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REPORT

February 2021

TOWN OF
Paxton
MASSACHUSETTS

Schematic Design Report
New Public Works Facility



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PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 1

PROGRAMMING REVIEW & CONFIRMATION

- Updated Space Needs Assessment Program
- DPW Organization Chart
- DPW Vehicle Inventory List

Paxton, Massachusetts
Department of Public Works
Space Needs Summary
February 21, 2019

Building Requirements

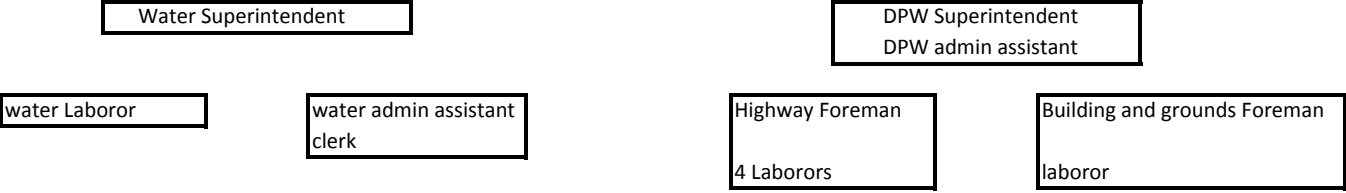
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Paxton, Massachusetts
Department of Public Works
Space Needs Summary
February 21, 2019

Building Requirements

Area	Description	Sheet No.	Original Size (SF)	Revision 1 Size (SF)	Revision 2 Size (SF)	Quant	Room / Area Dimensions		
							length	width	size
D. Maintenance									
	Large Maintenance Bay	D1.01	1,100	1,100	1,100	1	20	55	1,100
	Large Maintenance Bay	D1.01	1,100	1,100	1,100	1	20	55	1,100
	Mechanics Office / Reference Room	D1.02	120	120	120	1	10	12	120
	Parts Room	D1.03	1,080	512	448	1	16	28	448
	Fluids Room	D1.04	256	224	168	1	14	12	168
	Subtotal:		3,656	3,056	2,936				
	Area Grossing Factor (10%):		366	306	294				
	Circulation (10%):		402	336	323				
	TOTAL:		4,424	3,698	3,553				
E. Wash Area									
	Wash Bay	E1.01	1,650	1,375	1,375	1	25	55	1,375
	Wash Equipment Room	E1.01	100	100	100	1	10	10	100
	Subtotal:		1,750	1,475	1,475				
	Area Grossing Factor (5%):		88	74	74				
	Circulation:		n/a	n/a	n/a				
	TOTAL:		1,838	1,549	1,549				
F. Vehicle and Equipment Storage									
	Vehicle / Equipment Storage	F1.01	11,875	10,528	10,528	1	94	112	10,528
									-
	Subtotal:		11,875	10,528	10,528				
	Area Grossing Factor (5%):		594	526	526				
	Circulation:		n/a	n/a	n/a				
	TOTAL:		12,469	11,054	11,054				
BUILDING TOTAL:			24,433	21,401	20,721	15% Reduction			

PAXTON DPW ORGANIZATIONAL CHART (projected future)



Currently the staff consists of : DPW Supt.

- Water Foreman
- Part time admin assistant
- Highway Foreman
- (4) Equipment Operators/ Laborors
- Mechanic

**Town of Paxton
DPW Equipment**

3/2/2017

	Storage Type			
	Large	Medium	Equipment	Material
2010 MACK Ten Wheeler with sander, wing plow, front plow	1			
2016 MACK 6 wheeler with sander , wing plow, front plow	1			
1989 MACK 6 wheeler with sander, wing plow , front plow	1			
1997 International catch basin cleaner with sander , front plow	1			
1997 International with sander, front plow	1			
1996 VOLVO Front end loader with front plow	1			
2012 CAT Loader with wing plow and front plow	1			
2002 John Deere Backhoe	1			
Elgin Street sweeper	1			
Tiger Roadside Mower with side boom brush cutter		1		
F550 dump truck with front plow		1		
F550 dump truck with front plow		1		
F350 pick up with front plow		1		
Tow behind air compressor			1	
Tow behind Light Tower			1	
Asphalt roller with trailer			1	
Misc ride on lawn tractors, (3)			3	
Misc power equipment, compactors, chop saws, pumps, hoses, generators				1
misc hand tools, wheel barrows, asphalt equipment				1
Area for safety signage, cones, barrles, traffic signs				1
Area for Street signs, road signs, posts, etc.				1
Area for spare tires, mower head, Pallet of concrete, pallet of ice melt				1
Area for ladders, safety equipment, trench box				1
Area for mechanics tools, plasma cutter, torches, welders, air compressor				1
Total For Vehicle / Equipment Storage Area	9	4	6	

* water dept. van and a second f350 pickup truck are driven home by water and highway supts.

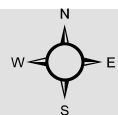
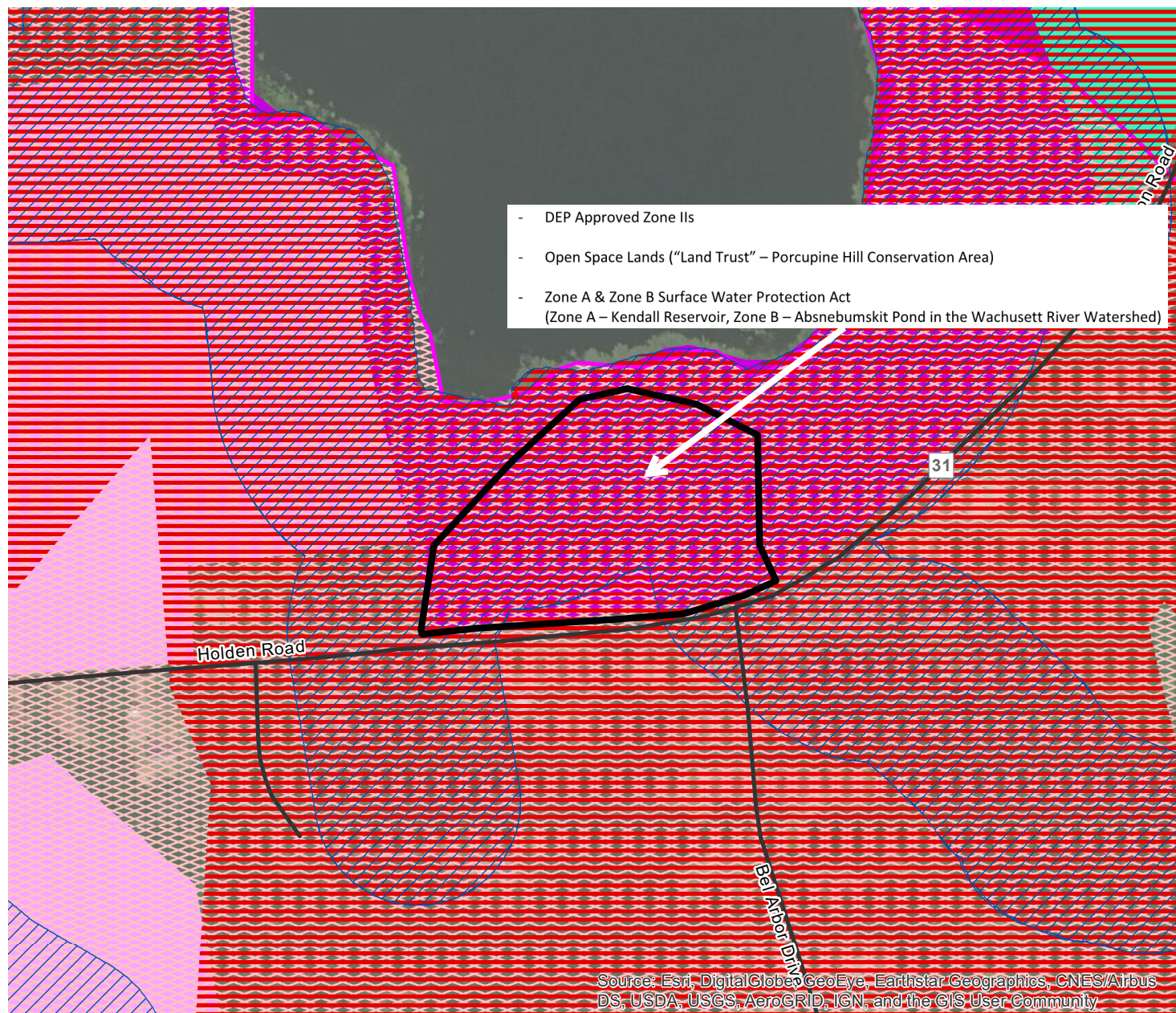
PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 2

EXISTING CONDITIONS

- Human Receptor Map
- Watershed Protection Area Maps (MassDEP & DCR)
- Preliminary Zoning Analysis
- Existing Conditions Survey
- Survey with DCR Watershed Protection Zones (Colored)



300 150 0 300
Feet

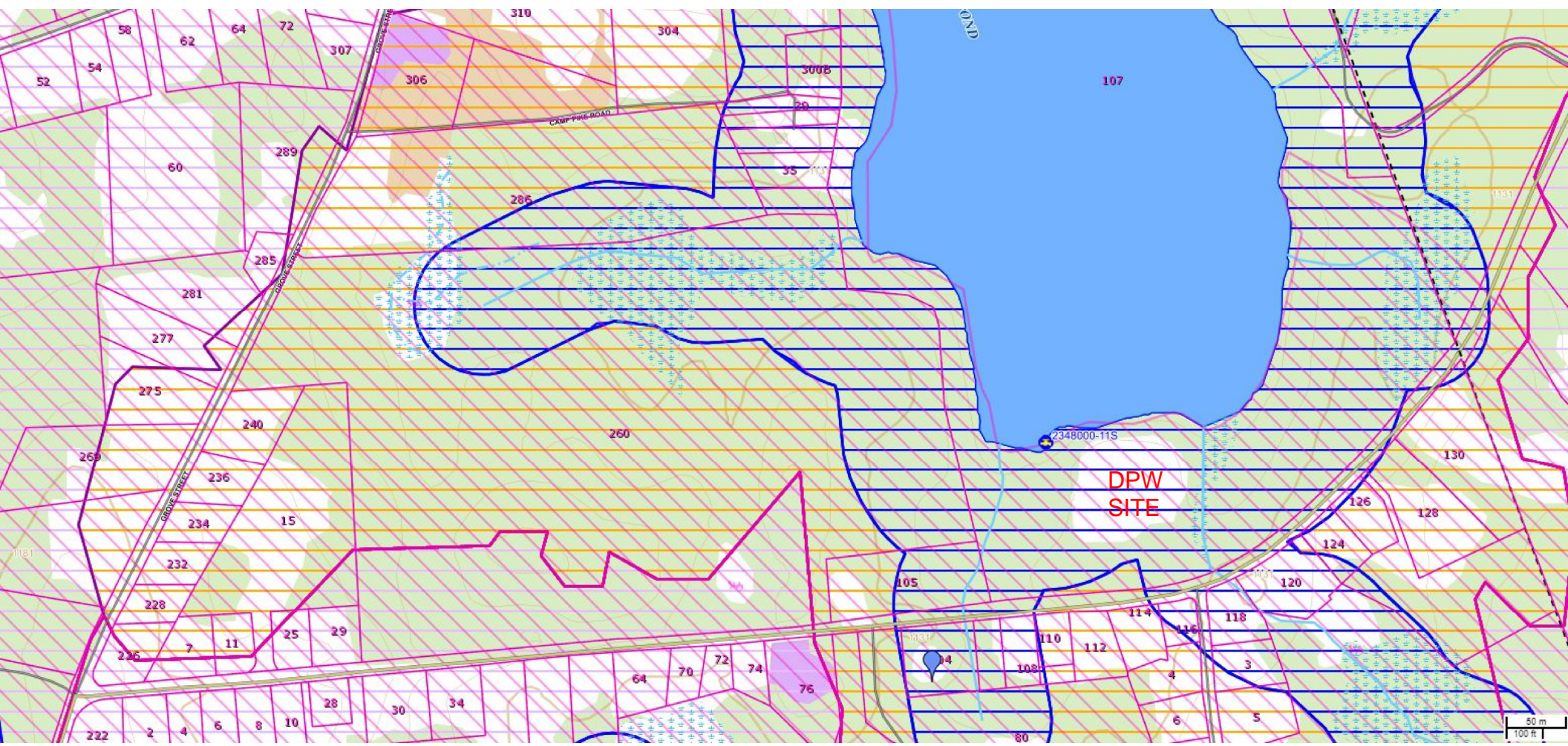
Data Source: Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

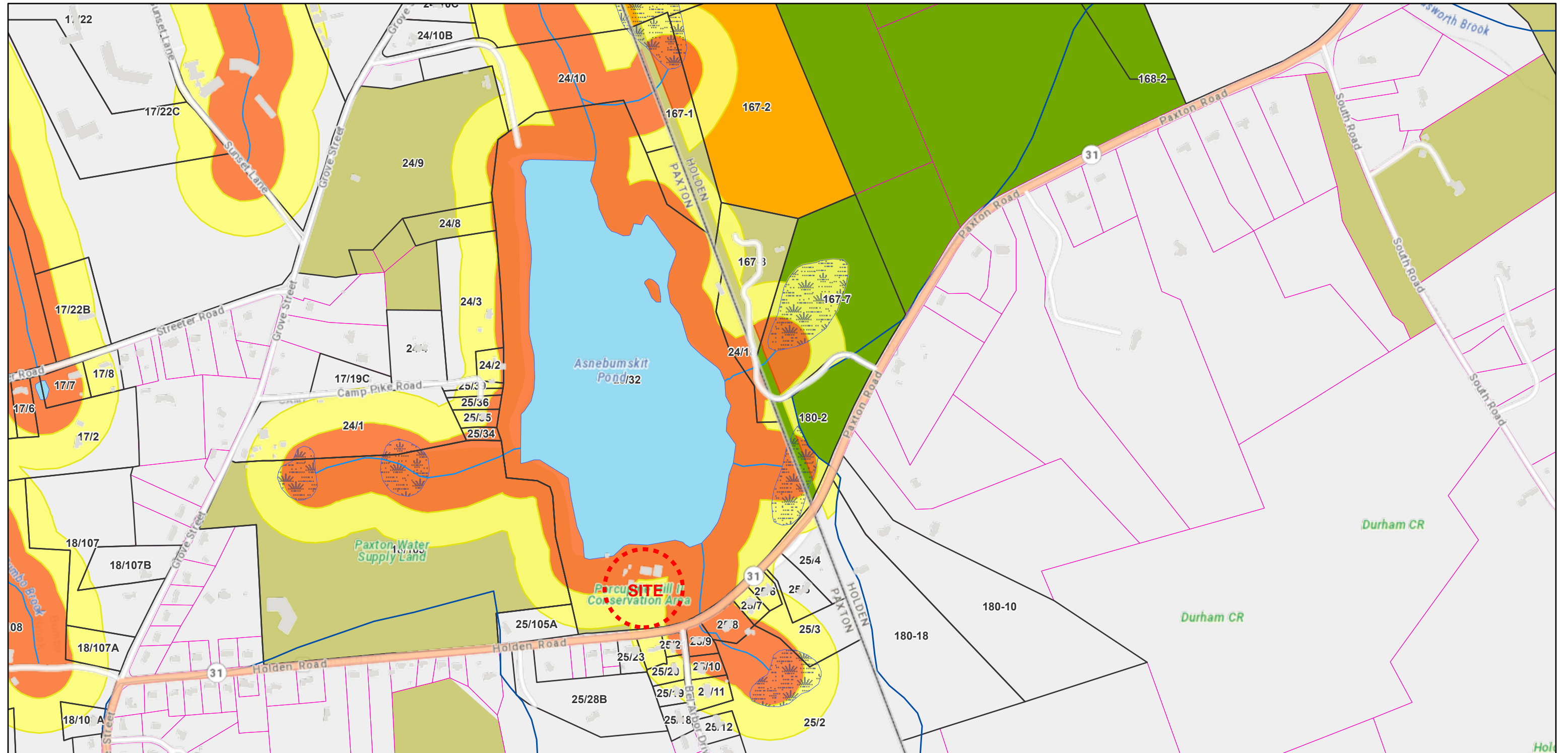
- Work Area
- State Registry of Historic Places
- All Underground Storage Tanks
- Tier 1A
- Tier 1B
- Tier 1C
- Tier 1D
- Tier II
- Community Ground Water
- Community Surface Water
- Surface Distribution Site
- Non-Transient Non-Community
- Transient Non-Community
- Proposed Well
- CH21E_AUL_Sites
- DEP BWP Major Facilities**
- Large Quantity Generators (LQG)**
- EPA/RCRA-regulated Hazard. Waste
- MA-regulated Hazard. Waste
- MA and EPA/RCRA-regulated Hazard. Waste
- MassDOT Roads
- Zone I
- Solid Waste Facilities - All Landfills
- IWPAs
- Zone A
- ZONE B
- DEP Approved Zone IIs
- Federal
- DCR-State Parks & Recreation
- DCRS/DFG
- Department of Fish & Game
- DCR-Urban Parks & Recreation
- DCR-Water Supply Protection
- Department of Agricultural Resources
- Commonwealth of Massachusetts
- County
- Municipal
- Public Non-Profit
- Land Trust
- Conservation Organization
- Non-Profit
- Private
- Other
- Unknown

FIGURE 1
DPW Facility
Paxton, MA












WATER SUPPLY PROTECTION AREA MAP

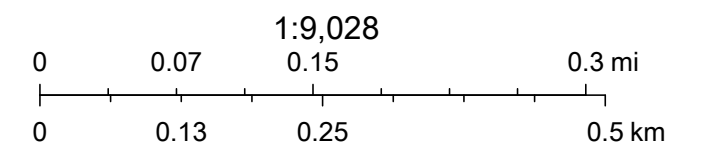


DCR Watershed Protection Act Viewer Map



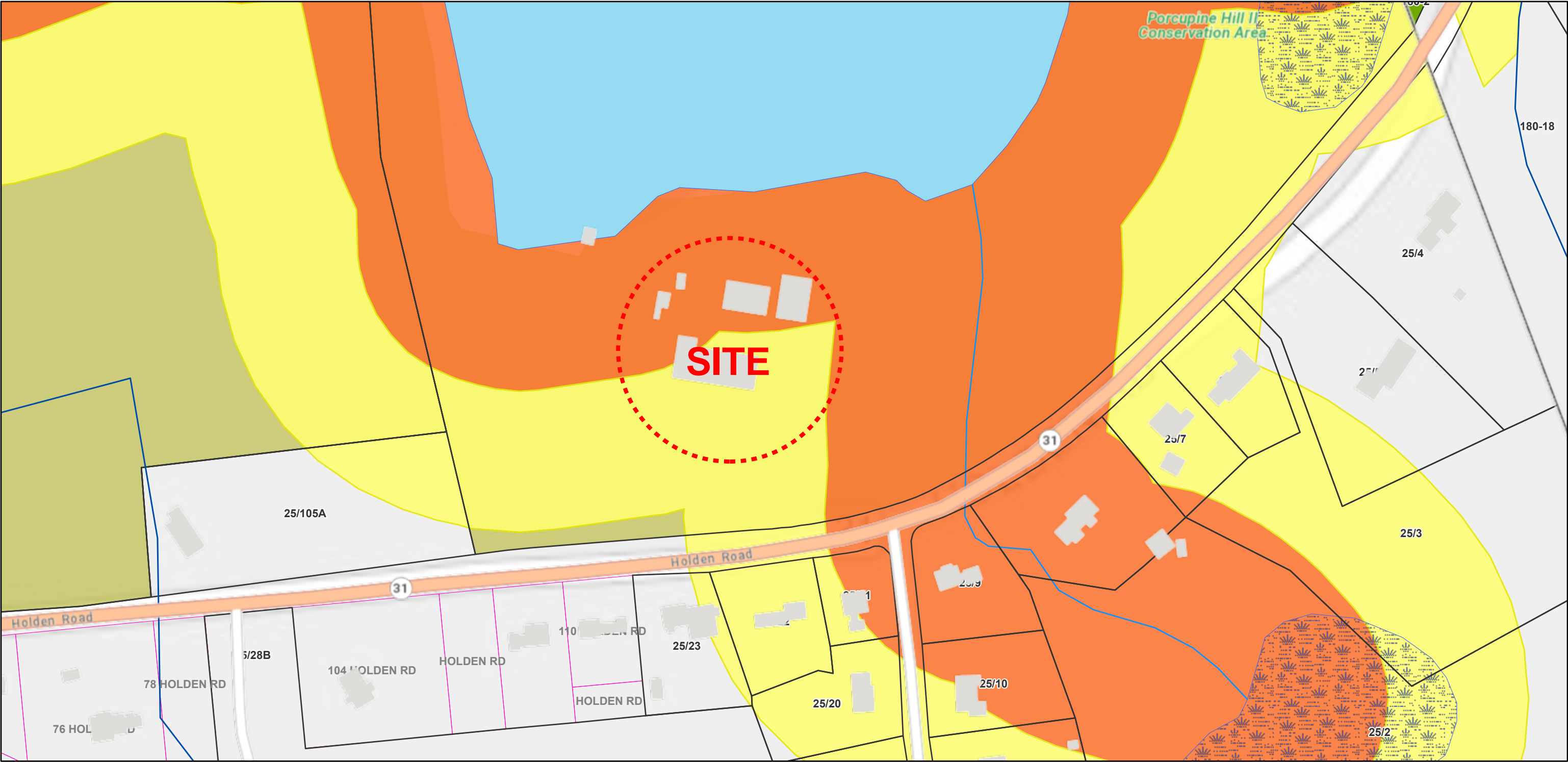
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- | | | |
|---|--|--|
|  Watershed Boundaries |  WsPA Wetlands |  WsPA Secondary Protection Zone |
|  WsPA Affected Parcels (as of May 2019) |  WsPA Open Water |  DCR/DWSP Fee Property |
|  MassGIS Parcels | WsPA Buffers |  DCR/DWSP Watershed Preservation Restrictions |
|  WsPA Streams |  WsPA Primary Protection Zone |  Other Permanently Protected Open Space |













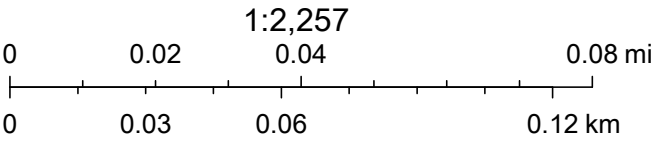
MassGIS, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

DCR Watershed Protection Act Viewer Map



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- | | | |
|---|--|--|
|  Watershed Boundaries |  WsPA Wetlands |  WsPA Secondary Protection Zone |
|  WsPA Affected Parcels (as of May 2019) |  WsPA Open Water |  DCR/DWSP Fee Property |
|  MassGIS Parcels |  WsPA Buffers |  Other Permanently Protected Open Space |
|  WsPA Streams |  WsPA Primary Protection Zone | |



MassGIS, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Town of Paxton, Massachusetts

New Public Works Facility

Zoning Analysis Summary

- Site Location: 107 Holden Road
- Site Size per on-line GIS data
 - Lot 025-32 75.0 acres (Parcel includes all of Asnebumskit Pond)
- Proposed DPW Statistics:
 - Development area: 5.93 acres
(*Area enclosed from front property line and 15' no disturbance wetlands setback*)
 - Impervious Building Area: 23,181 SF (0.53 acres)
 - Impervious Site Area: 80,791 SF (1.85 acres)
 - Total Impervious Area: 103,972 SF (2.38 acres)
- Zoning District:
 - General Residence B (GRB)
 - Watershed Protection District
- *Municipal administrative, cultural, recreational, water supply or protective use, operated by the Town of Paxton, and any other municipal use not specifically set forth herein are an allowable use in accordance with Section 3.2.3 of the Zoning Bylaws.*
- Zoning Overlaying Districts
 - Watershed Protection District Zone I
 - Watershed Protection District Zone II
 - Flood Plain District (Asnebumskit Pond *only*)
- MassDEP Water Supply Protection Areas Map:
 - Streams
 - Public Water Supply Reservoir (Asnebumskit Pond)
 - Surface Water Supply Protection Area (Zone A & B)
 - Approved Wellhead Protection Area (Zone II)
 - Surface Water Supply Watershed Boundary
 - Title 5 Buffer (200')
- Dimensional Requirements
 - Min Lot Frontage: 200'
 - Min Front Yard: 30' (40')
 - Min Side Yard: 25' (25')
 - Min Rear Yard: 30' (30')
 - Building Height: 30' (35')

Note – First dimensional requirement is required of a building height of 2 or less stories and the second is required for 2 ½ stories.

