CITY OF WORCESTER, MASSACHUSETTS

Administration & Finance
Purchasing Division
455 Main Street – Room 201
Worcester, MA 01608
(508) 799-1220
www.worcesterma.gov

August 18, 2023

To: All Bidders

Subject: **Bid No. 8055-M4, East Park Improvements – Little League Field / DPWP**

ADDENDUM NO. 2

To Whom It May Concern:

- **BID DUE DATE EXTENDED TO FRIDAY, AUGUST 25, 2023 AT 10:00 AM**

- **PLEASE SEE ATTACHED GENERAL BID CLARIFICATIONS**

Bidders are requested to acknowledge and/or include this addendum with bid. All other terms, conditions and specifications remain unchanged.

Very truly yours,

Christopher J. Gagliastro
Purchasing Director

ADDENDUM NUMBER TWO

Date: **August 18, 2023**
Project: **East Park Improvements – Little League Field**
City of Worcester Dept. of Public Works and Parks; Parks, Recreation and Cemetery Div.

General Bid Clarifications:

a. Article 41, Security Camera Appurtenances, Item b: delete 1000 LF and replace with 1500 LF.
b. Furnish and install dedicated continuously powered duplex or circuit at the six LPs (light poles) for security camera usage. Coordinate location and height with Owner.
c. Furnish and install dedicated circuit to the dugout lights, score board and parking lot lights. Install scoreboard remote transmitter in the electrical cabinet.
d. Communication HH (24"x36"x36") and electrical HH (12"x24") shall be as per attached shop drawing from South Worcester Playground Project, approved 08-14-2018 or approved equal.
e. Size of HDPE pipe for security cameras is 2.0", sweep from comm HH to light pole base is 1.5".
f. **Single "home run"** routing of security camera 2.0" HDPE pipe and horizontal fiber optic cable shall begin at LP-P2, LP-P1, LP-A2, LP-A1, LP-B1, LP-B2 and to electrical cabinet, route to remain outside of ballfield of play.. Horizontal fiber optic shall be a continuous/single cable run from LP-P2 to electrical cabinet.
g. Furnish and install one 2.0" HDPE pipe, one 24x36 comm HH and required sweeps from riser pole #7 to electrical cabinet for future cable service.
h. Furnish and install one communication and one electrical HH and required conduit at base of the six LPs. Furnish and install and one communication HH and required conduit at base electrical cabinet.
i. Parking lot and dugout light circuit to be connected to Musco controller.
j. Parking lot light pole and fixture revised catalog number:
    i. **SSA 2055G D1 R2 BK 1 HZ08BOWBK RFD197740**
    ii. Description - (SSA2055G) Square Straight Aluminum Pole 20FT, 5.0 Square x .188 Wall: SSA2055G 5.0 Square, Drilling for 1 Unit, 2 hole drill pattern 5.00 from top, Black Paint, Anchor Bolts, Festoon Box located at pole top, location the festoon box to be provided by customer at time of order. GFCI receptacle is provided by others. Fixture is ATB0 EPA .76 Weight 14 lbs. Pole criteria 90 MPH, AASHTO 2009.
    iii. HZ08BOWBK - Non decorative horizontal arm 8 inches 1 unit - 2 hole drill pattern "W" for SSA poles, black finish. Special: Festoon box located at pole top.
k. Delete Sheets:
    i. C3.1 and C7.6, dated 08/07/2023 and E-1, dated 07/25/23 and replace with C3.1 and C7.6, dated 08/16/2023 and E-1, dated 08/16/23.
l. Delete:
    i. Specification Section 26000 Electrical, dated June 2023 and replace with Specification Section 26000 Electrical, dated July 26, 2023.

General Bid Questions:

Question1: Where can the detail and specifications for the 8x16' scoreboard be found?
Answer: **Scoreboard to be Daktronics BA-2518 (4'x9') or approved equal on 4'x12'concrete pad. With 1'x 9' Ad panel at top and 2'x9' Ad panel on bottom. Lettering shall read City of Worcester at top panel, Cristoforo Colombo Park at bottom panel. Shop drawings to be submitted for review prior to ordering.**
Question2: Is repair of the existing basketball court only required if damaged by the contractor? Or are the repairs to be made regardless?
Answer: **Only if damaged by the Contractor.**
Question3: Is there a new park sign included in this bid?
Answer: **No**
Question4: Has a Geotech report been completed within the ball field Limits?
Answer: **Report Attached.**

Attachments:

Geotechnical Engineering Report (34 pages)
Section 260000 Electrical Specification (11 pages)
Project Standard Handholes (7 pages)
Dwg Sheet C3.1 – Layout and Materials Plan
Dwg Sheet C7.6 – Site Details #6
Dwg Sheet E-1 – Site Plan (Electrical)
Musco Lightpole Foundation Plans (3 sheets)

END OF ADDENDUM TWO

NORTHEAST
GEOTECHNICAL, INC.
Delivering Practical Engineering Solutions

GEOTECHNICAL ENGINEERING REPORT
PROPOSED LIGHT TOWERS AND FIELD RENOVATIONS
EAST PARK
SHREWSBURY STREET
WORCESTER, MASSACHUSETTS

Prepared For:
Beals and Thomas, Inc.
144 Turnpike Road
Southborough, MA 01772

Prepared By:
Northeast Geotechnical, Inc.
166 Raymond Hall Drive
North Attleborough, MA 02760

Project No. O372.00
November 27, 2019

NORTHEAST GEOTECHNICAL, INC.
Delivering Practical Engineering Solutions

November 27, 2019 Project No. O372.00

David J. LaPointe, RLA, LEED AP, CPSI
Principal
Beals and Thomas, Inc.
144 Turnpike Road
Southborough, MA 01772

SUBJECT: Geotechnical Engineering Report
Proposed Light Towers and Field Renovations
East Park
Shrewsbury Street
Worcester, MA

Dear Dave:

Northeast Geotechnical, Inc. is pleased to present this report summarizing the results of our geotechnical engineering studies for the proposed light tower installation and field renovations project located at East Park in Worcester, Massachusetts. Our services have been performed in accordance with our proposal to you dated October 17, 2019.

Our objective has been to develop geotechnical engineering recommendations for use by the project team in design and construction of the light tower foundations and field renovations. We accomplished our objective in part by coordinating, observing and logging one day of subsurface exploratory soil test borings in the area of the proposed light towers and three subsurface exploratory test pit excavations in the area of field renovations in order to assess the existing subsurface soil, bedrock and groundwater conditions.

BACKGROUND

The City of Worcester is proposing to renovate a Little League size baseball field at East Park. The plans include moving the field slightly south and west, closer to and potentially into an existing hillside to increase the outfield area. The City is also planning to add sports lighting for the field.

Beals and Thomas, Inc. (BTI) has been selected to provide design phase services for the project. BTI anticipates there will be four sports light towers around the proposed field. BTI provided a worksheet plan showing the location of the proposed renovated field with four proposed light tower locations.

The current Little League field is located on the western side of East Park to the north of Risso Court. Existing ground surface within the existing field appears to range between approximate Elevations 471 and 467 feet gently sloping down from west to east. The area to the south and west where the field

may be moved is currently wooded and more steeply sloping from approximate Elevation 471 feet up to about Elevation 480 feet beyond which to the west is a steep, exposed rock face. It appears that the proposed third base dugout is shown to be within 10 feet of the rock face. The plans provided do not show the ground surface elevations at the top of the rock face.

SUBSURFACE EXPLORATORY SOIL TEST BORINGS

BTI provided a plan showing approximate locations of four light towers proposed for the field. Four soil test borings (B-1 to B-4) were advanced on November 12, 2019 by Soil X, Corporation of Leominster, Massachusetts. Two of the test borings, B-2 and B-3 were moved further east than the proposed light towers due to the steep terrain and woods. Test borings B-1 and B-4 were performed at the approximate proposed light tower locations. The borings were observed and logged by Northeast Geotechnical, Inc. personnel.

The borings were located in the field based on taping and pacing from existing site features. The locations shown on the Subsurface Exploration Location Plan (Figure No. 1 attached to this report) should be considered very approximate only.

The soil test borings were performed using an off-road, ATV mounted test boring rig advancing 4.25± inch inside diameter hollow stem augers to depths of about 11.5± to 32± feet below existing ground surface grades. Test boring B-2 terminated on a refusal condition which in our opinion is probably representative of natural bedrock at the site. The other three test borings terminated in apparent natural soils.

Standard Penetration Tests (SPTs) were generally performed at approximate 5-foot intervals or less. This testing was conducted by driving a 2 inch outside diameter standard split spoon sampler a distance up to 24 inches at each sampling depth by blows of a 140-pound automatic trip safety hammer falling 30 inches.

The soil samples retrieved in the split spoon sampler during each SPT were visually described in the field using Burmister's soil descriptions. The visual descriptions, the hammer blow counts required to drive the split spoon sampler during the penetration testing, and other observations are shown on the boring logs attached to this report. Note that the soil descriptions of the split spoon samples are generally representative of the minus 1.4± inch size fraction of the overall soil deposits sampled. This is the approximate inside diameter of the split spoon sampler.

