ADDENDUM NO. 3

TO

CONTRACT DOCUMENTS

IMPROVEMENTS TO WAYLAND HIGH SCHOOL ATHLETIC FACILITIES
Wayland, MA

IFB #19-1030

October 11, 2018

NOTICE TO BIDDERS

NOTE: Submission deadline remains unchanged and is still scheduled for Tuesday, October 23, 2018 at 2:00 PM

The attention of all bidders submitting proposals for "Improvements to Wayland High School Athletic Facilities" is called to the following Addenda to the specifications and plans. The items set forth herein, whether of omission, addition or substitution are to be included in, and form part of the specifications and plans of the above-named project for bids to be received as advertised.

PLEASE BE SURE TO ACKNOWLEDGE
THIS ADDENDUM ON BID PRICING PAGE

The following clarifications, modifications, deletions and additions are hereby incorporated into and become part of the Contract Documents.

WRITTEN CHANGES AND CLARIFICATIONS TO SPECIFICATIONS

1. **DELETE**: Appendix A: Geotechnical Engineering Report dated April 13, 2018.

   ADD: Appendix A: Geotechnical Engineering Report dated October 4, 2018 per attachment.

2. **DELETE**: Specification Section 00 31 32- SUBSURFACE DATA

   ADD: Specification Section 00 31 32- SUBSURFACE DATA per attachment

3. **ADD:** Section 01 45 00 – SAMPLING AND TESTING, per attachment.

4. Specification Section 12 40 00 SITE FURNISHINGS, PART 2 – PRODUCTS:

   A. **ADD**: Item Y. PORTABLE DISCUS CAGE

      The portable discus cage shall be Model #732220, High School Portable Discus Cage as manufactured by Gill Athletics, Litania Sports Group, Inc. 601 Mercury Drive, Champaign IL 68122, or approved equal, per attachment. (2 total)

5. Specifications Section 12 40 00 – SITE FURNISHING, PART – PRODUCTS:

   A. **ADD**: Section 2.04 FLAG POLE

The flag pole shall be Model ECH25 Ground Set Tapered Aluminum Flagpole as manufactured by Eder Flag Manufacturing Company, 1000 W. Rawson Avenue, Oak Creek, WI 53154, or approved equal, per attachment.

6. **DELETE:** Specification Section 31 00 00 – EARTHWORK

   ADD: Specification Section 31 00 00 – EARTHWORK per attachment

WRITTEN CHANGES AND CLARIFICATIONS TO PLANS

1. DELETE: Sheet L4.01 – LAYOUT PLAN ENLARGMENT

   ADD: Sheet L4.01 – LAYOUT PLAN ENLARGMENT, per attachment.

2. Sheet L7.02, Detail 5 – SYNTHETIC TURF AT PERIMETER TRACK DRAIN:

   A. **FOR CLARIFICATION,** "Stabilization Fabric" and "Demarcation Fabric" shall be referred to as "Synthetic Turf Sub Base Fabric as referenced in Specification Section 31 05 19 – GEOTEXTILE FABRICS.

3. Sheet L7.02, Detail 8 – COLLECTOR PIPE AT SYNTHETIC TURF FIELD:

   A. **FOR CLARIFICATION,** "Stabilization Fabric" and "Demarcation Fabric" shall be referred to as "Synthetic Turf Sub Base Fabric as referenced in Specification Section 31 05 19 – GEOTEXTILE FABRICS.

4. Sheet L7.05, Detail 1 – SYNTHETIC TURF:

   A. **FOR CLARIFICATION,** "Stabilization Fabric" and "Demarcation Fabric" shall be referred to as "Synthetic Turf Sub Base Fabric as referenced in Specification Section 31 05 19 – GEOTEXTILE FABRICS.

   B. **FOR CLARIFICATION,** Drainage Stone depth shall be 12" typical within the limits of the synthetic turf field.

5. Sheet L7.05, Detail 5 – TRACK SECTION:

   A. **FOR CLARIFICATION,** "Drainage Stone" shall be placed below the "Compacted Leveling Stone at the synthetic turf field per Detail 1, Sheet L7.05 – SYNTHETIC TRUF FIELD

6. Sheet L7.05, Detail 3 – TRACK SECTION

   A. **DELETE** callout "Stabilization Fabric."

7. **DELETE**: Sheet S3.02-BLEACHER FOUNDATION PLANS II

   ADD: Sheet S3.02-BLEACHER FOUNDATION PLANS II, per attachment

QUESTIONS AND CLARIFICATIONS

Question 1: What should be the diameter of the straw wattles?

Response: The minimum diameter of the straw wattle shall be 12" unless otherwise required by the local Conservation Commission.

Question 2: There is a discrepancy between the layout of the away bleacher foundation in Detail 1, S3.02 – AWAY BLEACHER FOUNDATION PLAN and the away bleacher layout on sheet L3.02. Which is the correct layout.

Response: Refer to Sheet S3.02 – BLEACHER FOUNDATION PLANS II per attachment.

Question 3: On Sheet L2.01, can the leveling stone and drainage stone of the existing field be reused? If so, has any testing been performed to determine depths of these materials and infiltration rates?

Response: As referenced on Sheet L2.01, the Contractor has the option to Remove and Salvage the leveling stone and drainage stone for re-use in the new synthetic turf field system, but only if they meet all requirements identified in Specification Section 32 18 13 – SYNTHETIC GRASS INFILL SYSTEM. The Contractor is responsible for any and all testing needed to verify re-used materials meet the requirements.

Question 4: Please clarify all drain pipe sizes on sheet L5.04.

Response: All proposed solid and perforated HDPE drain pipes shall be 12" diameter per attachment SK-1.

Question 5: What is the invert for the perforated HDPE pipe in the trench drain on Sheet L5.04?

Response: The invert where the perforated HDPE pipe connects to the solid HDPE pipe shall be 131.43.

Question 6: Can asphalt on site be reclaimed and reused on-site as the subbase for the compacted dense graded crushed stone as referenced on Details 2, 5, and 9, L7.05 and Details 6, 9, and 10, L7.02?

Response: Any re-claimed materials that may be considered for reuse as the subbase material("compacted dense graded crushed stone") must meet all requirements of Specification Section 31 10 00 - EARTHWORK. All reclaimed material shall conform to the requirements of MassDOT Subsection M1.11.0 of Division III, Materials.

Question 7: Will a concrete pad need to be provided for any relocated storage sheds?

Response: The Contractor shall provide a concrete pad conforming to Detail 5, L7.03 – CONCRETE PAVEMENT with dimensions that extend a minimum of 6" beyond the outside edge of the storage shed wall at a location to be determined by the owner. Contractor shall provide two (2) concrete pads total; one (1) pads for each shed to be relocated.

Question 8: Is the Contractor supposed to grind the stumps of any trees that are removed and disposed in the area of the proposed tennis courts?

Response: For all tree stumps that falls within the limits of the proposed paved areas, contractor shall completely remove and dispose of existing tree stumps. Stump grinding may occur outside of proposed pavement areas that fall within the landscape planted areas.

Question 9: Are the existing drain lines under the existing synthetic turf field to be removed or abandoned in place?

Response: All existing drain lines under the existing synthetic turf field shall be completely removed and disposed of by the Contractor

Question 10: What are the specific depths of the asphalt and gravel base for bituminous concrete where lawn is at the edge?

Response: Contractor shall refer to various types of bituminous concrete pavement as as identified on the plans and details.

Question 11: What is the outside diameter of the safety netting poles?

Response: The safety netting poles shall conform to Specification Section 12 40 00 – SITE FURNISHINGS, Subsection 2.01, Item P.

Question 12: What is the correct depth of the base stone below the synthetic turf field?

Response: The drainage stone depth will vary throughout depending on the proposed conditions per the various details within the plan set. Refer to details. Under the synthetic turf field, drainage base stone shall be 12" depth typical. Refer to Specification 32 18 13 – SYNTHETIC GRASS INFILL SYSTEM. The course drainage stone referenced in Detail 2, L7.04 is drainage stone at the back of the retaining wall and not associated with the depth of the synthetic turf base stone drainage system.

Question 13: Will the Owner be paying for any utility back charges as a result of the electrical upgrades?

Response: Yes, the Owner will pay any utility back charges as a result of electrical upgrades.

Question 14: Do the 2" lateral drains at the softball field tie into a 2" collector drain along the outfield?

Response: The 2" perforated HPDE lateral drains flow to the 4" solid HDPE pipe per the Plan 1, L5.03.

Question 15: Section 2.01 of 32 12 36 calls for "dense finish" which is not a MassDOT mix. Please specify which MassDOT binder mix is required for the sidewalks and courts.

Response: The binder course shall conform to the relevant provisions of Sections 460 and (M3.11.03) of the MassDOT Standard Specifications for Highways and Bridges, Latest Edition, including any Supplemental Specifications to the MassDOT Standard Specifications.

Question 16: What are the PSI requirements for CIP Concrete?

Response: Minimum requirement for CIP concrete shall be 4,000 PSI unless otherwise noted in the plans, details and specifications. Concrete turf anchor specifically shall be 4,500 PSI per detail.

Question 17: Will the sub-surface infiltration system and drain lines directly conflict with the existing fiber optic line and/or gas line that feed the school? Will these lines remain in place and the drainage system will be adjusted as needed?

Response: Contractor shall refer to layout of infiltration system as identified in SK-1 – 12" HDPE PIPE AND INFILTRATION SYSTEM LAYOUT per attachment.

Question 18: Please clarify which conduits are concrete encased with rebar?

Response: All conduits under any roadways or pavement surfacing shall be encased in concrete and reinforced with rebar. All conduits in landscaped areas shall be direct buried encased in sand .

Question 19: Clarify who will be responsible for retaining and paying an independent testing agency during construction?

Response: Contractor will be responsible to retaining and payment of any testing that is required as part of project scope. See Specification Section 01 45 00 – SAMPLING AND TESTING, per attachment.

Question 20: Is the use of "Submittal Exchange" required by the Contractor for all project submittals?

Response: Yes, unless it is a physical sample to be reviewed.

Question 21: Has environmental testing been completed on the Press Box and Concession/Ticket Building?

Response: No environmental testing has been performed on either the Press Box or the Concession/Ticket Building.

Question 22: Will a stamped structural design be provided for the safety netting foundations?

Response: A structural stamped design will not be provided for the safety netting foundation. Refer to Sheet L7.05, Detail 8 – 20' BALL NETTING. All footings for the safety netting shall be installed per the approved manufacturer's requirements.

Question 23: Will the building manufacturer in IFB #19-1032 be providing the anchor bolts and any required embedment's for a foundation contractor to set?

Response: Yes, building manufacturer to provide anchor bolts and hardware, and installation within their scope of work.

Question 24: Will final stamped structural foundation designs be provided by the building manufacturer in IFB #19-1032?

Response: Building Manufacturer will provide recommendations for the foundation designs. Stamped structural drawings are not provided, a local engineer will need to verify compliance with local soil conditions.

Question 25: Is there a specification for the vapor barrier?

Response: W&S is not clear about what specifically is being asked. W&S believes this is related to the press box as identified on Sheet L7.16 – CONSTRUCTION DETAILS – BUILDING PLANS AND SECTIONS. Manufacturer of the press box may submit a proposed vapor barrier compliant with Massachusetts Building Codes, 9th edition 780 CMR.

Question 26: Clarify the condition where the bleacher piers/footings meet the storage building wall/footings. It appears there is a conflict with their locations and depths.

Response: Building Manufacturer will provide recommendations for the foundation designs. Stamped structural drawings are not provided, a local engineer will need to verify compliance with local soil conditions.

Question 27: Will the Contractor be required to hand water the proposed softball field throughout establishment?

Response: The Contractor is responsible for establishment of all applied seed mixes. Refer to Specification Section 32 92 19 – HYDROSEEDING.

Question 28: In Detail 6, L7.01, Detail 3, L7.02, and plan sheet L5.03, clarify the depth of the 2" lateral drains and cleanout at the proposed softball field and the pipe slope requirement?

Response: The depth of the of the 2" lateral drains and the cleanout at the proposed softball field shall be 18-inch depth, at minimum slope of 0.5%.

Question 29: Are there structural designs for the proposed softball backstop footings?

Response: Stamped structural designs for the softball backstop footings will not be provided.

Question 30: Have topsoil tests been performed to determine if the existing material meets specification requirements or if amendments are required?

Response: No topsoil testing has been performed to determine if excavated topsoil on site will meet specification requirements. The Contractor is responsible for the testing of any salvaged material from the existing site to determine if it meets specification requirements and amend as required to meet the specifications prior to installation.

Question 31: The fence specification has info that appears to be for ornamental fencing with references to color galvanizing, etc. Where is this required?

Response: This project does not have ornamental fence. Delete all references to ornamental fencing.

Question 32: The black-vinyl chain link fence specification calls for wire ties for fence fabric, details call for multi-lock bands. Please clarify.

Response: Multi-lock bands shall be used.

Question 33: Spec 32 12 36 references coating a splash pad. Please confirm there is no splash pad to be coated and the specs are appropriate for courts.

Response: This project does not have a splash pad component. Delete all references to splash pad.

Question 34: Is the riser plank closure at the front of the bleachers (both home and away) shown on the drawing included in the project? It is not identified in the specifications.

Response: A riser plank closure shall be included at the front of the home bleacher and the away bleacher per Sheet L7.15, Detail 1 – HOME BLEACHER SECTION 1 and Detail 2 – VISITOR BLEACHER SECTION.

Question 35: How does the elevation of the proposed water main along Old Connecticut Path relate to the existing water main? Does it pass over top?

Response: Within Old Connecticut Path, all proposed water main line shall have minimum coverage of 5'-0" depth below the finished roadway elevation. Where is crosses the existing main line, it shall be located below.

Question 36: Is the Contractor required to supply maintenance equipment for the new synthetic turf field?

Response: The Contractor is not required to supply new maintenance equipment for the synthetic turf field.

Question 37: Please clarify which sports have field striping lines stitched into the synthetic turf fabric and which have just the tick marks?

Response: The synthetic turf striping shall be as follows:

a. Football: all lines and markings shall be stitched
b. Soccer: all lines and markings shall be stitched
c. Mens Lacrosse: tick marks
d. Womens Lacrosse: tick marks
e. Womens Field Hockey: tick marks

The Contractor shall paint the field striping lines for the sports that only have tick marks in the synthetic turf field.

Question 39: Can the 16" water main and associated hydrants be installed while the school is in session?

Response: Scheduling of the water main work along Old Connecticut Path shall be coordinated with a School Department representative, the Owner's Representative, and the Contractor. Refer to Specification Section 01 14 00, Sub-section 3.15 CONNECTIONS TO EXISTING WATER SYSTEMS. All efforts shall be made to limit the amount of disturbance to school operations the best extent possible with regards to water main. The preference is for work to occur during scheduled school vacations or during the summer months when school is not in session. Work that interrupts the flow of traffic along Old Connecticut Path and the access drive to the high school shall not occur during peak drop-off and pick-up hours, typically 6:45A.M. to 8:45 A.M. and 1:45 P.M to 3:00 P.M.

ATTACHMENTS:

Appendix A: Geotechnical Engineering Report
Specification Section 00 31 32 – SUBSURFACE DATA
Specification Section 01 45 00 – SAMPLING AND TESTING

Portable Discus Cage Cut Sheet
Flag Pole Cut Sheet
Specification Section 31 00 00 - EARTHWORK
Sheet L4.01 – LAYOUT ENLARGEMENT PLAN
Sheet S3.02 – BLEACHER FOUNDATION PLAN II
SK-1 12" HDPE PIPE AND INFILTRATION SYSTEM LAYOUT
Sports Lighting Cut Sheet
Sports Lighting MUSCO Footing Detail

END OF ADDENDUM NO. 3

5 Centennial Drive, Peabody, MA 01960 (HQ)
Tel: 978.532.1900

Town of Wayland, MA
Weston & Sampson Project No. 2180076

October 4, 2018

Town of Wayland, MA
C/o Cassidy Chroust, RLA
Weston & Sampson
85 Devonshire Street, 3rd Floor
Boston, MA 02109

RE: Geotechnical Engineering Report
Wayland High School Athletic Facilities &
Loker Conservation and Recreation Area
Wayland, Massachusetts

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present this geotechnical engineering report for the proposed Wayland High School Athletic Facilities and Loker Conservation & Recreation Area projects in Wayland, Massachusetts. The proposed projects include improvements at two separate sites: the Loker Conservation and Recreation Area located at 410 Commonwealth Road (hereinafter the "Loker Site"), and the Wayland High School site located at 264 Old Connecticut Path (hereinafter the "High School Site"). Our project understanding is based on conceptual site plans prepared by Weston & Sampson for the project, and our correspondence with the project team.

For important information on the use of this report, please refer to the attached document titled "*Important Information about This Geotechnical-Engineering Report*" in *Attachment D*.

PROJECT UNDERSTANDING

Loker Site

The Loker Conservation and Recreation Area is a wooded site bound by Commonwealth Road (MA Route 30) to the south, Rice Road to the west, the Massachusetts Water Resources Authority (MWRA) Hultman Aqueduct to the north and woods to the east. Refer to *Figure 1 – Loker Site Plan* for site conditions.

The site was formerly owned by the Dow Chemical Company and contained a laboratory building approximately 200 ft. by 80 ft. in footprint area, and associated septic system, underground storage tanks, several small structures, and parking lots according to a Site Plan and General Facility Layout by Ransom Environmental Consultants, Inc., dated April 2000, included in Attachment A. The site was known to be environmentally contaminated and was remediated. The above grade structures were demolished. The site is currently owned and maintained by the Town of Wayland as a recreational area with nature trails open to the public.

An asphalt-paved road extends from Commonwealth Road to the former asphalt-paved parking lot, currently used for public parking for the trails. The former building area is a cleared, grassy open space to the west of the parking lot. There is an asphalt paved driveway to the west and south of the open space.

Existing grades at the grassy open space are generally flat at about El. 213 and slope down beyond the open space in all directions. The slope towards the existing parking lot is an approximate 4H:1V (Horizontal:Vertical) slope down to about El. 200 at the parking lot. Ground surface at the site entrance on Commonwealth Road is at approximately El. 168. Elevations included herein are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

The proposed improvements include construction of an approximately 330 ft. by 195 ft. multi-purpose artificial turf athletic field generally in the grassy open space area with a finished grade at El. 212, and associated field lights, access road improvements, and a 61-space parking lot. The proposed parking lot will partially overlap the existing parking area at the site. Re-grading for the site improvements include cutting of up to 7 ft and filling of up to 10 ft. of soils.

High School Site

Wayland High School is bound by Old Connecticut Path (MA Route 126) to the southeast, a residential neighborhood to the east, the MWRA Weston Aqueduct to the south, and the Sudbury River and surrounding wetland areas to the west and north. Refer to ***Figure 2 – High School Site Plan*** for site conditions.

Existing development at the site includes two academic buildings (North and South buildings), a round field house building, paved parking areas with solar panel canopies, two baseball fields, a softball field, two soccer fields, a basketball court, ten tennis courts, and a football field with perimeter running track with metal frame bleachers.

Existing grades within the school grounds are generally flat with elevations ranging from about El. 135 to El. 140 southeast of the academic buildings to about El. 125 to El. 135 northwest of the academic buildings. One of the soccer fields is up on a hill southwest of the school buildings.

The proposed site improvements include a new track and field with new metal frame bleachers and a new concrete pad near the existing track and field, with associated storage canopy and light poles; a new softball field in place of the existing tennis courts; and six new tennis courts and two new basketball courts with associated light poles and a parking area in place of the existing softball field at the entrance to the school from Old Connecticut Path. The light pole heights will range between 40 ft. and 90 ft. Re-grading requirements for these site improvements are anticipated to be less than 2 ft.

