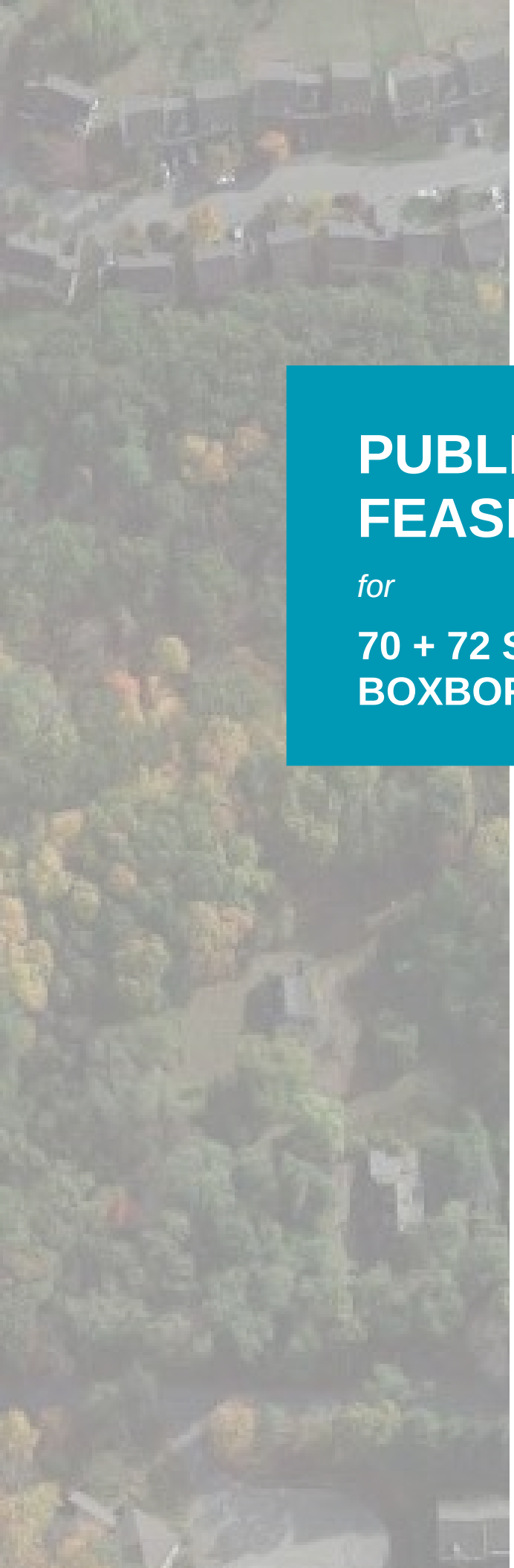

AUGUST 2021

PUBLIC SAFETY PROJECT FEASIBILITY STUDY

for

70 + 72 STOW ROAD
BOXBOROUGH, MASSACHUSETTS

Prepared For:
TOWN OF BOXBOROUGH, MA

HKT architects inc.
24 ROLAND STREET, SUITE 301
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FINAL REPORT

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EXECUTIVE SUMMARY

At the request of the Town of Boxborough, HKT Architects and Pare Corporation conducted a limited study to investigate the feasibility of developing the site located at 70 + 72 Stow Road (Assessor's Plat 14, Lots 098 and 086) for a new public safety facility. The purpose of the study was to complete limited investigations of the site to determine if a public safety building of approximately 35,000 square feet with a footprint similar to that of a public safety building recently built in another community could fit on the site. The assessment also included looking at whether there would be adequate space on site for wells and septic to support a public safety building. In addition, HKT was asked if it was determined that the site could accommodate a public safety facility, would there be adequate space remaining to construct a community center on the site also.

The study scope included a feasibility level site evaluation featuring a utility review, site review, constraints mapping and a permitting review. With information gathered from the site evaluation, "test fit" sketch options of the building and parking on the site were developed and two sketch options were selected by the Building Committee to be developed into concept site plans. These concept site plans show a preliminary site layout including buildings, parking, wells, septic and stormwater management areas. Conceptual grading plans and drainage and utility plans were beyond the scope of this study.

Pare Corporation was also tasked with conducting some limited subsurface investigations to broadly assess the suitability of the site, subsurface soil characteristics and estimated seasonal high groundwater.

SITE ASSESSMENT

A copy of Pare Corporation's Site Feasibility Study is included in the appendices of this report. The existing conditions and constraints are outlined in the Pare report and include constraints determined based on desk research of publicly available sources as well as observation of test pits performed on three separate occasions in January, June and July 2021. Potential permitting requirements are also outlined in Pare's report.

Based on Pare's findings, two constraints maps were developed for use by HKT and Pare in developing conceptual options for the site. The constraints maps developed by Pare show existing wellhead protection areas, including for the now deactivated well at the Old Marketplace at 61 Stow Road (see discussion under Test Fit Diagram: Option C below). Two constraints map sketches were developed showing two future 2,000 gallon per day (GPD) wells and two future 45'x97' septic fields (one septic and one reserve field) which would meet the needs of the Public Safety Building and Community Center. One

constraints map demonstrates the wells and associated Zone 1 and Zone 2 well protection areas on the main portion of the site with septic fields in the panhandle while the other map shows the wells in the panhandle area of the site with the septic fields on the main portion of the site. Exact locations of the wells and septic fields could vary depending on the final site development plan.

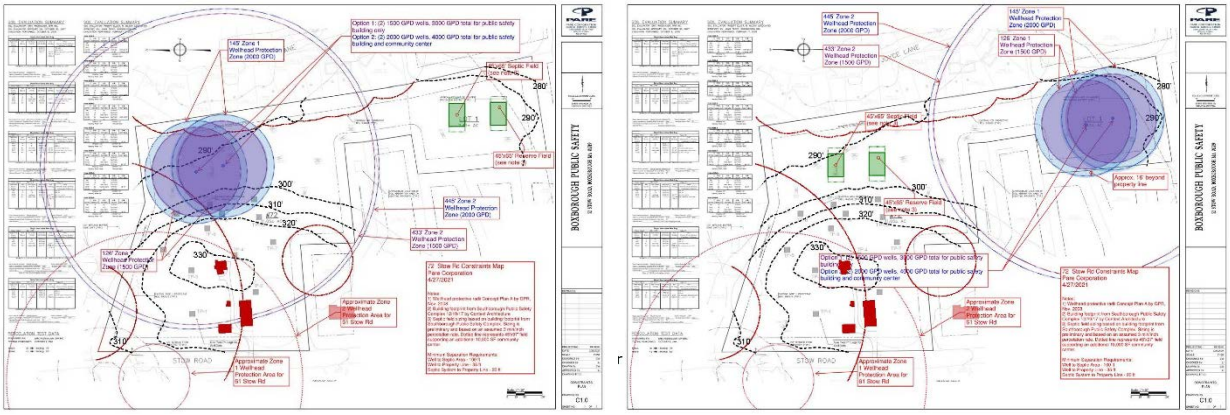

Figure 1 - Constraints maps

Consideration of code mandated restrictions to development within the existing and potential future Zone 1 and Zone 2 Wellhead Protection areas was a frequent topic of discussion with the Building Committee. Code mandated restrictions are outlined in Pare's Site Feasibility Study. Two restrictions have the greatest impact on development at the Stow Road site: ownership/control of the Zone 1 Wellhead Protection area for a public well and restrictions on grading within a Zone 2 Wellhead Protection area.

Regulations outlined in 310 CMR 22 dictate that the Zone 1 area of a public well must be owned or controlled by the user. If two 2,000 GPD wells are located in the panhandle of the Stow Road site, a small portion of their Zone 1 areas would extend over the property line onto abutters' properties as demonstrated on Pare's constraint map. An easement or another legal arrangement with the neighbors might be required in this case. Alternatively, it might be possible to increase the number of wells to three which would each be of a smaller size with smaller Zone 1 areas that would then fit within the Town's property. Additional wells have the downside of potential added cost to construct and additional equipment to maintain. Further discussion and study will be required during the next phase of design to determine the best path forward.

Code requirements in 310 CMR 22 prohibit permanently removing soil from within four feet of the historical high groundwater table elevation unless the soils are redeposited within 45 days to achieve final grading greater than four feet above the historical high groundwater mark. Some exclusions to this requirement exist such as for the excavation for building foundations and installation of utilities. Depending on the elevation of the historical high groundwater, this requirement could impact the final

building and site layout and fine grading on the site. In particular, preliminary test pits on the Stow Road site indicated some redoximorphic soils located in the area of the large hill across the middle of the site. These soils are likely indicative of small pockets of trapped water and not likely indicative of seasonal high groundwater. However, if it is determined that the soils are indicative of seasonal high groundwater, the restrictions would limit the amount of soil that could be removed from the hill to create a more level building area.

Additional test pits were dug on the site in July 2021 to gather more data on the groundwater in the area of the hill. Pare discussed results with the Board of Health. The Board of Health indicated that additional subsurface investigations and review of historical data will be required during the design phase to make a determination as to whether these redoximorphic soils are indicative of trapped water or seasonal high groundwater.

Throughout the study there was much discussion with the Building Committee and design sub-committee regarding concerns ledge might be encountered during construction on-site. Limited sub-surface investigations were undertaken to better understand where ledge might be found and to estimate its depth. Pare worked with the Boxborough DPW on three occasions to observe test pit excavation. Test pit logs summarizing Pare's observations are included as appendices to the Site Feasibility Study. Over the course of the three separate days, twenty-six test pits were dug of varying depths up to 20' below grade. No ledge was observed in any locations. Large boulders were encountered in some locations.

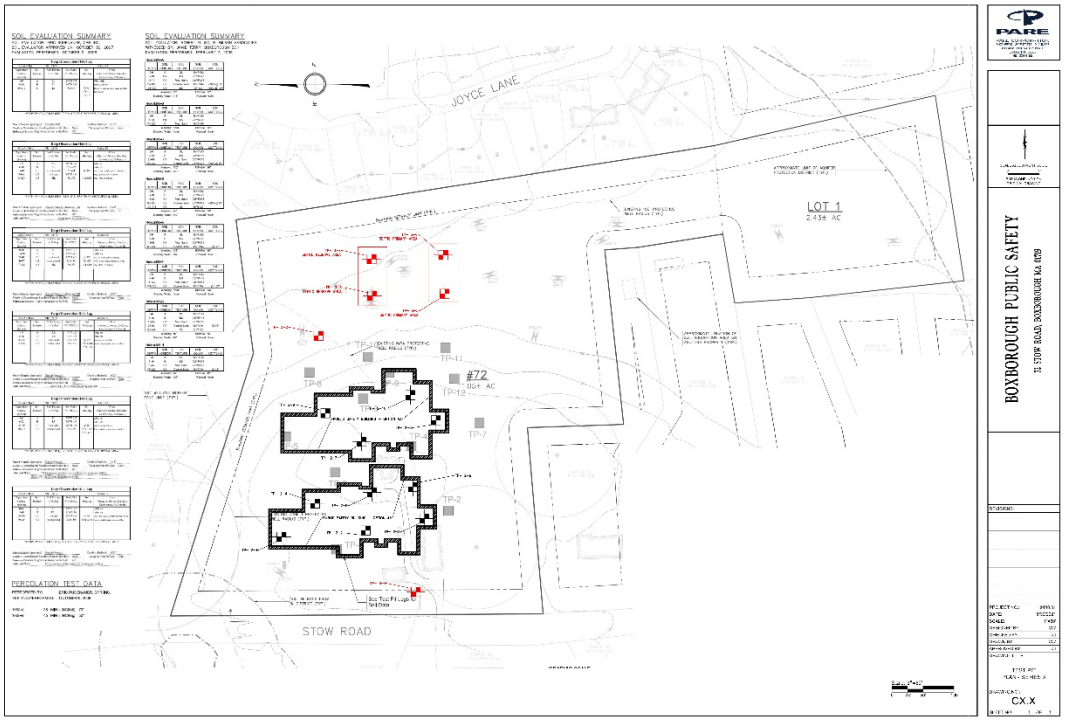

Figure 2 - Test Pit Locations

TEST FIT DIAGRAMS

Conceptual “test fit” sketches were developed utilizing the footprint of a two-story public safety building developed for another community. The footprint of the building was provided to HKT and Pare by the Town of Boxborough. It should be noted that no space needs programming for the Boxborough Police and Fire Departments was done as part of this study to confirm that this example building program aligns with the Town of Boxborough’s needs. An update of previous programming work done with the Town in 2014 and 2015 and development of a building design that meets the unique needs of the Town of Boxborough’s police and fire departments as well as the characteristics of the 70 + 72 Stow Road site will be required as design of the project moves forward.

In addition, development of grading plans was beyond the scope of this study. All options developed utilized the building footprint provided to HKT. This building footprint developed for another community appears to have been developed for a relatively flat site as garage doors are located around most of the building perimeter for vehicular access to fire department apparatus bays, a police Sally Port and police vehicular garages all on the same floor level. The existing 70 + 72 Stow Road site features some topographical changes that would require regrading the site to make this floor plan arrangement work for vehicles. As discussed under the previous section, restrictions to grading efforts within four feet of the historical high groundwater elevation may impact the final grading design and building layout. Alternative building and site designs should be explored in a future design phase to develop the most cost effective and functional design that meets the Town of Boxborough’s needs and works with all constraints, including the topography of this site.

Parking requirements for the facility were based upon previous programming discussions as part of the 2014 and 2015 Space Needs Assessments. Parking for public safety facilities is typically estimated based on needs at a shift change when personal vehicles for the on-coming and out-going shifts are on site as well as department vehicles and some visitors. For this exercise, a minimum of 21 parking spaces for the fire department, 27 parking spaces for the police department and 10 parking spaces for visitors were assumed.

Similarly, no space needs programming was done with the Town to determine the needs for a Community Center. For the purposes of this study, a 10,000 square foot Community Center was assumed. Programmatic needs for the Community Center were assumed in order to estimate parking requirements. These assumed space needs included:

- Administrative space for 7 staff members
- A multi-purpose room for 100 occupants
- A movement classroom for 50 occupants
- A general classroom for 30 occupants

- A conference room for 12 occupants
- A kitchen, toilets, storage and mechanical spaces

Based on this sample program, parking needs were calculated at one space per staff member and one space for every four visitors for a total of 55 spaces. Parking counts will need to be confirmed in a later phase as a program and design for a Community Center are developed in detail.

With these basic programmatic assumptions in place, HKT began exploring test fit options on the site. Three options were initially presented to the Building Committee.

Option A: Phase 1 + Phase 2

While all options developed as part of this study could be phased, not all options included separate sketches showing phased development. Option A does illustrate a possible phased solution. Option A assumes that a Public Safety Building would be constructed on the site first and that a Community Center would be constructed at a later time. This option was designed to place the Public Safety Building in a prominent location on the site with good visibility of the public traveling along Stow Road. Apparatus bay garage doors are located toward the northern end of the site to minimize impact to the residential development across Stow Road. Public parking is located off the main entrance driveway and is shown with a gate separating it from the police and fire department staff and department parking areas and Sally Port entrances behind the building. A second driveway is shown to the north of the building and would be for police and fire staff or departmental vehicles only. This secondary drive allows quick and easy access for emergency response from the back parking area without conflicting with vehicles in the public parking area.

OPTION A – PHASED PUBLIC SAFETY + COMMUNITY CENTER – PHASE 1

- Phased option to minimize impact to public safety parking + operations in second phase
- Locate police/fire department and staff parking separate from public
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 63 spaces
- Fire department drive-thru bays with separate drive off Stow Road for fire apparatus to access the back of the building

Figure 3 - Option A, Phase 1

In Phase 2, a Community Center, with its associated parking lot, would be constructed to the east, behind the Public Safety Building. In this location, the Community Center and its parking area are on a steep portion of the site which might impact the grading design or require the design of retaining walls in some locations. Access to the Community Center parking is through the Public Safety Building public parking area and a portion of the police and fire staff/departmental parking area. Public accessing the Community Center would also have a clear sightline to the entrance to the Sally Port.

OPTION A – PHASED PUBLIC SAFETY + COMMUNITY CENTER – PHASE 2

- Phased option to minimize impact to public safety parking in second phase
- Locate police/fire department and staff parking separate from public
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 48 spaces
  - Additional parking for police and fire personnel – 12 spaces
  - Parking for community center – 58 spaces
- Community center + parking on steeper portion of site

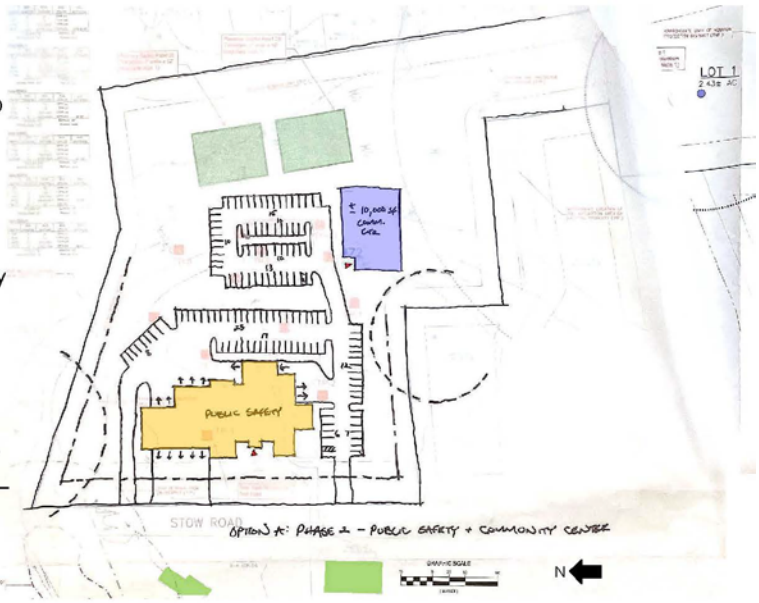

Figure 4 - Option A, Phase 2

Option B

In Option B, the Public Safety Building is moved closer to Stow Road to give it maximum visibility by the public while still maintaining a 65' deep apron in front of the apparatus bays to allow for fire apparatus movement. The Public Safety Building is also shifted farther north on the site to further minimize impact to the residential development across Stow Road. Some parking for police and fire department staff and department vehicles is provided behind the building, The majority of parking for the public safety building though would be in a common parking lot on the south side of the building and would be shared with the Community Center. Additional Community Center parking is located to the east of the Public Safety building. Like the Public Safety Building, the Community Center is moved west, closer to Stow Road, and to a flatter portion of the site than in Option A. Public accessing the Community Center would have a clear sightline to the entrance to the Sally Port.

In shifting the Public Safety Building to the north, the secondary access drive connecting Stow Road and the rear parking area is eliminated. Therefore, all public and emergency response vehicles would use the same driveway in accessing the parking areas and all garage doors in the rear of the building.

OPTION B – PUBLIC SAFETY + COMMUNITY CENTER

- Shift public safety building to the north to minimize impact of apparatus traffic on development across street
- Shift community center to the west to flatter portion of the site
- Keep drive thru apparatus bays – eliminate second curb cut
  - Fire apparatus must access back of building through parking lot
  - Some parking for police and fire personnel located behind the public safety building – 29 spaces
  - Shared public safety (visitor + personnel)/community center parking – 110 spaces

Figure 5 - Option B

Option C

In Option C, the Public Safety Building is turned 90 degrees on the site and modified slightly so the public entrance door faces a parking lot shared with the Community Center while the apparatus bay doors still open directly onto an apron on Stow Road. This option maintains the Community Center location farther back on the site, but allows for more privacy for the Sally Port. This option also allows for secured private parking for police and fire department personnel and department vehicles separate from all public parking.

