1.0 ppmv		-----0'-----	S-1 (0 to 2'): Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt. Moist.	
4	S-2	4 - 6	9 20 24 20	24/3	PID: ND			S-2 (4 to 6'): Dense, brown, GRAVEL, trace Sand, trace Silt. Wet.	
8	S-3	8 - 10	52 24 21 16	24/3	PID: ND			S-3 (8 to 10'): Dense, brown, GRAVEL, trace Sand, trace Silt. Wet.	
10							SAND & GRAVEL		
14	S-4	14 - 16	5 5 4 7	24/3	PID: ND			S-4 (14 to 16'): Loose, brown, GRAVEL, trace Sand, trace Silt. Wet.	
18	S-5	18 - 20	14 20 15 16	24/5	PID: ND			S-5 (18 to 20'): Dense, brown, GRAVEL, trace Sand, trace Silt. Wet.	
20							-----20'-----	Boring terminated at 20 feet. No refusal encountered.	

NOTES:

1. Soil samples were screened for volatile organic compounds (VOCs) using a MiniRAE 2000 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.

BORING LOG P:\4400S\4414.01\WORK\LOGS\4414.01 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 7/18/18

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Pond St. Residential
Location: Rockland, MA
Project No.: 4414.01

Log of Boring SH-3

Ground Elevation: 137 ± feet
Datum: Project Datum

Drilling Method: 4" Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Crawford Drilling Services, LLC
Foreman: T. Martinelli
Date Started: 07/10/18 **Date Finished: 07/10/18**
Logged By: E. Briggs **Checked By: V. Kokosa**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
07/10/18	09:45	3.7'	Ground Surface		20'	1 Hour

Depth (ft)	Sample Information					Stratum		Geologic Description	Remarks
	Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Log	Description		
0	S-1	0 - 2	5 5 6 6	24/8	PID: ND		-----0'-----	S-1 (0 to 2'): Medium dense, brown, fine to coarse SAND and Gravel, trace Silt. Moist.	
4	S-2	4 - 6	8 10 12 11	24/10	PID: ND			S-2 (4 to 6'): Medium dense, brown, fine to coarse SAND and Gravel, trace Silt. Wet.	
9	S-3	9 - 11	10 12 12 13	24/6	PID: ND		SAND & GRAVEL	S-3 (9 to 11'): Medium dense, brown, GRAVEL, little Sand, trace Silt. Wet.	
14	S-4	14 - 16	9 10 5 3	24/9	PID: ND			S-4 (14 to 16'): Medium dense, gray, GRAVEL, little Sand, trace Silt. Wet.	
19	S-5	19 - 21	4 6 5 4	24/6	PID: ND			S-5 (19 to 21'): Medium dense, gray, fine to coarse SAND, little Silt, little Gravel. Wet.	
21							-----21'-----	Boring terminated at 21 feet. No refusal encountered.	

NOTES:

1. Soil samples were screened for volatile organic compounds (VOCs) using a MiniRAE 2000 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.

BORING LOG P:\4400S\4414.01\WORK\LOGS\4414.01 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 7/18/18

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Pond St. Residential
Location: Rockland, MA
Project No.: 4414.01

Log of Boring SH-4

Ground Elevation: 136 ± feet
Datum: Project Datum

Drilling Method: 4" Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Crawford Drilling Services, LLC
Foreman: T. Martinelli
Date Started: 07/10/18 **Date Finished: 07/10/18**
Logged By: E. Briggs **Checked By: V. Kokosa**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
07/10/18	14:55	2.50'	Ground Surface		10.5'	30 Minutes

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Remarks
0	S-1	0 - 2	5 9 8 9	24/14	PID: ND		-----0'-----	S-1 (0 to 2'): Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt. Moist.	
4	S-2	4 - 6	12 12 15 15	24/17	PID: ND		SAND & GRAVEL	S-2 (4 to 6'): Medium dense, gray, fine to coarse SAND, little Silt, little Gravel. Wet.	
9	S-3	9 - 10.5	32 33 25	18/6	PID: ND			S-3 (9 to 10.5'): Very dense, gray, fine to coarse SAND, little Silt, little Gravel. Wet.	
10							-----10.5'-----	Boring terminated at 10.5 feet. No refusal encountered.	

NOTES:

1. Soil samples were screened for volatile organic compounds (VOCs) using a MiniRAE 2000 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.

BORING LOG P:\4400S\4414.01\WORK\LOGS\4414.01 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 7/18/18

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-1

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 136.4'±
DATE START : 5/28/20
END : 5/28/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/28/20	7:45am	4	4	6	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			4 11 10 8	S-1	0.0 2.0	14		Medium dense, brown, fine to coarse SAND, some fine Gravel, trace (+) Silt, trace (-) Roots.
			8 11 10 10	S-2	2.0 4.0	8		Medium dense, gray-brown, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt. -FILL-
4			11 8 7 9	S-3	4.0 6.0	8		Medium dense, wet, dark brown, fine to coarse SAND, little Silt, trace (+) fine Gravel, trace (-) Roots.
							130.4	
			5 5 6 8	S-4	6.0 8.0	12	6.0	Medium dense, gray, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt.
8								
			8 18 10 7	S-5	9.0 11.0	9		Medium dense, olive-brown, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt.
12								-SAND & GRAVEL-
			10 9 7 7	S-6	14.0 16.0	12		Medium dense, olive-brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt.
16								
							117.4	
			45 33 34 36	S-7	19.0 21.0	12	19.0	Very dense, gray, fine to coarse SAND and fine to coarse GRAVEL, some (-) Silt. -GLACIAL TILL-
20							115.4	
							21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-1

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-2

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 137.7'±
DATE START : 5/28/20
END : 5/28/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/28/20	10:55am	2	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			3 18 19 9	S-1	0.0 2.0	10	135.7	Dense, dark brown, fine to coarse SAND, some fine to coarse Gravel, little Silt. -FILL-
			4 2 2 2	S-2	2.0 4.0	2	2.0	Very loose to looose, wet, black, fine to coarse SAND, some (+) Silt, little Roots.
4			2 1 2 1	S-3	4.0 6.0	6		Soft, wet, black, ORGANIC SILT, some (-) Roots/Wood, little (-) fine Sand. -ORGANICS-
			1 1 10 17	S-4 S-4A	6.0 8.0	16	130.2 7.5	Stiff, wet, black, ORGANIC SILT, some (+) Roots/Wood, trace (+) fine Sand. Split spoon tip: Gray to gray-brown, fine to coarse SAND, some (-) Silt, little fine Gravel.
8			7 6 4 5	S-5	9.0 11.0	6		Loose to medium dense, gray, fine to coarse SAND, some (-) Silt, little (+) fine to coarse Gravel.
12			5 4 3 4	S-6	14.0 16.0	4		Loose, gray, fine to coarse SAND, some (+) fine to coarse Gravel, trace (+) Silt. -SAND & GRAVEL-
16			9 10	S-7	19.0 20.0	8	117.7	Gray, fine to coarse SAND, some fine to coarse Gravel, trace (+) Silt.
20			14 24	S-7A	20.0 21.0	6	20.0 116.7 21.0	Gray, fine to coarse SAND, some fine to coarse Gravel, some Silt. -GLACIAL TILL- BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-2

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-3

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138.5'±
DATE START : 5/29/20
END : 5/29/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/29/20	9:40am	3.5	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			4 14 16 15	S-1	0.0 2.0	10		Medium dense to dense, gray-brown, fine to coarse GRAVEL, some (+) fine to coarse Sand, little (-) Silt.
			16 9 8 6	S-2	2.0 4.0	12		Medium dense, brown, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt. -FILL-
4			5 6 4 4	S-3	4.0 6.0	12	132.5	Loose to medium dense, brown to gray, fine to coarse SAND, trace (+) Silt, trace (-) Roots.
			3 4 4 5	S-4	6.0 8.0	10	6.0	Loose, gray, fine to coarse SAND, little fine Gravel, trace (+) Silt.
8								
			4 4 4 4	S-5	9.0 11.0	12		Loose, gray, fine to medium SAND, little (-) Silt.
12								-SAND-
							124.5	
			2 2 2 3	S-6	14.0 16.0	16	14.0	Very loose to loose, gray, fine SAND, some (+) Silt.
16								-SILTY SAND-
							120.5	
							18.0	[Change in strata at 18± based on increased rollerbit resistance]
			6 7 7 7	S-7	19.0 21.0	8		Medium dense, gray, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -SAND & GRAVEL-
20							117.5	
							21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-3

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-4

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 2
LOCATION N : See Plan
E :
ELEVATION : 136.6'±
DATE START : 5/28/20
END : 5/28/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/28/20	9:05am	2	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			5 5 4 11	S-1	0.0 2.0	14	136.1 0.5	Dark brown, fine to medium SAND, some Silt, little Roots/Leaves. -FOREST MAT-
			7 7 7 7	S-2	2.0 4.0	10		Loose, gray-brown, fine to coarse SAND, some (+) Silt, little (-) fine to coarse Gravel. Medium dense, gray-brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace (-) Roots. -FILL-
4			9 9 11 14	S-3	4.0 6.0	9		Medium dense, gray-brown, fine to coarse SAND, some (-) fine to coarse Gravel, some (-) Silt.
			11 10	S-4 S-4A	6.0 7.0 7.0	6 10	129.6 7.0	Gray-brown, fine to coarse SAND, some (-) Silt, little fine to coarse Gravel. Gray, fine to coarse SAND, some (+) fine to coarse Gravel, trace (+) Silt.
8			4 4		8.0			
			25 24 35 37	S-5	9.0 11.0	6		Very dense, gray, fine to coarse SAND, some (-) fine to coarse Gravel, trace (+) Silt. [Blow counts may not be representative of actual conditions, casing became unscrewed and split spoon was lodged in casing after driving.]
12								-SAND & GRAVEL-
							122.6	
			8 10 7 7	S-6	14.0 16.0	3	14.0	Medium dense, gray, fine to medium SAND, trace Silt.
16								-SAND-
			4 4 4 4	S-7	19.0 21.0	6		Loose, gray, fine to coarse SAND, trace fine Gravel, trace Silt.
20			5 5 10	S-8	21.0 23.0	6		Medium dense, gray, fine to coarse SAND, little (-) fine Gravel, trace Silt.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-4

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-4

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC

MGA NO. : W0810
SHEET NO. : 2 of 2

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
			14				113.6	
							23.0	BOTTOM OF BORING AT 23 FEET.
24								
28								
32								
36								
40								
44								
48								

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION

- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY

Station:
Rock:
Samples:

BORING MGA-4

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McArdle Gannon Associates, Inc. Engineers & Consultants	TEST BORING LOG	BORING MGA-5

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138.5'±
DATE START : 5/29/20
END : 5/29/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/29/20	7:40am	3.5	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			3 5 10 10	S-1	0.0 2.0	6		Medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -FILL-
			9 5 7 8	S-2	2.0 4.0	10		Medium dense, brown, fine to coarse SAND, some Silt, some fine Gravel. [Bottom 6± inches wet]
4			15 15 16 12	S-3	4.0 6.0	12	134.5 4.0	Dense, olive-brown, fine to coarse SAND and fine to coarse GRAVEL, little (-) Silt.
			11 11 16 9	S-4	6.0 8.0	10		Medium dense, reddish-brown, fine to coarse SAND and fine to coarse GRAVEL, little (-) Silt.
8			10 8 5 5	S-5	9.0 11.0	4		Medium dense, olive-brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt.
12								-SAND & GRAVEL-
			13 11 9 6	S-6	14.0 16.0	4		Medium dense, olive-brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt.
16							119.5	
			17 14 16 20	S-7	19.0 21.0	12	19.0 117.5	Medium dense to dense, olive, fine to coarse SAND, some fine to coarse Gravel, little (+) Silt. -GLACIAL TILL-
20							21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-5

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McArdle Gannon Associates, Inc. Engineers & Consultants	TEST BORING LOG	BORING MGA-6

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138'±
DATE START : 5/29/20
END : 5/29/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/29/20	12:10pm	3.5	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recovery (in)	Elevation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			3 9 13 8	S-1	0.0 2.0	3		Medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -FILL-
			5 5 4 3	S-2	2.0 4.0	8	134.0	Loose, gray-brown, fine to coarse SAND, some fine to coarse Gravel, little (+) Silt. [Bottom 6± inches wet]
4			1 2 3 10	S-3	4.0 6.0	4	4.0 132.0	Loose, dark brown, fine to coarse SAND, some (+) Organic Silt, trace (+) Roots. -ORGANICS-
			12 14 14 18	S-4	6.0 8.0	10	6.0	Medium dense, gray, fine to coarse GRAVEL and fine to coarse SAND, little Silt. -SAND & GRAVEL-
8			9 12	S-5	9.0 10.0	4	128.0	Gray, fine to coarse SAND and fine to coarse GRAVEL, little (-) Silt.
			5 4	S-5A	10.0 11.0	6	10.0	Gray, fine to coarse SAND, trace (+) Silt. -SAND-
12							125.0	
							13.0	[Change in strata at 13± based on increased rollerbit resistance]
			9 11 5 5	S-6	14.0 16.0	4		Medium dense, gray, fine to coarse SAND, little (+) fine to coarse Gravel, trace Silt. -SAND & GRAVEL-
16								
			6 6 6 6	S-7	19.0 21.0	12		Medium dense, gray, fine to coarse SAND, some (-) fine Gravel, little Silt.
20							117.0	
							21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-6

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McArdle Gannon Associates, Inc.
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TEST BORING LOG

BORING MGA-7

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 135.9'±
DATE START : 5/27/20
END : 5/27/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/27/20	9:40am	2	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			2 4 6 9	S-1	0.0 2.0	12		Loose to medium dense, brown to gray, fine to coarse SAND, little (+) fine to coarse Gravel, little (-) Silt. -FILL-
							133.9 2.0	
			6 7 6 8	S-2	2.0 4.0	16		Medium dense, wet, olive-brown to gray, fine to medium SAND, little (-) Silt. [Grounwater mottles observed throughout recovered sample]
4			1 2 2 3	S-3	4.0 6.0	9		Very loose to loose, olive-brown, fine to medium SAND, little (-) Silt.
			3 3 4 4	S-4	6.0 8.0	18		Loose, olive-brown, fine to medium SAND, little Silt.
8								-SAND-
			4 5 5 8	S-5	10.0 12.0	20		Loose to medium dense, olive-brown, fine to medium SAND, little Silt.
12								
							121.9	
			5 5 6 5	S-6	14.0 16.0	16	14.0	Medium dense, gray, fine to coarse SAND and fine to coarse GRAVEL, trace (+) Silt.
16								-SAND & GRAVEL-
							118.9 17.0	[Change in strata at 17± based on decreased rollerbit resistance]
			3 5 5 6	S-7	19.0 21.0	18		Loose to medium dense, gray, fine to medium SAND, some Silt.
20								-SILTY SAND-
							114.9 21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-7

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TEST BORING LOG

BORING MGA-8

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138.3'±
DATE START : 5/27/20
END : 5/27/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/27/20	1:30pm	4	4	6	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recovery (in)	Elevation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			1 1 1 2	S-1	0.0 2.0	6		Very loose, dark brown, fine to coarse SAND, some (-) Silt, little (-) Roots, trace fine Gravel. -FILL-
			4 16 75 10	S-2	2.0 4.0	9		Very dense, brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. [Rollerbitted through possible boulder or obstruction from 3-4± feet]
4			6 4 4 3	S-3	4.0 6.0	12	134.3 4.0	Loose, wet, olive-brown, fine to coarse SAND, little (-) fine Gravel, trace (+) Silt.
			5 5 4 4	S-4	6.0 8.0	14		Loose, olive-brown, fine to medium SAND, little (-) Silt.
8								
			4 3 3 3	S-5	9.0 11.0	14		Loose, olive-brown, fine to medium SAND, little (-) Silt. -SAND-
12							125.3	
							13.0	[Change in strata at 13± based on increased rollerbit resistance]
			4 3 3 4	S-6	14.0 16.0	6		Loose, beige, fine to coarse SAND and fine to coarse GRAVEL, trace Silt. -SAND & GRAVEL-
16								
			5 8 8 10	S-7	19.0 21.0	6		Medium dense, gray, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt.
20							117.3 21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-8

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-9

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138.1'±
DATE START : 5/28/20
END : 5/28/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/28/20	12:50pm	3.5	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			3 4 6 7	S-1	0.0 2.0	6		Loose to medium dense, dark brown, fine to coarse SAND, little (-) fine Gravel, little (-) Silt.
			9 7 8 8	S-2	2.0 4.0	9		Medium dense, gray-brown, fine to coarse SAND, little fine Gravel, little (-) Silt. [Bottom 6± inches wet]
4			13 7 4 4	S-3	4.0 6.0	6		Medium dense, dark brown, fine to coarse GRAVEL, little (+) fine to coarse Sand, little (-) Silt, trace (-) Roots.
			5 3 4 4	S-4	6.0 8.0	4		Loose, dark brown, fine to coarse SAND, little Silt, trace (+) fine Gravel. -FILL-
8							129.1	
			3 4 4 3	S-5	9.0 11.0	4	9.0	Loose, olive-brown, fine to coarse SAND and fine to coarse GRAVEL, trace (+) Silt.
12								
			5 5 8 8	S-6	14.0 16.0	6		Medium dense, gray, fine to coarse SAND, some fine to coarse Gravel, trace (+) Silt.
16								-SAND & GRAVEL-
			11 7 6 6	S-7	19.0 21.0	2		Medium dense, olive-brown, fine to coarse GRAVEL, little (-) fine to coarse Sand, trace (-) Silt. [Piece of gravel lodged in split spoon tip]
20							117.1	
							21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-9

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-10

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 2
LOCATION N : See Plan
E :
ELEVATION : 135.5'±
DATE START : 5/27/20
END : 5/27/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/27/20	8:00am	2	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			3 3 3 3	S-1	0.0 2.0	9		Loose, brown, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt. -FILL-
							133.5	
			1 1/12" 1	S-2	2.0 4.0	12	2.0	Very soft, wet, black, ORGANIC SILT, some (-) Wood/Roots. -ORGANICS-
4			1 3 12 11	S-3	4.0 6.0	10		Black to gray, ORGANIC SILT, some fine to medium Sand.
							129.5	
			7 9 9 8	S-4	6.0 8.0	10	6.0	Medium dense, gray, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -SAND & GRAVEL-
8								
							126.5	
			3 4 5 4	S-5	9.0 11.0	12	9.0	Loose, gray, fine to medium SAND, some (-) Silt.
12								
			8 10 12 12	S-6	14.0 16.0	18		Medium dense, olive-brown, fine to medium SAND, little (+) Silt.
16								-SILTY SAND-
			6 15 18 16	S-7	19.0 21.0	14		Dense, olive-brown, fine to medium SAND, some (-) Silt.
20								
							113.5	
							22.0	[Change in strata at 22± based on increased rollerbit resistance]

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-10

300 Oak Street, Suite 460 Pembroke, MA 02359 | Telephone 781.826.0040 | Fax 781.735.0418 | mcardlegannon.com

McArdle Gannon Associates, Inc. Engineers & Consultants	TEST BORING LOG	BORING MGA-10

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC

MGA NO. : W0810
SHEET NO. : 2 of 2

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
24			10 16 15 12	S-8	24.0 26.0	14	109.5	Dense, olive-brown, fine to coarse GRAVEL, some fine to coarse Sand, trace (+) Silt. -SAND & GRAVEL-
							26.0	BOTTOM OF BORING AT 26 FEET.
28								
32								
36								
40								
44								
48								

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION

- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY

Station:
Rock:
Samples:

BORING MGA-10

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Engineers & Consultants

TEST BORING LOG

BORING MGA-11

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 135.6'±
DATE START : 5/27/20
END : 5/27/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/27/20	11:00am	2	0	4	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			2 8 10 9	S-1	0.0 2.0	14		Medium dense, dark brown to gray-brown, fine to coarse SAND, some fine Gravel, trace Silt. -FILL-
			5 7 5 5	S-2	2.0 4.0	9		Medium dense, wet, gray-brown to dark brown, fine to coarse SAND, some (-) Silt, little fine to coarse Gravel, trace (-) Roots.
4			1 1 1 1	S-3	4.0 6.0	14	131.6 4.0	Very soft to soft, dark brown to black, ORGANIC SILT, some Roots, trace fine Sand. -ORGANICS-
			1/12" 1	S-4	6.0 7.5	6		Very soft, black, ORGANIC SILT, trace Roots.
8			9	S-4A	7.5 8.0	3	128.1 7.5	Gray, fine to coarse SAND, little Silt, trace fine Gravel.
			17 29 13 15	S-5	9.0 11.0	4		Dense, olive-brown, fine to coarse GRAVEL, some fine to coarse Sand, little (+) Silt. [Piece of gravel lodged in split spoon tip]
12								
			10 10 13 11	S-6	14.0 16.0	6		Medium dense, olive-brown, fine to coarse SAND, some (-) fine to coarse Gravel, little (-) Silt.
16								-SAND & GRAVEL-
			10 16 8 10	S-7	19.0 21.0	8		Medium dense, olive-brown, fine to coarse SAND, some (+) fine to coarse Gravel, trace Silt.
20							114.6 21.0	BOTTOM OF BORING AT 21 FEET.

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-11

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST BORING LOG

BORING MGA-12/12A

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: New England Boring Contractors

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138'±
DATE START : 5/27/20
END : 5/27/20
DRILLER : Matt Sousa
ENGINEER : Robert Drown

GROUNDWATER		DEPTH (ft) OF:			EQUIPMENT	CASING	SAMPLER	CORE
Date	Time	Water	Casing	Hole	Type	HW	Split Spoon	----
5/27/20	3:10pm	4	4	4.5	Size I.D.	4"	1-3/8"	----
					Hammer Wt.	300"	140#	- - - -
					Hammer Fall	24"	30"	- - - -

Depth in Feet	Strata Change	Case BPF (Drill) (min/ft)	Sampler Blows Per 6" (RQD%)	Sample Number/ Type	Sample Depth Range (ft)	Sample Recov-ery (in)	Elev-ation/ Depth (ft)	FIELD CLASSIFICATION AND REMARKS
0			5 17 11 13	S-1	0.0 2.0	8		Medium dense, gray-brown, fine to coarse GRAVEL, some fine to coarse Sand, little (-) Silt. [Split spoon kicked off to the side on a boulder. Drove casing to 4 feet]
								-FILL-
4			20 50/0"	S-2	4.0 4.5	3		ROCK and WOOD FRAGMENTS.
							133.0 5.0	CASING AND ROLLERBIT REFUSAL AT 5 FEET.
								[Moved 5± feet north to boring MGA-12A. Casing and rollerbit refusal at 6.5± feet.]
8								
12								
16								
20								

BLOWS/FT.	DENSITY
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

BLOWS/FT.	CONSISTENCY
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
30+	Hard

SAMPLE IDENTIFICATION
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- B - Bulk/Grab Sample

SUMMARY
Station:
Rock:
Samples:

BORING MGA-12/12A

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McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST PIT LOG

TEST PIT NO. TP-1

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: SLT Construction Corp.

EQUIPMENT: Komatsu PC228 Excavator

OPERATOR: Joe Kehoe

GROUNDWATER

Date	Time	Depth (ft.)	Notes
05/26/2020	11:20am	3.5±	Flowing

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 137'±
DATE START : 05/26/2020
END : 05/26/2020
ENGINEER : Robert Drown

Depth in Feet	Strata Change	Sample Number/ Type	Sample Depth Range (ft)	Elev-ation/ Depth (ft)	SOIL DESCRIPTION (BURMISTER)	REMARKS
0				136.5	Dark brown, fine to medium SAND, some (-) Silt, some (-) Roots/Leaves. -FOREST MAT-	
				0.5	Brown to gray-brown, fine to coarse SAND, some fine to coarse Gravel, little (+) Boulders, little (-) Debris (Tires, Plastic, Metal). -FILL-	
2						
				133.5		
				3.5	3.5-5.5'±: Black, fine to medium SAND and SILT, some (-) Roots/ Stumps. -ORGANICS-	
4						
					5.5-6.5'±: Black, ORGANIC SILT, some (-) Roots.	
6						
					6.5-7.5'±: Black, ORGANIC SILT.	
				129.5		
				7.5	Gray, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -SAND & GRAVEL-	
8				129.0		
				8.0	BOTTOM OF TEST PIT AT 8 FEET.	
10						

TEST PIT DIMENSIONS	BOULDERS	SAMPLE IDENTIFICATION	SUMMARY
Width: 4± Feet	6" to 18" Diameter= 4	- B - Bag	Overburden:
Length: 6± Feet	18" to 36" Diameter= 1	- J - Jar	Rock:
	Over 36" Diameter= 0 (number)	- P - Percolation Test	Samples:
			TEST PIT NO. TP-1

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST PIT LOG

TEST PIT NO. TP-2

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: SLT Construction Corp.

EQUIPMENT: Komatsu PC228 Excavator

OPERATOR: Joe Kehoe

GROUNDWATER

Date	Time	Depth (ft.)	Notes
05/26/2020	11:45am	3±	Slowly Seeping

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 135.5'±
DATE START : 05/26/2020
END : 05/26/2020
ENGINEER : Robert Drown

Depth in Feet	Strata Change	Sample Number/ Type	Sample Depth Range (ft)	Elev-ation/ Depth (ft)	SOIL DESCRIPTION (BURMISTER)	REMARKS
0				135.0	Dark brown, fine to coarse SAND, some Silt, some (-) Roots/Leaves. -FOREST MAT-	
				0.5	Brown, fine to coarse SAND, some fine to coarse Gravel, little (+) Silt. -FILL-	
2				133.5 2.0	2-5'±: Black, SILT, some (+) fine to medium Sand, some (-) Roots/ Stumps. -ORGANICS-	
4					5-7'±: Black, ORGANIC SILT, some (-) Roots, little (+) fine Sand.	
6					7-9'±: Black, ORGANIC SILT.	
8				126.5		
				9.0	Gray, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -SAND & GRAVEL-	
10				125.5 10.0	BOTTOM OF TEST PIT AT 10 FEET.	

TEST PIT DIMENSIONS	BOULDERS	SAMPLE IDENTIFICATION	SUMMARY
Width: 4± Feet	6" to 18" Diameter= 0	- B - Bag	Overburden:
Length: 6± Feet	18" to 36" Diameter= 0	- J - Jar	Rock:
	Over 36" Diameter= 0 (number)	- P - Percolation Test	Samples:
			TEST PIT NO. TP-2

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST PIT LOG

TEST PIT NO. TP-3

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: SLT Construction Corp.

EQUIPMENT: Komatsu PC228 Excavator

OPERATOR: Joe Kehoe

GROUNDWATER

Date	Time	Depth (ft.)	Notes
05/26/2020	12:00pm	4±	Stable

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138'±
DATE START : 05/26/2020
END : 05/26/2020
ENGINEER : Robert Drown

Depth in Feet	Strata Change	Sample Number/ Type	Sample Depth Range (ft)	Elev-ation/ Depth (ft)	SOIL DESCRIPTION (BURMISTER)	REMARKS
0				137.5	Dark brown, fine to medium SAND, some Silt, some (-) Roots/Leaves.	
				0.5	-FOREST MAT-	
2					Brown, BOULDERS and COBBLES, some (-) fine to coarse Gravel, little fine to coarse Sand, trace Silt.	Drill stem holes observed in some boulders
					-BOULDERY FILL-	
4						
6				132.0		
				6.0	BOTTOM OF TEST PIT AT 6 FEET IN FILL.	
					[Unable to excavate further due to boulders and hole collapse]	
8						
10						

TEST PIT DIMENSIONS

Width: 8± Feet

Length: 8± Feet

BOULDERS

6" to 18" Diameter= >20
18" to 36" Diameter= 5
Over 36" Diameter= 2
(number)

SAMPLE IDENTIFICATION

- B - Bag
- J - Jar
- P - Percolation Test

SUMMARY

Overburden:
Rock:
Samples:

TEST PIT NO. TP-3

McArdle Gannon Associates, Inc.
Engineers & Consultants

TEST PIT LOG

TEST PIT NO. TP-4

PROJECT: Proposed Apartment Buildings - 75-79 Pond Street, Rockland, MA
CLIENT: Coneco Building LLC
CONTRACTOR: SLT Construction Corp.

EQUIPMENT: Komatsu PC228 Excavator

OPERATOR: Joe Kehoe

GROUNDWATER

Date	Time	Depth (ft.)	Notes
05/26/2020	12:15pm	4±	Quickly Seeping

MGA NO. : W0810
SHEET NO. : 1 of 1
LOCATION N : See Plan
E :
ELEVATION : 138'±
DATE START : 05/26/2020
END : 05/26/2020
ENGINEER : Robert Drown

Depth in Feet	Strata Change	Sample Number/ Type	Sample Depth Range (ft)	Elev-ation/ Depth (ft)	SOIL DESCRIPTION (BURMISTER)	REMARKS
0				137.5	Dark brown, fine to medium SAND, some Silt, some (-) Roots/Leaves. -FOREST MAT-	
				0.5	Brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt, trace Debris (Metal, Plastic). -FILL-	
2						
				134.5		
				3.5	3.5-6.5'±: Black, fine to medium SAND, some Silt, some (-) Roots/ Stumps. -ORGANICS-	
4						
6					6.5-9'±: Black, ORGANIC SILT, little fine Sand, little to trace Roots with depth.	
8						
				129.0		
				9.0	Gray, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt. -SAND & GRAVEL-	
10				128.0		
				10.0	BOTTOM OF TEST PIT AT 10 FEET.	