We understand that future improvements, including a varsity and junior varsity baseball field, and a multi-purpose athletic field are proposed for the site. These future improvements are not part of this report.

SUBSURFACE CONDITIONS

Weston & Sampson completed a subsurface exploration program at both sites. The exploration program consisted of test borings and test pits at the Loker site and test borings in the High School site.

The test borings were drilled by Technical Drilling Services (TDS) of Sterling, Massachusetts using an All-Terrain Vehicle (ATV) -mounted drill rig and 4-1/4-inch inside diameter (ID) hollow-stem augers. Standard penetration tests (SPTs) and sampling were conducted in each boring by driving a 24-inch long by 1-1/2-inch ID (2-inch outside diameter) split spoon sampler with blows from a 140-pound automatic hammer falling freely 30 inches per blow. The number of blows required to drive the sampler for the middle 12 inches is referred to as the SPT N-value, which can be correlated to soil consistencies and engineering soil properties. Sampler refusal (or SPT refusal) is defined as more than 50 hammer blows for less than 6 inches of sampler penetration. Drilling refusal is defined as no discernable advancement of the auger bit over a period of approximately 5 minutes.

The test pits were excavated by the Town of Wayland Department of Public Works using a Caterpillar backhoe. Weston & Sampson staff observed the explorations in the field and prepared logs for each exploration.

Soil samples from the borings at the Loker site were screened with a photoionization detector (PID) to assess the presence of volatile organic compounds (VOCs). The PID screening results are discussed in the April 4, 2018 memorandum titled "Proposed Recreation Field- Loker Conservation and Recreation Area Focused Environmental Records Review and Soil Assessment", prepared by Weston & Sampson and submitted under a separate cover.

Subsurface conditions encountered in our explorations are described in the following sections and in *Attachment B – Boring Logs* and *Attachment C – Test Pit Logs*.

Loker Site

Geologic Setting

Surficial geology information available from the Massachusetts Office of Geographic Information Systems (MassGIS) OLIVER viewer indicates that the Loker site is in an area underlain by till deposits and/or shallow bedrock. Bedrock outcrops are indicated at the southwest portion of the site. Bedrock outcrops were observed to the southwest of the site, near the corner of Rice Road and Commonwealth Road during the field explorations. The Bedrock Geologic Map of Massachusetts indicates bedrock at the site is Dedham Granite consisting of light grayish-pink to greenish-gray, equigranular to slightly porphyritic, variably altered granite.

Subsurface Conditions

Subsurface conditions at the Loker site were explored on March 12, 2018 by advancing five (5) borings (B-1A/B-L through B-5-L) to depths ranging from 5 to 8 ft. and on March 21, 2018 by excavating six (6) test pits (TP-1 through TP-6) to depths ranging from 4.8 to 7.6 ft. Approximate locations of the borings and test pits are shown on *Figure 1*.

In general, subsurface conditions encountered at the exploration locations consisted of topsoil or asphalt pavement over FILL over SAND and GRAVEL. Most of the explorations were terminated due to refusal or rock. The subsurface conditions beneath the fill were consistent with mapped surficial geology for the site. The major strata encountered in the explorations are described below. Variations may occur and should be expected outside and between exploration locations.

Asphalt Pavement – A surficial 4-inch thick asphalt pavement layer was encountered at the ground surface in test pits TP-5 and TP-6. Asphalt was encountered below a grass surface in TP-4.

Topsoil – A surficial topsoil or forest mat layer was encountered in every exploration except for B-2A/B-L, TP-5, and TP-6. In TP-4, a buried topsoil layer was encountered beneath the pavement. Topsoil thickness ranged from approximately 1 to 15 inches.

Fill – Fill was encountered in all explorations below the topsoil or asphalt layers, and generally comprised of loose to medium dense sands with various amount of gravel, silt, organic materials, and debris. The remains of the septic field, consisting of coarse gravel, broken clay pipes, and concrete walls was encountered in test pits TP-1 and TP-2. The depth to bottom of fill material ranged from approximately 1.3 ft. to 5 ft. below ground surface.

Sand & Gravel – Dense to very dense, fine to coarse SAND with varying amounts of gravel (some to gravelly) and silt (trace to little) or fine to coarse GRAVEL with varying amounts of sand (little to sandy) and silt (trace to some) was encountered underlying the fill.

Rock/Refusal – Auger refusal was encountered below the sand and gravel in every boring except B-5-L at depths ranging from approximately 5 to 8 ft. Where auger refusal was encountered, borings were offset and re-attempted. Auger refusal was encountered at every boring offset attempted, typically at a depth within approximately 1 ft. of the original auger refusal depth. Rock was observed in the bottom of test pits TP-1 through TP-4 at depths ranging from approximately 4.8 to 7.6 ft.

Groundwater – Groundwater was observed only in TP-5 at a depth of approximately 5 ft. We anticipate groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface after extended periods of wet weather.

High School Site

Geologic Setting

Surficial geology information available from the MassGIS OLIVER viewer indicates that the High School site is underlain by a mix of sand and gravel at the southeast portion of the site and fine grained-deposits at the northwest portion of the site and in the vicinity of the high school access road. The Bedrock Geologic Map of Massachusetts indicates bedrock at the site is metamorphosed mafic to felsic flow and volcaniclastic and hypabyssal intrusive rocks including diorite and gabbro.

Subsurface Conditions

Subsurface conditions at the High School site were explored on March 14 and 22, 2018 by advancing seven (7) borings (B-1-HS through B-7-HS) to depths ranging from 17 to 22 ft. at the approximate locations shown on the attached ***Figure 2***. Borings B-1-HS through B-4-HS were drilled near proposed light poles and bleachers in the track and field area (northwest portion). Borings B-5A/B-HS through B-7-HS were drilled near the entrance of the high school, in the proposed tennis courts, basketball court and parking areas (southeast portion).

The subsurface conditions encountered were generally consistent with the mapped surficial geology for the site. At the northwest portion, near the track and field area, subsurface conditions consisted of generally fine-grained soils below a sand & gravel layer. At the southeast portion, the fine-grained soils were not observed within the exploration depths. The major strata encountered in the explorations are described below. Variations may occur and should be expected outside and between exploration locations.

Topsoil – Surficial materials at each boring locations consisted of topsoil ranging in thickness from approximately 7 to 24 inches.

Fill – FILL was encountered below the topsoil in borings B-2-HS, B-4-HS, B-5-HS, and B-6-HS. Fill thickness ranged from about 1 ft. to 3 ft. , and was generally comprised of silts or sands.

Sand & Gravel – Medium dense to very dense SAND & GRAVEL was encountered below the topsoil or fill in all borings. This stratum generally consisted of fine to coarse SAND with varying amounts of gravel (trace to gravelly) and silt (trace to some) or fine to coarse GRAVEL with varying amounts of sand (little to sandy) and silt (trace to little).

Silt / Silt & Sand – Medium stiff to very stiff SILT or interbedded layers of SILT & SAND was encountered below the sand and gravel stratum at B-1-HS through B-4-HS at the High School site. The silt typically consisted of silt with varying amounts of sand (little to sandy) and trace to no gravel. The sands typically consisted of loose to medium dense sand with varying amounts of silt (little to silty).

Sand – Medium dense SAND was encountered below the sand and gravel stratum at B-7-HS only. The sand stratum typically consisted of fine to coarse sand with little to no gravel and trace to little silt.

Groundwater – Groundwater was observed in every boring at the High School site. Groundwater was typically shallow in the track and field area (northwest portion) of the site with depths between 1.2 ft. and 4 ft below ground surface at B-1-HS through B-4-HS. Groundwater was observed at depths between approximately 9 and 15 ft at B-5B-HS through B-7-HS. We anticipate groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface after extended periods of wet weather.

GEOTECHNICAL RECOMMENDATIONS

Structures proposed on either site include the bleachers at the High School site, and 40 ft to 90 ft high light poles on both sites. Our recommendations for shallow footings and light pole foundations are provided below.

Light Pole Foundations

Light pole foundations typically consist of cylindrical precast concrete bases installed in drilled shafts and backfilled with structural concrete. At locations where bedrock exists above precast concrete base support depths (Loker site), construction of shallow spread footings for support of the light poles will be required, unless rock is drilled for a drilled shaft support. The light pole foundations should be designed in accordance with the provisions of Section 1807.3 (Embedded Posts and Poles) of the 2018 International Building Code

(IBC), the provisions of the current edition of the Massachusetts State Building Code and the Technical Specifications provided by the light pole manufacturer.

Precast Concrete Base Support

The proposed light poles at the High School site can be supported by precast concrete bases installed in drilled shafts and backfilled with concrete. Drilled shaft excavations will require use of temporary casing and/or drilling fluid to maintain open excavations and support the surrounding ground. All loose and disturbed materials should be removed from the base of the shaft prior to placement of the precast base. Backfill around the precast base should consist of Portland cement concrete with a minimum (28 day) compressive strength of 3,000 pounds per square inch. The concrete should be placed from the bottom of the shaft using a tremie pipe during extraction of the temporary casing.

An allowable bearing pressure of 4,000 psf can be used at the base of the shaft to resist axial loads provided all loose material and slough is removed from the bored hole prior to placement of the precast light pole base and concrete backfill. Skin friction along the shaft sidewall should be ignored when calculating resistance to axial loads.

Resistance to lateral loads can be calculated using the soil parameters in the following table. Resistance in the top 2 feet of foundation embedment and in the fill should be ignored. Groundwater should be assumed to be at ground surface.

	Sand & Gravel	Silt / Silt & Sand	Sand
Submerged Unit Weight, lb/ft3	68	58	58
Soil Angle of Internal Friction, Φ, degrees	34	28	30
Coefficient of Passive Earth Pressure, Kp (Rankine)	3.5	2.8	3

Shallow Spread Footing Support

Construction of shallow spread footings for support of the light poles could be required at the Loker site due to shallow bedrock. All fill and debris should be removed from the entire zone-of-influence (ZOI) beneath footings to expose the native, inorganic soils or bedrock. The ZOI is defined by planes extending horizontally away from the outside edges of the footings for 2 ft. and then down and away at a 1H:1V slope. To minimize the potential for cracking due to differential settlement, footings should not bear partially on bedrock and on soil. Therefore, if the footing bearing material transitions from soil to rock, we recommend overexcavating the rock to a minimum depth of 6 inches below subgrade elevation and replacement with Structural Fill or crushed stone to provide uniform footing support.

Footing bases should be compacted with a 700-pound vibratory plate compactor, or equivalent effort, until firm and stable. Standing water should be removed from excavations prior to placing concrete or Structural Fill. In no case shall fill or concrete be installed on frozen soils or in standing water.

Footings bearing on the native sand and gravel or on structural fill should be designed using an allowable bearing pressure of 6,000 psf. Footings should be embedded at least 4 ft. below ground surface.

Resistance to lateral loads can be obtained by passive pressure against the sides of the footings using an equivalent fluid weight of 300 pounds per cubic foot (pcf), ignoring the top 12 inches of embedment. Lateral resistance can also be provided by friction along the bottoms of the footings assuming a footing base friction coefficient of 0.5. We recommend a minimum factor of safety of 1.5 when using sliding friction alone. A larger magnitude of movement is required to engage passive resistance than sliding friction. Therefore, a minimum factor of safety of 2.0 is recommended when using passive pressure in addition to base friction to resist lateral loads.

Bleacher Foundations and Slab at the High School Site

Shallow Spread Footings – Footings bearing on the native silt/silt and sand, or sand and gravel or on properly constructed Structural Fill directly overlying these materials should be designed using an allowable bearing pressure of 4,000 psf. Foundations for the proposed bleachers should be designed in accordance with the provisions of the latest edition of the Massachusetts State Building Code. Footings should be embedded at least 4 ft. below ground surface.

Resistance to lateral loads can be obtained by passive pressure against the sides of the footings using an equivalent fluid weight of 250 pcf. The top 12 inches of embedment should be ignored. Lateral resistance can also be provided by friction along the bottom of the footing assuming a footing base of coefficient of friction of 0.45.

Shallow foundations constructed as recommended herein are anticipated to undergo total settlement of less than 1-inch with less than ½-inch of differential settlement between adjacent support column locations. Estimated settlements assume subgrade preparation and Structural Fill placement and compaction are performed in accordance with the recommendations provided in the *Earthwork* section of this report.

Slab on Grade - The silt and silt & sand soils have a high fines content and are frost susceptible. Concrete pads placed directly on these soils could experience movement and eventual damage due to frost (freeze-thaw cycles). The proposed slab on grade should be supported on a minimum 24-inch thick layer of free-draining structural fill or crushed stone placed on a properly prepared subgrade in native, inorganic soils. A greater thickness of Structural Fill or crushed stone is recommended to increase frost protection depending on the tolerance for movement.

The slab-on-grade bearing on these materials can be designed using a modulus of subgrade reaction (k) of 180 pounds per square inch per inch (psi per inch, or pci). Saw joints or construction joints should be used to control shrinkage cracks.

CONSTRUCTION CONSIDERATIONS

The following sections present recommendations and considerations for the proposed construction. Unless otherwise specified, the recommendations presented herein are applicable to both project sites.

Earthwork Considerations

Based on our understanding of proposed conditions, excavation will be required for site grading, foundation construction, removal of existing features, subgrade preparation, and utility placements/relocations, and backfilling will be required fill placement where unsuitable foundation soils are removed and raising grades.

Site grading at the Loker site may include cuts of up to about 7 feet and fills of up to 10 feet.

Based on the subsurface conditions encountered in the explorations, the site cuts may encounter pavement, topsoil, fill, septic field materials, abandoned utilities, and buried foundations, and native soils. Cobbles and boulders should be anticipated especially in the Loker site. Native soils encountered in the borings are generally considered suitable for reuse. Reworking of the on-site soils to be used as Structural Fill may be required if they are not within the range of acceptable gradation, moisture content and density.

Dewatering is not anticipated to be a major construction consideration at the Loker site. However, groundwater as shallow as 1.2 ft. was encountered at the High School Site in the vicinity of the track and field area to the northwest of the high school buildings. Dewatering will be required in these excavation areas as described below.

Excavation support systems, if necessary, should be the responsibility of the contractor and designed by a Professional Engineer licensed in the Commonwealth of Massachusetts. All excavations should be made in accordance with applicable OSHA safety regulations.

Site Preparation

Prior to earthwork construction, all vegetation, topsoil, organics (if encountered) bituminous pavement, trash and debris should be removed from the proposed improvements areas and a 5-foot perimeter around those areas. All Fill material should be removed from the ZOI of proposed foundations to expose the underlying native sand and gravel. Abandoned utilities and foundations should be removed to a minimum of 3 ft. below the final sports field grades.

Utilities and debris should be removed or properly abandoned using Structural Fill, controlled density fill (CDF), or grouting in such a manner to prevent voids. Excavations resulting from site preparation should be brought back to grade with Structural Fill prepared as recommended below.

Subgrade Preparation and Protection

Site and subgrade preparation will likely expose fill material and the native soils. Variability should be expected. We recommended that the project budget and schedule include contingencies for over-excavation and stabilization of soft and variable subgrade conditions.

Following stripping and removal of unsuitable materials, subgrades should be recompacted until dense and stable with several passes of a large vibratory plate compactor. Weston & Sampson should be contacted to evaluate the exposed subgrade prior to placement of overlying materials. Depending on the thickness of undocumented fill encountered during construction, partial removal may be required to facilitate proper recompaction of the entire fill thickness.

Soft and/or disturbed areas will require over-excavation and backfilling with compacted angular crushed stone or compacted Structural Fill. A geosynthetic separation layer between the excavation subgrade and crushed stone backfill will be required. We recommend that a geosynthetic used for stabilization consist of a woven geosynthetic with an AOS of #70 to # 100 sieve, and a minimum puncture resistance of at least 120 pounds (such as Mirafi FW700 or equivalent).

Soils containing more than trace (>10 percent) amounts of silt are highly susceptible to softening and disturbance

by construction activity during wet or freezing weather. Subgrade protection is the responsibility of the contractor and special precautions and protective measures appropriate for the weather and traffic conditions during construction should be used during earthwork and foundation construction to preserve the integrity of subgrades. Construction traffic should not operate directly on subgrades.

If construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should be employed to prevent subgrades from freezing. Fill, concrete, foundations and bituminous concrete should not be installed on frozen subgrades. Protection of subgrades is the responsibility of the Contractor.

Pavement Subgrade Preparation and Base Materials

Subgrades should be prepared as recommended above. Prior to placing granular base material, the prepared subgrade should be proof rolled using a vibratory drum roller or fully loaded 10-wheeled dump truck. We should be contacted to observe proof rolling and identify soft, disturbed, or yielding materials. Unsuitable areas should be repaired by scarifying and compacting or by over-excavation and replacement with a well graded, angular crushed stone (or gravel subbase material) compacted as recommended for Structural Fill. If a stabilization geosynthetic is required, we recommend a woven geosynthetic with an AOS of #70 to #100 sieve, and a minimum puncture resistance of 120 pounds (such as Mirafi FW700 or equivalent).

Granular base material should be angular crushed stone or stone conforming to MassDOT Material Specification M2.01.7 (Dense-graded Crushed Stone). Granular base material should be placed in maximum 10 inch thick lifts (measured prior to compaction) and compacted to at least 95 percent of maximum dry density as determined by ASTM D1557 (modified proctor).

Fill Recommendations

Fill placement will be required to raise the grade and also as backfill within the excavated areas. Structural Fill consisting should be used to raise grades and replace unsuitable soils within the zone-of-influence of proposed structures and slabs and within 3 feet of finished grade within pavement areas. Common Fill may be used outside of proposed structures, such as landscaped areas and athletic field areas.

Imported well graded sand and gravel fill with less than approximately 10 percent fines (such as MassDOT M1.03.0-type B Gravel Borrow or M2.01.7 Dense-graded Crushed Stone) is recommended for use as Structural Fill. On-site materials meeting the gradation requirements for the aforementioned MassDOT materials may be acceptable for use as Structural Fill if approved by the geotechnical engineer. Structural Fill should be placed in lifts and each lift compacted to at least 95 percent of maximum dry density as determined by ASTM D1557 (modified proctor) for the specific fill material.

On-site granular soils containing less than approximately 20 percent fines and free of organics, contamination (including metals, VOCs, SVOCs, etc.), and other deleterious materials may be suitable for use as Common Fill if properly moisture conditioned. Moisture conditioning, if required, could consist of drying by scarification and frequent mixing in thin lifts during warm, dry conditions. Once moisture contents are within 3 percent of optimum, the material should be compacted to at least 92 percent of maximum dry density as determined by ASTM D1557.

Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and

snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the requirements provided in MassDOT Standard Specifications section M2.01.0.

Fill should be placed in lifts no greater than 9 inches in loose (uncompacted) thickness. In confined areas and where only hand-guided compaction equipment can be used, lift thicknesses should be reduced to not more than 6 inches. The contractor should not place backfill or fill material on subgrade surfaces that are muddy, frozen, or contain frost/ice. Frozen soils are not suitable fill sources.

Earthwork observation and quality control testing of fill and backfill densities is critical throughout construction. During earthwork activities, a representative of the Geotechnical Engineer should evaluate subgrades and compaction of the fill placed. Earthwork during rainy months will require extra effort and caution by the contractors. The soils may be too wet to compact which will require processing to dry the soil. The grading contractor should be responsible to protect his work to avoid damage by rainstorms, including smooth rolling to seal off a pad or subgrade surface to facilitate drainage and to reduce rain damage. Ponded water should be pumped out of excavations and subgrade areas immediately.