OPTION C – PUBLIC SAFETY + COMMUNITY CENTER

- Reorient public safety building with public entrance off shared public parking lot to create separate public safety parking behind building
- Eliminate drive-thru apparatus bays
  - Gated parking for police and fire personnel – 57 spaces
  - Shared public/community center parking – 69 spaces

Figure 6 - Option C

After reviewing the preliminary conceptual site options, the Building Committee selected Option A for development with some modifications. It was noted that the Fire Department strongly prefers drive through apparatus bays if at all possible. The Police Department prefers to have the Public Safety Building located farther back from Stow Road with the Sally Port entrance outside of view from the roadway.

In regards to the septic and well locations, the Building Committee asked HKT and Pare to look at the possibility of flipping their locations so the septic would be in the panhandle and the wells in the main portion of the site. Their primary concern was the requirement that the land area of the Zone 1 Wellhead Protection area be owned by or controlled by the well owner and that given the size of the wells, it is likely that the Zone 1 will extend over the property line and require a legal agreement with one or more abutters. The Building Committee also noted that they believed one public well, for the Old Marketplace located across Stow Road, was not identified on the preliminary constraints drawings and therefore not taken into account in Options A, B and C. Subsequent investigation revealed that this well was deactivated in 2018 and is no longer registered with the DEP. Its approximate location is noted on each of the following Options developed in response to the Building Committee's feedback and on the updated constraints maps included in the Site Feasibility Study.

Option A1

Option A1 is similar to the original Option A, except that the Public Safety Building and its parking area is pushed 20 feet to the east in response to the Building Committee's comments. The Community Center is in approximately the same location as in Option A and the space between the Public Safety and Community Center parking areas is reduced to maintain this location.

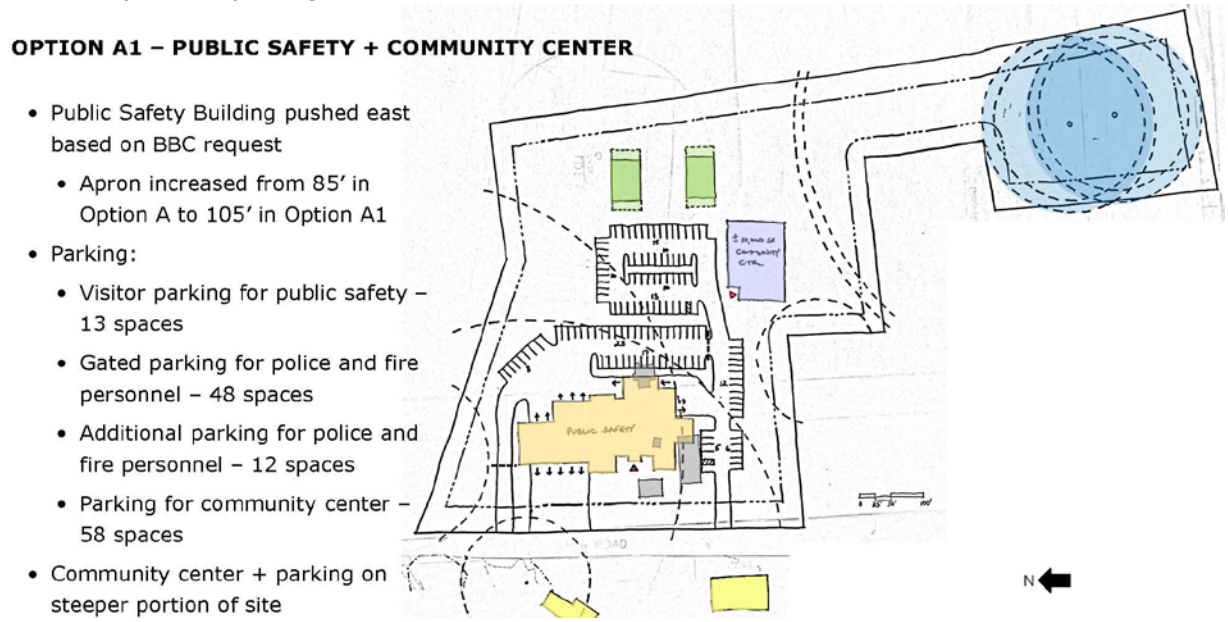

Figure 7 - Option A1

In this option, the wells would need to be located in the panhandle as there would not be enough unrestricted land within the main portion of the site given the building and parking development to accommodate them.

Option A2

Option A2 pushes the Public Safety Building 35 feet farther east than Option A1 and eliminates the Community Center entirely. The elimination of the Community Center from the development reduces the size of the wells and Zone 1 area required. The smaller Zone 1 area appears to fit within the panhandle of the site without encroaching on the abutters' properties and therefore does not require any legal agreements. Locating the wells within the main portion of the site is also a possibility in this scheme as more area is available without the Community Center.

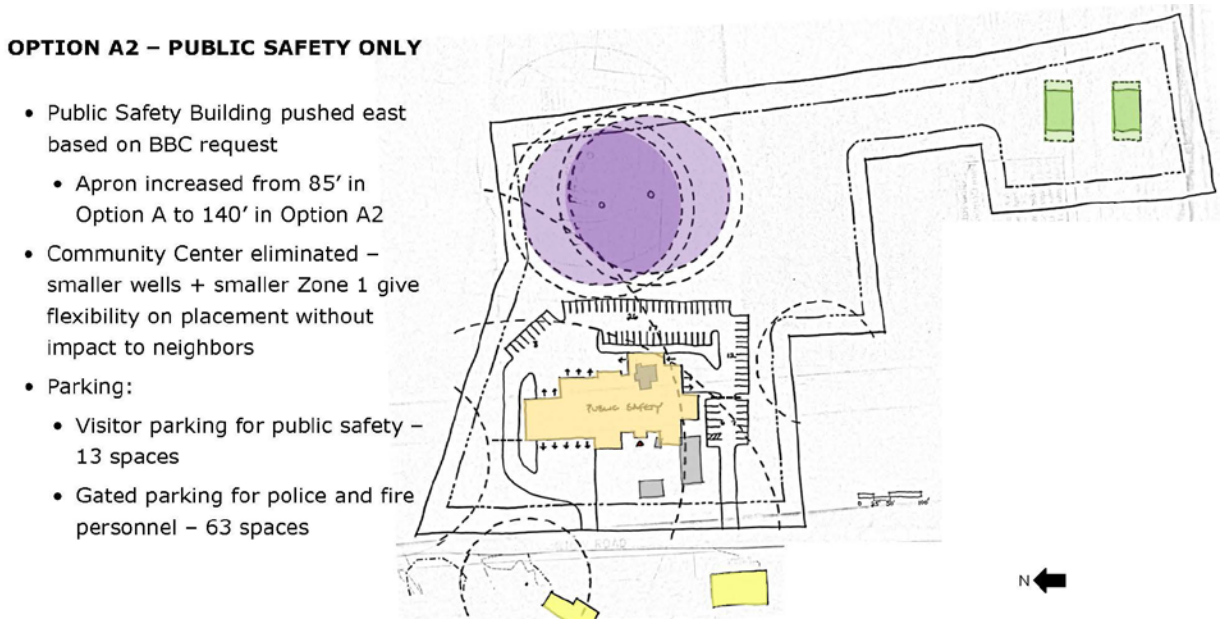

Figure 8 - Option A2

Option A3

In this option, the location of the Public Safety Building and Community Center are flipped with the Community Center located closest to Stow Road. With the Community Center in front of the Public Safety Building, parking for all Public Safety personnel and department vehicles can be located toward the back of the site and be gated for the greatest privacy. A shared parking area for the Community Center and public safety visitors is located at the front portion of the site. The wells in this option are again located in

the panhandle as there would not be adequate room for them on the main portion of the site.

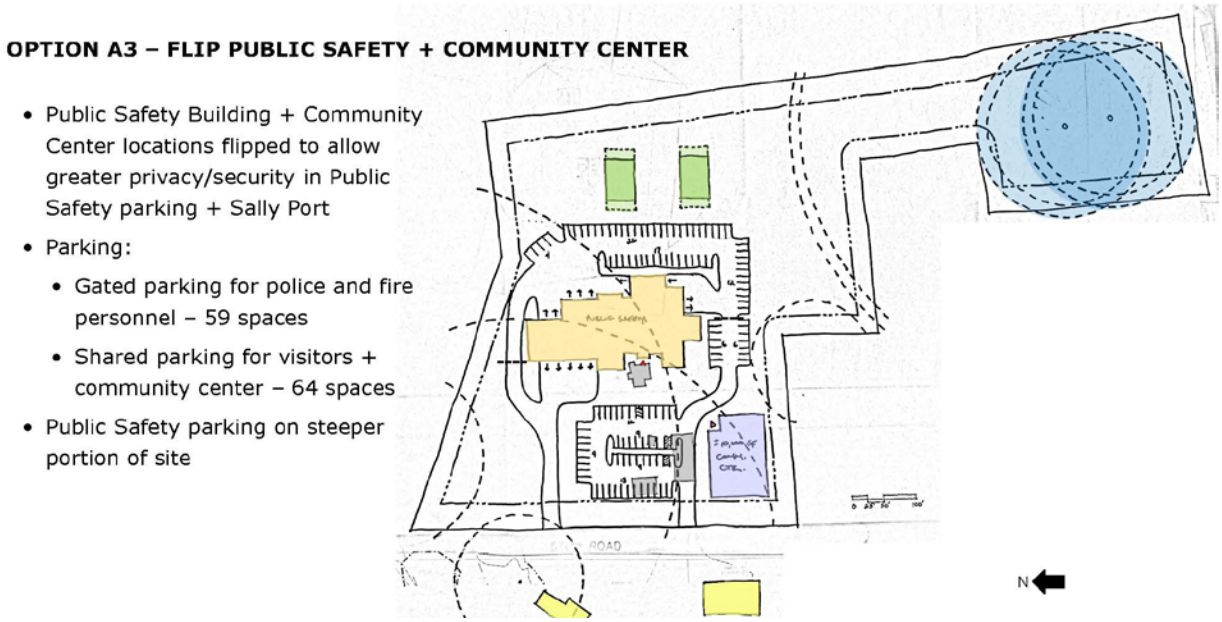

Figure 9 - Option A3

The Building Committee selected Options A1 and A3 as the preferred concepts for further development by Pare. Conceptual site plans were developed by Pare for each of these options showing additional details such as utility layouts, stormwater management areas, parking and paving, septic system and well locations. Underground storage for the buildings' fire protection systems is not shown as this would be sized by a fire protection engineer as the design progresses. The Conceptual Site Plans A1 and A3 are included in the appendices of this report.

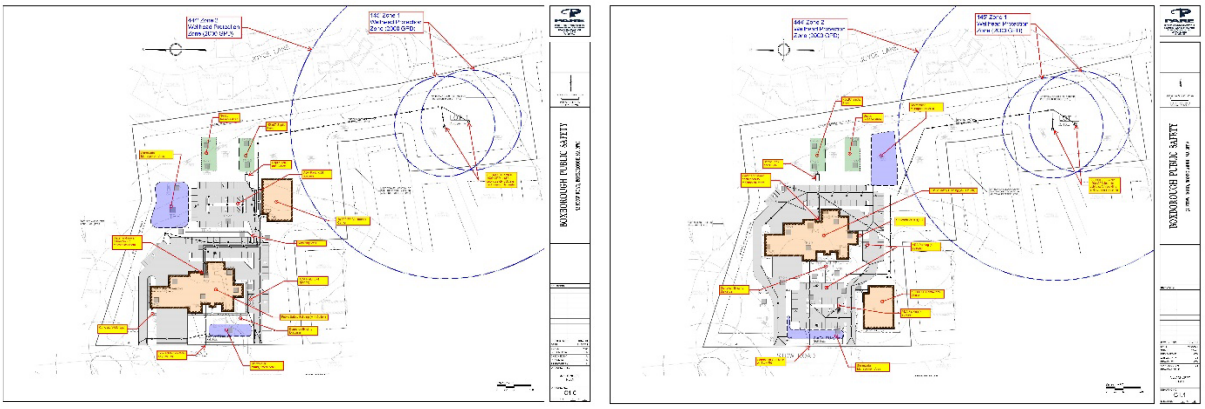

Figure 10 - Conceptual Site Plans A1 and A3

CONCLUSION

Based on the study findings, it appears there is adequate space at 70 + 72 Stow Road for the future home of the Boxborough Public Safety Facility. In addition, there appears to be adequate space for a small Community Center on the site. As design proceeds to the next phase, additional subsurface investigations will be required as well as further discussions with the Board of Health to determine the historical high groundwater elevation on the site. The determination of the historical high groundwater elevation will ultimately impact the extent of regrading that will be possible across the site which will in turn impact the layout of the building and site. The next phase of design will also require an update to space needs programming conducted in 2014 and 2015 and development of conceptual building and site designs to meet the needs of Boxborough's Police and Fire Departments. A professional cost estimate based on a conceptual building and site design is recommended to estimate probable construction and total project costs.

APPENDICES

HKT
architects inc.

SITE FEASIBILITY STUDY

PARE PROJECT NO. 19140.01

SITE FEASIBILITY STUDY – 72 STOW ROAD

TOWN OF BOXBOROUGH
PUBLIC SAFETY FACILITY
BOXBOROUGH, MASSACHUSETTS

PREPARED FOR:

HKT Architects
24 Roland Street, Suite 301
Charlestown, MA 02129

August 2021

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Introduction

The intent of this site feasibility study is to evaluate for the feasibility of developing a new Public Safety Facility in the Town of Boxborough, Massachusetts. As requested by HKT Architects (HKT), the property included with this feasibility level evaluation is 72 Stow Rd, Boxboro MA.

Based on the findings contained herein, a constraints map has been included in Appendix E. This constraints map denotes the various jurisdictional areas, regulatory boundaries, and additional pertinent information reviewed as part of this feasibility study.

The methodology for obtaining the information within this feasibility level site evaluation included the comprehensive review of the following resources:

- Massachusetts Geographic Information System (MassGIS)/Boxborough Geographic Information System (Boxborough GIS) data layers, accessed on March 9, 2021;
- Town of Boxborough Tax Assessor's database, accessed on March 9, 2021;
- MACRIS Maps 2.0 Beta historical inventory, accessed March 9, 2021;
- NRCS Web Soil Survey, accessed on March 9, 2021;
- Boxborough Conservation Commission Regulations for Wetland Bylaw, Revised November 17, 2004;
- Boxborough Planning Board Site Plan Approval Rules and Regulations, Revised April 11, 2011;
- Boxborough Stone Walls Bylaw (No Date);
- Boxborough Significant Aquifers Areas Map, Revised September 1981;
- Boxborough Planning Board Scenic Road, Public Shade Tree, and Stone Wall Removal or Alteration Application (No Date);
- Boxborough Wireless Overlay District Map (No Date);
- Town of Boxborough Zoning Bylaw, Revised September 2018;
- Town of Boxborough Zoning Map, Dated May 2018;
- Flood Insurance Rate Map, Middlesex County MA Panel 331 of 656, Map number 25017C0331F, Revised July 7, 2014;
- 310 CMR 22: The Massachusetts Drinking Water Regulations;
- 310 CMR 15: Septic Systems (Title 5)

This feasibility level evaluation excludes the following:

- In-person site reconnaissance;
- Hazardous materials identification and evaluation of any type;
- Capacity analysis for existing utilities;
- Existing conditions of existing utilities (including operability of well pumps, fire pumps, and septic systems);
- Analysis of existing traffic conditions;
- Historic/previous site development; and
- Any information not provided by the resources identified herein.

SITE EVALUATION

Pare evaluated the feasibility of development at the Site provided by HKT. The existing conditions and constraints at the Site are described in this section of the report. No structural review of the existing buildings located on the Site was performed; at this time it is assumed that the existing structures onsite will be demolished during construction.

EXISTING SITE, 72 Stow Rd

The Site at 72 Stow Rd is comprised of a single parcel currently owned by the Town of Boxborough according to the Boxborough Assessor's Database. The 11.05-acre (481,350 square foot) parcel identified as Map 14, Parcel 098 000 in the Boxborough Assessor's Database includes the existing building.

The Boxborough Zoning Map (Revision: May 2018) indicates that the property is located within the Agricultural-Residential District. The Site is currently developed with 1,344 square foot, 2-story house, and several associated accessory structures. The existing residential building is located approximately in the middle of the cleared portion of the Site. The Site is bounded by Stow Road to the West and residential property to the north, south, and east.

The Site is generally flat with a large hill across the middle of the site. The topography slopes down to the east across the site with the large hill resulting in a change in grade of approximately 45 feet. Based on available MassGIS data, no wetlands, streams, surface water protection areas, vernal pools, or flood plains were identified on the Site. A 100 ft "w-district" buffer shown on previous constraints plans extends onto the northwest corner of the site that will have minimal impact on developing the site. Note that state GIS does not show any wetlands associated with this buffer; further investigation will be required if site development is proposed in this buffer. The Site has wellhead protection zones across much of the area. Aquifer and Boxboro Water District protection zones are present on the Site.

Based on available MassGIS data maps, there are no known Natural Heritage and Endangered Species Program (NHESP) mapped habitat onsite.

According to NRCS Web Soil Survey mapping, the Site contains Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony (307B), Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony (307D), and Hinkley loamy sand, 3 to 8 percent slopes (253B). Paxton fine sandy loam has a hydrologic soil group of C, group C soils have a slow rate of water transmission. Hinkley loamy sand has a hydrologic soil group of A, group A soils have a very fast rate of water transmission.

Preliminary test pits were performed by Pare on January 19, 2021 to locate the depth of ledge onsite. Test pit depths ranged from approximately 8 to 10 feet, and at no test pits was ledge located. This indicates a ledge depth lower than 10 feet below surface grade; however, it should be noted that boulders are visible at surface grade and ledge depths may vary throughout the site.

A second round of test pits was performed on June 3, 2021 at the request of the Town to investigate groundwater depths at two proposed building locations. One test pit (TP-2.3) was found to have mottling 54" below surface grade; no other pits dug had groundwater weeping or redoximorphic features indicative of a groundwater table. Textural analysis of the soils in the pits were consistent with a B type hydrologic soil group. The actual seasonal high groundwater elevation appears to be below the 10 foot depth of the test pits performed, the mottling found in TP-2.3 appears to be the result of localized perched water and not indicative of the sites seasonal high groundwater. Coordination with the Board of Health agent on the site's groundwater table will be required to

determine appropriate groundwater elevations. Groundwater elevations are required to determine allowable grading revisions in the Zone II Wellhead Protection Zones.

A third round of test pits were performed on July 8, 2021 primarily to investigate potential septic field locations at the eastern edge of the site and perform percolation tests with the Board of Health agent present. Testing produced a percolation rate of <2min/inch, the highest percolation rate allowed under Title V testing standards.

It is anticipated that further geotechnical investigation including test pits and soil borings will be required prior to future development of the Site. Refer to Appendix D of the report for further soils information.

Based on available aerial imagery and street imagery, existing impervious area onsite is limited to an existing driveway and appears to be in poor condition with cracking and settling observed. Existing vehicular access to the Site is limited to the single one lane driveway from Stow Road. At this time it is assumed that the existing impervious area will be demolished during construction. Note that Stow Road itself is a relatively narrow country road, and any fire truck access to and from the Site will need to account for this.

Electricity is supplied by the Littleton Electric Light and Water Department via overhead wires along Stow Road. Telecommunications is supplied by Verizon and Comcast to the site from the same overhead wires on Stow Road.

Dig Safe markings on Stow Road shown via street imagery, a 2" carbon steel (CS) natural gas main line runs under the eastern edge of Stow Road. Sawcutting, and patching at the edge of the road at the access drive appears to indicate that a previous gas service to the property has been cut and removed. At this time National Grid Gas has not responded to inquiry about gas services on Stow Rd. Should a service connection to the line be required, further coordination with utility providers will be required to confirm size and location of the main.