SUBSURFACE EXPLORATORY TEST PITS

The Worcester Department of Public Works and Parks (DPW&P) provided a John Deere 301SG rubber-tire backhoe to excavate test pits along the steeper slope towards the exposed rock face west and south of the existing field. Beals and Thomas, Inc. selected approximate locations of the test pits and a Northeast Geotechnical, Inc. representative observed and logged the test pits. Each of the three test pits terminated on refusal conditions in moderately weathered bedrock at depths of approximately six to eight feet below ground surface.

LABORATORY SOIL TESTING

A laboratory testing program was performed to assess the geotechnical engineering characteristics of the soils encountered in the test borings. The testing included sieve analyses on samples of the natural granular soils as well as Atterberg Limits tests on samples of the natural fine-grained soils.

The test results are attached to this report. Note that these samples are from a split spoon sampler with an inside diameter of about 1.4± inches. Therefore, the results do not reflect particle sizes larger than this that might be present.

GENERAL SUBSURFACE SOIL, ROCK AND GROUNDWATER CONDITIONS

The generalized subsurface conditions vary between the hillside to the west of the existing baseball field layout and the existing baseball field layout to the east.

The three test pits and test boring B-2 performed within the hillside contained generally less than one foot of topsoil fill overlying subsoil-like fill and then more granular/urban fill extending to depths of approximately 3± to 4.5± feet below ground surface. The granular/urban fill was then underlain by a discontinuous layer of very dense, natural, glacial till soil and then weathered bedrock followed by possibly more intact bedrock.

The granular/urban fill appeared to generally consist of fine to medium sand, 20± to 50± percent silt, 5± to 35± percent fine to coarse gravel, 5± to 15± percent cobbles, and 5± to 20± percent debris consisting of brick, plastic, newspaper, glass, ash and roots.

The granular/urban fill was observed to be underlain by medium dense to very dense, natural, glacial till soil extending up to approximately 5± to 10± feet below ground surface in test pit TP-2 and test boring B-2. The glacial till soil was observed to generally consist of a heterogenous mixture of fine to coarse sand, fine to coarse gravel, and silt size particles along with less than 10± percent cobbles. Test pit TP-2 and test boring B-2 were performed toward what will be the infield area and the third base dugout portion of the proposed field.

Test pit TP-1 (performed in the outfield area of the proposed field) and test pit TP-3 did not encounter glacial till soils underlying the granular fill. Each of the three test pits terminated in apparent weathered bedrock at depths of approximately 6± to 8± feet below ground surface. Test boring B-2 also encountered a refusal to further penetration condition at approximately 11.5± feet below ground surface. This refusal condition could be weathered bedrock or more intact bedrock.

Test borings B-1, B-3 and B-4 were performed away from the toe of the hillside slope in the area of the site which is more nearly graded like the current baseball field. Here, the profile varied substantially from the hillside. The fill appeared to be thicker than on the hillside and appeared to contain more debris and is referred to as urban fill on the logs. Also, neither natural glacial till nor weathered bedrock was encountered in these three test borings to the depths explored.

The urban fill was observed to typically consist of brown to black, fine to coarse sand, 10± to greater than 50± percent coarse gravel, 25± to 50± percent silt, and varying amounts of red brick, asphalt, plastic, metal, wood and coal ash. The urban fill is typically considered loose.

Natural sand was observed at a depth of approximately 5± feet below ground surface extending to the depth explored in test boring B-1 which was approximately 27± feet below ground surface. The natural sand typically is considered medium dense (based on the SPT) and generally consisted of fine to coarse sand, with up to 15± percent fine gravel, and 10± to 15± percent silt.

The urban fill in test borings B-3 and B-4 was observed to extend approximately 10± feet below ground surface. The urban fill appeared to be underlain by natural organic soils consisting of very soft silty peat extending to depths of approximately 11± to 12± feet below ground surface.

Then, natural sands and silts were encountered to the depth explored in test boring B-3 which was approximately 32 feet below ground surface. These natural granular soils are considered loose to medium dense based on the SPT.

Loose to medium dense, natural fine sands and silts were encountered below the peat in test boring B-4 to an approximate depth of 20 feet below ground surface. Then, very soft natural silt and clay was encountered extending possibly to approximately 30 feet below ground surface. Test boring B-4 appeared to encounter some medium dense fine sand and silt below the very soft silt and clay at the bottom of the test boring at about 30± feet below ground surface. It is not clear if this sand and silt layer is a change in stratum or a layer within the very soft silt and clay.

Groundwater was not encountered to the depths explored in the hillside subsurface explorations (test pits TP-1 through TP-3 and test boring B-2). Groundwater was encountered in the test borings performed to the east of the hillside at depths of approximately 10± to 11± feet below ground surface. Groundwater levels should be expected to fluctuate due to variations in temperature, precipitation, and other factors. Therefore, groundwater levels at any time could be different than the groundwater levels reported herein.

CONCLUSIONS AND RECOMMENDATIONS

Our geotechnical engineering conclusions and recommendations for design and construction of the light tower foundations and for earthwork associated with the revised baseball field are presented below. Our conclusions and recommendations are subject to the attached Limitations and Service Constraints.

Light Pole Foundation Design Recommendations

Plans provided by BTI showed four proposed light towers for the new baseball field alignment: two on the hillside – one by the third base dugout and the other near the left field corner; and two to the east of the hillside – one by the first base dugout and the other near the right field corner. It appears that one light tower will be located near test pit TP-2 and test boring B-2; one will be located between test pit TP-1 and test boring B-1 but more on the hillside than B-1; one will be located near test boring B-3 and another near test boring B-4.

We anticipate that a cut will need to be made into the hillside to reach the field level. The cut in the area of the proposed light towers on the western side of the field may be on the order of 5 feet. We anticipate the ground surface in the area of the proposed light towers on the western side of the field may consist of natural glacial till soils or weathered bedrock.

Here, consideration could be given to constructing mat type foundations to support the light towers rather than trying to advance drilled shaft foundations into the weathered rock. The mat foundation should be designed to extend to four feet below surrounding ground surface for frost protection assuming the excavation terminates in weathered rock. If, however, intact bedrock is encountered at or below bottom of foundation, then the excavation may terminate at shallower depth but not less than three feet below ground surface. The mass of the mat foundation should be designed to be sufficient to withstand the overturning moments of the light tower. Consideration may be given to pinning the foundation to intact rock to resist overturning.

A minimum of 6 inches of ¾-inch crushed stone should be placed and compacted over the weathered rock to proposed bottom of footing. The compaction should be performed by making a minimum of 6 passes with vibratory plate type compactors. Foundations bearing on weathered bedrock or natural undisturbed glacial till may be designed using an allowable bearing capacity of four tons per square foot.

If the left field light tower is shifted further to the east and away from the hillside, then subsurface conditions may consist of urban fill soil overlying natural sands as seen in test boring B-1. Light towers proposed at the first base dugout and the right field corner are anticipated to encounter subsurface conditions as observed in test borings B-3 and B-4. These test borings indicated a profile of urban fill overlying natural compressible organics and then natural fine sand and silt underlain by natural silt and clay.

We recommend that foundations for the light towers to be installed away from the hillside be designed and constructed as drilled shaft foundations which are constructed using poured-in-place, reinforced concrete. Drilled shafts are typically advanced with temporary casing to maintain sidewall stability as the shafts are advanced. The casing is withdrawn as concrete and reinforcing are installed so that the concrete makes contact with the surrounding soil.

Drilling below the groundwater level may also require the use of drilling mud (typically a bentonite slurry). The drilling mud should be kept at a sufficient level above the groundwater table to maintain a positive head and reduce the possibility of base heave.

An installation contractor experienced in these types of installations is highly recommended and considered essential to the success of the project. The casing design and the bentonite slurry design should be performed by the drilling contractor with review by this office.

We recommend that the drilled shaft foundations extend through the existing urban fill and the soft silty peat extending to the underlying natural soils. In addition, the peat soils should be ignored in terms of providing frictional support to the proposed drilled shaft foundation system.

For a drilled shaft foundation system, we recommend the following average soil parameters be used in design:

Urban Fill

- Dry soil unit weight – 110 pcf
- Angle of internal friction - 28º

Natural Sand

- Allowable soil bearing capacity – 1,500 psf
- Dry soil unit weight – 110 pcf
- Angle of internal friction - 30º

Natural Sand and Silt as well as Natural Silt

- Allowable soil bearing capacity – 1,000 psf
- Dry soil unit weight – 100 pcf
- Angle of internal friction - 28º

Natural Silt and Clay

- Allowable soil bearing capacity – 750 psf
- Dry soil unit weight – 100 pcf
- Allowable undrained shear strength – 250 psf

We are of the opinion that if the light tower foundation base in the area of test boring B-4 is terminated in the natural sand and silt or the natural silt and clay that settlements on the order of 6 inches may occur unless the shafts are designed to provide axial resistance solely in friction along the sides of the shaft ignoring any base resistance.