- Section 1.6 states “Municipal Exemption: This Bylaw shall not apply to any lot, use, building or structure necessary for use and occupancy by the Town of Paxton or any of its agencies or departments for public or municipal purposes.”
- Paxton Parcel Map 24 of identifies the site parcel as an “exempt lot.”
- Paxton Land Use Map identifies the Parcel in the 200’ Cohen Bill Protection Buffer.
- The Paxton Zoning Map and the DCR Watershed Protection Act Viewer identify the stream located to the right of the existing DPW building as an intermittent stream. (Note that the Weston & Sampson Wetlands Delineation Report dated December 5, 2019 identifies both streams to the left and right of the existing DPW building as intermittent streams.
- Asnebumskit Pond located on the parcel is a drinking water supply, owned and maintained by the Town of Paxton and is connected to the City of Worcester’s Water System.

Section 4.5.3.1 The Watershed Protection District

Prohibited within:

Watershed Protection District Zone I: Generation, Storage, Disposal or Discharge of Pollutants is prohibited within Zone 1 those portions of the Watershed Protection District that lies:

- within 400 feet of the Bank of a Reservoir (Asnebumskit Pond)
- within 200 feet of the Bank of a Tributary or Surface Waters (Asnebumskit Pond)

Watershed Protection District Zone II:

- within the area between 200 and 400 feet of the Bank of a Tributary or Surface Water
- within the Groundwater Protection District (area which surrounds Asnebumskit Pond)

Watershed Protection District:

- b. the storage of liquid petroleum products of any kind unless such storage is in connection with permitted residential use and the physical storage
- e. the outdoor Storage of road salt or other de-icing chemicals; provided, however, that the outdoor Storage of sand, gravel or materials used in road construction which are not Hazardous Materials or Hazardous Waste shall not be prohibited
- f. the outdoor Storage of fertilizers, herbicides and pesticides;
- i. the servicing, washing and/or repairing of motor vehicles or, recreational domestic equipment other than as incidental to permitted residential use
- k. the rendering impervious of more than ten (10) percent of any Lot or 2,500 square feet, whichever is greater

Town of Paxton Stormwater By-law

Section 5.0 Applicability:

A.) The Bylaw shall apply to any activities that will result in an increased amount of stormwater runoff or pollutants from a parcel of land, or that will alter the drainage characteristics of a parcel of land, unless exempt under Section 5.C of this Bylaw. All new development and redevelopment under the jurisdiction of this Bylaw shall be required to obtain a Stormwater Management Permit.

B.) An alteration, redevelopment, or conversion of land use to a hotspot such as: auto salvage yards, auto fueling facilities, fleet storage yards, commercial parking lots with high intensity use, road salt storage areas, commercial nurseries and landscaping, outdoor storage and loading areas of hazardous substances, or marinas, shall require a Stormwater Management Permit.

Town of Paxton Wetlands Protection By-law

- A public water supply is identified as a resource area.
- Need permit from Conservation Commission to remove, fill dredge, build upon, degrade, discharge into or otherwise alter the following resource areas: any intermittent streams....lands adjoining these resource areas out to a distance of 100 feet known as the 'buffer zone'; perennial rivers, streams.....lands adjoining these resource areas out to a distance of 200 feet, known as the riverfront area; lands subject to flooding or inundation by groundwater or surface water; and lands subject to flooding (collectively the "resource areas protected by this bylaw").

Town of Paxton Wetlands Regulations

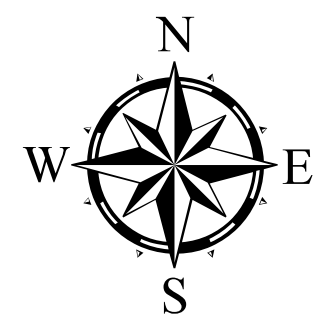
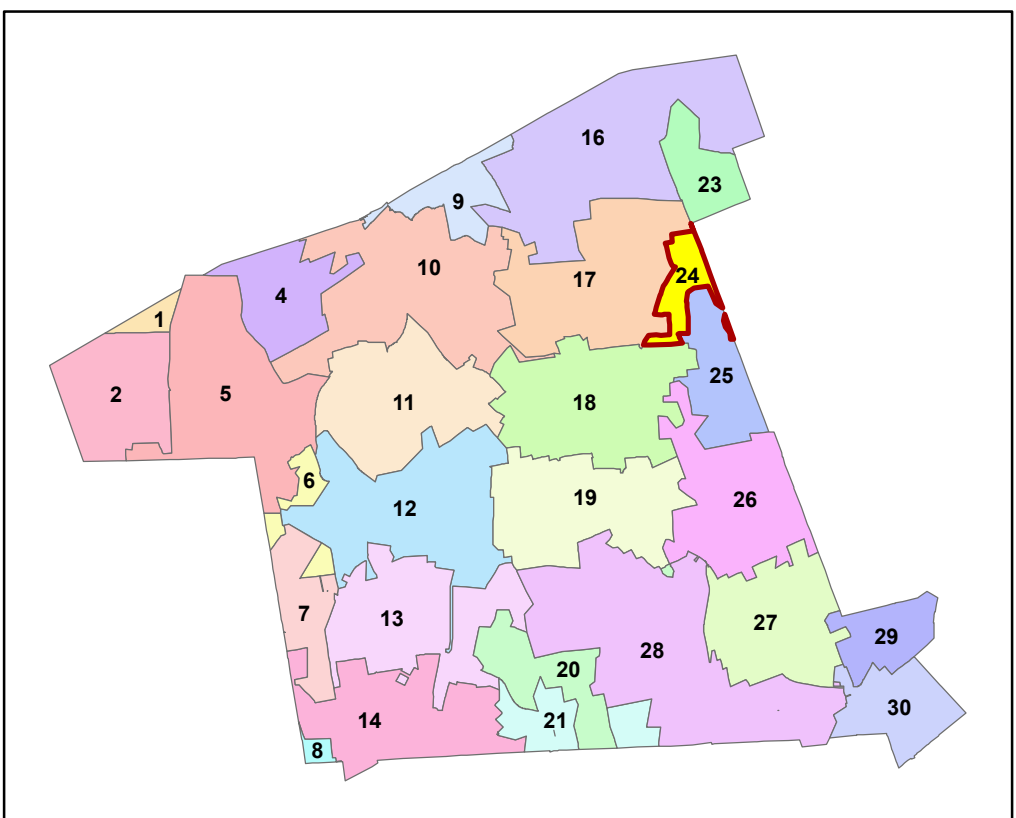
- No foundation, building, road, sidewalk, or other permanent structure shall be placed within thirty (30) feet of any resource area.
- No grading, filling, excavation, removal of vegetation or other construction activity shall be allowed within fifteen (15) feet of a resource area.

Town of Paxton, Massachusetts 2019

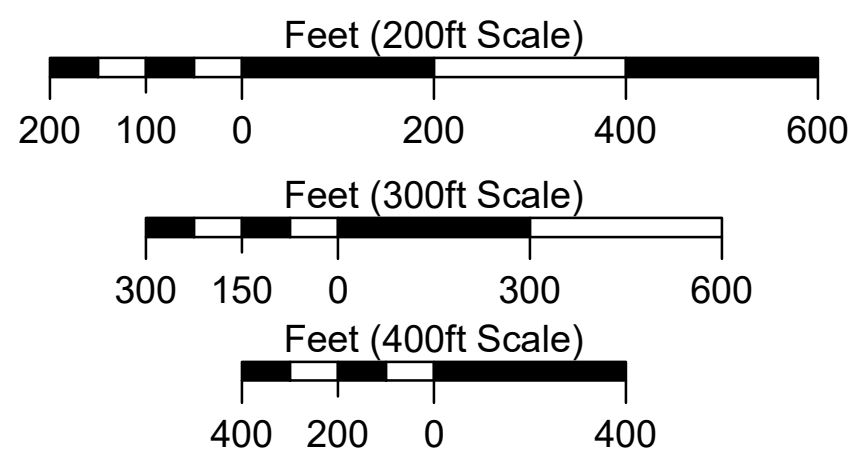


Legend

- PARCEL BOUNDARY
- LOT NUMBER
- LOT DIMENSION (FEET)
- ACREAGE OF LOT
- EASEMENT
- RIGHT OF WAY
- LEASED LAND
- HISTORICAL LINES
- GENERAL RESIDENCE A ZONING DISTRICT
- CHAPTER 61
- CHAPTER 61A
- EXEMPT LOT
- EXEMPT
- FIRE HYDRANTS
- WATER BODY
- STREAMS
- STRUCTURES



1 inch = 200 feet



ASSESSOR SHEET REVISIONS & UPDATES	
DATE	SIGNATURE
JAN. 1, 2019	CMRPC - GIS DEPT.
JAN. 1, 2018	CMRPC - GIS DEPT.
JAN. 1, 2017	CMRPC - GIS DEPT.
JAN. 1, 2016	CMRPC - GIS DEPT.
JAN. 1, 2015	CMRPC - GIS DEPT.
JAN. 1, 2014	CMRPC - GIS DEPT.
JAN. 1, 2013	CMRPC - GIS DEPT.
JAN. 1, 2012	CMRPC - GIS DEPT.
JAN. 1, 2011	CMRPC - GIS DEPT.
JAN. 1, 2010	CMRPC - GIS DEPT.
JAN. 1, 2009	CMRPC - GIS DEPT.

Map Sheet 24



NOTE: THIS MAP IS FOR ASSESSMENT PURPOSES ONLY. IT IS NOT A VALID DOCUMENT FOR LEGAL DESCRIPTION OR CONVEYANCE. LOT DIMENSIONS DERIVED FROM SURVEY BASED PLANS OR ASSESSOR MAPS. FOR LEGAL DETERMINATION PLEASE REFER TO PARCEL SPECIFIC DEEDS OR THE TOWN OF PAXTON.

Date: 5/21/2019 Document Path: H:\Projects\O_Paxton_GIS\Map28_Assessor_Maps_28\36.mxd

PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 3

PERMITTING CONSIDERATIONS

- Wetlands Delineation Report
- DCR Watershed Determination of Applicability Correspondence



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Wetland Delineation Report

November 2019

Paxton, Massachusetts
Project # 2191012

DPW Facility, 107 Holden Road
Paxton, MA



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2.2 Wetland Delineation Methodology	2-1
2.3 Bordering Vegetated Wetlands (BVW)	2-2
2.4 Bank.....	2-3
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FIGURES

Figure 1.....	Wetlands Field Map
Figure 2.....	USGS Topographic Map
Figure 3.....	FEMA FIRM Map
Figure 4.....	Environmental Resources Map

APPENDICES

Appendix A	US ACOE Data Forms
Appendix B	Site Photographs

1.0 SITE DESCRIPTION

On November 4th, 2019 Weston and Sampson delineated wetland resources adjacent to the Paxton Department of Public Works (DPW) facility located at 107 Holden Road in Paxton, MA. The delineation was conducted under the direction of a New Hampshire Certified Wetlands Scientist (CWS). The site under consideration is located in a forested area adjacent to municipal facilities and Asnebumskit Pond. Please see Figure 1 (Wetlands Field Map) and Figure 2 (USGS Map) of this report for the investigation area.

Wetland resource areas including bordering vegetated wetlands, two intermittent streams, and a water body were identified and flagged in the field using pink flagging by a Weston & Sampson wetland scientist who is trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) and the US Army Corps of Engineers (ACOE) methodology.

2.0 DELINEATION OF WETLAND RESOURCES

2.1 Site Observations

The Weston & Sampson wetland scientist, trained in the ACOE Wetland Delineation Manual and Massachusetts Department of Environmental Protection (MassDEP) Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetland Protection Act guidance document, observed the following protected wetland resources at the site:

- Bordering Vegetated Wetlands (BVW)
- Bank – Intermittent Streams
- Bank – Pond

Field data were recorded on ACOE Wetland Delineation Data Forms. See Appendix A for completed ACOE data forms and Appendix B for site photographs.

2.2 Wetland Delineation Methodology

Wetland delineation assessment was conducted in accordance to the Massachusetts Wetland Protection Act Regulations (310 CMR 10.55(2)(c)), Massachusetts Department of Environmental Protection (MassDEP) Delineating Bordering Vegetated Wetlands Under the Massachusetts Protection Act (March 1995), and ACOE Wetland Manual (Technical Report Y-87-1).

The bordering vegetated wetlands (BVW) delineation methodology included the characterization of vegetation, soil any hydrologic conditions in both wetland and upland areas to identify the transitional area, which was used as the BVW limit. Pink flags with distinct flag numbers are left in the field to show wetland resource area limits.

Vegetation, hydrology and soils are assessed in both wetland and upland areas to accurately place the wetland limits at each site. The percentage of vegetative species was estimated by creating sample plots. Sample plot radius for trees, shrubs, herb and woody vine strata was 30', 15', 5' and 30', respectively. After creating the sample plot areas, the percent basal area coverage of each species within the monitoring plot was recorded. Using these field observations, the percent dominance of each species within its stratum was calculated. The 50/20 Rule was then used to determine dominance.

Dominant species were considered the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceeds 50% of the total dominance measure (basal area) for the stratum, plus any additional species comprising 20% or more of the total dominance measure for the stratum. Once the dominant species were determined, they were treated equally to determine the presence of hydrophytic vegetation. If the number of dominant species with a Wetland Indicator Status of FAC (excluding FAC-), FACW or OBL is greater than, or equal to, the number of remaining dominant species, the area was considered a jurisdictional wetland resource area based on vegetation.

A soil sample from each wetland sample plot is also taken. Each soil sample goes to a depth of at least 12 – 24 inches. The soil is characterized to determine if the soil sample is considered a hydric (wetland) soil. Soil samples, including mottles, are characterized based on color using Munsell Soil-Color charts as a color reference.

The general area is then assessed for hydrologic conditions, including, but not limited to, site inundation, depth to free water, depth of soil saturation, water marks, drift lines, sediment deposits, water stained leaves.

2.3 Bordering Vegetated Wetlands (BVW)

A total of two separate BVW series were delineated at the site. The limit of the BVW resource areas were determined by locating the transitional area between wetland and upland vegetation, soils and hydrologic conditions. Wetland flags left in the field included:

- BVW-A1 through BVW-A6 (BVW “A” Series)
- BVW-B1 through BVW-B16 (BVW “B” Series)

The BVW A Series is associated with Asnebumskit Pond, while the BVW B series is associated with an unnamed intermittent stream on the eastern side of the parcel.

Dominant vegetation within the wetland resource areas included red maple (*Acer rubrum*), sensitive fern (*Onoclea sensibilis*), red maple (*Acer rubrum*), and reed canarygrass (*Phalaris arundinacea*) species that generally thrive in wet conditions. Soils within the BVW's were composed of gravel fill, coarse sand,

mucky peat and fine sandy loam with coarse sand particles underlain by compacted coarse sand and gravel. Other indicators of wetland hydrology included surface water, highwater table and saturation.

Dominant upland vegetation in the area included eastern white pine (*Pinus strobus*), northern red oak (*Quercus rubra*), Kentucky bluegrass (*Poa pratensis*), eastern hemlock (*Tsuga canadensis*), highbush blueberry (*Vaccinium corymbosum*), and cinnamon fern (*Osmunda cinnamomea*). Soil in the upland areas consist of very fine sandy loam, with no evidence of mottling. There was evidence of a restrictive layer in the form of compacted coarse sand and gravel on the eastern portion of the site.

A 100-foot buffer zone is associated with the BVW resource area.

2.4 Bank

Water bodies, including intermittent streams and ponds, have banks which are protected by the Massachusetts Wetland Protection Act. Bank is a wetland resource area defined by 310 CMR 10.54(2)(a) as “the portion of land surface which normally abuts and confines a water body. It occurs between a waterbody and a vegetated bordering wetland and adjacent floodplain, or, in absence of these, it occurs between a waterbody and an upland.” Vegetated banks provide valuable functions such as flood control, stormwater prevention, fisheries protection, and water quality protection. The limit of this resource area is identified by Top of Bank (TOB) which is located at the first observable break in slope or the Mean Annual Flood Level (MAFL), whichever is lower. TOB is easily identified in the field so that indicator was utilized for this wetland delineation.

Intermittent Stream Bank

Two intermittent streams were identified on site, one along the eastern side of the property and one along the western side of the property. The stream along the western property boundary begins at a culvert on Holden Road before flowing north towards Asnebumskit Pond. Prior to outletting into the pond, the stream channel becomes diffuse and loses channelized flow within the BVW A series. Evidence of excavation suggests that the stream channel may have been diverted by the construction of a berm and fence around Asnebumskit Pond. At the time of investigation no water was actively flowing throughout the entire reach of the channel. The stream is also not present on the current United States Geographical Survey (USGS) map, and has a watershed size of less than 0.5 square miles in size according to USGS Stream Stats which also classifies the stream as intermittent per 310 CMR 10.58 (2)(a)(1)(b-c). The

boundary of the western intermittent stream is was determined by locating the first observable break in slope (TOB). Wetland fags left in the field included:

- TOB-A1 through TOB-A13

The second stream delineated on site is located along the eastern property boundary. Much like the western intermittent stream, the eastern intermittent stream also begins at a culvert on Holden Road before flowing north towards Asnebumskit Pond where the channel becomes diffuse and loses channelized flow within the BVW B series just prior to outletting into the pond. At the time of the investigation, the stream had approximately 4-12 inches of water and in the field it was undetermined if the stream was considered perennial or intermittent. Upon further investigation, the stream is shown as intermittent on the current United States Geographical Survey (USGS) map and has a watershed size of less than 0.5 square miles in size according to USGS Stream Stats which classifies the stream as intermittent per 310 CMR 10.58 (2)(a)(1)(b-c). The boundary of the western intermittent stream was identified in the field by the location of Mean High Water (MHW) which also coincided with the first observable break in slope (TOB). Wetland flags left in the field included:

- MHW-B1 through MHW-B10

Banks are subject to a 100ft buffer under the Massachusetts Wetland Protection Act per 301 CMR 10.02(2)(b).

Pond Bank

According to the Paxton Open Space Plan Asnebumskit Pond is a Worcester Reservoir which can supply up to 270,000 gallons per day. Banks, such as those delineated at Asnebumskit Pond, are significant resources because they provide protection of the public water supply, ground water supply, and prevent pollution. The boundary of the western intermittent stream was identified in the field by the location of Mean High Water (MHW) which also coincided with the first observable break in slope (TOB). Wetland flags left in the field included:

- MHW-A1 through MHW-A20

Banks are subject to a 100ft buffer under the Massachusetts Wetland Protection Act per 301 CMR 10.02(2)(b).

2.5 Other Protected Areas

Weston & Sampson created an environmental resources map (see Figure 4) of the site to determine the presence of other protected areas. The data source of these map layers was the Massachusetts Geographic Information System (MassGIS). These areas included:

- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Certified and Potential Vernal Pools
- Areas of Critical Environmental Concern (ACEC)
- Outstanding Resource Waters (ORW)

Wetland resources identified in the field were also added to this map. Based on the MassGIS information, the entire investigational area is located within an Outstanding Resource Water.

A FEMA FIRM map (see Figure 3) was created online from the FEMA website to determine if there is a 100-year flood zone at the site. Based on the information provided by the FIRM map a portion of the investigational area adjacent to Asnebumskit Pond is located within the 100 year floodplain.

.

3.0 SUMMARY

On November 4th, 2019 Weston and Sampson delineated wetland resources adjacent to the Paxton Department of Public Works (DPW) facility located at 107 Holden Road in Paxton, MA. Two bordering vegetated wetlands, two intermittent streambanks, and a pond bank were identified and flagged in the field. Additional MassGIS and FEMA FIRM mapping indicated that the site was also within an Outstanding Resource Water, and portions of the site are within the 100 year floodplain.

This Wetlands Delineation Report has been reviewed and approved by a Professional Wetland Scientist PWS.

4.0 REFERENCES

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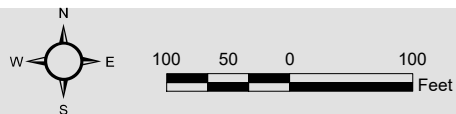
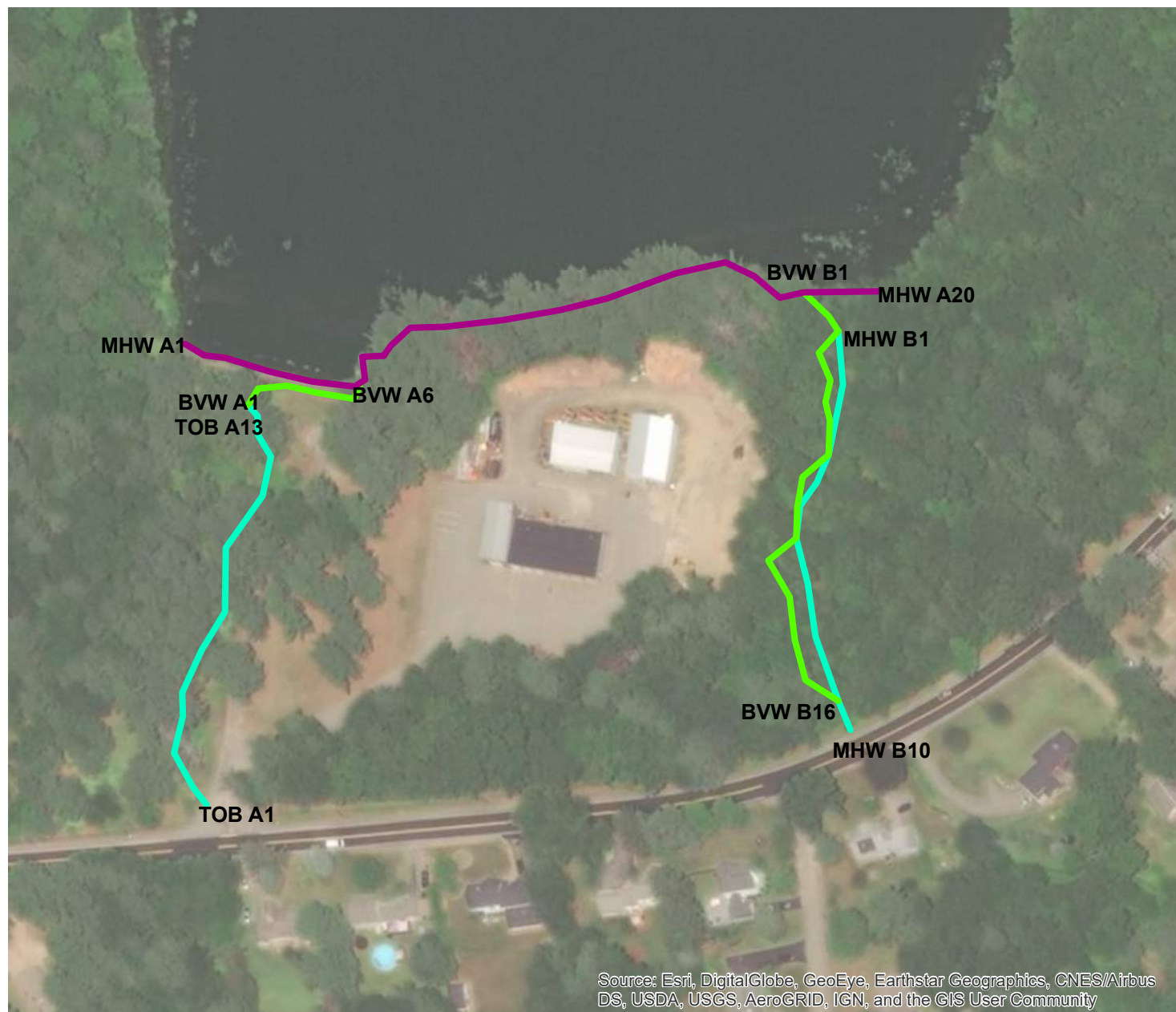
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Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