TEST PIT DIMENSIONS	BOULDERS	SAMPLE IDENTIFICATION	SUMMARY
Width: 4± Feet	6" to 18" Diameter= 0	- B - Bag	Overburden:
Length: 8± Feet	18" to 36" Diameter= 0	- J - Jar	Rock:
	Over 36" Diameter= 0 (number)	- P - Percolation Test	Samples:
			TEST PIT NO. TP-4

APPENDIX C
Recent Boring Logs

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-1**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/03/20 End: 06/03/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 137 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/3/2020	7:30	2'	0'	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	11	0-2	5 - 13	Medium dense, tan, fine to coarse SAND, some Silt, some Gravel		1	
				16 - 16		**FILL**		
	S-2	6	2-4	14 - 10	Medium dense, tan, fine to coarse SAND, little Silt, little Gravel			
				6 - 9		**4'**		
	S-3	13	4-6	10 - 8	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt			
5				6 - 7				
	S-4	4	6-8	8 - 7	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt			
				7 - 6				
	S-5	6	9-11	8 - 10	Medium dense, tan, fine to coarse SAND, some Silt, little Gravel			
10				17 - 22				
	S-6	0	14-16	8 - 6				
15				5 - 7'	No Recovery			No Well Installed
	S-7	10	16-18	6 - 5	Medium dense, tan, fine to medium SAND, little Silt, trace Gravel	**SAND & GRAVEL**	2	
				6 - 7				
	S-8	7	19-21	20 -25	Dense, tan, fine to coarse SAND, some Gravel, little Silt			
20				21 - 23				
	S-9	4	24-26	5 - 8	Medium dense, tan, fine to coarse SAND, little Gravel, little Silt			
25				7 - 12				
				53 - 26				
30	S-10	3	29-31	18 - 18	Dense, tan, fine to coarse SAND, some Gravel, little Silt		3	

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Sample S-7 taken to get recovery around 15' bgs. Casing break in hole after taking Sample S-7. Borehole offset 5' and resumed with S-8.
3. End of borinmg at 31' bgs. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-2**
Page 1 of 2
File No. B-5068-001
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractorsr	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/03/20 End: 06/03/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ±138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/3/2020	13:00	4'	0'	0
6/3/2020	15:00	4'	29'	0.5 hours

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	14	0-2	5 - 10	2 inches of topsoil Medium dense, brown, fine to coarse SAND, some Silt, little Gravel, trace wood and roots	**TOPSOIL** **FILL** **2'**	1	
				8 - 100/5				
	S-2	7	2-4	5 - 7	Stiff, dark brown, PEAT and fine to coarse SAND, little Gravel, trace roots			
				5 - 5				
	S-3	6	4-6	2 - 2	Soft, black, PEAT, trace wood			
5				1 - 1				
	S-4	18	6-8	1 - 1	Soft, black, PEAT, little fine Sand, trace wood	**PEAT**		
				1 - 5				
	S-5	3	9-11	7 - 7	Stiff, black, PEAT, trace wood			
10				4 - 3				
						12'	2	
	S-6	10	14-16	4 - 5	Loose, tan, GRAVEL and fine to coarse SAND, trace Silt			No Well Installed
15				4 - 4		**SAND & GRAVEL**		
	S-7	5	19-21	6 - 7	Medium dense, tan, GRAVEL and fine to coarse SAND, little Silt			
20				7 - 7		**21'**		
	S-8	4	24-26	1 - 2	Loose, tan/light gray, fine to medium SAND and SILT, trace Gravel			
25				3 - 3		**SAND & SILT**		
				5 - 6				
30	S-9	5	29-31	17 - 14	Medium dense, tan, fine to coarse SAND, some Silt, little Gravel	**31'**	3	

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020
2. Strata change based on drill cuttings and increased penetration resistance.
3. End of borinmg at 31' bgs. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-3**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/08/20 End: 06/08/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/9/2020	7:00	5.7	9'	16 hours
6/9/2020	12:00	3.6	0	0.5 hours

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	16	0-2	2 - 9	1 inch of topsoil	**TOPSOIL**	1	
				9 - 11	Medium dense, brown, fine to coarse SAND, some Silt, little Gravel	**FILL**		
	S-2	15	2-4	12 - 8		**2.5'**		
				7 - 6	Medium dense, gray, fine to medium SAND, little Silt, little Gravel			
	S-3	18	4-6	7 - 5				
5				5 - 5	Medium dense, tan, fine to medium SAND, little Silt, trace Gravel	**SAND and GRAVEL**		
	S-4	24	6-8	6 - 5				
				5 - 8	Medium dense, tan, fine to coarse SAND, little Silt, trace Gravel			
	S-5	6	8-10	5 - 6				
				5 - 5	Medium dense, tan, GRAVEL and fine to coarse SAND, little Silt			
10						**10'**		
	S-6	5	14-16	3 - 2				
15				2 - WH	Soft, gray, SILT and fine SAND, trace Gravel			No Well Installed
						SAND & SILT		
	S-7	13	19-21	5 - 2				
20				2 - 3	Loose, gray, fine SAND, little Silt, trace Gravel		2	
						24'		
	S-8	4	24-26	21 - 17				
25				17 - 16	Dense, tan, GRAVEL, some fine to coarse SAND, little Silt			
						SAND & GRAVEL		
				7 - 5				
30	S-9	3	29-31	9 - 8	Medium dense, tan, fine to coarse SAND and GRAVEL, some Silt			

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Increased casing casing and drilling penetration resistance.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-3**
Page 1 of 2
File No. J-5019-002
Checked by:

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
30						**SAND & GRAVEL**		
						34'		
	S-10	4	34-36	15 - 13	Medium dense, light brown, fine to coarse SAND, some Silt, trace Gravel			
35				7 - 6				
	S-11	7	39-41	11 - 18	Dense, light brown, fine to coarse SAND, some Silt, trace Gravel			
40				17 - 10				
	S-12	4	44-46	12 - 16	Medium dense, light brown, fine to coarse SAND, some Silt, little Gravel			No Well Installed
45				9 - 9				
						GLACIAL TILL		
	S-13	9	49-50.4	34 - 37	Very dense, light brown, fine to coarse SAND, some Silt, little Gravel			
50				100/5 --				
	S-14	4	54-54.4	100/4 --	Very dense, light brown, fine to coarse SAND, some Silt, some Gravel			
55				-- --				
	S-15	8	59-60	88 - 100/5	Very dense, light brown, fine to coarse SAND, some Silt, some Gravel		3	
60				-- --	End of boring at 60'			
65								

Notes:
3. Borehole backfilled with cuttings after completion.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-4 (MW)**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D. (in)	4/4.5	1.375/2
Hammer Wt.(lb)	300	140
Hammer Fall(in)	30	30
Rig Make/Model	Mobile B-53	
Drilling Method:	Drive & Wash	
Hammer Type:	Auto	

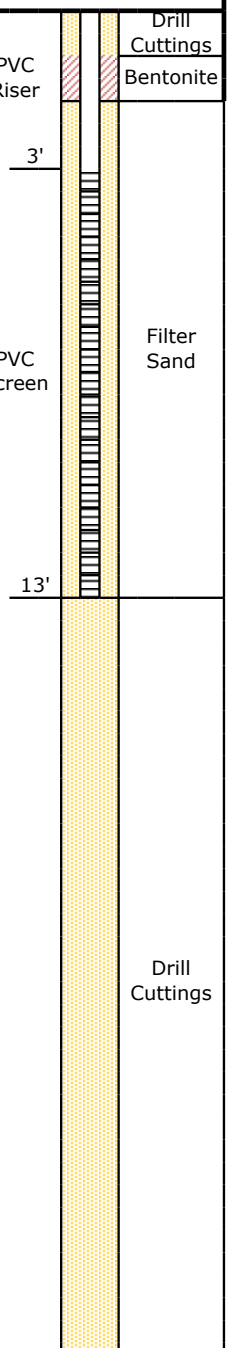
Drilling Co.: New England Boring Contractors
Foreman: W. Hoeckele
T&B Rep.: R. Manson
Date Start: 06/09/20 End: 06/09/20
Location See Exploration Location Plan
GS. Elev. ± 138 Datum: NAVD88

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/9/2020	15:00	6'	0	0
6/10/2020	7:00	6'	0	15 hours
6/10/2020	15:00	6'	MW	3 hours

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes
	S-1	14	0-2	4 - 6	1 inch of topsoil	**TOPSOIL**	1
				8 - 11	Medium dense, tan, fine to coarse SAND and GRAVEL, trace Silt		
	S-2	13	2-4	13 - 14	Medium dense, tan, fine to coarse SAND and GRAVEL, little Silt		
				13 - 12			
	S-3	6	4-6	11 - 7	Medium dense, tan, fine to coarse SAND and GRAVEL, little Silt	**FILL**	
5				6 - 7			
	S-4	24	6-8	10 - 9	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt		
				6 - 5		**8'**	2
	S-5	9	9-11	5 - 4	Medium, gray, SILT, little fine Sand, trace Gravel		
10				4 - 3			
	S-6	7	14-16	4 - 1	Very loose, gray, fine SAND, some Silt, trace Gravel		
15				1 - 2		**SAND & SILT**	
	S-7	3	19-21	6 - 4	Loose, gray, fine SAND, some Silt, trace Gravel		
20				3 - 3			
	S-8	5	24-26	3 - 7	A: Top 1 inch gray fine SAND, some Silt, trace Gravel	**24'**	3
25				8 - 16	B: Bottom 4 inches medium dense, tan, fine to coarse SAND and GRAVEL, little Silt	**SAND & GRAVEL**	
						27'	
						BOULDER	4
						28'	
				6 - 11	Medium dense, tan, GRAVEL and fine to coarse SAND, trace Silt	**GRAVEL & SAND**	
30	S-9	2	29-31	11 - 15			5

Well Construction



Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Strata change observed at 8' bgs based on drill cuttings.
3. Strata change observed in sample S-8 and in cuttings.
4. Small boulder encountered 27-28' bgs.
5. A groundwater monitoring well was installed after completion.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

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Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-5**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/04/20 End: 06/05/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 136 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/4/2020	14:00	2	0'	0
6/5/2020	7:00	2.5	10'	16 hours

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	11	0-2	2 - 4	2 inches of topsoil	**TOPSOIL**	1	
				3 - 2	Loose, brown, fine to medium SAND, some Gravel, little Silt	**FILL**		
						2'		
	S-2	9	2-4	WH - 1	Soft, black, ogranic SILT, little fine Sand, trace Gravel, trace wood, trace roots			
				1 - 1				
	S-3	2	4-6	1 - 1	Soft, black, organic SILT, little fine Sand, trace Gravel, trace wood, trace roots	**ORGANIC SILT**		
5				2 - 1				
	S-4	12	6-8	1 - 1	S-4A: 8 inches soft, black, organic SILT, little fine Sand, trace Gravel, trace wood			
				1 - 7	S-4B: 4 inches tan fine to coarse SAND, some Silt, little Gravel	**7.5'**		
	S-5	7	9-11	3 - 4	Loose, tan, fine to coarse SAND, some Gravel, some Silt			
10				4 - 6				
						SAND & GRAVEL		
	S-6	8	14-16	8 - 6	Medium dense, brown, fine to coarse SAND and GRAVEL, little Silt			No Well Installed
15				6 - 4		**16'**		
						SAND & SILT		
	S-7	14	19-21	6 - 8	Stiff, brown/gray, SILT, some fine Sand, trace Gravel			
20				7 - 11				
						22'		
						BOULDER		
						23'	2	
	S-8	0	24-26	10 - 8	No Recovery			
25				9 - 7				
	S-9	7	26-28	5 - 14	Medium dense, brown, fine to coarse SAND, some Silt, trace Gravel	**SAND & SILT**		
				14 - 16				
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. End of day 6/4/2020 after sample S-5.
3. Small boulder (approximately 1' thick) encountered at 22' bgs.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-5**
Page 2 of 2
File No. J-5019-002
Checked by:

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
30	S-10	10	29-31	8 - 5	Medium dense, brown/gray, fine to coarse SAND, little Silt, little Gravel			
				12 - 13		**SAND & SILT**		
						33'		
						BOULDER	4	
35						**36.5'**		
						SAND & SILT		No Well Installed
						39.5'		
	S-11	2	39-39.2	100/2 --	Very dense, brown, fine to coarse SAND and GRAVEL, little Silt			
40				-- --		**BOULDER**		
						42.5'		
						SAND & SILT		
	S-12	7	44-44.9	13 - 100/5	Very dense, brown/gray, fine to coarse SAND, some Silt, little Gravel		5	
45				-- --	End of boring at 44.9'			
50								
55								
60								
65								

Notes:
4. Sampling interval extended to every 10' to increase production and drill through a boulder.
5. Boring ended at 45' bgs due to an equipment failure. The casing broke during advancement with the bottom of casing at approximately 44'. Sample S-12 was taken and the borehole was backfilled with cuttings.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
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Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-6**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D. (in)	4/4.5	1.375/2
Hammer Wt.(lb)	300	140
Hammer Fall(in)	30	30
Rig Make/Model	Mobile B-53	
Drilling Method:	Drive & Wash	
Hammer Type:	Auto	

Drilling Co.: New England Boring Contractors
Foreman: W. Hoeckele
T&B Rep.: R. Manson
Date Start: 06/04/20 End: 06/04/20
Location See Exploration Location Plan
GS. Elev. ± 138 Datum: NAVD88

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/4/2020	10:00	4'	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	7	0-2	4 - 12	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt		1	
				17 - 15		**FILL**		
	S-2	8	2-4	15 - 25	Medium dense, dark brown, fine to coarse SAND and GRAVEL, little Silt, trace roots			
				23 - 18		**4'**		
	S-3	15	4-6	8 - 6	Medium dense, tan/brown, fine to medium SAND, little Silt, trace Gravel			
5				4 - 6				
	S-4	11	6-8	10 - 13	Medium dense, tan, fine to medium SAND, some Gravel, trace Silt			
				11 - 14				
						SAND & GRAVEL		
	S-5	3	9-11	14 - 16	Medium dense, brown, GRAVEL, some fine to coarse Sand, little Gravel			
10				11 - 7				
						14.5'		
	S-6	4	14-16	11 - 5	Loose, brown, fine to coarse SAND, some Silt, little Gravel			No Well Installed
15				1 - 4				
						SAND & SILT		
	S-7	7	19-21	9 - 6	Medium dense, brown, fine to coarse SAND, some Gravel, some Clayey Silt			
20				7 - 8		**22'**		
						BOULDER	2	
						23.5'		
	S-8	8	24-26	12 - 15	Medium dense, brown, fine to medium SAND and SILT, little Gravel			
25				8 - 8				
						SAND & SILT		
				8 - 10	Medium dense, brown, fine to coarse SAND, some Gravel, little Silt			
30	S-9	5	29-31	7 - 7			3	

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Boulder encountered from 22' bgs to 23.5' bgs during drilling.
3. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

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Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-7**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/08/20 End:	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/8/2020	10:30	4'	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	7	0-2	3 - 15	1 inch of topsoil Medium dense, brown, fine to coarse SAND, some Silt, little Gravel	**TOPSOIL**	1	
				14 - 28				
	S-2	14	2-4	25 - 13	Dense, brown, fine to coarse SAND, some Silt, little Gravel	**FILL**		
				18 - 22		**4'**	2	
	S-3	8	4-6	6 - 2	Soft, black, PEAT and organic SILT, little fine to coarse SAND, trace Gravel, trace wood, trace roots	**PEAT**		
5				2 - 3				
	S-4	3	6-8	2 - 3	A: Top 1 inch PEAT, some fine Sand, little Gravel	**7'**		
				13 - 12	B: Bottom 2 inches medium dense, brown, fine to coarse SAND, little Peat, little Gravel			
	S-5	7	8-10	12 - 14	Dense, brown, fine to coarse SAND and GRAVEL, little Silt, trace Peat			
				18 - 22				
10						**SAND & GRAVEL**		No Well Installed
						13.5'		
						BOULDER		
	S-6	5	14.5-16.5	19 - 32	Very dense, brown, GRAVEL, some fine to coarse SAND, little Silt	**14.5'**	3	
15				22 - 20				
						SAND & GRAVEL		
	S-7	8	19-21	21 - 87	Very dense, brown, fine to coarse SAND, some Silt, trace Gravel			
20				49 - 28			4	
					End of boring at 21'			
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Many boulders encountered from 0-4' bgs. Difficultly advancing casing through this layer.
3. Boulder encountered from approximately 13.5-14.5' bgs. Sample S-6 was taken below the obstruction.
4. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

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Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-8**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/08/20 End: 06/08/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 139 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/8/2020	2:30	4'	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	10	0-2	2 - 3	3 inches of topsoil	**TOPSOIL**	1	
				4 - 7	Loose, brown, fine to coarse SAND and SILT, trace Gravel			
	S-2	16	2-4	17 - 8	Medium dense, tan, fine to coarse SAND, little Gravel, trace Silt	**FILL**		
				9 - 10		**4'**		
	S-3	0	4-6	11 - 11	No Recovery		2	
5				11 - 10				
	S-4	4	6-8	8 - 11	Medium dense, tan, GRAVEL and fine to coarse SAND, trace Silt			
				13 - 14				
	S-5	4	8-10	9 - 14	Medium dense, tan, GRAVEL, some fine to coarse Sand, little Silt			
				15 - 14				
10								
	S-6	0	14-16	26 - 32	No Recovery			No Well Installed
15				27 - 16				
						GRAVEL & SAND		
	S-7	2	19-21	17 - 22	Dense, brown, GRAVEL, some fine to coarse Sand, little Silt			
20				19 - 4				
	S-8	10	24-26	29 - 38	Very dense, brown, fine to coarse SAND and GRAVEL, little Silt			
25				28 - 31				
				23 - 26				
30	S-9	11	29-31	23 - 23	Dense, tan, fine to medium SAND, some Silt, little Gravel		3	

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Soils strata cahnge at 4' observed in drill cuttings.
3. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-9**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/05/20 End: 06/05/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 136 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/5/2020	15:30	2'	0	0.5

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	20	0-2	1 - 1	2 inches of topsoil	**TOPSOIL**	1	
				1 - 1	Very loose, brown, fine to medium SAND and SILT, trace Gravel			
	S-2	14	2-4	1 - 1	Loose, brown/tan, fine to coarse SAND, some Clayey Silt, little Gravel	**FILL**		
				6 - 10		**4'**		
	S-3	10	4-6	12 - 11	Medium dense, brown, GRAVEL and fine to coarse SAND, little Silt			
5				11 - 10				No Well Installed
	S-4	15	6-8	8 - 6	Medium dense, brown, fine to coarse SAND, some Gravel, little Silt	**SAND & GRAVEL**		
				4 - 5				
	S-5	7	9-11	17 - 10	Medium dense, brown, fine to coarse SAND, some Gravel, some Silt			
10				6 - 13			2	
					End of boring at 11'			
15								
20								
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-10**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/08/20 End: 06/08/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/8/2020	7:00	4'	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	6	0-2	2 - 3	2 inches of topsoil Loose, brown, fine to coarse SAND, some Gravel, some Silt	**TOPSOIL**	1	
				3 - 5		**FILL**		
	S-2	15	2-4	2 - 4	Medium dense, brown/tan, fine to coarse SAND, some Gravel, some Silt	**4'**		
				10 - 13				
	S-3	13	4-6	12 - 14	Medium dense, brown, fine to coarse SAND, some Clayey Silt, little Gravel			No Well Installed
5				11 - 12				
	S-4	8	6-8	8 - 6	Medium dense, brown, fine to coarse SAND, some Silt, little Gravel	**SAND & SILT**		
				10 - 13				
	S-5		8-10	3 - 7	Medium dense, brown, fine to coarse SAND, some Silt, trace Gravel			
				8 - 7				
10					End of boring at 10'		2	
15								
20								
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-11**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/09/20 End: 06/09/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/9/2020	14:30	2	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	10	0-2	3 - 7	2 inches of topsoil	**TOPSOIL**	1	No Well Installed
				11 - 9	Medium dense, brown, fine to coarse SAND, some Gravel, some Silt			
	S-2	1	2-4	6 - 7	Medium dense, tan, fine to coarse SAND, some Silt, little Gravel	**FILL**		
				7 - 7				
5	S-3	18	4-6	6 - 4	Loose, tan/gray, fine SAND, some Silt, trace Gravel	**6'**		
				3 - 3				
	S-4	20	6-8	3 - 2	Loose, gray, fine SAND, little Silt, trace Gravel	**SAND & SILT**		
				3 - 5				
	S-5	7	9-11	5 - 5	Loose, gray, fine to medium SAND, some Silt, trace Gravel			
10				3 - 3				
						13'	2	
						ORGANIC SILT		
	S-6	6	14-16	3 - WH	Loose, dark gray, Organic SILT and fine to coarse SAND, little Gravel	**15'**	3	
15				5 - 14				
	S-7	4	19-21	6 - 4	Loose, brown, fine to coarse SAND, some Gravel, trace Silt	**SAND & GRAVEL**		
20				4 - 2				
	S-8	5	24-26	5 - 5	Medium dense, fine to coarse SAND, some Gravel, some Silt		4	
25				8 - 5				
					End of boring at 26'			
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Strata change to Peat observed in drill cuttings at 13' bgs
3. Top 3 inches of sample S-6 were peat.
4. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-12**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/10/20 End: 06/10/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 138 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/10/2020	13:00	4'	0	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	15	0-2	8 - 12	3 inches of topsoil	**TOPSOIL**	1	
				9 - 13	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt			
	S-2	4	2-4	17 - 5	Medium dense, tan/gray, fine to coarse SAND and GRAVEL, little Silt	**FILL**		
				17 - 32		**4'**		
	S-3	7	4-6	3 - 4	Loose, gray, fine to coarse SAND, some Gravel, little Organic Silt			
5				4 - 8				No Well Installed
	S-4	6	6-8	3 - 6	Loose, gray, fine to coarse SAND and Organic SILT, some Gravel			
				3 - 3		**SAND & ORGANIC SILT**		
	S-5	12	8-10	4 - 5	Medium dense, dark gray, fine to coarse SAND, some Organic Silt, some Gravel			
				6 - 6				
10	S-6	8	10-12	5 - 4	Medium dense, gray, fine to coarse SAND, some Organic Silt, little Gravel			
				6 - 3			2	
					End of boring at 12'			
15								
20								
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-13**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D. (in)	4/4.5	1.375/2
Hammer Wt.(lb)	300	140
Hammer Fall(in)	30	30
Rig Make/Model	Mobile B-53	
Drilling Method:	Drive & Wash	
Hammer Type:	Auto	

Drilling Co.: New England Boring Contractors
Foreman: W. Hoeckele
T&B Rep.: R. Manson
Date Start: 06/10/20 End: 06/10/20
Location See Exploration Location Plan
GS. Elev. ± 139 Datum: NAVD88

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/10/2020	12:00	6'	5'	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	8	0-2	4 - 17	3 inches of topsoil	**TOPSOIL**	1	
				25 - 25	Dense, tan, fine to coarse SAND, some Gravel, little Silt			
	S-2	13	2-4	17 - 10	Medium dense, dark brown, fine to coarse SAND, some Gravel, little Organic Silt, trace wood			
				13 - 18				
	S-3	9	4-6	11 - 8	Medium dense, dark gray, fine to coarse SAND, some Organic SILT, trace Gravel, trace wood	**FILL and ORGANIC SILT**		
5				8 - 15				
	S-4	5	6-8	10 - 7	Medium dense, dark gray, fine to coarse SAND and GRAVEL, some Silt			No Well Installed
				5 - 7		**8'**		
	S-5	3	8-10	5 - 14	Medium dense, gray, fine to coarse SAND, little Silt, trace Gravel			
				14 - 18		**SAND**		
10	S-6	16	10-12	14 - 9	Medium dense, gray, fine to coarse SAND, little Silt, trace Gravel			
				9 - 9			2	
					End of boring at 12'			
15								
20								
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

Tighe&Bond
Engineers | Environmental Specialists

Project: Pond Street Apartments
Location: Pond Street, Rockland, MA
Client: Jones Street Development

Boring No. **TB-14**
Page 1 of 1
File No. **J-5019-002**
Checked by: MR

		Casing	Sampler
	Type	HW	Split Spoon
Drilling Co.: New England Boring Contractors	I.D./O.D. (in)	4/4.5	1.375/2
Foreman: W. Hoeckele	Hammer Wt.(lb)	300	140
T&B Rep.: R. Manson	Hammer Fall(in)	30	30
Date Start: 06/10/20 End: 06/10/20	Rig Make/Model	Mobile B-53	
Location See Exploration Location Plan	Drilling Method:	Drive & Wash	
GS. Elev. ± 143 Datum: NAVD88	Hammer Type:	Auto	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
6/10/2020	11:00	8'	10'	0

Depth (ft.)	Sample No.	Recovery (in.)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
	S-1	19	0-2	6 - 9	2 inches of topsoil	**TOPSOIL**	1	No Well Installed
				12 - 17	Medium dense, tan, fine to coarse SAND and GRAVEL, little Silt			
	S-2	14	2-4	12 - 13	Medium dense, tan, fine to coarse SAND and GRAVEL, little Silt	**FILL**		
				18 - 31				
5	S-3	10	4-6	16 - 11	Medium dense, tan, fine to coarse SAND, some Gravel, little Silt			
				8 - 7				
	S-4	6	6-8	8 - 4	Medium dense, tan, fine to coarse SAND and GRAVEL, little Silt			
				2 - 5		**8'**		
	S-5	13	8-10	13 - 20	Dense, Gray, GRAVEL, some fine to coarse Sand, some Silt	**SAND & GRAVEL**		
				20 - 21				
10	S-6	21	10-12	24 - 34	Very dense, gray, GRAVEL and fine to coarse SAND, little Silt			
				29 - 22			2	
					End of boring at 12'			
15								
20								
25								
30								

Notes:
1. Ground surface elevations based on a plan titled Existing Conditions Key Plan prepared by Coneco Engineers & Scientists, dated May 14, 2020.
2. Borehole backfilled with cuttings at the end of drilling.

SILT	PI = 0
CLAYEY SILT	0 < PI < 4
SILT & CLAY	4 < PI < 10
CLAY & SILT	10 < PI < 20
SILTY CLAY	20 < PI < 40
CLAY	PI > 40

Proportions by Weight
TRACE (TR.) 0 - <10%
LITTLE (LI.) 10 - <20%
SOME (SO.) 20 - <35%
AND 35 - <50%

Density/Based on N-values
VERY LOOSE 0-4 bpf
LOOSE 4-10 bpf
MEDIUM DENSE 10-30 bpf
DENSE 30-50 bpf
VERY DENSE >50 bpf
bpf=blows per foot

Consistency/Based on N-values
VERY SOFT <2 bpf
SOFT 2-4 bpf
MEDIUM 4-8 bpf
STIFF 8-15 bpf
VERY STIFF 15-30 bpf
HARD >30 bpf

APPENDIX D
Recent Test Pit Logs

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-1**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep. M. Trovato
Weather 65 Degrees - Sunny
Contractor New England Boring Contractors
Operator Manly Thompson
Make Kubota Model KX-080-4
Capacity 0.3 yd^3 Reach 15.1 ft.
Date 06/03/20
Ground Elev. 135±
Time Started 8:15
Time Completed 9:05

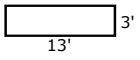
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	4-inches of Topsoil, over light brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, dry	S-1	0.0	E	A (5%)	1
2'				E	A (5%)	
3'	Grayish-brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, trace Wood, wet 3'	S-2	0.0	E	A-B (5-10%)	
4'	Dark brown, fiberous PEAT, some Organic Silt, little fine to coarse Sand, trace fine to coarse Gravel 4'	S-3	0.0	E	A-B (5-10%)	
5'	Gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Wood	S-4		E	A-B (10-15%)	
6'			0.0	E	A-B (10-15%)	
7'				E	A-B (10-15%)	2
8'	8'					
9'	Bottom of exploration at 8 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Granular sand and gravel fill observed from approximately 0 to 3 feet below surface grade.

2) No groundwater infiltration observed in test pit, however soil conditions wet below 3 feet.