Municipal water and sewer are not supplied to the site. According to previous constraints plans prepared by GPR, the surrounding residential properties in the area receive their water supply from

wells. The existing building onsite also appears to be served by a well, the condition of which is unknown. A Zone 1 and 2 wellhead protection area centered around a well at 688 Massachusetts Avenue covers a portion of the northwest edge of the Site. There is also a well serving 61 Stow Road which has a Zone 1 and 2 wellhead protection zone which encroaches onto the site. Locations of these protection zones are shown on the constraints map. Based on previous studies performed and existing conditions, it is assumed a well will be required for any new construction. Testing to determine the existing well yield should be considered.

Regarding fire protection, there are no fire hydrants located on the Site, and aerial imagery does not show any fire hydrants on Stow Road or in the vicinity of the site. Proposed fire protection measures should be coordinated with the Boxborough Fire Department.

The site is not served by a public water supply therefore wells will need to be developed on-site. Based on the Southborough Public Safety building, It is estimated that the public safety facility will require approximately 2,700 gallons per day (GPD) and the proposed 10,000 square foot Community Center will require approximately 1,220 GPD. It is recommended that two wells providing a capacity of 2,000 GPD each be developed, this will provide redundancy in the equipment and reduce the diameter of the well protection zones. The Zone I well protection area for a 2,000 GPD well is a 145 feet diameter. The Zone II well protection area is a 444 foot diameter. Wells are typically designed to supply the daily capacity within a 2 hour peak period, therefore each well will need to supply approximately 17 gallons per minute (GPM) to meet peak demand.

310 CMR 22 and local requirements for a Zone I and II well protection for wells with flows less than 100,000 GPD that may impact development of the public safety building include the following:

- The Zone I area must be owned or controlled by the user.
- Installation of septic systems is prohibited within the Zone I protection zone.
- Uses including landfills and facilities that generate and/or store hazardous materials are prohibited within the Zone II protection zone.
- Grading changes are restricted to an area four feet above the seasonal groundwater table within the Zone II protection zone. Several test pits have identified redoximorphic soils indicating potential groundwater, with no groundwater encountered in any test pit. The

redoximorphic soils are likely indicative of small pockets of trapped water and are likely not indicative of seasonal groundwater. These test pit results will require further discussion with the BOH to determine impacts of grading within the Zone II Protection Zone.

- storage of liquid hazardous materials, as defined in M.G.L. c. 21E, and/or liquid petroleum products is prohibited in Zone 2 unless such storage is:
  a. above ground level;
  b. on an impervious surface; and either:
     (i) in container(s) or above-ground tank(s) within a building; or
     (ii) outdoors in covered container(s) or above-ground tank(s) in an area that has a containment system designed and operated to hold either 10% of the total possible storage capacity of all containers, or 110% of the largest container's storage capacity, whichever is greater;

There is no municipal sewers serving the site. As such, a septic system and leach field would be required to treat and infiltrate sewer flow from the proposed building. Utilizing the provided 2017 Southborough Public Safety Building concept plans as a model, a preliminary design flow of 2,695 GPD was calculated. This was calculated using the Title-V system sewage flow design criteria of 75 GPD per 1000 square feet for office applications, and 110 GPD per person (bedroom). As no design guidance is given for public safety or fire station construction, a residential bedroom was used as a substitution for fire department living quarters, and office space for the remainder of the building. The 10,000 square foot Community Center design flow was calculated to be approximately 1,220 GPD. Proposed dimensions and locations for the leach field and reserve field can be found on the attached constraints map. (See Appendix E)

According to arial imagery, there is no drainage system along Stow Road or on the Site. Runoff in the area is infiltrated through the existing natural woodland. Based on the Site's topography, overland flow from much of the site drains to the East towards a residential neighborhood. Any proposed construction will require drainage improvements to account for water quality and stormwater volume from the increase in impervious area.

Based on MACRIS mapping and data, the Site does not have any historic or cultural resources on or adjacent to the Site.

PERMITTING

Based on the location Site evaluated, there are multiple permits that may be required at the local, state, and federal levels for future development of the Site. Review periods are assumed and may vary. The local permitting information was compiled from the Boxborough Zoning By-laws and Wetland Regulations. The Site is located in the Agricultural-Residential District, as shown on the Town of Boxborough Zoning map. Site dimensional constraints are defined in Table 1.

Per Section 5000

Table 1: Schedule of Dimensional Requirements

	Min Lot Area (Sq. Ft.)	Min Lot Width (Foot)	Min Lot Frontage (Foot)	Minimum Setbacks (foot)			Min Upland Lot area	Max Height (Foot)	Max Stories
				Front	Side	Rear			
Site: 72 Stow Rd	60,000	100	150	40	30	40	20,000	45	3

Per the Zoning Bylaw Section 4003 (3) Use Regulations, municipals uses are permitted within the Agricultural-Residential zone.

Per the Zoning Bylaw Section 6006 Off-Street Parking Requirements table, minimum parking requirements for governmental buildings is “One (1) space for every 250 square feet of gross floor area.” ADA parking should also be considered for the Site. Parking requirements will be coordinated with the Planning Board in final design to determine the unique requirements of the Public Safety Facility and potential shared use with the proposed Community Center.

Per the Zoning Bylaw Section 6007 Off-Street Loading Requirements table, minimum off-street loading requirements for “uses occupying greater than 5,000 sq. ft. not normally handling goods in large quantities including hospitals, office buildings, restaurants, auditoria, hotels, motels, funeral homes and similar uses” is “One space for buildings of 5,000 - 50,000 sq. ft. gross floor area and one bay per each additional 50,000 sq. ft. gross floor area or fraction thereof.” Note that further assessment of parking requirements will be required once the building’s use or uses has been determined.

PLANNING BOARD

Site Plan Approval

Per the Zoning Bylaw Section 8000 Site Plan Approval and Design Review, this project will be subject to a site plan approval by the Boxborough Planning Board based on its requirement for site plan approval for institutional purposes. Further, Section 8002 requires site plan approval for "….municipal…purposes." No permit for construction, exterior alteration, relocation, occupancy, or change in use of any building or lot that results in the substantial alteration of an existing building or lot shall be given and no existing use shall be extended unless site plan approval has been granted by the Planning Board. After a complete application for site plan approval is submitted to the Planning Board, the review process is estimated to take approximately 2 months depending on public notice and additional information requirements. An applicant may also request a pre-application conference with the board. A pre-application conference is not legally binding nor will it alter the legally required schedule for site plan approval.

Special Permits

Stow Road from Route 111 to the Stow Town Line is designated as a Scenic Road by the Boxborough Planning Board per the Boxborough Scenic Road Application. After a road has been designated as a Scenic Road, any repair, maintenance, reconstruction, or paving work done with respect thereto shall not involve or include the cutting or removal of trees, or the tearing down or destruction of stone walls, or portions thereof, except with the prior written consent of the Planning Board.

Per the Boxborough Stone Walls Bylaw, prior written approval must also be given by the Planning Board for the removal, tearing down, or destruction of stone walls or portions thereof within or on the boundary of any Town Way. The Site has stone walls along the frontage with Stow Road.

Per the Boxboro Earth Removal Bylaw, prior written approval must also be given by the Planning Board for the removal of earth from any parcel in the Town.

TOWN MEETING

As part of the Site Plan Approval process, a public hearing will be held within 35 days of the submission of the Site Plan Review application per section 3.5 of the Site Plan Approval Rules and Regulations. Notice of the time and place as well as the subject matter shall be given by Board in a paper of general circulation in the Town of Boxborough once the first notice being not less than 7 days before the day of such hearing.

CONSERVATION COMMISSION

Based on available MassGIS data, wetland and riverfront resource areas are not present onsite. Wetland delineation should be completed to confirm the absence of wetlands.

If development occurs within jurisdictional resource areas, submission of a Notice of Intent (NOI) to the Boxborough Conservation Commission and Massachusetts Department of Environmental Protection (Mass DEP) will be required. Delineation of jurisdictional resource areas will be required at the site prior to future development.

After a completed NOI is filed with the Commission, the project will be reviewed at a public hearing. Per the Boxborough Wetlands Protection Bylaw Rules and Regulations, Section 3, the public hearing will be held within 21 calendar days of receipt of the NOI. Permitting will likely require attendance at one hearing prior to closing. Written order from the Conservation Commission will be issued within 21 days of the hearing. It is anticipated that the permitting process with the Commission would take approximately 1-2 months.

The Site is outside of FEMA floodplains. A copy of the FEMA Firmette is included in Appendix C.

DEPARTMENT OF PUBLIC WORKS

Future development will likely require trench and street opening permits through the Boxborough Department of Public Works (DPW). Such permits are typically obtained immediately before the start of construction, and obtained by the Selected Contractor.

BUILDING DEPARTMENT

No building permit shall be issued by the Inspector of Buildings without the written approval of a site

plan by the Planning Board, where applicable, or unless thirty (30) days lapse from the date of the close of the public hearing without action by the Planning Board. No permit or license shall be granted for a use of a building, structure or land unless such use shall conform in all respects with all Boxborough Zoning Bylaw Section 9000 provisions.

FIRE DEPARTMENT / POLICE DEPARTMENT

Future development of a public safety facility will require coordination with the Boxborough Fire Department and Police Department. Once a schematic design is developed, a meeting with the Boxborough Fire Chief and Police Chief should be arranged to review emergency vehicle accessibility, hydrant locations, and fire safety.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASS DEP)

Future development of a public safety facility will be required to meet the 2008 Stormwater Management Guidelines. Submissions will be made to the Boxborough Planning Board, Conservation Commission, and Mass DEP, the jurisdictional entities for these guidelines.

Due to the well in vicinity of the Site, the Site contains a Zone I wellhead protection area. Per the 2001 Source Water Assessment Program (SWAP) Report for the Site, systems not meeting DEP Zone I requirements must get DEP approval and address Zone I issues prior to increasing water use or modifying systems. Per 310 CMR 22.21(5), the Department may grant a variance if the Department finds that strict compliance with such requirements would result in an undue hardship and would not serve to further the intent of 310 CMR 22.21.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

Development of a public safety facility will likely require filing of a NPDES construction general permit with the EPA, as it is anticipated that more than one acre of land will be disturbed. The Contractor awarded the contract is typically responsible for filing the NPDES General Permit and preparing a project specific Stormwater Pollution Prevention Plan.

MASSACHUSETTS ENVIRONMENTAL POLICY ACT (MEPA)

It is not anticipated that the future development of a public safety facility will trigger MEPA thresholds;

however potential triggers that would require filing of an Environmental Notification Form and Environmental Impact Report will be monitored as the design progresses. If MEPA review is required, MEPA requires applications to be submitted one year prior to construction. MEPA submission will include approved Schematic Design plans. MEPA review thresholds are detailed in 301 CMR 11.00, section 11.03, and include thresholds for land, state listed species, wetlands, waterways, tidelands, water, wastewater, transportation, energy, solid and hazardous waste, historical and archeological resources, areas of critical environmental concern, and regulations.

Appendix A: Zoning Map

Town of Boxborough
Massachusetts
May 2018

N
W E
S

Project area

1,000 500 0 1,000 Feet

Zoning Districts

- AGRICULTURAL-RESIDENTIAL
- BUSINESS
- BUSINESS-1
- INDUSTRIAL-COMMERCIAL
- OFFICE PARK
- RESIDENTIAL-1
- TOWN CENTER

Appendix B: Property Card

14	098	000	1 of 2	RESIDENTIAL
MAP	LOT	BLOCK	CARD	*Boxborough*

	Total Card	/	Total Parcel
APPRAISED:	509,900	/	565,500
USE VALUE:	509,900	/	565,500
ASSESSED:	509,900	/	565,500

PROPERTY LOCATION

No	Alt No	Direction/Street/City
72		STOW ROAD, BOXBOROUGH

OWNERSHIP

Unit #:

Owner 1:	BOXBOROUGH TOWN OF
Owner 2:	
Owner 3:	
Street 1:	29 MIDDLE ROAD
Street 2:	
Twn/City:	BOXBOROUGH
St/Prov:	MA Cntry: Own Occ:
Postal:	01719 Type:

PREVIOUS OWNER

Owner 1:	LUDOVICO - BEVERLY G, TR
Owner 2:	LYONS FAMILY TRUST -
Street 1:	12 INDEPENDENCE RD
Twn/City:	ACTON
St/Prov:	MA Cntry:
Postal:	01720

NARRATIVE DESCRIPTION

This parcel contains 11.05 ACRES of land mainly classified as MUN/IMP/SELE with a CONVENT`NL Building built about 1930, having primarily WOOD SHING Exterior and 1344 Square Feet, with 1 Unit, 1 Bath, 0 3/4 Bath, 0 HalfBath, 5 Rooms, and 3 Bdrms.

OTHER ASSESSMENTS

Code	Descrip/No	Amount	Com. Int

PROPERTY FACTORS

Item	Code	Description	%	Item	Code	Description
Z	AR	AR	100	water	9	ART WL
o				Sewer	A	SEPTIC
n				Electri		
Census:				Exmpt		
Flood Haz:						
D				Topo		
s				Street	PT	PAVED TW
t				Gas:	2	LIGHT

IN PROCESS APPRAISAL SUMMARY

Use Code	Land Size	Building Value	Yard Items	Land Value	Total Value
931	11.050	163,000	4,600	342,300	509,900
Total Card	11.050	163,000	4,600	342,300	509,900
Total Parcel	11.050	218,600	4,600	342,300	565,500

Source: Market Adj Cost | Total Value per SQ unit /Card: 379.39 | /Parcel: 253.93

Legal Description

town purchased with intention of possible future use for affordable housing project

Entered Lot Size	
Total Land:	11.05
Land Unit Type:	AC

User Acct

GIS Ref

GIS Ref

Insp Date

05/11/06

Patriot Properties Inc.

PREVIOUS ASSESSMENT

Parcel ID: 14-098-000

!1136!

Tax Yr	Use	Cat	Bldg Value	Yrd Items	Land Size	Land Value	Total Value	Asses'd Value	Notes	Date
2019	931	FV	218,600	4600	11.05	342,300	565,500		YER	1/4/2019
2018	931	FV	213,600	4600	11.05	330,300	548,500		Year End Roll	1/5/2018
2017	931	FV	216,200	4600	11.05	330,300	551,100		Year End Roll	12/6/2016
2016	931	FV	215,600	4600	11.05	330,300	550,500		Year end	1/6/2016
2015	931	FV	205,600	4100	11.05	299,800	509,500	509,500	Year End Roll	12/12/2014
2014	931	FV	184,200	4100	11.05	291,100	479,400	479,400	Year End Roll	1/22/2014
2013	931	FV	184,200	4100	11.05	297,100	485,400	485,400		10/22/2012
2012	931	FV	147,600	4000	11.05	327,700	479,300	479,300	Year End	11/30/2011

PRINT

Date	Time
08/06/19	10:53:54

LAST REV

Date	Time
04/20/18	12:34:12
apro	
1136	

USER DEFINED

Prior Id # 1:	06-4-166
Prior Id # 2:	1
Prior Id # 3:	
Prior Id # 1:	
Prior Id # 2:	
Prior Id # 3:	
Prior Id # 1:	
Prior Id # 2:	
Prior Id # 3:	
ASR Map:	
Fact Dist:	
Reval Dist:	
Year:	
LandReason:	
BldReason:	
CivilDistrict:	
Ratio:	

SALES INFORMATION

TAX DISTRICT

PAT ACCT.

Grantor	Legal Ref	Type	Date	Sale Code	Sale Price	V	Tst	Verif	Notes
LUDOVICO,BEVERL	56124-151	Q	12/17/2010	MULTI PARCEL	850,000	No	No		70 STOW, 72 STOW AND 10-4-207-1 (BURROUGHS RD
LYONS,FRANCIS G	48744-98		12/28/2006	FAMILY	1	No	No		
LYONS	22794/187		1/4/1993	CONVENIENCE	1	Yes	No		
	7805/70		9/27/1951	OTHER		No	No		

BUILDING PERMITS

Date	Number	Descrip	Amount	C/O	Last Visit	Fed Code	F. Descrip	Comment
7/5/1988	8834	MISC	1,500		4/20/1989			

ACTIVITY INFORMATION

Date	Result	By	Name
5/11/2006	FIELD REVIEW	999	COLLEEN W
7/12/2005	MEAS&INSPECT	999	COLLEEN W
11/29/2000	EXT INSP	REB	R BALL

Sign: VERIFICATION OF VISIT NOT DATA __/__/__

LAND SECTION (First 7 lines only)

Use Code	Description	LUC Fact	No of Units	Depth / PriceUnits	Unit Type	Land Type	LT Factor	Base Value	Unit Price	Adj	Neigh	Neigh Influ	Neigh Mod	Infl 1	%	Infl 2	%	Infl 3	%	Appraised Value	Alt Class	%	Spec Land	J Code	Fact	Use Value	Notes
931	MUN/IMP/SEL		60000		SQUARE FE	SITE		0	4.27	1.00	R2									256,200						256,200	
931	MUN/IMP/SEL		9.6726		ACRES	EXCESS		0	8,900.	1.00	R2									86,086						86,100	

Total AC/HA:	11.05001	Total SF/SM:	481338	Parcel LUC:	931	MUN/IMP/SELE	Prime NB Desc	R2	Total:	342,286	Spl Credit		Total:	342,300

EXTERIOR INFORMATION

Type:	22 - CONVENT`NL		
Sty Ht:	1H - 1H		
(Liv) Units:	1	Total:	2
Foundation:	3 - MASONRY		
Frame:	1 - WOOD		
Prime Wall:	1 - WOOD SHING		
Sec Wall:			%
Roof Struct:	1 - GABLE		
Roof Cover:	1 - ASPHALT SH		
Color:			
View / Desir:			

GENERAL INFORMATION

Grade:	C - AVERAGE		
Year Blt:	1930	Eff Yr Blt:	
Alt LUC:		Alt %:	
Jurisdict:		Fact:	.
Const Mod:			
Lump Sum Adj:			

INTERIOR INFORMATION

Avg Ht/FL:	STD		
Prim Int Wal	1 - DRYWALL		
Sec Int Wall:			%
Partition:	T - TYPICAL		
Prim Floors:	3 - HARDWOOD		
Sec Floors:	4 - CARPET	40	%
Bsmnt Flr:	12 - CONCRETE		
Subfloor:			
Bsmnt Gar:			
Electric:	3 - TYPICAL		
Insulation:	2 - TYPICAL		
Int vs Ext:	S		
Heat Fuel:	2 - GAS		
Heat Type:	3 - FORCED H/W		
# Heat Sys:	1		
% Heated:	100	% AC:	0
Solar HW:	NO	Central Vac:	NO
% Com Wal		% Sprinkled	

BATH FEATURES

Full Bath	1	Rating:	FAIR
A Bath:		Rating:	
3/4 Bath:		Rating:	
A 3QBth		Rating:	
1/2 Bath:		Rating:	
A HBth:		Rating:	
OthrFix:		Rating:	

OTHER FEATURES

Kits:	1	Rating:	GOOD
A Kits:		Rating:	
Frpl:	1	Rating:	AVERAGE
WSFlue:		Rating:	

CONDO INFORMATION

Location:	
Total Units:	
Floor:	
% Own:	
Name:	

DEPRECIATION

Phys Cond:	AV - Average	38.	%
Functional:			%
Economic:			%
Special:			%
Override:			%
Total:		38.2	%

CALC SUMMARY

Basic $ / SQ:	86.00
Size Adj.:	1.34404755
Const Adj.:	1.00187993
Adj $ / SQ:	115.805
Other Features:	28525
Grade Factor:	1.12
NBHD Inf:	1.00000000
NBHD Mod:	
LUC Factor:	1.00
Adj Total:	263757
Depreciation:	100755
Depreciated Total:	163002

COMMENTS

CHAPTER 61B ZONING CHNGE FY`2000 - NOW ALL BUSINESS .