Dewatering and Groundwater Management

Water was observed in at the High School site at depths ranging from approximately 1.2 to 4 ft. in borings B-1-HS through B-4-HS (track and field area) and at depths ranging from approximately 9 to 15 ft. in B-5A-HS through B-7-HS (southeast of school buildings). It is anticipated that excavations in the vicinity of the track and field area will extend below groundwater.

Groundwater should be controlled to complete the excavations, subgrade preparation, fill/soil removal and replacement procedures, and foundation construction in the dry and to maintain the integrity of the existing soil deposits and bearing surfaces. It is essential to dewater prior to excavating below groundwater level. Construction dewatering may require a combination of wells, well points, and/or open pumping with collector sumps and trenches. The dewatering system should be designed by an experienced specialty contractor and should be designed and operated to prevent pumping of soil, undermining of previous construction, disturbance of subgrades, and adverse effects to existing site features. Pumped water should be recharged on site.

The dewatering system should be capable of lowering the groundwater table at least 1 ft. below the anticipated excavation depths and be kept operational until fill placement and compaction have been completed to a level of at least 2 ft. above the groundwater table elevation.

Dewatering of fine grained soils such as silts will induce consolidation of the layer. The dewatering system should be designed to avoid dewatering of the Silt subgrade so as to prevent settlement of adjacent structures. The contractors plans and design for dewatering should be reviewed by Weston & Sampson for conformance with the design intent and geotechnical recommendations provided herein.

Slopes

Temporary slopes up to 10 feet high can be inclined up to 1.5H:1V provided no seepage or sloughing is present. Equipment should not be allowed to induce vibration or infiltrate water above the slopes and no surcharges should be located within 20 feet of slope crests. Temporary slopes should be expected to ravel somewhat, depending on weather conditions, soil conditions, seepage, and duration of exposure. Soft or

loose fill soils and the presence of seepage may require flatter slopes, erosion control measures, drainage elements, and/or temporary excavation support.

Permanent cut slopes up to 10 feet high in non-structural areas can be inclined at 2H:1V in medium dense or denser sand and gravel provided groundwater is not encountered in the exposed slope. Permanent fill slopes in non-structural areas should also be inclined no steeper than 2H:1V provided the fill is placed and compacted as required in the project earthwork specification. However, we recommend flatter slopes be used if possible (inclined at 3H:1V or flatter) as flatter slopes are preferred from the perspectives of lawn maintenance and public safety. The face of fill slopes should be overbuilt and cut back into compacted materials with a smooth excavator bucket. If steeper fill slopes are desired Weston & Sampson should be consulted to evaluate use of grid reinforcement and/or crushed rock blankets buttresses.

LIMITATIONS

We have prepared this report for use by the Town of Wayland and the design and construction teams for these projects and sites only. The information herein can be used for bidding or estimating purposes but should not be construed as a warranty of subsurface conditions. We have made observations only at the aforementioned locations and only to the stated depths. These observations do not reflect soil types, strata thicknesses, water levels or seepage that may exist between observations.

We should be retained to observe site preparation, subgrade preparation, and fill placement and compaction. We should also be retained to review final design and specifications to see that our recommendations are suitably followed. If any changes are made to the anticipated locations, loads, grading, configurations, or construction timing, our recommendations may not be applicable, and we should be consulted. We should also review contractor prepared designs for ground improvement, temporary excavation support, and dewatering.

The preceding recommendations should be considered preliminary, as actual soil conditions may vary. For our recommendations to be final, we should be retained to observe actual subsurface conditions encountered. Our observations will allow us to interpret actual conditions and adapt our recommendations if needed.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty, expressed or implied, is given.

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

Sincerely,
WESTON & SAMPSON ENGINEERS, INC.

Matthew J. Zanchi, EIT
Engineer II

Tulin Fuselier, PE
Geotechnical Practice Leader

Attachments:

Figure 1 – Loker Site Plan
Figure 2 – High School Site Plan
Attachment A – Loker Site Plan by Ransom Environmental Consultants Inc, April 2000.
Attachment B – Boring Logs (17 pages)
Attachment C – Test Pit Logs (6 pages)
Attachment D – Important Information about This Geotechnical-Engineering Report

NOTES:

1. THIS FIGURE IS BASED ON AN EXISTING AND PROPOSED CONDITIONS SURVEY PLAN PREPARED BY WESTON & SAMPSON ENGINEERS, INC. DATED MARCH 2018.
2. ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. BORINGS WERE COMPLETED BY TECHNICAL DRILLING SERVICES, INC. OF STERLING, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MARCH 12, 2018.
4. TEST PITS WERE COMPLETED BY THE TOWN OF WAYLAND AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MARCH 21, 2018.
5. BORING LOCATIONS SHOWN ARE APPROXIMATE AND WERE LOCATED IN THE FIELD BY WESTON & SAMPSON ENGINEERS, INC. USING A HANDHELD GPS DEVICE.
6. LOCATIONS OF UNDERGROUND UTILITIES AND STRUCTURES SHOWN HAVE BEEN COMPILED, IN PART, FROM RECORD MAPPING AND OTHER DATA SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES AND/OR OTHER SOURCES. THESE LOCATIONS MUST BE CONSIDERED APPROXIMATE.

LEGEND:

B-1-L — BORING DESIGNATION AND APPROXIMATE LOCATION.

TP-1 — TEST PIT DESIGNATION AND APPROXIMATE LOCATION.

60 30 0 60 120

SCALE: 1"=60'

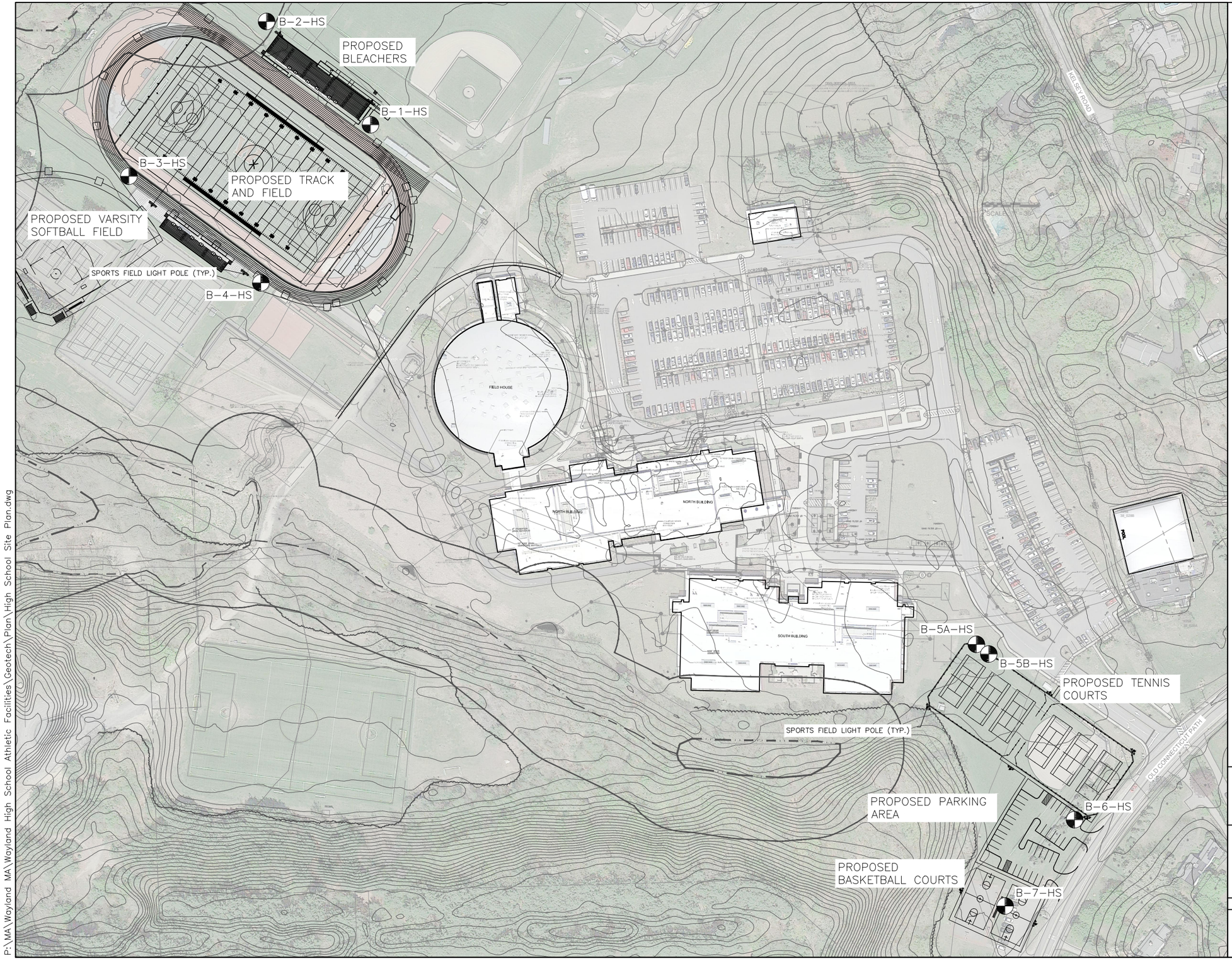
FIGURE 1
LOKER SITE PLAN

WAYLAND HIGH SCHOOL ATHLETIC FACILITIES
WAYLAND, MA

DESIGNED BY: MJZ	CHECKED BY:	DATE: APRIL 2018

Weston & Sampson

P:\MA\Wayland MA\Wayland High School Athletic Facilities\Geotech\Plan\Loker Site Plan.dwg



NOTES:

1. THIS FIGURE IS BASED ON AN EXISTING AND PROPOSED CONDITIONS PLAN PREPARED BY WESTON & SAMPSON ENGINEERS, INC. DATED MARCH 2018.
2. ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. BORINGS WERE COMPLETED BY TECHNICAL DRILLING SERVICES, INC. OF STERLING, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MARCH 14 AND 22, 2018.
4. BORING LOCATIONS SHOWN ARE APPROXIMATE AND WERE LOCATED IN THE FIELD BY WESTON & SAMPSON ENGINEERS, INC. USING TIE-OFFS TO EXISTING SITE FEATURES.

LEGEND:

B-1-HS
BORING DESIGNATION AND APPROXIMATE LOCATION.

150 75 0 150 300

SCALE: 1"=150'

FIGURE 2
HIGH SCHOOL SITE PLAN

WAYLAND HIGH SCHOOL ATHLETIC FACILITIES
WAYLAND, MA

DESIGNED BY: MJZ	CHECKED BY:	DATE: APRIL 2018

Weston & Sampson

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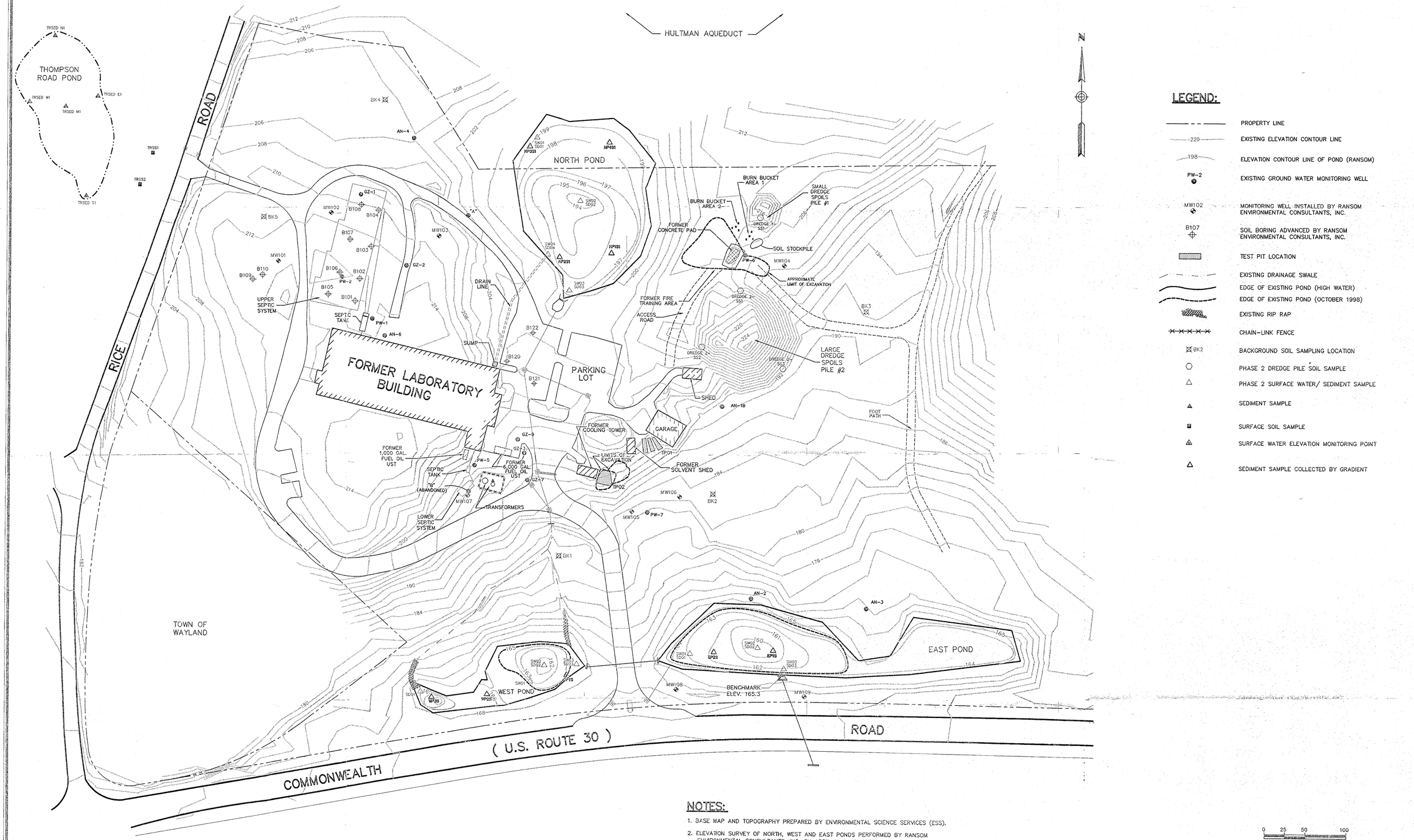
Attachment A

Loker Site Plan by Ransom Environmental Consultants Inc, April 2000



LEGEND:

- PROPERTY LINE
- 220 — EXISTING ELEVATION CONTOUR LINE
- 198 — ELEVATION CONTOUR LINE OF POND (RANSOM)
- PW-2 — EXISTING GROUND WATER MONITORING WELL
- MW102 — MONITORING WELL INSTALLED BY RANSOM ENVIRONMENTAL CONSULTANTS, INC.
- B107 — SOIL BORING ADVANCED BY RANSOM ENVIRONMENTAL CONSULTANTS, INC.
- TEST PIT LOCATION
- EXISTING DRAINAGE SWALE
- EDGE OF EXISTING POND (HIGH WATER)
- EDGE OF EXISTING POND (OCTOBER 1998)
- EXISTING RIP RAP
- CHAIN-LINK FENCE
- BK2 — BACKGROUND SOIL SAMPLING LOCATION
- PHASE 2 DREDGE PILE SOIL SAMPLE
- PHASE 2 SURFACE WATER/ SEDIMENT SAMPLE
- SEDIMENT SAMPLE
- SURFACE SOIL SAMPLE
- SURFACE WATER ELEVATION MONITORING POINT
- SEDIMENT SAMPLE COLLECTED BY GRADIENT

NOTES:

1. BASE MAP AND TOPOGRAPHY PREPARED BY ENVIRONMENTAL SCIENCE SERVICES (ESS).
2. ELEVATION SURVEY OF NORTH, WEST AND EAST PONDS PERFORMED BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON APRIL 11 & 12, 1996.
3. PROPERTY LINE INFORMATION OBTAINED FROM ESS BASE MAP. RANSOM ENVIRONMENTAL CONSULTANTS, INC. NOT RESPONSIBLE FOR INACCURATE PROPERTY LINE INFORMATION OR BUILDING LOCATIONS.
4. EXISTING UNDERGROUND UTILITIES OBTAINED FROM MAP ENTITLED, "POND ENHANCEMENTS/GRADING PLAN", PREPARED BY ANDERSON-NICHOLS & CO., INC., DATED JULY 21, 1992.

0 25 50 100
SCALE in FEET
1"=50'

RANSOM Environmental Consultants, Inc.

PREPARED FOR:
THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

SITE:
FORMER DOW CHEMICAL PROPERTY
412 COMMONWEALTH ROAD
WAYLAND, MASSACHUSETTS

SITE PLAN

DATE: APRIL 2000
PROJECT: 94189
FIGURE: 1

p:\1994\94189\RAM-3\94189-04.dwg (laconfig:ram-3) (plotfile:dow.pc2)

Attachment B

Boring Logs

Weston & Sampson

BORING NUMBER: **B-1A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	11/24	2 4 4 11	8				FILL	6" Organics (Wood, leaves, pine needles, roots); moist. Loose, light brown, fine to coarse SAND, some fine to coarse gravel, little silt; moist. [FILL]	P.I.D. - 0.8 ppm
	S-2	2.0	13/14	14 36 120/2"					SAND & GRAVEL	Very dense, tan, gravelly fine to coarse SAND, little silt; moist.	P.I.D. - 0.1 ppm - Auger grinding at approximately 2 ft.
5	S-3	4.0	6/11	27 120/5"						Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; moist.	P.I.D. - 0.4 ppm - Heavy auger grinding and rig chatter at approximately 5 - 7 ft.

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 5 ft. west to B-1B-L and re-attempt.

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson SM

BORING NUMBER: **B-1B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										See log for B-1A-L for soil descriptions.	B-1B is offset approximately 5 ft. west of B-1A-L.
5										Auger refusal at 7 ft. End of boring at 7 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-2A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	3/24	2 3 4 8	7				FILL	Loose, brown, coarse GRAVEL, little silt, little fine to coarse sand, little organics (roots, leaves); moist. [FILL]	- Coarse gravel fragment in tip of spoon.
	S-2	2.0	12/14	28 35 120/2"					SAND & GRAVEL	Very dense, light brown, gravelly fine to coarse SAND, trace silt; moist.	P.I.D. - 0.1 ppm
5	S-3	4.0	12/12	55 33 120/0"						Very dense, gray-brown, fine to coarse GRAVEL, little fine to medium sand, trace silt; moist.	P.I.D. - 0.9 ppm

Auger refusal at 5 ft. End of boring at 5 ft. Offset boring approximately 2 ft. northwest to B-2B-L and re-attempt.

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson SM

BORING NUMBER: **B-2B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										See log for B-2A-L for soil descriptions.	B-2B-L is offset approximately 5 ft. northwest of B-2A-L.
5										Auger refusal at 5 ft. End of boring at 5 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-3A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	18/24	1 5 11 12	16				FILL	5" Topsoil Very stiff, orange-brown, sandy SILT, little fine to coarse gravel, trace roots; moist. [FILL]	P.I.D. - 6.2 ppm
	S-2	2.0	7/8	25 120/2"					SAND & GRAVEL	Very dense, gray-brown, gravelly fine to coarse SAND, little silt; moist.	P.I.D. - 4.3 ppm - Auger grinding approximately 2 - 4 ft.
5	S-3	4.0	8/9	25 120/3"						Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; moist.	- Heavy auger grinding and rig chatter at approximately 4 - 7 ft. Auger cuttings are primarily gray gravel from approximately 4 - 7 ft.
										Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 2.7 ft. east to B-3B-L and re-attempt.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson SM

BORING NUMBER: **B-3B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										(see guide below for soil classification based on constituent percentage) Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10% Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%	
5											B-3B-L is offset approximately 2.7 ft. east of B-3A-L. See log for B-3A-L for soil descriptions. - Auger grinding and rig chatter at approximately 2 - 6.5 ft. - Auger cuttings are primarily gray gravel from approximately 4 - 7 ft.