Test Pit Plan



Volume = 11.5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

J:\J\J5019 Jones Street\002 Pond St, Rockland\Environmental\Test Pits\Explorations\[Test Pit Log TP-1.xls]TP-1

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-2**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	135±
Weather	69 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	9:15
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	10:10

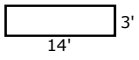
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	3-inches of Topsoil, over brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, dry	S-1		E	A-B (10-15%)	1
2'	2'		0.0	E	A-C (10%)	
3'	Grayish-brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, damp	S-2		E	A-C (10%)	
4'	4'		0.0	E	A-C (10%)	
5'	Dark brown, fiberous PEAT, some Organic Silt, little fine to coarse Sand, trace wood, trace fine to coarse Gravel, damp 4.9'	S-3	0.0	E	A (5%)	
6'	Gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Wood, wet	S-4		E	A-B (5%)	
7'			0.0	E	A-B (5%)	
8'	8.5'			E	A-B (5%)	2
9'	Bottom of exploration at 8.5 feet			E	A-B (5%)	
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Granular sand and gravel fill observed from approximately 0 to 2 feet below surface grade.

2) Groundwater observed to infiltrate at bottom of test pit at approximately 7.5 feet below surface grade.

Test Pit Plan



Volume = 13.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	7.5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-3**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	130±
Weather	71 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	10:20
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	11:15

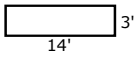
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	3-inches of Topsoil, over light brown, fine to coarse SAND and GRAVEL, little Silt, dry	S-1		E	A-B (5-10%)	
2'			0.0	E	A-B (5-10%)	
3'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Wood, Brick, Metal, damp 2.5'	S-2	0.0	E	A-B (5-10%)	1
4'	Grayish-brown, fine to coarse SAND, some fine Gravel, little Silt, trace Wood, Brick, damp 3.5'	S-3	0.0	E	A (5%)	
5'				E	A (5%)	
6'	Dark brown, Fiberous PEAT, some Organic Silt, trace fine to coarse Sand, trace Wood, wet 4.5'	S-4	0.0	E	0%	
7'	7'			E	0%	
8'	Gray, fine to coarse SAND, little Silt, little fine to coarse Gravel, wet 9'	S-5	0.0	E	A (5%)	2
9'				E	A (5%)	
10'	Bottom of exploration at 9 feet					
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Very dense, (dark colored) soil later observed under surficial sand and gravel fill - possibly grade of former junkyard.

2) Groundwater observed to infiltrate at bottom of test pit at approximately 7.5 feet below surface grade.

Test Pit Plan



Volume = 13.9 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	7.5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-4**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	131±
Weather	74 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	11:25
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	12:30

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5%)	
1'	Light brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, dry	S-1	0.0	E	A (5%)	
2'				E	A (5%)	
3'				E	A (5%)	
4'	4'					
	Red, fine to coarse SAND and GRAVEL, trace Silt, wet	S-2		E	A (5%)	1, 2
5'	Brown, fine to coarse GRAVEL, some fine to coarse Sand, little Silt, wet	S-3	0.0	E	A (5%)	
6'	6'					
7'	Gray, fine to coarse SAND, some Silt, some fine to coarse Gravel, wet	S-4	0.0	E	A (5%)	
8'	8'			E	A (5%)	
	Bottom of exploration at 8 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) iron deposits observed in soils from 4 to 4.5 feet below surface grade based on red coloration.

2) Groundwater observed at approximately 4.5 feet below surface grade.

Test Pit Plan

4.5'
13'

Volume = 17 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	4.5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-5**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	130±
Weather	76 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	12:45
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	13:35

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				M	A (5%)	1
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, trace Rubber, Metal, Plastic, Glass, Wood, Trash, dry	S-1	0.0	E	A (5%)	
2'				E	A (5%)	
3'	3'			E	A (5%)	
4'	Light brown, fine to coarse SAND, some Silt, trace fine Gravel, damp	S-2		E	A (5%)	
5'	5'		0.0	E	A (5%)	2
6'	Gray, fine to medium SAND and SILT, trace fine Gravel, wet	S-3		E	A (5%)	
7'			0.0	E	A (5%)	
8'	8.2'			E	A (5%)	3
9'	Bottom of exploration at 8.2 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Trash and debris typical of former junkyard operations observed in test pit commingled with soil from 0 to 3 feet below surface grade.

2) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

3) Bottom of exploration at approximately 8.2 feet due to sidewall collapse.

Test Pit Plan

5' × 12'

Volume = 17.3 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-6**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	131±
Weather	77 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	13:55
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	14:45

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				M	A (5%)	1
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Rubber, Metal, Tires, Plastic, Glass, Wood, Trash, dry	S-1	0.1	E	A (5-10%)	
2'				E	A (5-10%)	
3'	3'					
3'	Light brown, fine to coarse SAND, little Silt, little fine Gravel, damp	S-2		E	A-B (5%)	
4'			0.0	E	A (5-10%)	2
5'	5'					
5'	Brown, fine to medium SAND, some Silt, little fine Gravel, wet	S-3		E	A (5%)	
6'			0.0	E	A (5%)	
7'	7'					
7'	Gray, fine to medium SAND and SILT, trace fine Gravel, wet	S-4	0.0	E	A (5%)	3
8'	8'					
8'	Bottom of exploration at 8 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Trash and debris typical of former junkyard operations observed in test pit commingled with soil from 0 to 3 feet below surface grade.

2) Groundwater observed to infiltrate test pit at approximately 5.5 feet below surface grade.

3) Bottom of exploration at 8 feet due to sidewall collapse.

Test Pit Plan

5' × 12'

Volume = 17.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5.3'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-7**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep. M. Trovato
Weather 77 Degrees - Sunny

Contractor New England Boring Contractors
Operator Manly Thompson
Make Kubota Model KX-080-4
Capacity 0.3 yd^3 Reach 15.1 ft.

Date 06/03/20
Ground Elev. 132±
Time Started 14:55
Time Completed 15:35

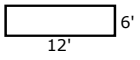
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5%)	
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, dry	S-1	0.0	E	A (5%)	
2'				E	A (5%)	
3'				E	A (5-10%)	
4'	Red, fine to coarse SAND, some fine to coarse Gravel, trace Silt, wet 4.5'	S-2		E	A (5-10%)	1
5'				E	A (5%)	
6'	Light brown, fine to coarse SAND, some fine Gravel, little Silt, wet	S-3	0.0	E	A (5%)	
7'				E	A (5%)	2
8'	8'					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

2) Bottom of exploration at 8 feet below grade due to sidewall collapse.

Test Pit Plan



Volume = 19.2 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-8**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/03/20
		Operator	Manly Thompson			Ground Elev.	131±
Weather	77 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	15:40
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	16:15

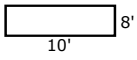
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5%)	
1'				E	A (5%)	
2'	Light brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, dry	S-1	0.0	E	A (5%)	
3'				E	A (5-10%)	
4'				E	A (5%)	1
5'	4.9'					
	Light brown, fine to coarse SAND and SILT, trace fine Gravel, wet	S-2		E	A (5%)	
6'			0.0	E	A (5%)	
7'				E	A (5%)	2
8'	8'					
	Bottom of exploration at 8 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

2) Bottom of exploration at 8 feet below grade due to sidewall collapse.

Test Pit Plan



Volume = 22.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-9**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	135±
Weather	72 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	7:50
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	8:25

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5%)	
1'				E	A (5%)	
2'	Dark brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Brick, Concrete, Metal, Glass, dry	S-1	0.0	E	A (5-10%)	
3'				E	A (5-10%)	
4'				E	A (5%)	
5'	5.1'					
				E	A (5%)	
6'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, damp	S-2	0.0	E	A (5%)	
7'				E	A (5%)	
8'	8'					
	Bottom of exploration at 8 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

Test Pit Plan

4' × 9'

Volume = 10.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

J:\J\J5019 Jones Street\002 Pond St, Rockland\Environmental\Test Pits\Explorations\[Test Pit Log TP-8.xls]TP-9

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-10**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	129±
Weather	74 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	8:35
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	9:10

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	3-inches of Topsoil, over brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, dry	S-1		E	A (5-10%)	
2'	2'		0.0	E	A (5%)	
3'	Gray, fine to coarse SAND, little fine to coarse Gravel, little Silt, damp	S-2	0.0	E	0%	1, 2
4'	3.5'			E	A (5%)	
5'	Light brown, fine to coarse SAND, little fine Gravel, little Silt, wet	S-3	0.0	E	A (5%)	
6'	6'			E	A (5%)	
7'	Gray, fine to medium SAND and SILT, trace fine Gravel, wet	S-4	0.0	E	A (5%)	
8'	7.4'			E	A (5%)	3
9'	Bottom of exploration at 7.4 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Reddish colored iron deposit soils observed at approximately 3 feet below surface grade.

2) Groundwater observed to infiltrate test pit at approximately 3.6 feet below surface grade.

3) Bottom of exploration at 7.4 feet due to sidewall collapse.

Test Pit Plan

4' × 9'

Volume = 10.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	3.5'

J:\J\J5019 Jones Street\002 Pond St, Rockland\Environmental\Test Pits\Explorations\[Test Pit Log TP-9.xls]TP-10

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-11**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	129±
Weather	77 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	9:20
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	9:55

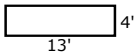
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A-B (5-10%)	
1'				E	A-B (5-10%)	
2'	Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, trace Brick, Metal, Rubber, Glass, Clay Pipe, dry	S-1	0.0	E	A-B (5-10%)	
3'				E	A (5-10%)	
4'	4'					
4'	Thin layer of red, fine to coarse SAND, some fine to coarse Gravel, trace Silt, over, light brown, fine to coarse SAND, some fine Gravel, little Silt, wet	S-2	0.0	E	A (5-10%)	1
5'	5.5'			E	A (5-10%)	
6'	Gray, fine to medium SAND and SILT, little fine Gravel, wet	S-3	0.0	E	A (5%)	
7'	7.6'			E	A (5%)	2
8'	Bottom of exploration at 7.6 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5.1 feet below surface grade.

2) Bottom of exploration at 7.6 feet due to sidewall collapse.

Test Pit Plan



Volume = 10.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5.1'

J:\J\J5019 Jones Street\002 Pond St, Rockland\Environmental\Test Pits\Explorations\[Test Pit Log TP-10.xls]TP-11

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-12**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	131±
Weather	79 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	10:05
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	10:45

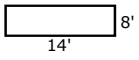
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A-C (5-10%)	
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt, trace Brick, dry	S-1	0.0	E	A-C (5-10%)	
2'				E	A-C (5-10%)	
3'	3'			E	A-B (5-10%)	
4'				E	A-B (5-10%)	1
5'	Light brown, fine to coarse SAND, some Silt, little fine Gravel, wet	S-2	0.0	E	A-B (5-10%)	
6'				E	A-B (5-10%)	
7'	7.3'			E	A (5-10%)	2
8'	Bottom of exploration at 7.3 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5.4 feet below surface grade.

2) Bottom of exploration at 7.3 feet due to sidewall collapse.

Test Pit Plan



Volume = 25.2 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5.4'

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-13**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	130±
Weather	80 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	11:00
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	11:45

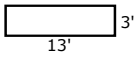
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0				E	A (5-10%)	
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Brick, Metal, Debris, dry	S-1	0.0	E	A (5-10%)	
2'				E	A (5-10%)	
3'	3'			E	A (5-10%)	
4'			0.0	E	A (5-10%)	1
5'	Brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, wet	S-2		E	A (5-10%)	
6'				E	A (5%)	
7'	7.1'			E	A (5%)	2
8'	Bottom of exploration at 7.1 feet					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

2) Bottom of exploration at 7.1 feet due to sidewall collapse.

Test Pit Plan



Volume = 10.2 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-14**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	130±
Weather	81 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	12:15
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	13:00

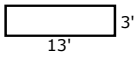
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Brick, Metal, Debris, Wood, Clay Pipe, dry	S-1		E	A (5-10%)	
2'	2'		0.0	E	A (5-10%)	
3'	Dark brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Metal, Wood, Clay Pipe, Glass, damp	S-2		E	A (5-10%)	
4'	4.5'		36.9	E	A (5-10%)	1
5'	Dark brown, Fiberous PEAT, some Organic Silt, trace fine to coarse Sand, trace fine Gravel, wet	S-3		E	A (5%)	2
6'	6.5'		1.2	E	A (5%)	
7'	Gray, fine to coarse SAND, some Silt, little fine Gravel, wet	S-4		E	A (5%)	
8'	8'		0.0	E	A (5%)	
9'	Bottom of exploration at 8 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Observed fill material from 2 to 4.5 feet below surface grade appears dissimilar to fill material observed in other areas of the site from historic operations.

2) Groundwater observed to infiltrate test pit at approximately 5 feet below surface grade.

Test Pit Plan



Volume = 10.9 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-15**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	129±
Weather	83 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	13:10
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	14:05

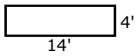
Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Rubber, Metal, Debris, Wood, dry	S-1		E	A-B (5-10%)	
2'	2.5'		0.0	E	A-B (5%)	
3'	Gray, fine to coarse SAND, some fine Gravel, some Rubber/Tires, little Silt, trace Metal, Brick, Glass, damp	S-2		E	A-B (5%)	
4'	4.5'		0.7	E	A (5-10%)	1
5'	Dark brown, Fiberous PEAT, some Organic Silt, trace fine to coarse Sand, trace fine Gravel, wet	S-3		E	A (5%)	2
6'	5.5'		0.0	E	A (5%)	
7'	Gray, fine to coarse SAND, some Silt, some fine Gravel, wet	S-4		E	A (5%)	
8'	8'		0.0	E	A (5%)	
9'	Bottom of exploration at 8 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Layer of cut tires and rubber observed from approximately 2.5 to 4 feet below surface grade.

2) Groundwater observed to infiltrate test pit at approximately 5.8 feet below surface grade.

Test Pit Plan



Volume = 16.5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	5.8'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-16**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	130±
Weather	83 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	14:15
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	15:00

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	4-inches of Concrete, over light brown, fine to medium SAND, some Silt, little fine Gravel, dry	S-1		E	A (5%)	1
2'			0.0	E	A (5%)	
3'	2.5'			E	0%	
4'	Light brown, fine to medium SAND and SILT, trace fine Gravel, damp	S-2		E	0%	
5'			0.0	E	0%	2
6'	6.5'			E	0%	
7'	Bottom of exploration at 6.5 feet					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1) Test pit completed at edge of former building foundation. No evidence of waterproofing or footings - slab-on-grade foundation.

2) Groundwater observed to infiltrate test pit at approximately 4.9 feet below surface grade.

Test Pit Plan

4' / 8'

Volume = 7.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	4.9'

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Tighe&Bond

Project/Site Information

Geo-Environmental Investigation
Jones Street Residential
Rockland, Massachusetts

Test Pit No. **TP-17**
Page No. 1 of 1
File No. J-5019-002
Checked By:

T&B Rep.	M. Trovato	Contractor	New England Boring Contractors			Date	06/04/20
		Operator	Manly Thompson			Ground Elev.	129±
Weather	83 Degrees - Sunny	Make	Kubota	Model	KX-080-4	Time Started	15:10
		Capacity	0.3 yd^3	Reach	15.1 ft.	Time Completed	15:55

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulder Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, trace Rubber, Metal, Debris, Wood, dry	S-1		E	A (5-10%)	
2'	2'		0.0	E	A (5-10%)	
3'	Dark brown, fine to coarse SAND, some fine Gravel, some Rubber/Tires, little Silt, trace Metal, Brick, Glass, damp	S-2		E	A (5-10%)	1
4'	4.8'		0.4	E	A (5-10%)	2
5'	Dark brown, Fiberous PEAT, some Organic Silt, trace fine to coarse Sand, trace fine Gravel, wet	S-3		E	A (5%)	
6'	5.8'		0.0	E	A (5%)	
7'	Gray, fine to coarse SAND, some Silt, some fine Gravel, wet	S-4	0.0	E	A (5%)	3
8'	6.5'					
9'	Bottom of exploration at 6.5 feet					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

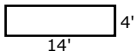
Notes:

1) Layer of cut tires and rubber observed from approximately 2 to 3.5 feet below surface grade.

2) Groundwater observed to infiltrate test pit at approximately 3.1 feet below surface grade.

3) Bottom of test pit at approximately 6.5 feet below surface grade due to shallow groundwater in test pit.

Test Pit Plan



Volume = 13.8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" +

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.25	3.1'

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APPENDIX E
Laboratory Test Results

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Tighe & Bond
Westfield, MA
PM: Matt Abraham
Assigned By: Rob Manson
Collected By: Client

Project Information:
Proposed Multi-Family Development
Rockland, MA
TEI Project Number: 74-20-0002.104
Summary Page: 1 of 1
Report Date: 07.07.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-F-177

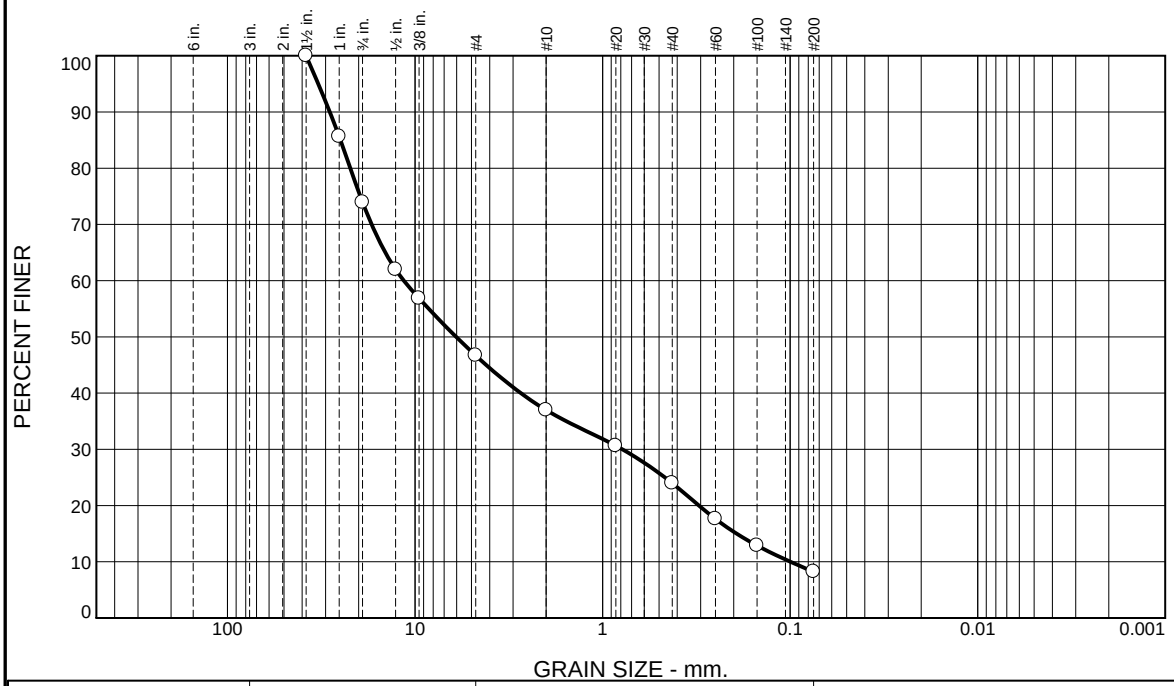
Boring	Sample No	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
TB-8	S-4	6-8	20-S-1667				53.3	38.5	8.2											Light Brown poorly graded gravel with silt and sand
TB-7	S-5	8-10	20-S-1668				38.2	50.9	10.9											Brown poorly graded sand with silt and gravel
TB-11	S-4	6-8	20-S-1669				3.7	77.8	18.5											Brown silty sand
TB-4	S-5	9-11	20-S-1670				0.6	14.6	84.8											Gray silt with sand
TB-12	S-3	4-6	20-S-1671				28.3	54.3	17.4											Brown silty sand with gravel
TB-6	S-7	19-21	20-S-1672				30.1	48.8	21.1											Brown silty sand with gravel
TB-6	S-4	6-8	20-S-1673				31.9	63.2	4.9											Brown poorly graded sand with gravel
TB-2	S-6	14-16	20-S-1674				46.9	45.2	7.9											Gray well-graded gravel with silt and sand
TB-1	S-3	4-6	20-S-1675				28.9	63.9	7.2											Brown well-graded sand with silt and gravel
TB-2	S-8	24-26	20-S-1676				2.3	54.1	43.6											Brown silty sand
TB-5	S-7	19-21	20-S-1677				0.6	28.9	70.5											Brown sandy clayey silt
TB-3	S-6	14-16	20-S-1678				0.0	45.3	54.7											Gray sandy silt

Date Received: *06.29.2020*

Reviewed By:

Date Reviewed: *07.07.2020*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.1	27.2	9.7	13.0	15.8	8.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	85.7		
3/4"	73.9		
1/2"	62.0		
3/8"	56.9		
#4	46.7		
#10	37.0		
#20	30.6		
#40	24.0		
#60	17.6		
#100	12.9		
#200	8.2		

* (no specification provided)

Material Description

Light Brown poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 28.4649 D_{85}= 24.9849 D_{60}= 11.4920
D_{50}= 6.0331 D_{30}= 0.7852 D_{15}= 0.1929
D_{10}= 0.0996 C_u= 115.37 C_c= 0.54

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 6-8' **Date Sampled:**
Sample Number: TB-8 / S-4

Thielsch Engineering Inc.

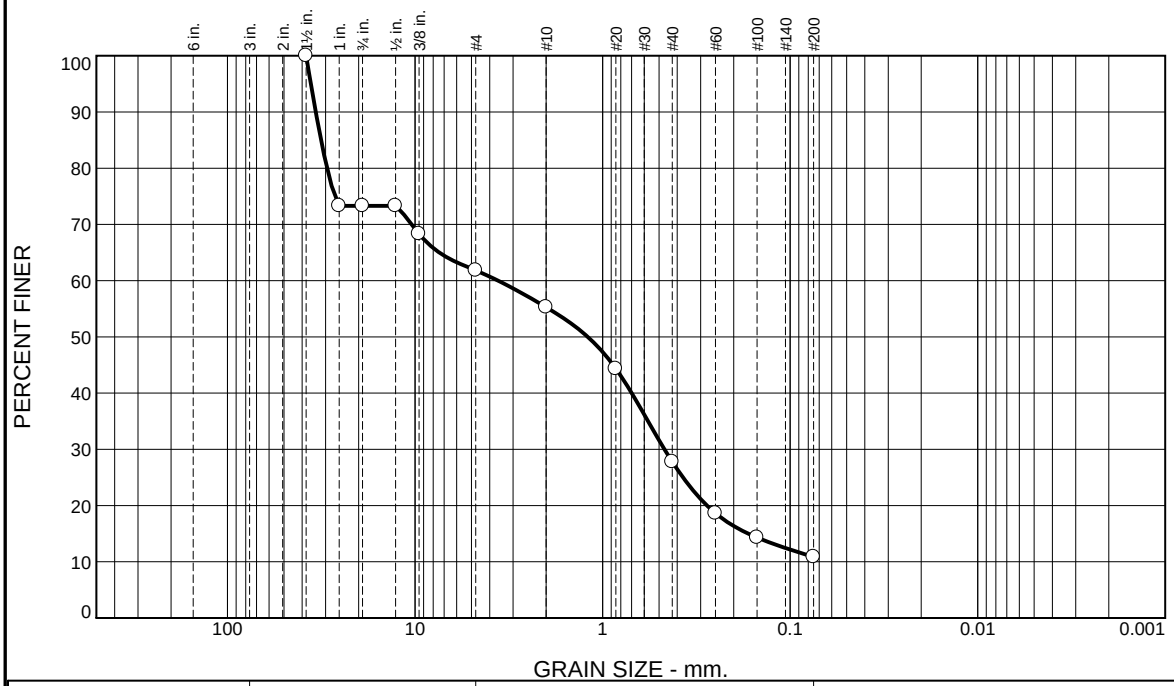
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1667

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.7	11.5	6.5	27.5	16.9	10.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	73.3		
3/4"	73.3		
1/2"	73.3		
3/8"	68.3		
#4	61.8		
#10	55.3		
#20	44.3		
#40	27.8		
#60	18.6		
#100	14.3		
#200	10.9		

* (no specification provided)

Material Description

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 33.8194 D_{85}= 31.6981 D_{60}= 3.6037
D_{50}= 1.1994 D_{30}= 0.4677 D_{15}= 0.1669
D_{10}= C_u= C_c=

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 8-10' **Date Sampled:**
Sample Number: TB-7 / S-5

Thielsch Engineering Inc.

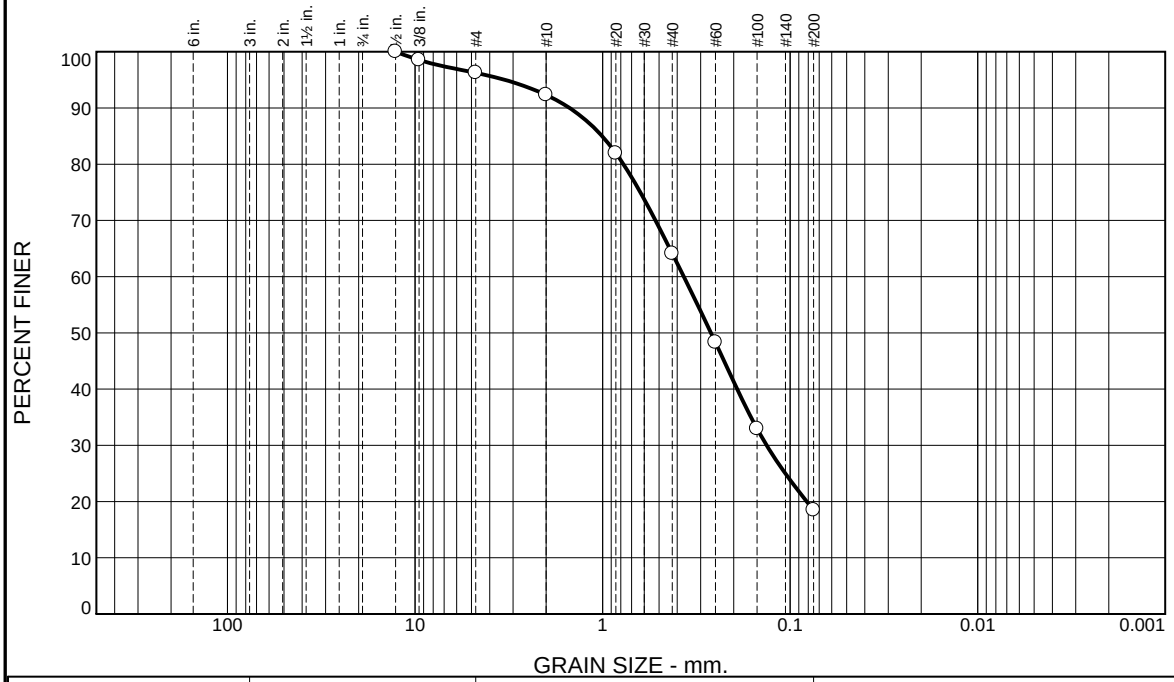
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1668

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.7	4.0	28.2	45.6	18.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.5		
#4	96.3		
#10	92.3		
#20	82.0		
#40	64.1		
#60	48.3		
#100	33.0		
#200	18.5		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 1.4980 D_{85}= 1.0067 D_{60}= 0.3690
D_{50}= 0.2642 D_{30}= 0.1334 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 6-8' **Date Sampled:**
Sample Number: TB-11 / S-4

Thielsch Engineering Inc.

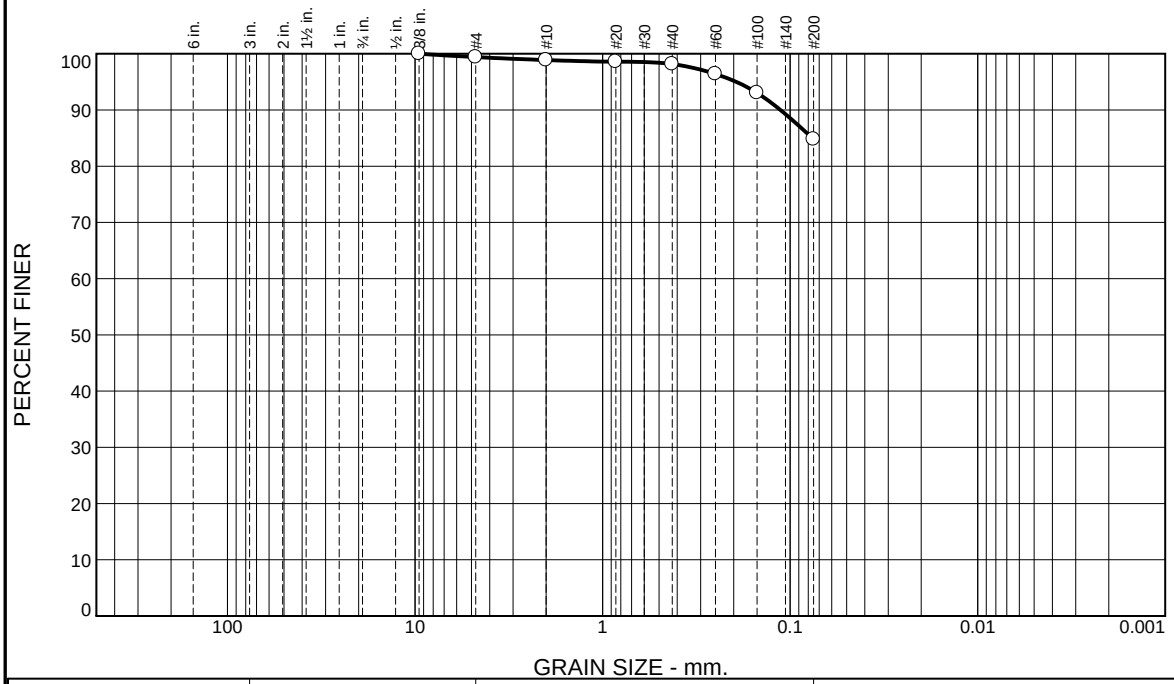
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1669

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.5	0.7	13.4	84.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.4		
#10	98.9		
#20	98.6		
#40	98.2		
#60	96.4		
#100	93.0		
#200	84.8		

* (no specification provided)

Material Description

Gray silt with sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.1125 D_{85}= 0.0762 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample was recieved with standing water. Sample visually classified as non-plastic.