We recommend that consideration be given to advancing the light tower base below the silt and clay deposit encountered in test boring B-4. Furthermore, consideration should be given to performing an additional, deeper test boring in the area of B-4 to assess the presence of granular soils and/or bedrock below the silt and clay stratum.

A design groundwater level of 8 feet below ground surface should be utilized in addition to the soil parameters provided.

Field Construction Recommendations

We anticipate that a cut will need to be made into the hillside to reach the field level. The cut in the western side of the field may be on the order of 5 feet. We anticipate the cut in this area may terminate in natural glacial till soils or weathered bedrock. We recommend that if cuts terminate in weathered or intact bedrock, that the rock be removed a minimum of 24 inches below finish playing surface grade.

The rock surface should be assessed by geotechnical engineering personnel to develop an opinion or whether an initial choking layer of crushed stone should be placed over voided, weathered rock. An initial lift of ¾ inch crushed stone should be placed if voided, weathered rock is observed. Crushed stone if needed, or the surface of the weathered rock, if not voided, should be compacted by making a minimum of 6 passes with a self-propelled vibratory drum compactor having a minimum drum weight of 10,000 pounds.

The excavations should be backfilled with controlled, 12-inch maximum thick lifts of structural fill. Each lift of fill should be compacted to at least 90 percent of the fill material's maximum dry density as determined by ASTM D-1557. Excavated on-site glacial till can be reused as compacted backfill provided the material is non-frozen, free of particles over 6 inches in size and the material is at suitable moisture content to be placed and compacted to the required density in a firm and stable condition.

Structural fill from off-site sources should be free from roots, sod, rubbish, and other deleterious or organic material, and meet the following gradation criteria:

Structural Fill Gradation Recommendation

Sieve Size	Percent Finer by Weight
6 inches	100
No. 10	30-95
No. 40	10-70
No. 200	0-12

Other Considerations

The proposed field to the west of its current location will closely approach the face of a rock slope. An assessment of the stability of the rock slope, the potential for rock blocks spalling from the rock slope over time and means to potentially stabilize the rock slope and control rock falls is beyond the scope of our services. However, these analyses should be performed, and methods developed to mitigate the potential for rock falls to occur in this area.

Design Review and Construction Observation

Northeast Geotechnical should be retained to review the foundation plans and earthwork/drilled shaft installation specifications prior to construction to see that our recommendations have been properly interpreted and included.

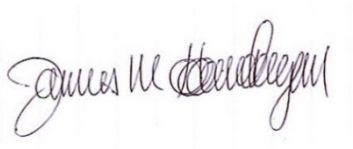
Northeast Geotechnical should also be retained to provide construction observation and testing services during the drilled shaft foundation installation and earthwork phase of the project. The purpose of our participation is to observe that the contractor performs earthwork and drilled shaft foundation installation in general compliance with the recommendations presented in this report and to verify our design assumptions in the field. In addition, we can provide engineering input in a timely manner if subsurface conditions are found to vary from those anticipated prior to construction and warrant a design change or a change in earthwork/drilled shaft installation procedures.

We have enjoyed working with you on this project and look forward to continuing our involvement during the upcoming construction phase. If you have any questions or require additional information, please do not hesitate to call.

Sincerely,

Northeast Geotechnical, Inc.

Glenn A. Olson, P.E.
Principal Engineer



James M. Handanyan, P.E.
Principal Engineer

Attachments: Figure No. 1 – Subsurface Exploration Location Plan
Limitations and Service Constraints
Test Boring Logs
Test Pit Logs
Laboratory Soil Test Results

FIGURE

NOTES:

1. BASE MAP DEVELOPED FROM PLAN TITLED "BASEBALL FIELD", DATED OCTOBER 31, 2019 PREPARED BY BEALS AND THOMAS, INC.
2. TEST BORING AND TEST PIT LOCATIONS ESTABLISHED IN THE FIELD BY TAPING AND PACING FROM EXISTING SITE FEATURES. TEST BORING AND TEST PIT LOCATIONS SHOWN ON THIS PLAN SHOULD BE CONSIDERED APPROXIMATE.
3. TEST BORINGS AND TEST PITS OBSERVED AND LOGGED BY NORTHEAST GEOTECHNICAL, INC. PERSONNEL.

LEGEND:

- TEST BORINGS PERFORMED BY SOIL X, CORP. OF LEOMINSTER, MA ON NOVEMBER 12, 2019.
- TEST PITS EXCAVATED BY CITY OF WORCESTER'S DEPARTMENT OF PUBLIC WORKS AND PARKS ON NOVEMBER 12, 2019.

NORTHEAST GEOTECHNICAL

NORTHEAST GEOTECHNICAL, INC.

EAST PARK BALL FIELD IMPROVEMENTS

SHREWSBURY STREET WORCESTER, MA

SUBSURFACE EXPLORATION LOCATION PLAN

Project No.: O372.00	Drawn By: JJP	Reviewed By: G.OLSON, P.E.
Date: 11/17/2019	Scale: 1"=50'	Figure No.: 1

Limitations and Service Constraints

LIMITATIONS AND SERVICE CONSTRAINTS
Geotechnical Engineering Consulting Services

The opinions, conclusions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by Northeast Geotechnical, Inc. and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the geotechnical consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that Northeast Geotechnical, Inc. relied upon any information prepared by other parties not under contract to Northeast Geotechnical, Inc. , Northeast Geotechnical, Inc. makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

Subsurface Explorations and Testing

Results of any observations, subsurface exploration or testing, and any findings presented in this report apply solely to conditions existing at the time when Northeast Geotechnical, Inc.'s exploratory work was performed. It must be recognized that any such observations and exploratory or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the project site may vary from those at the locations where data were collected and conditions can change with time. Northeast Geotechnical, Inc.'s ability to interpret exploratory and test results is related to the availability of the data and the extent of the exploratory and testing activities.

The findings, conclusions and recommendations submitted in this report are based, in part, on data obtained from subsurface borings, test pits, and specific, discrete sampling locations. The nature and extent of variation between these test locations, which may be widely spaced, may not become evident until construction. If variations are subsequently encountered, it will be necessary to re-evaluate the conclusions and recommendations of this report.

Correlations and descriptions of subsurface conditions presented in boring logs, test pit logs, subsurface profiles, and other materials are approximate only. Subsurface conditions may vary significantly from those encountered in borings and sampling locations and transitions between subsurface materials may be gradual or highly variable.

Conditions at the time water level measurements and other subsurface observations were made are presented in the boring logs or other sampling forms. This field data has been reviewed and interpretations provided in this report. However, groundwater levels may be variable and may fluctuate due to variation in precipitation, temperature, and other factors. Therefore, groundwater levels at the site at any time may be different than stated in this report.

Review

In the event that any change in the nature, design, or location of the proposed structure(s) is planned, the conclusions and recommendations in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or verified in writing.

Northeast Geotechnical, Inc. should be provided the opportunity for a general review of final design plans and specifications to assess that our recommendations have been properly interpreted and included in the design and construction documents.

Construction

To verify conditions presented in this report and modify recommendations based on field conditions encountered in the field, Northeast Geotechnical, Inc. should be retained to provide geotechnical engineering services during the construction phase of the project. This is to observe compliance with design concepts, specifications, and recommendations contained in this report, and to verify and refine our recommendations as necessary in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Test Boring Logs

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Boring No.: B-1
Page: 1 of 1
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19 - Showers, 33 to 42°F
Northeast Geotechnical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 471.5± feet
Depth to Water: 10± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0'-0.5'	6"	4"	4	1	Topsoil Fill 0.5'±	Brown, SILT and fine SAND, some Roots
	S-1B	0.5'-2'	12"	12"	5-7-6			M. dense, brown, f/c SAND, some Silt, little f/c Gravel/Red Brick
							Urban Fill	Loose, black to brown, fine to medium SAND, some Silt, little fine to coarse Gravel, trace Ash (Coal/Wood)
	S-2	2'-4'	24"	12	2-3-3-4			
5'							5'±	
								Medium dense, tan, fine to coarse SAND, little fine Gravel, little Silt
	S-3	5'-7'	24"	18"	4-10-14-17			
10'						2		
								Medium dense, wet, tan, fine to coarse SAND, little Silt, trace fine Gravel
	S-4	10'-12'	24"	18"	6-5-6-7			
15'							Natural Sand	
								Medium dense, wet, tan, fine to coarse SAND, little (-) Silt
	S-5	15'-17'	24"	18"	5-7-6-8			
20'						3		
								Medium dense, wet, brown, fine to coarse SAND, little Silt
	S-6	20'-22'	24"	17"	5-7-8-7			
25'						4		
								Medium dense, wet, orangish brown, fine to medium SAND, little Silt
	S-7	25'-27'	24"	18"	3-5-7-6	5	27'±	
								Boring terminated in natural sand at 27± ft.