Auger refusal at 6.5 ft. End of boring at 6.5 ft.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

Weston & Sampson SM

BORING NUMBER: **B-4A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	12/24	5 4 4 5	8				FILL	3" Topsoil Loose, light brown, fine to medium SAND, little fine to coarse gravel, trace silt; moist. [FILL]	
	S-2	2.0	7/24	6 5 6 6	11					Medium dense, light brown, fine to medium SAND, little fine gravel, little silt; moist. [FILL]	
5	S-3	4.0	6/7	9 120/1"					SAND & GRAVEL	Very dense, gray-brown, fine to coarse SAND, some fine to coarse gravel, little silt; moist.	

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 5 ft. northeast to B-4B-L and re-attempt.

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson SM

BORING NUMBER: **B-4B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0											B-4B-L is offset approximately 5 ft. northeast of B-4A-L. See log for B-4A-L for soil descriptions.
5											

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

Auger refusal at 8 ft. End of boring at 8 ft.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

Weston & Sampson SM

BORING NUMBER: **B-5-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0	S-1	0.0	9/24	4 7 13 12	20				FILL	1" Topsoil Medium dense, brown, fine to coarse SAND, little fine gravel, trace silt; moist. [FILL]	
	S-2	2.0	15/24	13 12 9 11	21					Top 4" - Brown, fine to coarse SAND, little fine gravel, trace silt; moist. [FILL] Bottom 11" - Medium dense, orange-brown, silty fine SAND, little fine to coarse gravel; moist. [FILL]	
5	S-3	4.0	10/24	9 17 18 30	35				SAND & GRAVEL	Dense, brown, sandy fine to coarse GRAVEL, trace silt; moist.	

End of boring at 6 ft.

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE SYMBOL	SAMPLE TYPE
S	Split spoon
ST	Shelby tube
AG	Auger grab
NX	Rock core
GP	Direct push

GRANULAR SOILS N-Value	Density
0-4	Very Loose
4-10	Loose
10-30	Med. Dense
30-50	Dense
> 50	Very Dense

COHESIVE SOILS N-VALUE	CONSISTENCY
< 2	Very Soft
2-4	Soft
4-8	Med. Stiff
8-15	Stiff
15-30	Very Stiff
> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-1-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/14/2018 **END DATE:** 3/14/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/14/2018	1.2 ft. +/-	Observed in hand excavation.

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0										8" Topsoil	Hand excavate to 2 ft. due to possible electric lines.
	S-1	0.7	/						SAND & GRAVEL	Medium dense, light brown, fine to coarse SAND, some fine gravel, trace silt; wet. ▼	
	S-2	2.0	18/24	6 7 8 9	15					Top 8" - Light brown, fine to coarse SAND, some fine gravel, trace silt; wet.	
										Bottom 10" - Medium dense, light brown, fine to medium SAND, little silt; wet.	
	S-3	4.0	7/24	3 6 7 6	13					Stiff, brown, sandy SILT; wet.	
5											
10											
	S-4	10.0	16/24	3 5 5 7	10				SILT & SAND	Stiff, brown, sandy SILT; wet. - Bottom 2" is gray	
15											
	S-5	15.0	14/24	3 3 4 5	7					Loose, gray, silty fine SAND; wet.	
	S-6	19.0	21/24	5 6 7 7	13					Stiff, gray, SILT, some fine sand; wet.	
20											
										End of boring at 21 ft.	

MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-2-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/14/2018 **END DATE:** 3/14/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/14/2018	2 ft. +/-	Observed in hand excavation.

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	/							12" Topsoil	Hand excavate to 2 ft. due to possible electric lines.
									FILL	Dark brown, SILT, little fine to coarse sand, trace fine gravel, trace roots; moist. [FILL] ▼	
	S-2	2.0	10/24	9 12 14 18	26				SAND & GRAVEL	Medium dense, light brown, gravelly fine to coarse SAND, trace silt; wet.	
5	S-3	4.0	12/24	9 15 21 20	36					Top 5" - Light brown, gravelly fine to coarse SAND, trace silt; wet. Bottom 7" - Dense, orange-brown, sandy fine to coarse GRAVEL, trace silt; wet. - Iron staining	
10	S-4	10.0	10/24	5 7 7 6	14					Top 5" - Light brown, fine to coarse SAND, little fine gravel, trace silt; wet.	
									SILT	Bottom 5" - Stiff, gray-brown, SILT, some fine to medium sand, trace fine gravel; wet.	
15	S-5	15.0	13/24	9 7 9 11	16					Very stiff, gray, SILT, little fine sand; wet.	
20	S-6	19.0	17/24	6 7 8 7	15					Very stiff, gray, sandy SILT; wet.	
										End of boring at 21 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-3-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/14/2018 **END DATE:** 3/14/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/14/2018	2 ft. +/-	Observed in hand excavation.

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0	S-1	0.0	/							7" Topsoil	Hand excavate to 2 ft. due to possible electric lines.
									SAND & GRAVEL	Brown, fine to coarse SAND, little fine to coarse gravel, little silt; moist. ▼	
	S-2	2.0	16/24	9 10 10 11	20					Medium dense, brown, gravelly fine to coarse SAND, trace silt; wet.	
5	S-3	4.0	14/24	17 18 17 16	35					Dense, brown, fine to coarse GRAVEL, little fine to coarse sand, trace silt; wet.	
10	S-4	10.0	15/24	7 6 7 9	13				SILT	Stiff, brown, SILT, some fine sand; wet. - varves of silt and fine sand	
15	S-5	15.0	13/24	3 3 5 5	8					Stiff, gray, SILT, some fine sand; wet.	
20	S-6	19.0	23/24	3 4 4 4	8					Stiff, gray, SILT, some fine sand; wet.	
										End of boring at 21 ft.	

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-3-HS**

Weston & Sampson

BORING NUMBER: **B-4-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/22/2018 **END DATE:** 3/22/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/22/2018	4 ft. +/-	Based on wet samples.

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	/							10" Topsoil	Hand excavate to 2 ft. due to possible electric lines.
									FILL	Dark brown, SILT, some fine to coarse sand, trace fine gravel, trace roots; moist. [FILL]	
	S-2	2.0	15/24	10 11 14 18	25				SAND & GRAVEL	Medium dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist.	
5	S-3	4.0	7/24	4 9 16 17	25					Medium dense, brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt; wet. - coarse gravel fragment in tip of spoon.	
10	S-4	10.0	14/24	3 5 5 6	10				SILT	Stiff, gray, SILT, some fine sand; wet.	
15	S-5	15.0	19/24	3 4 5 6	9					Stiff, gray, SILT, some fine sand; wet.	
20	S-6	19.0	17/24	6 7 7 8	14					Stiff, gray, SILT, some fine sand; wet.	
										End of boring at 22 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson SM

BORING NUMBER: **B-5A-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/22/2018 **END DATE:** 3/22/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/22/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0	S-1	0.0	16/24	5 6 6 7	12					10" Topsoil	
									FILL	Medium dense, brown, fine to coarse SAND, little fine gravel, little silt; moist. [FILL]	
	S-2	2.0	14/24	12 18 24 12	42					Dense, brown, fine to coarse SAND, some fine gravel, trace silt; moist. [FILL]	

Approximately 4 in. diameter plastic gas line encountered at 4 ft. End of boring at 4 ft. Offset boring approximately 24 ft. south to B-5B-HS.

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE

SYMBOL	TYPE
S	Split spoon
ST	Shelby tube
AG	Auger grab
NX	Rock core
GP	Direct push

GRANULAR SOILS

N-Value	Density
0-4	Very Loose
4-10	Loose
10-30	Med. Dense
30-50	Dense
> 50	Very Dense

COHESIVE SOILS

N-VALUE	CONSISTENCY
< 2	Very Soft
2-4	Soft
4-8	Med. Stiff
8-15	Stiff
15-30	Very Stiff
> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-5B-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/22/2018 **END DATE:** 3/22/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/22/2018	9 ft. +/-	Measured in borehole.

DEPTH (ft.) Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										See log for B-5A-HS for upper 4 ft. descriptions.	- B-5B is offset approximately 24 ft. south of B-5A-HS.
5	S-3	4.0	12/24	14 15 21 18	36				SAND & GRAVEL	Dense, brown, fine to coarse GRAVEL, little fine to coarse sand, trace silt; moist.	- Auger grinding and rig chatter from approximately 5 - 15 ft. Coarse gravel and cobbles in auger spoils.
10	S-4	10.0	18/24	53 117 54 40	171					Very dense, gray, sandy fine to coarse GRAVEL, trace silt; wet.	
15	S-5	15.0	18/24	6 10 15 36	25					Medium dense, brown, fine GRAVEL, some medium to coarse sand, trace silt; wet.	- Heave observed in augers after sampling 15 - 17 ft. Unable to continue boring.
										End of boring at 17 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **B-6-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/22/2018 **END DATE:** 3/22/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/22/2018	15 ft. +/-	Measured in borehole.

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	20/24	2 2 8 14	10					11" Topsoil	
										Medium dense, gray-brown, silty SAND, little fine gravel; moist. [FILL]	
	S-2	2.0	12/24	5 7 13 22	20				FILL	Medium dense, brown, fine to coarse SAND, little fine gravel, little silt; moist. [FILL]	
5	S-3	4.0	15/24	14 23 35 22	58					Top 6" - Brown, fine to coarse SAND, some silt, little fine gravel; moist. Bottom 9" - Very dense, gray-brown, fine to coarse GRAVEL, little fine to coarse sand, trace silt; moist.	- Auger grinding at approximately 5 ft.
10	S-4	10.0	3/24	19 15 16 16	31				SAND & GRAVEL	Dense, brown, fine to coarse GRAVEL, little fine to coarse sand, little silt; moist.	- Coarse gravel fragment stuck in tip of spoon.
15	S-5	15.0	10/24	9 9 7 6	16					▼ Medium dense, brown, fine to coarse SAND, trace fine gravel, trace silt; wet.	
20	S-6	20.0	18/24	11 10 12 20	22					Medium dense, tan, fine to coarse GRAVEL, little medium to coarse sand, trace silt; wet.	
										End of boring at 22 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-6-HS**

Weston & Sampson

BORING NUMBER: **B-7-HS**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT / T. Fuselier, PE
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/14/2018 **END DATE:** 3/22/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/22/2018	15 ft. +/-	Based on wet samples.

DEPTH (ft.) Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	14/24	3 5 6 5	11					Stiff, dark brown, SILT, little fine to coarse gravel, little fine to coarse sand; moist. [TOPSOIL]	
	S-2	2.0	12/24	11 17 12 25	29				SAND & GRAVEL	Medium dense, brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt; moist.	
5	S-3	4.0	14/24	50 35 40 53	75					Very dense, brown, sandy fine to coarse GRAVEL, trace silt; moist.	
10	S-4	10.0	14/24	13 11 11 10	22				SAND	Medium dense, brown, fine to coarse SAND, little fine to coarse gravel, trace silt; moist.	
15	S-5	15.0	12/24	9 8 8 8	16					Medium dense, brown, fine to medium SAND, trace silt; wet. ▼	
20	S-6	20.0	24/24	5 7 7 8	14					Medium dense, brown, fine to medium SAND, little silt; wet.	
										End of boring at 22 ft.	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-7-HS**

Attachment C

Test Pit Logs

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-1	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 1.3' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	1.3' - 2.7' - Yellow-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	**FILL**
3	2.7' - 5.0' - Coarse GRAVEL, sub-rounded; moist. [SEPTIC FIELD]	**SEPTIC FIELD [FILL]**
4	- 6" diameter broken clay pipe observed at approximately 3.0'	
5		
6	5.0' - 6.7' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND AND GRAVEL**
7	Possible bedrock encountered at 6.7'. Bottom of test pit at 6.7'.	**BEDROCK**
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3265 Lat., -71.3433 Long.

TEST PIT NUMBER
TP-1

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-2	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 1.3' - Dark brown, fine to medium SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	1.3' - 2.7' - Brown, gravelly fine to coarse SAND, trace silt; moist. [FILL] - Concrete wall at west corner of test pit at approximately 2.5'	**FILL**
3	2.7' - 5.0' - Coarse GRAVEL, sub-rounded; moist. [SEPTIC FIELD]	
4	- 6" diameter broken clay pipe observed at approximately 2.7'	**SEPTIC FIELD [FILL]**
5		
6	5.0' - 6.0' - Yellow-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist.	
7	6.0' - 7.6' - Gray-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist.	**SAND AND GRAVEL**
8	Possible bedrock encountered at 7.6'. Bottom of test pit at 7.6'.	**BEDROCK**
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3264 Lat., -71.3434 Long.

TEST PIT NUMBER
TP-2

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-3	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 0.7' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	0.7' - 1.3' - Brown, fine to medium SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [FILL]	**FILL**
3	- 1" diameter electrical conduit at 1.0'. 1.3' - 2.7' - Brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	
4	2.7' - 5.7' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND**
5		
6	Possible bedrock encountered at 5.7'. Bottom of test pit at 5.7'.	**BEDROCK**
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3259 Lat., -71.3437 Long.

TEST PIT NUMBER
TP-3

Weston & Sampson℠

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-4	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface on pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics (roots, grass); moist. [BURIED TOPSOIL]	**BURIED TOPSOIL**
2	1.3' - 2.0' - Light brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	**FILL**
3	2.0' - 4.8' - Light brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND AND GRAVEL**
4		
5		
6	Possible bedrock encountered at 4.8'. Bottom of test pit at 4.8'.	**BEDROCK**
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3262 Lat., -71.3432 Long.

TEST PIT NUMBER
TP-4

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-5	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		5.0'

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Asphalt Pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Brown, gravelly fine to coarse SAND, trace silt, trace organics; moist. [FILL]	**FILL**
2	1.3' - 4.0' - Gray-brown, fine to coarse SAND, some gravel, trace silt; moist.	**SAND AND GRAVEL**
3		
4		
5	4.0' - 5.0' - Brown, gravelly fine to coarse SAND, some silt; moist to wet.	
6	Bottom of test pit at 5.6'.	
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3262 Lat., -71.3427 Long.

TEST PIT NUMBER
TP-5

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			**TEST PIT NUMBER**	
LOCATION	Wayland, Massachusetts			TP-6	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY	Stefanie Bridges	DATE	10/4/18		Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Asphalt Pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Brown, fine to medium SAND, trace silt; moist. [FILL]	**FILL**
2	1.3' - 7.3' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND AND GRAVEL**
3		
4		
5		
6		
7		
8	Bottom of test pit at 7.3'.	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3260 Lat., -71.3422 Long.

TEST PIT NUMBER
TP-6

Weston & Sampson℠

Attachment D

Important Information about this Geotechnical Engineering Report by GBA, Inc.

Important Information about This

Geotechnical-Engineering Report

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

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

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

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

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

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

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

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

This Report's Recommendations Are Confirmation-Dependent

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

This Report Could Be Misinterpreted

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

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

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

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

SECTION 00 31 32

SUBSURFACE DATA

PART I - GENERAL

1.01 SCOPE:

A. A subsurface exploration program consisting of borings and test pits have been performed, with reasonable care. The results of the exploration program are appended hereto and are a part of the Contract Documents. Samples of the materials encountered may be seen upon request during the bidding period only at the office of Weston & Sampson Engineers, Inc., 5 Centennial Drive, Peabody, Massachusetts. If Contractors deem the subsurface information insufficient, they may, after obtaining Owner's permission, carry out additional subsurface explorations, at no expense to the Owner.

B. Subsurface data is available in the Contract Documents and is made available to the Contractor for ***informational purposes only***. The subsurface conditions presented in these documents, as applicable, shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data. The Contractor shall not rely on the interpretations, opinions, conclusions, or recommendations in the report. Specific project requirements are provided *only* in the project design drawings and specifications

C. Subsurface information provided in the Contract Documents is limited by the methods used for obtaining and expressing such data, and is subject to various interpretations. The terms used to describe soils, rock, groundwater and such other conditions are subject to local usage and individual interpretation.

D. Borings have been drilled substantially at the locations indicated on the drawings and advanced to the depths shown on the logs. Soil information presented in the boring logs, as to classification, gradation, properties, density and consistency, is based on visual observation of recovered samples. Groundwater levels reported on the boring logs are those measured in the field at the particular location and at the time measurements were made, and do not necessarily represent permanent groundwater elevations. Groundwater elevations may be affected by temperature, rainfall, tidal fluctuation, and other factors that may not have been present at the time the measurements were made. The Contractors should be aware that groundwater level fluctuations may affect methods of construction.

E. Subsurface exploration, soil and rock data are for the general information of the Contractors. The Contractors are obligated to examine the site, review boring and test pit logs, all available information and records of explorations, investigations and other pertinent data for the site, and then based upon their own interpretations and investigations decide the character of material to be encountered and excavated, the suitability of the materials to be used for backfilling and such other purposes, the groundwater conditions, difficulties or obstacles likely to be encountered, and other conditions affecting the work.

The subsurface data is accurate only at the particular locations and times the subsurface explorations were made. No other warranty either expressed or implied by the Owner, Engineer or their agents is made as to the accuracy of the subsurface information and data shown on the drawings or presented in the Contract Documents.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 01 45 00

SAMPLING AND TESTING

PART 1- GENERAL

1.01 SCOPE OF WORK

A. The work under this Section shall consist of performing or ordering the work of collecting samples for testing, having tests performed by a Certified Testing Laboratory satisfactory to the Owner's Representative, having all test results forwarded to the Owner's Representative for approval, and paying all costs associated with the collection and sampling, transportation, shipping, postage, and testing, and the coordination of test results and approvals.

1.02 SUBMITTALS

A. In accordance with Section 01 33 00 – SUBMITTALS of these Specifications, submit the names, addresses and certification of laboratories to be utilized for approval by the Owner's Representative.

PART 2 - MATERIALS

2.01 CONTAINERS AND TOOLS

A. Utilize tools recommended by the laboratory to obtain samples, packaging or containers suitable to or furnished by, the laboratory, and collect all samples in the proper number and quantity to permit tests to be conducted.

2.02 TESTS

A. Refer to technical section specifications for test requirements and criteria for results; coordinate with the Owner's Representative.

B. All irrigation systems, and any other components from the scope of work as requested by the Owner's Representative shall be tested to ensure complete compliance with manufacturer's installation instructions and warrantee requirements.

E. The Contractor shall provide up to four (4) test pits where indicated by the owner's representative to perform percolation and water quality testing as required at no additional expense to the owner.

F. Compaction tests are required on all base surfaces. Contractor shall provide testing at 5 locations at designer's direction or per Owner's direction. At the Contractor's expense, an independent testing agency must perform the work and

submit the results directly to the Owner's Representative.

G. All other tests as indicated or required in the drawings and specifications.

PART 3 - EXECUTION

3.01 METHODOLOGY

A. Unless otherwise directed by the Section specifications, perform sampling and testing will be ordered by the Contractor and approved by the Owner's Representative. Locations, number and quantity of samples shall be submitted for approval as directed in accordance with the Specifications.