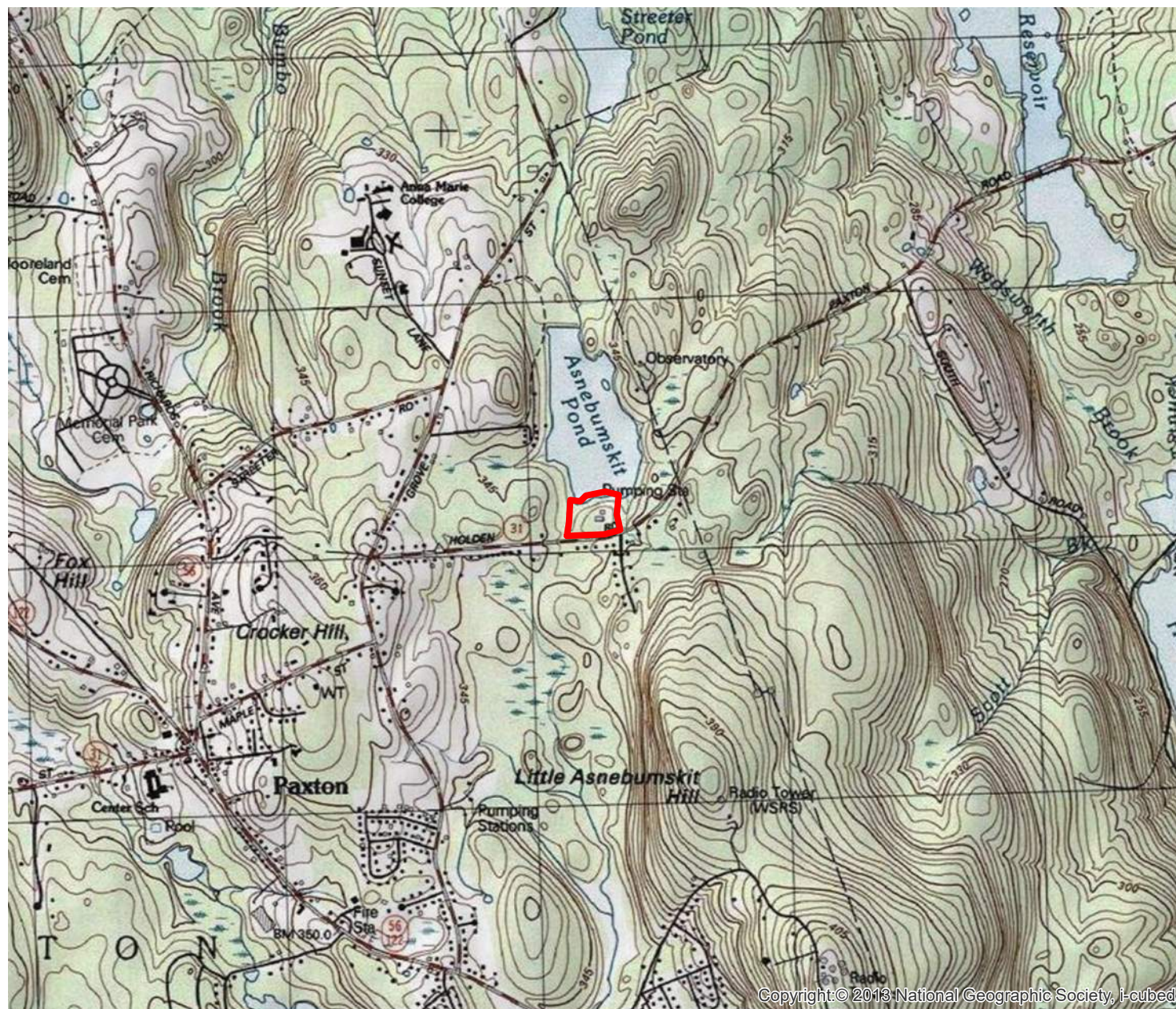
Legend

- Pond Bank
- Bordering Vegetated Wetlands
- Intermittent Stream Banks

FIGURE 1

Paton DPW Facility
Paxton MA

Wetland Delineation Map



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Legend

— Investigation Area

FIGURE 2

Paton DPW Facility
Paxton MA

USGS Topographic Map

Data Source: Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts Executive Office of Environmental Affairs

Weston & Sampson

National Flood Hazard Layer FIRMette



42°19'21.53"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **12/4/2019 at 12:15:07 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



100 50 0 100
Feet

Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

- Pond Bank
- Bordering Vegetated Wetlands
- Intermittent Stream Banks
- ACECs
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- * NHESP Certified Vernal Pools
- * NHESP Potential Vernal Pools
- Public Water Supply Contributor
- ORW for ACEC
- ORW for both Water Supply and Other

FIGURE 4

Paton DPW Facility
Paxton MA

Environmental Resources Map

APPENDIX A

ACOE Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: 107 Holden Road City/County: Paxton Sampling Date: 11/4/2019
 Applicant/Owner: Paxton Department of Public Works State: MA Sampling Point: BVW-A2 UP
 Investigator(s): Devin Batchelder Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
 Slope (%): 3-15% Lat: 42deg19'12.417"N Long: 71deg54'27.078"W Datum: _____
 Soil Map Unit Name: Woodbridge Paxton association NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No X
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u>		<u>Secondary Indicators (minimum of two required)</u>
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)		Wetland Hydrology Present? Yes _____ No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Predominance of maintained grass adjacent to reservoir building suggests the area was seeded upon construction of the access road and building.		

VEGETATION – Use scientific names of plants.

 Sampling Point: BVW-A2 UP

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>eastern white pine (Pinus strobus)</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
<u>25</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. <u>red oak (Quercus rubra)</u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
<u>5</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>Kentucky bluegrass (Poa pratensis)</u>	<u>100</u>	<u>Yes</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>American red raspberry (Rubus idaeus)</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
3. <u>common cinquefoil (Potentilla simplex)</u>	<u>1</u>	<u>No</u>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>106</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <u>X</u>
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
<u>0</u> = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Predominance of maintained grass adjacent to reservoir building suggests the area was seeded upon construction of the access road and building.				

SOIL

Sampling Point: BVW-A2 UP

[illegible]

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: 107 Holden Road City/County: Paxton Sampling Date: 11/4/2019
 Applicant/Owner: Paxton Department of Public Works State: MA Sampling Point: BVW-A2 WET
 Investigator(s): Devin Batchelder Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
 Slope (%): 3-15% Lat: 42deg19'11.531"N Long: 71deg54'33.528"W Datum: _____
 Soil Map Unit Name: Woodbridge Paxton association NWI classification: PEM1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No X
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: (Explain alternative procedures here or in a separate report.) Soils are disturbed due to fill from adjacent reservoir berm and fence installation.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>4</u> " Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>4</u> " (includes capillary fringe)		Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION – Use scientific names of plants.

 Sampling Point: BVW-A2 WET

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
<u>0</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. <u>red maple (acer rubrum)</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>5</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>sensitive fern (Onoclea sensibilis)</u>	<u>80</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>reed canarygrass (Phalaris arundinacea)</u>	<u>15</u>	<u>No</u>	<u>FACU</u>	
3. <u>upright sedge (Carex stricta)</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
4. <u>wrinkleleaf goldenrod (Solidago rugosa)</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
<u>105</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
<u>0</u> = Total Cover				
Hydrophytic Vegetation Present? Yes <u>X</u> No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: BVW-A2 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R,
<input type="checkbox"/> Histic Epipedon (A2)	MLRA 149B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)
<input checked="" type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
☐ Coast Prairie Redox (A16) (**LRR K, L, R**)
☐ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
☐ Dark Surface (S7) (**LRR K, L**)
☐ Polyvalue Below Surface (S8) (**LRR K, L**)
☐ Thin Dark Surface (S9) (**LRR K, L**)
☐ Iron-Manganese Masses (F12) (**LRR K, L, R**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
☐ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☒ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No

Remarks:

Soils are disturbed due to fill from adjacent reservoir berm and fence installation.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: 107 Holden Road City/County: Paxton Sampling Date: 11/4/2019
Applicant/Owner: Paxton Department of Public Works State: MA Sampling Point: BVW-B2 UP
Investigator(s): Devin Batchelder Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
Slope (%): 3-15% Lat: 42deg19'12.417"N Long: 71deg54'27.078"W Datum: _____
Soil Map Unit Name: Woodbridge Paxton association NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes _____ No <u>X</u>	
Wetland Hydrology Present? Yes _____ No <u>X</u>	
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		_____ Surface Soil Cracks (B6)
_____ Surface Water (A1)	_____ Water-Stained Leaves (B9)	_____ Drainage Patterns (B10)
_____ High Water Table (A2)	_____ Aquatic Fauna (B13)	_____ Moss Trim Lines (B16)
_____ Saturation (A3)	_____ Marl Deposits (B15)	_____ Dry-Season Water Table (C2)
_____ Water Marks (B1)	_____ Hydrogen Sulfide Odor (C1)	_____ Crayfish Burrows (C8)
_____ Sediment Deposits (B2)	_____ Oxidized Rhizospheres on Living Roots (C3)	_____ Saturation Visible on Aerial Imagery (C9)
_____ Drift Deposits (B3)	_____ Presence of Reduced Iron (C4)	_____ Stunted or Stressed Plants (D1)
_____ Algal Mat or Crust (B4)	_____ Recent Iron Reduction in Tilled Soils (C6)	_____ Geomorphic Position (D2)
_____ Iron Deposits (B5)	_____ Thin Muck Surface (C7)	_____ Shallow Aquitard (D3)
_____ Inundation Visible on Aerial Imagery (B7)	_____ Other (Explain in Remarks)	_____ Microtopographic Relief (D4)
_____ Sparsely Vegetated Concave Surface (B8)		_____ FAC-Neutral Test (D5)
Field Observations:		Wetland Hydrology Present? Yes _____ No <u>X</u>
Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____		
Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____		
Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION – Use scientific names of plants.

 Sampling Point: BVW-B2 UP

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>eastern white pine (Pinus strobus)</u>	<u>40</u>	<u>Yes</u>	<u>FACU</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>40</u> (A/B)														
2. <u>eastern hemlock (Tsuga canadensis)</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>															
3. <u>red oak (Quercus rubra)</u>	<u>5</u>	<u>No</u>	<u>FACU</u>															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
<u>60</u> = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <td style="width: 50%;">Total % Cover of:</td> <td style="width: 50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>55</u></td> <td>x 2 = <u>110</u></td> </tr> <tr> <td>FAC species <u>1</u></td> <td>x 3 = <u>3</u></td> </tr> <tr> <td>FACU species <u>76</u></td> <td>x 4 = <u>304</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>132</u> (A)</td> <td><u>417</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.16</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>55</u>	x 2 = <u>110</u>	FAC species <u>1</u>	x 3 = <u>3</u>	FACU species <u>76</u>	x 4 = <u>304</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>132</u> (A)	<u>417</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>55</u>	x 2 = <u>110</u>																	
FAC species <u>1</u>	x 3 = <u>3</u>																	
FACU species <u>76</u>	x 4 = <u>304</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>132</u> (A)	<u>417</u> (B)																	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)																		
1. <u>red oak (Quercus rubra)</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>															
2. <u>highbush blueberry (Vaccinium corymbosum)</u>	<u>5</u>	<u>Yes</u>	<u>FACW</u>															
3. <u>nannyberry (Viburnum lentago)</u>	<u>1</u>	<u>No</u>	<u>FAC</u>															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
<u>21</u> = Total Cover																		
Herb Stratum (Plot size: <u>5'</u>)																		
1. <u>cinnamon fern (Osmunda cinnamomea)</u>	<u>50</u>	<u>Yes</u>	<u>FACW</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. <u>partridgeberry (Mitchella repens)</u>	<u>1</u>	<u>No</u>	<u>FACU</u>															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
12. _____	_____	_____	_____															
<u>51</u> = Total Cover																		
Woody Vine Stratum (Plot size: <u>30'</u>)																		
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <u>X</u>														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
<u>0</u> = Total Cover																		
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: BVW-B2 UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R,
<input type="checkbox"/> Histic Epipedon (A2)	MLRA 149B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
☐ Coast Prairie Redox (A16) (**LRR K, L, R**)
☐ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
☐ Dark Surface (S7) (**LRR K, L**)
☐ Polyvalue Below Surface (S8) (**LRR K, L**)
☐ Thin Dark Surface (S9) (**LRR K, L**)
☐ Iron-Manganese Masses (F12) (**LRR K, L, R**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
☐ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: compacted coarse sand and gravel

Depth (inches): 9 "

Hydric Soil Present? Yes _____ No X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: 107 Holden Road City/County: Paxton Sampling Date: 11/4/2019
 Applicant/Owner: Paxton Department of Public Works State: MA Sampling Point: BVW-B2 WET
 Investigator(s): Devin Batchelder Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____
 Slope (%): 3-15% Lat: 42deg19'12.417"N Long: 71deg54'27.078"W Datum: _____
 Soil Map Unit Name: Woodbridge Paxton association NWI classification: PFO1/4E
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> " Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> " Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> " (includes capillary fringe)		Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION – Use scientific names of plants.

 Sampling Point: BVW-B2 WET

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. <u>red maple (Acer rubrum)</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)																
2. <u>eastern white pine (Pinus strobus)</u>	<u>5</u>	<u>No</u>	<u>FACU</u>																	
3. <u>red oak (Quercus rubra)</u>	<u>5</u>	<u>No</u>	<u>FACU</u>																	
4. <u>eastern hemlock (Tsuga canadensis)</u>	<u>5</u>	<u>No</u>	<u>FACU</u>																	
5. _____	_____	_____	_____	Prevalence Index worksheet: <table style="width: 100%;"> <tr> <td style="width: 50%;">Total % Cover of:</td> <td style="width: 50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: _____</td> <td>(A) _____ (B) _____</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = _____</td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = _____	FACW species _____	x 2 = _____	FAC species _____	x 3 = _____	FACU species _____	x 4 = _____	UPL species _____	x 5 = _____	Column Totals: _____	(A) _____ (B) _____	Prevalence Index = B/A = _____	
Total % Cover of:	Multiply by:																			
OBL species _____	x 1 = _____																			
FACW species _____	x 2 = _____																			
FAC species _____	x 3 = _____																			
FACU species _____	x 4 = _____																			
UPL species _____	x 5 = _____																			
Column Totals: _____	(A) _____ (B) _____																			
Prevalence Index = B/A = _____																				
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
<u>30</u> = Total Cover																				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)																				
1. _____	_____	_____	_____	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
<u>5</u> = Total Cover																				
Herb Stratum (Plot size: <u>5'</u>)																				
1. <u>reed canarygrass (Phalaris arundinacea)</u>	<u>100</u>	<u>Yes</u>	<u>FACW</u>	Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
2. <u>arrowleaf tearthumb (Polygonum sagittatum)</u>	<u>5</u>	<u>No</u>	<u>OBL</u>																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes <u>X</u> No _____																
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____	Woody Vine Stratum (Plot size: <u>30'</u>)																
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12. _____	_____	_____	_____																	
<u>106</u> = Total Cover				Hydrophytic Vegetation Present? Yes <u>X</u> No _____																
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2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____	Woody Vine Stratum (Plot size: <u>30'</u>)																
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6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____	Woody Vine Stratum (Plot size: <u>30'</u>)																
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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2. _____	_____	_____	_____																	
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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<u>0</u> = Total Cover				Woody Vine Stratum (Plot size: <u>30'</u>)																
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SOIL

Sampling Point: BVW-B2 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/>	Histosol (A1)	<input type="checkbox"/>
<input type="checkbox"/>	Histic Epipedon (A2)	<input type="checkbox"/>
<input type="checkbox"/>	Black Histic (A3)	<input type="checkbox"/>
<input type="checkbox"/>	Hydrogen Sulfide (A4)	<input type="checkbox"/>
<input type="checkbox"/>	Stratified Layers (A5)	<input type="checkbox"/>
<input type="checkbox"/>	Depleted Below Dark Surface (A11)	<input type="checkbox"/>
<input type="checkbox"/>	Thick Dark Surface (A12)	<input type="checkbox"/>
<input type="checkbox"/>	Sandy Mucky Mineral (S1)	<input type="checkbox"/>
<input type="checkbox"/>	Sandy Gleyed Matrix (S4)	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sandy Redox (S5)	<input type="checkbox"/>
<input type="checkbox"/>	Stripped Matrix (S6)	<input type="checkbox"/>
<input type="checkbox"/>	Dark Surface (S7) (LRR R, MLRA 149B)	<input type="checkbox"/>

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
☐ Coast Prairie Redox (A16) (**LRR K, L, R**)
☐ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
☐ Dark Surface (S7) (**LRR K, L**)
☐ Polyvalue Below Surface (S8) (**LRR K, L**)
☐ Thin Dark Surface (S9) (**LRR K, L**)
☐ Iron-Manganese Masses (F12) (**LRR K, L, R**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
☐ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: compacted coarse sand and gravel

Depth (inches): 8 "

Hydric Soil Present? Yes X No

Remarks:

APPENDIX B

Site Photographs

Figure 1: Intermittent Stream Identified with TOB A Flag Series



Figure 2: BVW Identified with BVW A Flag Series



Figure 3: Building Located at Reservoir



Figure 4: Reservoir Berm and Fence



Figure 5: Pond Bank Identified with MHW A Flag Series



Figure 6: Intermittent Stream Identified with MHW B Flag Series



Figure 7: BVW Identified with BVW B Flag Series



Figure 8: Wetland Soils Observed Onsite





May 16, 2017

Carol Riches, Town Administrator
Town of Paxton
697 Pleasant Street
Paxton, Massachusetts 01612

RE: Watershed Protection Act Jurisdiction at DPW Property, Holden Road, Paxton, MA

Dear Ms. Riches:

Almost twenty five years have passed since the Watershed Protection Act (WsPA) was signed into law. This state regulation authorizes the Department of Conservation and Recreation (DCR), Division of Water Supply Protection to regulate, for protection of water quality, certain land uses and activities located on properties that are jurisdictional under the Act.

This office routinely reviews building permits, legal ads etc. to check if any applications or permits have been applied for property that may be subject to jurisdiction of the WsPA. It has come to our attention through a newspaper article that the Town is discussing a new facility at the DPW property on Holden Road. I would like to remind you this property is subject to the Watershed Protection Act (313 CMR 11.00). Therefore, you are advised to submit a Request for Determination of Applicability under the Watershed Protection Act as soon as possible.

I have enclosed an application for your assistance. Should you have any questions, please do not hesitate to contact the Environmental Planning Unit at (508)792-7806, ex 314. Thank you.

Sincerely,

John M. Scannell
Regional Director

JMS/NM

Enclosure as stated

COMMONWEALTH OF MASSACHUSETTS · EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS

Department of Conservation and Recreation
180 Beaman Street
West Boylston, MA 01583
508-792-7806 508-792-7805 Fax
www.mass.gov/dcr



Charles D. Baker
Governor

Karyn E. Polito
Lt. Governor

Matthew A. Beaton, Secretary, Executive
Office of Energy & Environmental Affairs

Leo Roy, Commissioner
Department of Conservation & Recreation



Commonwealth of Massachusetts
Department of Conservation and Recreation

Massachusetts Watershed Protection Act
M.G.L. ch. 92A ½

Watershed Protection Regulations
313 CMR 11.00

WsPA Form 1
Request For Watershed Determination of Applicability

INSTRUCTIONS

USING THIS FORM

This form is used to request an Applicability Decision under the Watershed Protection Act (WsPA) from the Division of Water Supply Protection (the Division) as to whether or not the WsPA regulations apply to your property or project.

To obtain further information, please refer to the 1) *Watershed Protection Act Guidance Document for Applicants of Advisory Rulings, Determinations of Applicability, Variances, and Exemptions of Tributaries*; 2) Watershed Protection Act, Chapter 36 of the Acts of 1992; 3) Massachusetts General Law c. 92A½; or 4) the Watershed Protection Regulations, 313 CMR 11.00. These documents are available from either office listed below or the Division's website at www.mass.gov/dcr/wspsa.

FILING THIS FORM

If your property is located in **Boylston, Holden, Leominster, Paxton, Princeton, Sterling, West Boylston, or Worcester**, send your form to:

DCR, Division of Water Supply Protection
Attn: Environmental Planning
180 Beaman Street
West Boylston, MA 01583
(508) 792-7806

If your property is located in **Athol, Barre, Hardwick, Hubbardston, New Salem, Oakham, Orange, Petersham, Phillipston, Rutland, Shutesbury, Templeton, Westminster, or Wendell**, send your form to:

DCR, Division of Water Supply Protection
Attn: Environmental Planning
485 Ware Road
Belchertown, MA 01007
(413) 323-6921 x501

AFTER FILING

The Division will issue a written Applicability Decision within 60 days of the Date of Submission (as defined in 313 CMR 11.03). If the Division fails to issue a written Decision within that time frame then it shall be deemed that the WsPA Regulations do not apply to your property or project. The Decision is a recordable document.

If you wish to appeal the Applicability Decision, you must file a Notice of Claim for an Adjudicatory Proceeding with the Commissioner and the Division within 21 days of issuance of the decision. The Division utilizes the Commonwealth's Division of Administrative Law Appeals to adjudicate an appeal. See 801 CMR 1.00 et seq. for applicable procedures.



Commonwealth of Massachusetts
Department of Conservation and Recreation

Massachusetts Watershed Protection Act
M.G.L. ch. 92A ½

Watershed Protection Regulations
313 CMR 11.00

WsPA Form 1
Request For Watershed Determination of Applicability

I. OWNER/APPLICANT/LOT IDENTIFICATION

A. Property Owner

Name:

Mailing Address:

Town:

State:

Zip:

Telephone Number:

Fax Number:

B. Applicant/Representative

Name:

Mailing Address:

Town:

State:

Zip:

Telephone Number:

Fax Number:

C. Lot Identification

Address:

Town:

County:

Town Assessor's Sheet Number:

Town Assessor's Lot Number:

Registry of Deeds Book Number:

Deed Book Page Number:

II. DESCRIPTION OF PROPOSED STRUCTURE, USE AND/OR ACTIVITY

Describe the existing lot and all proposed activities and, if applicable, any change in use, extent of expansion (e.g., number of bedrooms and square footage), land alteration, or increase in impervious area. If you are constructing a storage building or warehouse, please specify the type of material(s) and quantities that will be stored.

- ☐ *Check here if you only want to know whether there is WsPA jurisdiction on the property and are NOT proposing any activity.*

WsPA Form 1
Request For Watershed Determination of Applicability

III. SUPPORTING MATERIALS

You may also wish to include the following (please check those provided):

- | | |
|---|--|
| <input type="checkbox"/> Land Surveyor's Determination or Plot Plan | <input type="checkbox"/> Septic System Plan |
| <input type="checkbox"/> Town Assessor's Map | <input type="checkbox"/> Topographic Map |
| <input type="checkbox"/> Site Plan | <input type="checkbox"/> Soil Conditions Map |

Additional materials may be necessary in order for the Division to make a decision. The Division will contact you if additional information is required.

IV. CERTIFICATION

Please read the following statement and sign below.

I certify that the information provided on this form and in all attachments is correct and accurate to the best of my knowledge. I understand that the Division of Water Supply Protection, Office of Watershed Management staff may, at reasonable times, inspect my property for the purposes of confirming information given here and for determining the impact of this proposal on water quality.

In compliance with 313 CMR 11.06(1)(a), an **Applicability Decision** may only be issued to a **person Owning an Interest in Real Property**.

Signature: _____ Date: _____
(Property Owner)

If you are not the property owner, please attach a statement and signature from the owner granting the applicant permission to seek this Decision on his or her behalf and sign below.

Signature: _____ Date: _____
(Applicant)

Please note that this Applicability Decision is only related to the provisions of the Watershed Protection Act regulations (313 CMR 11.00) and does not relieve the applicant of the duty to obtain any other required state, federal, or local permits or variances. Where applicable it will still be necessary to obtain wetlands permits, Title 5 approvals, 401 water quality certifications, storm water permits (including the development of a Storm Water Pollution Prevention Plan), and any local zoning acceptances.

PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 4

GEOTECHNICAL INVESTIGATION

- Boring Location Map
- Geotechnical Feasibility Report

**Paxton Department of Public Works
Weston & Sampson Project No. 2191012**

August 31, 2020

Paxton Department of Public Works
c/o Jeffrey Alberti, LEED AP
Weston & Sampson
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035

**RE: Geotechnical Feasibility Study
 Proposed Department of Public Works Facility
 Paxton, MA**

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present this letter report summarizing our geotechnical feasibility study for the proposed Department of Public Works (DPW) facility at the existing Paxton DPW property at 107 Holden Road in Paxton, Massachusetts. The purpose of our feasibility study was to identify preliminary geotechnical considerations for the proposed site improvements.

EXISTING CONDITIONS

The existing Paxton DPW property (site) is bound by Holden Road to the south, Asnebumskit Pond to the north, and wooded areas to the east and west. The existing Paxton DPW facility occupies the north portion of the site. The facility includes an approximately 6,000 square foot (SF) vehicle storage building, an approximately 2,515 SF metal building, an approximately 2,430 SF wood-framed salt shed, and several storage trailers. We assume below-grade features are not present in the existing buildings. Other site features include an above-grade fuel storage tank with a wood canopy above and an adjacent below-grade 1,500-gallon fuel tank, and a liquefied petroleum gas (LPG) tank and generator on concrete pads. Subsurface utilities at the facility include water, electric, communications, sewer, and diesel fuel. Soil and debris material stockpiles are located at the east portion of the facility. The ground surface at the existing facility is mostly covered in asphalt pavement. Access to the existing facility is provided by a paved access road from Holden Road to the south. Existing site features are shown on the attached *Figure 1 – Site Plan – Existing Conditions*.