Notes:

1. Lawn surface consisted of 2± to 3± in. tall grass (about 1± inch thick matted grass layer).
2. Groundwater observed at a depth of about 10± ft. at time of boring advancement.
3. Possible 6± inches in depth of blow-in observed at a depth of about 20± ft. Water added to HSA.
4. Possible 12± inches in depth of blow-in observed at a depth of about 25± ft. Water added to HSA.
5. Boring terminated in natural sand at a depth of about 27± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Boring No.: B-2
Page: 1 of 1
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19 - Showers, 33 to 42°F
Northeast Geotechnical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 472± feet
Depth to Water: not observed

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0'-0.5'	6"	4"	4	1,2	Topsoil Fill 0.5'±	Dark brown to or. brown, f/c SAND, some Silt, some Roots
	S-1B	0.5'-1.5'	12"	6"	5-8		Granular Fill 2'±	Rust, SILT and fine SAND, trace Roots
	S-1C	1.5'-2'	6"	4"	16			Brown, f/c GRAVEL, some Silt, little f/c Sand
	S-2	2'-4'	24"	8"	12-5-9-11			M. dense, tan, f/c GRAVEL, little f/c Sand, trace Silt
5'								Very dense, brown to orangish brown, fine to coarse SAND, some Silt, some (-) fine to coarse Gravel
	S-3	4'-6'	24"	15"	23-27-35-43			
						3	Natural, Boney Glacial Till	
10'								
								Very dense, brown, fine to coarse GRAVEL, some fine to coarse SAND,
	S-4	10'-11.2'	14"	6"	20-35-45/2"	4,5	11.5'±	trace (+) Silt
							//\\ //\\	Boring terminated upon REFUSAL (possible bedrock) at 11.5± ft.
15'								
20'								
25'								

Notes:
1. Lawn surface consisted of 2± to 3± in. tall grass (about 1± inch thick matted grass layer).
2. Groundwater was not observed at time of boring advancement.
3. Grinding of augers (possible cobbles/boulders) observed from a depth of about 2± to 7± ft.
4. Refusal of split-spoon sampler (possible bedrock) at a depth of about 11.2± ft. Refusal of augers at a depth of about 11.5± ft.
5. Boring terminated upon REFUSAL (possible bedrock) at a depth of about 11.5± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Boring No.: B-3
Page: 1 of 2
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19-Showers, 33 to 42°F
Northeast Geotechnical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 472± feet
Depth to Water: 11± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0'-1'	12"	8"	3-2	1	Topsoil Fill 1'±	Brown, SILT, little f/c SAND, trace f Gravel, trace Roots
	S-1B	1'-2'	12"	2"	3-2			Dark brown, f GRAVEL and SILT, little f/c Sand, tr. Roots
								Loose, black, fine to medium SAND and SILT, little (+) fine to coarse Gravel, trace Brick
	S-2	2'-4'	24"	8"	4-4-3-11			
5'							Urban Fill	
								No Recovery (Loose)
	S-3	5'-7'	24"	0"	4-4-5-6			
								Loose, damp, dark brown to red, fine to coarse GRAVEL/BRICK FRAGMENTS, trace fine to coarse Sand, trace Silt (Poor Recovery)
	S-4	7'-9'	24"	3"	5-5-2-3			
10'							10'±	
	S-5A	10'-11'	12"	12"	1-5	2	Nat. Peat 11'±	Damp, black, Silty PEAT
	S-5B	11'-12'	12"	10"	12-12			Wet, gray, fine SAND and SILT, trace peat fibers
15'								
	S-6	15'-17'	24"	14"	4-5-3-3		Natural Sand and Silt	Loose, wet, gray, SILT, little fine Sand
20'								
	S-7	20'-22'	24"	18"	4-5-9-7			Medium dense, wet, gray to rust, fine to medium SAND and SILT (Stratified)
25'						3	25'±	
	S-8	25'-27'	24"	14"	6-7-7-6		Natural Silt	Medium dense, wet, gray, SILT, little fine Sand
							(cont. on pg. 2)	

Notes:

1. Lawn surface consisted of 2± to 3± in. tall grass .
2. Groundwater observed at a depth of about 11± ft. at time of boring advancement.
3. Possible 6± inches in depth of blow-in observed at a depth of about 25± ft. Water added to HSA.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements
Shrewsbury Street
Worcester, MA

Test Boring No.: B-3
Page: 2 of 2
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19 - Showers, 33 to 42°F
Northeast Geotechical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 472± feet
Depth to Water: 11± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
							Natural Silt	Medium dense, wet, gray, SILT, trace fine Sand
	S-9	30'-32'	24"	18"	5-7-7-5	4	32'±	
								Boring terminated in natural silt at 32± ft.
35'								
40'								
45'								
50'								
55'								

Notes:

4. Boring terminated in natural silt at a depth of about 32± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Boring No.: B-4
Page: 1 of 2
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19 - Showers, 33 to 42°F
Northeast Geotechnical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 467± feet
Depth to Water: 10± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0'-0.5'	6"	6"	4	1	Topsoil Fill 0.5'±	Dark brown, SILT, some fine Sand, some Roots
	S-1B	0.5'-2'	18"	6"	6-5-5			M. dense, brown to dk. brown, f/c GRAVEL and SILT, some f/c Sand
								Medium dense, black, f/C SAND and SILT/ASH (Coal/Wood), some fine to coarse Gravel
	S-2	2'-4'	24"	12"	11-8-9-18			
5'							Urban Fill	
								Loose, black, SILT, some fine Sand, trace fine Gravel, trace Roots (Poor Recovery)
	S-3	5'-7'	24"	1"	WH-3-2-1			
								Very loose, dark brown to black, SILT/ASH (Coal/Wood), some fine to coarse Sand, little fine Gravel, trace plastic and metal
	S-4	7'-9'	24"	12"	2-1-2-2			
10'						2	10'±	
							Natural Peat	Very soft, damp, dark brown, Silty PEAT
	S-5	10'-12'	24"	20"	WH/12"-2-3		12'±	
								Medium dense, wet, dark gray, fine SAND, some Silt
	S-6	12'-14'	24"	20"	6-9-16-15			
15'								
							Natural Fine Sand and Silt	Loose, wet, dark gray, SILT and fine SAND
	S-7	15'-17'	24"	22"	1-2-3-2			
20'							20'±	
								Very soft, wet, dark gray, SILT & CLAY
	S-8	20'-22'	24"	22"	WH/24"			
25'							Natural Silt and Clay	
								Very soft, wet, dark gray, SILT & CLAY
	S-9	25'-27'	24"	24"	WH/24"			
							(cont. on pg. 2)	
						3	30'±	

Notes:

1. Lawn surface consisted of 2± to 3± in. tall grass.
2. Groundwater observed at a depth of about 10± ft. at time of boring advancement.
3. Apparent stratum change to fine sand and silt observed at a depth of about 30± feet.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Boring No.: B-4
Page: 2 of 2
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Soil X Corp. of Leominster, MA
Foreman: Pat Goodale/Mike Tisdale
Boring Equipment: CME C750X ATV-mounted drill rig; 4-1/4" (ID) hollow-stem augers; 140# auto-trip hammer falling 30"

Date/Weather: 11/12/19 - Showers, 33 to 42°F
Northeast Geotechnical Observer: Joe Papandrea
Test Boring Location: See Exploration Location Plan
Ground Surface Elevation: 467± feet
Depth to Water: 10± feet

Sample Data							Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-10	30'-32'	24"	20"	5-7-7-5	4	Nat. Fine Sand and Silt 32'±	Medium dense, wet, gray, fine SAND and SILT
								Boring terminated in natural fine sand and silt at 32± ft.
35'								
40'								
45'								
50'								
55'								

Notes:

4. Boring terminated in natural fine sand and silt at a depth of about 32± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

Test Pit Logs

NORTHEAST GEOTECHNICAL, INC.

TEST PIT LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Pit No.: TP-1
Page: 1 of 1
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Subcontractor: City of Worcester DPW & P
Operator: M. Pelce
Equipment: John Deere 310SG Backhoe
Capacity/Reach: ½ cubic yard toothed bucket/14.5 ft

Date/Weather: 11/12/19 - Rain, 30s °F
Northeast Geotechnical Observer: C. Rice, P.E.
Test Pit Location: See Exploration Location Plan
Ground Surface Elevation: 474± ft (west side), 473± ft (east side)

Depth	Strata Change	Soil Description (Burmister Identification System)	Excavation Effort	Boulder Count	Note No.
1'	Topsoil Fill 0.8±	Topsoil	E	0%	
2'	Subsoil Fill 3.3±	Gray-brown, F/M SAND and SILT, trace F/C Gravel, frequent Roots	E	0%	
3'	Urban Fill 4.5±	Gray-brown, F/M SAND, some Silt, little F/C Gravel, little Cobbles, little Debris (brick, glass, ash)	M	0%	
4'					
5'					
6'	Weathered Bedrock 8±	Gray, moderately weathered BEDROCK, highly fractured, Class A size bedrock pieces, little F/M Sand, trace Silt, trace F/C Gravel	D	70%± (bedrock pieces)	
7'					
8'					1,2,3
9'		Bottom of test pit (refusal) at 8± feet			
10'					
11'					
12'					
13'					
14'					
15'					

Notes:
1. Depths referenced from higher (west) side of test pit.
2. Groundwater not observed at the time of the test pit.
3. Refusal on moderately weathered bedrock at 8± feet.