B. Sampling and Testing results must be provided to the Owner's Representative and Approved prior to the installation of any work potentially impacted by unacceptable test results.

END OF SECTION 01 45 00

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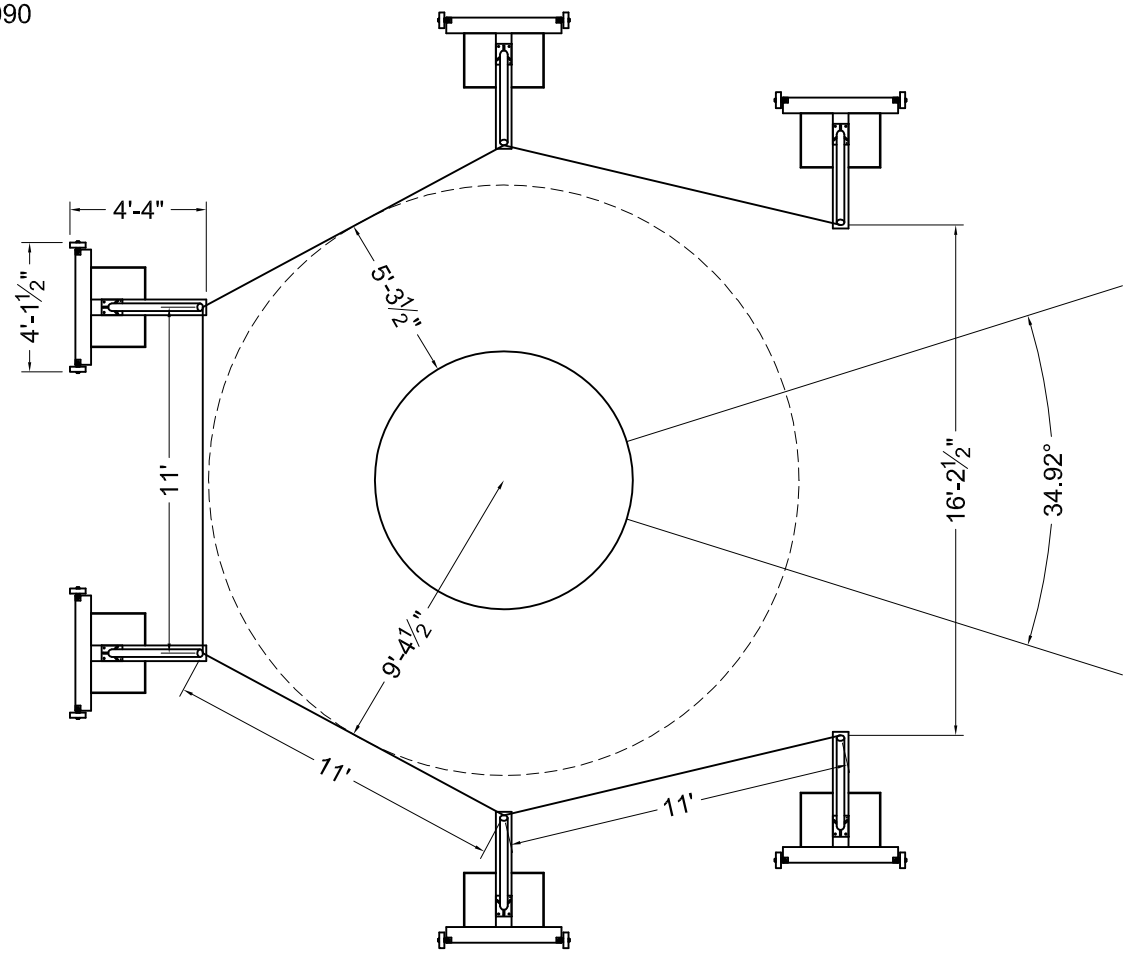
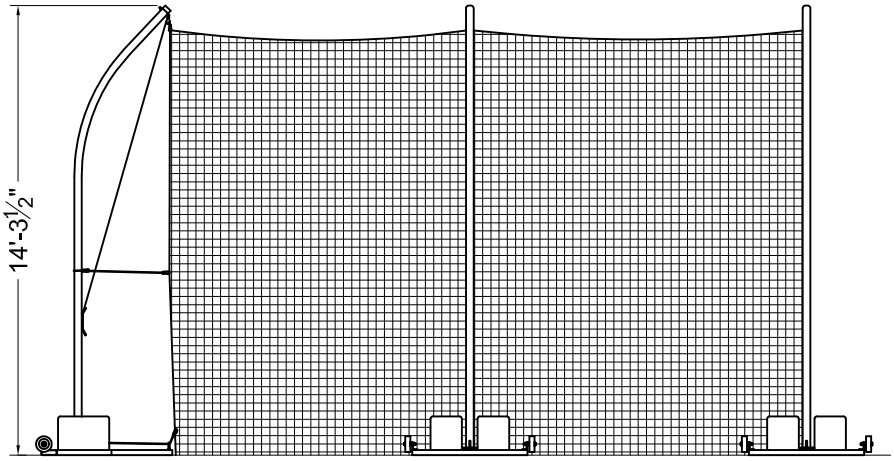
800-637-3090

732220 - HIGH SCHOOL PORTABLE DISCUS CAGE SPECIFICATIONS





The 732220, High School Portable Discus Cage, is designed to be set up and removed as needed. The cage consists of six aluminum net poles with steel bases, weather treated nylon net, and replaceable bungee cords to secure the net at each base. The steel bases are each furnished with two 8" wheels, allowing the assembled net poles to be rolled into position with ease. The net poles are 2 7/8" dia., 0.203" wall, 6063-T6 aluminum tube. Pole bases are fabricated from 6" x 2" x 3/16" wall steel tube and 3/16" thick steel angle. All steel parts are finished with durable black powder coat paint. Pole bases are weighted with 5 gallon, heavy duty plastic jugs which are to be filled with sand or water. The cage poles stand 14' tall. The net is #504 knotless, nylon netting with a breaking strength of over 180lbs.

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732220_spec

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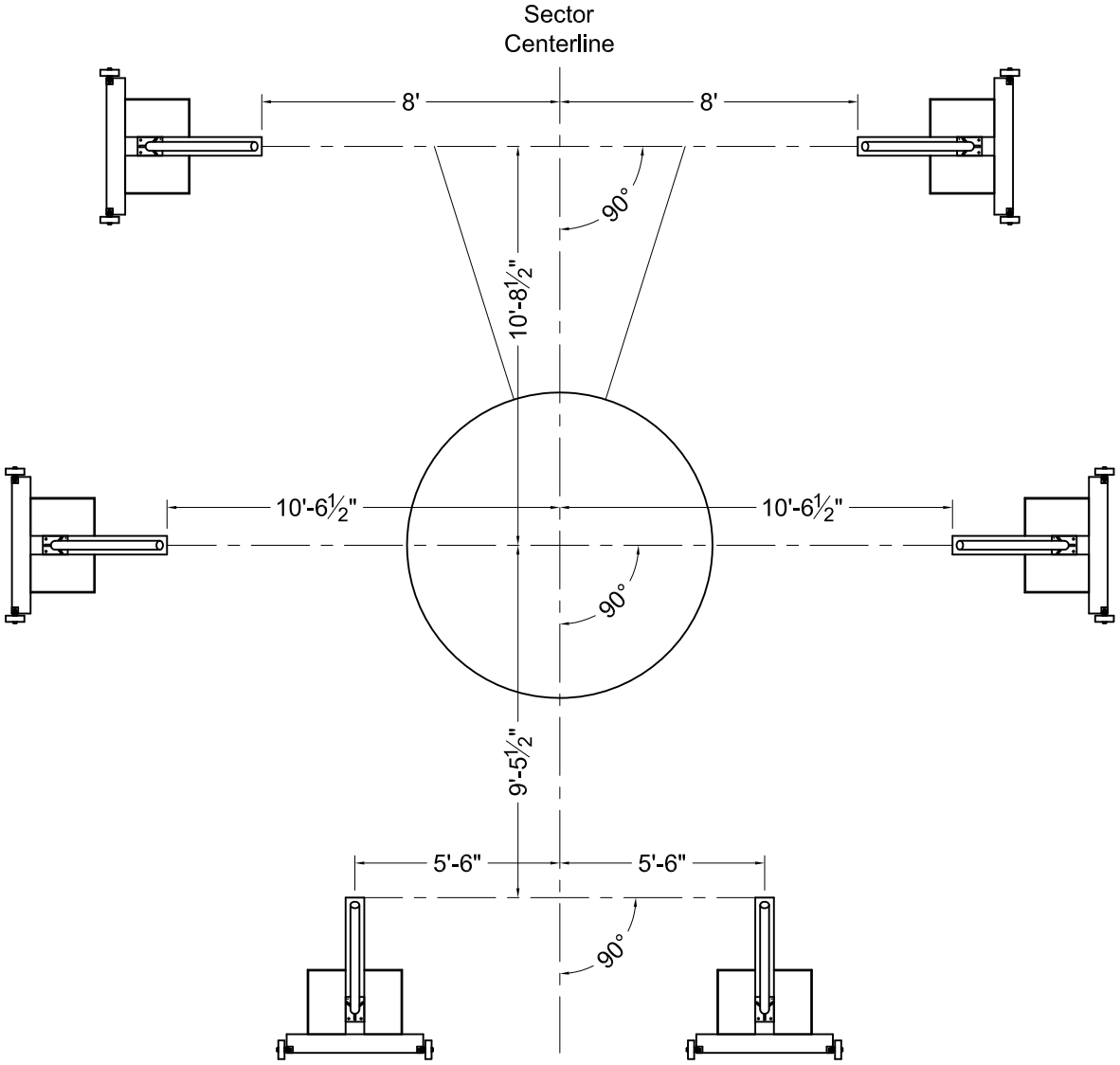
732220 - HIGH SCHOOL PORTABLE DISCUS CAGE
POLE POSITION LAYOUT

1. Layout and mark circle center and sector lines. Locate and mark with a string line the sector center line. This line should extend 12' forward and behind the circle center. Along this line, locate and mark with stakes a point 10' 8 1/2" in front of the circle and a second point 9' 5 1/2" behind the circle.

2. Locate and mark leading edge of net pole bases. On lines perpendicular to the sector center line; mark points 8' to the right and left for the front bases, 10' 6 1/2" from the circle center for the middle bases, and 5' 6" for the back bases. Position net poles at these positions as shown in the diagram below.

3. Fill weight jugs with sand or water, place in base weight trays and install jug covers. Adhesive back Velcro tape is provided to help secure the covers. Align Velcro tape on tray edge with cover flap.



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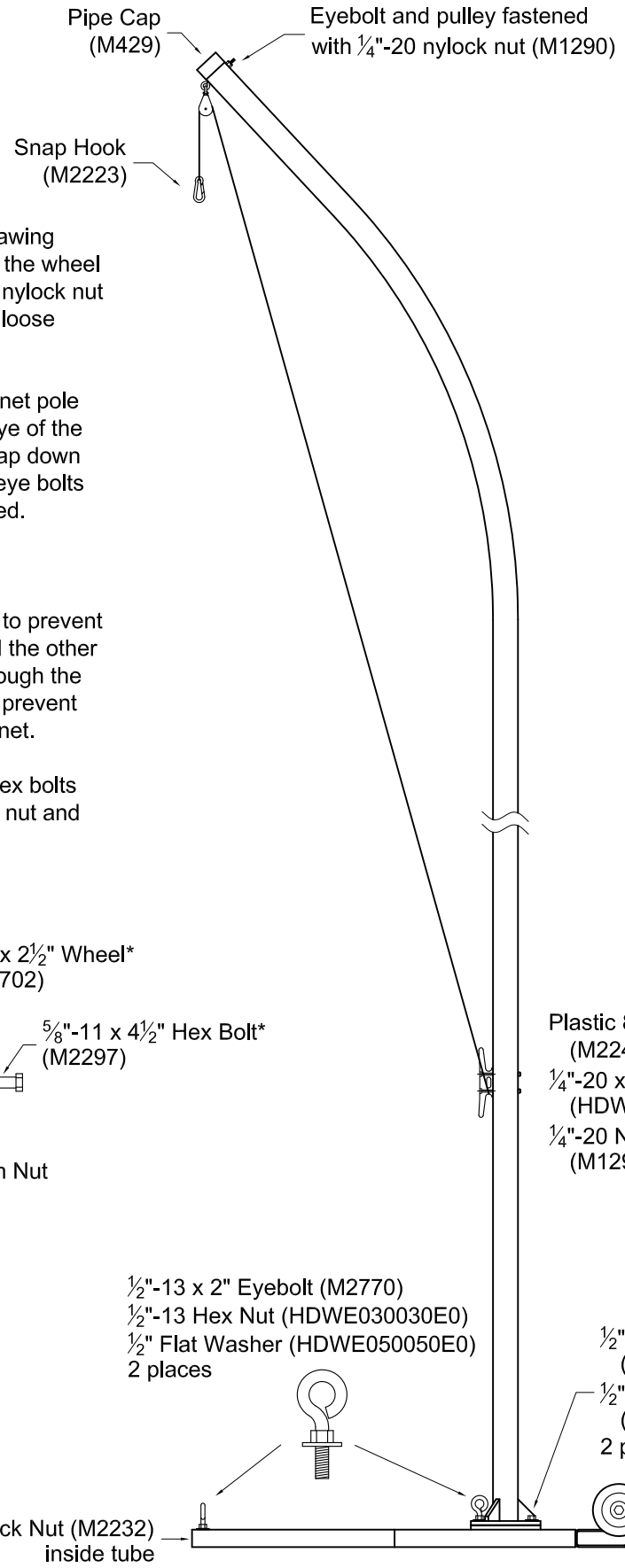
73222020 & 73223020 - PORTABLE CAGE NET POLES
NET POLE ASSEMBLY



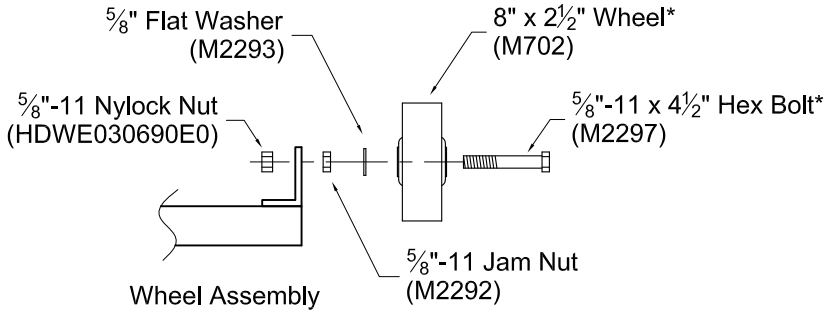
1. Attach wheels to net pole bases, see drawing below. The 5/8" jam nut is used to tighten the wheel assembly to the bracket along with the 5/8" nylock nut on the opposite side. The wheel should be loose enough to freely turn.

2. Install pulley assembly at the top of the net pole with 1/4" nylock hex nuts. The gap in the eye of the bolt should face up. Install the black pole cap down to the pulley eye bolt. The thread on these eye bolts can be trimmed after installation, if so desired.

3. Install the rope cleat with ¼" hardware.

4. Cut each 50' rope in half and melt ends to prevent fraying. Tie one end to snap hook and feed the other through the pulley. After the rope is fed through the pulley, tie the loose end to the rope cleat to prevent the rope from being lost when lowering the net.

5. Bolt the pole to the base with two 1/2" hex bolts with washers and one 1/2" eyebolt with jam nut and washer as shown below.



* The weight throw cage (732250) uses a different wheel and axle bolt.
6" x 2" Wheel (M701)
⅝"-11 x 4" Hex Bolt (M2278)

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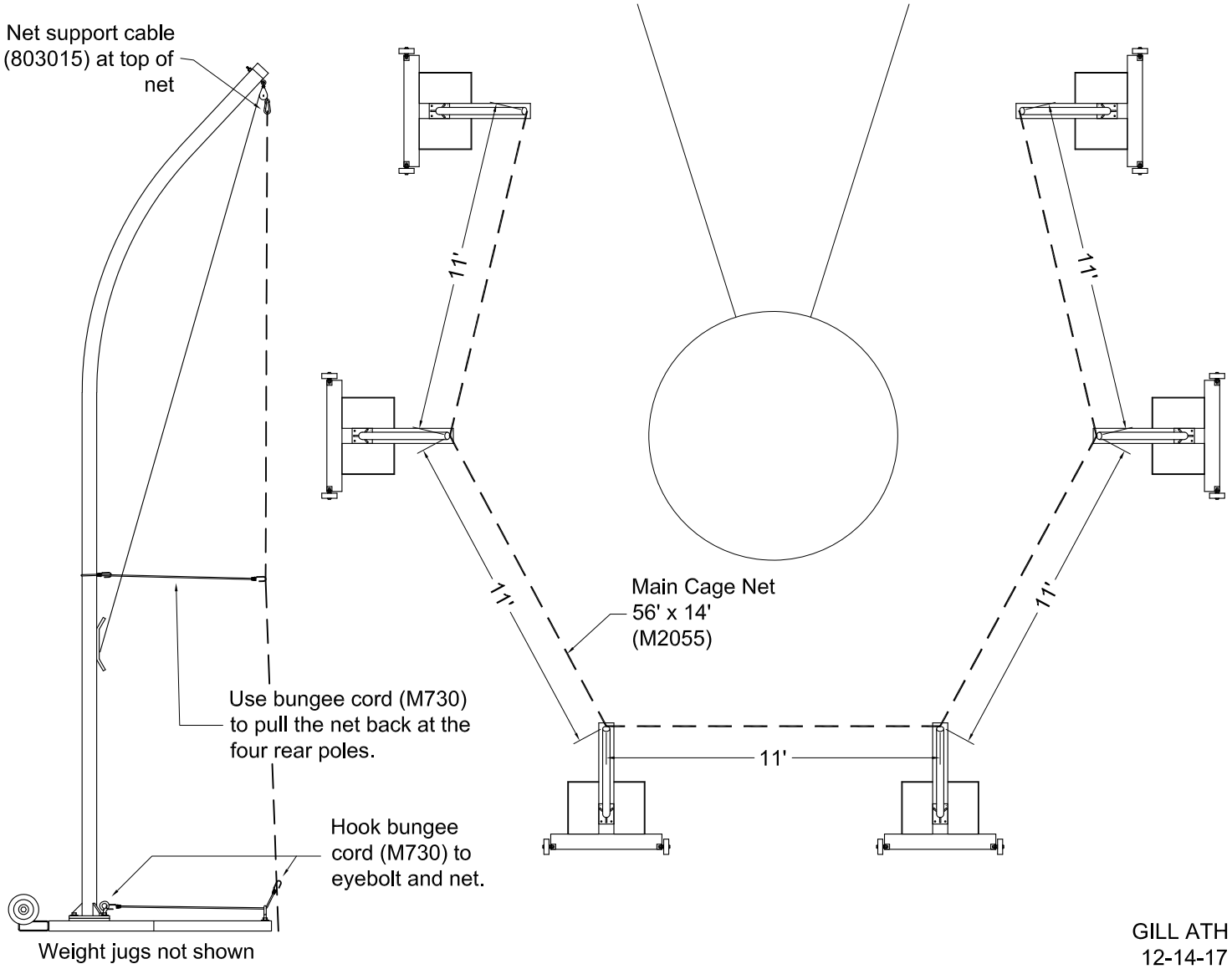
732220 - HIGH SCHOOL PORTABLE DISCUS CAGE NET INSTALLATION

1. To minimize sag, the net is supported by a vinyl coated steel cable. To install the cable, weave it in and out through every 5th net opening just below the top edge of the net. When finished, the loops at each end of the cable should be even with the ends of the net.