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 9-11' **Date Sampled:**
Sample Number: TB-4 / S-5

Thielsch Engineering Inc.

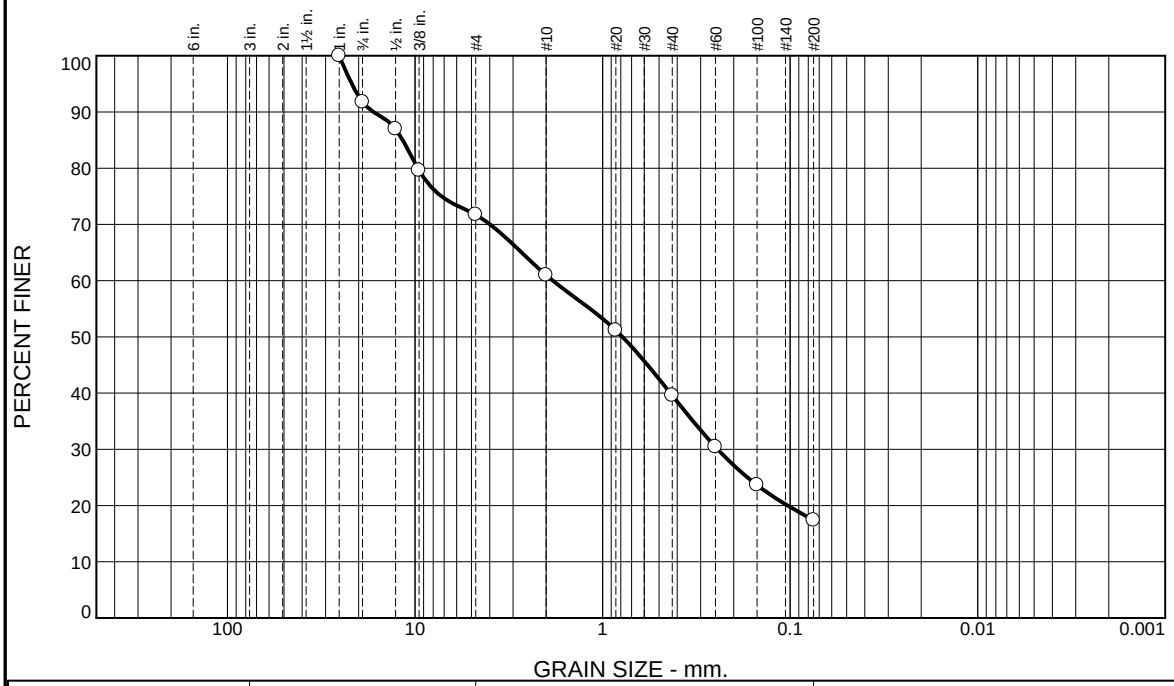
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1670

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.2	20.1	10.7	21.4	22.2	17.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	91.8		
0.5"	87.0		
0.375"	79.6		
#4	71.7		
#10	61.0		
#20	51.1		
#40	39.6		
#60	30.4		
#100	23.6		
#200	17.4		

* (no specification provided)

Material Description

Brown silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 16.6959 D_{85}= 11.6322 D_{60}= 1.8420
D_{50}= 0.7844 D_{30}= 0.2432 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 4-6' **Date Sampled:**
Sample Number: TB-12 / S-3

Thielsch Engineering Inc.

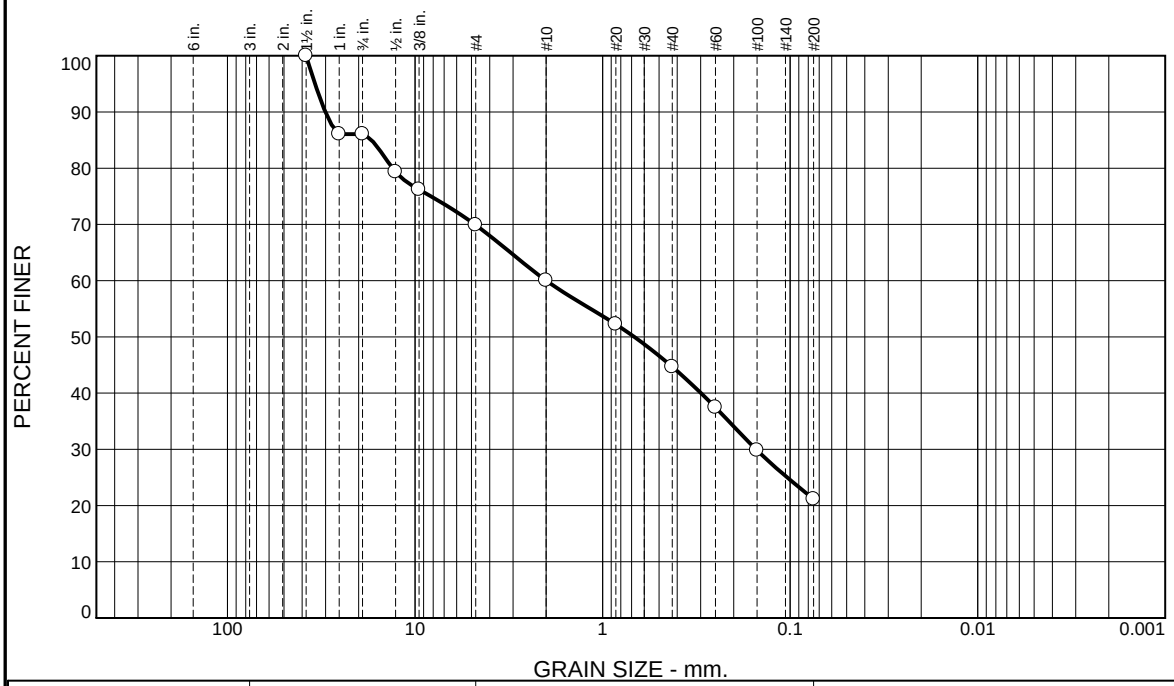
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1671

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.9	16.2	9.9	15.3	23.6	21.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	86.1		
3/4"	86.1		
1/2"	79.4		
3/8"	76.2		
#4	69.9		
#10	60.0		
#20	52.2		
#40	44.7		
#60	37.4		
#100	29.8		
#200	21.1		

* (no specification provided)

Material Description

Brown silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 30.0547 D_{85}= 17.0716 D_{60}= 1.9948
D_{50}= 0.6781 D_{30}= 0.1518 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 19-21' **Date Sampled:**
Sample Number: TB-6 / S-7

Thielsch Engineering Inc.

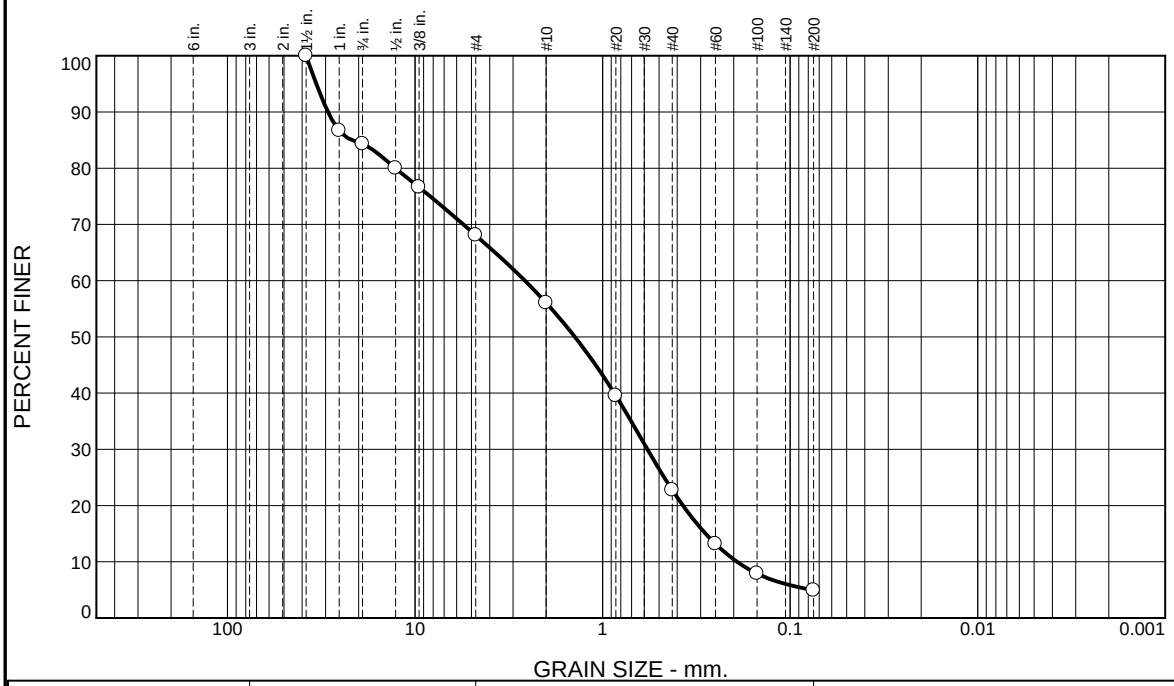
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1672

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.7	16.2	12.0	33.3	17.9	4.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	86.7		
3/4"	84.3		
1/2"	80.0		
3/8"	76.6		
#4	68.1		
#10	56.1		
#20	39.5		
#40	22.8		
#60	13.2		
#100	7.9		
#200	4.9		

* (no specification provided)

Material Description

Brown poorly graded sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 29.1140 D_{85}= 21.6624 D_{60}= 2.5966
D_{50}= 1.4050 D_{30}= 0.5767 D_{15}= 0.2823
D_{10}= 0.1919 C_u= 13.53 C_c= 0.67

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 6-8' **Date Sampled:**
Sample Number: TB-6 / S-4

Thielsch Engineering Inc.

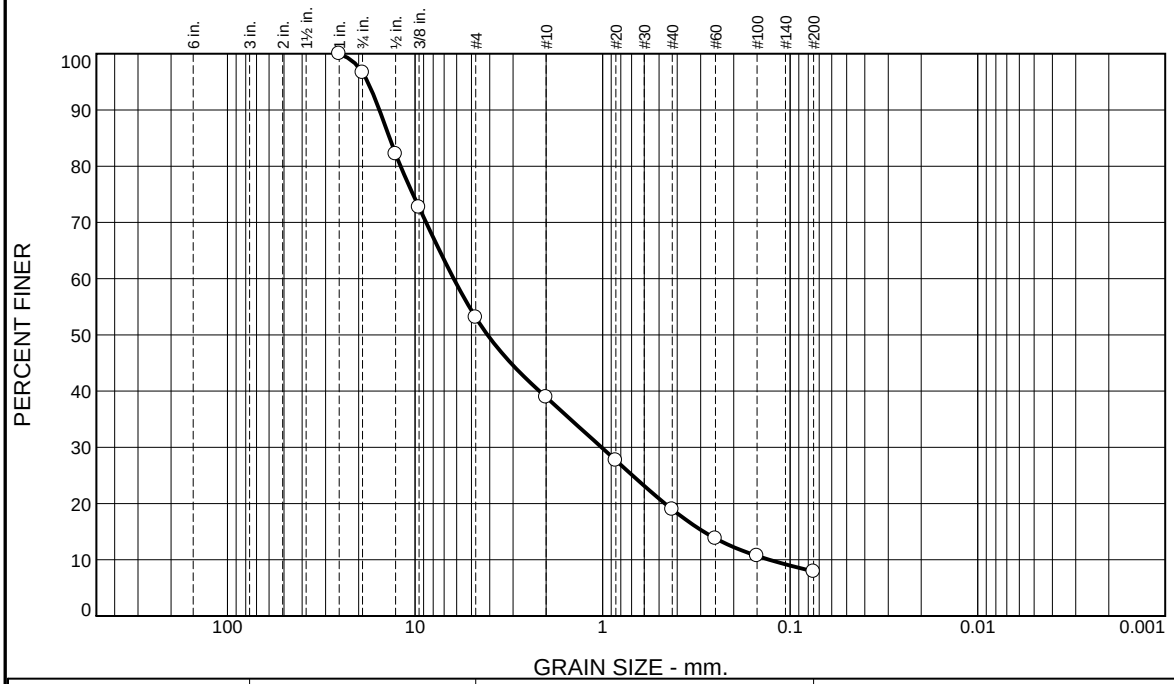
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1673

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	43.5	14.2	19.9	11.1	7.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	96.6		
0.5"	82.2		
0.375"	72.7		
#4	53.1		
#10	38.9		
#20	27.7		
#40	19.0		
#60	13.8		
#100	10.7		
#200	7.9		

* (no specification provided)

Material Description

Gray well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GW-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 15.4930 D_{85}= 13.6561 D_{60}= 6.2210
D_{50}= 4.1044 D_{30}= 1.0141 D_{15}= 0.2890
D_{10}= 0.1288 C_u= 48.32 C_c= 1.28

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 14-16' **Date Sampled:**
Sample Number: TB-2 / S-6

Thielsch Engineering Inc.

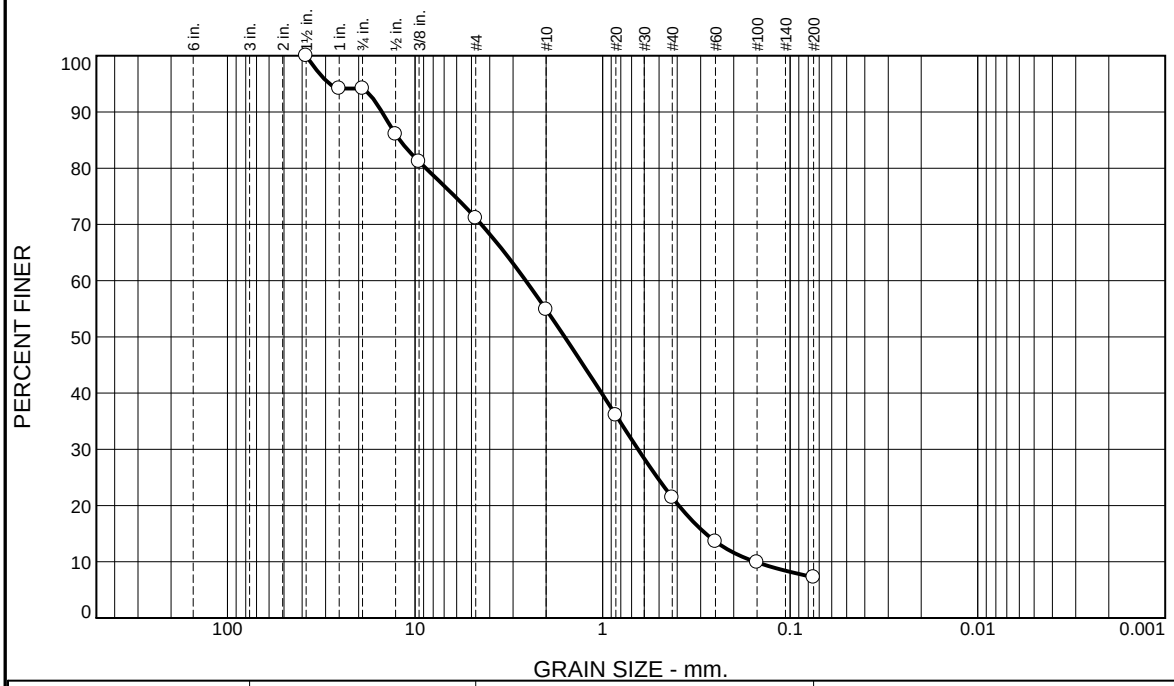
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1674

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.8	23.1	16.2	33.5	14.2	7.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	94.2		
3/4"	94.2		
1/2"	86.0		
3/8"	81.2		
#4	71.1		
#10	54.9		
#20	36.1		
#40	21.4		
#60	13.6		
#100	9.9		
#200	7.2		

* (no specification provided)

Material Description

Brown well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 15.0090 D_{85}= 12.0702 D_{60}= 2.5697
D_{50}= 1.5925 D_{30}= 0.6472 D_{15}= 0.2818
D_{10}= 0.1533 C_u= 16.76 C_c= 1.06

Remarks

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 4-6' **Date Sampled:**
Sample Number: TB-1 / S-3

Thielsch Engineering Inc.

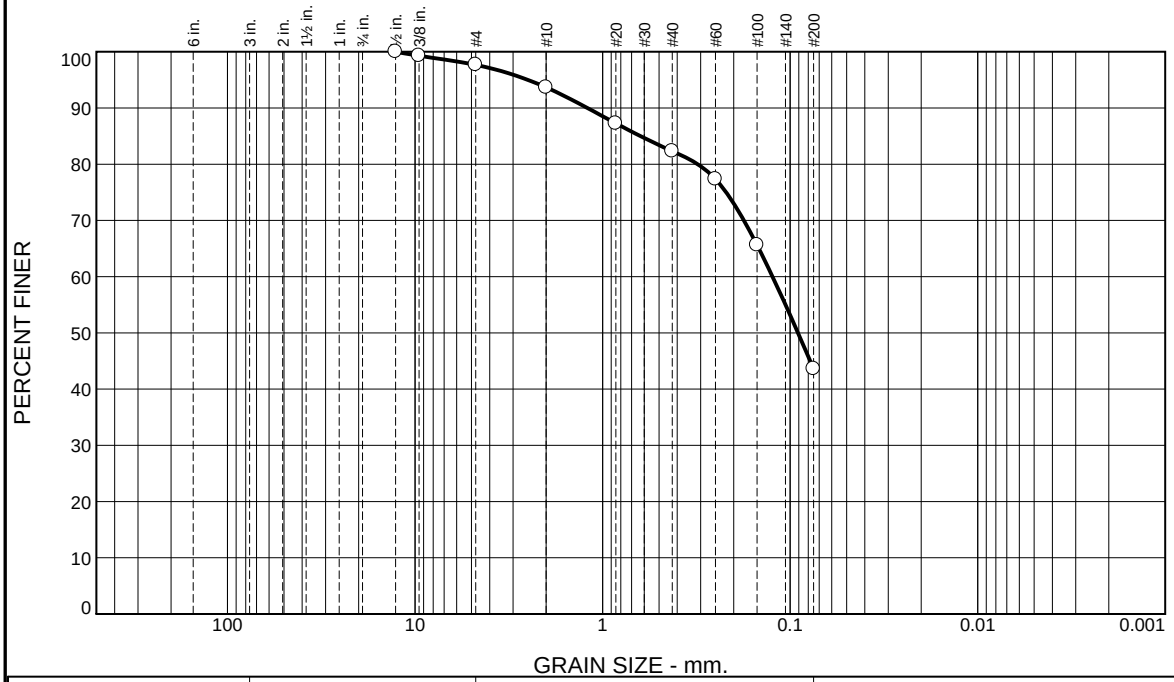
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1675

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	4.0	11.4	38.7	43.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	99.3		
#4	97.7		
#10	93.7		
#20	87.3		
#40	82.3		
#60	77.3		
#100	65.6		
#200	43.6		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 1.2053 D_{85}= 0.6275 D_{60}= 0.1241
D_{50}= 0.0909 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic. Sample was received with standing water.

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 24-26' **Date Sampled:**
Sample Number: TB-2 / S-8

Thielsch Engineering Inc.

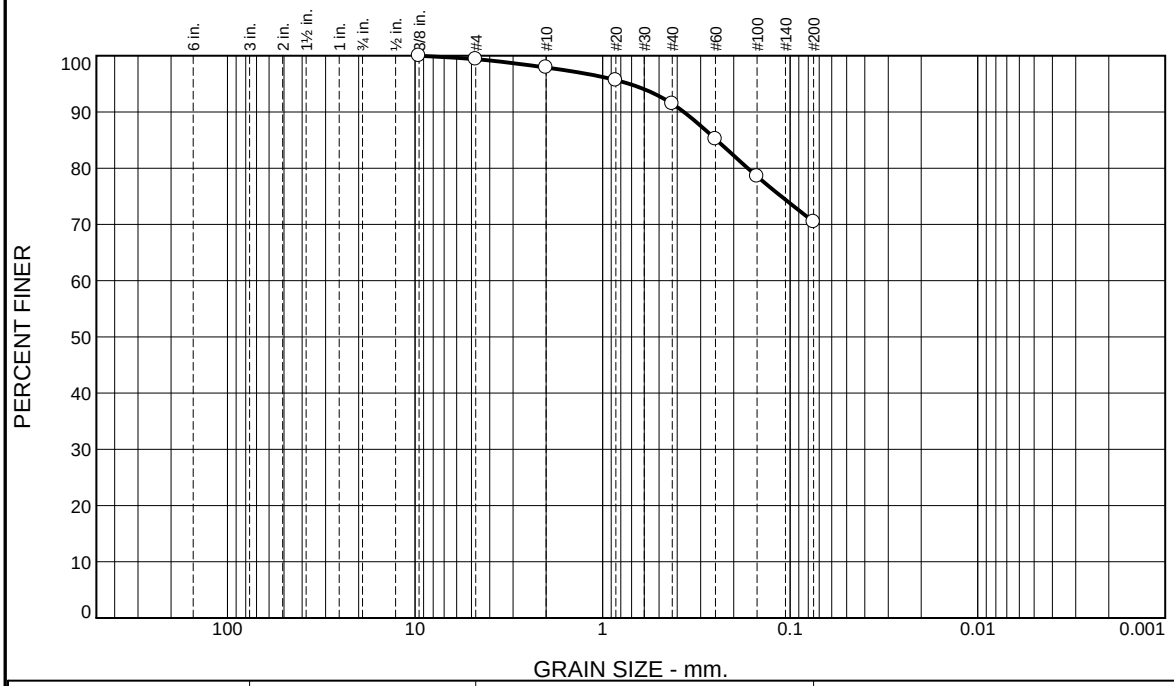
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1676

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	1.5	6.4	21.0	70.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.4		
#10	97.9		
#20	95.7		
#40	91.5		
#60	85.2		
#100	78.6		
#200	70.5		

* (no specification provided)

Material Description

Brown sandy clayey silt

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.3687 D_{85}= 0.2464 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/4". Sample was received with standing water.

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 19-21' **Date Sampled:**
Sample Number: TB-5 / S-7

Thielsch Engineering Inc.

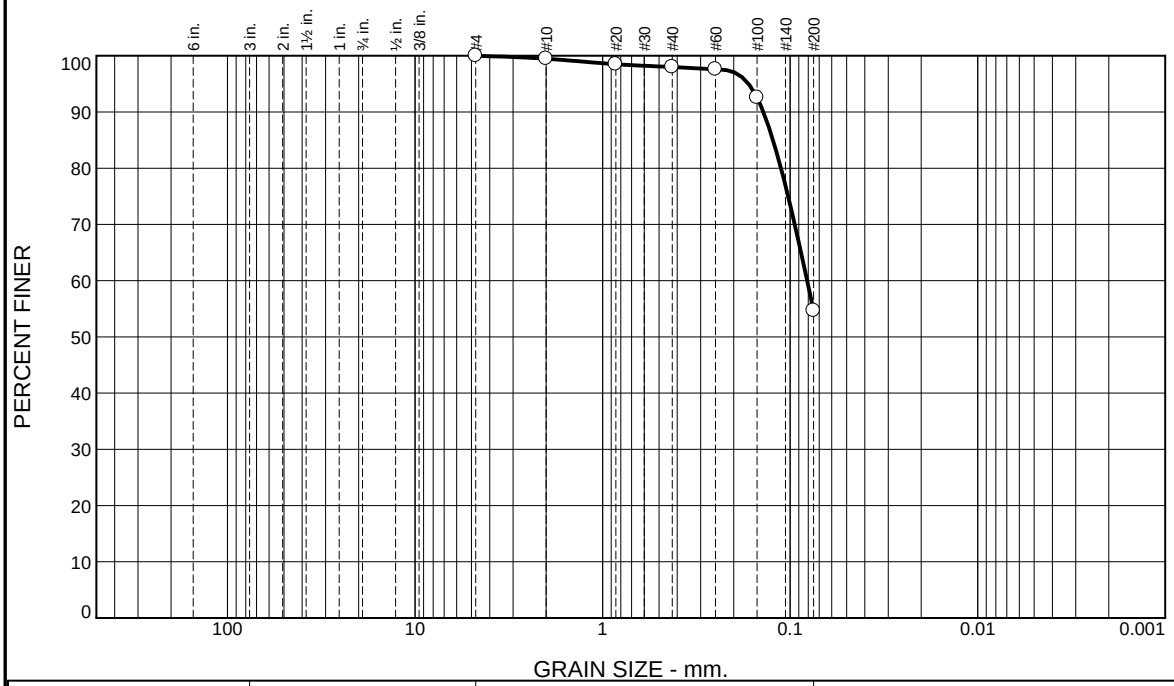
Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1677

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	1.5	43.3	54.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.5		
#20	98.5		
#40	98.0		
#60	97.6		
#100	92.6		
#200	54.7		

* (no specification provided)

Material Description

Gray sandy silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.1388 D_{85}= 0.1234 D_{60}= 0.0812
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic. Sample was received with standing water.

Date Received: 06.29.2020 **Date Tested:** 07.03.2020

Tested By: IA

Checked By: Rebecca Roth

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 14-16' **Date Sampled:**
Sample Number: TB-3 / S-6

Thielsch Engineering Inc.

Cranston, RI

Client: Tighe & Bond

Project: Proposed Multi-Family Development
Rockland, MA

Project No: 74-20-0002.104 **Figure** 20-S-1678

Exhibit 12

Culvert Condition Photos

MEMORANDUM Tighe&Bond

Shinglemills Multi-Family Development – On-Site Existing Culvert Photo Log

TO: Town of Rockland, MA - ZBA
DATE: September 4, 2020

Photo 1: Existing culvert along Pond Street

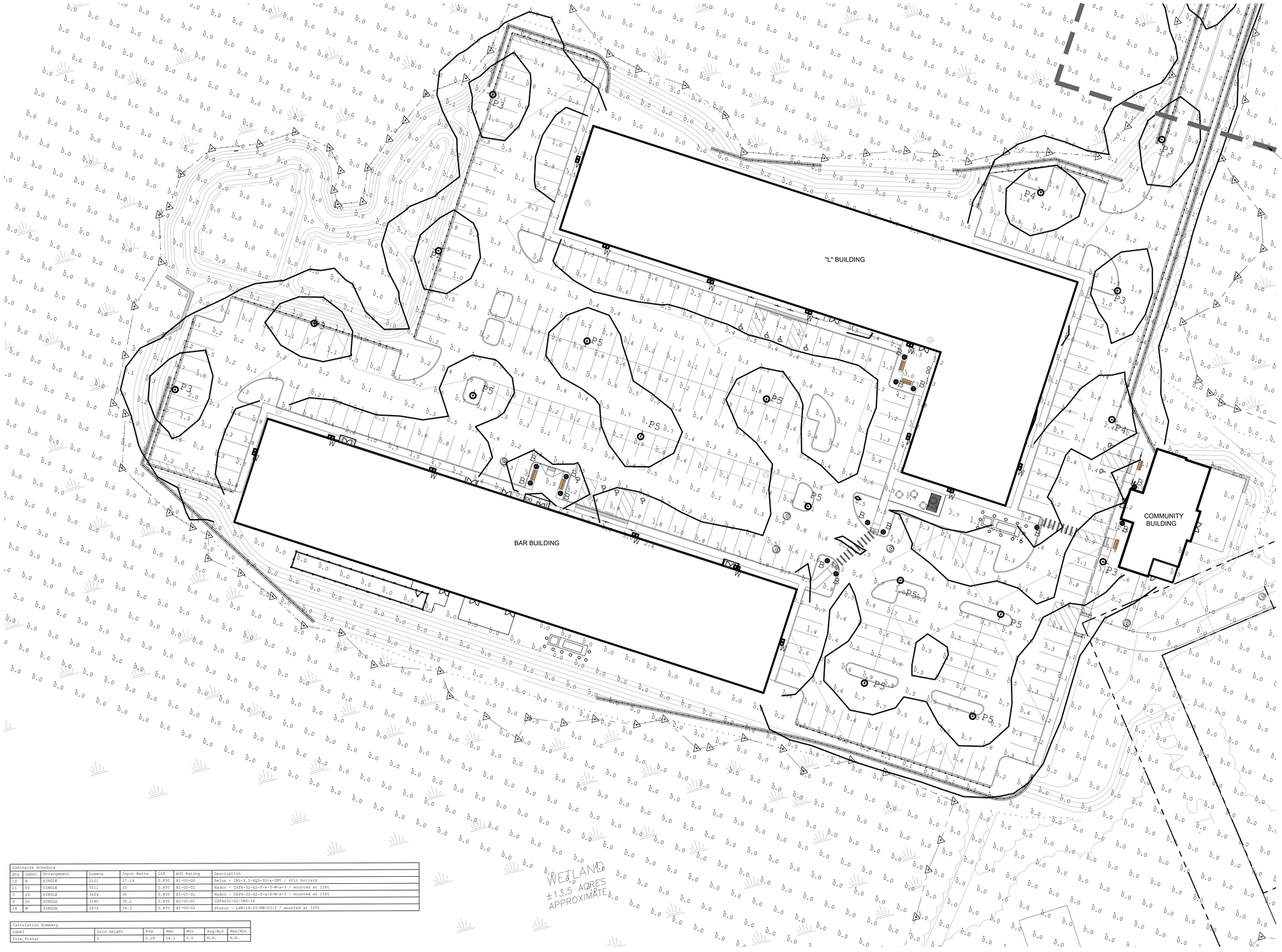
Photo 2: Existing culvert along Pond Street

Photo 3: Existing On-Site 24” RCP culvert

Photo 4: Existing On-Site 24” RCP culvert

Exhibit 13

Landscape Plans



Luminaire Schedule							
Qty	Label	Arrangement	Lumens	Input Watts	LLF	BUG Rating	Description
14	B	SINGLE	2101	27.19	0.850	B1-U0-G0	Selux - IBL-3.5-4QD-30-x-UNV / 42in bollard
11	P3	SINGLE	3511	35	0.850	B1-U0-G1	Hadco - CXF6-32-G2-T-x-3-W-x-3 / mounted at 15ft
3	P4	SINGLE	3424	35	0.850	B1-U0-G1	Hadco - CXF6-32-G2-T-x-4-W-x-3 / mounted at 15ft
9	P5	SINGLE	3395	35.2	0.850	B2-U0-G1	CXFxx32-G2-SW5-14
14	W	SINGLE	3474	34.3	0.850	B1-U0-G1	Stonco - LPW4-14-30-NW-G3-3 / mounted at 12ft

Calculation Summary						
Label	Grid Height	Avg	Max	Min	Avg/Min	Max/Min
Site_Planar	0	0.09	16.1	0.0	N.A.	N.A.