Test Pit Dimensions	Boulder Classification		Proportions Used	Abbreviations	Excavation Effort
N/S = **3.5± ft**	Diameter	Class	Trace (T): 0-10%	F = Fine	E = Easy
	6" - 18"	A	Little (Li): 10-20%	M = Medium	M = Moderate
E/W = **7± ft**	18" - 36"	B	Some (So): 20-35%	C = Coarse	D = Difficult
	>36"	C	And: 35-50%	F/M = Fine to Medium	

NORTHEAST GEOTECHNICAL, INC.

TEST PIT LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Pit No.: TP-2
Page: 1 of 1
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Subcontractor: City of Worcester DPW & P
Operator: M. Pelce
Equipment: John Deere 310SG Backhoe
Capacity/Reach: ½ cubic yard toothed bucket/14.5 ft

Date/Weather: 11/12/19 - Rain, 30s °F
Northeast Geotechnical Observer: C. Rice, P.E.
Test Pit Location: See Exploration Location Plan
Ground Surface Elevation: 478± ft (west side), 477± ft (east side)

Depth	Strata Change	Soil Description (Burmister Identification System)	Excavation Effort	Boulder Count	Note No.
1'	Topsoil Fill 0.8±	Topsoil	E	0%	
2'	Urban Fill	Gray-brown, F/M SAND and COBBLES, some Silt, trace F/C Gravel, trace Debris (brick, plastic), frequent Roots	M	0%	
3'	3±				
4'	Natural Glacial Till	Brown, F/M SAND and SILT, little F/C Gravel, occasional Cobbles	M	0%	
5'	5±				
6'	Weathered Bedrock 6±	Gray-brown, moderately weathered BEDROCK, highly fractured, Class A size bedrock pieces, some F/M sand, some Silt, trace F/C gravel	D	50%± (bedrock pieces)	1,2,3
7'		Bottom of test pit (refusal) at 6± feet			
8'					
9'					
10'					
11'					
12'					
13'					
14'					
15'					

Notes:
1. Depths referenced from higher (west) side of test pit.
2. Groundwater not observed at the time of the test pit.
3. Refusal on moderately weathered bedrock at 6± feet.

Test Pit Dimensions	Boulder Classification		Proportions Used	Abbreviations	Excavation Effort
N/S = **3.5± ft**	Diameter	Class	Trace (T): 0-10%	F = Fine	E = Easy
	6" - 18"	A	Little (Li): 10-20%	M = Medium	M = Moderate
E/W = **9± ft**	18" - 36"	B	Some (So): 20-35%	C = Coarse	D = Difficult
	>36"	C	And: 35-50%	F/M = Fine to Medium	

NORTHEAST GEOTECHNICAL, INC.

TEST PIT LOG

Project: East Park Improvements, Shrewsbury Street, Worcester, MA

Test Pit No.: TP-3
Page: 1 of 1
File No.: O372.00
Reviewed By: Glenn Olson, P.E.

Subcontractor: City of Worcester DPW & P
Operator: M. Pelce
Equipment: John Deere 310SG Backhoe
Capacity/Reach: ½ cubic yard toothed bucket / 14.5 ft

Date/Weather: 11/12/19 - Rain, 30s °F
Northeast Geotechnical Observer: C. Rice, P.E.
Test Pit Location: See Exploration Location Plan
Ground Surface Elevation: 479± ft (west side), 478± ft (east side)

Depth	Strata Change	Soil Description (Burmister Identification System)	Excavation Effort	Boulder Count	Note No.
	Topsoil Fill 0.5±	Topsoil	E	0%	1
1'	Subsoil Fill 1.5±	Brown F/M SAND and SILT, trace F/C Gravel, frequent Roots	E	0%	
2'	Urban Fill	Gray-brown F/M SAND and SILT, some F/C Gravel, occasional Cobbles, trace debris (plastic, newspaper)	M	0%	
3'	3±				2,3
4'					
5'	Weathered Bedrock	Light brown-gray moderately weathered BEDROCK, highly fractured, Class A to B size bedrock pieces, little F/M Sand, little Silt, trace F/C Gravel	D	60%± (bedrock pieces)	
6'					
7'	7±				4
8'		Bottom of test pit (refusal) at 7± feet			
9'					
10'					
11'					
12'					
13'					
14'					
15'					

Notes:
1. Depths referenced from higher (west) side of test pit.
2. Groundwater not observed at the time of the test pit.
3. Mottling observed at 3± feet.
4. Refusal on moderately weathered bedrock at 7± feet.

Test Pit Dimensions	Boulder Classification		Proportions Used	Abbreviations	Excavation Effort
N/S = **3.5± ft**	Diameter	Class	Trace (T): 0-10%	F = Fine	E = Easy
	6" - 18"	A	Little (Li): 10-20%	M = Medium	M = Moderate
E/W = **7± ft**	18" - 36"	B	Some (So): 20-35%	C = Coarse	D = Difficult
	>36"	C	And: 35-50%	F/M = Fine to Medium	

Laboratory Test Results

THIELSCH ENGINEERING
195 Frances Avenue
Cranston RI, 02910
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Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Northeast Geotechnical, Inc.
Georgetown, MA
PM: Glenn A. Olson
Assigned By: Glenn A. Olson
Collected By: Glenn A. Olson

Project Information:
East Park Ball Field
Shrewsbury Street, Worcester, MA
NEG Project Number: O372.00
Summary Page: 1 of 1
Report Date: 11.25.19

LABORATORY TESTING DATA SHEET, Report No.: 7419-L-153

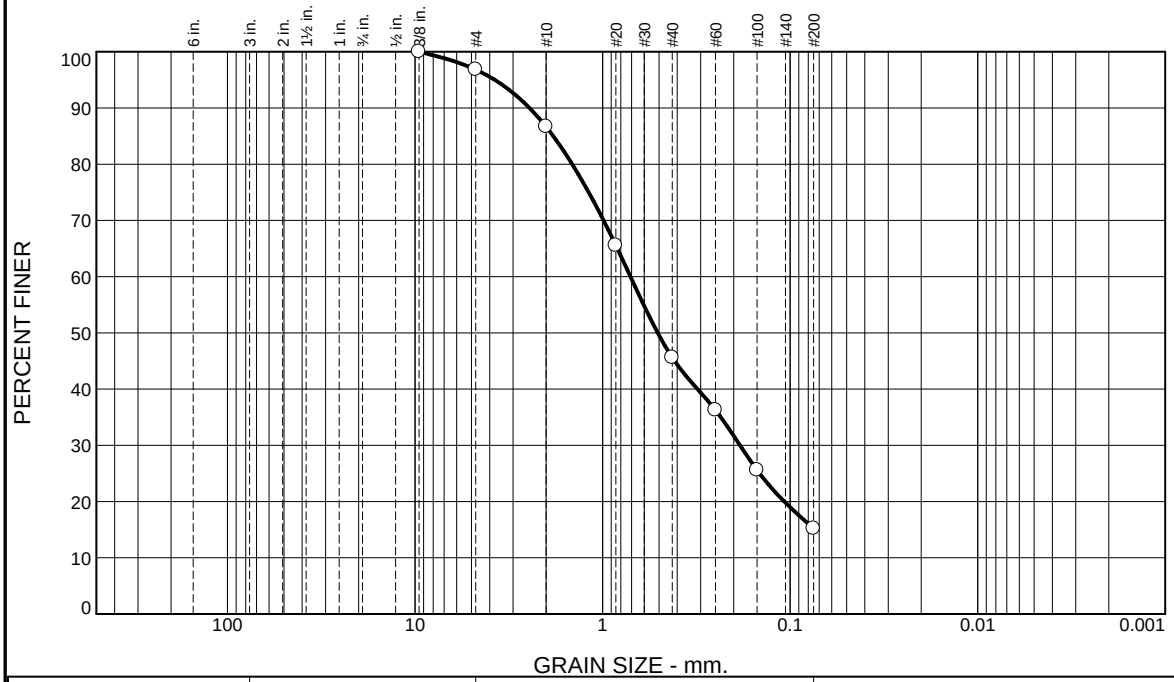
Boring ID	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) / W_{opt} (%)	γ_d MAX (pcf) / W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
B-1	S-4	10-12	19-S-2611				3.2	81.6	15.2											Brown silty sand
B-2	S-3	4-6	19-S-2612				20.3	55.2	24.5											Brown silty sand with gravel
B-3	S-6	15-17	19-S-2613				0.0	17.6	82.4											Brown silt with sand
B-3	S-9	30-32	19-S-2614	25.4	NV	NP														Gray clayey silt
B-4	S-7	15-17	19-S-2615	25.8	NV	NP	0.0	41.0	59.0											Gray sandy silt
B-4	S-8	20-22	19-S-2616	31.6	30	22														Brown lean clay

Date Received: *11.18.19*

Reviewed By:

Date Reviewed: *11.25.19*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	10.1	41.1	30.4	15.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	96.8		
#10	86.7		
#20	65.6		
#40	45.6		
#60	36.3		
#100	25.6		
#200	15.2		

* (no specification provided)

Material Description

Brown silty sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.4522 D_{85}= 1.8313 D_{60}= 0.7105
D_{50}= 0.5080 D_{30}= 0.1851 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 11.18.19 **Date Tested:** 11.20.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 10-12' **Date Sampled:**
Sample Number: B-1 / S-4

Thielsch Engineering Inc.