The south portion of the site is mostly undeveloped and moderately wooded, although the paved access road is located in this portion of the site. Surface boulders and/or bedrock outcrops are present in this portion of the site.

Based on review of an October 2019 Survey Plan prepared by Weston & Sampson, ground surface elevations in the north portion of the site (existing DPW facility) range from approximately El. 1121 ft. to El. 1123 ft. The ground surface slopes down and away from the north side of the facility at approximately 4H:1V to El. 1112 ft. and from the east side of the facility at approximately 1.5H:1V to El. 1109 ft. Finished floor elevations of the existing

buildings were not indicated on the Survey Plan, but based on surrounding ground surface elevations, the finished floor elevations likely range from approximately El. 1122 ft. to El. 1123 ft. Ground surface elevations in the south portion of the site (wooded and paved access road areas) generally slope up from the west at El. 1113 ft. to the east at El. 1122 ft. The ground surface slopes gradually down to El. 1115 ft. in the east section of the wooded area. Elevations in this report are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

PROPOSED CONDITIONS

Based on review of a February 7, 2020 Conceptual Grading and Drainage Plan prepared by Weston & Sampson, the proposed DPW facility will include an approximately 20,500 SF DPW building, a 2,400 SF salt shed, paved parking areas around the building and a paved access road extending from Holden Road, a stormwater detention basin, and new subsurface utilities. Demolition of all existing site features are planned as part of the proposed construction. Proposed site features are shown in *Figure 2 – Site Plan – Proposed Conditions*.

The DPW building will include administration and employee office space, maintenance shops, a vehicle storage area, and a vehicle wash area. The DPW building will be located south of the existing vehicle storage building and will span portions of the north and south areas of the site.

Structural information for the DPW building was not available at the time of this report, but based on our experience with similar structures, we anticipate that loads will be less than 400 kips for columns, less than 7 kips per lineal foot for walls, and up to 250 pounds per square foot for floor slabs. The building will have a first-floor slab-on-grade set at El. 1124 ft. We assume that basements and/or below grade areas are not planned except for possible below grade vaults up to approximately 8 ft. deep at isolated locations.

The proposed salt shed will be located east of the new DPW building and in an existing wooded area. Information on the salt shed, including the construction type, interior floor type (e.g. asphalt or concrete), and floor elevation was not indicated on the Conceptual Plan. We assume, however, that the salt shed will be a timber-framed structure supported on concrete foundation walls, the interior floor will be paved with asphalt concrete pavement, and the floor elevation will be within 2 ft. of the DPW finished floor elevation.

The stormwater detention basin will be located west of the new DPW building and in an existing wooded area. The basin will have side slopes inclined at approximately 3H:1V and will have a bottom elevation of El. 1111 ft.

The proposed building and site elevations will require fills up to approximately 8 ft. and cuts up to approximately 2 ft. relative to existing grades. The thickest fill will be required in the paved parking area west of the new DPW building. Soil fill slopes up to approximately 7 ft. tall and inclined at approximately 3H:1V are proposed around the west and south sides of the site to facilitate the proposed grading. New subsurface utilities are assumed to be less than 5 ft. below existing grades.

SUBSURFACE CONDITIONS

Geological Setting

Information from the Massachusetts Office of Geographic Information (MassGIS) indicates the site is located in

an area of glacial till overlying bedrock at depths less than 50 feet. Bedrock geology at the site is mapped as biotite granofels, calc-silicate granofels, and sulfidic schist of the Paxton Formation. The nearest mapped bedrock outcrops are located approximately ¼-mile east of the site. Possible bedrock outcrops were observed in the south portion of the site as discussed above.

Subsurface Explorations

Subsurface conditions were explored on February 3, 2020 by advancing nine borings (B-1, B-2A, B-2B, B-3A, B-3B, B-4, B-5, B-6A and B-6B) to depths up to 11.5 ft. at the approximate locations shown in **Figures 1 and 2**. Borings with a “B” designation represent an offset of up to approximately 5 ft. away from the initial “A” location. Weston & Sampson geotechnical engineering staff monitored exploration activities, measured exploration locations from existing site features, and prepared logs for each exploration.

The borings were completed by Technical Drilling Services, Inc. of Sterling, Massachusetts using a track-mounted drill rig and hollow-stem auger drilling methods with 4-¼-inch hollow stem augers. Standard penetration tests (SPTs) were conducted at 2 to 5 ft. intervals in each boring by driving a 24 in. long by 1-3/8 in. inside diameter (2 in. outside diameter) split spoon sampler with blows from a 140 lb. automatic hammer falling 30 in. per blow. Hammer blows per 6-inches of sampler penetration (for 24-inches) were recorded. The blow counts for the middle 12-inches are combined and designated as the SPT N-Value, which is correlated to soil consistencies and engineering soil properties. Samples were generally not collected in “B” locations at depths previously sampled in the “A” location. Split-spoon refusal, where noted in the boring logs, is defined as 100 hammer blows for less than 6-inches of sampler penetration. Auger refusal is defined as no discernable advancement of the auger under the full weight of the drill rig over a period of approximately 5 minutes.

Subsurface Conditions

Subsurface conditions encountered in the explorations below surficial asphalt concrete (AC) pavement or topsoil generally consisted of approximately 2 ft. of fill or 3 ft. to 3.5 ft. of subsoil above native glacial till and refusal. The native subsurface conditions encountered in the borings below the fill were generally consistent with the mapped surficial geology.

Descriptions of the subsurface conditions encountered in the explorations are included in **Attachment A – Boring Logs**. The major strata encountered in the explorations are described below. Variations may occur and should be expected outside and between exploration locations.

Surficial Materials – Approximately 2.5 to 3-inches of AC pavement was encountered at the ground surface in B-2A/B and B-3A/B. Approximately 2 to 10-inches of topsoil was encountered at the ground surface in B-2A/B, B-4, B-5, and B-6A/B.

Fill – Approximately 2 ft. of medium dense FILL was encountered below the AC pavement in B-1. The FILL was generally comprised of fine gravel with some fine to coarse sand and trace non-plastic fines.

Subsoil – Approximately 3 to 3.5 ft. of loose to medium dense SUBSOIL was encountered below the topsoil in B-4 through B-6A/B. The SUBSOIL was generally comprised of fine to coarse sand with little to some non-plastic fines, few to little fine to coarse gravel, and trace organics (roots).

Glacial Till – Medium dense to very dense GLACIAL TILL was encountered either below the AC pavement, topsoil, fill, or subsoil in all borings. The GLACIAL TILL was generally comprised of fine to coarse gravel with some fine to coarse sand and trace to few non-plastic fines or fine to coarse sand with little to some gravel and few to little non-plastic fines. Based on periodic auger grinding, cobbles and boulders are likely present in the glacial till.

Refusal – Auger refusal was encountered below the glacial till in all borings at depths ranging from approximately 2 to 11.5 ft. Rock coring was not completed at the refusal depths; therefore, refusals could have been on boulders or bedrock.

Groundwater – Groundwater was not encountered in the borings. We anticipate that groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

PRELIMINARY GEOTECHNICAL CONSIDERATIONS

General

Based on the subsurface conditions encountered in the explorations, the primary geotechnical considerations for the proposed site development are the presence of existing topsoil and subsoil, undocumented (non-engineered) fill materials and possible shallow bedrock. The existing topsoil, subsoil, and fill should be removed from structural areas as described below. The proposed structures can be supported on conventional shallow foundations bearing in medium dense (or denser) native, undisturbed glacial till or on properly constructed Structural Fill overlying the glacial till or bedrock. Existing foundations and utilities should be removed from structural and pavement areas as described below.

Unsuitable Material Removal

Undocumented (non-engineered) fill was encountered to a depth of approximately 2 ft in B-1 and topsoil and subsoil were encountered to depths ranging from approximately 10 in. to 3.5 ft. in B-2A, B-4, B-5, and B-6A (wooded area of site). The fill, topsoil, and subsoil materials are unsuitable for support of proposed foundations and other rigid structures such as interior and exterior slabs that could be adversely affected by differential settlement.

All vegetation, topsoil, subsoil, fill, and asphalt concrete pavement should be completely removed from within the zone-of-influence (ZOI) beneath foundations, slabs, and other rigid improvements and replaced with compacted Structural Fill. The ZOI is defined by planes extending horizontally away from the bottom outside edges of footings, slabs, and other proposed improvements for 2 ft. and then down and away at a 1H:1V slope to the top of the native glacial till.

All vegetation and topsoil should be removed from below proposed pavement areas. However, based on our feasibility-level explorations, subsoil and granular fill can remain provided these materials do not contain organic or debris materials. The suitability of these materials to support flexible pavements should be evaluated further during final design.

Existing Structure and Utility Removal

Existing foundation elements and utilities should be removed from within the ZOI beneath foundations, slabs, and other rigid site improvements and replaced with compacted Structural Fill.

Existing foundation elements can remain in-place below pavement areas provided the tops of the elements are removed to a minimum of 2 ft. below the pavement and they do not interfere with construction of proposed site improvements. Utilities to be abandoned below pavement areas should be either removed and replaced with compacted Structural Fill or filled with controlled density fill (CDF). All below-grade tanks should be removed and replaced with compacted Structural Fill.

Excavation and Bedrock Removal

Difficult excavations and the presence of boulders in the subsurface soils should be expected at the site. Auger refusal was encountered in all borings at depths ranging from approximately 2 to 11.5 ft. (El. 1111.5 ft. to El. 1120 ft.). If excavations for foundations, utilities, or other proposed site features will extend below these depths/elevations, bedrock removal should be expected. Where encountered, bedrock should be removed at least 1 ft. below proposed building foundations, slabs, and utilities and at least 2 ft. below proposed pavements and replaced with compacted Structural Fill.

Fill

Structural Fill is recommended for use within the ZOI beneath foundations and within the top 3 ft. in pavement areas. Structural Fill should consist of well graded sand and gravel with a maximum particle size of 3-inches and no more than 10 percent fines (such as MADOT M1.03.0-Type b Gravel Borrow or M2.01.7 Dense Graded Crushed Stone). Crushed Stone may be used as Structural Fill if fully wrapped in a non-woven geotextile fabric (such as Mirafi 160N or equivalent) and compacted until dense and well-keyed.

Common Borrow is recommended for use up to 3 ft. below pavement areas and within landscaped areas. Common Borrow should consist of granular soils with less than 20 percent fines and be free of organics and contamination (including metals, VOCs, SVOCS, etc.).

Based on subsurface conditions encountered in our explorations, re-use of excavated granular fill and native glacial till as Common Borrow appears feasible provided debris and organic materials are removed. Re-use of these materials as Structural Fill could also be feasible, however, the native glacial till possesses a relatively high fines content and mixing of materials to create a well-graded, reasonably consistent material with less than approximately 10 percent fines could be necessary for use as Structural Fill. On-site materials may also require screening to remove oversize particles (cobbles and boulders) before re-use as either Structural Fill or Common Borrow. Re-use of the subsoil as Structural Fill or Common Borrow is not considered feasible.

Foundations for Proposed Structures

Based on the subsurface conditions encountered in our explorations and our experience with previous projects involving similar types of structures, the proposed structures can be supported on conventional shallow spread foundations bearing in undisturbed, medium dense (or denser) native glacial till or on properly constructed Structural Fill over the native glacial till or bedrock. As discussed above, all existing undocumented fill, topsoil, subsoil, foundation elements, and utilities should be removed from below the ZOI of proposed foundations and replaced with compacted Structural Fill.

An allowable bearing pressure of 6,000 pounds per square foot (psf) can be used for preliminary design of spread footings supported on native glacial till or on Structural Fill overlying glacial till or bedrock. The allowable bearing pressure can be increased to 8,000 psf to resist temporary wind and seismic loads provided load eccentricities are within the middle third of the footing. Additional recommendations for design and construction of foundations can be provided in a design-level geotechnical report.

Additional Explorations and Analyses

The purpose of our feasibility study was to complete explorations to investigate subsurface conditions and to identify preliminary geotechnical considerations at the subject site. Additional explorations and geotechnical analyses will be required to develop final geotechnical recommendations for foundation, earthwork, and pavement design.

LIMITATIONS

We have prepared this preliminary feasibility study for use by the Town of Paxton and members of the design and construction team for the subject project and this site only. The data and report can be used for preliminary cost estimating and/or alternative analysis but is not considered sufficient for design or bidding and should not be construed as a warranty of subsurface conditions. Additional geotechnical explorations and analyses will be required for final design.

Subsurface conditions indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist between exploration locations. If subsurface conditions differing from those described are noted during excavation and construction, reevaluation will be necessary.

Site development plans and design details were not finalized at the time this report was prepared. If changes are made in site grades, configuration, design loads, or type of construction for the structure, the preliminary geotechnical considerations may not be applicable.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, is given. For additional information about the use of this report, see the Geoprofessional Business Association, Inc. (GBA) documents included in **Attachment B**.

It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Very truly yours,

WESTON & SAMPSON, INC.



Matthew J. Zanchi, EIT



Thomas J. Strike, PE
Senior Project Manager

MJZ:TJS

Attachments:

Figure 1 – Site Plan – Existing Conditions

Figure 2 – Site Plan – Proposed Conditions

Attachment A – Boring Logs (11 pages)

Attachment B – Important Information about This Geotechnical-Engineering Report (2 pages)

\\wse03.local\\WSE\\Projects\\MA\\Paxton MA\\DPW Facility\\Geotechnical\\Report\\DRAFT Geotechnical Feasibility Report - Paxton DPW.doc

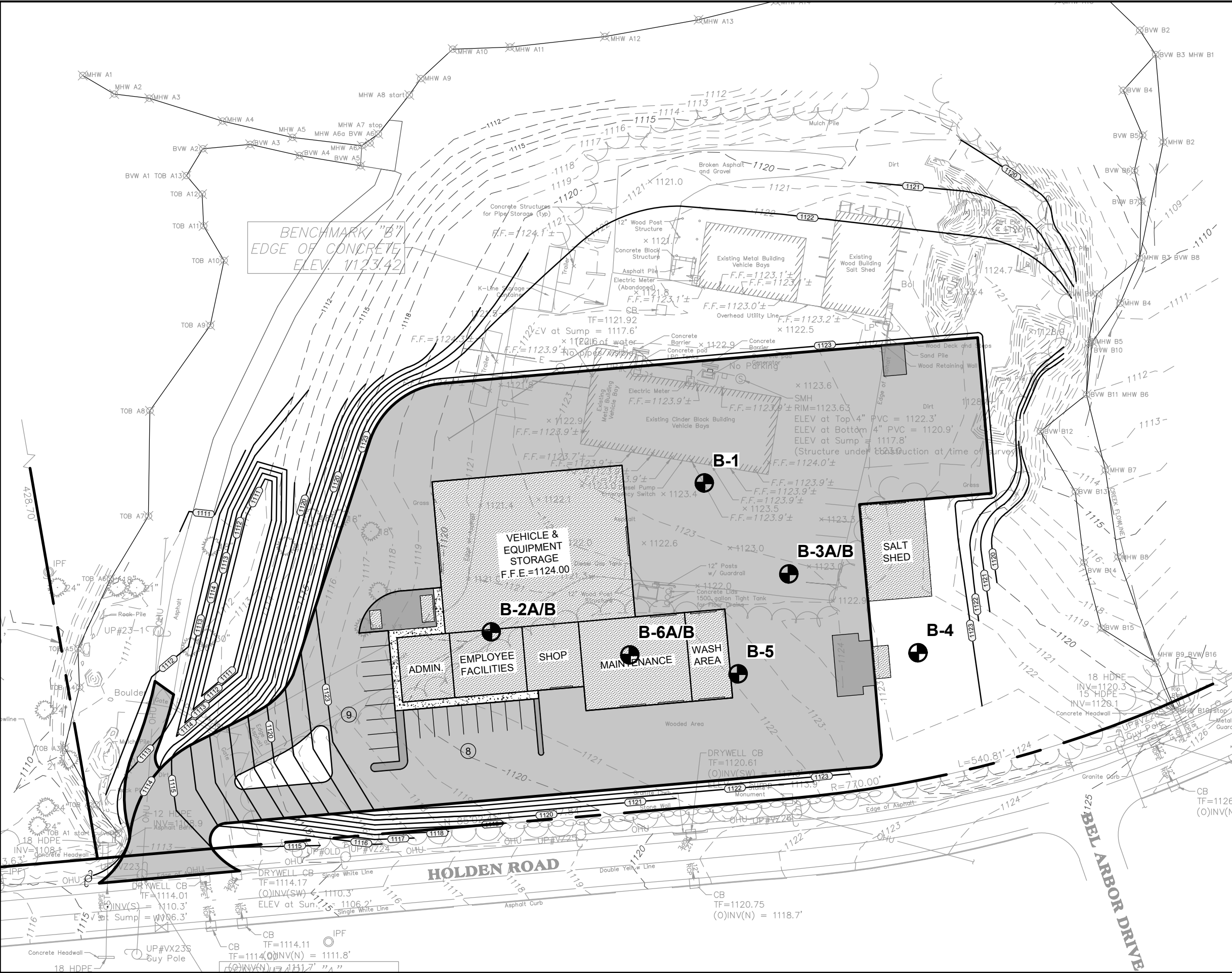
FIGURES

[illegible]

A north arrow pointing upwards, labeled 'N' at the top. Below the arrow is a graphic scale bar with markings at 60, 30, 0, 60, and 120. The text 'SCALE: 1"=60\'' is printed below the scale bar.

DPW FACILITY
PAXTON, MASSACHUSETTS

Weston & SampsonSM



- NOTES:**
1. THIS DRAWING IS BASED ON A FEBRUARY 2020 CONCEPTUAL GRADING & DRAINAGE PLAN PREPARED BY WESTON & SAMPSON ENGINEERS, INC.
 2. BORINGS WERE COMPLETED BY TECHNICAL DRILLING SERVICES, INC. OF STERLING, MA ON FEBRUARY 3, 2020 AND OBSERVED BY WESTON & SAMPSON GEOTECHNICAL ENGINEERING STAFF.
 3. EXPLORATION LOCATIONS SHOWN ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS TO EXISTING FEATURES.
 4. ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

LEGEND:

B-1
BORING DESIGNATION AND APPROXIMATE LOCATION.

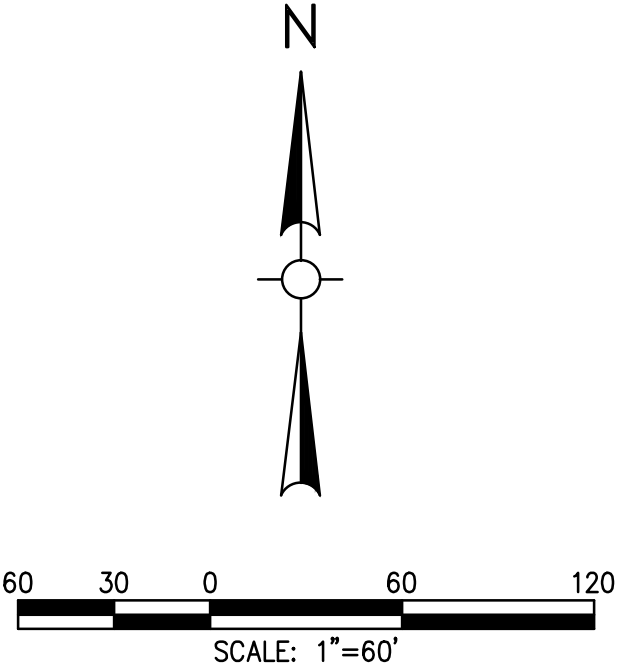


FIGURE 2
SITE PLAN - PROPOSED CONDITIONS

DPW FACILITY
PAXTON, MASSACHUSETTS

DESIGNED BY: MJZ	CHECKED BY: TJS	DATE: AUGUST 2020
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Weston & Sampson

ATTACHMENT A
BORING LOGS






CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1123.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	6.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	LOCATION:	N:2941731 ± / E:545685 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%)		Surface: Asphalt concrete (AC) pavement. 3" AC Pavement. Well graded gravel with sand (GW) - Medium dense; orange to brown; moist; mostly fine GRAVEL, some fine to coarse sand, trace non plastic fines; [FILL]. Well graded gravel with sand (GW) - Dense to very dense; light brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, trace non plastic fines; [GLACIAL TILL].		
5		S-1 8/24	21 14 13 9	27				
		S-2 11/24	10 17 32 41	>> 49				Occasional auger grinding from approximately 2.3 ft. to 6.0 ft.
		S-3 20/24	31 25 30 32	>> 55			1118	
10							1113	
15							1108	
20							1103	Exploration ended at 6.0 ft. due to auger refusal.

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1121.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	2.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings	LOCATION:	N:2941638 ± / E:545551 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				<ul style="list-style-type: none"> ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%) 		Surface: Grass 10" Topsoil.		
		S-1 20/20	12 32 71 100/2			Well graded gravel with sand (GW) - Very dense; brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, trace non plastic fines; possible cobble fragments [GLACIAL TILL].		Occasional auger grinding from approximately 1.0 ft. to 2.0 ft. Exploration ended at 2.0 ft. due to auger refusal.
5							1116	
10							1111	
15							1106	
20							1101	

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1121.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	7.2 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings	LOCATION:	N:2941639 ± / E:545554 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				<ul style="list-style-type: none"> ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%) 		Surface: Grass B-2B offset approximately 5 ft. northeast of B-2A. See log for B-2A for soil descriptions for upper 2 ft.		
5		S-1 21/24	5 16 21 36	37		Silty sand with gravel (SM) - Dense; brown; moist; mostly fine to coarse SAND, little fine gravel, little non plastic fines; [GLACIAL TILL].	1116	Occasional auger grinding from approximately 2.0 ft. to 7.2 ft.
		S-2 17/24	17 24 34 36	>> 58		Well graded gravel with silt and sand (GW-GM) - Very dense; brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines; possible cobble fragments [GLACIAL TILL].		
10		S-3 0/2	100/2					Exploration ended at 7.2 ft. due to auger refusal.
15							1106	
20							1101	

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1123.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	3.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	LOCATION:	N:2941675 ± / E:545738 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				<ul style="list-style-type: none"> ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%) 				
				10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 18/24	22 48 57 29			2.5" AC Pavement.		
		S-2 7/6	69 120/0			Well graded gravel with sand (GW) - Very dense; light brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, trace non plastic fines; possible cobble fragments [GLACIAL TILL].		Occasional auger grinding from approximately 0.2 ft. to 3.0 ft.
						Well graded sand with silt and gravel (SW-SM) - Light brown; moist; mostly fine to coarse SAND, some fine to coarse gravel, few non plastic fines; [GLACIAL TILL].		Exploration ended at 3.0 ft. due to auger refusal.
5							1118	
10							1113	
15							1108	
20							1103	

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1123.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	3.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	LOCATION:	N:2941675 ± / E:545738 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf)	⊕ Moisture Content (%)	▼ Plastic Limit (%)	▲ Liquid Limit (%)				
				10	20	30	40		Surface: Asphalt concrete (AC) pavement.		
									2.5" AC Pavement. B-3B offset approximately 4 ft. east of B-3A. See log for B-3A for soil descriptions..		Occasional auger grinding from approximately 0.2 ft. to 3.0 ft.
5										1118	
10										1113	
15										1108	
20										1103	
											Exploration ended at 3.0 ft. due to auger refusal.

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1123.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	11.5 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings	LOCATION:	N:2941626 ± / E:545817 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				<ul style="list-style-type: none"> ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%) 		Surface: Forest debris (wooded area). 3" Topsoil. Silty sand with gravel (SM) - Loose; orange-brown; moist; mostly fine to coarse SAND, little fine gravel, little non plastic fines; [SUBSOIL].		
		S-1 6/24	2 2 5 5	7				
		S-2 17/24	4 5 8 17	13		Silty sand with gravel (SM) - Medium dense; light brown; moist; mostly fine to medium SAND, some non plastic fines, little fine to coarse gravel; no odor; [SUBSOIL].		
5		S-3 18/24	11 34 96 70	>> 130		Silty sand with gravel (SM) - Very dense; light brown to brown; moist; mostly fine to medium SAND, little fine to coarse gravel, little non plastic fines; [GLACIAL TILL].	1118	Occasional auger grinding from approximately 3.5 ft. to 11.5 ft.
10		S-4 24/24	18 43 77 95	>> 120			1113	
15							1108	
20							1103	Exploration ended at 11.5 ft. due to auger refusal.