RESIDENTIAL GRID

1st Res Grid	Desc:	Line 1	# Units	1

Level	FY	LR	DR	D	K	FR	RR	BR	FB	HB	L	O
Other												
Upper												
Lvl 2												
Lvl 1												
Lower												

Totals	RMs:	5	BRs:	3	Baths:	1	HB	

REMODELING

Exterior:	
Interior:	
Additions:	
Kitchen:	
Baths:	
Plumbing:	
Electric:	
Heating:	
General:	

RES BREAKDOWN

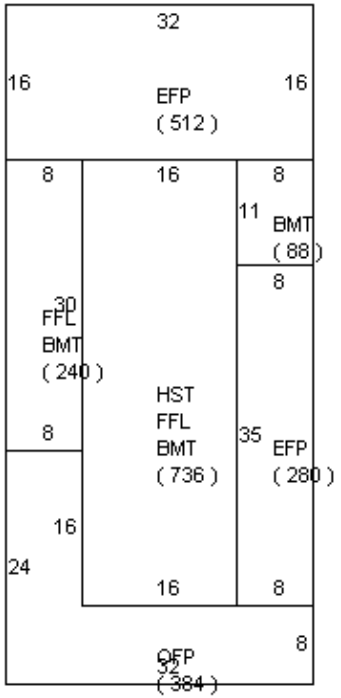
No Unit	RMS	BRS	FL
1	5	3	
Totals			
1	5	3	

COMPARABLE SALES

Rate	Parcel ID	Typ	Date	Sale Price

WtAv$/SQ:		AvRate:	
Ind.Val	1681700.000		
Juris. Factor:		Before Depr:	129.70
Special Features:	0	Val/Su Net:	45.48
Final Total:	163000	Val/Su SzAd	121.28

SKETCH



SUB AREA

Code	Description	Area - SQ	Rate - AV	Undepr Value
BMT	BASEMENT	1,064	23.160	24,643
FFL	1ST FLOOR	976	115.810	113,026
EFP	ENCL PORCH	792	25.870	20,491
OFP	OPEN PORCH	384	16.130	6,195
HST	HALF STORY	368	115.810	42,616

Net Sketched Area:	3,584	Total:	206,971
Size Ad	1344	Gross Area	3952	FinArea	1344
---	---	---	---	---	---

SUB AREA DETAIL

Sub Area	% Usbl	Descrip	% Type	Qu	# Ten

IMAGE

AssessPro Patriot Properties, Inc

MOBILE HOME

Make:		Model:		Serial #		Year:		Color:	

SPEC FEATURES/YARD ITEMS

PARCEL ID 14-098-000

Code	Description	A	Y/S	Qty	Size/Dim	Qual	Con	Year	Unit Price	D/S	Dep	LUC	Fact	NB Fa	Appr Value	JCod	JFact	Juris. Value
2	SHED/FR		Y	1	168	A	FR	1930	15.28	T	55	931			1,200			1,200
4	GARAGE/L	A	Y	1	396	F	PR	1930	24.46	T	65	931			3,400			3,400

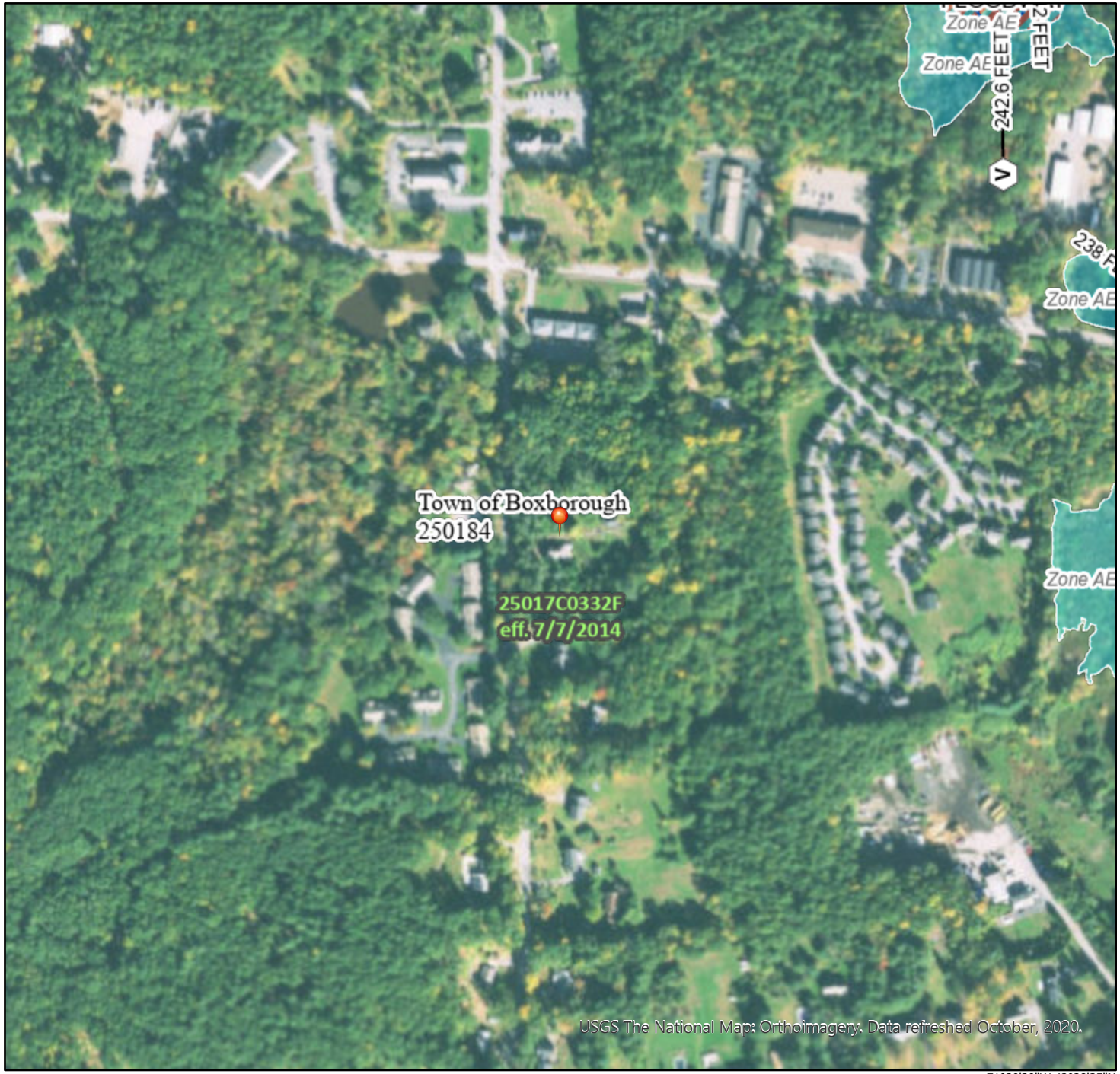
More:	N	Total Yard Items:	4,600	Total Special Featues:		Total:	4,600

Appendix C: FEMA Mapping

National Flood Hazard Layer FIRMette

FEMA

71°31'7"W 42°29'2"N



71°30'30"W 42°28'35"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

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
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

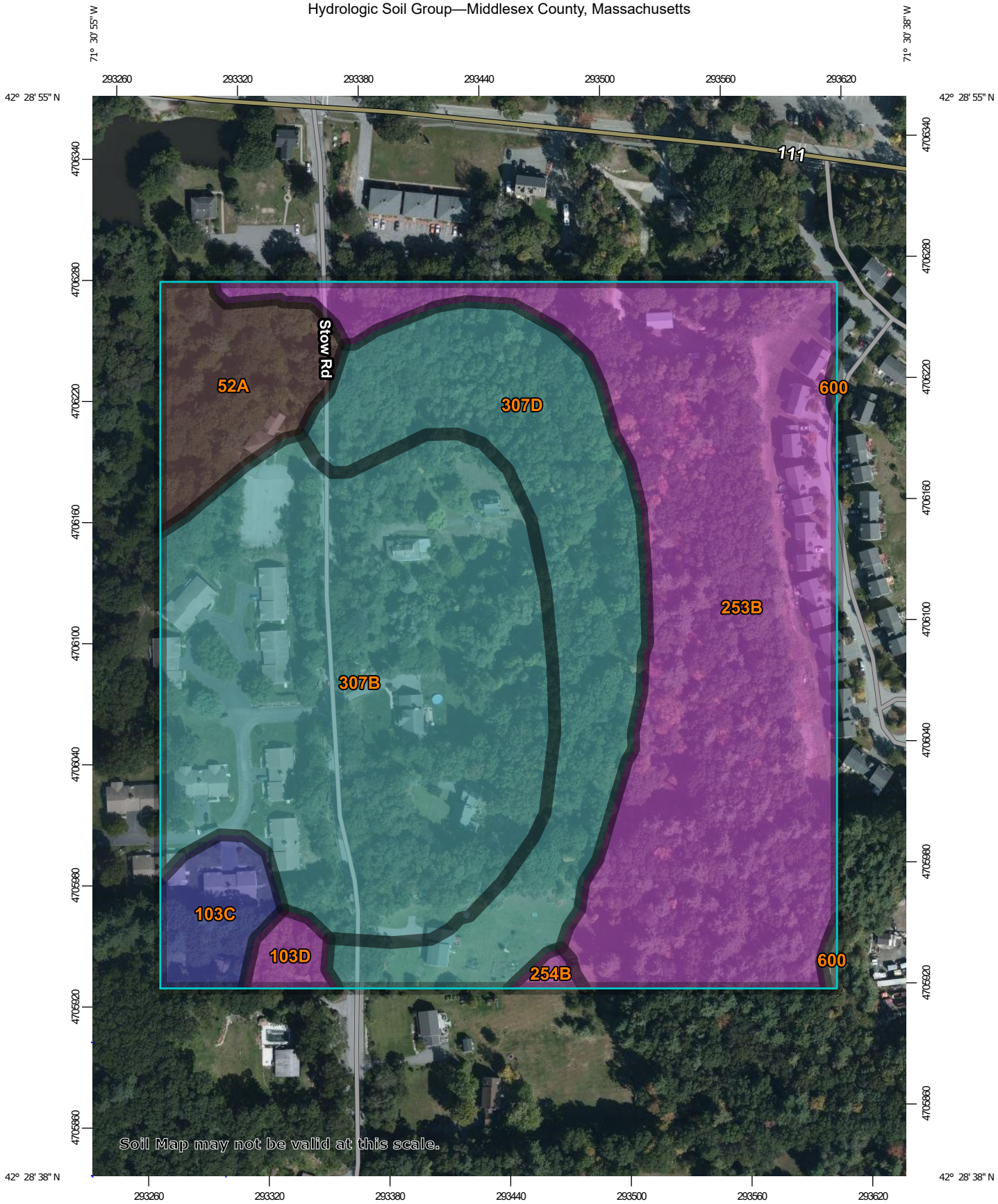
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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 1/4/2021 at 3:46 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.

Appendix D: Soil Information



Map Scale: 1:2,610 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 9, 2019—Sep 28, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	B/D	1.8	6.2%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	0.9	3.1%
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	A	0.3	1.1%
253B	Hinckley loamy sand, 3 to 8 percent slopes	A	10.3	35.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	0.1	0.4%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	10.1	34.6%
307D	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	C	5.6	19.2%
600	Pits, gravel		0.1	0.2%
Totals for Area of Interest			**29.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-1**

SHEET 1 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"			10 yr 4/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	9-19"			10 yr 5/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	19-96"			10 yr 6/3	-				Loamy Sand	Massive	Friable	15% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 317 Surface Elevation of Test Pit (approximate): 325

COMMENTS:

Roots at 0-15"
Boulders common at 6' and down
No weeping, redox, or ledge found

TEST HOLE NO. **TP-1**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2**

SHEET 2 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"			10 yr 4/2	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	9-21"			10 yr 5/8	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C	21-45"			10 yr 6/4	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders
C2	45-96"			10 yr 6/3	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8'

Depth to Groundwater or Seepage: 45" Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 324.25 Surface Elevation of Test Pit (approximate): 328

COMMENTS:

Very saturated, dense material at opposite side of pit, minor weeping at 45"
boulder encountered at 7.5'
No redox or ledge found

TEST HOLE NO. **TP-2**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-3**

SHEET 3 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 4/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-18"			10 yr 5/6	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders
C	18-114"			10 yr 6/6	-				Stony Loamy Sand	Massive	Friable	15% Gravel 15% Cobbles 10% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 9.5'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 321.5 Surface Elevation of Test Pit (approximate): 331

COMMENTS:

C layer less stony starting at 5.5'

No weeping, redox, or ledge found

TEST HOLE NO. **TP-3**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-4**

SHEET 4 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"			10 yr 4/3	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	9-26"			10 yr 6/6	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders
C	26-120"			10 yr 7/4	C 10 yr 7/8 D 10 yr 7/2				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 325.25 Surface Elevation of Test Pit (approximate): 329

COMMENTS:

Large, occasional boulders starting at surface
Redox features at 45"

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-4**

SHEET 5 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 4/2	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-20"			10 yr 6/6	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders
C	20-120"			10 yr 6/4	-				Sand	Single Grain	Loose	10% Gravel 10% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 315 Surface Elevation of Test Pit (approximate): 325

COMMENTS:

Large, occasional boulders starting at surface
Redox features at 45"

TEST HOLE NO. **TP-4**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-8**

SHEET 6 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-14"			10 yr 4/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	14-26"			10 yr 4/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	26-96"			10 yr 5/3	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 315 Surface Elevation of Test Pit (approximate): 325

COMMENTS:

Large boulder at 8' at the back of the pit

TEST HOLE NO. **TP-8**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-9**

SHEET 7 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-12"			10 yr 3/1	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	12-26"			10 yr 6/4	-				Loamy Sand	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	26-78"			10 yr 6/2	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 6.5'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: 6.5' (several large boulders)

Estimated Seasonal High Water Table: 308.5 Surface Elevation of Test Pit (approximate): 315

COMMENTS:

Larger bould at 24", excavator could move, shifted pit slightly uphill to avoid
Several boulderst at 6.5', machine couldn't go deeper (did not appear to be ledge)

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-10**

SHEET 8 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"			10 yr 4/1	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	8-14"			10 yr 6/6	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
B/C	14-28"			10 yr 6/3	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders
C	28-96"			10 yr 6/2	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 302 Surface Elevation of Test Pit (approximate): 310

COMMENTS:

Larger bould at 24", excavator could move, shifted pit slightly uphill to avoid

Several boulderst at 6.5', machine couldn't go deeper (did not appear to be ledge)

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-11**

SHEET 9 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 4/2	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-25"			10 yr 6/4	-				Loamy Sand	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C	25-102"			10 yr 6/2	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8.5'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 299.5 Surface Elevation of Test Pit (approximate): 308

COMMENTS:

TEST HOLE NO. **TP-11**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-12**

SHEET 10 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: January 19, 2021

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-11"			10 yr 4/1	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	11-21"			10 yr 6/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
B/C	21-35"			10 yr 6/3	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 5% Boulders
C	35-96"			10 yr 6/2					Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 8'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 308 Surface Elevation of Test Pit (approximate): 316

COMMENTS:

Large boulder at 23"

For all test pits - no ledge was located at bottom of pits

TEST HOLE NO. **TP-12**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.1**

SHEET 1 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 2:45pm - 3:15pm

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-14"			10 yr 3/3	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	14-27"			10 yr 6/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	27-78"			10 yr 7/2	-				Loamy Sand	Massive	Friable in Hand; Firm in Place	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 6.5'

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: 6.5' (boulders)

Estimated Seasonal High Water Table: 313.5 Surface Elevation of Test Pit (approximate): 320 (Existing topo)

COMMENTS:

Multiple boulders at 6.5', pit abandoned at this depth

Excavator noted that the bottom was not flat; teeth catching in gaps. Ledge unlikely

No weeping or redox found

TEST HOLE NO. **TP-2.1**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.2**

SHEET 2 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 2:15pm - 2:45pm

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"			10 yr 3/3	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Fill	8-36"											

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 36"

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: 36"

Estimated Seasonal High Water Table: N/A

Surface Elevation of Test Pit (approximate): 326 (Existing topo)

COMMENTS:

Subsurface perforated pipe and drainage stone found at 3', pit abandoned
Likely septic system / dry well / foundation drain
No weeping or redox found

TEST HOLE NO. **TP-2.2**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.3**

SHEET 3 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 10:50am - 11:30am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 3/3	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-18"			10 yr 5/4	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	18-120"			10 yr 5/2	C: 10yr6/8 D: 10yr7/2				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 319.02

Surface Elevation of Test Pit (approximate): 324.77 (GPS)

COMMENTS:

Mottling @ 5'-9", spotty

TEST HOLE NO. **TP-2.3**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.4**

SHEET 4 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 1:15pm - 1:45 pm

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"			10 yr 4/3	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
Bw	9-22"			10 yr 6/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	22"-114"			10 yr 5/4					Gravelly Loamy Sand	Massive	Friable	25% Gravel 10% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 9.5'

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 317.5

Surface Elevation of Test Pit (approximate): 327 (Existing topo)

COMMENTS:

Spotty, inconsistant mottling at 69", does not appear to indicate groundwater

Heavy roots throughout

TEST HOLE NO. **TP-2.4**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.5**

SHEET 5 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 9:30am - 10:10 am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"			10 yr 4/3	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders
Bw	7-15"			1- yr 5/6	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders
C1	15-31"			10 yr 4/3					Sandy Loam	Massive	Firm in place, friable in hand	15% Gravel 5% Cobbles 5% Boulders
C2	31-120"			10 yr 6/6					Sandy Loam	Massive	Firm in place, friable in hand	15% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 317.24

Surface Elevation of Test Pit (approximate): 327.24 (GPS)

COMMENTS:

TEST HOLE NO. **TP-2.5**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.6**

SHEET 6 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 10:15am - 10:45am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"			10 yr 2/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	7-20"			10 yr5/6	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C1	20-120"			10 yr 7/2	C 10yr6/8 D: 10yr7/2				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 317.65

Surface Elevation of Test Pit (approximate): 327.65 (GPS)

COMMENTS:

Minor redox noted @ 21-40", does not appear to indicate groundwater

Spotty, inconsistant mottling throughout C horizon

TEST HOLE NO. **TP-2.6**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.7**

SHEET 7 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 1:10pm - 1:40pm

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-11"			10 yr 4/3	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	11-19"			10 yr 6/6	-				Sandy Loam	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders
C	19-120"			10 yr 6/3	-				Sandy Loam	Massive	Friable	15% Gravel 10% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 10'

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 320

Surface Elevation of Test Pit (approximate): 330 (Existing topo)

COMMENTS:

Large boulders (2+') @ 31"

TEST HOLE NO. **TP-2.7**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.8**

SHEET 8 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 8:30am - 9:00am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"			10 yr 3/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	8-21"			5 yr 4/6	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C1	21-27"			10 yr 6/6	-				Loamy Sand	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C2	27-115"			10 yr 6/4	-				Loamy Sand	Massive	Friable	10% Gravel 10% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D Total Depth of Test Hole: 115"

Depth to Groundwater or Seepage: N/A Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 312.37 Surface Elevation of Test Pit (approximate): 321.95 (GPS)

COMMENTS:

Soil appears more saturated at bottom of pit (no weeping, redox, or GW noted)

TEST HOLE NO. **TP-2.8**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.9**

SHEET 9 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 11:45am - 12:15pm

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-11"			10 yr 3/3	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
Bw	11-27"			10 yr 6/6	-				Sandy Loam	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C	27-120"			10 yr 6/3	-				Loamy Sand	Massive	Friable	10% Gravel 5% Cobbles 0% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 120"

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 315

Surface Elevation of Test Pit (approximate): 325 (Existing topo)

COMMENTS:

TEST HOLE NO. **TP-2.9**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-2.10**