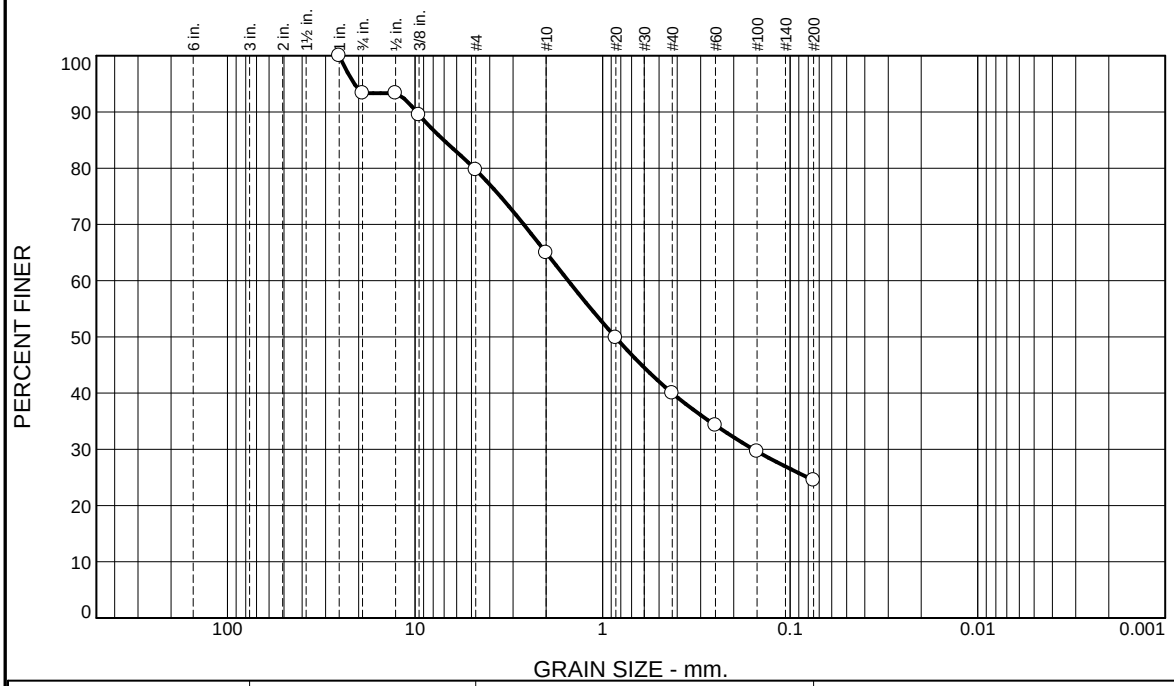
Cranston, RI

Client: Northeast Geotechnical

Project: East Park Ball Field
Shrewsbury Street, Worcester, MA

Project No: O372.00 **Figure** 19-S-2611

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.7	13.6	14.7	25.0	15.5	24.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	93.3		
0.5"	93.3		
0.375"	89.5		
#4	79.7		
#10	65.0		
#20	49.9		
#40	40.0		
#60	34.3		
#100	29.6		
#200	24.5		

* (no specification provided)

Material Description

Brown silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 9.8160 D_{85}= 7.0275 D_{60}= 1.5251
D_{50}= 0.8578 D_{30}= 0.1568 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 11.18.19 **Date Tested:** 11.20.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 4-6' **Date Sampled:**
Sample Number: B-2 / S-3

Thielsch Engineering Inc.

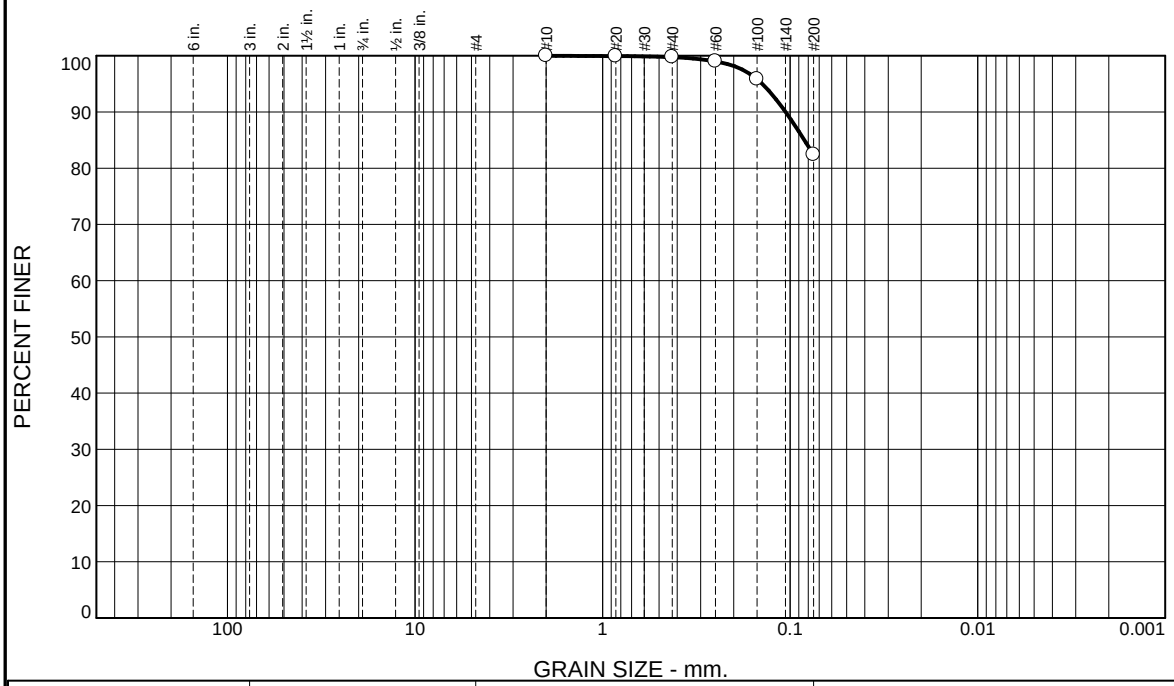
Cranston, RI

Client: Northeast Geotechnical

Project: East Park Ball Field
Shrewsbury Street, Worcester, MA

Project No: O372.00 **Figure** 19-S-2612

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	17.4	82.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.0		
#100	95.8		
#200	82.4		

* (no specification provided)

Material Description

Brown silt with sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.1057 D_{85}= 0.0840 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/4".

Date Received: 11.18.19 **Date Tested:** 11.20.19

Tested By: IA / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 15-17' **Date Sampled:**
Sample Number: B-3 / S-6

Thielsch Engineering Inc.