0 30 60 90 120 feet

1" = 30'

TRAVERSE
landscape architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

STAMP

PROJECT NAME

SHINGLE MILL

PROJECT ADDRESS

0 POND STREET
ROCKLAND, MA 02370

NO.	REVISIONS	DATE

SUBMITTAL	DATE
ZBA HEARING #3	

DRAWN BY:	CHECKED BY:
JL	AI
DATE ISSUED:	SCALE:
9.15.2020	AS NOTED

PROJ. NO.
R1016

SHEET TITLE

SITE LIGHTING PLAN 1

SHEET NO.
E1.0

POND STREET

UPLAND
±0.4 ACRES
APPROXIMATE

WETLAND
±13.5 ACRES
APPROXIMATE

WETLAND
±1.8 ACRES
APPROXIMATE

Luminaire Schedule						
Qty	Label	Arrangement	Lumens	Input Watts	LLF	BUG Rating	Description
14	B	SINGLE	2101	27.19	0.850	B1-U0-G0	Selux - IBL-3.5-4QD-30-xx-UNV / 42in bollard
11	P3	SINGLE	3511	35	0.850	B1-U0-G1	Radco - CXF6-32-G2-T-x-3-W-x-3 / mounted at 15ft
3	P4	SINGLE	3424	35	0.850	B1-U0-G1	Radco - CXF6-32-G2-T-x-4-W-x-3 / mounted at 15ft
9	P5	SINGLE	3395	35.2	0.850	B2-U0-G1	CXFxx32-G2-5W5-16
14	W	SINGLE	3474	34.3	0.850	B1-U0-G1	Stonco - LPW-16-30-NW-G3-3 / mounted at 12ft

Calculation Summary						
Label	Grid Height	Avg	Max	Min	Avg/Min	Max/Min
Site_Planar	0	0.09	14.1	0.0	N.A.	N.A.

0 30 60 90 120 feet

1" = 30'

TRAVERSE
landscape architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

STAMP

PROJECT NAME

SHINGLE MILL

PROJECT ADDRESS

0 POND STREET
ROCKLAND, MA 02370

NO.	REVISIONS	DATE
1		
2		
3		
4		
5		
6		

SUBMITTAL	DATE
ZBA HEARING #3	

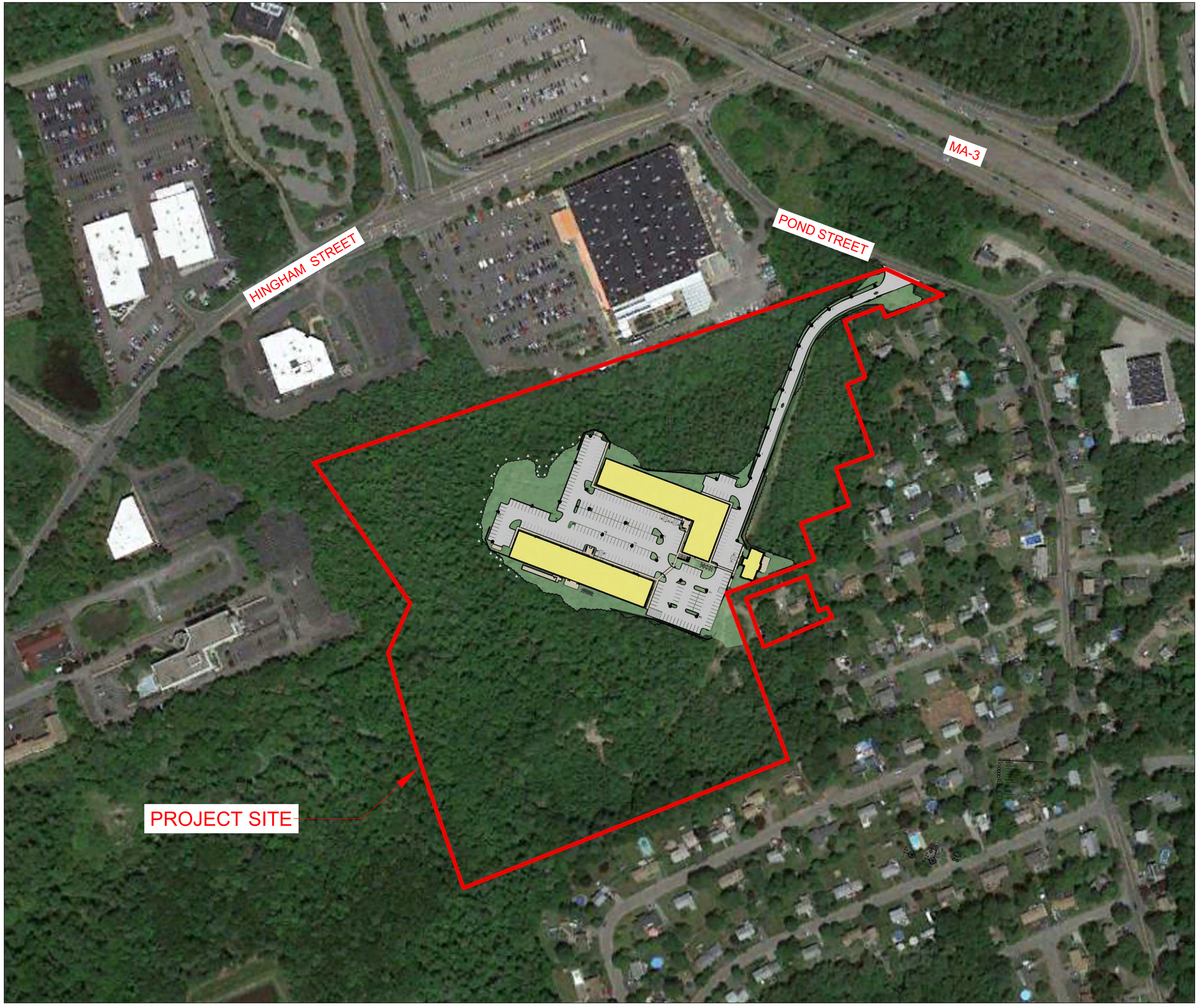
DRAWN BY:	CHECKED BY:
JL	AI
DATE ISSUED:	SCALE:
9.15.2020	AS NOTED

PROJ. NO.
R1016

SHEET TITLE

SITE LIGHTING PLAN 2

SHEET NO.
E1.1



NOTE: INFORMATION ON THIS PLAN WAS OBTAINED FROM GOOGLE EARTH

0 120 240 360 480 feet

1" = 120'

TRAVERSE
landscape architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

STAMP

PROJECT NAME

SHINGLE MILL

PROJECT ADDRESS

0 POND STREET
ROCKLAND, MA 02370

NO.	REVISIONS	DATE

SUBMITTAL	DATE
ZBA HEARING #3	

DRAWN BY:	CHECKED BY:
JL	AI
DATE ISSUED:	SCALE:
9.15.2020	AS NOTED

PROJ. NO.
R1016

SHEET TITLE

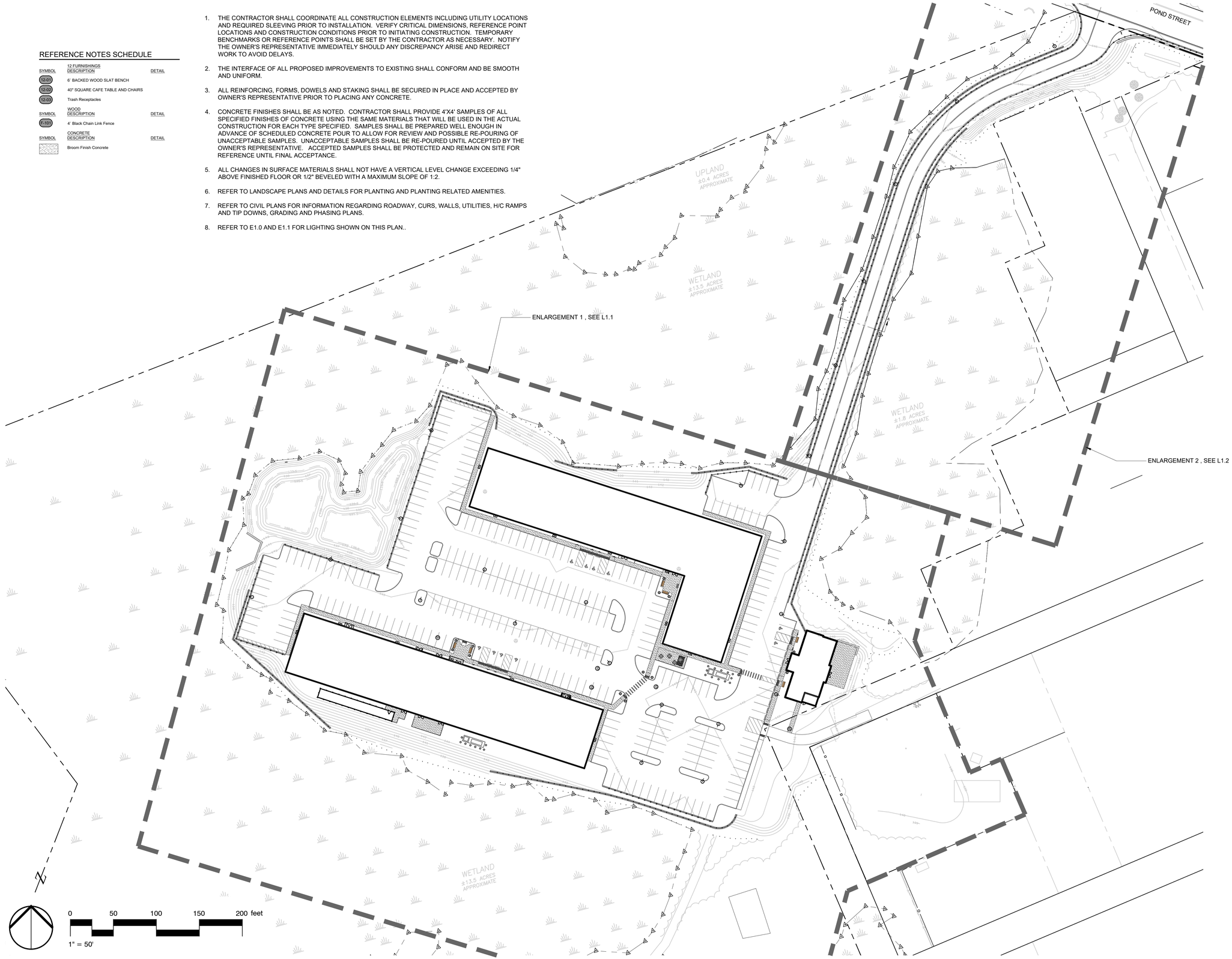
AERIAL MAP

SHEET NO.
L0.0

REFERENCE NOTES SCHEDULE

SYMBOL	12 FURNISHINGS DESCRIPTION	DETAIL
12-01	6' BACKED WOOD SLAT BENCH	
12-02	40" SQUARE CAFE TABLE AND CHAIRS	
12-03	Trash Receptacles	
SYMBOL	**WOOD DESCRIPTION**	**DETAIL**
E-101	4' Black Chain Link Fence	
SYMBOL	**CONCRETE DESCRIPTION**	**DETAIL**
	Broom Finish Concrete	

1. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ELEMENTS INCLUDING UTILITY LOCATIONS AND REQUIRED SLEEVING PRIOR TO INSTALLATION. VERIFY CRITICAL DIMENSIONS, REFERENCE POINT LOCATIONS AND CONSTRUCTION CONDITIONS PRIOR TO INITIATING CONSTRUCTION. TEMPORARY BENCHMARKS OR REFERENCE POINTS SHALL BE SET BY THE CONTRACTOR AS NECESSARY. NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY SHOULD ANY DISCREPANCY ARISE AND REDIRECT WORK TO AVOID DELAYS.
2. THE INTERFACE OF ALL PROPOSED IMPROVEMENTS TO EXISTING SHALL CONFORM AND BE SMOOTH AND UNIFORM.
3. ALL REINFORCING, FORMS, DOWELS AND STAKING SHALL BE SECURED IN PLACE AND ACCEPTED BY OWNER'S REPRESENTATIVE PRIOR TO PLACING ANY CONCRETE.
4. CONCRETE FINISHES SHALL BE AS NOTED. CONTRACTOR SHALL PROVIDE 4'X4' SAMPLES OF ALL SPECIFIED FINISHES OF CONCRETE USING THE SAME MATERIALS THAT WILL BE USED IN THE ACTUAL CONSTRUCTION FOR EACH TYPE SPECIFIED. SAMPLES SHALL BE PREPARED WELL ENOUGH IN ADVANCE OF SCHEDULED CONCRETE POUR TO ALLOW FOR REVIEW AND POSSIBLE RE-POURING OF UNACCEPTABLE SAMPLES. UNACCEPTABLE SAMPLES SHALL BE RE-POURED UNTIL ACCEPTED BY THE OWNER'S REPRESENTATIVE. ACCEPTED SAMPLES SHALL BE PROTECTED AND REMAIN ON SITE FOR REFERENCE UNTIL FINAL ACCEPTANCE.
5. ALL CHANGES IN SURFACE MATERIALS SHALL NOT HAVE A VERTICAL LEVEL CHANGE EXCEEDING 1/4" ABOVE FINISHED FLOOR OR 1/2" BEVELED WITH A MAXIMUM SLOPE OF 1:2.
6. REFER TO LANDSCAPE PLANS AND DETAILS FOR PLANTING AND PLANTING RELATED AMENITIES.
7. REFER TO CIVIL PLANS FOR INFORMATION REGARDING ROADWAY, CURS, WALLS, UTILITIES, H/C RAMPS AND TIP DOWNS, GRADING AND PHASING PLANS.
8. REFER TO E1.0 AND E1.1 FOR LIGHTING SHOWN ON THIS PLAN..



TRAVERSE
landscape architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

STAMP

PROJECT NAME

SHINGLE MILL

PROJECT ADDRESS

0 POND STREET
ROCKLAND, MA 02370

NO.	REVISIONS	DATE
1		

SUBMITTAL	DATE
ZBA HEARING #3	

DRAWN BY:	CHECKED BY:
JL	AI
DATE ISSUED:	SCALE:
9.15.2020	AS NOTED

PROJ. NO.
R1016

SHEET TITLE
OVERALL HARDSCAPE PLAN

SHEET NO.
L1.0

PEDESTRIAN GUARDRAIL

SEE CIVIL ENGINEERING PLANS FOR ALL GRADING, TYP.

SEE CIVIL ENGINEERING PLANS FOR ALL RETAINING WALLS, TYP.

BROOM FINISH CONCRETE PAVING, TYP.

PEDESTRIAN GUARDRAIL

"L" BUILDING

6' BACKED WOOD SLAT BENCH, TYP.

TRASH RECEPTACLES

BROOM FINISHED CONCRETE PATIO

12'X8' WOOD PERGOLA/CAFE TABLE AND CHAIR

SEE E1.0 AND E1.1 FOR ALL SITE LIGHTING FIXTURES, TYP.

SEE E1.0 AND E1.1 FOR ALL SITE LIGHTING FIXTURES, TYP.

BAR BUILDING

6' BACKED WOOD SLAT BENCH, TYP.

TRASH RECEPTACLES

PEDESTRIAN GUARDRAIL

PET RUN-SYTHETIC TURF SURFACE WITH 6" CONCRETE CURB AND 4' BLACK CHAIN LINK FENCING AND GATE

BROOM FINISHED CONCRETE

BROOM FINISH CONCRETE PAVING, TYP.

GENERATOR/TRANSFORMER ON CONCRETE PAD/UTILITY BOLLARDS

GENERATOR/TRANSFORMER ON CONCRETE PAD/UTILITY BOLLARDS

COMMUNITY BUILDING

WETLAND
±1.8 ACRES
APPROXIMATE

PEDESTRIAN GUARDRAIL

ENLARGEMENT 2 , SEE L1.2

SEE E1.0 AND E1.1 FOR ALL SITE LIGHTING FIXTURES, TYP.

OUTDOOR CLUBHOUSE SPACE, CONCRETE PATIO AND AMENITIES

Existing B

(NOTE: NOT

WILSON STREET

SEE CIVIL ENGINEERING PLANS FOR ALL GRADING, TYP.

OPEN SPACE

CEDAR ST

SEE CIVIL ENGINEERING PLANS FOR ALL RETAINING WALLS, TYP.

PEDESTRIAN GUARDRAIL

WETLAND
±13.5 ACRES
APPROXIMATE

REFERENCE NOTES SCHEDULE

SYMBOL	12 FURNISHINGS DESCRIPTION	DETAIL
12-01	6` BACKED WOOD SLAT BENCH	
12-02	40" SQUARE CAFE TABLE AND CHAIRS	
12-03	Trash Receptacles	

SYMBOL	WOOD DESCRIPTION	DETAIL
F-101	4` Black Chain Link Fence	

SYMBOL	CONCRETE DESCRIPTION	DETAIL
	Broom Finish Concrete	

0 30 60 90 120 feet

1" = 30'

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SHEET TITLE
HARDSCAPE PLAN ENLARGEMENT 1

SHEET NO.
L1.1

REFERENCE NOTES SCHEDULE

SYMBOL	12 FURNISHINGS DESCRIPTION	DETAIL
12-01	6` BACKED WOOD SLAT BENCH	
12-02	40" SQUARE CAFE TABLE AND CHAIRS	
12-03	Trash Receptacles	

SYMBOL	WOOD DESCRIPTION	DETAIL
F-101	4` Black Chain Link Fence	

SYMBOL	CONCRETE DESCRIPTION	DETAIL
	Broom Finish Concrete	

POND STREET

SEE CIVIL ENGINEERING PLANS FOR ALL GRADING, ROADWAYS AND RETAINING WALLS, TYP.

SEE E1.0 AND E1.1 FOR ALL SITE LIGHTING, TYP.

PEDESTRIAN GUARDRAIL

UPLAND
±0.4 ACRES
APPROXIMATE

WETLAND
±13.5 ACRES
APPROXIMATE

WETLAND
±1.8 ACRES
APPROXIMATE

0 30 60 90 120 feet

1" = 30'

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PROJECT ADDRESS

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ROCKLAND, MA 02370

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PROJ. NO.
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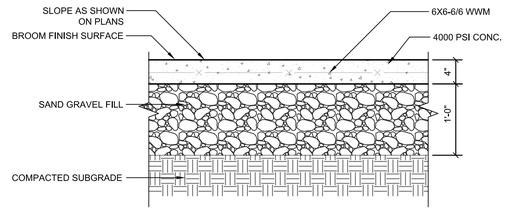
SHEET TITLE
HARDSCAPE PLAN ENLARGEMENT 2

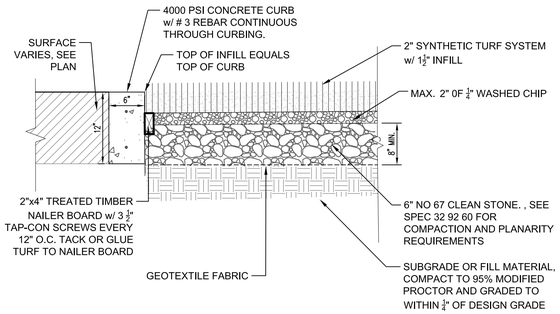
SHEET NO.
L1.2



NOTES:
1. JOINTS SHALL BE TOOLED PER DETAILS AND SHALL BE PLACED AS FOLLOWS UNLESS OTHERWISE NOTED ON THE PLANS.
2. EXPANSION JOINTS SHALL BE 20' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
3. CONTROL JOINTS SHALL BE 5' O.C. UNLESS OTHERWISE NOTED ON THE PLANS.
4. BROOM FINISH SHALL BE PERPENDICULAR TO PEDESTRIAN TRAFFIC FLOW UNLESS OTHERWISE NOTED ON THE PLANS.
5. MAX SLOPE SHALL BE 2%.

1 BROOM FINISH CONCRETE PAVING

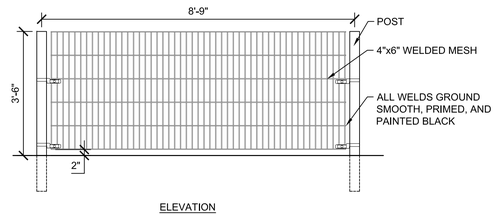
1" = 1'-0"



NOTE:
1. ALL STONE UNDER PLAY TURF SHALL BE WASHED CLEAN AND FREE OF SEDIMENTS.
2. CONTRACTOR SHALL PROVIDE STONE SAMPLES FOR LANDSCAPE ARCHITECTS REVIEW AND APPROVAL PRIOR TO STONE BASE INSTALLATION.

2 PET RUN TURF

1" = 1'-0" P-RE-SHI-01



ELEVATION

NOTES:
1. GUARDRAIL SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS.
2. GUARDRAIL SHALL BE PRIMED AND PAINTED BLACK.
3. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH DETAIL & SPECIFICATIONS.

4 ORNAMENTAL WIRE FENCE

1/2" = 1'-0" P-RE-SHI-07

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R1016

SHEET TITLE

DETAILS

SHEET NO.

LD1.0

PLANT SCHEDULE SITE PLANTING

TREES	QTY	BOTANICAL / COMMON NAME	CONT	CAL	SIZE
	16	Acer rubrum `Autumn Glory` / Autumn Glory Maple	B&B	2"-2.5" Cal.	
	3	Betula populifolia `Whitespire Sr.` / Gray Birch	B&B, Multi-stem		8`-10`
	5	Gleditsia triacanthos inermis `Shademaster` / Shademaster Locust	B&B	2"-2.5" Cal.	
	23	Juniperus virginiana `Canaertii` / Canaerti Juniper	B&B	6/7`	
	7	Pinus strobus / White Pine	B&B	3"Cal	

SHRUBS	QTY	BOTANICAL / COMMON NAME	CONT	SIZE
	12	Aronia melanocarpa `Autumn Magic` / Autumn Magic Black Chokeberry	#3	
	313	Buxus x `Green Mountain` / Green Mountain Boxwood	5 gal	
	36	Clethra alnifolia `Hummingbird` / Hummingbird Summersweet	5 gal	
	16	Cornus sericea `Kelseyi` / Kelseyi Dwarf Redtwig Dogwood	5 gal	
	7	Hydrangea arborescens `Annabelle` / Annabelle Hydrangea	5 gal	
	19	Juniperus chinensis `Blue Point` / Blue Point Juniper	10 gal	
	15	Juniperus chinensis `Hetzii Columnaris` / Hetzi Column Juniper	5`/6` B&B	
	41	Juniperus virginiana `Grey Owl` / Grey Owl Juniper	3 gal	
	11	Kalmia latifolia `Elf` / Dwarf Mountain Laurel	#3	
	61	Spiraea x bumalda `Anthony Waterer` / Anthony Waterer Spiraea	#3	

GRASSES/PERENNIALS	QTY	BOTANICAL / COMMON NAME	CONT	SPACING	SPACING
	75 sf	Calamagrostis x acutiflora `Karl Foerster` / Feather Reed Grass	2 gal		24" o.c.
	228 sf	Panicum virgatum `Heavy Metal` / Heavy Metal Switch Grass	#1		36" o.c.
	1,114 sf	Pennisetum alopecuroides `Hameln` / Hameln Fountain Grass	#1		30" o.c.
	1,996 sf	Pennisetum alopecuroides `Karlay Rose` / Fountain Grass	#1		30" o.c.
	192 sf	Perovskia atriplicifolia `Blue Jean Baby` / Blue Jean Baby Russian Sage	#1		30" o.c.

SEED MIX	QTY	BOTANICAL / COMMON NAME	CONT	SPACING	SPACING
	7,105 sf	Seed Mix / Erosion Control Seed Mix	seed		
	9,866 sf	Wetland Seed Mix New Enland Wetland Plants	seed		

PLANT SCHEDULE RAIN GARDEN AREA 1

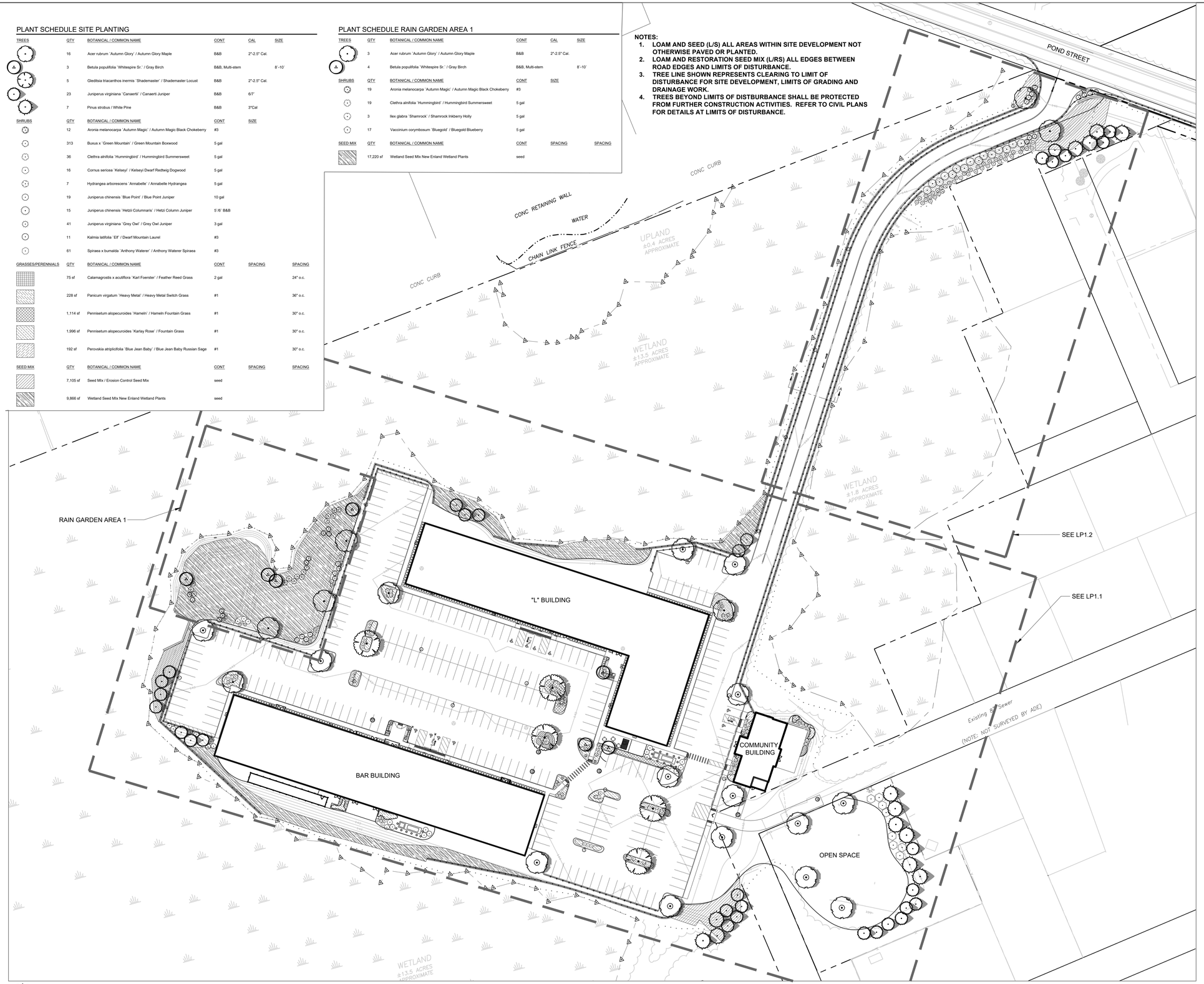
TREES	QTY	BOTANICAL / COMMON NAME	CONT	CAL	SIZE
	3	Acer rubrum `Autumn Glory` / Autumn Glory Maple	B&B	2"-2.5" Cal.	
	4	Betula populifolia `Whitespire Sr.` / Gray Birch	B&B, Multi-stem		8`-10`

SHRUBS	QTY	BOTANICAL / COMMON NAME	CONT	SIZE
	19	Aronia melanocarpa `Autumn Magic` / Autumn Magic Black Chokeberry	#3	
	19	Clethra alnifolia `Hummingbird` / Hummingbird Summersweet	5 gal	
	3	Ilex glabra `Shamrock` / Shamrock Inkberry Holly	5 gal	
	17	Vaccinium corymbosum `Bluegold` / Bluegold Blueberry	5 gal	

SEED MIX	QTY	BOTANICAL / COMMON NAME	CONT	SPACING	SPACING
	17,220 sf	Wetland Seed Mix New Enland Wetland Plants	seed		

NOTES:

1. **LOAM AND SEED (L/S) ALL AREAS WITHIN SITE DEVELOPMENT NOT OTHERWISE PAVED OR PLANTED.**
2. **LOAM AND RESTORATION SEED MIX (L/RS) ALL EDGES BETWEEN ROAD EDGES AND LIMITS OF DISTURBANCE.**
3. **TREE LINE SHOWN REPRESENTS CLEARING TO LIMIT OF DISTURBANCE FOR SITE DEVELOPMENT, LIMITS OF GRADING AND DRAINAGE WORK.**
4. **TREES BEYOND LIMITS OF DISTBURBANCE SHALL BE PROTECTED FROM FURTHER CONSTRUCTION ACTIVITIES. REFER TO CIVIL PLANS FOR DETAILS AT LIMITS OF DISTURBANCE.**



0 50 100 150 200 feet

1" = 50'

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SHEET TITLE

OVERALL PLANTING PLAN

SHEET NO.