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1122.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	6.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings	LOCATION:	N:2941625 ± / E:545639 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				<ul style="list-style-type: none"> ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%) 		Surface: Forest debris (wooded area). 4" Topsoil. Silty sand (SM) - Loose; orange-brown; moist; mostly fine to coarse SAND, little non plastic fines, few fine to coarse gravel; [SUBSOIL]. Well graded sand with silt and gravel (SW-SM) - Dense to very dense; light brown; moist; mostly fine to coarse SAND, some fine gravel, few non plastic fines; [GLACIAL TILL].		
		S-1 10/24	2 3 2 1	5				
		S-2 20/24	2 7 25 31	32				Occasional auger grinding from approximately 3.0 ft. to 6.0 ft.
5		S-3 11/16	18 61 120/4				1117	
10							1112	
15							1107	
20							1102	Exploration ended at 6.0 ft. due to auger refusal.

CONTRACTOR:	Technical Drilling Services, Inc.	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE START:	February 3, 2020
FOREMAN:	Brett Balyk	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	DATE FINISH:	February 3, 2020
LOGGED BY:	Matthew Zanchi	SUPPORT CASING:	N/A	GROUND EL:	1122.0 ± (NAVD88)
CHECKED BY:	Tom Strike, PE	CORING METHOD:	N/A	FINAL DEPTH:	6.0 ft.
EQUIPMENT:	All-Terrain Drill Rig	BACKFILL MATERIAL:	Drill Cuttings	LOCATION:	N:2941625 ± / E:545639 ±
SPT HAMMER:	Automatic (140-lb.)	ADDITIONAL NOTES:		GRID SYSTEM:	NAD83 State Plane (MA)

DEPTH BELOW GROUND SURFACE, VERTICAL FT.	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO, IN./IN.	SPT BLOWS PER 6 IN. [CORING RATE PER FT.]	SPT RESISTANCE AND LABORATORY TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▼ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%)				
				10 20 30 40		Surface: Forest debris (wooded area). B-6B offset approximately 5 ft. south of B-6A. See log for B-6A for soil descriptions..		
5							1117	Occasional auger grinding from approximately 3.0 ft. to 6.0 ft.
10							1112	
15							1107	
20							1102	
								Exploration ended at 6.0 ft. due to auger refusal.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 1 GENERAL INFORMATION

GENERAL NOTES AND USE OF LOG

- 1.) This exploration was made by ordinary and conventional methods and with care deemed adequate for Weston & Sampson's study and/or design purposes. Since this exploration was not made to gather information relating to construction, the data noted in the field and recorded may not necessarily be the same as that which a construction contractor would desire.
- 2.) This log is part of a specific report prepared by Weston & Sampson for the referenced project and client, and is an integral part of that report. The information and interpretations provided in this log are subject to the explanations and limitations stated in the report.
- 3.) This log represents general conditions observed at the point of exploration on the date(s) stated. Changes may occur over time.
- 4.) Since subsurface conditions outside each exploration location are unknown and cannot be relied upon to be consistent or uniform, no warrant is made that conditions adjacent to this exploration will necessarily be the same as or similar to those shown on this log. Weston & Sampson will not be responsible for any interpretations, assumptions, projections, or interpolations made by construction contractors, or other users of this log.
- 5.) Boundary lines separating soil and rock layers (strata) presented in this log represent approximate boundaries only; actual transitions may be gradual or differ from those shown. No warranty is provided as to the continuity of subsurface conditions between sample depths and elevations.
- 6.) Soil and rock descriptions presented in this log are based on visual-manual examination of recovered samples and/or direct observation (when permissible) and were modified where appropriate based on laboratory testing.
- 7.) Water levels recorded on this log are based on observations made in the exploration at the times and under the conditions stated. Fluctuations in the groundwater level may occur due to factors other than those present at the time observations were made. Water levels can be expected to vary both seasonally and yearly.
- 8.) Water levels recorded on this log should be used with discretion since the use of drilling fluids or the addition of water to the exploration may distort the actual field conditions. Furthermore, water levels in cohesive soils often take extended periods of time to reach equilibrium and thus reflect actual field conditions. The absence of notations on this log regarding water does not necessarily mean that this exploration was dry or that the contractor will not encounter subsurface water during the course of construction.
- 9.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. In such cases, reported gravel conditions may not reflect actual in-situ conditions.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length (in inches) of material recovered in a drive or push type sampler over the length (in inches) of sampler penetration, expressed as fraction (e.g. 18/24, where 18 is the recovered length and 24 is the total length of penetration).

Standard Penetration Test (SPT) - An in-situ test completed in the bottom of a borehole during which a split-spoon sampler with an inside diameter of 1-3/8 inches is driven a given distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (N) - The raw (uncorrected) blow count representation of a soil's penetration resistance, reported in blows per foot (bpf). The N-value is equal to the total number of blows required to drive the sampler over the depth interval of 6 to 18 inches and can be correlated to soil engineering properties.

Auger Refusal - Auger penetration of less than 6 inches under a minimum 500 psi of auger-feed down pressure for a period not less 5 minutes.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are recorded and reported on the exploration log as benzene equivalent units in parts per million (ppm).

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures.

STRATIFICATION BOUNDARIES

Boundary Type	Line Style	Example
Observed Boundary	Solid	_____
Inferred Boundary	Dashed	- - - - -

KEY TO WATER LEVELS

- Measured in borehole during advancement.
- Measured in borehole or test pit at completion, prior to backfilling.
- Measured in borehole or test pit after stabilization period, prior to backfilling.

CAVING / SEEPAGE TERMS

Caving Term	Criteria
Minor.....	less than 1 cubic ft.
Moderate.....	1 to 3 cubic ft.
Severe.....	greater than 3 cubic ft.
Seepage Term	Criteria
Slow.....	less than 1 gpm
Moderate.....	1 to 3 gpm
Fast.....	greater than 3 gpm

LABORATORY TESTS

MC..... Moisture Content (Natural)
OC..... Organic Content
PL..... Plastic Limit
PI..... Plasticity Index
SL..... Shrinkage Limit
GC..... Gravel Content
SC..... Sand Content
FC..... Fines Content
DS..... Direct Shear
TC..... Triaxial Compression
UC..... Unconfined Compression
UW..... Unit Weight (In-Situ)
VS..... Vane Shear

FIELD MEASUREMENTS

PP..... Pocket (Hand) Penetrometer
TV..... Torvane (Hand Vane)
PID..... Photoionization Detector
FID..... Flame Ionization Detector
WOR..... Weight of Rods
WOH..... Weight of Hammer
VSF..... Field Vane Shear

KEY TO SAMPLER TYPES

- Split Spoon (Standard) ⁽¹⁾
2" OD, 1-3/8" ID
- Split Spoon (Oversize)
3" OD, 2-3/8" ID
- Shelby or Piston Tube
3" OD, 2-7/8" ID
- Double-Tube Rock Core Barrel
2" Core Diameter
- Direct Push (Geoprobe)
DT22 Sampling System
- Auger Sample
(from cuttings or hand auger)
- Grab Sample
(manual, from discrete point)
- Composite Sample
(multiple grab samples)
- Wash Sample ⁽²⁾
(cuttings washed to surface)

⁽¹⁾ Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. In such cases, reported gravel conditions may not reflect actual in-situ conditions.

⁽²⁾ If provided on an exploration log, descriptions of wash samples should not be relied upon as indication of actual soil conditions.

KEY TO INSTALLATIONS

- Cement concrete seal around casing or riser pipe
- Bentonite seal around casing or riser pipe
- Cement grout seal around casing or riser pipe
- Common soil backfill around riser pipe or beneath screen
- Gravel backfill around screen or riser pipe
- Sand backfill around screen or riser pipe (filter sand)
- PVC riser pipe; Sch. 40, 1" ID unless noted otherwise
- PVC screen; Sch. 40, 1" ID with 0.02" machined slots
- Electronic piezometer or other measuring device
- Electronic borehole inclinometer within inclinometer casing
- Probe extensometer and PVC access pipe

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 2 SOIL DESCRIPTION

IMPORTANT INFORMATION ABOUT THIS GUIDE

- 1.) This guide is intended to provide a general overview of Weston & Sampson's practices and procedures for *classifying* and *describing* soil. Not all aspects of this guide may be applicable in all circumstances.
- 2.) The information in this guide is predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. This guide extends, and in some cases modifies, the ASTM standard to include additional descriptive terms and criteria.
- 3.) In the context of this guide, soil *classification* refers to the grouping of soils with similar physical characteristics into a category identified by a group name and corresponding group symbol using visual examination and manual tests.
- 4.) Weathered or decomposed rock that is friable and can be reduced to gravel size particles or smaller by normal hand pressure is identified as soil and subject to the description procedures in this guide.

MATRIX SOIL CONSTITUENTS AND ORGANICS

Gravel - Particles of rock smaller than a 3-in. sieve and larger than a No. 4 sieve. Gravel is subdivided into *coarse* and *fine* gravel.

Sand - Particles of rock smaller than a No. 4 sieve and larger than a No. 200 sieve. Sand is subdivided into *coarse*, *medium*, and *fine* sand.

Fines - Particles smaller than the No. 200 sieve and that may be further identified as silt and/or clay based on plasticity characteristics.

Organics - Partially or fully decomposed organic compounds. The term *organic fines* refers to mixtures of silt and/or clay and microscopically dispersed organic colloids. Soil organic matter also includes any organic components that can be visually identified and manually separated, such as intact roots and plant fibers.

SOIL CLASSIFICATION PROCEDURE

Soils are divided into one of the following three broad categories and then assigned the appropriate classification group symbol (e.g. SM) and group name (e.g. Silty Sand with Gravel) in accordance with ASTM D2488.

Coarse-Grained Soils - Soils containing 50% or less soil particles that will pass through a No. 200 sieve.

Fine-Grained Soils - Soils containing more than 50% of soil particles that will pass through a No. 200 sieve. Fine-grained soils with sufficient organic content to influence the soil properties are further defined as *Organic Soils*.

Highly Organic Soils (Peat) - Soils composed primarily of plant remains in various stages of decomposition, usually with an organic odor, a dark brown to black color, and a texture ranging from fibrous to amorphous.

GENERAL DESCRIPTION SEQUENCE

Soil descriptions are presented in the following general sequence. Deviation may occur when describing complex, erratic, or thinly layered soils, and soils containing significant amounts of artificial material or cobbles and boulders.

- (1) **Classification Group Name and Group Symbol**
- (2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
- (3) Soil Color and Moisture Condition (*in-situ*)
- (4) Matrix Soil Constituents and Proportions (*by weight of minus 3-in. fraction*)
- (5) Non-Matrix Soil Materials and Proportions (*by volume of total soil*)
- (6) Soil Structure / Texture (*as applicable*)
- (7) Odor (*if organic or unusual*)
- (8) Other Descriptive Information (*as applicable*)
- (9) **[Geologic Name by Depositional Process or Local Geologic Unit]**

SPT N-VALUE EMPIRICAL CORRELATIONS

Consistency	SPT N-Value	Apparent Density	SPT N-Value
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE CONDITION TERMS

Dry..... Apparent absence of moisture; dry to the touch
Moist..... Damp but no visible water
Wet..... Visible free water; may indicate soil is below water table

PROPORTIONS / PERCENTAGE TERMS

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages by weight (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.

Proportions of cobbles, boulders, and other materials including visually identifiable organic components (roots, fibers, etc.) are stated in the following terms indicating a range of percentages by volume (to nearest 5%) of the total soil.

Mostly	50% - 100%	Numerous	50% - 65%
Some	30% - 45%	Common	30% - 45%
Little	15% - 25%	Few	15% - 25%
Few	5% - 10%	Occasional	5% - 10%
Trace	less than 5%	Trace	less than 5%

PARTICLE SIZE RANGE TERMS

Descriptor	U.S. Sieve Size	Observed Size (in.)
Boulder	Greater than 12 in.	Greater than 12 in.
Cobble	3 in. - 12 in.	3 - 12 in.
Gravel (Coarse)	3/4 in. - 3 in.	3/4 - 3 in.
Gravel (Fine)	No. 4 - 3/4 in.	1/5 - 3/4 in.
Sand (Coarse)	No. 10 - No. 40	1/16 - 1/5 in.
Sand (Medium)	No. 40 - No. 10	1/64 - 1/16 in.
Sand (Fine)	No. 200 - No. 40	1/300 - 1/64 in.
Silt or Clay	Smaller than No. 200	1/300 in.

PLASTICITY TERMS (FINES ONLY)

Non-plastic..... Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.
Low..... Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.
Medium..... Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.
High..... Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COMMON GEOLOGIC TERMS

The following terms describe commonly encountered soil deposits in terms of geologic and depositional processes. Please note that not all terms which may appear on an exploration log are defined.

Fill (Made Ground) - Deposits of soil and/or artificial waste materials that have been placed or altered by human processes.

Glaciolacustrine Sediments - Lake-bottom deposits composed of material brought by glacial meltwater streams flowing into lakes bordering the glacier.

Glacial Drift - A general term applied to all soil/rock material including large boulders (glacial erratics) that has been transported by glaciers and deposited either directly from the ice or from the glacial meltwater.

Glacial Till - Unstratified and unsorted glacial drift deposited directly by and underneath a glacier without subsequent reworking by meltwater.

Glacial Outwash - Stratified sediments (chiefly sand and gravel) removed or "washed out" from a glacier and deposited by meltwater streams.

Glaciofluvial Sediments - Coarse-grained soil transported in suspension by glacial meltwater and subsequently deposited by sedimentation.

Alluvium - A general term used to describe soil that has been transported in suspension by flowing water and subsequently deposited by sedimentation.

Marine Sediments - Unconsolidated organic and/or inorganic particles deposited from various sources that have accumulated on the ocean floor.

ATTACHMENT B
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual site-wide subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



**GEOPROFESSIONAL
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ASSOCIATION**

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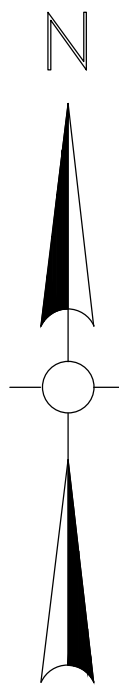
PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

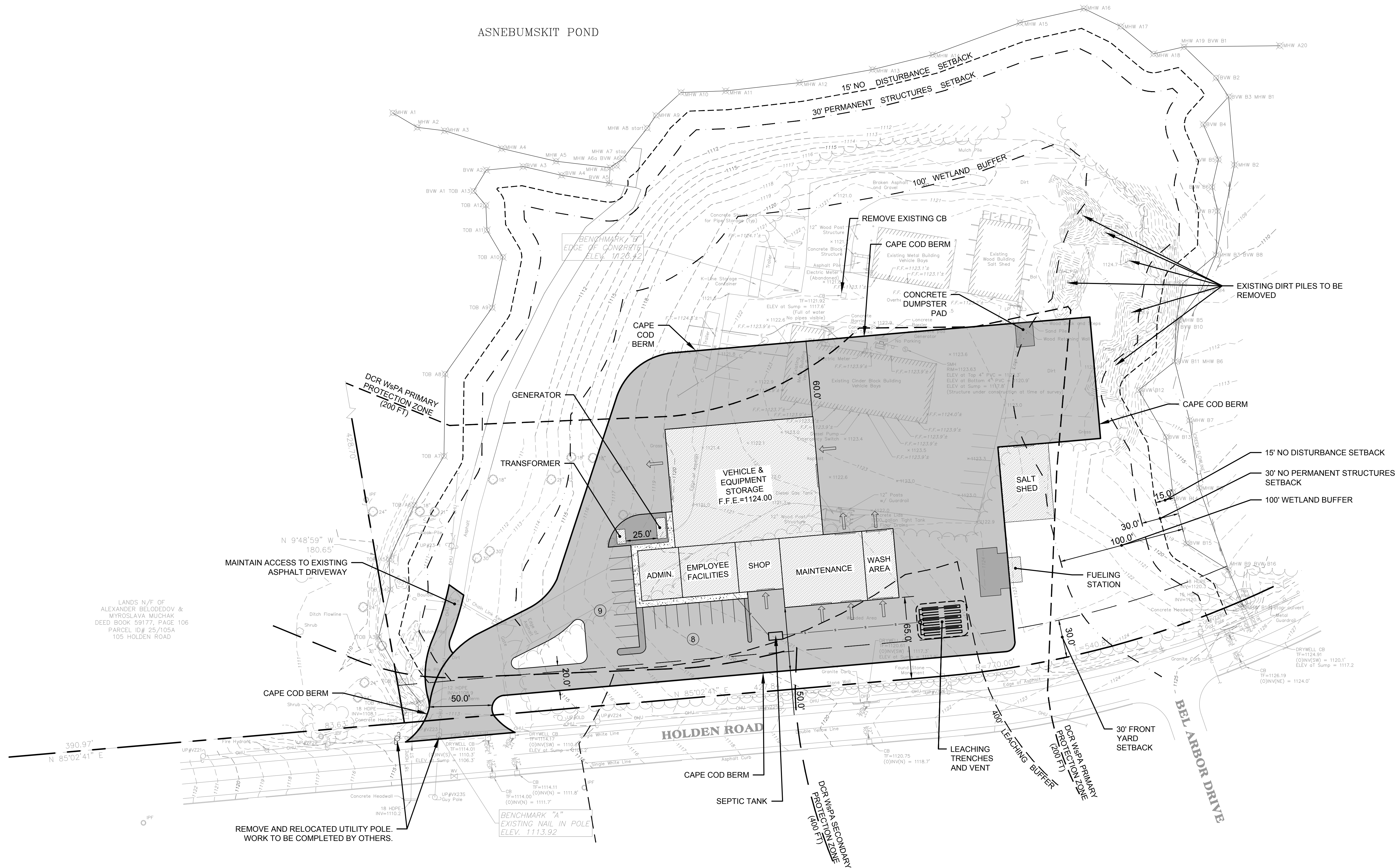
SECTION 5

SCHEMATIC DESIGN PLANS


- Civil / Site Plans
- Architectural Plans
- Industrial Equipment Plan



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Consultants:

Revisions:		
No.	Date	Description

Seal:

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CONCEPTUAL MATERIALS
& LAYOUT PLAN
NOT FOR CONSTRUCTION

Scale: AS NOTED

Date: JANUARY 28, 2020

Drawn By: CTK

Reviewed By:

Approved By:

W&S Project No:

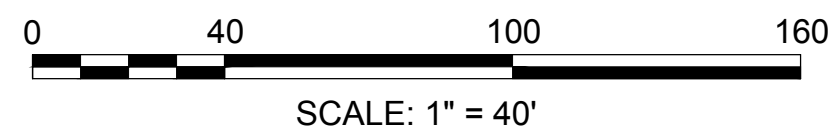
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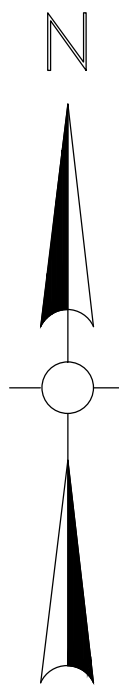
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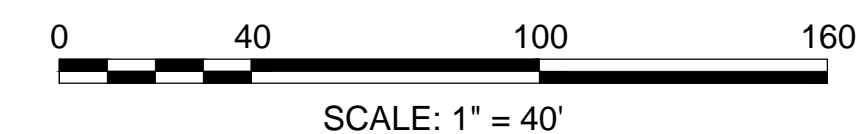
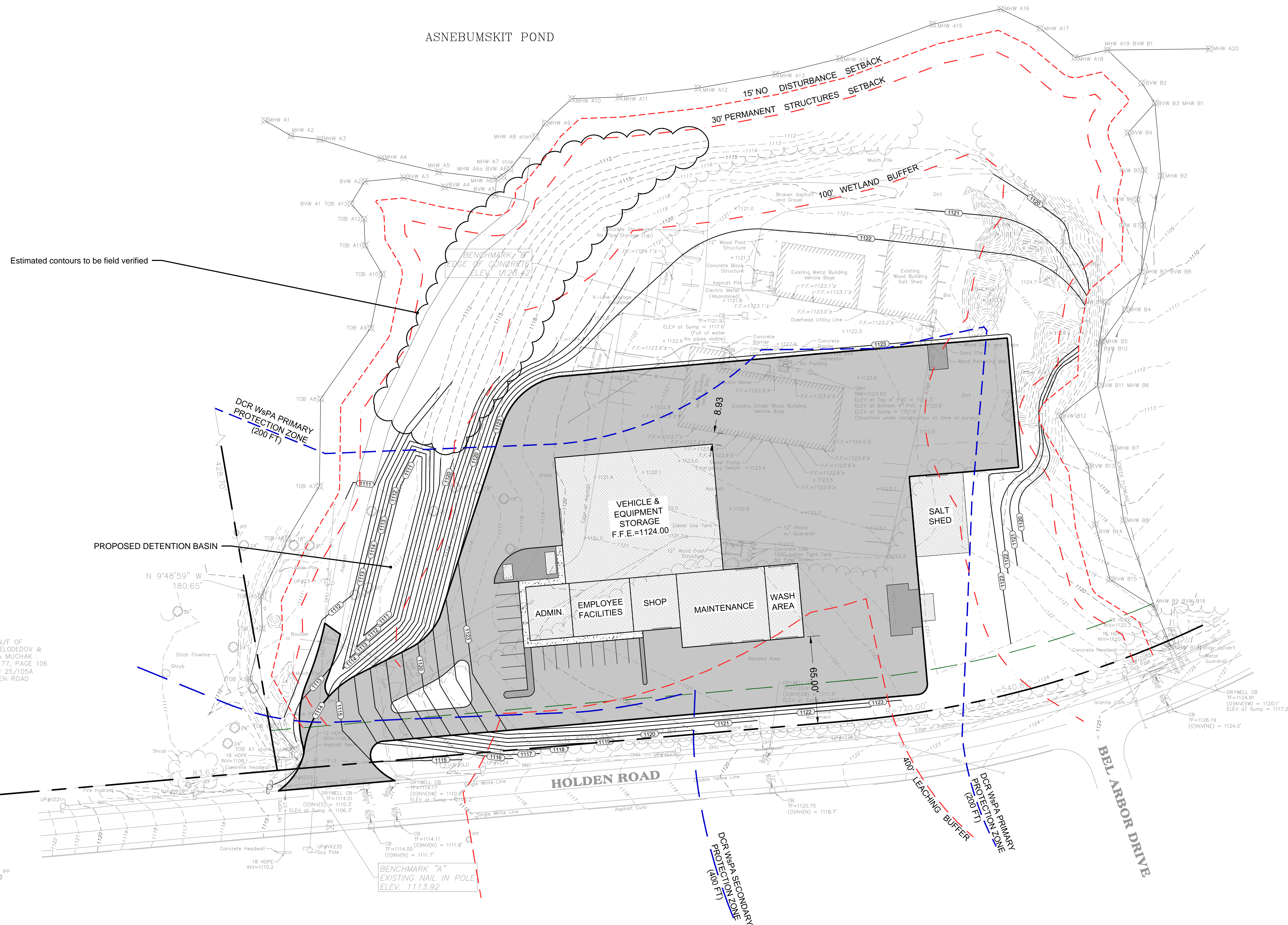
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Revisions:		
No.	Date	Description

Seal:

Issued For:

CONCEPTUAL GRADING &
DRAINAGE PLAN
NOT FOR CONSTRUCTION

Scale: AS NOTED

Date: February 7, 2020

Drawn By: CTK

Reviewed By:

Approved By:

W&S Project No:

W&S File No:

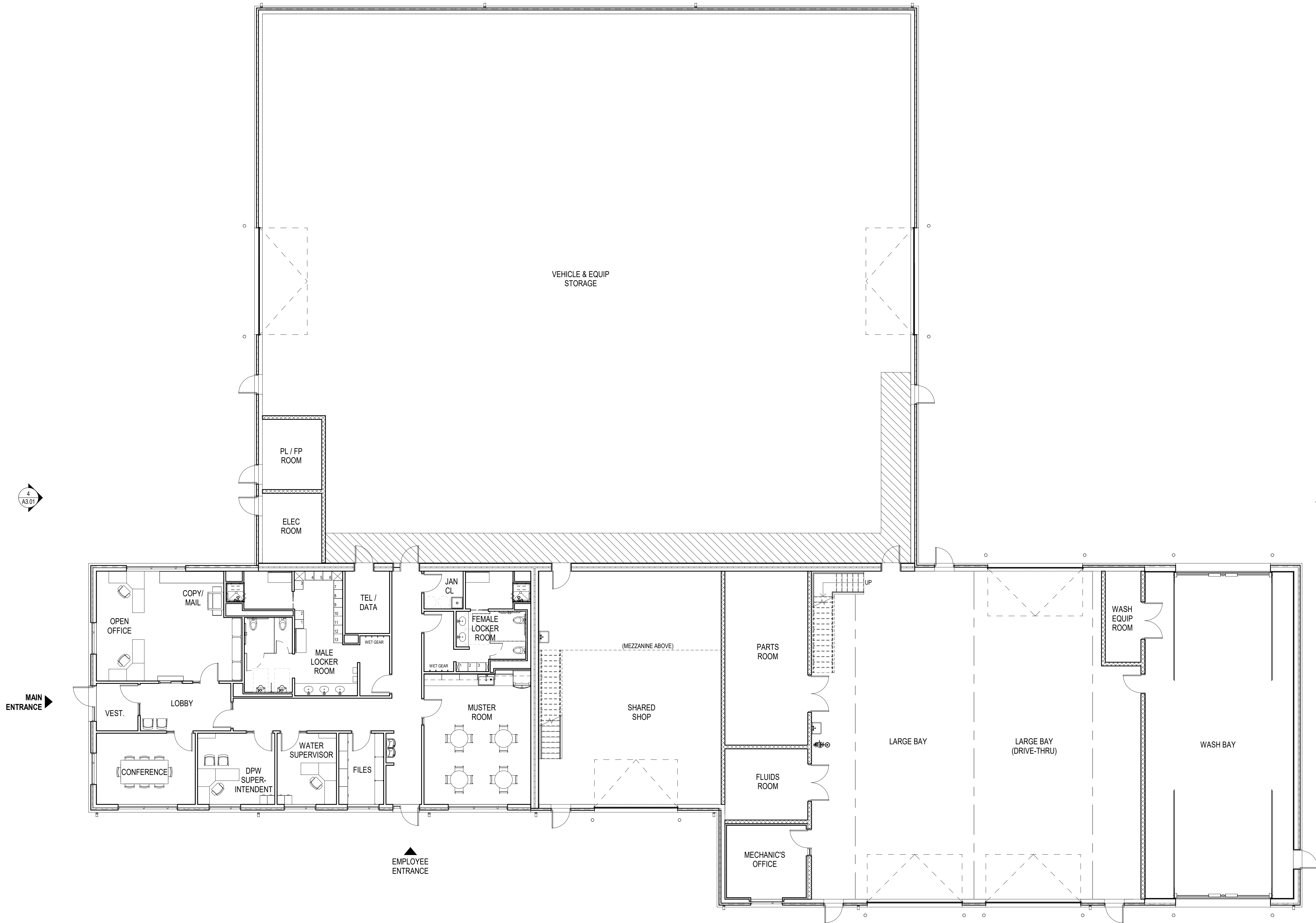
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CONCEPTUAL
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Sheet Number:

CX201

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PROJECT



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SCALE: AS NOTED

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Reviewed By: Checker

Approved By: Approver

W&S Project No: Project Number

Drawing Title:

SCHEMATIC
DESIGN -
FLOOR PLAN

Sheet Number:

A2.01

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1 SCHEMATIC FLOOR PLAN
1/8" = 1'-0" 1/ A3.01



1 OVERALL MEZZANINE PLAN
1/8" = 1'-0" 1/ A3.01

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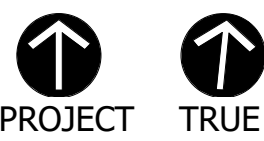
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Rev Date Description

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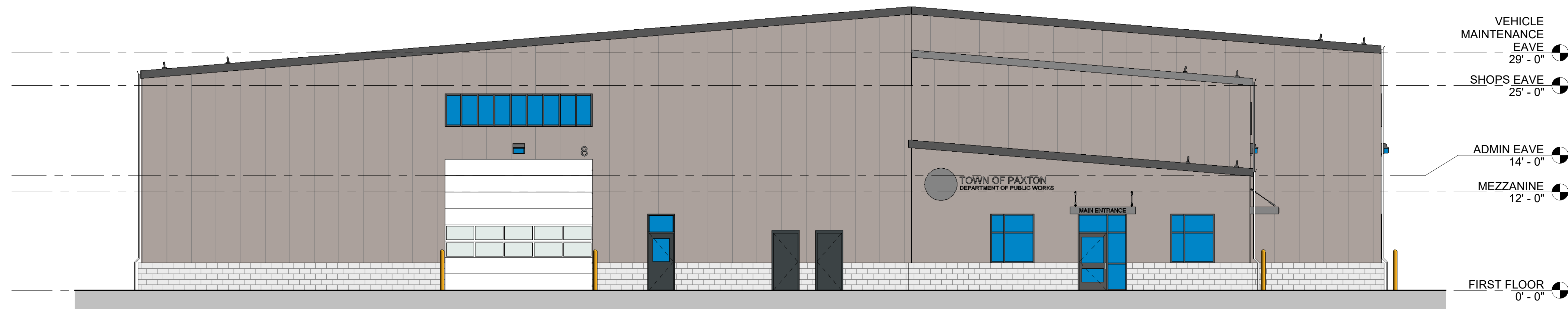
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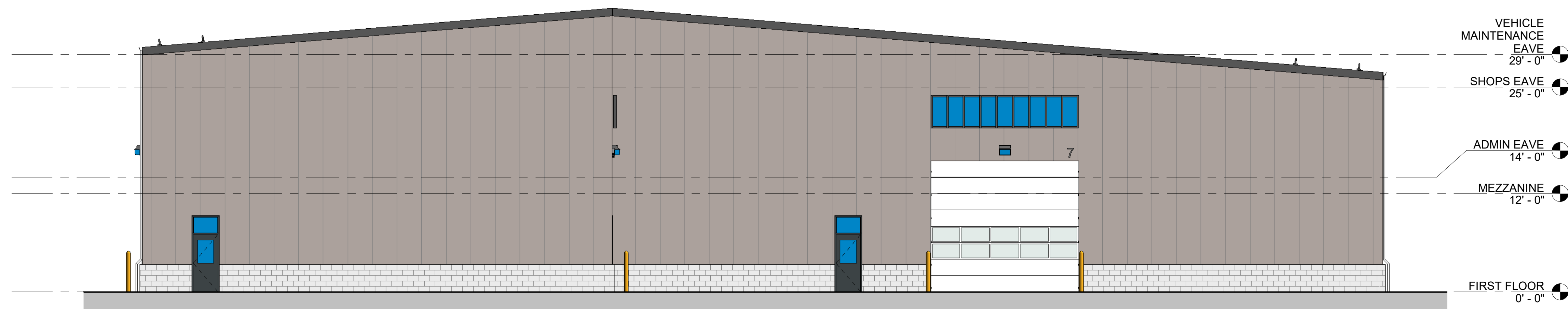
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MEZZANINE PLAN

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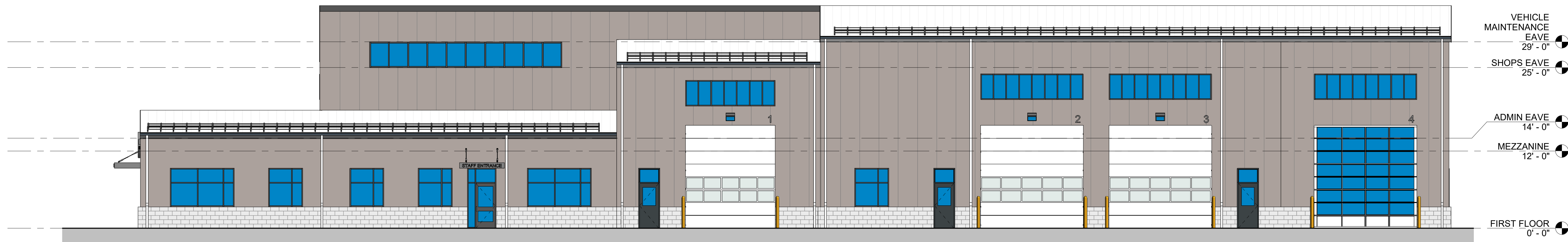
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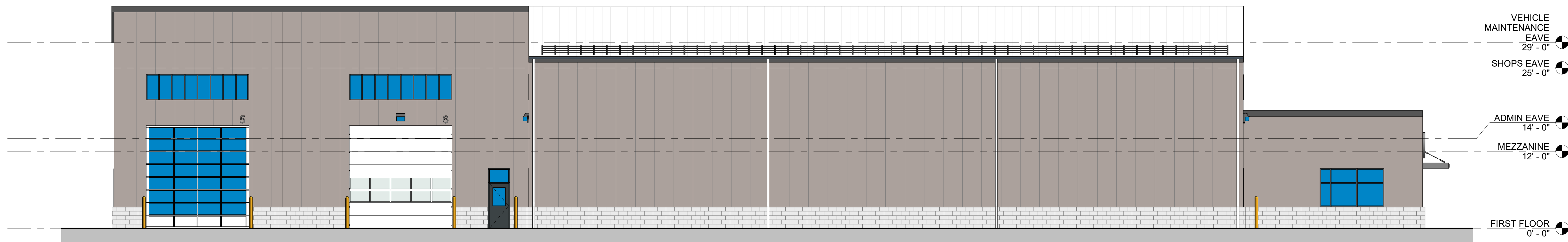
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1/8" = 1'-0" 1/ A2.01



① EAST ELEVATION
1/8" = 1'-0" 1/ A2.01




③ SOUTH ELEVATION
1/8" = 1'-0" 1/ A2.01



② NORTH ELEVATION
1/8" = 1'-0" 1/ A2.01

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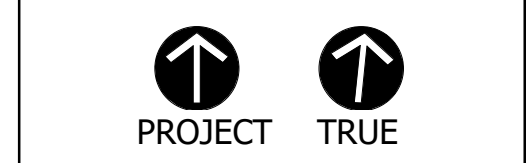
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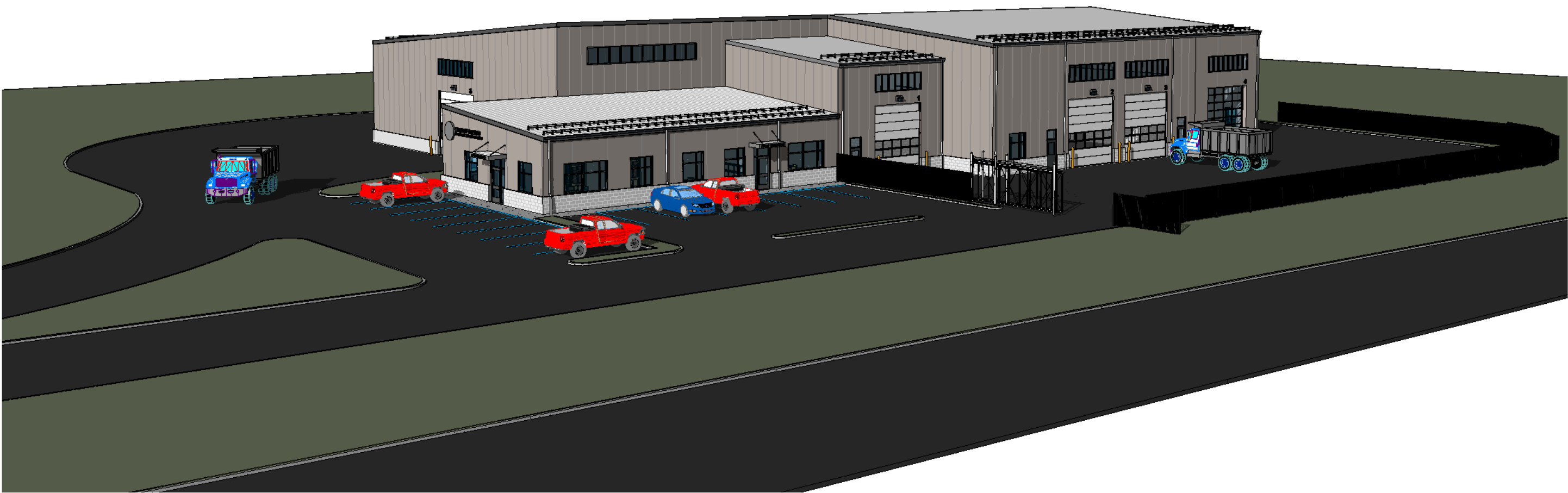
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BUILDING
ELEVATIONS

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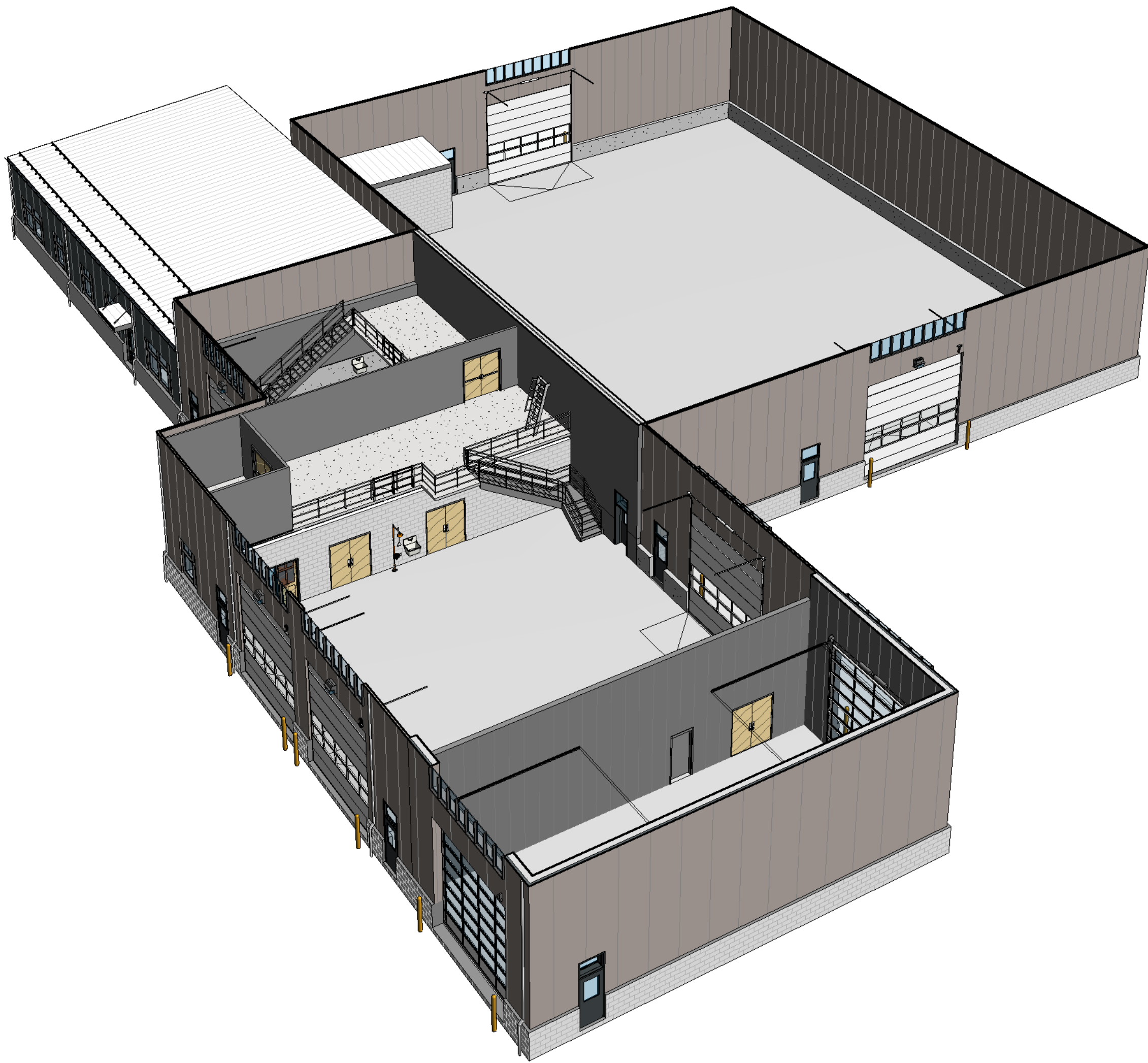
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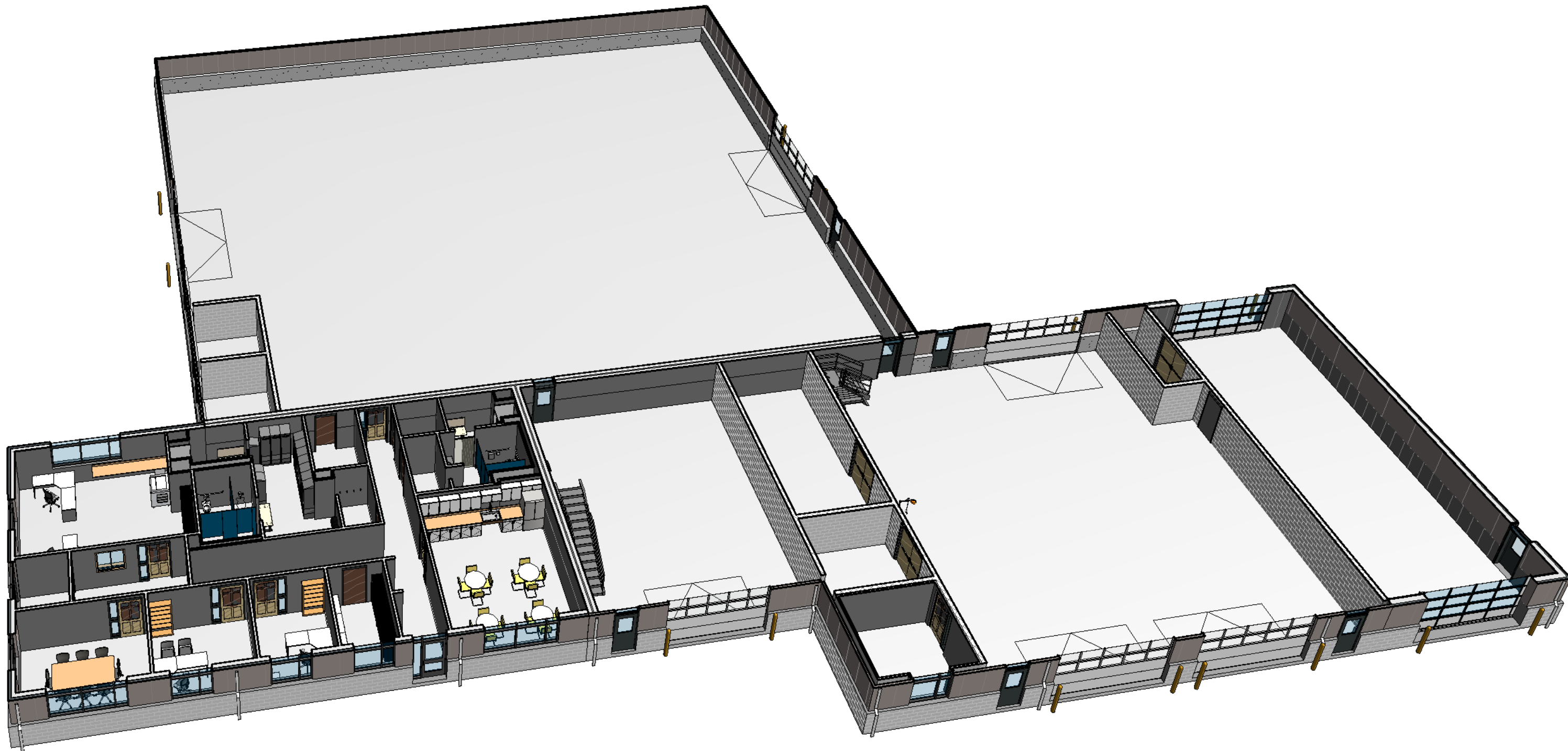
1 AERIAL VIEW



2 VIEW OF ENTRANCES - GROUND LEVEL



3 OPEN AERIAL 1



4 OPEN AERIAL 2

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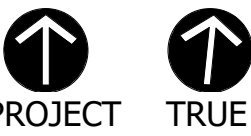
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Revisions:

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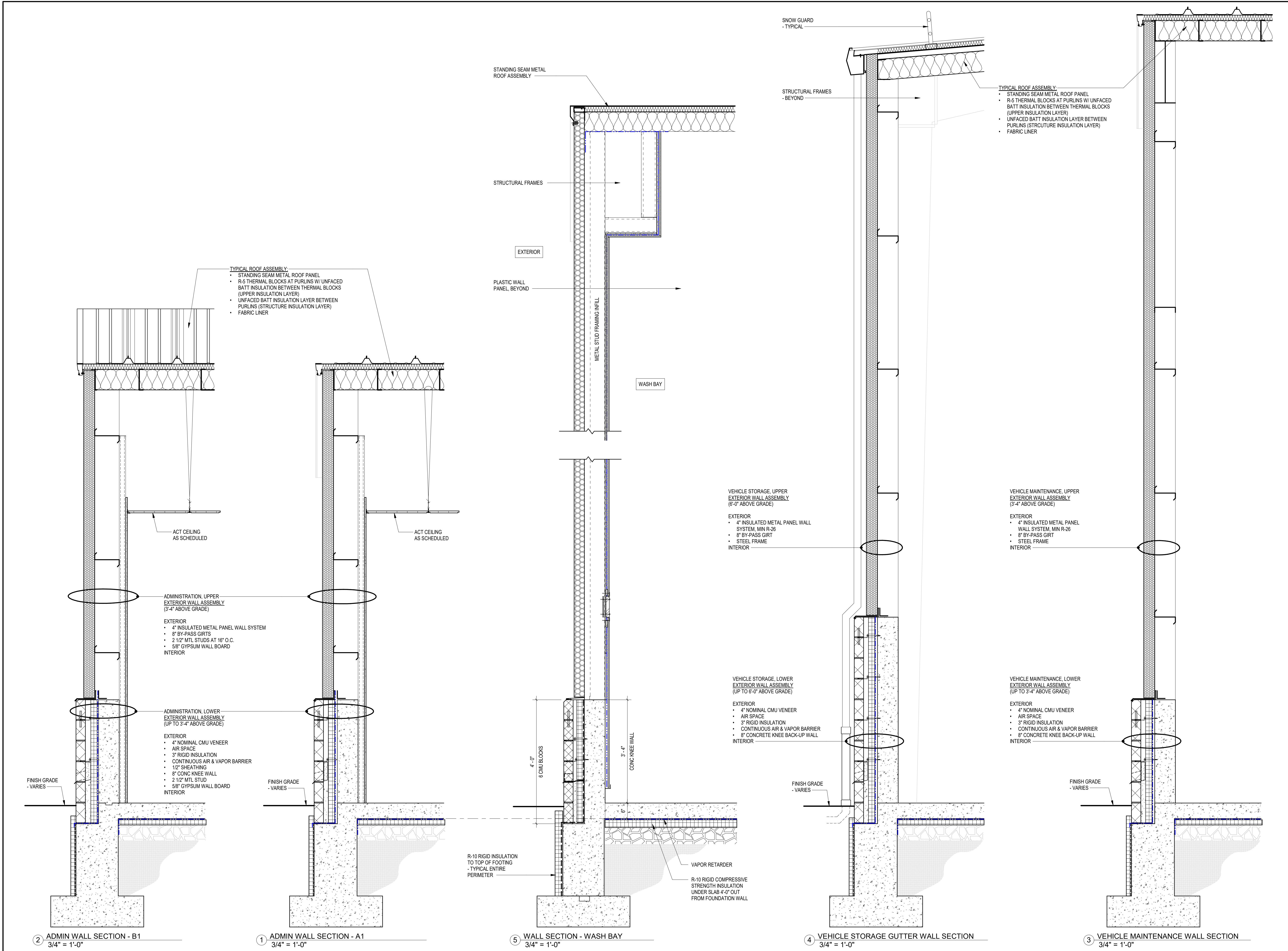
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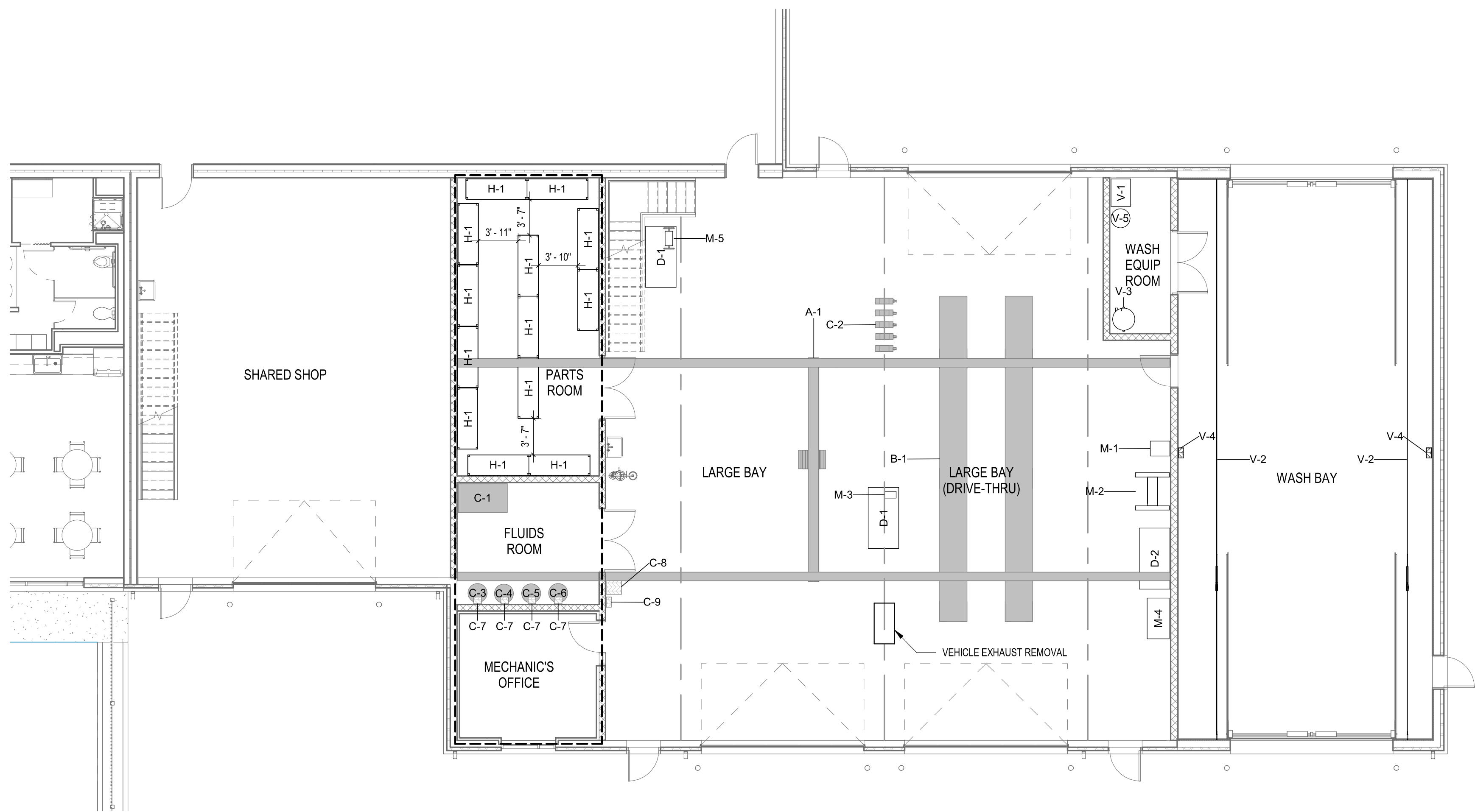
Sheet Number:

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Revisions:

Rev	Date	Description



EQUIPMENT LAYOUT PLAN
1/8" = 1'-0"

Industrial Equipment Schedule					
EQ Number	Description	Count	Equipment Type	Spec Number	Notes
A-1	5 Ton Bridge Crane	1	NIC		
B-1	80K Flush Mounted Platform Lift	1	NIC		
C-1	280 Gal Fluid Storage Tank (Waste Oil)	1	NIC		
C-2	Lube Reel Bank (5 reels)	1	NIC		
C-3	55 gal. 5W-20 Drum	1	NIC		
C-4	55 gal. 15W-30 Drum	1	NIC		
C-5	55 gal. Hyd. Fluid Drum	1	NIC		
C-6	55 gal. ATF Drum	1	NIC		
C-7	Wall Mounted Drum Pumps	4	NIC		
C-8	Waste Oil Pumpout System	1	NIC		
C-9	Waste Oil High Level Alarm	1	NIC		
D-1	Steel Work Bench (72inx36in)	2	N		
D-2	Steel Work Bench w/ Casters & Elec. Shelf	1	N		
H-1	Parts Shelving (6' x 2')	13	N		
M-1	Drill Press	1	N		
M-2	Shop Press	1	N		
M-3	Bench Vice	1	N		
M-4	Parts Washer	1	N		
M-5	Bench Grinder	1	N		
V-1	Vehicle wash Pressure Plant	1	N		
V-2	Vehicle Wash Festoon	2	N		
V-3	Vehicle Wash - Hot Water Heater	1	N		
V-4	Vehicle Wash Control Panel	2	N		
V-5	Soap Drum	1	N		

GENERAL NOTES:

- EQUIPMENT LAYOUTS ARE SCHEMATIC. GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING EXACT LOCATIONS WITH OWNER AND MANUFACTURER REQUIREMENTS. COORDINATE ALL UTILITY REQUIREMENTS WITH SUB-CONTRACTORS. FINAL EQUIPMENT LOCATIONS SHALL BE CONFIRMED BY THE OWNER PRIOR TO RUNNING UTILITIES AND INSTALLATION EQUIPMENT.
- GENERAL CONTRACTOR SHALL COORDINATE UTILITY REQUIREMENTS OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF SERVICES.
- PRIOR TO RUNNING UTILITIES, GENERAL CONTRACTOR SHALL MARK OUT ALL EQUIPMENT LOCATIONS ON THE FLOOR USING CHALK OR ANOTHER ACCEPTABLE MEANS, AND SHALL REVIEW/REVISE FINAL EQUIPMENT LOCATIONS AS DIRECTED BY THE OWNER AND THE ENGINEER.
- B-1 SHALL BE CENTERED IN THE MAINTENANCE BAYS AS DEFINED BY THE OVERHEAD DOOR OPENING. CONFIRM INSTALLATION LAYOUT DIMENSIONS WITH THE MANUFACTURER. ALSO SEE OWNERS MANUALS.
- ELECTRICAL, MECHANICAL, AND PLUMBING FSBs SHALL PROVIDE AND CONNECT UTILITIES TO ALL EQUIPMENT AS SHOWN ON THE ELECTRICAL, MECHANICAL AND PLUMBING DRAWINGS AND SPECIFICATIONS, AND IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS IN ORDER TO PROVIDED A COMPLETE AND OPERABLE SYSTEM.
- THE ELECTRICAL CONTRACTOR SHALL HAVE A MASSACHUSETTS LICENSED ELECTRICIAN CONFIRM THE VOLTS, PHASE, AMPS, AND NEMA PLUG CONFIGURATION FOR EACH PIECE OF EQUIPMENT (INCLUDING EXISTING EQUIPMENT TO BE RELOCATED) IN ADVANCE OF ORDERING MATERIALS AND INSTALLATION.
- SEE SPECIFICATION SECTION 11 11 29 - FLUID DISTRIBUTION SYSTEM ALONG WITH DETAILS ON EQ102 FOR ADDITIONAL INFORMATION AND SCOPE DELINEATION FOR THE FLUID AND WASTE FLUID DISTRIBUTION SYSTEMS.

ABBREVIATIONS:

- N NEW EQUIPMENT TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
- ERO EXISTING EQUIPMENT TO BE RELOCATED AND INSTALLED BY THE OWNER. UTILITIES FOR ERO EQUIPMENT TO BE PROVIDED BY THE FILED SUB-BID CONTRACTORS.
- ERC EXISTING EQUIPMENT TO BE RELOCATED AND INSTALLED BY THE CONTRACTOR. UTILITIES FOR ERC EQUIPMENT TO BE PROVIDED BY THE FILED SUB-BID CONTRACTORS
- NIC NEW EQUIPMENT PROVIDED AND INSTALLED BY THE OWNER (NOT IN CONTRACT), HOWEVER UTILITIES FOR THIS EQUIPMENT SHALL BE PROVIDED BY THE FILED SUB-BID CONTRACTORS.

LINE TYPES

MEZZANINE LIMITS

NIC/ERO EQUIPMENT

NEW EQUIPMENT


HATCHES

CEILING MOUNTED

WALL MOUNTED

Project:

TOWN OF PAXTON



NEW DEPARTMENT OF PUBLIC WORKS FACILITY
107 HOLDEN ROAD
PAXTON, MA 01612

Weston & Sampson

Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard Suite 250
Foxborough, MA 02035
(508) 698-3034 (800) SAMPSON
www.westonandsampson.com

Consultants:

Seal:


Revisions:		
Rev	Date	Description


PROGRESS PRINT

DATE: 9/2/2020 2:54:17 PM

NOT FOR CONSTRUCTION

Issued For: PROJECT STATUS

PROJECT

TRUE

0'4'8'16'

SCALE: 1/8" = 1'-0"

Date: FEBRUARY 7, 2020

Drawn By: NCH

Reviewed By: TJC

Approved By: JRF

W&S Project No: 2180508

Drawing Title:

EQUIPMENT LAYOUT PLAN

Sheet Number:

EQ101

WESTON & SAMPSON COPYRIGHT 2019

PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 6

SCHEMATIC DESIGN COST ESTIMATE

- Total Project Cost Summary
- Independent Cost Estimate
- Recent DPW Bid Prices

**Town of Paxton
New Public Works Facility
Budget Total Project Cost**

1/28/2020
Updated February 2021

<u>New Construction</u>	Area	2019		
		Size (SF)	Cost/SF (w/ markups)	Cost
Administration / Employee Facilities		3,112	\$ 353	\$ 1,098,392
Shops		1,452	\$ 248	\$ 360,127
Vehicle Maintenance (not including equipment)		3,553	\$ 248	\$ 881,221
Wash		1,549	\$ 469	\$ 726,505
Vehicle/Equipment Storage		11,054	\$ 196	\$ 2,161,671
New Construction Subtotal:		20,720		\$ 5,227,916
Building Cost per SF:		252		
		Place a "x" here if included		
Industrial Equipment				
- Wash Equipment		\$ 75,500	x	\$ 75,500
- Heavy Duty Vehicle Lift (Portable)		\$ 98,000		deferred
- Bridge Crane		\$ 65,900		deferred
- Overhead Lubrication System		\$ 50,000		deferred
- Miscellaneous Shop and Support Equipment		\$ 18,000	x	\$ 18,000
- Storage Shelving / Benches / Racks		\$ 14,000	x	\$ 14,000
- Exhaust Removal System (1 unit)		\$ 22,000	x	\$ 22,000
Industrial Equipment Subtotal:				\$ 129,500
Fuel System				
- Fuel System Equipment 1 - 6,000 Gallon Tank + Dispensers etc.		\$ 330,750	x	\$ 330,750
- Bollards		\$ 18,250	x	\$ 18,250
- Tank Setting & Crane		\$ 15,300	x	\$ 15,300
- Canopy and Foundations		\$ 99,450	x	\$ 99,450
- Permits		\$ 2,200	x	\$ 2,200
- Startup & Closeout		\$ 31,900	x	\$ 31,900
Fuel System Subtotal:				\$ 497,850
Building & Equipment Total:				\$ 5,855,266
Mezzanines		1,271	\$ 117	\$ 148,535
Site Development (acres) - assumes level site with no contamination, existing structures/utilities, etc.		2.1	\$ 442,444	\$ 929,133
Salt/Sand Sheds		3,600	116	\$ 416,745
		Subtotal Bldg, Equip, & Site: \$ 7,349,680		
		Design Contingency (5%): \$ 367,484		
		2019 Market Adjustment (10%): \$ 771,716		
		Escalation - 2020 (5% per year): \$ 424,444		
		Escalation - 2021 (5% per year): \$ 445,666		
		Escalation - 2022 (5% per year): \$ 467,950		
		Total Construction: \$ 9,826,940		
		Total Construction Cost/SF: 474		

**Town of Paxton
New Public Works Facility
Budget Total Project Cost**

1/28/2020

Department of Public Works Budget Total Project Cost	
<u>Owner's Soft Costs</u>	
A&E Fees (design, bid, const.)	\$ 982,694 (Assume 10% of Const. Value)
A&E Special Services	\$ 98,269 (Assume 1% of Const. Value)
Owner's Project Manager Fees	\$ 294,808 (Avg 3% of Const. Value)
Furnishings (FFE)	\$ 50,000 allowance
Communic. / Low Voltage System	\$ 30,000 allowance
Temporary Facilities	\$ - allowance
Printing Cost - Advertisement	\$ 10,000 allowance
Legal Costs	\$ 10,000 allowance
Commissioning	\$ 25,000 allowance
Abatement	\$ 40,000 allowance
Chapter 17 Test & Inspections	\$ 30,000 allowance
Construction Contingency (6%)	\$ 589,965 allowance
	Total Soft Costs: \$ 2,160,737
	TOTAL PROJECT COST \$ 11,987,676

Concept Design Cost Estimate

New Department of Public Works Facility

107 Holden Road
Paxton, Ma

Prepared by:



165 Middlesex Turnpike
Suite 106
Bedford, MA 01730
phone 781-275-5511
www.tortoraconsulting.com

Prepared for:

Weston and Sampson

February 4, 2020

New Department of Public Works Facility

107 Holden Road
Paxton, Ma



Concept Design Cost Estimate

04-Feb-20

MAIN CONSTRUCTION COST SUMMARY

	Building GSF	\$/sf	Estimated Construction Cost
New Department of Public Works Facility			\$8,681,204
TOTAL CONSTRUCTION COSTS - 2020 DOLLARS	20,720	\$418.98	\$8,681,204
27 Months escalation to May 2022 (6% Per year)		13.50%	\$1,171,963
TOTAL CONSTRUCTION COSTS - 2022 DOLLARS	20,720	\$475.54	\$9,853,167 *
*(Construction Costs Only - Does Not Include Soft Costs)			

QUALIFICATIONS

This Concept Design cost estimate was produced from progress drawings and other documentation prepared by Weston and Sampson and their design team dated January 14, 2020. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, general contractor's overhead and profit and design contingency. Cost escalation assumes May 2022 bidding.

Bidding conditions are expected to be public bidding to pre-qualified general contractors, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

All professional fees and insurance
All Furnishings, Fixtures and Equipment not identified
Items identified in the design as Not In Contract (NIC)
Items identified in the design as by others
Utility company back charges, including work required off-site
Work to City streets and sidewalks, (except as noted in this estimate)
Construction or occupancy phasing or off hours' work, (except as noted in this estimate)
Unsuitable or hazardous soil removals/replacements
Special foundations (unless indicated by design engineers)
Ledge blasting and removal
Sales Tax
Building Permit
Radiant heating

New Department of Public Works Facility

107 Holden Road

Paxton, Ma

**Concept Design Cost Estimate**

04-Feb-20

CONSTRUCTION COST SUMMARY IN CSI FORMAT		20,720 SF	
	Filed Sub-Bids	New Department of Public Works Facility	\$/SF
DIV. 2 EXISTING CONDITIONS			
020500 Demolition		\$60,000	\$2.90
024500 Hazardous Abatement		\$50,000	\$2.41
DIV. 3 CONCRETE			
033000 Cast-in-Place Concrete		\$606,457	\$29.27
DIV. 4 MASONRY			
040001 Masonry Work - FSB	\$169,707		
042000 Unit Masonry (part of 040001 FSB)		\$157,136	\$7.58
DIV. 5 METALS			
050001 Miscellaneous and Ornamental Iron - FSB	\$226,735		
051200 Structural Steel Framing		\$0	\$0.00
053100 Steel Decking		\$0	\$0.00
055000 Metal Fabrications (part of 050001 FSB)		\$209,940	\$10.13
DIV. 6 WOODS & PLASTICS			
061000 Rough Carpentry		\$38,247	\$1.85
064020 Interior Architectural Woodwork		\$63,975	\$3.09
DIV. 7 THERMAL & MOISTURE PROTECTION			
070001 Waterproofing, Dampproofing and Caulking - FSB	\$48,408		
070002 Roofing and Flashing - FSB	\$50,544		
072100 Thermal Insulation		\$31,332	\$1.51
072700 Air Barriers (part of 070001 FSB)		\$29,483	\$1.42
074600 Metal Panel System		\$0	\$0.00
075400 Thermoplastic Membrane Roofing (part of 070002 FSB)		\$7,000	\$0.34
075450 Asphalt Roofing System (part of 070002 FSB)		\$28,800	\$1.39
077200 Roof Accessories		\$11,000	\$0.53
078410 Penetration Firestopping		\$3,108	\$0.15
079200 Joint Sealants (part of 070001 FSB)		\$15,339	\$0.74
DIV. 8 DOORS & WINDOWS			
080001 Aluminum Windows - FSB	\$32,130		
081110 Hollow Metal Doors and Frames		\$33,300	\$1.61
081400 Flush Wood Doors		\$0	\$0.00
083110 Access Doors and Frames		\$87,360	\$4.22
083310 Overhead Coiling Doors		\$52,960	\$2.56
084110 Aluminum Windows		\$29,750	\$1.44
084500 Aluminum-Framed Entrances and Storefronts		\$10,110	\$0.49
084600 Translucent Windows		\$46,500	\$2.24
084650 Skylights		\$0	\$0.00
084660 Sunshades		\$0	\$0.00
087100 Door Hardware		\$18,400	\$0.89
088000 Glazing		\$7,000	\$0.34
089000 Louvers and Vents		\$5,000	\$0.24
DIV. 9 FINISHES			
090003 Acoustical Tile - FSB	N/A		
090004 Tile - FSB	\$28,350		
090005 Resilient Floors - FSB	N/A		
090007 Painting - FSB	\$99,881		
092110 Gypsum Board Assemblies		\$135,846	\$6.56
093000 Tiling		\$26,250	\$1.27
095100 Acoustical Ceilings		\$12,000	\$0.58
096510 Resilient Flooring and Accessories		\$8,985	\$0.43
096550 Carpet		\$5,500	\$0.27
097300 Resinous flooring and base		\$11,200	\$0.54
099000 Painting and Coating (part of 090007 FSB)		\$92,482	\$4.46

New Department of Public Works Facility

107 Holden Road
Paxton, Ma



Concept Design Cost Estimate

04-Feb-20

CONSTRUCTION COST SUMMARY IN CSI FORMAT		20,720 SF	
	Filed Sub-Bids	New Department of Public Works Facility	\$/SF
DIV 10 SPECIALTIES			
101400 Signage		\$7,500	\$0.36
102800 Toilet Accessories		\$4,397	\$0.21
104400 Fire Protection Specialties		\$2,000	\$0.10
106500 Toilet Partitions		\$4,850	\$0.23
108500 Lockers		\$7,200	\$0.35
109500 Screen Partitions		\$0	\$0.00
DIV. 11 EQUIPMENT			
113100 Appliances		\$5,000	\$0.24
118100 Industrial Equipment		\$250,000	\$12.07
DIV. 12 FURNISHINGS			
122110 Horizontal Louver Blinds		\$2,450	\$0.12
DIV. 13 SPECIAL CONSTRUCTION			
13100 Pre-fabricated Metal Building		\$1,107,341	\$53.44
13200 Pre-fabricated Wood Building (salt shed)		\$240,000	\$11.58
13300 Fuel Island Equipment and Canopy		\$443,000	\$21.38
DIV. 21 FIRE SUPPRESSION			
210000 Fire Suppression - FSB	\$159,990	\$148,139	\$7.15
DIV. 22 PLUMBING			
220000 Plumbing - FSB	\$374,333	\$346,605	\$16.73
DIV. 23 HVAC			
220000 HVAC - FSB	\$897,847	\$831,340	\$40.12
DIV. 26 ELECTRICAL			
260000 Electrical - FSB	\$820,359	\$759,592	\$36.66
DIV. 31 EARTHWORK			
311000 Site Clearing		\$30,000	\$1.45
312000 Earthwork		\$302,504	\$14.60
312500 Erosion and Sedimentation Controls		\$14,304	\$0.69
315000 Ground Improvements		\$0	\$0.00
DIV. 32 EXTERIOR IMPROVEMENTS			
321216 Asphalt Paving		\$222,144	\$10.72
321213 Portland Cement Concrete Paving		\$8,000	\$0.39
321613 Curbs and Gutters		\$28,800	\$1.39
323100 Site Improvements		\$30,315	\$1.46
329000 Landscaping		\$25,000	\$1.21
DIV. 33 UTILITIES			
331000 Site Water Distribution		\$30,000	\$1.45
333000 Sanitary Sewerage Utilities		\$65,000	\$3.14
334000 Storm Drainage		\$136,550	\$6.59
335000 Gas		\$10,000	\$0.48
SUBTOTAL DIRECT (TRADE) COST		\$6,956,491	\$335.74
GENERAL CONDITIONS & REQUIREMENTS	9%	\$626,084	
GL INSURANCE	1.3%	\$90,434	
BONDS	1.8%	\$125,217	
OVERHEAD	2%	\$155,965	
PROFIT	2%	\$159,084	
DESIGN AND PRICING CONTINGENCY	7%	\$567,929	
ESCALATION TO MAY 2022 (27 months)		SEE PAGE 1	
TOTAL CONSTRUCTION COSTS - 2020 DOLLARS		\$8,681,204	\$418.98

* FSB breakouts include contingency and escalation

Concept Design Cost Estimate

GSF 20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

GROSS FLOOR AREA CALCULATION

Offices and Office Support	1,298
Employee Facilities	1,814
Workshops	1,452
Vehicle Maintenance	3,553
Vehicle & Equipment Storage	11,054
Washbay	1,549
Mezzanines 1 & 2	1,260

TOTAL GROSS FLOOR AREA (does not include mezzanines) 20,720 GSF

A10 FOUNDATIONS

A1010 STANDARD FOUNDATIONS

3'-0" Strip footings to exterior walls

03300	Formwork	1,420	sf	15.00	21,300
03300	Re-bar	4,980	lbs	2.00	9,960
03300	Concrete material	83	cy	160.00	13,280
03300	Placing concrete	83	cy	38.00	3,154

1'-6" Frost foundation walls

03300	Formwork	5,680	sf	15.00	85,200
03300	Re-bar	10,790	lbs	2.00	21,580
03300	Concrete material	166	cy	160.00	26,560
03300	Placing concrete	166	cy	38.00	6,308

8" Back up stem foundation walls - 4' ht

03300	Formwork	3,136	sf	15.00	47,040
03300	Re-bar	2,795	lbs	2.00	5,590
03300	Concrete material	43	cy	160.00	6,880
03300	Placing concrete	43	cy	38.00	1,634

Column footings

03300	Formwork	1,680	sf	15.00	25,200
03300	Re-bar	8,550	lbs	2.00	17,100
03300	Concrete material	114	cy	160.00	18,240
03300	Placing concrete	114	cy	38.00	4,332

Piers

03300	Formwork	800	sf	15.00	12,000
03300	Re-bar	1,200	lbs	2.00	2,400
03300	Concrete material	16	cy	160.00	2,560
03300	Placing concrete	16	cy	38.00	608

SUBTOTAL

330,926

A1030 LOWEST FLOOR CONSTRUCTION

8" Slab on grade

07210	Vapor barrier	16,156	sf	0.25	4,039
03300	Reinforcing	17,772	sf	1.20	21,326
03300	Concrete - 8" thick	427	cy	160.00	68,320
03300	Placing concrete	427	cy	35.00	14,945
03300	Finishing and curing concrete	16,156	sf	1.50	24,234
03300	Control joints - saw cut	16,156	sf	0.20	3,231

5" Slab on grade

07210	Vapor barrier	4,564	sf	0.25	1,141
03300	Reinforcing	5,249	sf	0.75	3,937
03300	Concrete - 5" thick	80	cy	160.00	12,800
03300	Placing concrete	80	cy	35.00	2,800
03300	Finishing and curing concrete	4,564	sf	1.50	6,846
03300	Control joints - saw cut	4,564	sf	0.20	913

Concept Design Cost Estimate

GSF 20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

Miscellaneous

07210	Rigid insulation at 4' perimeter vertical and horiz	5,680	sf	3.50	19,880		
03300	Curbs at fluid storage and wash bay walls	210	lf	25.00	5,250		
03300	4' haunch under CM walls	566	lf	20.00	11,320		
03300	Equipment Pads, pits and supports	1	ls	5,000.00	5,000		
	SUBTOTAL					205,982	

TOTAL - FOUNDATIONS

\$536,908

B10 SUPERSTRUCTURE

B1010 FLOOR CONSTRUCTION

Mezzanine Floor Structure - Steel:

13100	W columns, beam, bracing, HSS tubes, L angles and Channels	5	tons	5,000.00	25,000		
	Mezzanine Floor Structure						
13100	Floor deck - 1 1/2" deck	1,260	sf	3.89	4,901		
03300	WWF reinforcement	1,449	sf	1.00	1,449		
03300	2" Concrete Fill to metal deck	17	cy	160.00	2,720		
03300	Place and finish concrete	1,260	sf	1.00	1,260		
	Miscellaneous						
05500	Misc metals	20,720	sf	4.50	93,240		
07841	Firestopping	20,720	sf	0.15	3,108		
	SUBTOTAL					131,678	