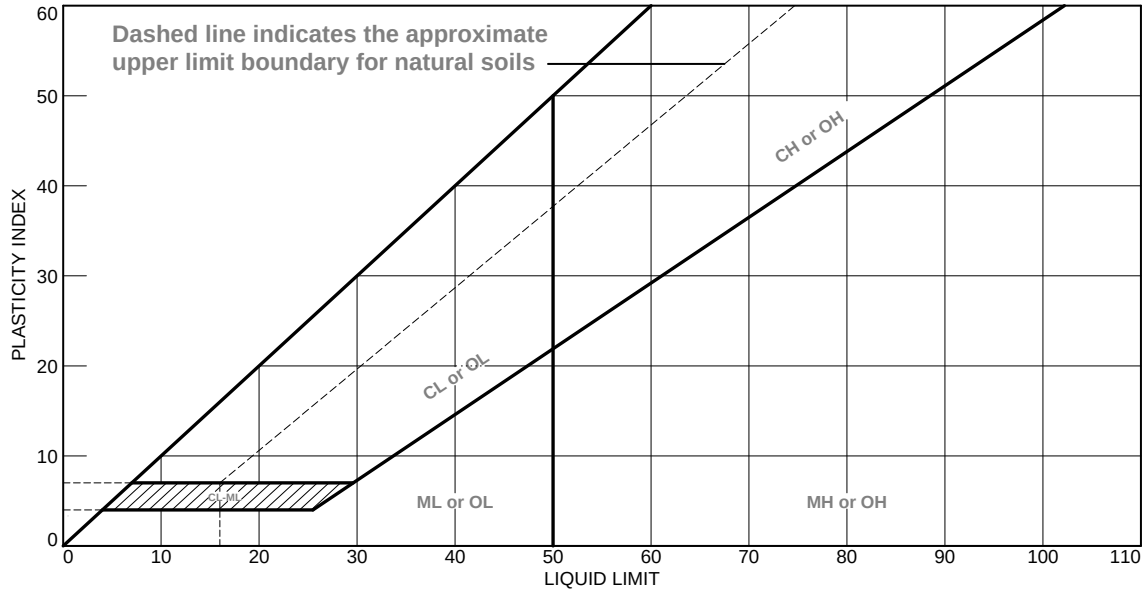
Cranston, RI

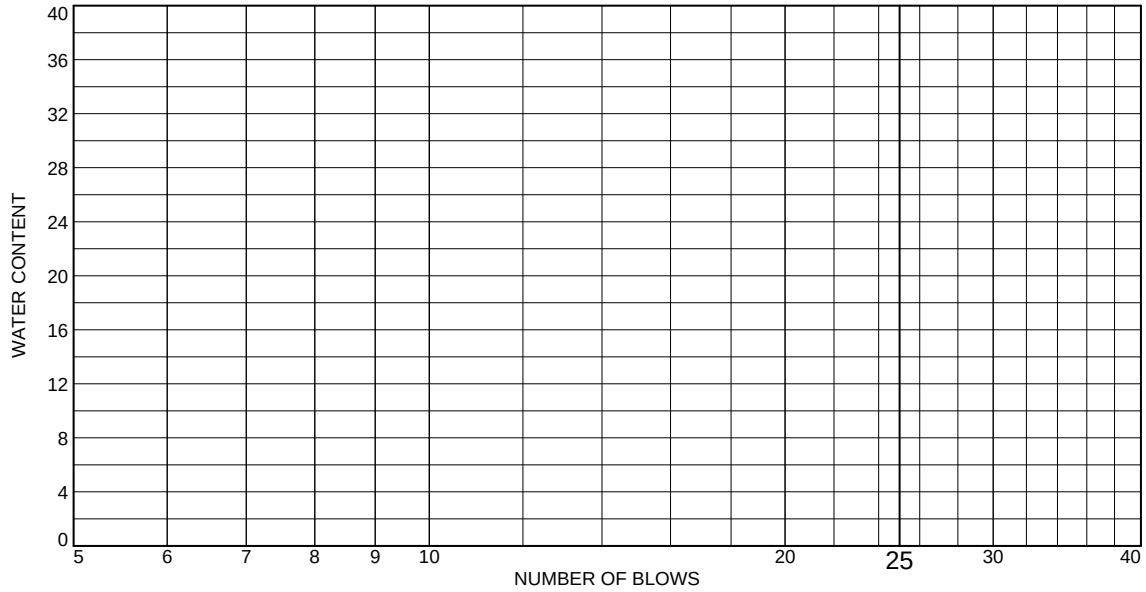
Client: Northeast Geotechnical

Project: East Park Ball Field
Shrewsbury Street, Worcester, MA

Project No: O372.00 **Figure** 19-S-2613

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray silt	NV	NP	NP			

Project No. O372.00 **Client:** Northeast Geotechnical

Project: East Park Ball Field

Shrewsbury Street, Worcester, MA

Source of Sample: Borings **Depth:** 30-32'

Sample Number: B-3 / S-9

Thielsch Engineering Inc.

Cranston, RI

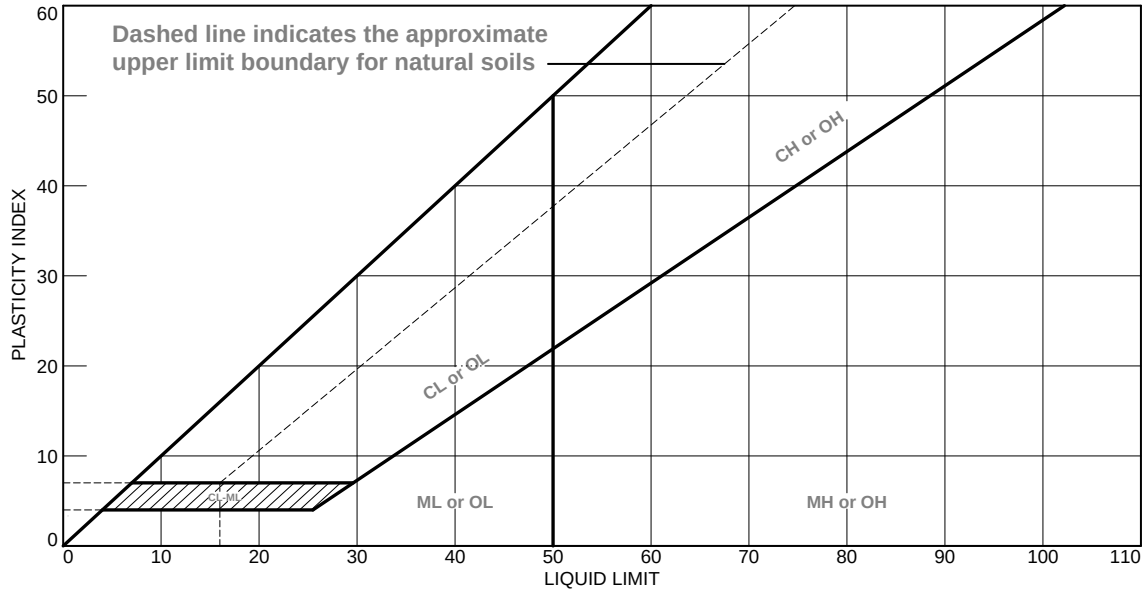
Remarks:

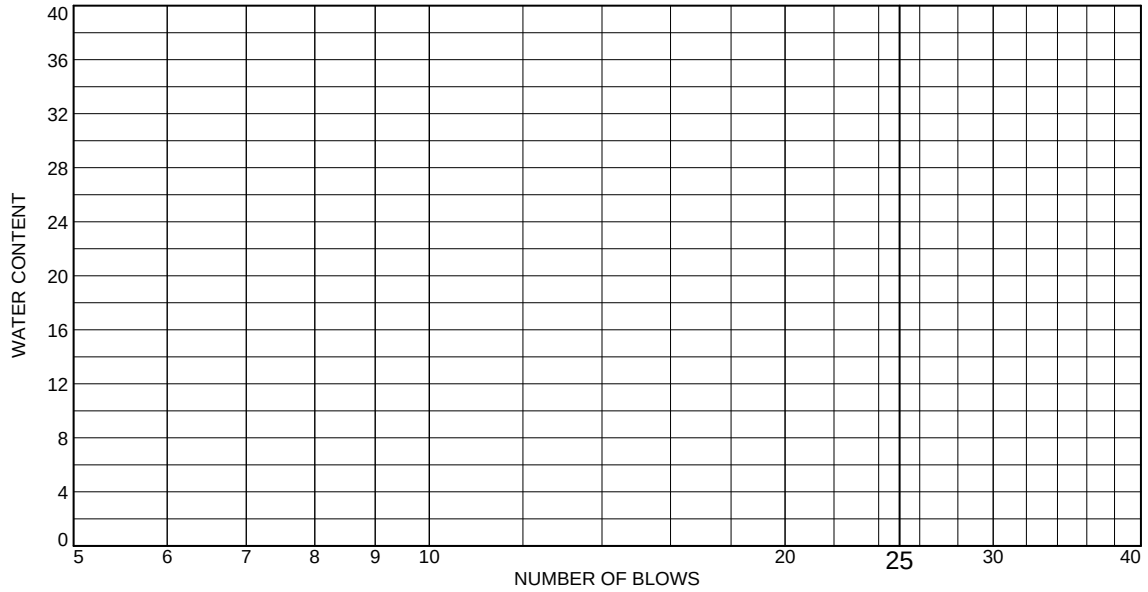
●Sample classified as non-viscous. Sample could not reach 25 blows. As received sample had standing water.

Figure 19-L-2614

Tested By: IA **Checked By:** SA

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray sandy silt	NV	NP	NP	99.6	59.0	ML

Project No. O372.00 **Client:** Northeast Geotechnical

Project: East Park Ball Field

Shrewsbury Street, Worcester, MA

Source of Sample: Borings **Depth:** 15-17'

Sample Number: B-4 / S-7

Thielsch Engineering Inc.