SHEET 10 OF 10

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: June 3, 2021 9:15am - 9:45am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes ☐ No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 3/3	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-20"			10 yr 5/8	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C1	20-28"			10 yr 6/6	-				Loamy Sand	Massive	Friable	5% Gravel 5% Cobbles 0% Boulders
C2	28-120"			10 yr 6/3					Loamy Sand	Massive	Firm on place, friable in hand	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 120"

Depth to Groundwater or Seepage: N/A

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 312

Surface Elevation of Test Pit (approximate): 322 (Existing topo)

COMMENTS:

TEST HOLE NO. **TP-2.10**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-3.1**

SHEET 1 OF 6

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: July 8, 2021 9:20am - 10:00am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"			10 yr 3/2	-				Sandy Loam	Massive	Very Friable	5% Gravel 0% Cobbles 0% Boulders
Bw	10-23"			10 yr 6/6	-				Sandy Loam	Massive	Very Friable	10% Gravel 5% Cobbles 5% Boulders
C	23-114"			10 yr 7/3	C: 10 yr 7/4 D: 10 yr 7/2				Loamy Sand	Massive	Very Friable	10% Gravel 5% Cobbles 5% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 114"

Depth to Groundwater or Seepage: 37"

Depth to Impervious or Limiting Layer: 114" Boulders

Estimated Seasonal High Water Table: 318.91'

Surface Elevation of Test Pit (approximate): 322' (topo)

COMMENTS:

Mottling @ 37"
Roots @ 5"-20"
Some Boulders

TEST HOLE NO. **TP-3.1**

PARE CORPORATION

8 BLACKSTONE VALLEY PLACE, LINCOLN, RHODE ISLAND

ENGINEERS *** PLANNERS *** CONSULTANTS

TEST HOLE NO. **TP-3.2**

SHEET 2 OF 6

Property Owner: Town of Boxborough

Project: Boxborough Public Safety Feasibility Contractor: DPW

Property Location: 72 Stow Rd Boxborough MA Excavator: DPW

Date of Test Hole: July 8, 2021 10:15am

Soil Evaluator: C. Webber State / Date of Exam: MA

Weather: Cloudy Shaded: Yes No ☐

SAMPLE DESCRIPTION

Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Percent Gravel Cobbles Stone
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-11"			10 yr 4/2	-				Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
Blv	11-26"			10 yr 6/6					Sandy Loam	Massive	Friable	5% Gravel 0% Cobbles 0% Boulders
C	26-82"			10 yr 4/4					Coarse Sand	S.G.	Loose	15% Gravel 10% Cobbles 15% Boulders
C2	82-120"			10 yr 5/2	C: 10 yr 5/8 D: 10 yr 7/2				Sandy Loam	Massive	Friable	15% Gravel 10% Cobbles 10% Boulders

Soil Class: Lodgment Till 307B/307D

Total Depth of Test Hole: 120"

Depth to Groundwater or Seepage: 82"

Depth to Impervious or Limiting Layer: N/A

Estimated Seasonal High Water Table: 290.16'

Surface Elevation of Test Pit (approximate): 297' (topo)

COMMENTS:

Sand layer very stoney

TEST HOLE NO. **TP-3.2**

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Boxboro
Owner Name

72 Stowe Rd
Street Address

014/098
Map/Lot #

Boxboro
City

MA
State

02771
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 307B/D (Soil Map Unit)

Paxton Fine Sandy Loam, Extremely Stony
Soil Name

NRCS reports C type HSG
Soil Limitations

Lodgement Till
Soil Parent material

Dromlins, Hillis, Ground Moraines
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018 USGS (Year Published/Source) Thin Till (Map Unit)

Nonsorted, nonstratisfied matrix of sand, some silt, and little clay & scattered pebble, cobble, and boulders
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 7/10/2021 (MAACW 158) (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3.3 (Hole #) | 7/8/21 (Date) | 11:30am (Time) | Cloudy (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | trees/bush (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: _____

2. Soil Parent Material: Lodgement Till | Drumlins (Landform) | FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >100 feet | Drinking Water Well >100 feet | Other - feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9"	Ap	Sandy Loam	10 yr 3/3		-		5	0	Massive	Friable	
9-22"	Bw	Sandy Loam	10 yr 5/6		-		5	5	Massive	Friable	
22-120"	C	Sandy Loam	10 yr 6/8		-		10	25	S.G.	Loose in hand	

Additional Notes:
2" band of 5 yr 5/8 sand (red) @ 33", not present throughout pit, Bot agreed this was not GW table

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3.4 (Hole #) _____ (Date) 12:30pm (Time) _____ (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: SPP Prior (e.g., woodland, agricultural field, vacant lot, etc.) _____ (Vegetation) _____ (Surface Stones (e.g., cobbles, stones, boulders, etc.)) _____ (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet
Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	Ap	Sandy Loam	10 yr 3/2		-		5	0	Massive	Friable	
12-23"	Bw	Sandy Loam	10 yr 5/6		-		5	5	Massive	Friable	
23-88"	C	Gravelly Sand	10 yr 6/2		-		20	15	S.G.	Loose	
88-120"	C2	Loamy Sand	10 yr 6/1	91"	10 yr 7/6	5-10%	10	10	Massive	Very Friable	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #3.3	Obs. Hole #3.4
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	120 inches	91 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 91 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	12 inches	Lower boundary:	91 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	7/8/2021 Date
Chris Webber Typed or Printed Name of Soil Evaluator / License #	7/1/2022 Expiration Date of License
James Garreffi Name of Approving Authority Witness	Nashoba Board of Health Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Boxboro
Owner Name

72 Stowe Rd
Street Address

014/098
Map/Lot #

Boxboro
City

MA
State

02771
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 307B/D (Soil Map Unit)

Paxton Fine Sandy Loam, Extremely Stony
Soil Name

NRCS reports C type HSG
Soil Limitations

Lodgement Till
Soil Parent material

Dromlins, Hillis, Ground Moraines
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018 USGS (Year Published/Source) Thin Till (Map Unit)

Nonsorted, nonstratisfied matrix of sand, some silt, and little clay & scattered pebble, cobble, and boulders
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 7/10/2021 (MAACW 158) (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3.5 (Hole #) | 7/8/21 (Date) | 1:00pm (Time) | Cloudy (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | trees/bush (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: _____

2. Soil Parent Material: Lodgement Till | Drumlins (Landform) | FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >100 feet | Drinking Water Well >100 feet | Other - feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-11"	Ap	Sandy Loam	10 yr 3/2		-		5	0	Massive	Friable	
11-27"	Bw	Sandy Loam	10 yr 4/6		-		5	0	Massive	Friable	
27-114"	C	Sand	10 yr 5/8		-		15	20	S.G.	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3.6 (Hole #) _____ (Date) 2:00pm (Time) _____ (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: See Prior (e.g., woodland, agricultural field, vacant lot, etc.) _____ Vegetation _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) _____ Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet
Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	Ap	Sandy Loam	10 yr 3/2		-		5	0	Massive	Friable	
12-18"	Bw	Sandy Loam	10 yr 6/4		-		5	0	Massive	Friable	
18-108"	C	Sand	10 yr 6/6		-		20	15	S.G.	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #3.5	Obs. Hole #3.6
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	114 inches	108 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 108 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 12 inches Lower boundary: 108 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Boxboro

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	7/8/2021 Date
Chris Webber Typed or Printed Name of Soil Evaluator / License #	7/1/2022 Expiration Date of License
James Garreffi Name of Approving Authority Witness	Nashoba Board of Health Approving Authority

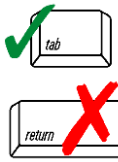
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Boxborough
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

Town of Boxborough
Owner Name

72 Stow Rd
Street Address or Lot #

Boxborough	MA	02771
City/Town	State	Zip Code

Les Fox	978-771-4093
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	7/8/2021 (Date)	2:00pm (Time)	-- (Date)	-- (Time)
Observation Hole #	1 (TP3.3)		Equiv. material, deemed unnneed	
Depth of Perc	12"			
Start Pre-Soak	2:00			
End Pre-Soak	~2:30			
Time at 12”	--			
Time at 9”	--			
Time at 6”	--			
Time (9”-6”)	--			
Rate (Min./Inch)	<2min/inch			
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☐ Test Failed: ☐	

Chris Webber
Test Performed By:

James Garreffi, Nashoba Board of Health
Board of Health Witness

Comments:

25 Gallons used during presoak, <2min/inch determined during this time (approved by BoH)

Appendix E: Constraints Mapping

SOIL EVALUATION SUMMARY

SOIL EVALUATOR: ERIC RUDENAUER, GPR INC.
SOIL EVALUATOR APPROVED ON: OCTOBER 30, 2007
EVALUATION PERFORMED: OCTOBER 9, 2008

Deep Observation Hole Log

Hole # 1008-1 NB 21/70 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR 3/4		VFR. ADK
9-26	B	SL	10YR 5/6		Roots, ABK vf
26-112	C	LS	5Y 6 4	@ 33" 5Y6 3 10YR6 4	Massive, firm in place. some cobbles few stones

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Abalation Till Depth to Bedrock: >112"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 33"

Deep Observation Hole Log

Hole # 1008-2 NB 21/71 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-6	A	SL	10YR 3/3		ABK, vfr
6-10	B	SL	2.5Y 6/6		ABK, vfr
10-30	C1	coarse sand	5Y 6/4	@ 30"	very loose, single grain, no stones
30-65	C2	med sand	10YR 4/6		ma, fr, many cobbles/stones
65-124	C3	SiL	5Y 5/2	10YR6/6	ma, vfirm, fr in hand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Outwash/ Abalation Till Depth to Bedrock: >124"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: 70"
Estimated Seasonal High Groundwater in the Hole 30"
Aditional Notes weeping at northwest corner

Deep Observation Hole Log

Hole # 1008-3 NB 21/71 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-10	A	SL	10YR 3 2		ABK, vfr
10-20	B	SL	10YR 4 6		ABK, vfr
20-48	C1	med sand	10YR 4 6	@ 28"	ma, fr, many cobbles/stones
48-77	C2	coarse sand	2.5Y 5/4	5Y 6/2	very loose, single grain, no stones
77-120	C3	SiL	5Y 5/2	10YR6/6	ma, vfirm, fr in hand

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Outwash/ Abalation Till Depth to Bedrock: >120"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 28"

Deep Observation Hole Log

Hole # 1008-4 NB 21 72 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-8	A	SL	10YR 3/2		ABK, vfr
8-20	B	LS	10YR 4/6		ABK, vfr
20-72	C1	med sand	10YR 4/6	@ 45"	ma, fi, many cobbles
72-122	C2	coarse sand	2.5Y 5 4	7.5YR 4/6 2.5Y 6 6	loose, single grain, some cobbles

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Outwash Depth to Bedrock: >122"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 45"
Aditional Notes Sides of C1 & C2 were sloughing into hole

Deep Observation Hole Log

Hole # 1008-5 NB 21/72 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-6	A	SL	10YR 3/3		ABK, vfr
6-22	B	LS	10YR 4/6		ABK, vfr
22-70	C1	med sand	10YR 4/6	@ 46"	ma, fr, many cobbles
70-118	C2	coarse sand	2.5Y 5/4	7.5YR 4 6 2.5Y 6 6	loose, single grain, some cobbles

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Outwash Depth to Bedrock: >118"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 46"
Aditional Notes C1 has pockets of clean med sand with no stones or cobbles
Sides of C1 & C2 were sloughing into hole

Deep Observation Hole Log

Hole # 1008-6 NB 21/72 Suface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0-16	A	SL	10YR 3 3		ABK, vfr
16-31	B	FSL	7.5YR 4/4		ABK, vfr
31-70	C1	med LS	10YR 4 4	@ 46"	ma, firm in place, many cobbles/stones
70-124	C2	coarse sand	2.5Y 5/6	7.5YR 4 6	loose, single grain, some cobbles

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Outwash Depth to Bedrock: >124"
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 46"
Aditional Notes C2 has pockets of fine sandwith no stones or cobbles

PERCOLATION TEST DATA

PERFORMED BY: ERIC RUDENAUER, GPR INC.
TESTING PERFORMED: OCTOBER 9, 2008

1008-A 36 MIN / INCH @ 70"
1008-B < 2 MIN / INCH @ 52"

SOIL EVALUATION SUMMARY

SOIL EVALUATOR: ROBERT ELLIOT, R. WILSON ASSOCIATES
WITNESSED BY: JAMIE TERRY, BOXBOROUGH BOH
EVALUATION PERFORMED: FEBRUARY 7, 2006

Hole #206-A

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	Bw	LS	7.5YR 4/6	
18-72	C1	Med. Sand	7.5YR 5/6	
72-108	C2	Coarse Sand	10YR 4/4	>20% @ 72"
108-122	C3	LS	5Y 4/3	>10% @ 108"

Weeping: 92" ESHGW: 72"
Standing Water: 116" Refusal: None

Hole #206-B

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-8	A	SL	10YR 3/3	
8-20	Bw	LS	7.5YR 4/6	
20-120	C	Med. Sand	10YR 5/8	

Weeping: None ESHGW: 120"
Standing Water: None Refusal: None

Hole #206-C

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-8	A	SL	10YR 3/3	
8-20	B	LS	7.5YR 4/6	
20-96	C1	Med. Sand	7.5YR 5/6	
96-132	C2	Coarse Sand	7.5YR 6/2	>20% @ 96"

Weeping: 120" ESHGW: 96"
Standing Water: 120" Refusal: None

Hole #206-D

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	B	LS	7.5YR 4/6	
18-80	C1	Med. Sand	7.5YR 5/6	
80-120	C2	Coarse Sand	7.5YR 6/2	>20% @ 80"
120-144	C3	SL	5YR 5/2	

Weeping: 84" ESHGW: 80"
Standing Water: 140" Refusal: None

Hole #206-E

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	B	LS	7.5YR 4/6	
18-88	C1	Med. Sand	7.5YR 5/6	
88-144	C2	Coarse Sand	10YR 4/4	@ 88"

Weeping: 132" ESHGW: 88"
Standing Water: 132" Refusal: None

Hole #206-F

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	B	LS	7.5YR 4/6	
18-132	C1	Med. Sand	7.5YR 5/6	
132-138	C2	Coarse Sand	10YR 4/4	@ 132"

Weeping: None ESHGW: 132"
Standing Water: None Refusal: None

Hole #206-G

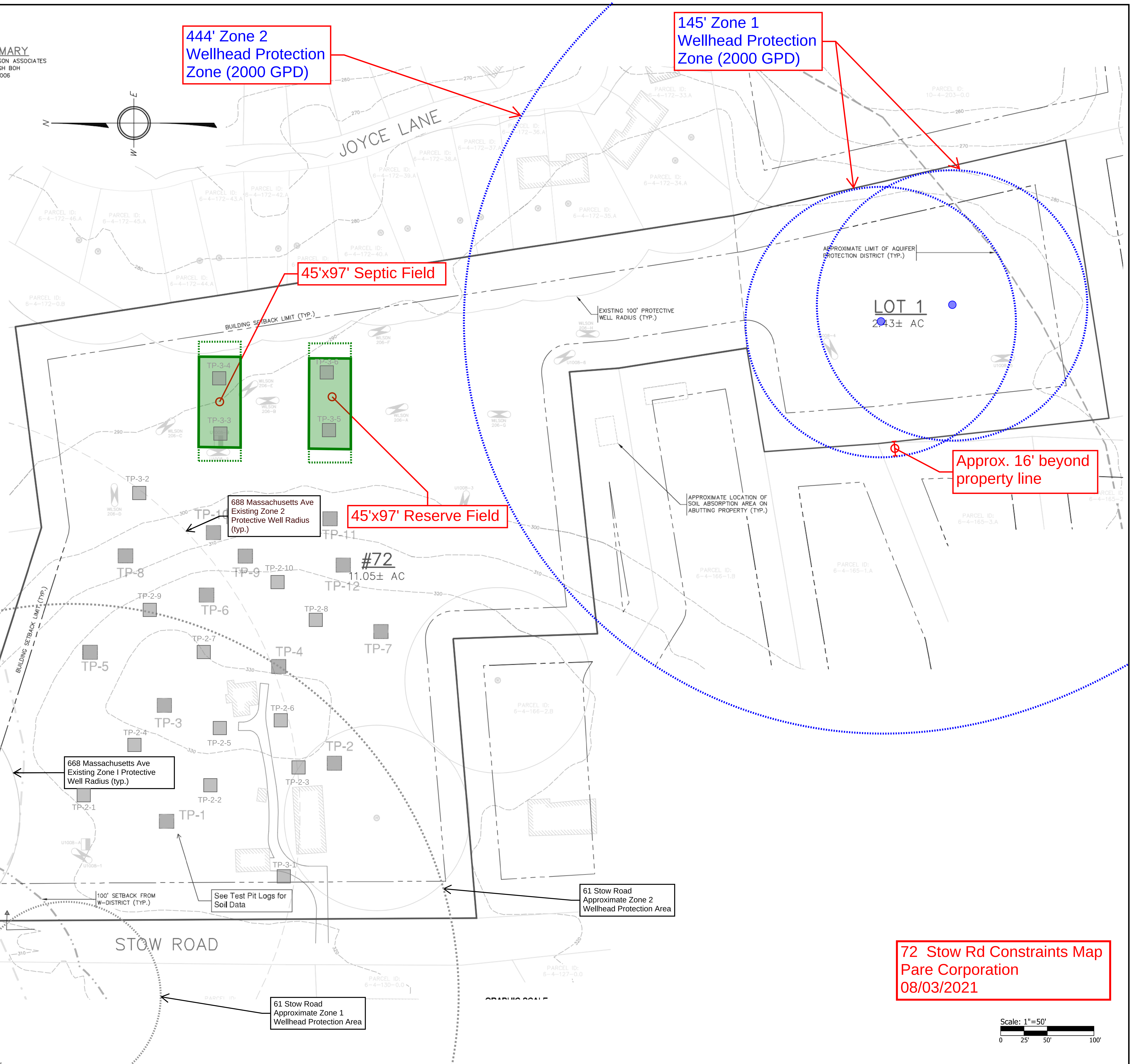
DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	B	LS	7.5YR 4/6	
18-36	C1	Med. Sand	7.5YR 5/6	
36-90	C2	Coarse Sand	10YR 4/4	@ 36"
90-144	C3	SL	2.5Y 5/2	

Weeping: 85" ESHGW: 36"
Standing Water: 90" Refusal: None

Hole #206-H

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0-6	A	SL	10YR 3/3	
6-18	B	LS	7.5YR 5/6	
18-42	C1	Med. Sand	7.5YR 5/6	
42-132	C2	Coarse Sand	10YR 4/4	@ 42"

Weeping: 96" ESHGW: 42"
Standing Water: 120" Refusal: None



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401-334-4100

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

BOXBOROUGH PUBLIC SAFETY

72 STOW ROAD, BOXBOROUGH MA 01719

REVISIONS:

PROJECT NO.:	19140.01
DATE:	3/26/2021
SCALE:	1"=50'
DESIGNED BY:	CW
CHECKED BY:	JJ
DRAWN BY:	CW
APPROVED BY:	JJ

DRAWING TITLE:

CONSTRAINTS PLAN

DRAWING NO.:

C1.0

SHEET NO. 1 OF 1

SOIL EVALUATION SUMMARY

SOIL EVALUATOR: ERIC RUDENAUER, GPR INC.
SOIL EVALUATOR APPROVED ON: OCTOBER 30, 2007
EVALUATION PERFORMED: OCTOBER 9, 2008

Deep Observation Hole Log

Hole # 1008-1 NB 21/71 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-9	A	SL	10YR 3/3		95% +2OC
9-26	B	SL	10YR 5/6		stone, silt, vf-
26+112	C	LS	5Y 6/4	@ 33"	Massive, less in place. some cobbles
				5YR 5/3	few stones
				10YR6/4	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Alsolution Till — Depth to Bedrock: >112"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole: 33"

Deep Observation Hole Log

Hole # 1008-2 NB 21/71 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0+6	A	SL	10YR 3/3		10%, <3
6-10	B	SL	2.5Y 4/6		10%, <3
10+30	C1	coarse sand	5Y 6/4	@ 39"	stone, single grain, no stones
30+65	C2	med sand	10YR 4/6		no stones, single grain, no stones
65+124	C3	SiL	5Y 5/2	10YR6/6	massive, silty, 8 in hard

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Glacial Outwash/ Alsolution Till — Depth to Bedrock: >124"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: 70"
Estimated Seasonal High Groundwater in the Hole: 70"
Aditional Notes: weeping at normal water

Deep Observation Hole Log

Hole # 1008-3 NB 21/71 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0+10	A	SL	10YR 3/3		10%, <3
10+20	Bt	SL	10YR 4/4		10%, <3
20+48	C1	med sand	10YR 5/6	@ 28"	ss, fi, very subrounded
48+77	C2	coarse sand	2.5Y 5/4		very loose, single grain, no stones
77+120	C3	SiL	5Y 5/2	10YR6/6	ss, silty, fi in hard

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Glacial Outwash/ Alsolution Till — Depth to Bedrock: >120"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole: 28"

Deep Observation Hole Log

Hole # 1008-4 NB 21/71 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0+8	A	SL	10YR 3/3		10%, vf-
8+20	B	LS	10YR 4/6		10%, vf-
20+72	C1	med sand	10YR 4/6	@ 45"	ss, fi, very subrds
72+122	C2	coarse sand	2.5Y 5/4		loose, single grain, some cobbles
				5YR 4/6	
				5Y 6/6	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Glacial Outwash — Depth to Bedrock: >122"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole: 45"
Aditional Notes: Sides of C1 & C2 were sloughing into hole

Deep Observation Hole Log

Hole # 1008-5 NB 21/72 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0+6	A	SL	10YR 3/3		10%, vf-
6-22	B	LS	10YR 4/6		10%, vf-
22+70	C1	med sand	10YR 4/6	(@ 46"	ss, fi, some cobbles
70+118	C2	coarse sand	2.5Y 5/4	7.5YR 4/6	loose, single grain, some cobbles
				2.5Y 6/6	

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Glacial Outwash — Depth to Bedrock: >118"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole: 46"
Aditional Notes: Sides of C1 & C2 were sloughing into hole

Deep Observation Hole Log

Hole # 1008-6 NB 21/72 Surface El.