LP1.0

RAIN GARDEN AREA 1

LAWN

SEE LP1.2

WETLAND
±1.3 ACRES
APPROXIMATE

RAIN GARDEN AREA
2, SEE LP1.3

WILSON STREET

CEDAR ST

LAWN

WETLAND
±13.5 ACRES
APPROXIMATE

NOTE: REFER TO LP1.0 FOR PLANTING SCHEDULE.

0 30 60 90 120 feet

1" = 30'

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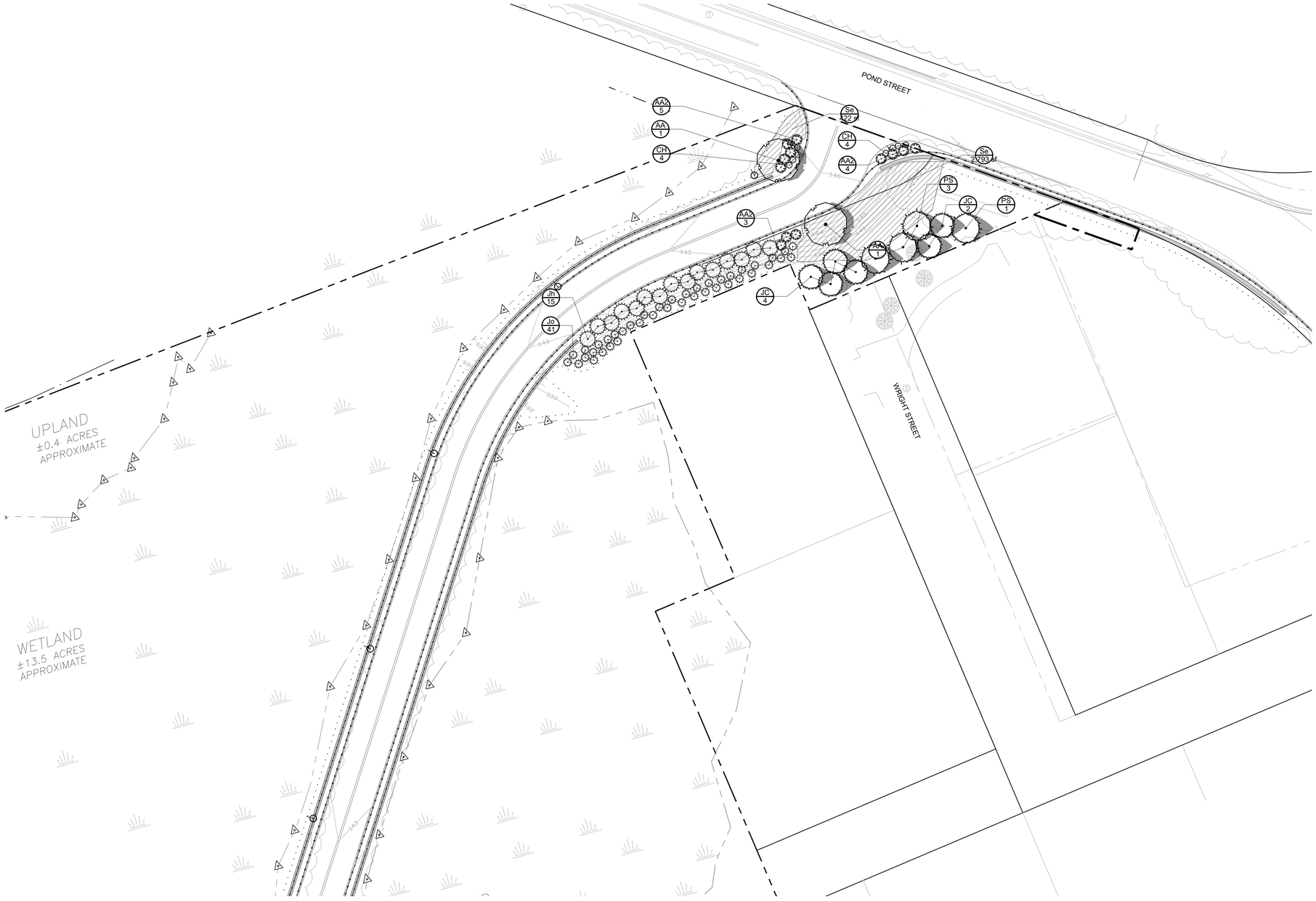
9.15.2020	AS NOTED

PROJ. NO.
R1016

SHEET TITLE

PLANTING
ENLARGEMENT 1

SHEET NO.
LP1.1



NOTE: REFER TO LP1.O FOR PLANTING SCHEDULE.

0 30 60 90 120 feet

1" = 30'

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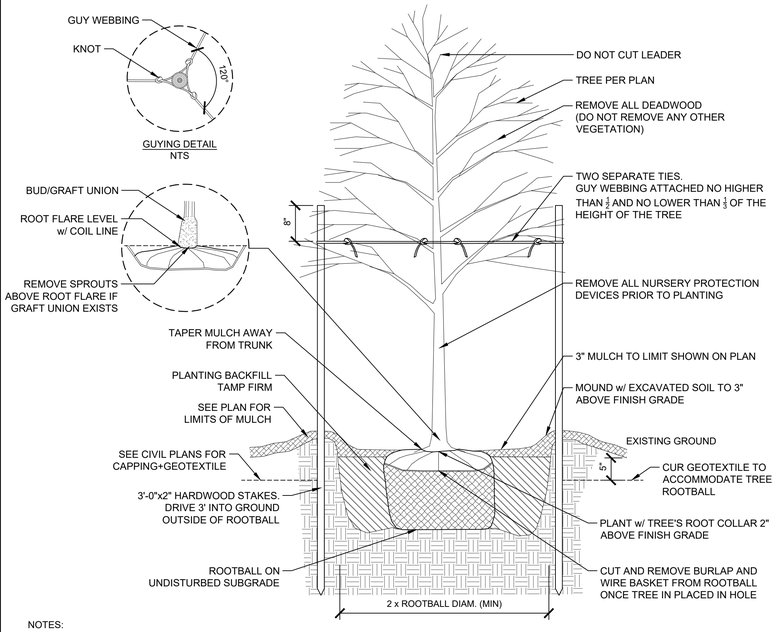
SHEET TITLE

PLANTING
ENLARGEMENT 2

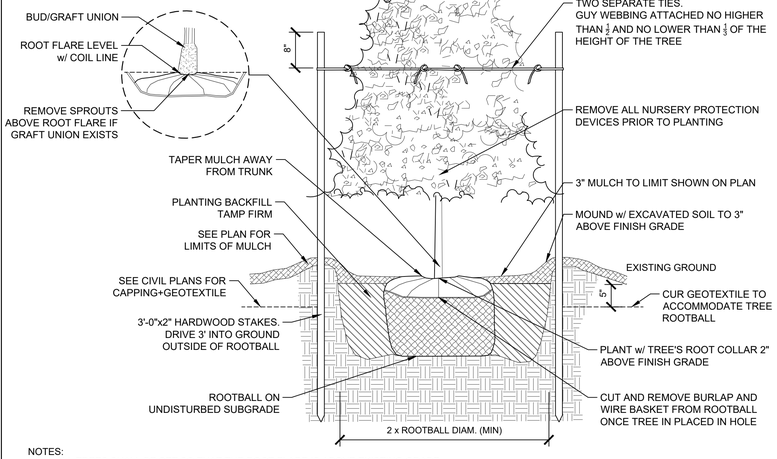
SHEET NO.
LP1.2



NOTES:
1. ALL TREES SHALL BE SET SO THAT THE ROOT FLARE IS ABOVE EXISTING GRADE.
2. AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.
3. ALL TREES NOT LOCATED WITHIN A LARGER MULCHED PLANTING BED SHALL RECEIVE A 5' DIAMETER MULCH BED AROUND THE BASE OF THE TREE. IN NO INSTANCE SHALL MULCH BE PILED UP AROUND THE ROOT FLARE.

1 DECIDUOUS TREE PLANTING AND STAKING

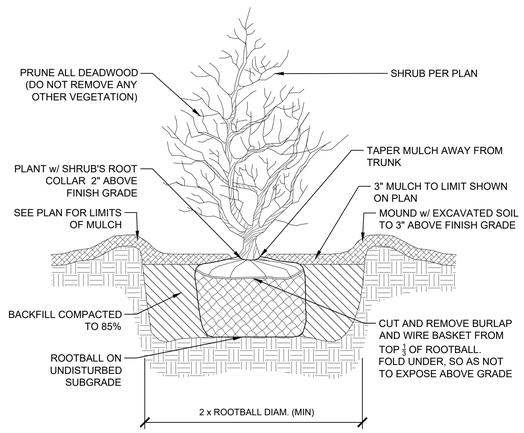
3/4" = 1'-0"



NOTES:
1. ALL TREES SHALL BE SET SO THAT THE ROOT FLARE IS ABOVE EXISTING GRADE.
2. AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.
3. ALL TREES NOT LOCATED WITHIN A LARGER MULCHED PLANTING BED SHALL RECEIVE A 5' DIAMETER MULCH BED AROUND THE BASE OF THE TREE. IN NO INSTANCE SHALL MULCH BE PILED UP AROUND THE ROOT FLARE.

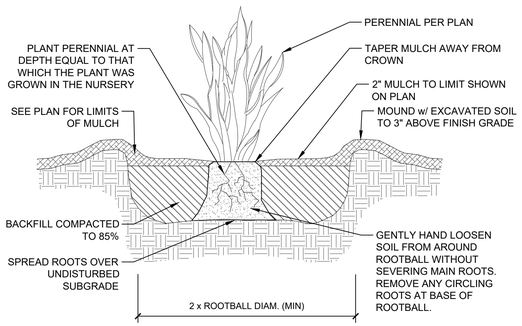
2 EVERGREEN TREE PLANTING AND STAKING

3/4" = 1'-0"



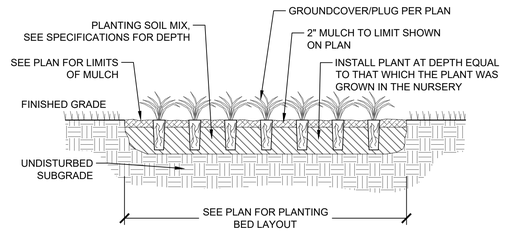
3 SHRUB PLANTING

1" = 1'-0" P-RE-SHI-24



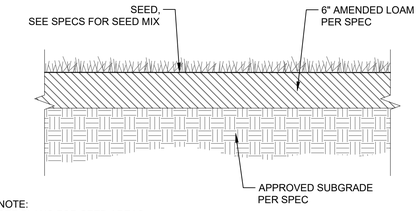
4 GRASS OR PERENNIAL PLANTING

1" = 1'-0"



5 GROUNDCOVER & PLUG PLANTING

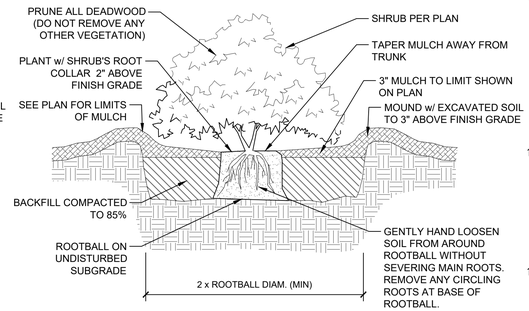
1" = 1'-0" P-RE-SHI-28



NOTE:
SEE PLANS FOR SEED AREAS

6 LOAM & SEED

1" = 1'-0" P-RE-SHI-29



7 CONTAINER GROWN SHRUB PLANTING

1" = 1'-0" P-RE-SHI-04

GENERAL NOTES:

1. All plant material must be tagged in the ground, at the nursery by the Landscape Architect. All plant material shall be commercially obtained and shall meet the American Association of Nurseryman standards for nursery stock, latest edition, and its amendments. Plant only during season normal to the particular variety. All plant inspections will be at the expense of the contractor. Permanent seals will be required.
2. Planting beds shall be excavated to a minimum depth of 12" and new loam and compost (50/50 mix) shall be incorporated into the planting bed to meet surrounding grades unless otherwise noted or detailed. Cover all planting beds with 3" shredded hardwood bark mulch within a seventy-two hour period after planting. See plan for bed layout.
3. All existing and proposed trees shown in lawn areas shall receive a 5' diameter mulch bed. Mulch shall be placed to a depth of 3". Remove all sod, roots, sticks and stones prior to placement of mulch.
4. All plant materials furnished by the contractor shall be guaranteed for a period of one year from final acceptance of landscape work.
5. Stake all trees over 5' as shown on details. Remove stakes at the end of the guarantee period.
6. The contractor is responsible for keeping the site clean of miscellaneous debris throughout the construction period. All waste material is to be disposed of immediately to an off-site location, unless otherwise indicated on the plans.
7. The contractor shall perform all work in accordance with all local, state, and federal regulations, and shall obtain all necessary permits for this project.
8. Loam: Loam moved during the course of construction shall be retained and distributed within the site in accordance with the landscape plan. Stockpiled loam shall not be mixed with any subsoil, noxious weeds or unsuitable materials. All excess loam shall remain on the property of the owner. New loam if required to provide the specified depth, shall be a fertile, friable medium textured sandy loam free of material toxic to healthy plant growth. Loam shall also be free of all stumps, roots, stones and other extraneous matter an inch (1") or greater in diameter. The pH shall be between 6.5 and 7.5. Organic content shall be a minimum of 5%.
9. Lawn Preparation: Remove all debris and other inorganic materials on the prepared subgrade, reshape and dress any damaged or eroded area prior to spreading the loam. Scarify and loosen subgrade in any areas where compaction may have occurred. Spread stockpiled and off-site loam on all disturbed areas to produce a depth of 4" unless otherwise noted on the plans. Fine grade loamed areas to produce a smooth and unbroken finish grade to the required depth. Apply a starter fertilizer (10-20-10) at a rate of 20 lbs. per 1000 square feet and lime at a rate of 40 lbs. per 1000 square feet unless otherwise noted on the plans or in the specifications. Once spread, the fertilizer and lime shall be thoroughly incorporated into the loam. The loam shall be rolled, and depression shall be top dressed and raked to create a smooth surface.
10. Seeding: Seeding shall take place between March 15 and May 31 or August 15 and October 15 only. Seed shall be pure, live, fresh seed from commercial sources meeting and labeled in accordance with State and Federal rules and regulations. The seed mixture shall be as noted on this sheet.

    Seeded areas shall, at a minimum, include all areas of the site that have been disturbed or are barren unless otherwise noted on the plans. Seed shall be applied at the rates indicated per seed mix.
11. Protection of Existing Plantings: Maximum effort should be made to save tree or other plant specimens which are large for their species, rare to the area, or of special horticultural or landscape value. Contact owner/landscape architect before removing any specimen of this type unless otherwise noted on the plans. No material or temporary soil deposits shall be placed within the drip line of shrubs or trees designated on the landscape plan to be retained. Protective barriers are to be installed around each plant and/or group of plants that are to remain on the site. Barriers shall not be supported by the plants they are protecting, but shall be self supporting. They shall be of minimum of four feet (4') high and constructed of a durable material, such as snow or silt fence, that will last until construction is completed.
12. Pruning: The contractor shall employ a certified arborist to prune any existing roots or branches carefully prune branches in the way of construction by using only approved methods and tools. The use of axes for trimming or spurs for climbing will not be permitted.
13. Existing Utilities: In accordance with Dig-Safe law (1-800-225-4977), the contractor shall contact all applicable utility companies and verify utility line locations. The contractor shall be solely responsible for any/all utility damage. Record locations of Dig-Safe utility line markings on project record documents.
14. Disturbed Areas: Any areas disturbed during the course of construction are to be restored to original (or better) condition by contractor before completion of the project, and are subject to approval by landscape architect and owner. All grass areas disturbed during construction shall be york raked to remove stones and loamed and seeded as per specifications.
15. Layout: All notes and dimensions are typical unless otherwise noted. All dimensions are square (parallel or perpendicular) unless otherwise noted. The contractor shall notify the owner/owner's representative immediately in the event of any discrepancies found in the contract documents and/or in the field, or of conditions uncovered in the work which are not reflected in the plans.
16. Drainage Systems: Contractor is responsible for general clean-out of all catch basins, manholes, and/or other drainage features on the site which have accumulated sediment as a result of construction activities.
17. Cleaning: Contractor is responsible for keeping site clean of miscellaneous debris throughout the construction period. All waste material is to be disposed of immediately to an off-site location, unless otherwise indicated on the plan.

TRAVERSE
landscape architects
150 Chestnut Street, 4th Floor
Providence, RI 02903

STAMP

PROJECT NAME

SHINGLE MILL

PROJECT ADDRESS

0 POND STREET
ROCKLAND, MA 02370

NO.	REVISIONS	DATE

SUBMITTAL	DATE
ZBA HEARING #3	

DRAWN BY:	CHECKED BY:
JL	AI
DATE ISSUED:	SCALE:
9.15.2020	AS NOTED

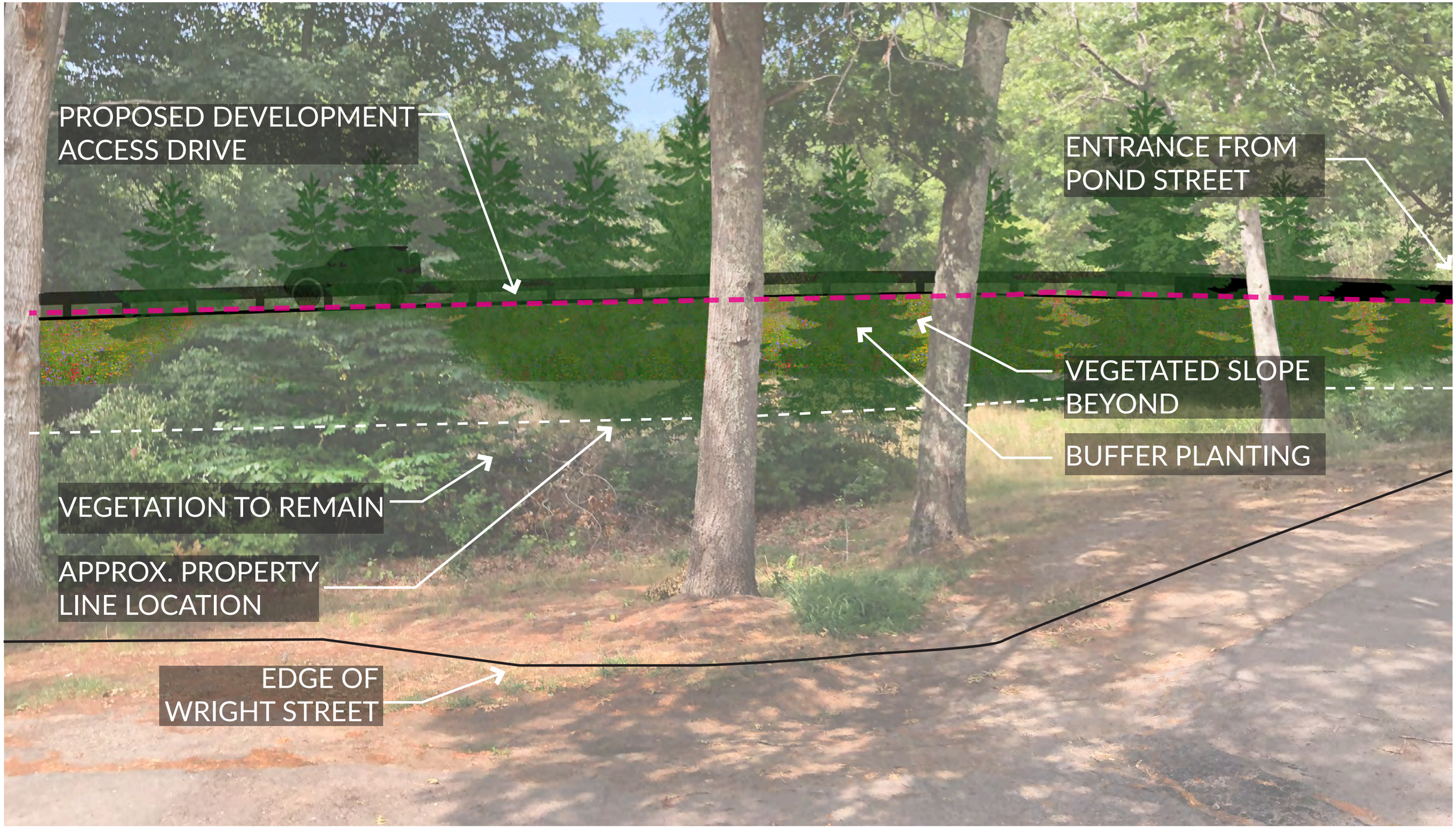
PROJ. NO.
R1016

SHEET TITLE
PLANTING DETAILS

SHEET NO.
LP1.3

Exhibit 14

Abutter Landscape Rendering



ABUTTERS VIEW FROM WRIGHT STREET - LANDSCAPE RENDERING #1 9.15.2020

Exhibit 15

Exterior Light Fixture Cut Sheets

HADCO by signify

Urban

Prima

CXF6 Pendant

Project:

Location:

Cat.No:

Type:

Lamps: Qty:

Notes:

The Hadco Pima pendant family offers a simple modern take on the traditional pendant lantern, providing style and elegance to downtown areas, commercial developments, parks and residential communities. These pendants use the latest LED technology which maximizes energy savings and provides uniform and comfortable light.

Ordering guide: **Example: CXF6-32-G2-A-A-2-W-A-3-DA-AST-SP2-N**

Series	LED's	Generation	Mounting	Finish	Optics	CCT	Voltage	Drive current
CXF6		G2						
CXF6 Swan	**32**[1] 32 LEDs **48** 48 LEDs **64** 64 LEDs **80**[2] 80 LEDs	**G2**	**A** Side arm **T** Top arm **W** Wall mount	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green	**2** Type II **3** Type III **4** Type IV **5** Type V	**W** 3000K **N** 4000K	**A** 120-277 VAC **B**[1,3] 347-480 VAC	**3** 350mA **5** 530 mA **7**[2] 700mA

Footnotes

1. 32 LED at 350mA and 530mA are not compatible with 347-480V.
2. Can't use 700mA with 80LED's.
3. 347-480V not compatible with optional dimming or optional programming.

Ordering guide (continued)

	Optional programs				
Optional dimming	1st option	2nd option	3rd option	Surge protection	Luminaire options
DA 4 Hrs 25% Reduction **DB** 4 Hrs 50% Reduction **DC** 4 Hrs 75% Reduction **DD** 6 Hrs 25% Reduction **DE** 6 Hrs 50% Reduction **DF** 6 Hrs 75% Reduction **DG** 8 Hrs 25% Reduction **DH** 8 Hrs 50% Reduction **DJ** 8 Hrs 75% Reduction **DALI** Compatible with DALI **N** No dimming	**AST** Adjustable start up **N** No 1st option	**CLO** Constant light output **N** No 2nd option	**OTL** Over the life **N** No 3rd option	**SP1** 10kV/20kA **SP2** 20Vk/20kA	**H** House side shield **N** No options

CXF6 Prima

Pendant

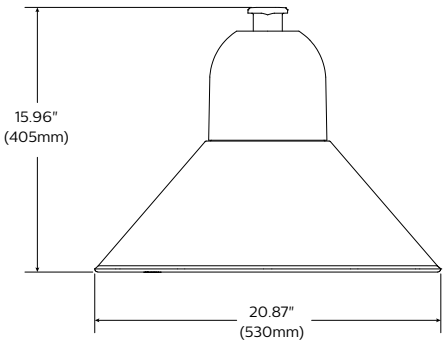
Dimensions

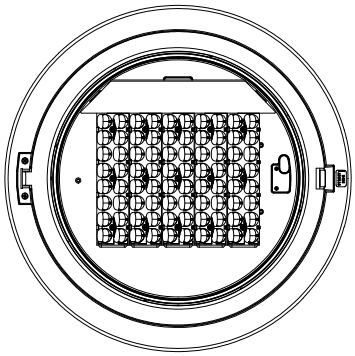
Width: 21" diameter

Height: 16-1/2"

EPA: 0.93 sq. ft

Weight: 27 lbs (12.25 kg) *(maximum)*





Predicted Lumen Depreciation Data

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L_{70} is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L_{70} hours limited to 6 times actual LED test hours.

Ambient Temperature °C	Driver mA	Calculated L_{70} Hours	L_{70} per TM-21	Lumen Maintenance % at 60,000 hrs
25°C	700 mA	>100,000 hours	>60,000 hours	>87%

LED Wattage and Lumen Values: Pima CXF6

4000K

Ordering Code	Total LEDs	LED Current (mA)	Average System Watts[1]	Color Temp.	Type 2 Delivered Lumens[2]	Type 2 Efficacy (LPW)	Type 2 BUG Rating	Type 3 Delivered Lumens[2]	Type 3 Efficacy (LPW)	Type 3 BUG Rating	Type 4 Delivered Lumens[2]	Type 4 Efficacy (LPW)	Type 4 BUG Rating	Type 5 Delivered Lumens[2]	Type 5 Efficacy (LPW)	Type 5 BUG Rating
CXF632-G2-N3-16	32	350	35	4000K	4,134	117	B1-U0-G1	4,012	114	B1-U0-G1	3,913	111	B1-U0-G1	3,803	108	B3-U0-G1
CXF632-G2-N5-16	32	530	51	4000K	5,850	114	B1-U0-G1	5,678	111	B1-U0-G1	5,537	108	B1-U0-G1	5,381	105	B3-U0-G1
CXF632-G2-N7-16	32	700	71	4000K	7,671	109	B2-U0-G1	7,445	106	B1-U0-G2	7,260	103	B1-U0-G2	7,055	100	B3-U0-G2
CXF648-G2-N3-16	48	350	52	4000K	5,994	116	B1-U0-G1	5,818	113	B1-U0-G1	5,673	110	B1-U0-G2	5,514	107	B3-U0-G1
CXF648-G2-N5-16	48	530	75	4000K	8,483	113	B2-U0-G2	8,232	110	B2-U0-G2	8,028	107	B2-U0-G2	7,802	104	B3-U0-G2
CXF648-G2-N7-16	48	700	103	4000K	11,122	108	B2-U0-G2	10,794	104	B2-U0-G2	10,526	102	B2-U0-G2	10,230	99	B4-U0-G2
CXF664-G2-N3-16	64	350	68	4000K	7,602	112	B2-U0-G1	7,378	108	B1-U0-G2	7,195	106	B1-U0-G2	6,993	103	B3-U0-G2
CXF664-G2-N5-16	64	530	99	4000K	10,758	109	B2-U0-G2	10,441	105	B2-U0-G2	10,182	103	B2-U0-G2	9,895	100	B4-U0-G2
CXF664-G2-N7-16	64	700	137	4000K	14,106	103	B3-U0-G2	13,690	100	B2-U0-G2	13,350	98	B2-U0-G2	12,974	95	B4-U0-G2
CXF680-G2-N3-16	80	350	87	4000K	10,214	117	B2-U0-G2	9,913	114	B2-U0-G2	9,667	111	B2-U0-G2	9,394	108	B4-U0-G2
CXF680-G2-N5-16	80	530	127	4000K	14,453	114	B3-U0-G2	14,027	111	B2-U0-G2	13,679	108	B2-U0-G2	13,294	105	B4-U0-G2

1. System input wattage may vary based on input voltage, by up to +/- 10% , and based on manufacturer forward voltage, by up to +/- 8%.
2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

Note: Some data may be scaled based on tests of similar, but not identical, luminaires.