B1020 ROOF CONSTRUCTION

Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :

13100	Prefabricated metal building package (galv steel, metal panels, metal roof, gutters, downspouts and snow guards)	20,720	sf	52.00	1,077,440		
	Miscellaneous						
05500	Overhead door openings	8	ea	1,850.00	14,800		
05500	Window openings	970	sf	10.00	9,700		
	SUBTOTAL					1,101,940	

TOTAL - SUPERSTRUCTURE

\$1,233,618

B20 EXTERIOR CLOSURE

B2010 EXTERIOR WALLS

Admin exterior wall back-up

09211	Metal stud	1,960	sf	6.00	11,760		
09211	5/8" int gwb	1,960	sf	2.75	5,390		
09900	Paint	1,764	sf	1.25	2,205		
	CMU veneer at building perimeter and entry						
04200	CMU veneer	1,568	sf	34.00	53,312		
07270	Air barrier	1,568	sf	6.00	9,408		
07210	Rigid insulation	1,568	sf	4.00	6,272		
	SUBTOTAL					88,347	

B2020 WINDOWS

Curtainwall and Aluminum windows

84600	Translucent windows	620	sf	75.00	46,500		
84110	Aluminum windows	350	sf	85.00	29,750		
08900	Louvers	2	ea	2,500.00	5,000		
07920	Backer rod & double sealant	610	lf	12.00	7,320		
06100	Wood blocking at openings	610	lf	10.00	6,100		
	SUBTOTAL					94,670	

Concept Design Cost Estimate

GSF

20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

B2030 EXTERIOR DOORS

Overhead doors

08311	18x16 OHD	2	ea	18,720.00	37,440		
08311	16x16 OHD	3	ea	16,640.00	49,920		
08331	14x16 OHD	1	ea	14,560.00	14,560		
08331	OHD Poly 16x16	2	ea	19,200.00	38,400		

Man Doors

84500	3x7 alum entry door, sidelight and trans	2	ea	3,455.00	6,910		
08100	Galv 3x7 frame and Door	2	ea	1,350.00	2,700		
08100	Galv 3x7 frame with trans and Door	7	ea	1,750.00	12,250		
08710	Hardware	11	lvs	650.00	7,150		

Misc

07920	Backer rod & double sealant	462	lf	12.00	5,544		
06100	Wood blocking at openings	462	lf	10.00	4,620		

SUBTOTAL

179,494

TOTAL - EXTERIOR CLOSURE

\$362,511

B30 ROOFING

B3010 ROOF COVERINGS

All roofing, gutters, downspouts and snow guards included with Prefabricated metal building

05500	Entry canopy (structure)	2	ea	5,500.00	11,000		
07540	Entry canopies (roofing and flashings)	2	ea	3,500.00	7,000		

SUBTOTAL

18,000

B3020 ROOF OPENINGS

07720	Roof hatch and ladder	2	ea	5,500.00	11,000		
05500	Fall protection	45	ea	650.00	29,250		

SUBTOTAL

NIC

40,250

TOTAL - ROOFING

\$58,250

C10 INTERIOR CONSTRUCTION

C1010 PARTITIONS

09211	Partitions - furout walls	624	sf	8.00	4,992		
09211	Typical metal studs and gwb at office/locker areas	3,720	sf	13.00	48,360		
09211	Plumbing chase walls	966	sf	14.00	13,524		
04200	CMU walls to underside mezz	1,452	sf	24.00	34,848		
04200	CMU to 12'	804	sf	24.00	19,296		
04200	CMU Separation walls - washbay to 10'	550	sf	24.00	13,200		
09211	GWB Separation walls - washbay- metal stud and gwb 10' to deck	880	sf	10.00	8,800		
04200	CMU partitions - separation -10' ht	1,520	sf	24.00	36,480		
09211	GWB Separation walls - metal stud and gwb 10' to deck	2,432	sf	10.00	24,320		
06100	Rough blocking	600	lf	8.00	4,800		

SUBTOTAL

208,620

Concept Design Cost Estimate

GSF

20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

C1020 INTERIOR DOORS

Doors & Frames

08111	Interior door & frame - single	19	ea	950.00	18,050		
08111	Interior door & frame - double	5	ea	1,850.00	9,250		
08111	Sidelights and borrowed lights	8	ea	750.00	6,000		
84500	Int alum entry door and sidelight	1	ea	3,200.00	3,200		

Hardware

08710	Hardware	25	lvs	450.00	11,250		
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Glazing

08800	Glazing to doors	40	sf	35.00	1,400		
08800	Glazing to frames	160	sf	35.00	5,600		
09900	Paint HM frames	33	ea	125.00	4,125		
07920	Sealants & caulking	33	ea	75.00	2,475		

SUBTOTAL

61,350

C1030 SPECIALTIES / MILLWORK

06402	Cabinets & counters - Kitchen & Lunch rooms	18	lf	425.00	7,650		
06402	Restroom vanity counters	16	lf	375.00	6,000		
06402	Sliding window and counters	1	ea	3,500.00	3,500		
06402	Window sills	55	lf	35.00	1,925		
06402	Cabinets/counters - copy/file	8	lf	250.00	2,000		
06402	General storage shelving	30	lf	35.00	1,050		
06402	Wet gear shelving	10	lf	85.00	850		

Lockers

10850	Lockers	16	ea	450.00	7,200		
06402	Locker ADA bench	3	ea	1,500.00	4,500		

Restrooms

10280	Shower curtain and rods	4	ea	200.00	800		
10650	Toilet partitions HC	2	ea	1,200.00	2,400		
10650	Toilet partitions Reg	2	ea	1,000.00	2,000		
10650	Toilet partitions urinal screen	1	ea	450.00	450		
10280	Soap disp	5	ea	18.00	90		
10280	Mirror	5	ea	233.00	1,165		
10280	Robe hook	10	ea	23.00	230		
10280	Grab bar	4	ea	95.00	380		
10280	Shower seat and bars	2	ea	250.00	500		
10280	TP holder	4	ea	45.00	180		
10280	PT disp/disp	3	ea	234.00	702		
10280	Janitor room accessories	1	ea	350.00	350		

Miscellaneous

06100	Plywood backers	800	sf	3.00	2,400		
06100	Locker bases	60	sf	20.00	1,200		
06100	Backer panels in electrical /tele/data closets	1	ls	1,500.00	1,500		
10440	Fire extinguisher cabinets	8	ea	250.00	2,000		
10140	Interior and exterior signage	1	ls	7,500.00	7,500		
05500	Interior bollards	20	ea	500.00	10,000		

SUBTOTAL

68,522

TOTAL - INTERIOR CONSTRUCTION

\$338,492

Concept Design Cost Estimate

GSF 20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

C20 STAIRCASES

C2010 STAIR CONSTRUCTION

05500	Mezzanine Stairs	2	ea	9,500.00	19,000		
05500	Mezzanine railings	70	lf	135.00	9,450		
05500	Gates	2	ea	1,250.00	2,500		
03300	Concrete material in pan infill	2	ea	850.00	1,700		
	SUBTOTAL					32,650	

C2020 STAIR FINISHES

09900	Paint to mezzanine stairs	2	ea	2,000.00	4,000		
09900	Paint to mezzanine rails/gates	70	lf	18.00	1,260		
	SUBTOTAL					5,260	

TOTAL - STAIRCASES

\$37,910

C30 INTERIOR FINISHES

C3010 WALL FINISHES

09900	Paint to GWB	15,654	sf	1.25	19,568		
09900	Paint to interior CMU	8,652	sf	2.10	18,169		
09300	Tile to walls	850	sf	25.00	21,250		
06402	1/2" PVC wall paneling on strapping at wash bay walls	3,650	sf	10.00	36,500		
07270	Air barrier	3,650	sf	5.50	20,075		
06100	Ply backer	3,650	sf	2.98	10,877		
	SUBTOTAL					126,439	

C3020 FLOOR FINISHES

09651	Linoleum	700	sf	8.00	5,600		
09730	RF - Resinous Flooring	800	sf	14.00	11,200		
09900	SC - Sealed Concrete	18,020	sf	1.00	18,020		
09300	Tile	200	sf	25.00	5,000		
09665	CPT - Carpet tile	1,000	sf	5.50	5,500		
09651	Rubber base	967	lf	3.50	3,385		
09900	Line stripping	450	sf	5.00	2,250		
	SUBTOTAL					50,955	

C3030 CEILING FINISHES

09510	ACT ceilings; 2' x 2'	2,000	sf	6.00	12,000		
09211	GWB ceilings	240	sf	8.00	1,920		
09211	L gwb soffits	30	lf	45.00	1,350		
09211	Drop gwb soffits	12	lf	40.00	480		
09900	Paint to GWB ceilings and soffits	360	sf	1.00	360		
06100	Utility and washbay equipment room roof caps	375	sf	18.00	6,750		
09900	Exposed prefab metal columns and beams	18,020	sf	1.25	22,525		
	SUBTOTAL					45,385	

TOTAL - INTERIOR FINISHES

\$222,779

Concept Design Cost Estimate

GSF 20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

D20 PLUMBING

D20	PLUMBING						
220000	Water Closet	4	ea	5,000.00	20,000		
220000	Vanity Sink	5	ea	4,750.00	23,750		
220000	Jan Sink	1	ea	4,250.00	4,250		
220000	Showers	2	ea	6,650.00	13,300		
220000	Urinals	2	ea	4,400.00	8,800		
220000	Shop Sinks	1	ea	4,750.00	4,750		
220000	Hose Bibb	4	ea	1,650.00	6,600		
220000	Eye Wash	1	ea	2,800.00	2,800		
220000	Water Cooler	1	ea	5,625.00	5,625		
220000	Kitchen Sink	1	ea	3,150.00	3,150		
220000	Domestic Hot Water Heater	1	ea	6,500.00	6,500		
220000	Floor Drains & Piping	20,720	sf	4.00	82,880		
220000	Wash Bay Floor Drain & Piping	1	ls	15,000.00	15,000		
220000	Piping and vent assemblies for Wash bay equipment	1	ls	20,000.00	20,000		
220000	Air Hose Reel	2	ea	4,500.00	9,000		
220000	CA drops and piping	20,720	sf	1.75	36,260		
220000	Gas Piping to HVAC equip	20,720	sf	2.00	41,440		
220000	Misc plumbing to support industrial equipment	1	ls	20,000.00	20,000		
220000	Seismic restraints	1	ls	10,000.00	10,000		
220000	Coordination	1	ls	7,500.00	7,500		
220000	Testing and Sterilization	1	ls	5,000.00	5,000		
220000	Sub slab vent system					NIC	
	SUBTOTAL						346,605

TOTAL - PLUMBING

\$346,605

D30 HVAC

D30	HVAC						
	Equipment						
230000	AHUs, H&Vs, HRV, ACCUs, MAUs, EFs, FRTs and associated pumps, boilers & vfd's	20,720	sf	12.00	248,640		
	Air Distribution						
230000	Gravity Ventilators, Louvers and RGDs	20,720	sf	4.00	82,880		
	Sheet Metal						
230000	Ductwork, venting and misc	20,720	sf	9.00	186,480		
	Piping						
230000	Piping systems	20,720	sf	5.00	103,600		
	Insulation						
230000	Sheet Metal & piping insulation	20,720	sf	3.00	62,160		
	Controls						
230000	Controls	20,720	sf	5.00	103,600		
	Commissioning						
230000	Start up	20,720	sf	0.20	4,144		
230000	Balancing	20,720	sf	0.50	10,360		
230000	3rd Party Assist	20,720	sf	0.30	6,216		
	Radiant Heating						
230000	Radiant floor heating system at maintenance					NIC	
	Miscellaneous						
230000	Coordination	80	hrs	122.00	9,760		
230000	Crane	1	ls	5,000.00	5,000		
230000	Rigging	1	ls	8,500.00	8,500		
	SUBTOTAL						\$831,340

TOTAL - HVAC

\$831,340

Concept Design Cost Estimate

GSF 20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

D40 FIRE PROTECTION

D40 FIRE PROTECTION

210000	FP service equipment, valves, compressors and misc	1	ls	17,500.00	17,500		
210000	Wet Sprinkler heads through-out	213	ea	175.00	37,275		
210000	Dry Sprinkler heads at washbay	18	ea	218.00	3,924		
210000	Branch sprinkler piping with fittings & hangers	2,310	lf	24.00	55,440		
210000	Main sprinkler piping with fittings & hangers	500	lf	38.00	19,000		
210000	Hydraulic calculations, permits and testing	1	ls	15,000.00	15,000		
	SUBTOTAL					148,139	

TOTAL - FIRE PROTECTION

\$148,139

D50 ELECTRICAL

D5010 SERVICE AND DISTRIBUTION

Power Equipment

260000	Service equipment, panels, controllers and disconnects	20,720	sf	5.00	103,600		
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Power Circuitry

260000	Power wiring and conduits	20,720	sf	2.50	51,800		
	SUBTOTAL					155,400	

D5020 LIGHTING & POWER

Light Fixtures

260000	Lighting	20,720	sf	5.25	108,780		
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Lighting and Power Circuitry

260000	Lighting wiring and conduits	20,720	sf	1.85	38,332		
260000	Lighting controls	20,720	sf	0.50	10,360		
260000	Power wiring and conduits	20,720	sf	1.00	20,720		
260000	Power devices	20,720	sf	1.50	31,080		
	SUBTOTAL					209,272	

D5030 COMMUNICATION & SECURITY SYSTEMS

Telecommunications System

260000	Term Boards	1	ea	1,000.00	1,000		
260000	Tel/Data Outlet Backbox w/ Stub up	30	ea	75.00	2,250		
260000	Misc rough in	1	ea	2,500.00	2,500		

Security System

260000	Security roughin allowance	1	ls	7,500.00	7,500		
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Fire Alarm

260000	FA system	20,720	sf	2.25	46,620		
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Misc systems

260000	Toxic Alert Panel Roughin	1	ea	350.00	350		
260000	CN CO/Nitrogen Detector Backbox	4	ea	75.00	300		
260000	CG Gas Detector Backbox	4	ea	75.00	300		
	SUBTOTAL					60,820	

D5040 OTHER ELECTRICAL SYSTEMS

Miscellaneous

260000	Temp Power and Lighting	1	ls	15,000.00	15,000		
	SUBTOTAL					15,000	

TOTAL - ELECTRICAL

\$440,492

E20 FURNISHINGS

E2010 FIXED FURNISHINGS

12211	Horizontal Louver Blinds	350	sf	7.00	2,450		
11310	Kitchen appliances	1	ea	5,000.00	5,000		
	SUBTOTAL					\$7,450	

TOTAL - FURNISHINGS

\$7,450

Concept Design Cost Estimate

GSF

20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

F10 INDUSTRIAL EQUIPMENT

Industrial Equipment

11810	Equipment allowance for wash equip, portable heavy duty lift, misc shop equipment, and exhaust removal system	1	ls	250,000.00	250,000		
	SUBTOTAL					250,000	

TOTAL - INDUSTRIAL EQUIPMENT

\$250,000

A SITE ELECTRICAL POWER AND LIGHTING

Light Fixtures

260000	Light Poles and wiring	6	ea	4,800.00	28,800		
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Power Circuitry

260000	Allow for service conduits	1	ls	75,000.00	75,000		
260000	Utility Pole Riser or street connection	1	ea	5,500.00	5,500		
260000	Sliding gate power	1	ea	2,000.00	2,000		

Emergency Power

260000	Emergency Generator, WP Encl	1	ea	135,000.00	135,000		
260000	Auto transfer Sw	1	ea	20,000.00	20,000		
260000	Generator Annunciator	1	ea	2,000.00	2,000		
260000	Generator Eqpt Junc Box	2	ea	250.00	500		

Telecommunications System

260000	Allow for service conduits	1	ls	5,000.00	5,000		
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Misc

260000	Misc Site Demo, Removals, make-safe and temp services	1	ls	7,500.00	7,500		
	SUBTOTAL					281,300	

TOTAL - SITE ELECTRICAL POWER AND LIGHTING

281,300

B SALT SHED

Gambrel High Arch structure

13200	40' x 60' Salt shed - foundation, frame, siding, door and finishes	2,400	sf	100.00	240,000		
07545	FSB Roof premium (asphalt)	2,400	sf	12.00	28,800		
321216	Heavy duty pavement	267	sy	28.00	7,476		
312000	E&B Elec duct banks to shed	80	lf	30.00	2,400		
03300	Encase duct banks in concrete	24	cy	180.00	4,320		

Power and lighting

260000	Lighting	1	ls	5,000.00	5,000		
260000	Feeders (2) 1"	80	lf	40.00	3,200		
260000	Salt Shed Conn's (systems)	1	ls	5,000.00	5,000		

SUBTOTAL

296,196

TOTAL - SALT SHED

296,196

C FUEL ISLAND

Fuel Island

13300	10,000 gallon AST split tank (5K gas and 5K diesel) with two dispensers mounted to the side	1	ls	375,000.00	375,000		
03300	Foundations and pads	1	ls	35,000.00	35,000		
13300	Canopy	1	ls	38,000.00	38,000		
13300	Fire suppression system	1	ls	30,000.00	30,000		
312000	E&B Elec duct banks	120	lf	30.00	3,600		
03300	Encase duct banks in concrete	36	cy	180.00	6,480		

Power and lighting

260000	Lighting	1	ls	15,000.00	15,000		
260000	Feeders (2) 1"	120	lf	40.00	4,800		
260000	Elec Conn's (systems)	1	ls	1,500.00	1,500		

SUBTOTAL

509,380

TOTAL - FUEL ISLAND

509,380

Concept Design Cost Estimate

GSF

20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
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New Department of Public Works Facility

C SITEWORK

Site Contractor general conditions

312000	Field Engineering	6	dy	1,375.00	8,250		
312000	Trench Plates Trench Safety	1	ls	5,000.00	5,000		
312000	Site Supervision	3	mo	7,500.00	22,500		
312000	Mobilization	1	ea	6,500.00	6,500		
311000	Site fencing, protection, barricades	1	ls	10,000.00	10,000		

Site prep and removals

311000	Stabilized Construction Entrance	1	ea	6,500.00	6,500		
311000	Site paving, fencing, misc item removals	3	cd	4,500.00	13,500		
02050	Building and foundation removal	6,000	sf	10.00	60,000		
02450	Building and site tanks haz-mat	1	ls	50,000.00	50,000		
312500	Straw waddle	1,700	lf	8.00	13,600		
312500	Infiltration Filters at CB	4	ea	176.00	704		

Earthwork

312000	Earthwork cuts, fills, import & export	15,556	cy	6.00	93,336		
312000	Shape & compact subgrade for new grades and all utilities	4	dy	4,500.00	18,000		

Structural excavation and backfill

312000	Excavate and backfill foundation footing and walls	1,111	cy	30.00	33,330		
312000	Excavate and backfill foundation column footings	300	cy	30.00	9,000		

Slab Prep

312000	Underslab base material	767	cy	30.00	23,010		
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Paving and walks prep

312000	Bitum. Paving 12" Dense Grade	2,509	cy	26.00	65,234		
312000	Conc. Walks 8" Dense Grade	44	cy	26.00	1,144		

Paving and curbing

321216	HMA pavement	7,531	sy	28.00	210,868		
321216	Street cut and patch pavement	100	sy	38.00	3,800		
321613	HMA Berm	1,800	lf	16.00	28,800		

Storm

334000	CB	5	ea	4,750.00	23,750		
334000	DMH	3	ea	4,900.00	14,700		
334000	Flared End and rip rap	2	ea	2,250.00	4,500		
334000	Building perimeter drain piping	600	lf	18.00	10,800		
334000	Storm piping	1,100	lf	48.00	52,800		
334000	Dention basin	5,000	sf	6.00	30,000		

Concept Design Cost Estimate

GSF

20,720

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
New Department of Public Works Facility							
	Septic						
333000	Septic system tanks, piping and field allowance	1	ls	65,000.00	65,000		
	Water						
331000	Allow for water service to be connected on site	1	ls	30,000.00	30,000		
	Gas						
335000	Piping to be connected on site	1	ls	10,000.00	10,000		
	Site Improvements						
321213	Concrete walks	1,000	sf	8.00	8,000		
323100	HC signs	2	ea	200.00	400		
323100	Site signs	2	ea	200.00	400		
323100	Parking space lines/symbols	17	ea	45.00	765		
05500	Bollards	20	ea	550.00	11,000		
323100	Allow for fencing and gates not shown	1	ea	15,000.00	15,000		
323100	Fencing - 6' CL at detention basin	250	lf	55.00	13,750		
	Landscaping						
329000	Allow for plantings and seed	1	ls	25,000.00	25,000		
	Pads, Ductbanks and Bases						
03300	Dumpster Pad and fencing	1	ea	4,500.00	4,500		
03300	Transformer Pad	1	ea	4,500.00	4,500		
03300	Generator Pad	1	ea	6,500.00	6,500		
312000	E&B Elec/communication duct banks	400	lf	28.00	11,200		
03300	Encase duct banks in concrete	119	cy	220.00	26,180		
260000	L.Pole Base	6	ea	550.00	3,300		
	SUBTOTAL					1,055,121	
TOTAL - SITEWORK							1,055,121

Department of Public Works Facilities
SUMMARY - Recent Cost Data
CONSTRUCTION COST

Description	Size (SF)	Bid Date	Low Bid Price	Average Bid Price	2014 Avg Cost per SF	2015 Avg Cost per SF	2016 Avg Cost per SF	2017 Avg Cost per SF	2018 Avg Cost per SF	2019 Avg Cost per SF	2020 Avg Cost per SF	2021 Avg Cost per SF	2022 Avg Cost per SF
Wayland Public Works Facility	39,869	2014	\$ 8,877,000	\$ 10,519,754	\$264	\$275	\$287	\$324	\$351	\$398	\$422	\$439	\$461
Medford Public Works Facility	45,000	2014	\$ 12,186,000	\$ 12,340,333	\$274	\$286	\$299	\$336	\$364	\$414	\$439	\$456	\$479
Bourne Public Works Facility	39,040	2014	\$ 10,441,002	\$ 11,063,598	\$283	\$296	\$309	\$348	\$377	\$428	\$453	\$471	\$495
Norwood Public Works Facility	53,870	2014	\$ 14,902,289	\$ 15,437,343	\$287	\$299	\$312	\$352	\$381	\$432	\$458	\$477	\$501
Boylston Highway Facility	13,926	2015	\$ 3,364,000	\$ 3,935,419	--	\$283	\$295	\$332	\$360	\$409	\$433	\$451	\$473
Hopkinton Public Works Facility	42,410	2016	\$ 11,532,000	\$ 12,112,833	--	--	\$286	\$322	\$349	\$396	\$420	\$436	\$458
Orleans Public Works Facility	42,278	2017	\$ 11,774,000	\$ 12,833,834	--	--	--	\$304	\$329	\$373	\$396	\$412	\$432
Andover Municipal Services Facility	54,088	2017	\$ 16,049,000	\$ 18,413,675	--	--	--	\$340	\$368	\$418	\$443	\$461	\$484
Longmeadow Public Works Facility	44,858	2018	\$ 12,707,000	\$ 14,773,364	--	--	--	--	\$329	\$374	\$396	\$412	\$433
Rye Brook NY Public Works Facility	32,883	2018	\$ 11,193,943	\$ 13,184,654	--	--	--	--	\$401	\$455	\$483	\$502	\$527
Grafton DPW Facility	33,710	2018	\$ 11,713,205	\$ 12,399,201	--	--	--	--	\$368	\$418	\$443	\$460	\$483
Middleboro DPW Facility	34,000	2019	\$ 13,673,300	\$ 14,355,199	--	--	--	--	--	\$422	\$448	\$465	\$489
Yarmouth DPW Facility	37,990	2019	\$ 14,633,435	\$ 16,367,227	--	--	--	--	--	\$431	\$457	\$475	\$499
Burlington DPW Facility	66,200	2019	\$ 23,925,000	\$ 26,074,333	--	--	--	--	--	\$394	\$418	\$434	\$456
Holden DPW Facility	42,000	2020	\$ 14,519,200	\$ 15,780,624	--	--	--	--	--	--	\$376	\$391	\$410
Average Cost per SF:					\$277	\$288	\$298	\$332	\$361	\$412	\$432	\$450	\$472

Paxton Public Works Facility	20,720	est. 2022		\$9,826,940	--	--	--	--	--	--	--	\$474
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PAXTON PUBLIC WORKS FACILITY

SCHEMATIC DESIGN REPORT

SECTION 7

PROJECT INFORMATIONAL DOCUMENTATION

- Rendered Site Plan
- 3-D Building Rendering



Paxton, MA
New Public Works Facility



Paxton, MA
New Public Works Facility

Weston & SampsonSM