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0+7	A	SiL	10YR 3/3		10%, vf-
11+31	B	FSL	7.5YR 4/4		10%, vf-
31+70	C1	med sand	10YR 4/4	(@ 46"	ss, some glass, many subrounded
70+124	C2	coarse sand	2.5Y 5/6	7.5YR 4/6	loose, single grain, some cobbles

*MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): Glacial Outwash — Depth to Bedrock: >124"
Depth to Groundwater: Standing Water in the Hole: None — Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole: 46"
Aditional Notes: C2 has pockets of fine sand with no stones or cobbles

PERCOLATION TEST DATA

PERFORMED BY: ERIC RUDENAUER, GPR INC.
TESTING PERFORMED: OCTOBER 9, 2008

1008-A 38 MIN / INCH @ 70"
1008-B < 2 MIN / INCH @ 52"

SOIL EVALUATION SUMMARY

SOIL EVALUATOR: ROBERT ELLIOT, R. WILSON ASSOCIATES
WITNESSED BY: JAMIE TERRY, BOXBOROUGH BOH
EVALUATION PERFORMED: FEBRUARY 7, 2006

Hole #206-A

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6-18	Bw	LS	7.5YR 4/6	
18+72	C1	Med. Sand	10YR 5/6	
72+108	C2	Coarse Sand	10YR 4/4	>20% @ 72"
108+122			5Y 4/3	>10% @ 108"

Weeping: 72" — ESHGW: 72"
Standing Water: 116" — Refusal: None

Hole #206B

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+20	Bw	LS	7.5YR 4/6	
20+129	C	Med. Sand	10YR 5/6	

Weeping: None — ESHGW: 120"
Standing Water: None — Refusal: None

Hole #206-C

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+8	A	SL	10YR 3/3	
8+20	B	LS	7.5YR 4/6	
20+96	C1	Med. Sand	7.5YR 5/6	
96+132	C2	Coarse Sand	7.5YR 6/2	>20% @ 96"

Weeping: 120" — ESHGW: 96"
Standing Water: 120" — Refusal: None

Hole #206-D

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+18	B	LS	7.5YR 4/6	
18+80	C1	Med. Sand	7.5YR 5/6	
80+120	C2	Coarse Sand	7.5YR 6/2	>20% @ 80"
120+144	C3	SL	5YR 5/2	

Weeping: 84" — ESHGW: 80"
Standing Water: 140" — Refusal: None

Hole #206-F

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+18	B	LS	7.5YR 4/6	
18+88	C1	Med. Sand	7.5YR 5/6	
88+144	C2	Coarse Sand	10YR 4/4	@ 88"

Weeping: 132" — ESHGW: 88"
Standing Water: 132" — Refusal: None

Hole #206-F

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+18	B	LS	7.5YR 4/6	
18+132	C1	Med. Sand	7.5YR 5/6	
132+139	C2	Coarse Sand	10YR 4/4	@ 132"

Weeping: None — ESHGW: 132"
Standing Water: None — Refusal: None

Hole #206-G

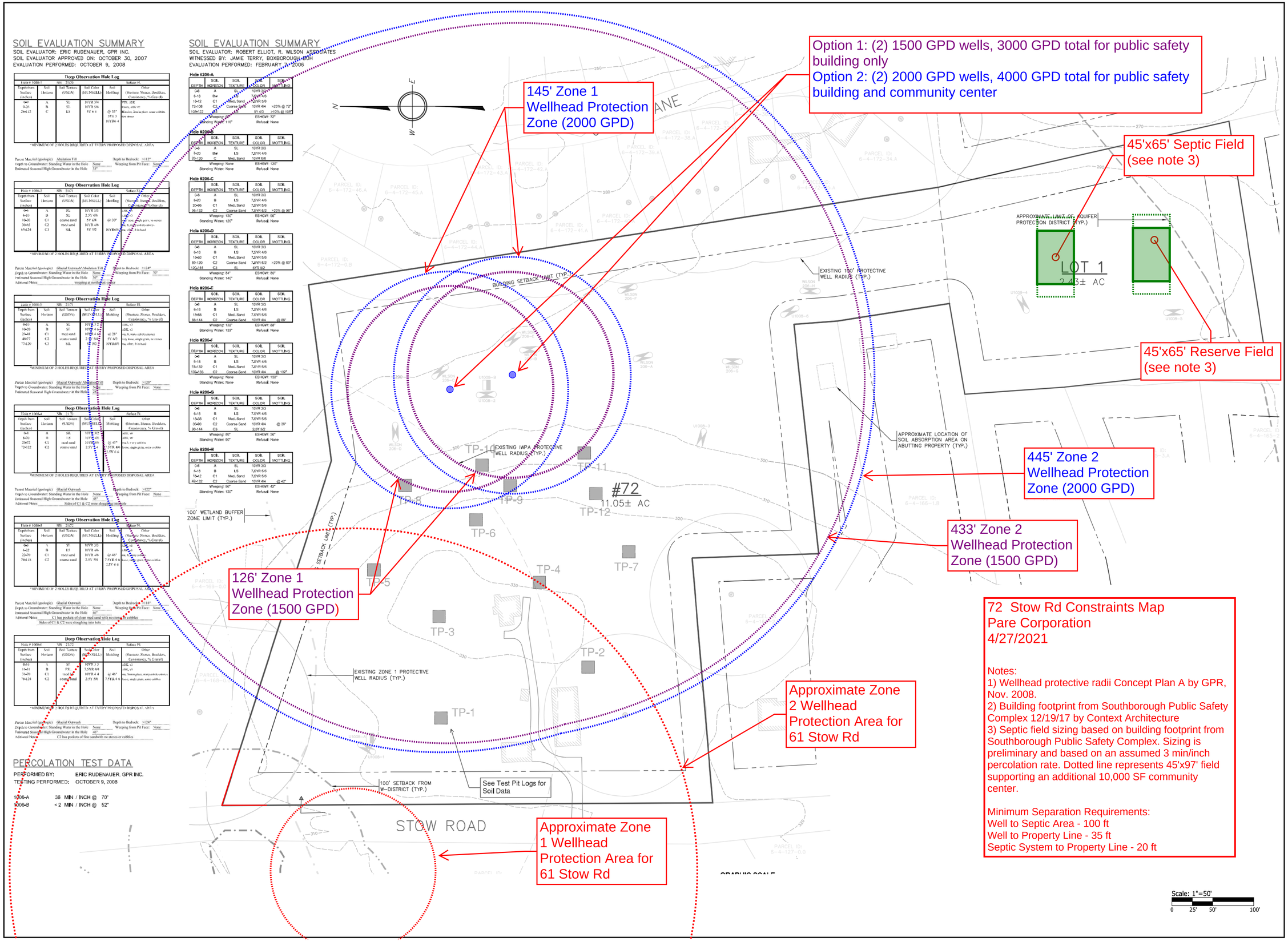
DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+18	B	LS	7.5YR 4/6	
18+36	C1	Med. Sand	7.5YR 5/6	
36+90	C2	Coarse Sand	10YR 4/4	@ 36"
90+144	C3	SL	2.5Y 5/3	

Weeping: 86" — ESHGW: 36"
Standing Water: 90" — Refusal: None

Hole #206-H

DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING
0+6	A	SL	10YR 3/3	
6+18	B	LS	7.5YR 5/6	
18+42	C1	Med. Sand	7.5YR 6/6	
42+132	C2	Coarse Sand	10YR 4/4	@ 42"

Weeping: 96" — ESHGW: 42"
Standing Water: 120" — Refusal: None



72 Stow Rd Constraints Map
Pare Corporation
4/27/2021

Notes:
1) Wellhead protective radii Concept Plan A by GPR, Nov. 2008.
2) Building footprint from Southborough Public Safety Complex 12/19/17 by Context Architecture
3) Septic field sizing based on building footprint from Southborough Public Safety Complex. Sizing is preliminary and based on an assumed 3 min/inch percolation rate. Dotted line represents 45'x97' field supporting an additional 10,000 SF community center.

Minimum Separation Requirements:
Well to Septic Area - 100 ft
Well to Property Line - 35 ft
Septic System to Property Line - 20 ft

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LINCOLN, RI 02865
401-334-4100

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

BOXBOROUGH PUBLIC SAFETY
72 STOW ROAD, BOXBOROUGH MA 01719

REVISIONS:

PROJECT NO.:	19140.01
DATE:	3/26/2021
SCALE:	1"=50'
DESIGNED BY:	CW
CHECKED BY:	JJ
DRAWN BY:	CW
APPROVED BY:	JJ

DRAWING TITLE:
CONSTRAINTS PLAN

DRAWING NO.:
C1.0

SHEET NO. 1 OF 1

HKT architects inc.

PRESENTATION OF PRELIMINARY OPTIONS A, B AND C

ASSUMPTIONS FOR CONCEPT SKETCHES

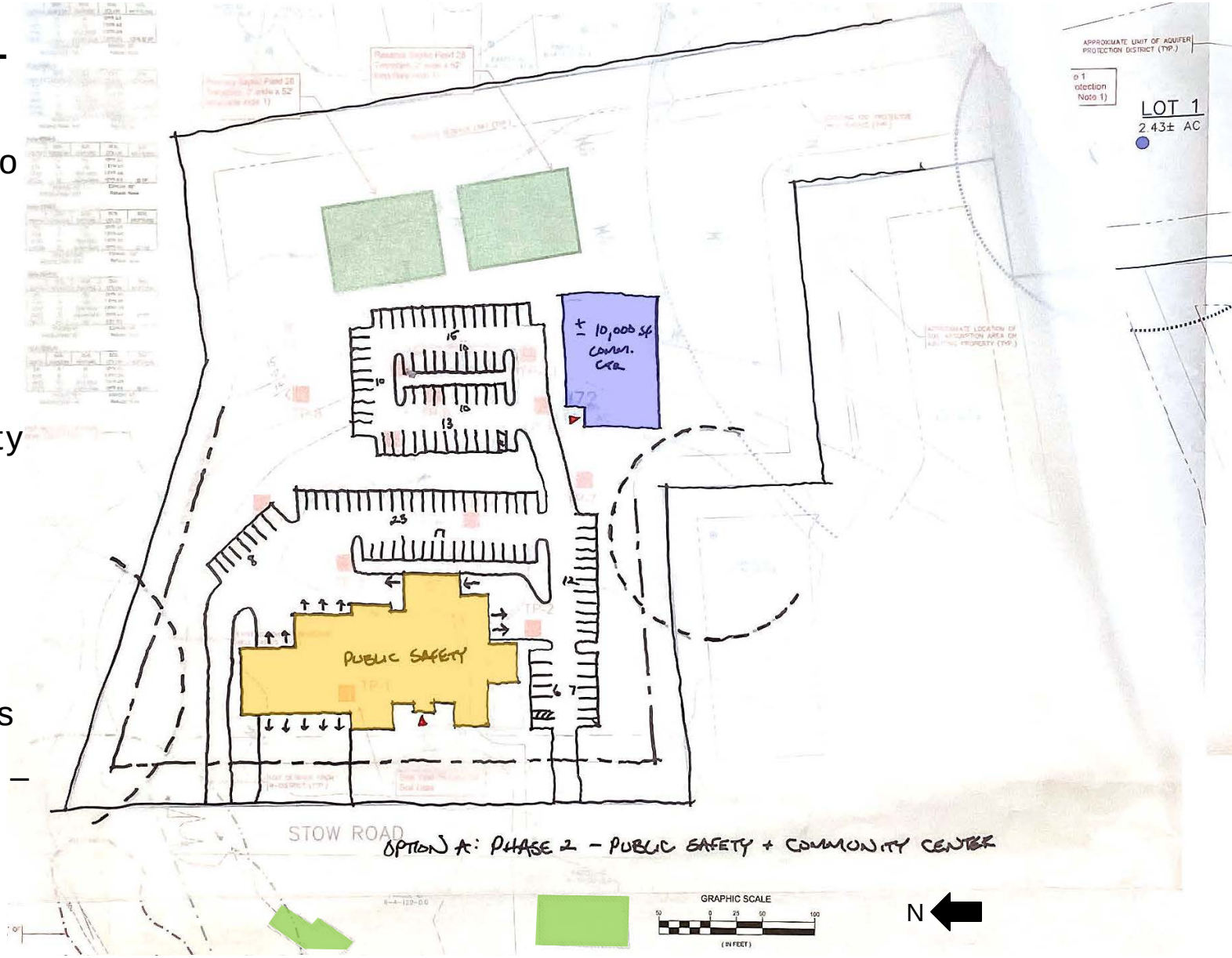
- Use Southborough Public Safety building footprint as template for how a future Boxborough Public Safety building might fit on 72 Stow Road site (final layout will be dependent on programming of Boxborough Police + Fire departments + development of a building design)
- Based on previous programming with Boxborough Police + Fire departments, assume minimum parking:
  - Fire – 21, Police – 27, Visitor – assume 10 minimum
- A 10,000 sf Community Center was assumed with the following possible program:
  - 7 staff members
  - Multi-purpose Room for 100
  - Movement classroom for 50
  - General classroom for 30
  - Conference room for 12
  - Kitchen, toilets, storage and mechanical spaces
  - Parking assumed at one space per staff + one space per every four visitors (7 staff + 192/4 visitors = 7 + 48 = 55 minimum) – note zoning requirements for this use are unclear

OPTION A – PHASED PUBLIC SAFETY + COMMUNITY CENTER – PHASE 1

- Phased option to minimize impact to public safety parking + operations in second phase
- Locate police/fire department and staff parking separate from public
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 63 spaces
- Fire department drive-thru bays with separate drive off Stow Road for fire apparatus to access the back of the building

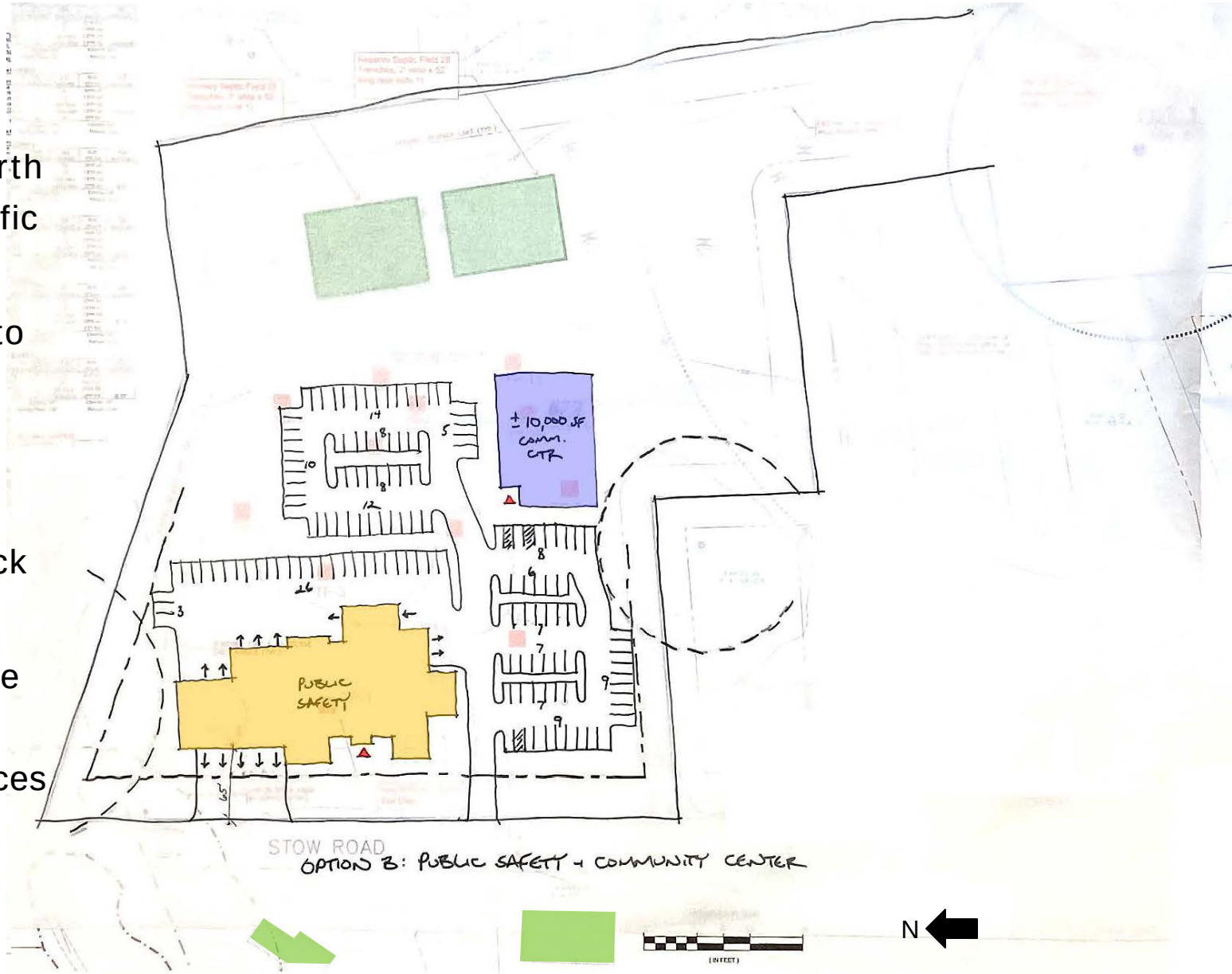
OPTION A – PHASED PUBLIC SAFETY + COMMUNITY CENTER – PHASE 2