CXF6 Prima

Pendant

LED Wattage and Lumen Values: Pima CXF6

3000K

Ordering Code	Total LEDs	LED Current (mA)	Average System Watts[1]	Color Temp.	Type 2 Delivered Lumens[2]	Type 2 Efficacy (LPW)	Type 2 BUG Rating	Type 3 Delivered Lumens[2]	Type 3 Efficacy (LPW)	Type 3 BUG Rating	Type 4 Delivered Lumens[2]	Type 4 Efficacy (LPW)	Type 4 BUG Rating	Type 5 Delivered Lumens[2]	Type 5 Efficacy (LPW)	Type 5 BUG Rating
CXF632-G2-W3-16	32	350	35	3000K	3,618	103	B1-U0-G1	3,511	100	B1-U0-G1	3,424	97	B1-U0-G1	3,395	96	B2-U0-G1
CXF632-G2-W5-16	32	530	51	3000K	5,119	100	B1-U0-G1	4,968	97	B1-U0-G1	4,845	95	B1-U0-G1	4,708	92	B3-U0-G1
CXF632-G2-W7-16	32	700	71	3000K	6,712	95	B2-U0-G1	6,514	92	B1-U0-G1	6,352	90	B1-U0-G2	6,176	88	B3-U0-G1
CXF648-G2-W3-16	48	350	52	3000K	5,245	102	B1-U0-G1	5,090	99	B1-U0-G1	4,964	96	B1-U0-G1	4,824	94	B3-U0-G1
CXF648-G2-W5-16	48	530	75	3000K	7,422	99	B2-U0-G1	7,203	96	B1-U0-G2	7,025	94	B1-U0-G2	6,827	91	B3-U0-G2
CXF648-G2-W7-16	48	700	103	3000K	9,732	94	B2-U0-G2	9,445	91	B2-U0-G2	9,210	89	B2-U0-G2	8,951	87	B3-U0-G2
CXF664-G2-W3-16	64	350	68	3000K	6,652	98	B2-U0-G1	6,456	95	B1-U0-G1	6,296	92	B1-U0-G2	6,118	90	B3-U0-G1
CXF664-G2-W5-16	64	530	99	3000K	9,413	95	B2-U0-G2	9,136	92	B2-U0-G2	8,909	90	B2-U0-G2	8,658	87	B3-U0-G2
CXF664-G2-W7-16	64	700	137	3000K	12,342	90	B2-U0-G2	11,978	88	B2-U0-G2	11,681	86	B2-U0-G2	11,352	83	B4-U0-G2
CXF680-G2-W3-16	80	350	87	3000K	8,937	103	B2-U0-G2	8,673	100	B2-U0-G2	8,458	97	B2-U0-G2	8,220	94	B3-U0-G2
CXF680-G2-W5-16	80	530	127	3000K	12,647	100	B2-U0-G2	12,274	97	B2-U0-G2	11,969	94	B2-U0-G2	11,632	92	B4-U0-G2

Specifications:

Housing

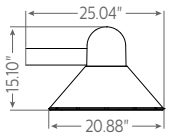
In a round shape, this housing is constructed of low copper die-cast aluminum and 0.090" thick spun aluminum. All non-ferrous fasteners prevent corrosion and ensure longer life.

Access-mechanism

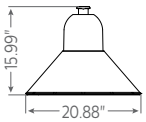
The hinged lens frame is cast aluminum with a stainless steel spring latch for tool-less access

Mounting

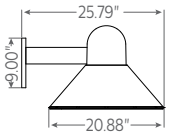
A: Side arm mount



T: Top arm mount



W: Wall mount



Light engine

LEDgine is composed of five main components: **Heat Sink, Lens, LED lamp, Optical System, and Driver.**
Electrical components are RoHS compliant.

LED module

LED type Lumileds LUXEON T. Composed of high-performance white LEDs. Color temperature as per ANSI/NEMA bin Neutral White, 4000 Kelvin nominal (3985K +/- 275K or 3710K to 4260K) or Warm White, 3000 Kelvin nominal (3045K +/- 175K or 2870K to 3220K), CRI 70 Min.

Heat sink

Made of cast aluminum optimizing the LEDs efficiency and life. Product does not use any cooling device with moving parts (only passive cooling device).

Finish

Color in accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils / 24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 2000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

Optical system

(**2**) Type II, (**3**) Type III, (**4**) Type IV and (**5**) Type V are composed of high performance optical grade PMMA acrylic refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Optical system is rated IP66. Performance shall be tested per LM 63, LM 79 and TM 15 (IESNA) certifying its photometric performance. Street side indicated.

CXF6 Prima

Pendant

Specifications (continued)

Driver

Driver comes standard with dimming compatible 0-10V. High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. Maximum ambient operating temperature from 40˚F (4˚C) to 130˚F (55˚C). Certified in compliance to UL1310 cULus requirement (dry and damp location). Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221˚F (105˚C). The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

Driver options

Optional programming 1
AST: Pre-set driver for progressive start-up of the LED module(s) to optimize energy management and enhance visual comfort at start-up.

Optional programming 2
CLO: Pre-set driver to manage the lumen depreciation by adjusting the power given to the LEDs offering the same lighting intensity during the entire lifespan of the LED module.

Optional programming 3
OTL: Pre-set driver to signal end of life of the LED module(s) for better fixture management.

Dimming options

DA: 4 Hrs 25% Reduction
DB: 4 Hrs 50% Reduction
DC: 4 Hrs 75% Reduction
DD: 6 Hrs 25% Reduction
DE: 6 Hrs 50% Reduction
DF: 6 Hrs 75% Reduction
DG: 8 Hrs 25% Reduction
DH: 8 Hrs 50% Reduction
DJ: 8 Hrs 75% Reduction
DALI: Pre-set driver compatible with the DALI logarithmic control system.

Surge protection

Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA.

Wiring

Gauge 18 wires. Top mount option come with quick disconnects. Arm mount options provide a 6" Minimum exceeding from luminaire.

Hardware

All non-ferrous fasteners prevent corrosion and ensure longer life.

Luminaire useful life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, using LM-80 data from LED manufacturers and engineering prediction methods, the luminaire useful life is expected to reach 100,000+ hours with >L70 lumen maintenance @ 25˚C. (48 LED and 64 LED@700mA is 82,000) Luminaire useful life accounts for LED lumen maintenance and additional factors, including LED life, driver life, PCB substrate, solder joints on/off cycles and burning hours for nominal applications.

LED products manufacturing standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product

Quality control

The manufacturer must provide a written confirmation of its ISO 9001 2008 and ISO 14001 2004 International Quality Standards Certification.

Vibration resistance

Meets the ANSI C136.31 2001, American National Standard for Roadway Luminaire Vibration specifications for normal Applications.

Certifications and Compliance

cETL listed to Canadian safety standards for wet locations. Manufactured to ISO 9001:2008 Standards. UL8750 and UL1598 compliant. ETL listed to U.S. safety standards for wet locations. cETL listed to Canadian safety standards for wet locations. LM80 & LM79 tested. IP Rating: The LED optics chamber is IP66 rated. The LED driver is IP66 rated. Pima LED luminaires are DesignLights Consortium qualified.

Warranty

5 year extended warranty.

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Somerset, NJ 08873
Telephone 855-486-2216

Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008

Date: _____ Customer: _____

Project: _____

Type: _____ Qty: _____

selux

Inula Bollard LED

Order Code: IBL - _____ - _____ - _____ - _____ - _____ - _____ - _____

IBL									
	Series	**IBL** Inula Bollard LED							
_____	Height	**1.5** 1.5'. (consult factory)	**2** 2' (consult factory)	**2.5** 2.5'	**3** 3'	**3.5** 3.5'	**4** 4'		
_____	Light Engine	**1Q**[1] 7.6w/577 lm	**2Q90** 14.1w/1156lm	**2Q180** 14.1w/1156 lm	**3Q** 20.5w/1689 lm	**4QS** 27.2w/2246 lm	**4QD** 27.2w/2246 lm		
_____	CCT	**AM**[2] Amber	**30**[2] 3000K	**40** 4000K	**50** 5000K				
_____	Finish	**WH** White	**BK** Black	**BL** Semi-Matte Black	**BZ** Bronze	**SV** Silver	**SP** Specify Premium Color		
_____	Voltage	**UNV** 120-277V	**120** 120V	**208** 208V	**240** 240V	**277** 240V	**347**[3] 347V	**480**[3] 480V	
_____	Options	**DM** Dimming (0-10V)	**HL30**[4,7,10,12] Hi-Lo Switching 100-30%	**REC**[5,6,17] GFCI Receptacle with weather-proof cover	**REC2**[5,6,17] GFCI Receptacle with padlockable in-use cover	**REC3**[17] USB & Duplex Receptacle with weather-proof cover	**REC4**[17] USB & Duplex Receptacle with-weatherproof padlockable in-use cover		
		EM[8,9,13] Emergency Battery Pack -20C	**PC**[11] Photocell	**LP**[12, 14, 15] Lower Power Version Decreases Light Output by 60%	**HP**[12] High Power Version Increases Light Output by 100%				

*Based on 5000K CCT, 120-277V
[1]Not available with EM

[2]IDA Approved
For other CCT please consult factory

*50 or 60 Hertz
[3] Requires step down transformer, 60 Hertz Only

[4]120-277V Only
[5]120V Only
[6]Not available in 2.5' height
[7]Not available at 208V.
[8]Not available with IQ
[9]120V or 277V only
[10]Not available with DM Option
[11]Not available at 480V
[12]Not available with EM option
[13]Not available with PC or LP option
[14]Not available with HL30 or HP options
[15]For 1Q, 2Qxx and 3Q please consult factory
[16] Not available with HL30
[17] See page 6 for details

Product Modifications

Please list modification requirements for review by factory:

Approvals

Date:

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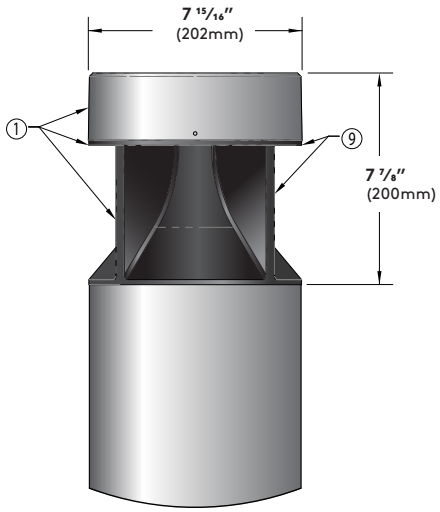
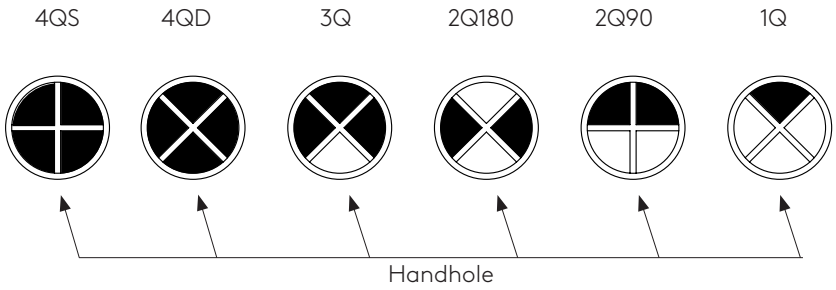
In a continuing effort to offer the best product possible, we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Specification sheets found at www.selux.us are the most recent versions and supercede all other printed or electronic versions.

IBL



Net Weight (35lbs)

LED Light Engine Distribution Guide



Specifications

1. Fixture Housing - Die cast low-copper and low-iron aluminum fixture body provide corrosion resistance in marine environments.

2. Gasketing - (not shown) Continuous gaskets provide weather-proofing, dust, and insect control between castings.

3. LED Light Engine - (not shown) High efficiency LED light engine equipped with brand-name LEDs, available in 3000K, 4000K, 5000K CCT tolerance within a 3-step MacAdams ellipse, and Amber CCT. Suitable for max ambient temperatures up to 45°C.

4. Optics - (not shown) Proprietary vandal and UV resistant acrylic optic provides optimal light blending between quadrants.

5. Surge Protector - (not shown) Designed to protect luminaire from electrical surge (20kA).

6. Hi-Lo Switching Option - (not shown) Controlled switching between 100% and 30% power. See wiring diagrams for additional details.

7. Low Power Option - (not shown) 60% decrease in Lumen output in same physical package.

8. High Power Option - (not shown) 100% increase in Lumen output in same physical package.

9. Light Chamber - Castings around Light Engine are painted with special matte black light absorbing powder coat paint. Meets International Dark-Sky Association (IDA) requirements B0, U0, and G0 BUG ratings at 3000K CCT. Powers 2Q90, 2Q180, 3Q, or 4Q configurations (refer to lumen matrix on page 3).

10. Low-Temperature Emergency Battery Pack Option - (not shown) Provide 90 minutes of constant-power egress lighting when external power is lost. -20˚C to +55˚C ambient temperature operation.

Exterior Luminaire Finish - Selux utilizes a high quality Polyester Powder Coating. All Selux luminaires and poles are finished in our Tiger Drylac certified facility and undergo a five stage intensive pretreatment process where product is thoroughly cleaned, phosphated and sealed. Selux powder coated products provide excellent salt and humidity resistance as well as ultraviolet resistance for color retention. All products are tested in accordance with test specifications for coatings from ASTM and PCI.

Standard exterior colors are White (WH), Black (BK), Semi-Matte Black (BL), Bronze (BZ), and Silver (SV). Selux premium colors (SP) are available, please specify from your Selux color selection guide.

5 Year Limited LED Luminaire Warranty - Selux offers a 5 Year Limited Warranty to the original purchaser that the Inula Bollard LED luminaire shall be free from defects in material and workmanship for up to five (5) years from date of shipment. This limited warranty covers the LED driver and LED array when installed and operated according to Selux instructions. For details, see "Selux Terms and Condition of Sale."

Listings and Ratings: Tested to INRTL Wet Location and IESNA LM-79-08 standards. LED tested to LM-80 standards.

Luminaire tested to IK10 standard, IDA Approved and Lighting Facts Certified.

Luminaire and LED tested at 25°C (77°F) ambient temperature.

LED LIFE - LED light engine provides a reported lumen maintenance of 93% at 36,000 hours. L70 calculated greater than 100,000 hours. NRTL Listed (i.e. UL, CSA)

Visit selux.us for our LED End of Life recycling policy.

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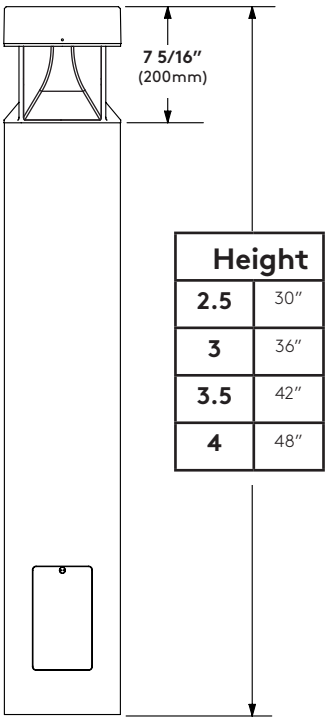
In a continuing effort to offer the best product possible, we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Specification sheets found at www.selux.us are the most recent versions and supercede all other printed or electronic versions.

selux

Lumen Matrix

ELECTRICAL SPECIFICATIONS at 120VAC-277VAC (at 347-480VAC)																
Light Engine		**4QD/4QS**				**3Q**				**2Q180/2Q90**				**1Q**			
LED CCT		**3000K**	**4000K**	**5000K**	**AMBER**	**3000K**	**4000K**	**5000K**	**AMBER**	**3000K**	**4000K**	**5000K**	**AMBER**	**3000K**	**4000K**	**5000K**	**AMBER**
Standard Power	**Delivered Lumens (lm)**	2101		2246	464	1580		1689	349	1083		1156	239	540		577	119
	Wattage (W)	27.2 (29.6)			20.7 [22.6]	20.5 (22.3)			15.6 [17.0]	14.1 [15.4]			10.6 [11.6]	7.6 (8.3)			5.6 [6.2]
	Efficacy (lm/W)	77.2 (71.0)		82.6 (75.9)	22.4 [75.9]	77.1 [70.9]		82.4 (75.7)	22.4 [20.5]	76.8 (70.3)		82.0 (75.1)	22.5 [20.6]	71.1 (65.1)		75.9 (69.5)	21.3 [19.2]
High Power (HP) Option	**Delivered Lumens (lm)**	4202		4492	N/A	3160		3378	N/A	2166		2312	N/A	1080		1155	N/A
	Wattage (W)	54.4 [59.2]				41.0 [44.6]				28.2 [30				15.2 [16.6]			
	Efficacy (lm/W)	77.2 (67.8)		82.6 (75.9)		77.1 (70.9)		82.4 (75.7)		76.8(70.3)		82.0 (75.1)		71.1 (65.1)		75.9 (69.5)	
EM Option	**Delivered Lumens (lm)**	2501		2674	N/A	1881		2011	N/A	1289		1376	N/A				

Profiles IBL-XX-4QD



Height	
2.5	30"
3	36"
3.5	42"
4	48"

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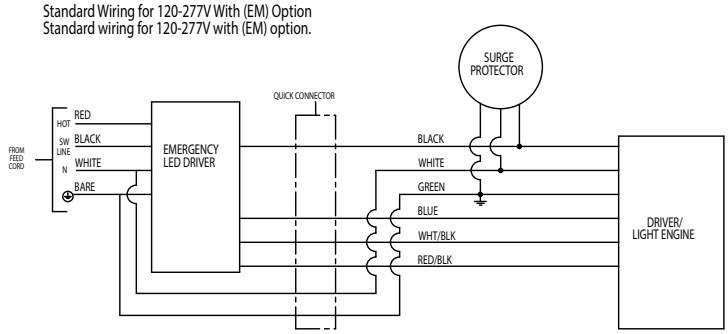
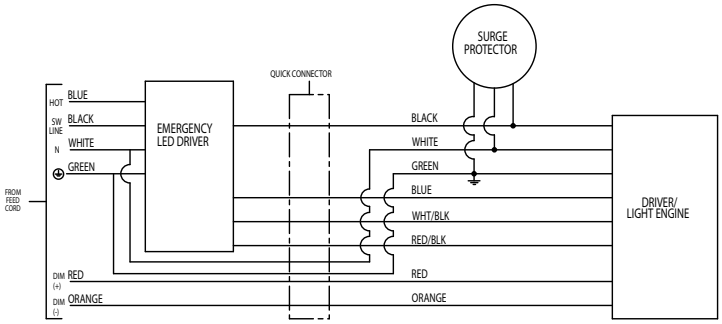
Wiring

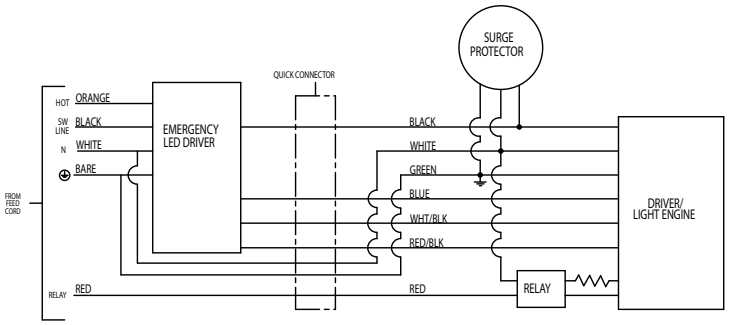
Standard Wiring for 120-277V With (EM) Option
Standard wiring for 120-277V with (EM) option.



0-10V Dimming Option (DM) Wiring for 120-277V With (EM) Option
100% light output at 10V, down to 1% light output at 0V.



Hi-Lo Switching Option (HL30) Wiring With (EM) Option
120/240/277V. When red is energized, light output will be at "Lo" level.



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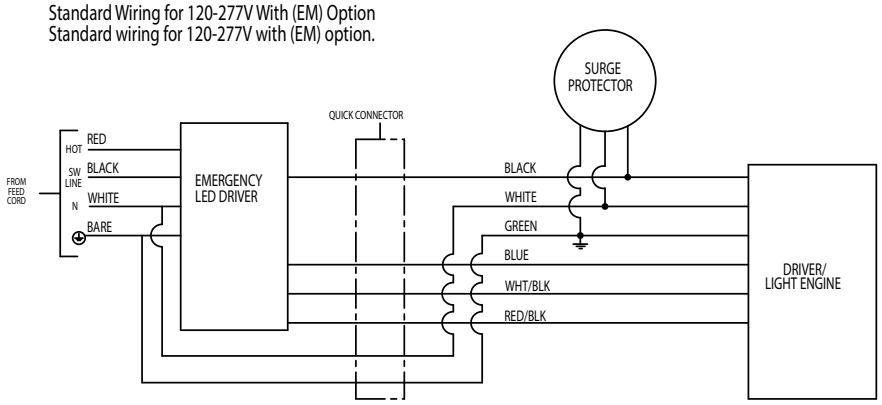
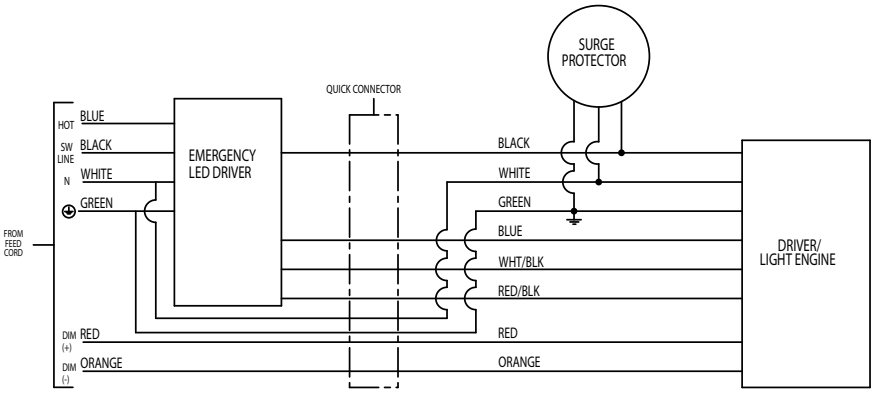
Wiring

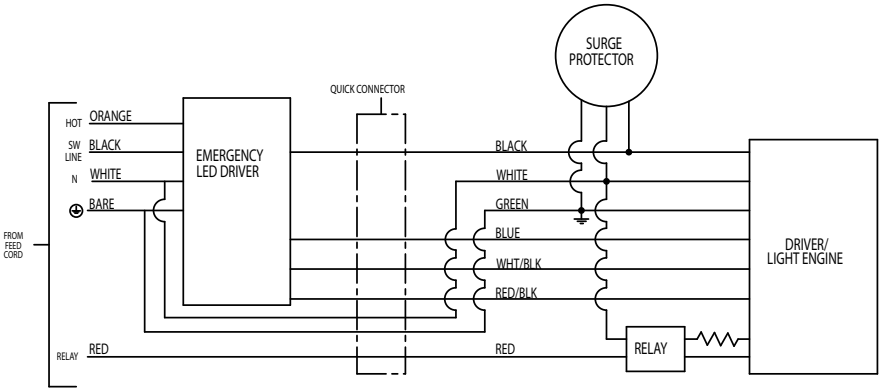
Standard Wiring for 120-277V With (EM) Option
Standard wiring for 120-277V with (EM) option.



0-10V Dimming Option (DM) Wiring for 120-277V With (EM) Option
100% light output at 10V, down to 1% light output at 0V.

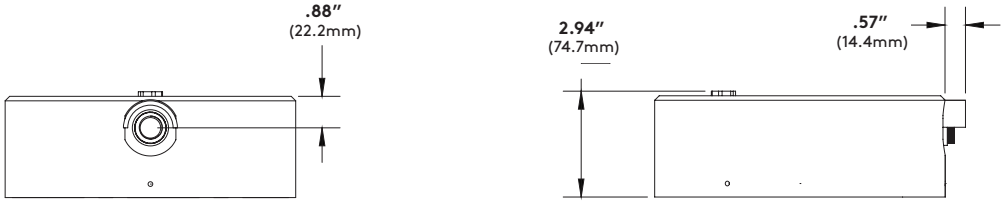


Hi-Lo Switching Option (HL30) Wiring With (EM) Option
120/240/277V. When red is energized, light output will be at "Lo" level.

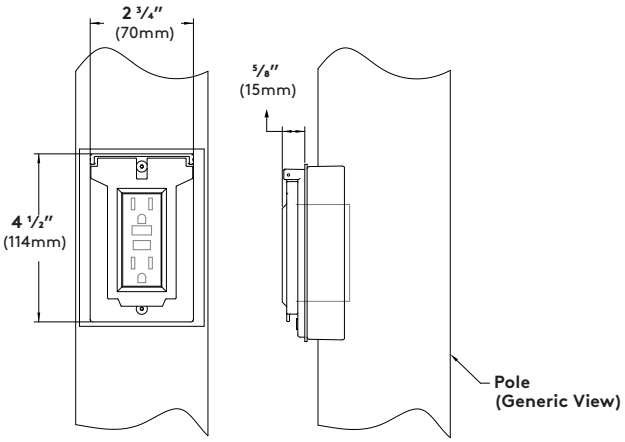


Optional Accessories

Photo Cell (PC) - Integrated in top cap for 360° of orientation adjustment in the field.

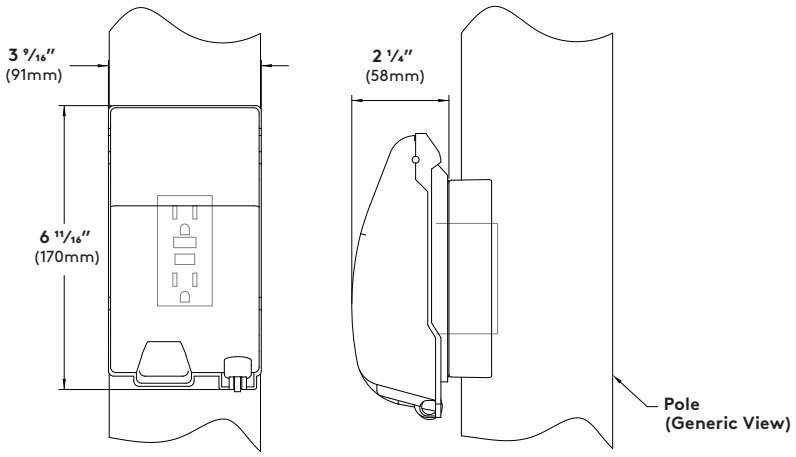


REC and REC3



Cover shown in the closed position

REC2 and REC4



Cover shown in the closed position

GFCI Receptacle (REC) - 120V 15A GFCI duplex receptacle with weather-proof, self-closing cover; located 18" (457mm) from base of pole, inline with handhole. Receptacle is intended only for portable tools or other portable equipment to be connected to outlet only when attended by operating personnel (120V only).

USB & Duplex Receptacle (REC3) (not shown) - 120V 15A duplex receptacle with USB combination ports. (1) type A and (1) type C high power 5 Amp, 5 Volt USB outlets.
With weather-proof, self-closing cover; located 18" (457mm) from base of pole, inline with handhole. Receptacle is intended only for portable tools or other portable equipment to be connected to outlet only when attended by operating personnel. REC3 does not incorporate GFCI (Ground Fault Circuit Interrupter) protection, and shall be powered by a GCFI protected branch circuit (by others).

GFCI Receptacle (REC2) - 120V 15A GFCI duplex receptacle with weather-proof, self-closing, padlockable in-use cover; located 18" (457mm) from base of pole, inline with handhole. Receptacle is intended only for portable tools or other portable equipment to be connected to outlet only when attended by operating personnel (120V only).