2. To ensure the net is evenly spaced when it is installed, mark each hook position on the net according to the diagram below. Stretch the net out flat and stake one upper corner to the ground along with the end of a 100 ft. long measuring tape. Stretch the net, cable, and tape and stake the corner to hold its position next to the tape. Mark the top of net and the cable at the dimensions shown.

3. Lay out the net inside the cage poles with each marked position next to the appropriate net rope hook. At each position hook both the net binding and the cable. At each end be sure the hook is through the cable loop.

4. Raise the net to the top of the poles and tie off the ropes. Hook one end of the bungee cord to the eye bolt at the pole base. Pass it through the outer eye bolt and hook the net so it is taught. The bottom few inches of the net is supposed to lay on the ground to help trap a discus.



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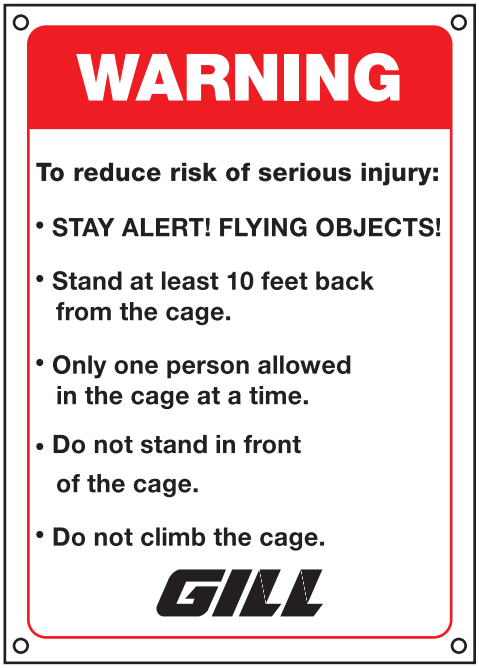
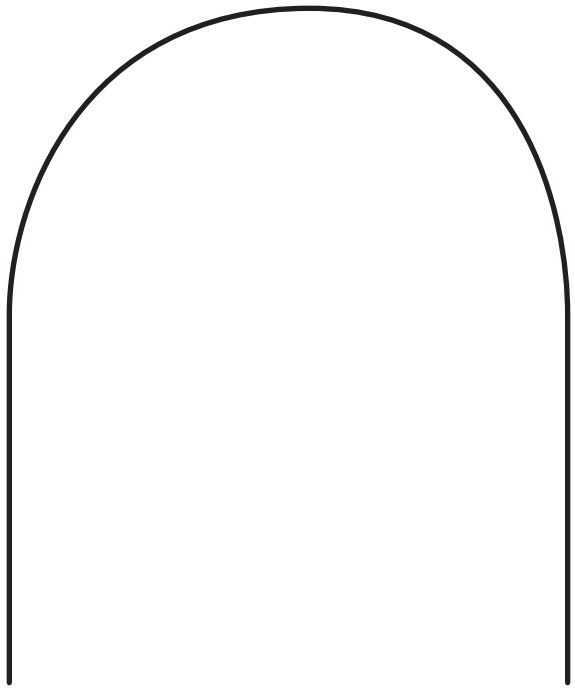
THROWING CAGE
INSTALLATION OF WARNING SIGNS

For the protection of athletes, spectators, and coaches install warning signs according to the diagram below.

Attach signs (M2322) to the cage net with the included 1.25” rings (M1250) in each corner. Signs should face away from the cage toward spectators.



Center Back: Attach sign to the outside of the net at eye level in the middle of the back of the cage.



Left Front Side: Attach sign to the outside of the net at eye level near the front left side of the cage.

Right Front Side: Attach sign to the outside of the net at eye level near the front right side of the cage.

732220 - HIGH SCHOOL PORTABLE DISCUS CAGE
SHIP LIST

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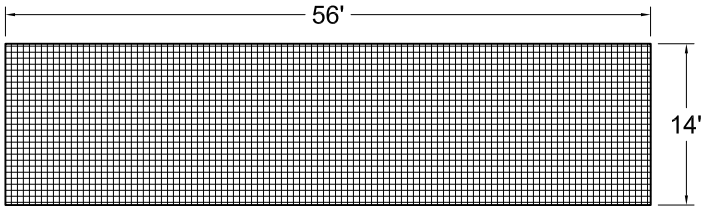
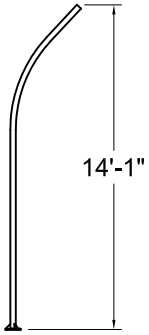
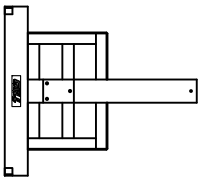
Main Net
M2055
x1



Net Pole
73222020
x6



Net Pole Base
73222025
x6

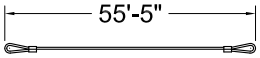


5 Gal Pail
M425
x24

Two Jug Cover
M605C09
x12

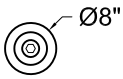
Cage Components Box - 73222040

Net Support Cable
803015
x1



Bunge Cord
M730
x10

8" x 2½" Wheel
M702
x12



Warning Sign
M2322
x3

Snap Ring
M1250
x12

¼" Polyester Rope
M2005
x150ft

Flat Black Touch-Up Paint
PANT00010016
x1

Hardware Kit - 73222060

BASE HARDWARE BAG x 1 (73222061):		
QTY.	M#	DESCRIPTION
24	HDWE050050E0	½" Flat Washer
6	M2232	½"-13 Nylock Hex Nut
12	HDWE030030E0	½"-13 Hex Nut
12	HDWE011540E0	½"-13 x 1¼" Hex Bolt
12	M2770	½"-13 x 2" Eyebolt

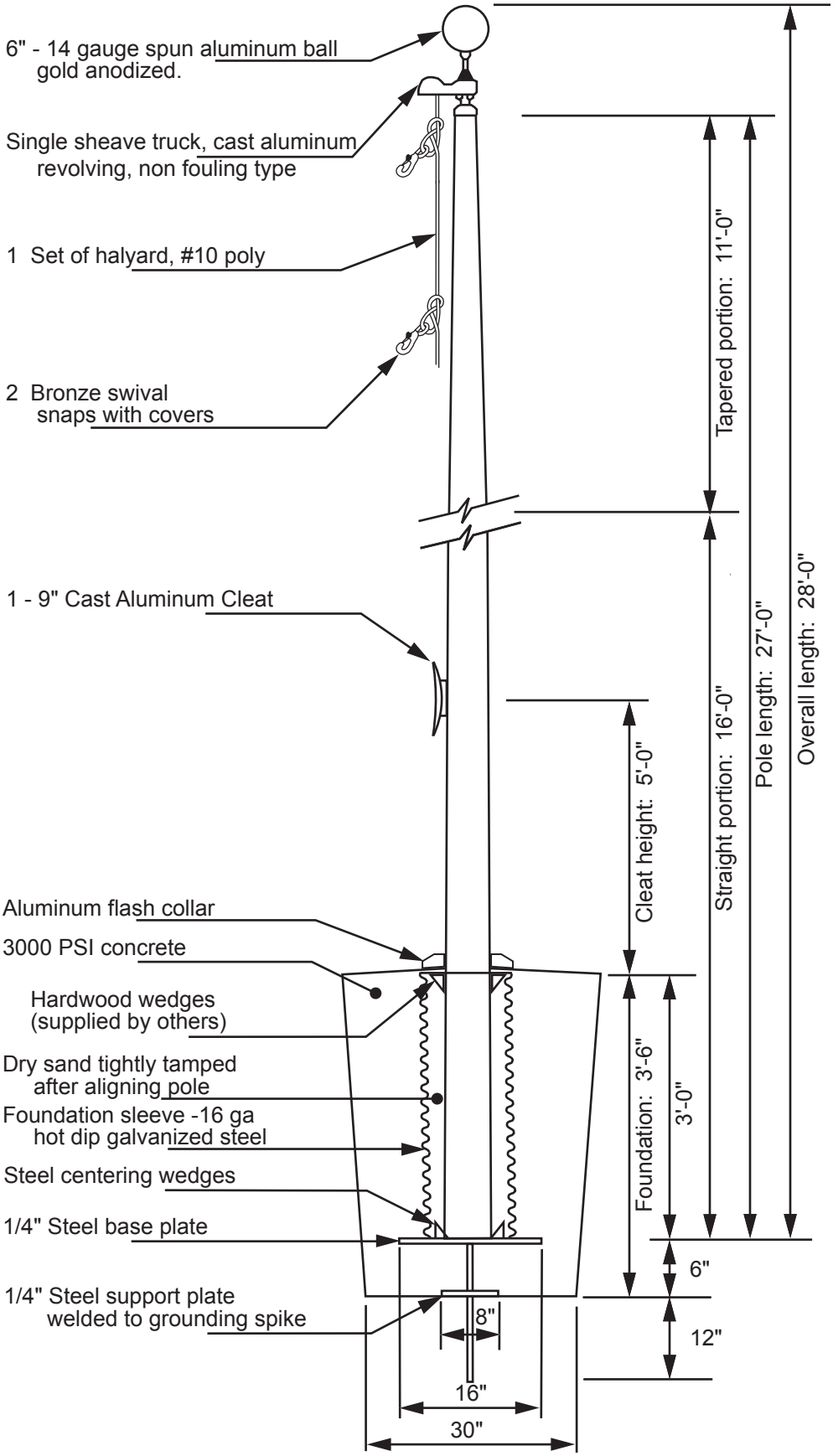
WHEEL HARDWARE BAG x 1 (73222062):		
QTY.	M#	DESCRIPTION
12	M2297	⅝"-11 x 4½" Hex Bolt
12	M2292	⅝"-11 Jam Nut
12	M2293	⅝" Flat Washer
12	HDWE030690E0	⅝"-11 Nylock Hex Nut

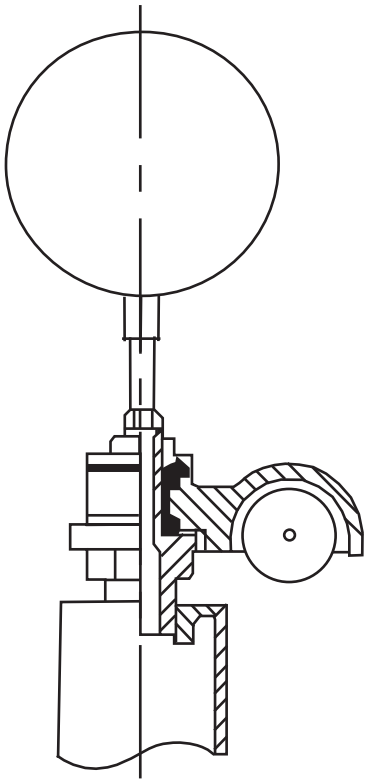
POLE HARDWARE BAG x 1 (73222063):		
QTY.	M#	DESCRIPTION
18	M1290	¼"-20 Nylock Hex Nut
6	M2729	*Pulley for ¼" Rope
6	M2749	*¼"-20 x 4" Eyebolt
6	M429	2½" Sch 40 Pipe Cap (2⅞" ID cap)
6	M2223	⅜" Snap Hook
6	M2245	Plastic 8" Rope Cleat
12	HDWE06213	¼"-20 x 4 ½" Screw

* The pulleys must be assembled onto the eyebolts.

THIS WARNING IS GIVEN IN COMPLIANCE WITH CALIFORNIA'S PROPOSITION 65:
WARNING
This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Model ECH25





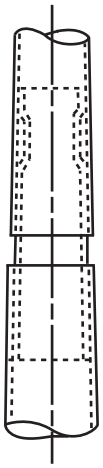
Truck Detail

Aluminum body
Stainless steel ball bearings
Aluminum sheave
Cast aluminum spindle

All shafts with overall length of more than 38'-6" are shipped in two sections.

Each section matched marked for field assembly. Exposed portion of jam sleeve must be **well lubricated** prior to assembly.

1-1/2" maximum shop gap allowed for field fitting (ram for tight joint)



Project:	Ground set tapered aluminum flagpole: ALLOY: 6063T6		EDER FLAG	Date:
Location:	Exposed height: 25'-0"	Overall height: 28'-0"	MANUFACTURING COMPANY	Revision:
Architect:	Ship in 1 section	Butt diameter: 6"	1000 W. Rawson Avenue	
Contractor	Top diameter: 3-1/2"	Wall thickness: .250"	Oak Creek, WI 53154	
Customer:	Finish: 100 grit polish			Job:

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

A. Section 00 31 43, PERMITS

B. Section 01 11 00, CONTROL OF WORK AND MATERIALS

C. Section 01 57 19, ENVIRONMENTAL PROTECTION

D. Section 31 05 19.13, GEOTEXTILE FABRICS

E. Section 31 11 00, CLEARING AND GRUBBING

F. Section 31 23 16.26, ROCK EXCAVATION AND DISPOSAL

G. Section 31 23 19, DEWATERING

H. Section 31 50 00, SUPPORT OF EXCAVATION

I. Section 32 12 00, PAVING

J. Section 32 91 19, LOAMING AND SEEDING

1.03 REFERENCES:

American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.

ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM	D1557	Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.
ASTM	D2922	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges.

Code of Massachusetts Regulations (CMR) 310.40.0032 Contaminated Media and Contaminated Debris

Code of Massachusetts Regulations (CMR) 520 CMR 14.00 Excavation & Trench Safety Regulation

1.04 QUALITY CONTROL

A. Contractor shall assume full responsibility for quality control inspection and testing and give sufficient notice to the Engineer to permit the witnessing of the inspections or tests.

B. Contractor shall engage a qualified, independent testing agency to perform quality control testing.

C. Source of supply. No earthwork materials will be accepted on the jobsite without written approval from the Engineer. The Contractor shall perform sufficient tests and inspections necessary to determine the acceptability of the source of supply. A Certified Testing and Inspection Agency may be used to perform such tests and inspections. The qualifications of the person or agency performing these tests and inspections shall be forwarded to the Engineer for approval. Subsequent to this approval, test results showing the acceptability of the source of supply, shall be forwarded to the Engineer for approval.

D. The Engineer reserves the right to perform inspections and tests at any time during the execution of the work.

E. Notification Point: The Contractor shall give the Engineer 2 days' notice in advance of quality control tests and inspections.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Backfill Materials: For each type of soil to be utilized as fill or backfill, the contractor shall provide the following documentation:

1. Location of borrow source site, including name of the owner or facility name with contact phone number, street address, city, and state.
2. Present and past usage of the source site and material.
3. Name of the qualified firm and analytical laboratory that performed the material sampling and testing.
4. All existing report(s) associated with an assessment of the source site as relates to the presence of oil or hazardous materials.

B. Submit a grain size distribution curve performed in accordance with ASTM D422 and results of a moisture-density relationship determination in accordance with ASTM D1557 for each proposed backfill material for review by the Engineer. Additional samples and analysis shall be submitted for every 500 cubic yards of the same material delivered to the site, more often if a change in material occurs at the borrow source.

C. In addition, a certification statement and analytical results shall accompany each physical sample of earth materials to be imported onto the site, including but not limited to crushed stone, loam, bedding sand, gravel sub-base, common fill and structural backfill. At a minimum the certification shall state the point of origin and that the material is free of contaminants. The certification shall include representative sample analysis from each point of origin of backfill to be used on the site. The sample(s) shall be analyzed by a certified laboratory for total metals (EPA priority pollutant metals), volatile organic compounds (EPA Method 8260), semi-volatile organic compounds (EPA Method 8270), petroleum hydrocarbons (EPA Method 8100), and Total PCBs and pesticides (EPA Method 8081 and 8082).

1. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and shall be either: 1) a Licensed Site Professional registered in the Commonwealth of Massachusetts; 2) a Professional Engineer registered in the Commonwealth of Massachusetts; 3) a professional Geologist registered in the Commonwealth of Massachusetts; 4) a certified groundwater/environmental professional; or 5) an authorized representative of the one of the persons listed above. Samples of each material shall be submitted to a chemical analytical laboratory, certified by the Massachusetts Department of Environmental Protection.

D. Within one week after making field adjustments, resubmit revised working drawings as necessary to reflect changes required by field conditions.

E. Information identifying the name of the field and laboratory soil testing subcontractor proposed for documenting conformance of earthwork activities. Include examples of typical field and laboratory test result documentation from the subcontractor that are proposed for use the project. In addition to test results, the report documentation shall include the location and elevation of all tests, materials tested, a description of methods and equipment used, compaction requirements, and conformance or non-conformance.

F. During construction, submit to the Engineer written confirmations of fill lift thickness, in-place soil moisture content, and percentage of compaction.

1.06 PROTECTION OF EXISTING PROPERTY:

A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points, which are disturbed or destroyed.

C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.07 DRAINAGE:

A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures or cause excessive disturbance of underlying natural ground or abutting properties.

1.08 FROST PROTECTION AND SNOW REMOVAL:

A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.

B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

1.09 EXAMINATION OF SITE AND DOCUMENTS

A. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of a lack of knowledge of existing conditions as indicated in the Contract Documents, or obvious from observation of the site.

B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct, but the Contractor shall have examined them for themselves during the bidding period and formed their own conclusions as to the full requirements of the work involved.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Existing available soil materials from on-site excavations may be reused as Common Fill or Structural Fill provided the on-site materials meet the requirements for the material as described herein.

B. COMMON FILL:

Common Fill shall be well-graded, natural inorganic soil containing no stones with maximum dimension greater than 2/3 the lift thickness or 6 inches, whichever is smaller. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. It shall be free of plastic clays, of all materials subject to decay or other materials that will corrode piping or metals. Common Fill shall have a maximum dry density of not less than 110 pounds per cubic foot. It shall be of such a nature and character that it can be compacted to the specified densities. Topsoil shall not be considered Common Fill.

C. STRUCTURAL FILL:

Structural Fill or "Gravel Borrow" shall satisfy the requirements listed in MassDOT 1988 Standard Specification Section M1.03.0 for Type B Gravel Borrow. "Free Draining" Structural fill shall meet the requirements of M1.03.0 Type B Gravel Borrow except with maximum 5% by weight passing the No. 200 sieve.

D. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in MassDOT 1988 Standard Specification Section M2.01. Crushed stone shall be 3/4 inch crushed stone unless otherwise indicated on the drawings.

E. DENSE GRADED CRUSHED STONE:

Dense Graded Crushed Stone shall satisfy the requirements listed in MassDOT 1988 Standard Specification Section M2.01.7.

F. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in MassDOT 1988 Specification Section M1.04.0.

G. PEA GRAVEL:

Pea Gravel shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

H. SELECT FILL:

Select fill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

Sieve Size	Percent Finer by Weight
3"	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

I. SPECIAL PIPE BEDDING MATERIAL

1. The special pipe bedding material shall consist of a filter fabric installed on the trench bottom before backfilling with crushed stone as specified and as shown on the contract drawings. Filter fabric shall be as specified in Section 02071, GEOTEXTILE FABRICS.

J. PROCESSED GRAVEL:

1. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

2. The gradation shall meet the following requirements:

Sieve Designation	Percentage Passing
3 in.	100
1 1/2 in.	70-100
3/4 in.	50-85
No. 4	30-60
No. 200	0-10

3. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.

B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.

C. The Contractor shall place a minimum of 12-inch layer of crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.02 EXCAVATION:

A. GENERAL:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.

2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with Structural Fill and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.