- Phased option to minimize impact to public safety parking in second phase
- Locate police/fire department and staff parking separate from public
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 48 spaces
  - Additional parking for police and fire personnel – 12 spaces
  - Parking for community center – 58 spaces
- Community center + parking on steeper portion of site



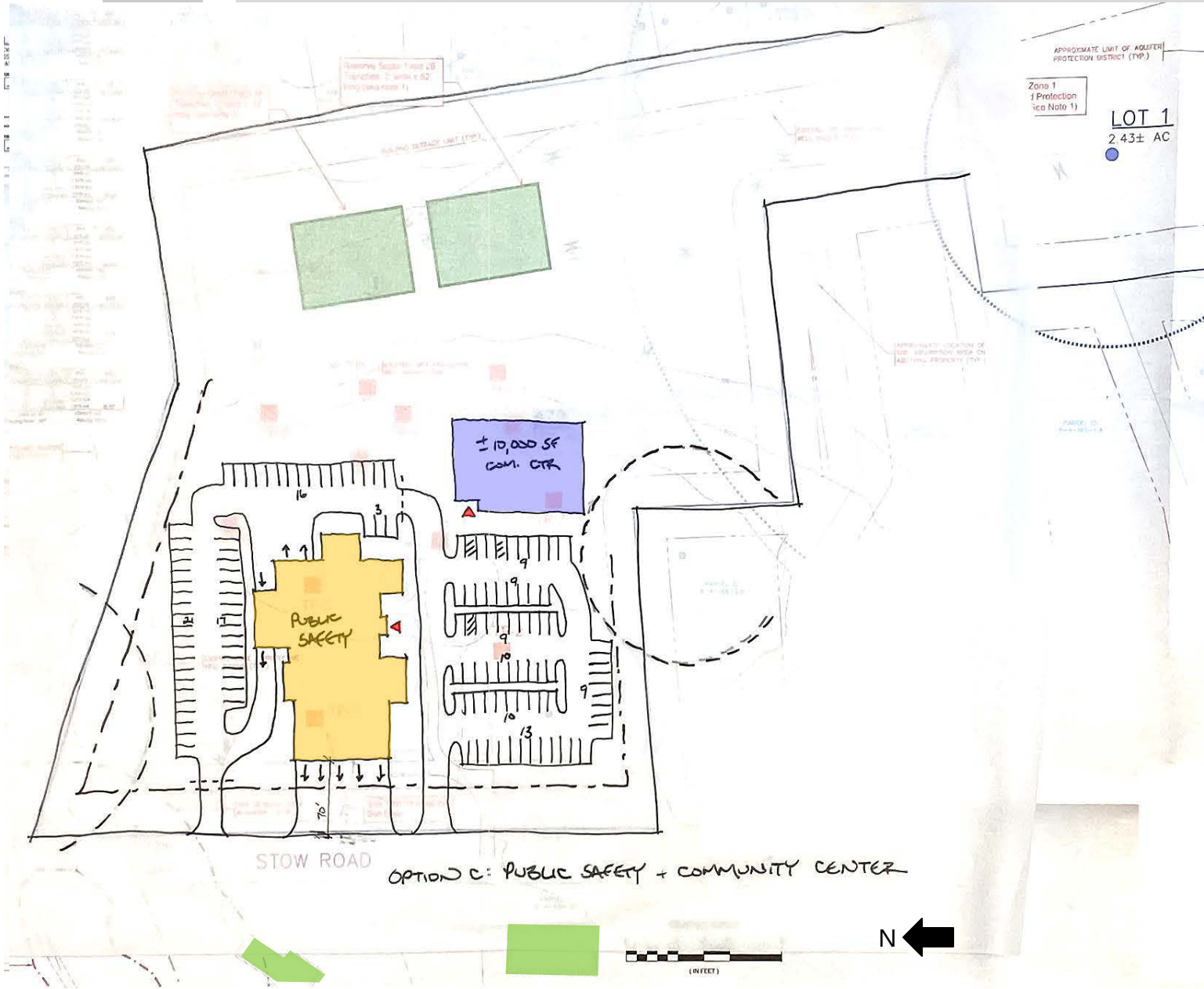
OPTION B – PUBLIC SAFETY + COMMUNITY CENTER

- Shift public safety building to the north to minimize impact of apparatus traffic on development across street
- Shift community center to the west to flatter portion of the site
- Keep drive thru apparatus bays – eliminate second curb cut
    - Fire apparatus must access back of building through parking lot
    - Some parking for police and fire personnel located behind the public safety building – 29 spaces
    - Shared public safety (visitor + personnel)/community center parking – 110 spaces



OPTION C – PUBLIC SAFETY + COMMUNITY CENTER

- Reorient public safety building with public entrance off shared public parking lot to create separate public safety parking behind building
- Eliminate drive-thru apparatus bays
  - Gated parking for police and fire personnel – 57 spaces
  - Shared public/community center parking – 69 spaces



HKT architects inc.

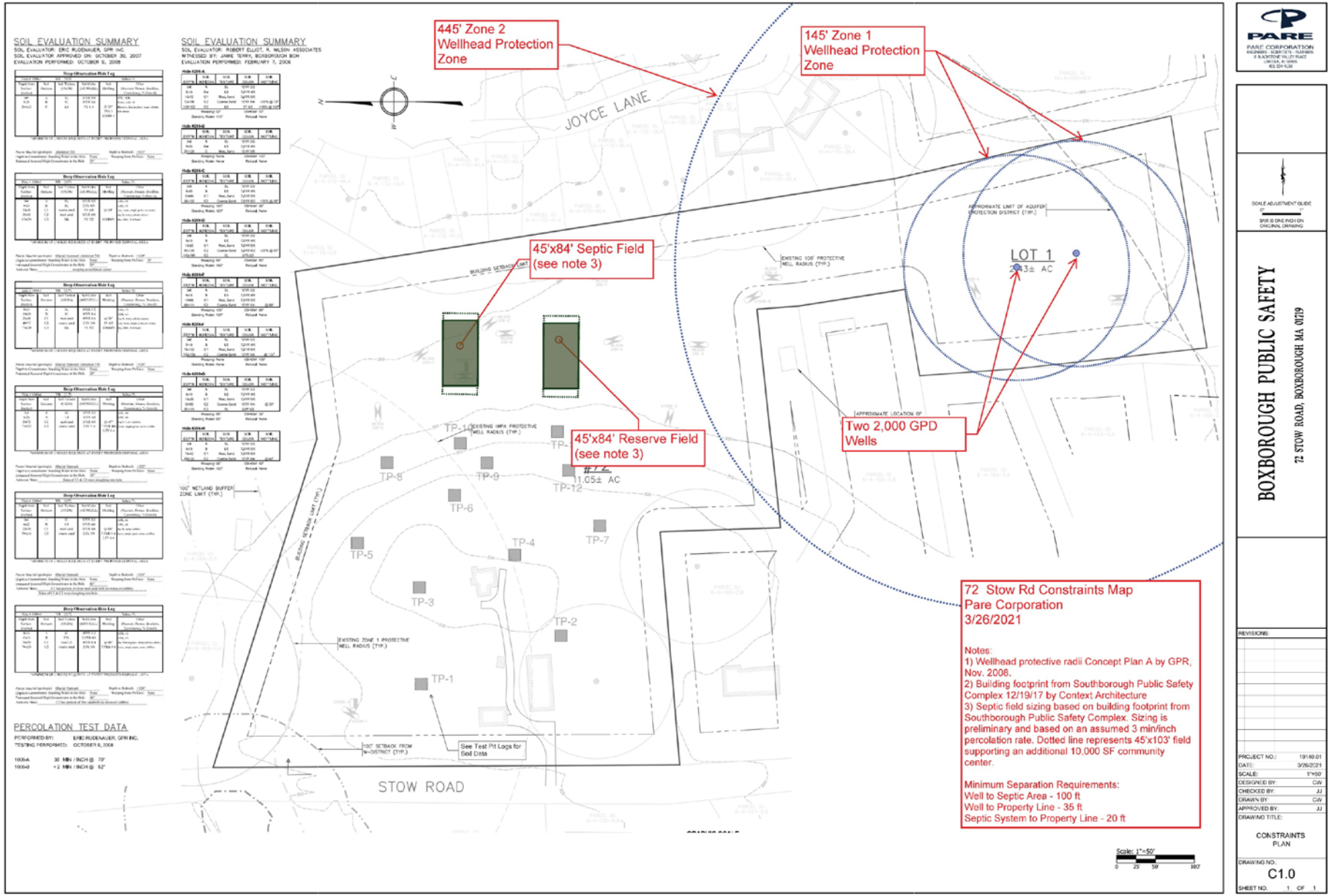
PRESENTATION OF OPTIONS A1, A2 AND A3

BOXBOROUGH PUBLIC SAFETY – 72 STOW ROAD

APRIL 28, 2021

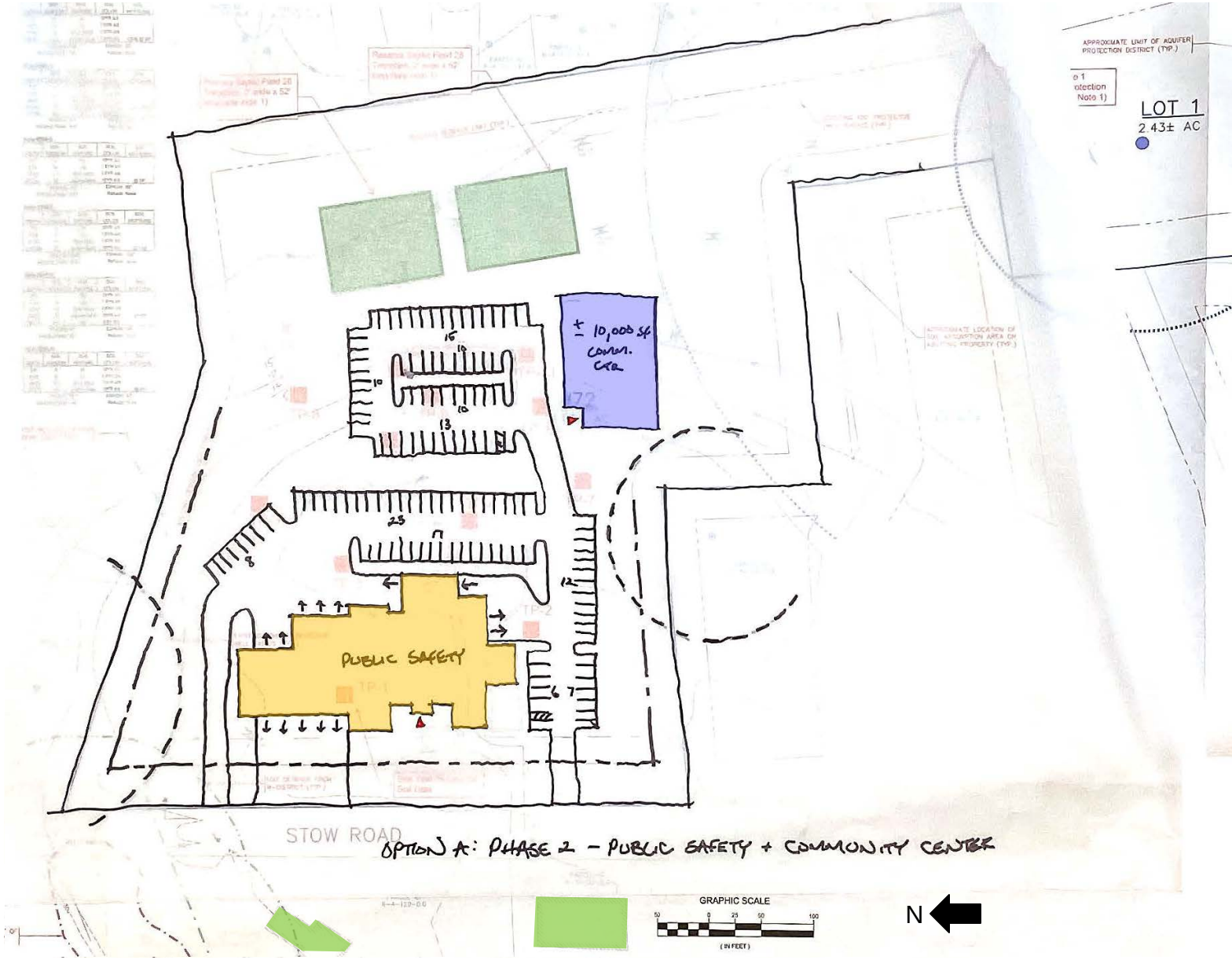
PREVIOUS MEETING

- Questions on constraints:
  - Zone 1 + 2 requirements for this use re: hazardous wastes + other?
  - Are redundant wells required? Size?
  - Can wells + septic locations be flipped?
  - Location of Zone 1 + 2 for the well at 61 Stow Road (yellow house) – verify others shown?
  - Make contour lines + existing house visible



PREVIOUS MEETING - OPTION A PREFERRED WITH MODIFICATIONS

- Drive thru bays strongly preferred
- Locate the Public Safety Building farther back from Stow Road
  - Sally port entrance outside of view from the roadway
- Overlay the existing homes on the drawings for perspective on distances and setback from the street
- Update option based on any new site constraints discovered



SITE CONSTRAINTS – ZONE 1 + 2 WELLHEAD PROTECTION AREA REQUIREMENTS

- Zone 1 requirements - 310 CMR:
  - Zone 1 of the proposed well is owned or controlled by the supplier of water
  - Current + future land uses within Zone 1 are limited to those related to the provision of public drinking water + will have no significant adverse impact on water quality
- Zone 2 prohibition of land uses - 310 CMR 22.21(2)(a):
  - Landfills + open dumps
  - Landfills receiving only wastewater residuals and/or septage
  - Automobile graveyards and junkyard
  - Stockpiling + disposal of snow or ice removed from highways + streets located outside of Zone 2 that contain sodium chloride, chemically treated abrasives or other chemicals used for snow/ice removal.
  - Petroleum, fuel oil + heating oil bulk stations + terminals
  - Treatment or disposal works for wastewater other than sanitary sewage
  - Facilities that generate, treat, store or dispose of hazardous waste

SITE CONSTRAINTS – ZONE 1 + 2 WELLHEAD PROTECTION AREA REQUIREMENTS

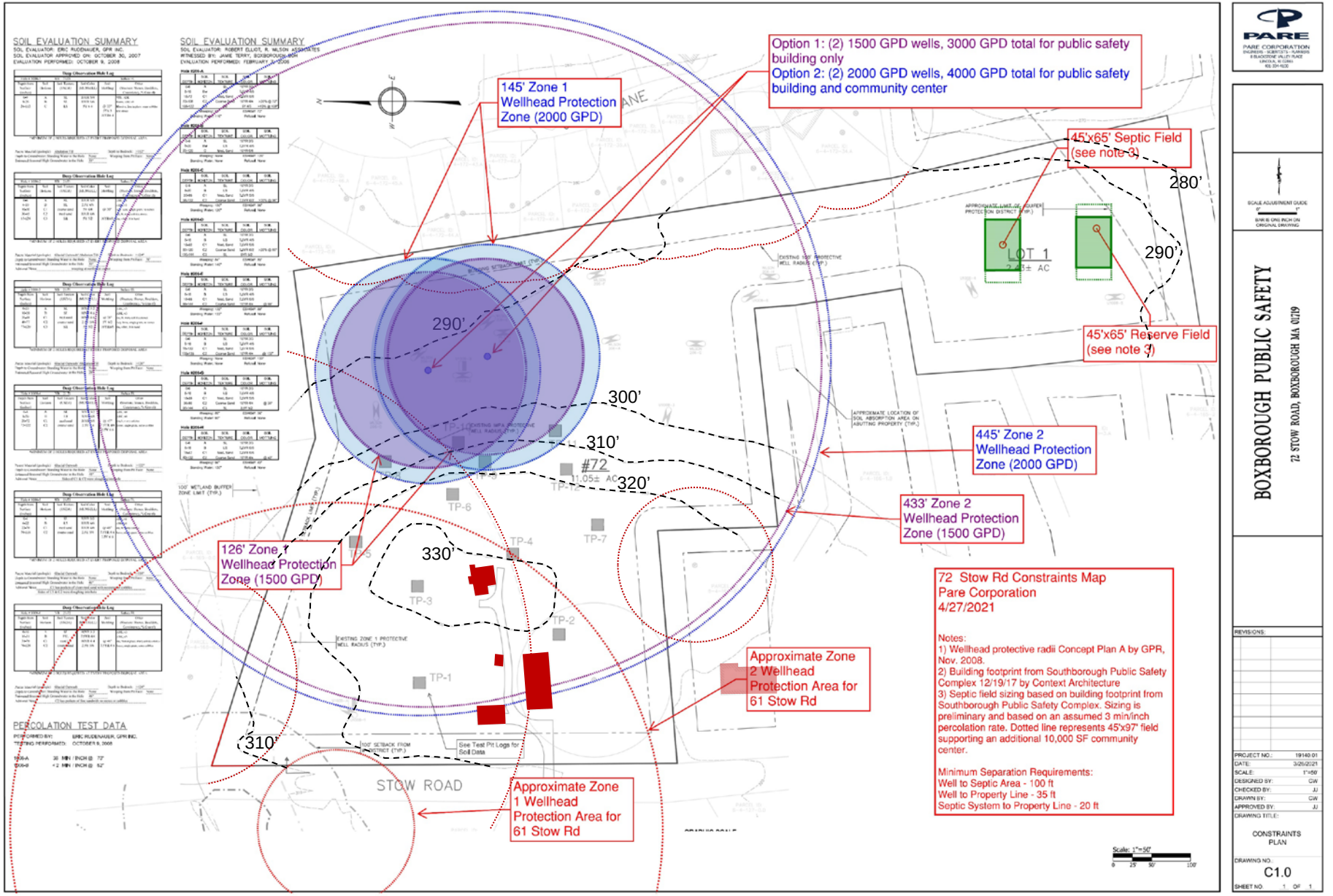
- Zone 2 prohibition of land uses 310 CMR 22.21(2)(a) + (b) continued:
  - Exceptions for facilities that generate, treat, store or dispose of hazardous waste include:
    - Very small quantity generators as defined by 310 CMR 30.00 Hazardous Waste
  - 310 CMR 22.21(2)(b) allows for performance standards for some of the above items to be in compliance
    - Storage of liquid hazardous materials per MGL c.21E and/or liquid petroleum products shall:
      - Be stored above ground level, on an impervious surface and either in containers or above ground tanks within a building or,
      - Outdoors in covered containers or above ground tanks in an area with a containment system
    - Land uses that result in the rendering of impervious of more than 15% or 2,500 square feet of any lot or parcel, whichever is greater, unless there is a system for stormwater recharge that will not result in degradation of groundwater quality

SITE CONSTRAINTS – WELL + SEPTIC SIZING

- Pare updated water demand calculations:
  - Based on Southborough Public Safety floor plans provided + assumptions on Community Center program
    - 2,694 GPD Public Safety + 1,220 GPD Community Center
    - Rounded to 3,000 GPD for Public Safety + 4,000 GPD for Public Safety + Community Center
- Pare recommending two wells to meet the required demand
  - Two wells provide redundancy of the equipment (pumps)
  - Pare sees no regulations requiring increasing well capacity to provide additional redundancy
  - Wells designed to supply daily capacity over a two hour period to account for peak demand
    - Two wells approximately 13 GPM for Public Safety – 126’ Zone 1 Wellhead Protection Zone
    - Two wells approximately 17 GPM for Public Safety + Community Center – 145’ Zone 1 Wellhead Protection Zone
- Septic + reserve fields – estimated size 45’x65’ for Public Safety; 45’x95’ for Public Safety + Community Center combined