USB & Duplex Receptacle (REC4) (not shown)- 120V 15A duplex receptacle with USB combination ports. (1) type A and (1) type C high power 5 Amp, 5 Volt USB outlets.
With weather-proof, self-closing padlockable in-use cover; located 18" (457mm) from base of pole, inline with handhole. Receptacle is intended only for portable tools or other portable equipment to be connected to outlet only when attended by operating personnel. REC4 does not incorporate GFCI (Ground Fault Circuit Interrupter) protection, and shall be powered by a GCFI protected branch circuit (by others).

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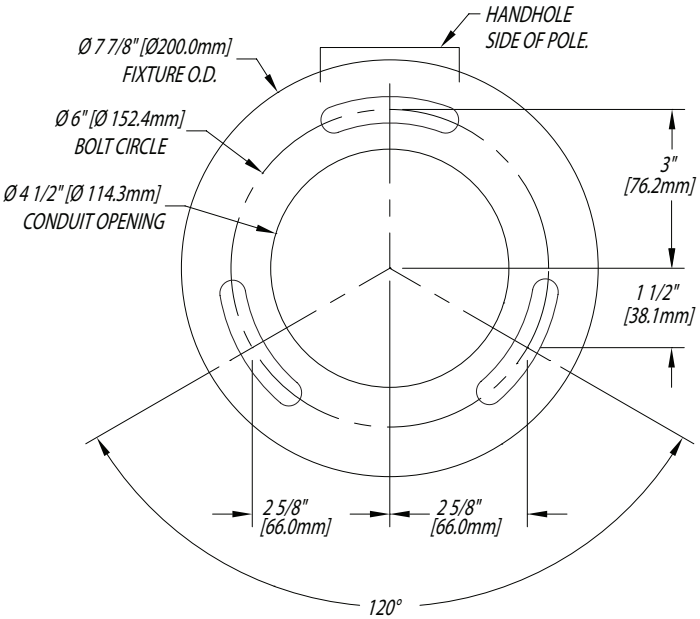
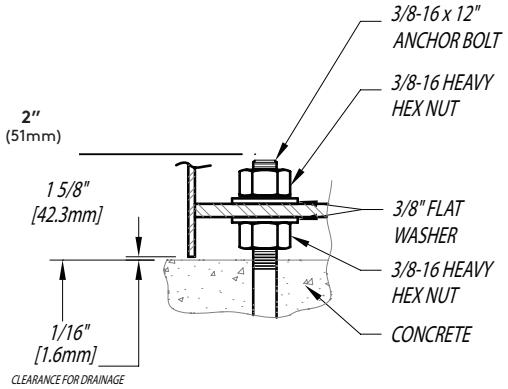
Mounting Information

NOTES:

1. BOLLARD ORIENTATION IS CRITICAL, ROD AND HAND HOLE LOCATIONS ARE CRITICAL.
2. LOCATE SINGLE BOLT AT HAND HOLE LOCATION.
3. ADEQUATE DRAINAGE MUST BE PROVIDED IN CONCRETE FOUNDATION.
4. CONDUIT SHOULD BE STUBBED UP ABOVE THE CONCRETE FOOTING.





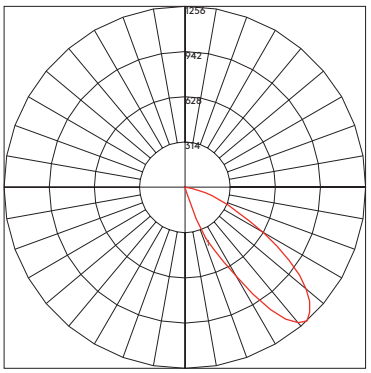
BOLT CIRCLE DETAIL (NOT TO SCALE)

USE CAUTION WHEN SETTING ANCHOR BOLTS. BOLTS MUST BE VERTICALLY STRAIGHT AND CENTERED ON DIMENSIONS SHOWN.

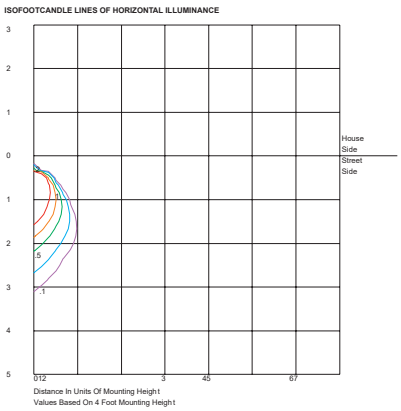
Photometry

1Q / 8W LED / 5000K CCT

Catalog #: IBL-X-1Q-50-XX-120-DS
Report #: 1197031-50
Maximum candela of 1256 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
577 Delivered Lumens
75 Lumens per Watt
B0-U0-G0

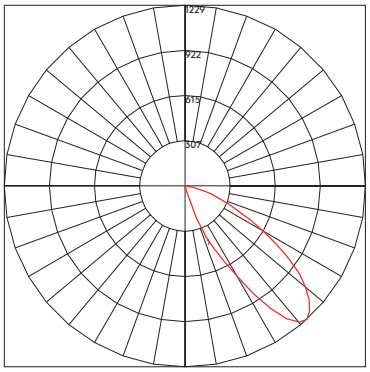


Maximum Candela = 1255.772 Located At Horizontal Angle = 315, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (315 - 135) (Through Max. Cd.)

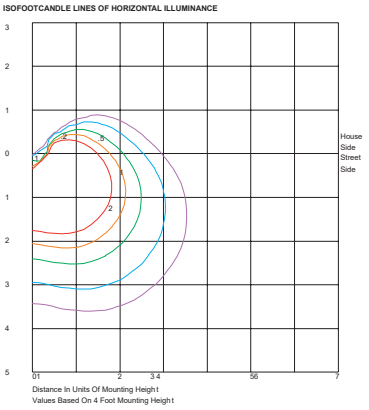


2Q90 / 14W LED / 5000K CCT

Catalog #: IBL-X-2Q90-50-XX-120-DS
Report #: 1197029-50
Maximum candela of 1229 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
1158 Delivered Lumens
82 Lumens per Watt
B0-U0-G0

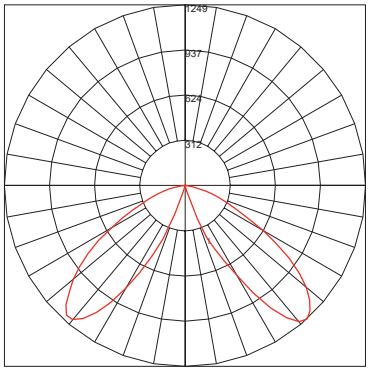


Maximum Candela = 1229.367 Located At Horizontal Angle = 45, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)

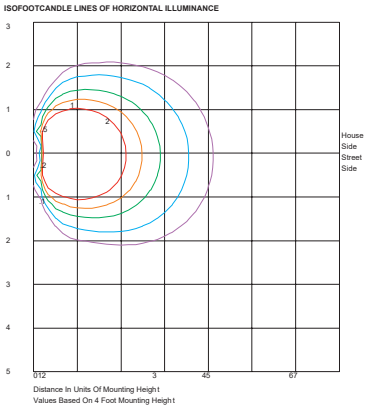


2Q180 / 14W LED / 5000K CCT

Catalog #: IBL-X-2Q180-50-XX-120-DS
Report #: 1197024-50
Maximum candela of 1249 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
1156 Delivered Lumens
81 Lumens per Watt
B1-U0-G0



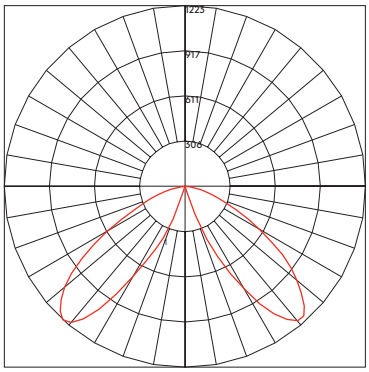
Maximum Candela = 1248.93 Located At Horizontal Angle = 85, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (85 - 265) (Through Max. Cd.)



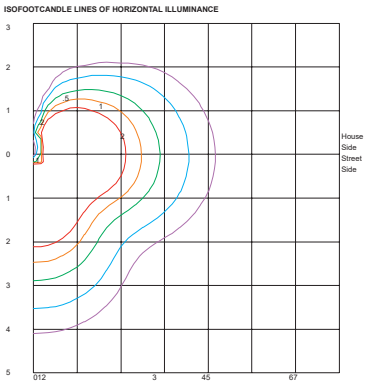
Photometry

3Q / 20W LED / 5000K CCT

Catalog #: IBL-X-3Q-50-XX-120-DS
Report #: 1197021-50
Maximum candela of 1223 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
1689 Delivered Lumens
82 Lumens per Watt
B1-U0-G0

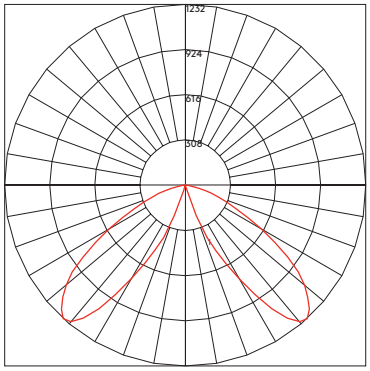


Maximum Candela = 1222.526 Located At Horizontal Angle = 270, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (270 - 90) (Through Max. Cd.)

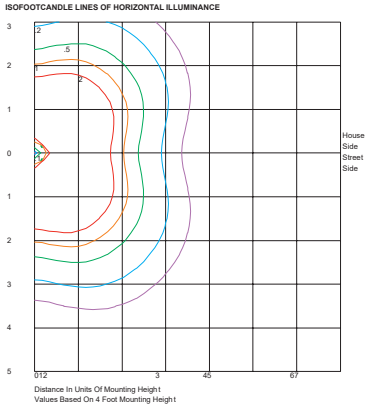


4QS / 27W LED / 5000K CCT

Catalog #: IBL-X-4QS-50-XX-120-DS
Report #: 1197039-50
Maximum candela of 1232 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
2246 Delivered Lumens
83 Lumens per Watt
B1-U0-G0

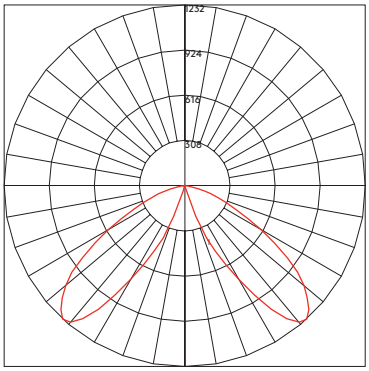


Maximum Candela = 1231.933 Located At Horizontal Angle = 45, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)

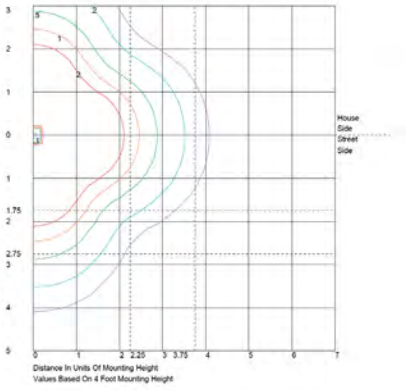


4QD / 27W LED / 5000K CCT

Catalog #: IBL-X-4QD-50-XX-120-DS
Report #: 1197039-50
Maximum candela of 1232 at 42.5° from vertical.
Mounting Height = 4' (1.22 m)
2246 Delivered Lumens
83 Lumens per Watt
B1-U0-G0



Maximum Candela = 1231.933 Located At Horizontal Angle = 45, Vertical Angle = 42.5
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)



Stonco

by signify

Wall mount

LytePro

LPW16 medium wall sconce

Stonco LytePro LED medium wall sconce LPW16 features outstanding value in a compact, architectural design. This powerful and precise combination offers outstanding energy savings with excellent photometric performance. LPW16 is ideal for entryways and corridors in addition to wall lighting applications requiring strong lateral spacing and forward pattern projection.

Project:

Location:

Cat.No:

Type:

Lamps: Qty:

Notes:

Ordering guide

Example: LPW16-20-NW-G3-3-120-PCB-BZ

					Options	
Prefix	**Wattage**	**LED Color/Gen**	**Distribution**	**Voltage**	**Photocontrol**	**Finish**
LPW16						
LPW16 LytePro 16 LED medium wall sconce	**20** 20W **30** 30W **50** 50W	**NW-G3** Neutral White 4000K 70 CRI Generation 3 **WW-G3** Warm White 3000K 70 CRI Generation 3	**3** Type 3 **4** Type 4	**120** 120V **208** 208V **240** 240V **277** 277V **347** 347V **480** 480V **UNV** 120-277V (50/60Hz) **HVU** 347-480V (50/60Hz)	**---** None **PCB** Photocontrol Button[1]	**Textured** **BK** Black **WH** White **BZ** Bronze **DGY** Dark Gray **MGY** Medium Gray **Customer specified** **RAL** Specify optional color or RAL (ex: OC-LGP or OC-RAL7024) **CC** Custom color (Must supply color chip for required factory quote)

Stocked luminaires – Ordering guide

Catalog Number	Description	Master Pack, Qty	UPC Code
LPW16-G3-8-BZ	LPW16, 30W, 650mA, 4000K, Type 3, 120-277V, Bronze textured paint	6	622252813872
LPW16-G3-8-DGY	LPW16, 30W, 650mA, 4000K, Type 3, 120-277V, Dark gray textured paint	6	622252813865

Stocked accessories – Ordering guide (Must be ordered separately)

Catalog Number	Description	Master Pack, Qty	UPC Code
LPWCVRPLT-BZ[2]	LPW Universal wall cover mounting plate, Bronze textured paint	(none)	190096144860

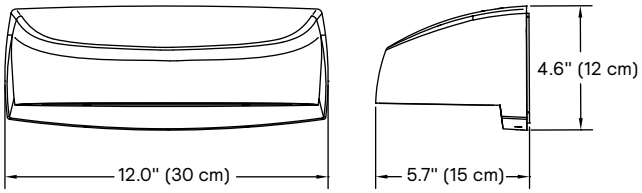
[1] Must specify voltage. Not available in 347V or 480V.

[2] Other colors available upon request as made-to-order

LPW16 LytePro

LED medium wall sconce

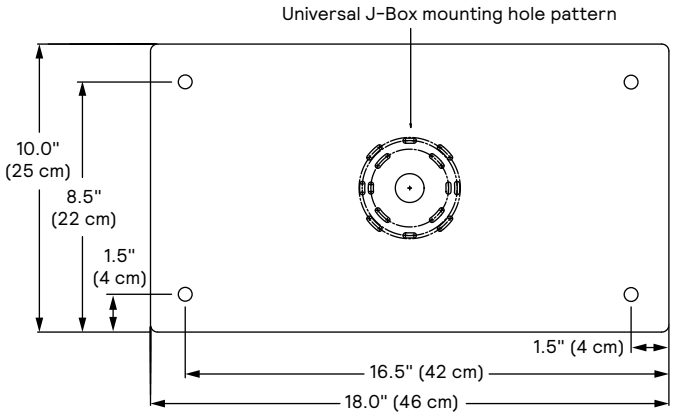
Dimensions



Luminaire weight: 6lbs (2.7 kg)

Accessory dimensions (ordered separately)

LPWCVRPLT-BZ LPW Universal wall cover mounting plate, 0.08" aluminum, bronze textured paint (used to cover larger pre-existing opening or surfaces, field installed). Offers same J-Box pattern as luminaire or may lagged to wall using (4) knockouts.



LED Wattage and Lumen Values

Ordering Code	Total LEDs	LED Current (mA)	Color Temp.	Average System Watts	Type 3			Type 4		
					Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)
LPW-16-20-NW-G3	16	400	4000	22.3	2,316	B1-U0-G1	104	2,242	B1-U0-G1	101
LPW-16-30-NW-G3	16	650	4000	34.3	3,474	B1-U0-G1	101	3,364	B1-U0-G1	98
LPW-16-50-NW-G3	16	900	4000	48.0	4,629	B1-U0-G1	96	4,482	B1-U0-G1	93
LPW-16-20-WW-G3	16	400	3000	22.3	2,132	B1-U0-G0	96	2,065	B1-U0-G1	93
LPW-16-30-WW-G3	16	650	3000	34.3	3,200	B1-U0-G1	93	3,098	B1-U0-G1	90
LPW-16-50-WW-G3	16	900	3000	47.5	4,263	B1-U0-G1	90	4,128	B1-U0-G1	87

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown.

Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.

NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

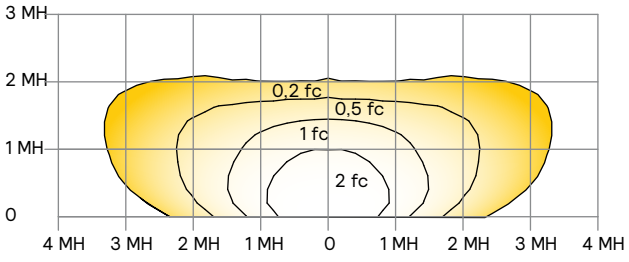
Predicted lumen depreciation data

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.L_{70} is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L_{70} hours limited to 6 times actual LED test hours

Ambient Temperature °C	Calculated L_{70} Hours	L_{70} per TM-21	Lumen Maintenance % at 60,000 hrs
up to 40°C	>200,000 hours	>54,000 hours	>96%

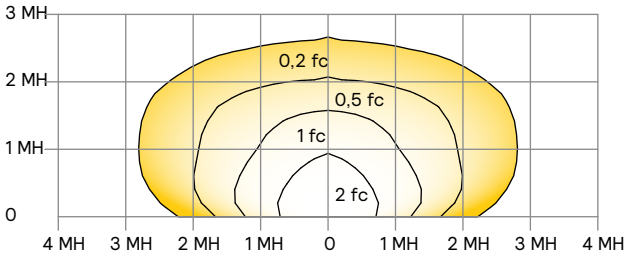
Optical distributions

Based on LPW16-30-NW-G3 at 15' mounting height



Type 3

LPW16 15' mounting height			
Mounting height	10 ft	12 ft	15 ft
Multiplier	1.57	1.34	1.00



Type 4

LPW16 15' mounting height			
Mounting height	10 ft	12 ft	15 ft
Multiplier	1.46	1.27	0.87

LPW16 LytePro

LED medium wall sconce

General Description

LytePro LED medium wall sconce LPW16 combines excellent performance, design and value to meet the needs of the energy and budget conscious. The LPW16 is available for use in downward facing, surface wall mount applications, over recessed j-boxes or where power can be directly fed through back surface, whereby connections splices can be made inside the luminaire housing. Two SKU's are available as in-stock configurations only (2-day quick ship).

Housing

Die-cast housing houses both the LED and driver assemblies. Design incorporates an integrated heat sink to maximize thermal performance and reliability. Backplate is corrosion free, composite polycarbonate, with built-in level bubble, offers integral interlocking hook and mount design for easy installation.

Mounting

Easy interlocking hook and mount housing/ backplate design for easy installation. Mounts over 3.5", 4" octagonal j-boxes and single gang switch boxes or can be directly lagged to surface. Ensure proper steps for gasket/sealing luminaire to surface.

IP Rating

Optical compartment is IP65 rated.

LED Board and Array

Provides up to 104 lm/W at the system level. Standard color temp is 4000K or 3000K +/- 250K, minimum 70 CRI.

Electrical

Driver efficiency (>90% standard). 120-277V and 347-480V available. All drivers are dimmable. Temp range: -40°C (-40°F) to 40°C (104°F). Open/short circuit protection. Inherent surge protection up to (6KVA). RoHS compliant.

Surge protection (SP1): Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground, and in accordance with DOE MSSLC Model Specification for LED Roadway Luminaires Appendix D Electrical Immunity High test level 10kV/10kA.

Listings

Product is cETLus listed suitable for Wet Locations. Suitable for use in ambients from -40°C to 40°C (-40°F to 104°F). DesignLights Consortium® qualified.

Finish

Each luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) textured polyester powdercoat finish.

Warranty

LPW16 luminaires, the LED arrays, and the drivers are all covered by a 5-year limited warranty. See www.signify.com/warranties for details.

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Exhibit 16

Design Approach Narrative

3.3 Narrative Description of Design Approach

The project is boarded to the north by a variety of commercial and retail businesses with Route 3 in the background and single family residential to the south. The approach to the building design was to develop an upscale unique aesthetic that would contribute to the identity as a destination. The residential buildings were kept to two structures allowing for a dense vegetated buffer at the full perimeter of the property and limiting disturbance to the site and existing buffers. Parking is convenient to multiple entrances. Units take advantage of vegetated views of the surrounding property. The façade makes use of a variety of high quality contemporary material while maintaining a traditional elegance.

Exhibit 17

Demographic & Parking Use Narrative

DMS design
Architecture & Interior Design

5 Essex Green Drive, Suite 11A

Peabody, MA 01960

Shingle Mill Apartments

2020- SEP- 15

Narrative

The Shingle Mill Apartments project being proposed for the town of Rockland has been developed by analyzing key elements of the area and finding ways to support the growing community.

The demographics unique to the area have been evaluated to create a design catered to those specific needs. The town serves as the headquarters for several major companies in the biotechnology and pharmaceuticals fields. In recent years there have also been a growing number of artists moving in who are attracted to the former factory buildings as a place to work and meet. Based on these findings the anticipated demographics for this project will be mostly young professionals with some empty nesters and a few snowbirds. The design team is focused on creating a social, community based, residential space that feels like a home haven.

The anticipated mainly young professional occupants have led to a unit breakdown that includes over 50% one-bedroom units and over 35% two-bedroom units. Studio and three-bedroom units make up less than 15% of the overall unit count.

Shingle Mill seeks to prioritize car sharing with a drop off and pick up location on site. Reducing car travel impact is being brought to the forefront by implementing zip cars to the project. Based on a parking demand analysis, it is expected that the number of bedrooms and number of residents are correlated to the parking demand. The demand is estimated at 309 spaces for 236 units that will provide adequate parking at peak times. As a result, the provided parking is about 1.3 spaces per unit, well exceeding surrounding parking requirements.

Proposed is a contemporary modern and fresh design with a vintage vibe created through developing a space that evokes a sense of place and character. Occupants should feel warm, lively, welcomed, and elevated through light filled spaces and the lush surrounding natural landscapes. Amenities will include a clubhouse with shared kitchenette, game rooms, dining and seating that can be reserved by occupants expanding the limits of their individual spaces. In each building there will be lounge spaces and work from home areas as well as crafting rooms and a fitness suite.

To facilitate a healthy balanced atmosphere the outdoor space has been carefully planned and calculated. Wetlands on the site have been preserved and will remain untouched. Of the upland area, 72.7% will be dedicated to open space for occupants to enjoy. To accommodate our four-legged friends, there is a pet grooming space that leads directly out to a dog run area. For the human occupants, the open space provides a great reprieve from the city with ample space to walk and relax. The club house has a dining area that leads directly out to a screened porch and fire pit adjacent to an area where the previous building has been converted to additional open space.

The design team feels that the development will reinvigorate a neglected site and bring vibrance to the community. With each detail carefully considered we feel we are bringing an immense improvement and asset to the town of Rockland.

Exhibit 18

List of Required Waivers

EXHIBIT "A"

Shinglemill LLC ("Applicant") hereby requests the following waivers and, as specified below, will be subject to the specific condition that any and all waivers are being granted only to the extent necessary to allow for the construction of the project according to the plans presented to the approved by the Rockland Zoning Board of Appeals ("Board"). Final plans to be submitted by the Applicant shall conform to the Board's decision and these specific waivers

SHINGLEMILL
LIST OF REQUESTED EXCEPTIONS, WAIVERS, AND PERMITS

	Local Regulation	Waiver Requested
1.	Chapter 407 Wetlands Protection By-Law, § 407-5 Permit and Conditions C.	A 25 foot vegetated no disturbance area is not included in the project design (See attached letter to the Conservation Commission).
2.	Chapter 415 Zoning By-law, § 415-19 H-1 Industrial Park-Hotel District A. Permitted principal uses	The proposed project use is residential apartment buildings which is not included in permitted principal uses for the Industrial Park-Hotel District.
3.	Chapter 415 Zoning By-law, § 415-22 Table: Minimum Yard Dimensions (Feet): Side	The proposed community building is within 1.5 feet of the Wilson Street Right-of-Way. This is 45 foot reduction from the 50 foot setback to an abutting land that is within a residential district. (50.0' to 1.2'= 48.8' reduction)
4.	Chapter 415 Zoning By-law, § 415-22 Table: Maximum Height (Stories/Feet)	The proposed apartment buildings will be 5 stories tall and approximately 69 feet about finished grade. This is 2 stories and 33 feet taller than the maximum building height for this district. (3 stories to 5 stories = 2 stories greater) (36.0' to 69.0' = 33.0' greater)
5.	Chapter 415 Zoning By-law, § 415-22 Building and lot Regulations A. Parking/access and egress requirements (1)	All proposed non-accessible designated parking spaces are 9'x18' spaces. Parking spaces as required by this bylaw shall be a minimum of 10 feet in width by 20 feet in length for full size vehicles; and nine feet in width by 18 feet in length for compact vehicles. (10.0'x 20.0' to 9.0'x 18.0')
6.	Chapter 415 Zoning By-law, § 415-22 Building and lot Regulations A. Parking/access and egress requirements (2)(e)	The emergency access/parking lot is 3.1 feet from the cedar street ROW. This is 26.9 feet less than the minimum set back of 30 feet from any property line. (30.0' to 3.1' = 26.9' reduction)
7.	Chapter 415 Zoning By-law, § 415-22 Building and lot Regulations B. Yard regulations (4)	The proposed community building is within 1.2 feet of the Wilson Street Right-of-Way. This is 10 feet less than the 15 foot minimum side yard setback for an accessory structure greater than 400 square feet. (15.0' to 1.2' = 13.2' reduction)

	Local Regulation	Waiver Requested
8.	Chapter 415 Zoning By-law, § 415-22 C. Height regulations	The proposed apartment buildings will be 5 stories tall and approximately 69 feet about finished grade. This is 2 stories and 33 feet taller than the maximum building height for this district. (3 stories to 5 stories = 2 stories greater) (36.0' to 69.0' = 33.0' greater)
9.	Chapter 415 Zoning By-law, § 415-22 Building and lot Regulations F. Multi-family developments. (4)	The proposed project does not conform to the Off-street parking requirements in § 415-35 of this bylaw as stated above.
10.	Chapter 415 Zoning By-law, § 415-29 Number of buildings on single lot.	The project site design includes two principal use apartment buildings and 1 commons building. Only one principal residential building is allowed by this bylaw.
11.	Chapter 415 Zoning By-law, § 415-35 Off street parking requirements A. Residential Uses (1)	The projects site is design with a 1.25 parking ratio. This is 1.75 spaces less than the required 3 spaces for multi-family residence. (3 spaces/unit to 1.25 spaces/unit = 1.75 space/unit reduction)
12.	Chapter 415 Zoning By-law, Article XIII Design Review board § 415-94 Types of sites and properties	This project is being submitted for approval from the ZBA, however, we welcome input from the Design Review Board during the ZBA review process
13.	Rules & Regulation of the Planning Board, § I.I.2. Location Map	All buildings and zoning district boundaries within 200 feet of the site are not shown on the site plans per this regulation.
14.	Rules & Regulations of the Planning Board, § III.B.1. Location and Alignment.	Although we do not believe that the Pond St. Access Driveway is not a Roadway, The access driveway begins to curve off a right angle at station 0+50.36 which is 49.64 feet less than the required distance of 100 feet from the intersecting street lines of Pond Street. (100.0' to 27.13' = 72.87' reduction)
15.	Rules & Regulations of the Planning Board, § III.C.2.e. Drainage Structures. 1)	All drain pipes are HDPE rather than Class III reinforced concrete pipe. (Class III RCP to HDPE)
16.	Rules & Regulations of the Planning Board, § III.C.2.f. Drainage Basins 1)	Subsurface infiltration chambers are proposed but are not permitted not be permitted unless approved by the board.
17.	Rules & Regulations of the Planning Board, § III.C.2.f. Drainage Basins 6)	Test Pits were performed throughout the site and infiltration rates were based on NRCS Web Soil Survey Values. Test pits and Percolation tests were not performed within the footprint of the subsurface structures.

Local Regulation		Waiver Requested
18.	Rules & Regulations of the Planning Board, Section IV.H. Shade Trees	Shade trees, of species and size as directed by the Board, shall be retained or planted. There shall be at least three (3) trees for every one hundred (100) feet, spaced evenly, on each side of the street. They shall be located as directed by the Board or the Tree Warden. The usual location will be five (5) to six (6) feet behind the sidewalk. Trees to be planted shall have a minimum height of twelve (12) feet with eight (8) foot head clearance and shall be at least three (3) inch caliper at forty-two (42) inches from ground level.
19.	Rules & Regulations of the Planning Board, Section IV.I. Side Slopes	All side slopes are graded at a 3:1 horizontal to vertical section. This regulation requires fill slopes are graded no greater the 4:1.
To the extent that the Project requires additional exemptions and waivers not expressly set forth above, the Applicant requests that such exemptions and waivers be granted to the extent necessary to complete the Project as shown on the Project Plans, as they may be amended throughout the hearing process.		