3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.02 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils.

All excavated materials shall be stockpiled separately from each other within the limits of work.

4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.

5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as required by the Engineer. Unsuitable material includes soft, loose, or disturbed soils, topsoil, loam, peat, other organic materials, snow, ice, existing fill, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted Structural Fill or crushed stone wrapped all around in non-woven filter fabric.

6. The Contractor shall satisfy all dewatering requirements specified in Section 31 23 19 DEWATERING before performing all excavations.

7. When excavations have reached the prescribed depths, the condition of the bottom of the trench or foundation bearing surface shall be evaluated by the Engineer. When excavating to subgrade level for pavement and hardscaping has been completed, the subgrade surface shall be evaluated by the Engineer. Following approval by the engineer, the Contractor will receive approval to proceed if conditions meet project requirements.

B. TRENCHES:

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.

2. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.

3. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.

4. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.

5. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.

6. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such disturbed subgrade to a minimum of 12 inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

7. The Contractor shall obtain a trench permit from the municipality where the trench is located prior to making any excavations of trenches (any subsurface excavation greater than three (3) feet in depth and fifteen (15) feet or less between soil walls as measured from the bottom).

8. All trenches required to be permitted must be attended, covered, barricaded, or backfilled. Covers must be road plates at least ¾-inch thick or equivalent, barricades must be fences at least 6-feet high with no openings greater than 4-inches between vertical supports and all horizontal supports required to be located on the trench-side of the fencing.

C. BUILDING AND FOUNDATION EXCAVATION:

1. Excavations shall not be wider than required to set, brace, and remove forms for concrete, or perform other necessary work.

2. After the excavation has been made, and before forms are set for footings, mats, slabs, or other structures, and before reinforcing is placed, all loose, disturbed, or unsuitable material shall be removed from the subgrade. Subgrades shall be proof-compacted in the presence of the Engineer using a vibratory drum roller or a fully loaded 10-wheel dump truck.

3. If, in the opinion of the Engineer, the existing material at subgrade elevation is unsuitable for structural support, the Contractor shall excavate and dispose of the unsuitable material to the required width and depth as required by the Engineer. If, in the opinion of the Engineer, filter fabric is required; the Contractor shall place filter fabric, approved by the Engineer, as per manufacturer's recommendations. The resulting area and all other low sections, holes, or depression shall be brought to the required grade with accepted material and the entire subgrade shaped to the required line, grade, and cross section and thoroughly compacted.

D. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.

2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.

3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. All subgrades must be observed and accepted by the Engineer prior to placement of backfill, concrete, or any structure over the subgrade.

2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.

3. The vertical and lateral limits of Structural Fill below proposed footings (the "zone of influence") shall be defined by a horizontal plane extending away from the outside edge of the footing or slab for two feet, then by a plane that slopes down and away from the foundation at a maximum 1H:1V slope to the natural inorganic soil subgrade.

4. Backfill Material: Unless otherwise specified or directed, material used for filling and backfilling shall meet the material requirements specified herein, and the following requirements:

   a. Common Fill for all unpaved areas around the site.

   b. Structural Fill within four feet of finished grade below proposed pavements or sidewalks.

   c. Common Fill below four feet of finished grade below proposed pavements or sidewalks.

   d. All backfill placed below the building footings, foundations, and slabs shall be Structural Fill within the Zone of Influence as defined herein.

   e. Underslab bedding material shall be Crushed Stone wrapped in Filter Fabric as specified herein.

5. The Contractor shall place and compact materials to the specified density in continuous horizontal layers, not to exceed nine (9) inches in thickness prior to compaction. The degree of compaction shall be based on maximum dry density as

determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

Area	ASTM Density Degree of Compaction
Within the Zone-of-Influence of foundations, slabs, and other structural features	95%
Pavement base course	95%
Pavement subgrade	95%
Common fill below pavement subbase	95%
Trench backfill - below pavements - below landscaped areas - below structures	95% 92% 95%
All other areas	92%

6. Compaction Control:

   a. In-place density tests shall be made in accordance with ASTM D1556, D2922, or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. In-place density testing shall be performed by the qualified testing agency engaged by the Contractor. Any corrective work required because of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. Additional in-place density testing shall be made at the Contractor's expense by the geotechnical testing agency.

   b. In-place density tests shall be performed at a minimum according to the following:
      i. One test per lift for each 5,000 square feet of fill below slabs
      ii. One test per lift within the Zone-of-Influence beneath each footing.
      iii. A minimum of one per 100 linear feet of trench.
      iv. One test per lift for each 10,000 square feet of parking lot, field, and sidewalk subgrade fill area.
      v. One test per lift for each 100 linear feet of roadway fills.

5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.

6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.

7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

8. Moisture Control:

   a. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise mixed and dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

   b. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

9. Unfavorable Conditions:

   a. In no case shall fill be placed over material that is frozen. In no case shall frozen soil or soil material containing frost, snow or ice be placed as backfill. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

   b. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

B. TRENCHES:

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings. Fill compaction shall meet the density requirements of this specification.

2. As soon as practicable after pipes have been laid, backfilling shall be started.

3. Unless otherwise indicated on the Drawings, backfill shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to

densities required. Backfill material in this zone shall be Structural Fill unless otherwise shown on the Drawings.

4. Water Jetting:

   a. Water jetting may be used when the backfill material contains less than 10 percent passing the number 200 sieve, but shall be used only if approved by the Engineer.

   b. Contractor shall submit a detailed plan describing the procedures he intends to use for water jetting to the Engineer for approval prior to any water jetting taking place.

   c. Compaction of backfill placed by water jetting shall conform to the requirements of this specification.

5. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the requirements for trench backfill, as shown on the drawings or specified herein.

6. Should the Engineer order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.

C. BACKFILLING ADJACENT TO STRUCTURES:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.

2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.

3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.04 DISPOSAL OF SURPLUS MATERIALS:

A. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or

shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.

B. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

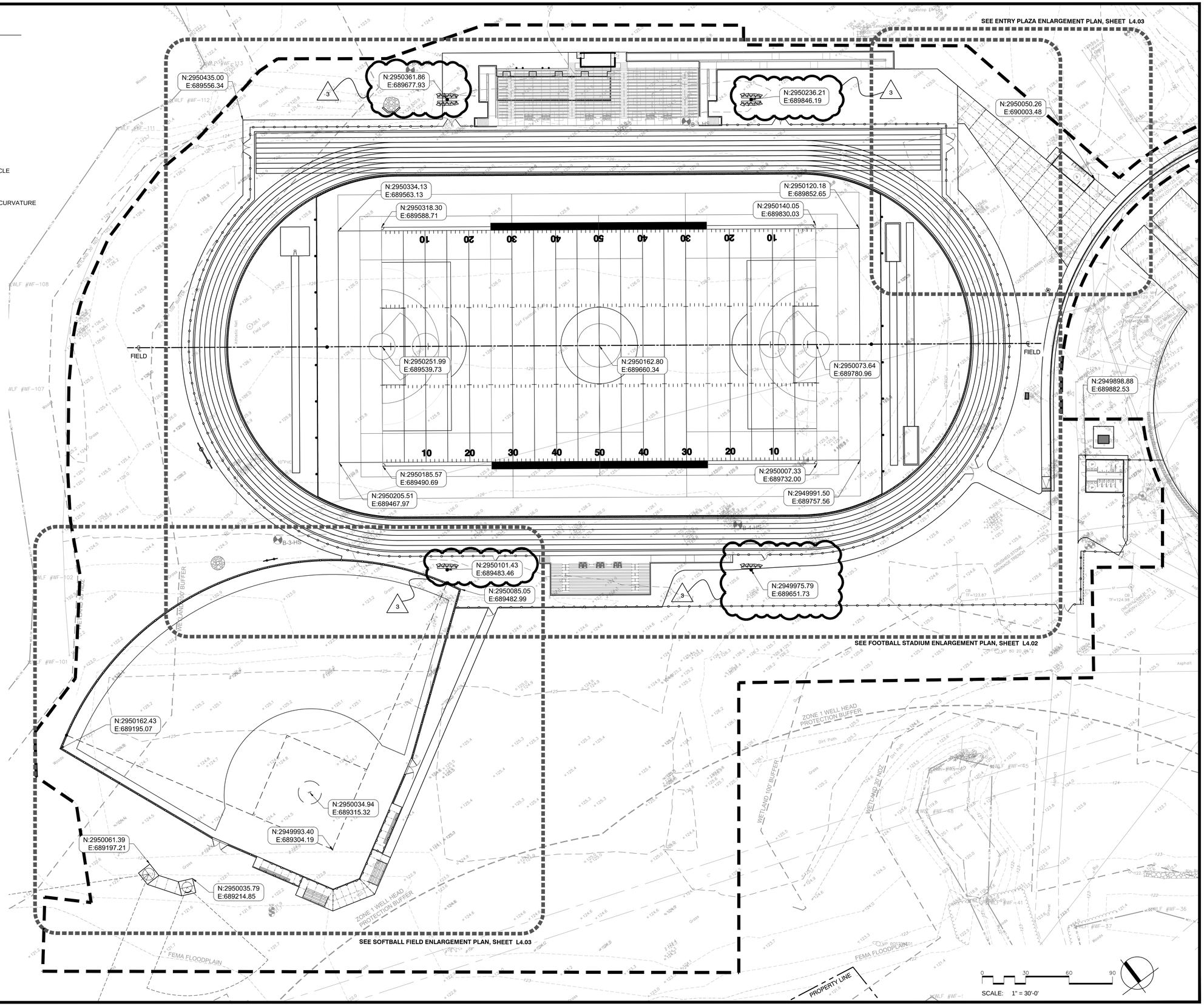
C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.

D. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

END OF SECTION

LEGEND

- PROPERTY LINE
- LIMIT OF WORK
- RXX' — RADIUS DIMENSION
- XX' — TYP. DIMENSION
- ⌒X-X' — TYP. ARC DIMENSION
- + CP — CENTER POINT
- CPC — CENTER POINT OF CIRCLE
- POB — POINT OF BEGINNING
- PC — POINT OF CURVATURE
- PCC — POINT OF COMPOUND CURVATURE
- PT — POINT OF TANGENCY
- ℄ — CENTER LINE



Project:

IMPROVEMENTS TO WAYLAND HIGH SCHOOL ATHLETIC FACILITIES

264 OLD CONNECTICUT PATH, WAYLAND, MA 01778

Weston & Sampson

85 Devonshire Street,
3rd Floor, Boston, MA 02109
617.412.4480 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description
3	10/10/18	ADDENDUM NO. 3

Issued For:

BIDDING DOCUMENTS

Scale:	AS SHOWN
Date:	SEPTEMBER 17, 2018
Drawn By:	CCC, DYF
Reviewed By:	BMK
Approved By:	ERB
W&S Project No:	2180076
W&S File No:	

Drawing Title:

LAYOUT PLAN ENLARGEMENT

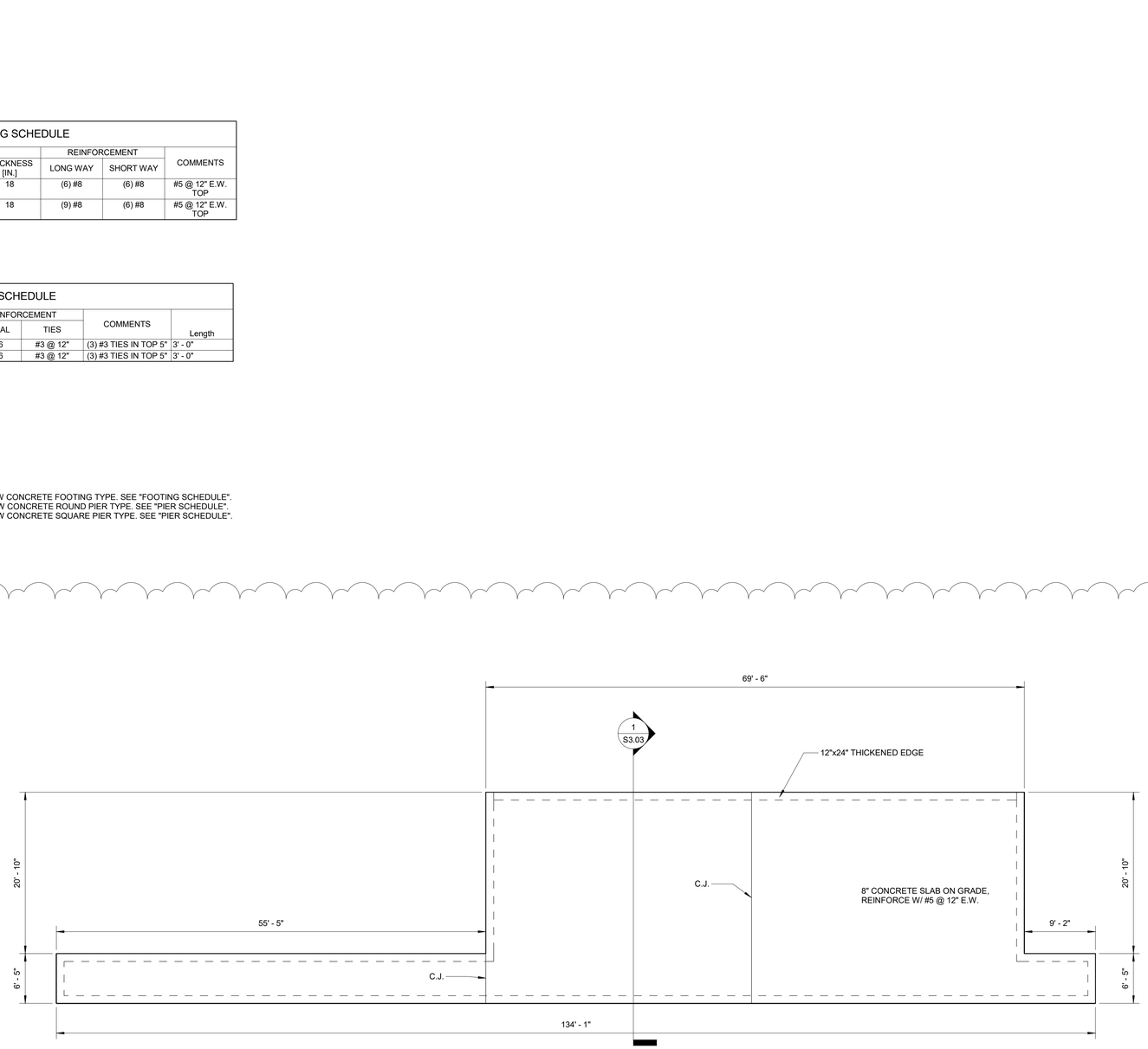
Sheet Number:

L4.01

FOOTING SCHEDULE						
MARK	DIMENSIONS			REINFORCEMENT		COMMENTS
	WIDTH [FT.]	LENGTH [FT.]	THICKNESS [IN.]	LONG WAY	SHORT WAY	
F6	6.0	6.0	18	(6) #8	(6) #8	#5 @ 12" E.W. TOP
F6x8	6.0	8.0	18	(9) #8	(6) #8	#5 @ 12" E.W. TOP

PIER SCHEDULE						
MARK	DIAMETER	T.O. PIER ELEVATION	REINFORCEMENT		COMMENTS	Length
			VERTICAL	TIES		
P1	1' - 8"	+0' - 0"	(10) #6	#3 @ 12"	(3) #3 TIES IN TOP 5"	3' - 0"
R20	1' - 8"	+0' - 0"	(10) #6	#3 @ 12"	(3) #3 TIES IN TOP 5"	3' - 0"

NOTES:
1. F# - INDICATES NEW CONCRETE FOOTING TYPE. SEE "FOOTING SCHEDULE".
2. R# - INDICATES NEW CONCRETE ROUND PIER TYPE. SEE "PIER SCHEDULE".
3. P# - INDICATES NEW CONCRETE SQUARE PIER TYPE. SEE "PIER SCHEDULE".



NOTE: COORDINATE LAYOUT AND DIMENSIONS WITH APPROVED BLEACHER SHOP DRAWINGS

1 VISITOR BLEACHER FOUNDATION PLAN

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

Project:

IMPROVEMENTS TO WAYLAND HIGH SCHOL ATHLETIC FACILITIES

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Consultants:

Revisions:

No.	Date	Description
3	10/10/18	VISITOR FOUNDATION

Issued For:

BIDDING DOCUMENTS

SCALE: AS NOTED

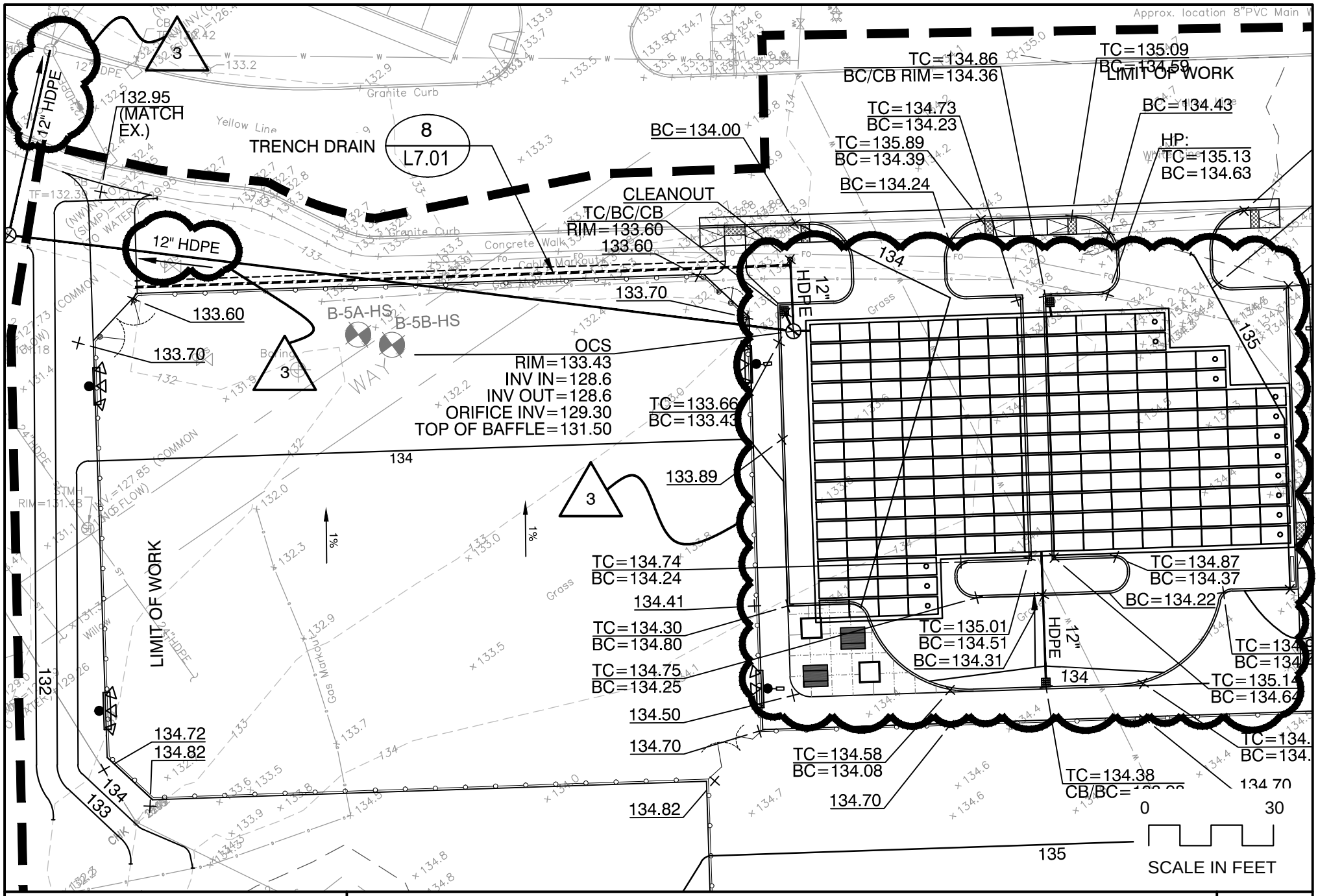
Date:	OCT. 9, 2018
Drawn By:	SAC
Reviewed By:	RAC
Approved By:	NMS
W&S Project No:	2180076
W&S File No:	