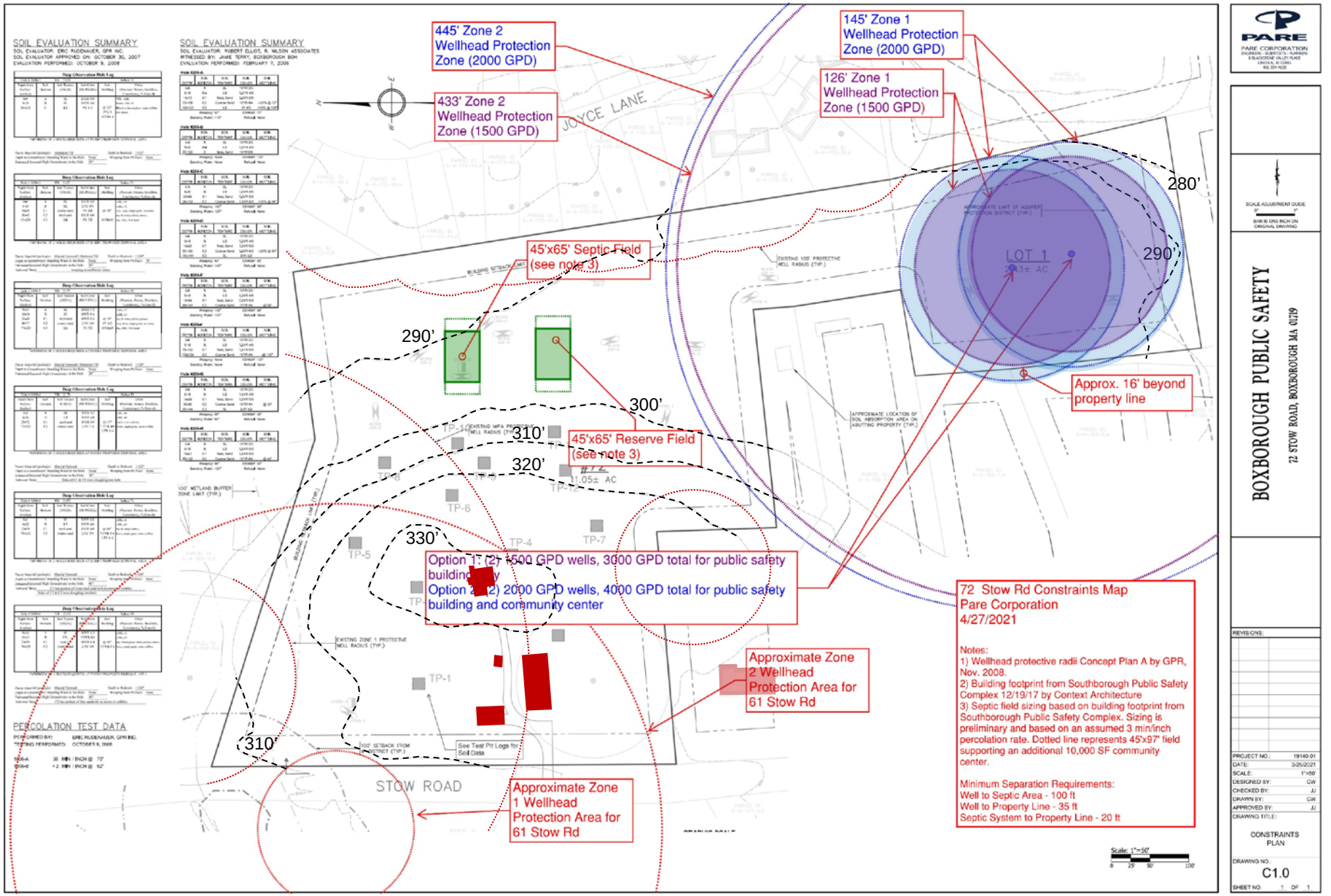
SITE CONSTRAINTS

- Septic in panhandle
- Required separations:
  - 100’ well to septic
  - 35’ well to property line
  - 20’ septic to property line
- Wells are shown with Zone 1 Wellhead Protection entirely on Town land
- Pumping to septic may be required due to distance from buildings



SITE CONSTRAINTS

- Wells in panhandle
- Required separations:
  - 100’ well to septic
  - 35’ well to property line
  - 20’ septic to property line
- Wells are shown with Zone 1 Wellhead Protection entirely on Town land if serving just the Public Safety Building
  - Zone 1 extends over lot line with added Community Center

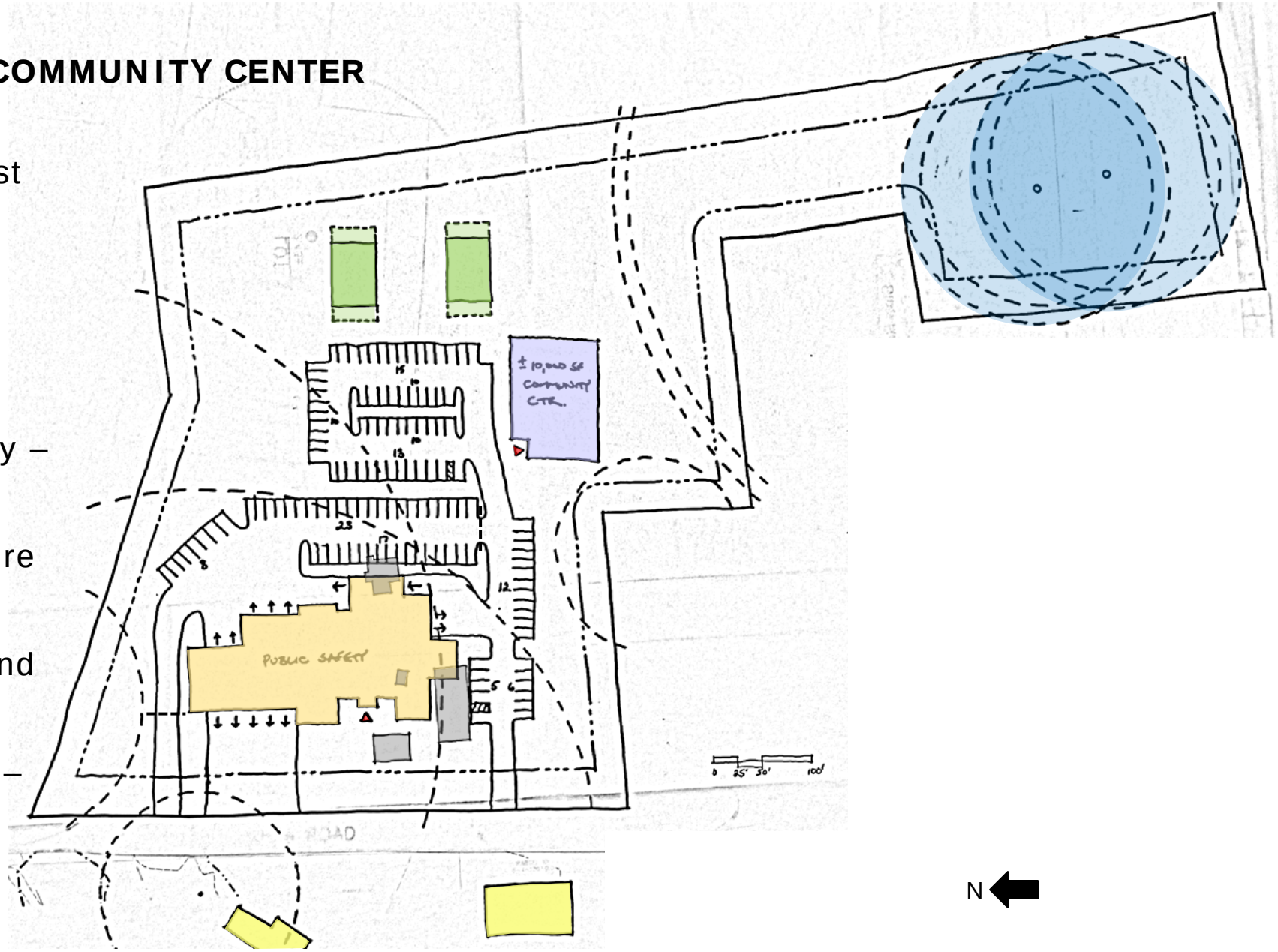


ASSUMPTIONS FOR CONCEPT SKETCHES

- Use Southborough Public Safety building footprint as template for how a future Boxborough Public Safety building might fit on 72 Stow Road site (final layout will be dependent on programming of Boxborough Police + Fire departments + development of a building design)
- Based on previous programming with Boxborough Police + Fire departments, assume minimum parking:
    - Fire – 21, Police – 27, Visitor – assume 10 minimum
- A 10,000 sf Community Center was assumed with the following possible program:
    - 7 staff members
    - Multi-purpose Room for 100
    - Movement classroom for 50
    - General classroom for 30
    - Conference room for 12
    - Kitchen, toilets, storage and mechanical spaces
    - Parking assumed at one space per staff + one space per every four visitors (7 staff + 192/4 visitors = 7 + 48 = 55 minimum) – note zoning requirements for this use are unclear

OPTION A1 – PUBLIC SAFETY + COMMUNITY CENTER

- Public Safety Building pushed east based on BBC request
  - Apron increased from 85’ in Option A to 105’ in Option A1
- Parking:
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 48 spaces
  - Additional parking for police and fire personnel – 12 spaces
  - Parking for community center – 58 spaces
- Community center + parking on steeper portion of site

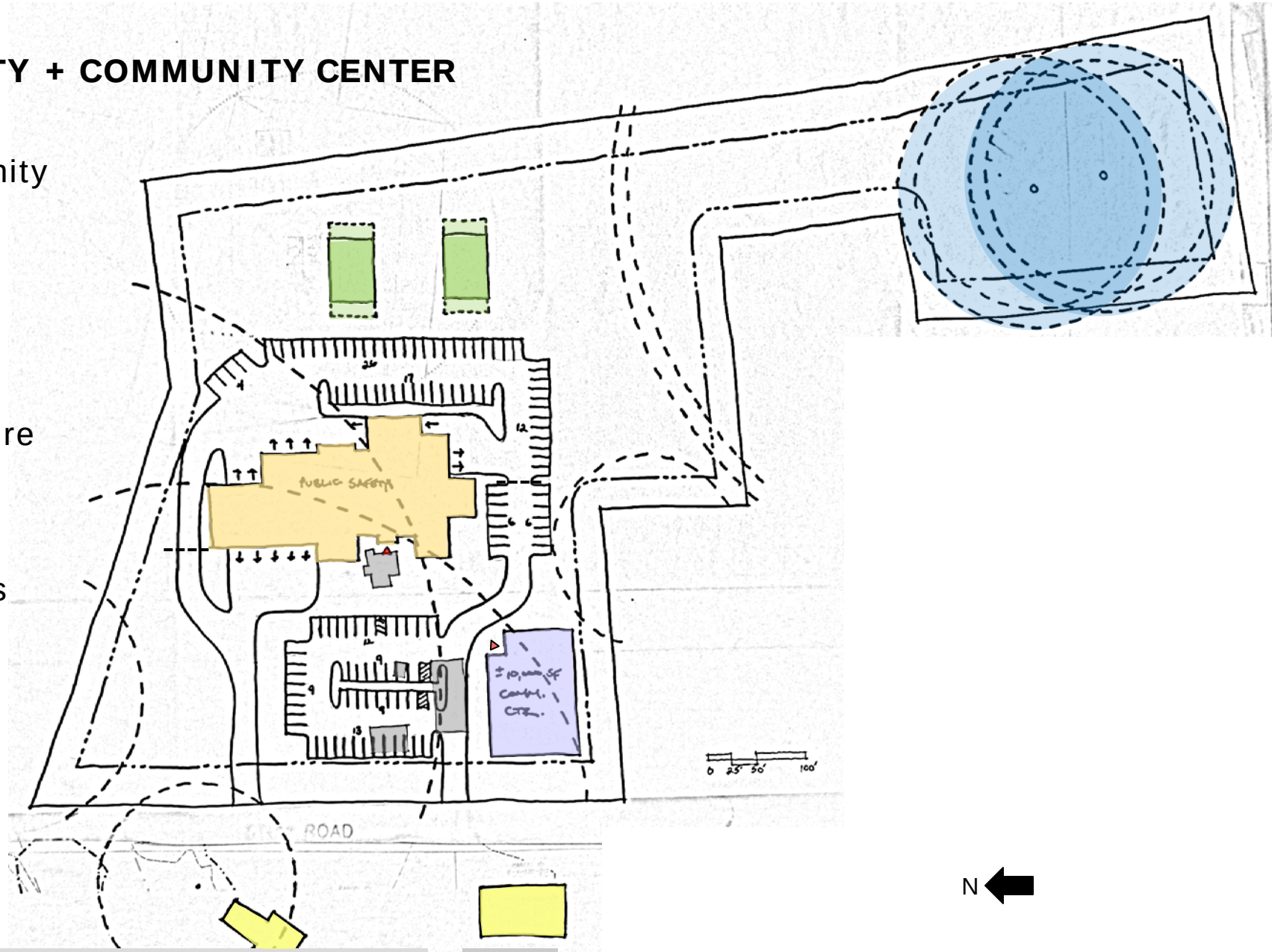


OPTION A2 – PUBLIC SAFETY ONLY

- Public Safety Building pushed east based on BBC request
  - Apron increased from 85’ in Option A to 140’ in Option A2
- Community Center eliminated – smaller wells + smaller Zone 1 give flexibility on placement without impact to neighbors
- Parking:
  - Visitor parking for public safety – 13 spaces
  - Gated parking for police and fire personnel – 63 spaces

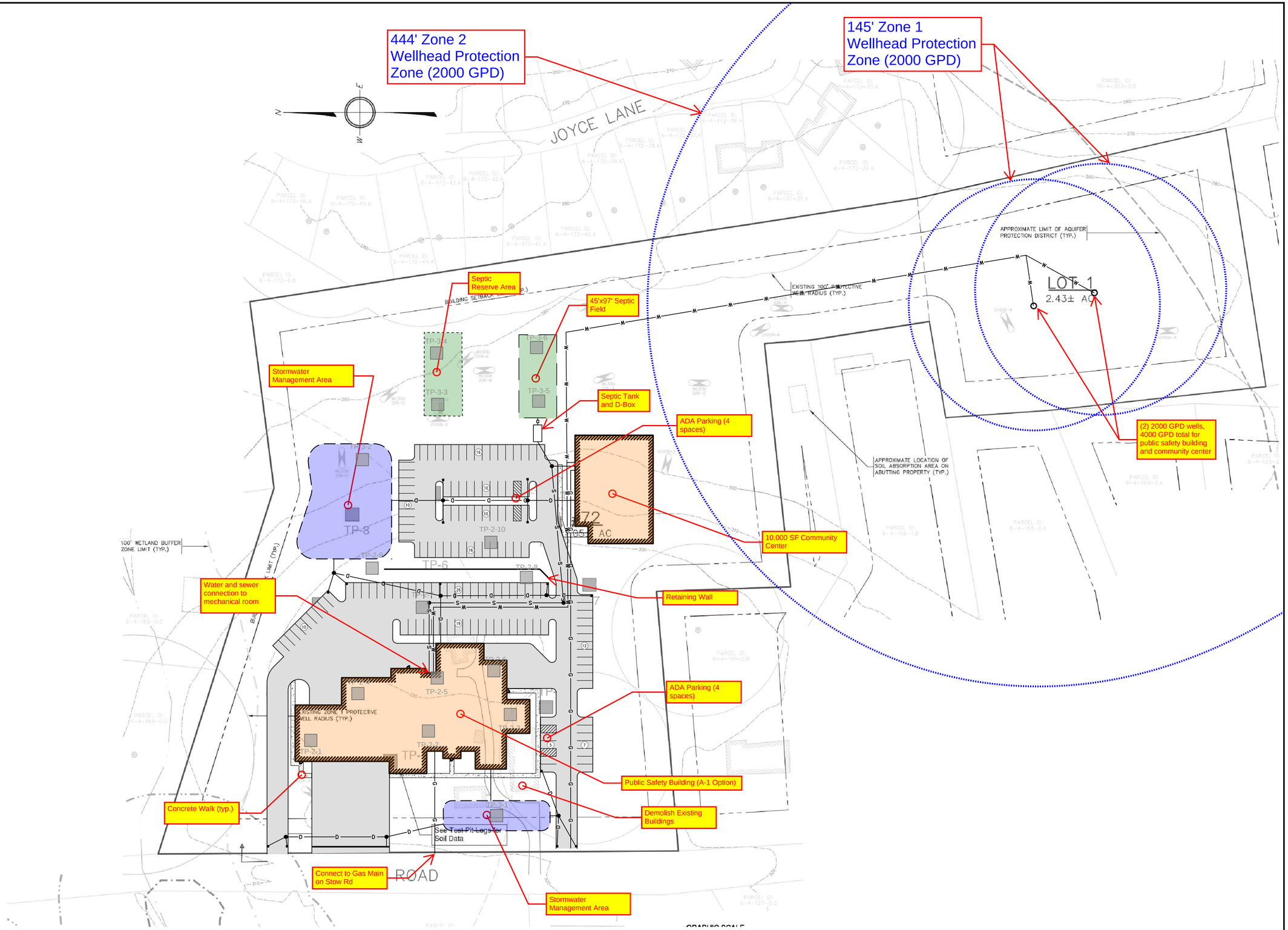
OPTION A3 – FLIP PUBLIC SAFETY + COMMUNITY CENTER

- Public Safety Building + Community Center locations flipped to allow greater privacy/security in Public Safety parking + Sally Port
- Parking:
  - Gated parking for police and fire personnel – 59 spaces
  - Shared parking for visitors + community center – 64 spaces
- Public Safety parking on steeper portion of site



HKT architects inc.

C1.0 – OPTION A-1 CONCEPT PLAN



Scale: 1"=50'
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401-334-4100

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

BOXBOROUGH PUBLIC SAFETY

72 STOW ROAD, BOXBOROUGH MA 01719

REVISIONS:

PROJECT NO.:	19140.01
DATE:	7/10/2021
SCALE:	1"=50'
DESIGNED BY:	CW
CHECKED BY:	JJ
DRAWN BY:	CW
APPROVED BY:	JJ

DRAWING TITLE:

A-1 CONCEPT PLAN

DRAWING NO.:

C1.0

SHEET NO. 1 OF 2

HKT architects inc.

C1.0 – OPTION A-3 CONCEPT PLAN

444' Zone 2 Wellhead Protection Zone (2000 GPD)

145' Zone 1 Wellhead Protection Zone (2000 GPD)

45'x97' Septic Field

Septic Reserve Area

Stormwater Management Area

Septic Tank and D-Box

Water and sewer connection to mechanical room

Public Safety Building (A-3 Option)

Concrete Walk (typ.)

ADA Parking (4 spaces)

Demolish Existing Buildings

10,000 SF Community Center

ADA Parking (4 spaces)

See Test Pit Logs for Soil Data

Connect to Gas Main on Stow Rd

Stormwater Management Area

(2) 2000 GPD wells, 4000 GPD total for public safety building and community center

JOYCE LANE

STOW ROAD

BUILDING SETBACK LIMIT (TYP.)

APPROXIMATE LIMIT OF AQUIFER PROTECTION DISTRICT (TYP.)

EXISTING 100' PROTECTIVE WELL RADIUS (TYP.)

APPROXIMATE LOCATION OF SOIL ABSORPTION AREA ON ABUTTING PROPERTY (TYP.)

100' WETLAND BUFFER ZONE LIMIT (TYP.)

LOT 1
2.43± AC

Scale: 1"=50'
0 25' 50' 100'

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BOXBOROUGH PUBLIC SAFETY

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SCALE:	1"=50'
DESIGNED BY:	CW
CHECKED BY:	JJ
DRAWN BY:	CW
APPROVED BY:	JJ

DRAWING TITLE:

A-3 CONCEPT PLAN

DRAWING NO.:

C1.1

SHEET NO. 2 OF 2