Drawing Title:

BLEACHER FOUNDATION PLANS II

Sheet Number:

S3.02



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IMPROVEMENTS TO WAYLAND HIGH SCHOOL
ATHLETIC FACILITIES

12" HDPE PIPE CLARIFICATION AND
INFILTRATION SYSTEM LAYOUT

Drawn by: CC

Approved by BK

Scale As Shown

10/10/18

SK-1

Control System Summary

Project Specific Notes:

Project Information

Project #:	126964
Project Name:	Wayland High School Multi Fields
Date:	07/20/18
Project Engineer:	MRoake
Sales Representative:	Mike Berry
Control System Type:	Control and Monitoring
Communication Type:	Digital Cellular
Scan:	126964C
Document ID:	126964P1V3-0720120504
Distribution Panel Location or ID:	Wayland High School
Total # of Distribution Panel Locations for Project:	1
Design Voltage/Hertz/Phase:	480/60/3
Control Voltage:	120

Equipment Listing

DESCRIPTION	APPROXIMATE SIZE
1.Control and Monitoring Cabinet	24 X 72
2.Control and Monitoring Cabinet	24 X 48

	QTY	SIZE
Total Contactors	20	30 AMP
Total Off/On/Auto Switches:	7	

Materials Checklist

Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone Chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

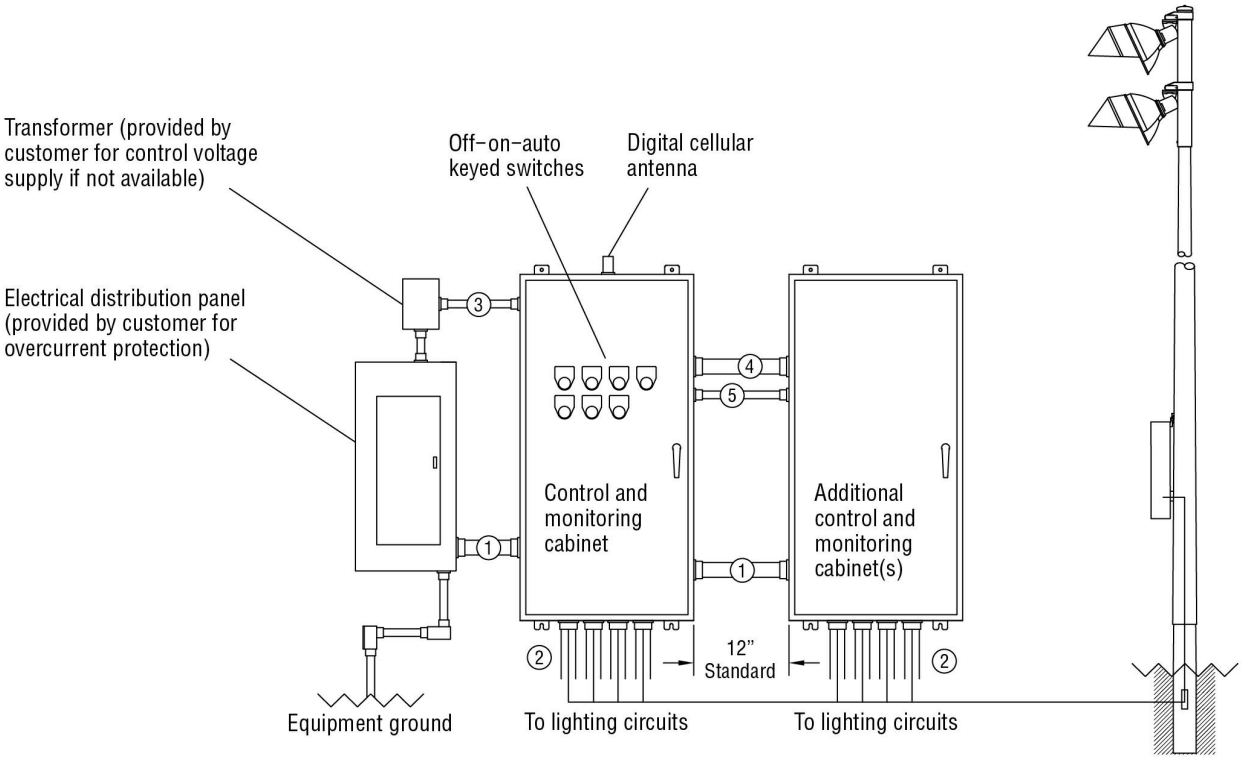
Call Control-Link Central ™ operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours

IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaires come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor is 0.9.

NOTE: Refer to Installation Instructions for more details on equipment information and the installation requirements

Control•Link® Control and Monitoring System



Wire	Description	# of Wires	Typ. Wire Size (AWG)	Max. Wire Length (FT)	Wire from Musco	Notes
1	Line power to contactors, and equipment grounding conductor	Note A	Note B	27	No	A – E
2	Load power to lighting circuits	Note A	Note B	N/A	No	A – D
3	Control power (dedicated, 20A)	3	12	N/A	No	C, D
4	Control harnesses	Note F	– –	8*	Yes*	C, D, F
5	Communication cable (RS – 485)	1	– –	8*	Yes*	C, D

R60-33-00_C

Notes:
A. Voltage and phasing per the notes on cover page.
B. Calculate per load and voltage drop.
C. Minimum conduit diameter.
   a. Wire 4 requires 2" (for connector ends to pass through).
   b. Wire 5 requires 1" (for connector ends to pass through).
   c. All other conduit diameters should be per code.
D. Refer to control and monitoring system installation instructions for more details on equipment information and the installation requirements.
E. Contact Musco if maximum wire length from circuit breaker to contactor exceeds value in chart.
F. Number of wires = 6 power wires + 2 wires per zone (see circuit summary by zone chart for the number of zones).

IMPORTANT: Communication wire (5) must be in separate conduit from any AC power wiring (1, 2, 3, 4). Control (3, 4) wires must be in separate conduit from line and load power wiring (1, 2).

*Musco supplied wire harnesses are provided in standard 8-foot lengths.

Control System Summary

SWITCHING SCHEDULE

Field/Zone Description	Zones
Football	1
Soccer	1
Track	2
Home	3
Visitor	4
Tennis	5
Parking	6
Basketball	7

CONTROL POWER CONSUMPTION	
120V Single Phase	
VA loading of Musco Supplied Equipment	INRUSH: 5503.0
	SEALED: 625.8

CIRCUIT SUMMARY BY ZONE

POLE	CIRCUIT DESCRIPTION	# OF FIXTURES	# OF DRIVERS	*FULL LOAD AMPS	CONTACTOR SIZE (AMPS)	CONTACTOR ID	ZONE
F1	Football	12	12	**19.1**	30	C1	1
F2	Football	12	12	**19.1**	30	C2	1
F3	Football	13	13	**21.7**	30	C3	1
F4	Football	13	13	**21.7**	30	C4	1
F1	Track	2	2	**5.1**	30	C5	2
F2	Track	2	2	**5.1**	30	C6	2
F3	Track	2	2	**5.1**	30	C7	2
F4	Track	2	2	**5.1**	30	C8	2
F1	Home	1	1	**1.3**	30	C9	3
F2	Home	1	1	**1.3**	30	C10	3
F3	Visitor	1	1	**1.3**	30	C11	4
F4	Visitor	1	1	**1.3**	30	C12	4
T1	Tennis	2	2	**5.1**	30	C13	5
T2	Tennis	2	2	**5.1**	30	C14	5
T3	Tennis	2	2	**5.1**	30	C15	5
T4	Tennis	2	2	**5.1**	30	C16	5
T2	Parking	1	1	**0.2**	30	C17	6
T3	Parking	1	1	**0.2**	30	C18	6
BA1	Basketball	4	2	**5.1**	30	C19	7
BA2	Basketball	4	2	**5.1**	30	C20	7

*Full Load Amps based on amps per driver.

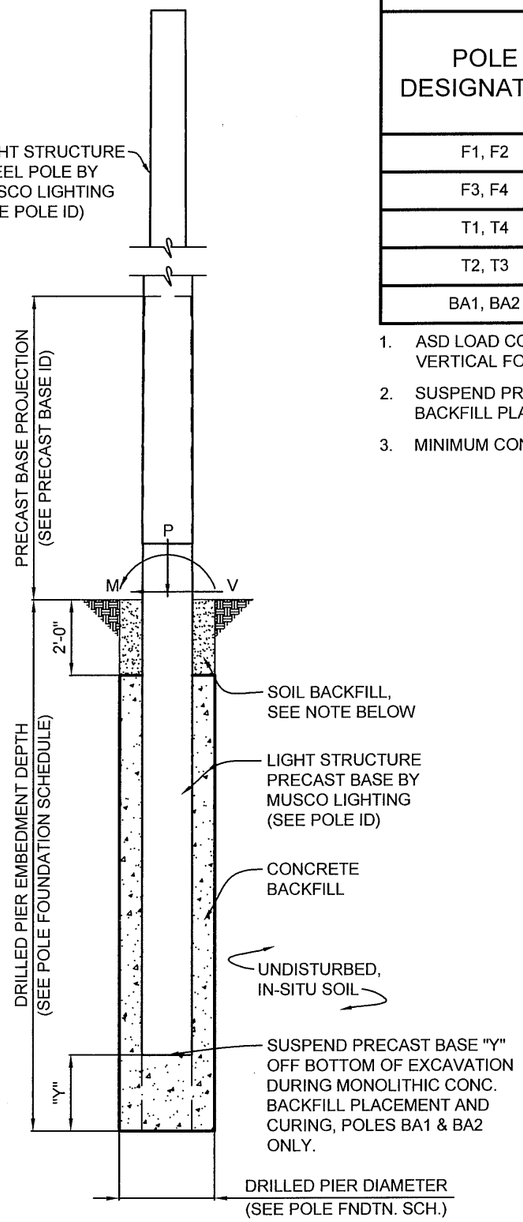
Control System Summary

PANEL SUMMARY

CABINET #	CONTROL MODULE LOCATION	CONTACTOR ID	CIRCUIT DESCRIPTION	FULL LOAD AMPS	DISTRIBUTION PANEL ID (BY OTHERS)	CIRCUIT BREAKER POSITION (BY OTHERS)
1	1	C1	Pole F1	19.14		
1	1	C2	Pole F2	19.14		
1	1	C3	Pole F3	21.70		
1	1	C4	Pole F4	21.70		
1	1	C5	Pole F1	5.13		
1	1	C6	Pole F2	5.13		
1	1	C7	Pole F3	5.13		
1	1	C8	Pole F4	5.13		
1	1	C9	Pole F1	1.28		
1	1	C10	Pole F2	1.28		
1	1	C11	Pole F3	1.28		
1	1	C12	Pole F4	1.28		
2	1	C13	Pole T1	5.13		
2	1	C14	Pole T2	5.13		
2	1	C15	Pole T3	5.13		
2	1	C16	Pole T4	5.13		
2	1	C17	Pole T2	0.24		
2	1	C18	Pole T3	0.24		
2	1	C19	Pole BA1	5.13		
2	1	C20	Pole BA2	5.13		

ZONE SCHEDULE

			CIRCUIT DESCRIPTION	
ZONE	SELECTOR SWITCH	ZONE DESCRIPTION	POLE ID	CONTACTOR ID
Zone 1	1	Football	F1 F2 F3 F4	C1 C2 C3 C4
Zone 2	2	Track	F1 F2 F3 F4	C5 C6 C7 C8
Zone 3	3	Home	F1 F2	C9 C10
Zone 4	4	Visitor	F3 F4	C11 C12
Zone 5	5	Tennis	T1 T2 T3 T4	C13 C14 C15 C16
Zone 6	6	Parking	T2 T3	C17 C18
Zone 7	7	Basketball	BA1 BA2	C19 C20



POLE FOUNDATION ELEV.

SCALE: NOT TO SCALE

SOIL BACKFILL NOTE:
THE TOP TWO FEET OF ANNULUS SHALL BE BACKFILLED WITH SOIL, WITH A CLASSIFICATION OF CLASS 5 (TABLE 1806.2) OR BETTER. COMPACTION, 95% FOR COHESIVE SOIL AND 98% FOR A COHESIONLESS SOIL BASED UPON STANDARD PROCTOR TESTING (ASTM D698).

POLE FOUNDATION SCHEDULE

POLE DESIGNATION	FORCES (1.)			DRILLED PIER			
	MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS	DIAMETER INCHES	EMBEDMENT DEPTH	SUSPENSION "Y" (2.)	CONCRETE BACKFILL YD^3 (3.)
F1, F2	191,484	3,471	4,551	36	18'-0"	NA	2.9
F3, F4	295,653	4,637	7,124	36	20'-0"	NA	2.7
T1, T4	27,270	911	818	36	10'-0"	NA	1.9
T2, T3	28,319	935	898	36	10'-0"	NA	1.9
BA1, BA2	20,203	724	611	36	9'-0"	1'-0"	1.8

1. ASD LOAD COMBINATION D + 0.6W.
   VERTICAL FORCE IS WEIGHT OF DRESSED POLE (DOES NOT INCLUDE PRECAST BASE WEIGHT)
2. SUSPEND PRECAST BASE "Y" OFF THE BOTTOM OF THE EXCAVATION DURING MONOLITHIC CONCRETE BACKFILL PLACEMENT AND CURING. NA = NOT APPLICABLE, SUSPENSION NOT REQUIRED.
3. MINIMUM CONCRETE BACKFILL VOLUME, SITE CONDITIONS MAY REQUIRE ADDITIONAL BACKFILL.

PRECAST BASE IDENTIFICATION

PRECAST BASE TYPE	PRECAST BASE WEIGHT	PRECAST BASE LENGTH	PROJECTION ABOVE GRADE	STANDARD EMBEDMENT	OUTSIDE DIAMETER
1B	920 LBS	15'-2"	7'-2"	8'-0"	9.56"
2B	1,690 LBS	17'-3"	7'-3"	10'-0"	12.00"
6B	6,930 LBS	26'-1"	8'-1"	18'-0"	20.56"
7B	10,160 LBS	27'-10"	7'-10"	20'-0"	23.75"

POLE IDENTIFICATION

POLE DESIGNATION	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIX. PER XARM)	FIXTURE AND ACCESSORIES EPA (FT^2)
F1, F2	LSS80C	6B	15 (6+6)	43.5
F3, F4	LSS90C	7B	21 (7+7) / (4)	62.0
T1, T4	LSS50AB	2B	2 (2)	6.0
T2, T3	LSS50AB	2B	3 (2)	6.8
BA1, BA2	LSS40A	1B	4 (4)	8.5

- POLES F1 - F4 HAVE ONE MUSCO LED FIXTURE AT 50'-0" AGL INCLUDED ABOVE.
- POLES T2 & T3 HAVE ONE CREE OSQ FIXTURE AT 40'-0" AGL INCLUDED ABOVE.
- POLES F1 - F4 HAVE TWO MUSCO LED FIXTURES AT 15'-0" AGL INCLUDED ABOVE.

DESIGN NOTES

DESIGN PARAMETERS:
WIND: V_{ult} = 126 MPH, V_{asd} = 98 MPH (EXPOSURE C, RISK CATEGORY II) PER MASSACHUSETTS STATE BUILDING CODE - 780 CMR, 9TH EDITION (IBC 2015 / ASCE 7-10).

GEOTECHNICAL PARAMETERS:
ALLOWABLE END BEARING SOIL PRESSURE: 4,000 PSF
ALLOWABLE LATERAL SOIL BEARING PRESSURE:
0 PSF/FT (GRADE TO -2'-0"); 200 PSF/FT (BELOW -2'-0")
IN ACCORDANCE WITH MASSACHUSETTS STATE BUILDING CODE - 780 CMR, 9TH EDITION, CHAPTER 18.

DESIGN SOIL PARAMETERS ARE AS NOTED. ACTUAL ALLOWABLE SOIL PARAMETERS MUST BE VERIFIED ON SITE. REFERENCE SOILS AND FOUNDATION REPORT, NO. 2180076, PREPARED BY WESTON & SAMPSON; PEABODY, MA.

A GEOTECHNICAL ENGINEER OR REPRESENTATIVE OF IS RECOMMENDED (NOT REQUIRED) TO BE AVAILABLE AT THE TIME OF THE FOUNDATION INSTALLATION TO VERIFY THE SOIL DESIGN PARAMETERS AND TO PROVIDE ASSISTANCE IF ANY PROBLEMS ARISE IN FOUNDATION INSTALLATION.

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY OCCUR. POLE FOUNDATIONS WILL NEED TO BE ANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST. IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY. REVISIONS WILL BE ANALYZED PER RECOMMENDATIONS DIRECTED BY A REGISTERED ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND CONCRETE BACKFILL PLACEMENT. TEMPORARY CASINGS OR DRILLERS SLURRY MAY BE USED TO STABILIZE THE EXCAVATION DURING INSTALLATION. CASINGS MUST BE REMOVED DURING CONCRETE BACKFILL PLACEMENT. CONCRETE BACKFILL MUST BE PLACED WITH A TREMIE WHEN SLURRY OR WATER IS PRESENT WITHIN THE EXCAVATION OR WHEN THE FREE DROP EXCEEDS 6'-0".

CONTRACTOR MUST BE FAMILIAR WITH THE COMPLETE SOIL INVESTIGATION REPORT AND BORINGS, AND CONTACT THE GEOTECHNICAL FIRM (IF NECESSARY) TO UNDERSTAND THE SOIL CONDITIONS AND THE POSSIBILITY OF GROUND WATER PUMPING AND EXCAVATION STABILIZATION OR BRACING DURING PRECAST BASE INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL.

CONCRETE:
CONCRETE SHALL BE AIR-ENTRAINED AND HAVE A MINIMUM COMPRESSIVE DESIGN STRENGTH AT 28 DAYS OF 3,000 PSI. 3,000 PSI CONCRETE SPECIFIED FOR EARLY POLE ERECTION, ACTUAL REQUIRED MINIMUM ALLOWABLE CONCRETE STRENGTH IS 1,000 PSI. ALL PIERS AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM UNDISTURBED SOIL.

GENERAL NOTES:
FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION. ENGINEER MUST BE NOTIFIED IF FOUNDATIONS ARE NEAR ANY RETAINING WALLS OR WITHIN / NEAR ANY SLOPES STEEPER THAN 3H : 1V. POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS AND INSTALLATION PER MUSCO LIGHTING.

COMMONWEALTH OF MASSACHUSETTS
KYLE G. LACINA
STRUCTURAL
No. 46148
REGISTERED PROFESSIONAL ENGINEER
10-5-2018

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DRAWING TITLE: POLE AND FOUNDATION
SCALE: SEE PLAN
NOTES: SCAN #126964F

PROJECT NUMBER 126964

DATE 05 OCTOBER 2018

DRAWING NUMBER C1
OF ONE