Cranston, RI

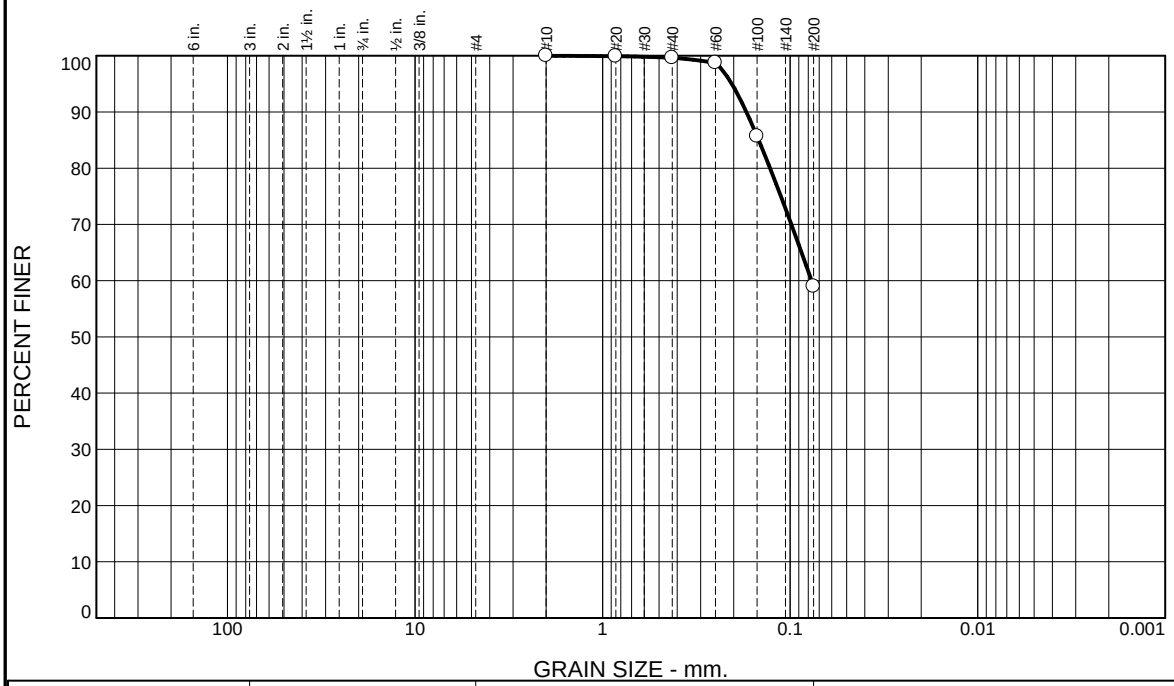
Remarks:

●Sample could not be rolled to a 1/4" and could not achieve a liquid limit greater than 15 blows.

Figure 19-L-2615

Tested By: IA **Checked By:** SA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.4	40.6	59.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.9		
#40	99.6		
#60	98.8		
#100	85.7		
#200	59.0		

* (no specification provided)

Material Description

Gray sandy silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.1710 D_{85}= 0.1470 D_{60}= 0.0769
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 11.18.19 **Date Tested:** 11.21.19

Tested By: IA

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Borings **Depth:** 15-17' **Date Sampled:**
Sample Number: B-4 / S-7

Thielsch Engineering Inc.

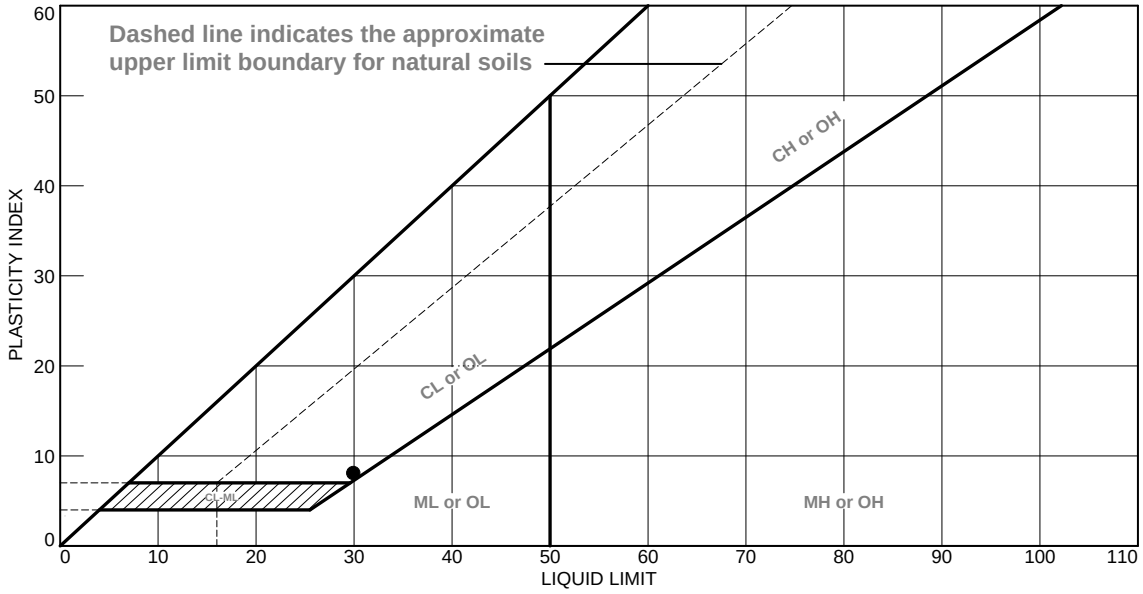
Cranston, RI

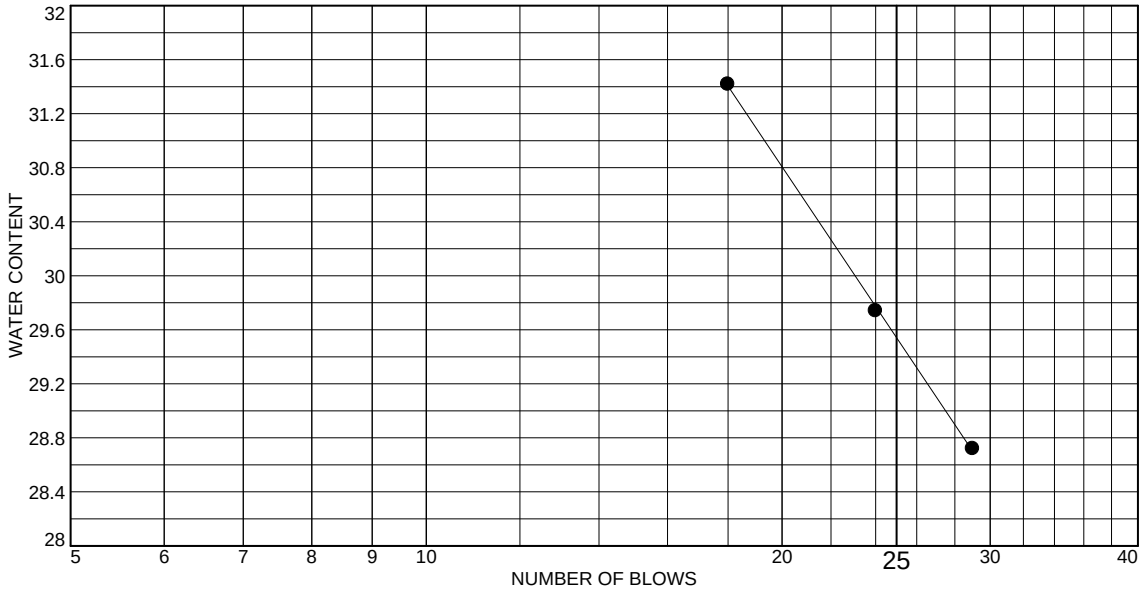
Client: Northeast Geotechnical

Project: East Park Ball Field
Shrewsbury Street, Worcester, MA

Project No: O372.00 **Figure** 19-S-2615

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown lean clay	30	22	8			

Project No. O372.00 **Client:** Northeast Geotechnical

Project: East Park Ball Field

Shrewsbury Street, Worcester, MA

Source of Sample: Borings **Depth:** 20-22'

Sample Number: B-4 / S-8

Remarks:

Thielsch Engineering Inc.

Cranston, RI

Figure 19-L-2616

Tested By: IA **Checked By:** SA

SECTION 26 00 00
ELECTRICAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The City of Worcester Bid Form, General Conditions, Supplementary Conditions, and applicable parts of the Special Conditions form a part of this Specification and the Contractor shall consult them in detail for instructions.

B. The Contractor shall provide all labor, equipment, and materials; and perform all operations necessary to complete the work of this section as indicated on the Drawings and specified herein which shall include but is not limited to the following:

1. Athletic field, walkway, and parking area lighting
2. Security lighting
3. Security camera system
4. PA system
5. Dugout lighting
6. Power to scoreboard and future press box
7. All other work shown on the Drawings and included in these Specifications.
8. Amenity building.

C. The Contractor shall furnish a complete, working finished product, which meets all applicable codes and standards, and the intent and specific requirements of the Drawings and specifications for this project. All materials and all work, which may be reasonably implied as being incidental to the work of this Section, shall be furnished at no extra cost to the Owner.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 26 56 68 – Exterior Athletic Lighting
B. Section 26 60 00 – Security Camera System
C. Section 32 12 16 – Bituminous Concrete
D. Section 03 30 53 – Cast-in-Place Concrete

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

B. The Contractor must be familiar will all other Sections of this specifications and the associated Drawings, which affect the scope of work. The General Conditions, all Supplementary and Special Conditions, and all other sections of this specification shall be adhered to, as they apply to this Section. Where paragraphs of this Section conflict with similar paragraphs elsewhere, the more stringent requirements shall prevail.

1.04 REFERENCE STANDARDS AND SPECIFICATIONS

A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and federal government, and other authorities that have lawful jurisdiction.

B. All materials and installations shall be in accordance with the latest edition of the Massachusetts Electrical Code, and all applicable local codes and ordinances. Materials and equipment shall be listed by Underwriters Laboratories (UL).

C. Except as modified by governing codes and by the Contract Documents, the Contractor shall comply with applicable provisions and recommendations of the following:

1. American National Standards Institute - ANSI
2. American Society for Testing & Materials - ASTM
3. Illuminating Engineering Society - IES
4. Institute of Electrical & Electronics Engineers - IEEE
5. Insulated Cable Engineers' Association - ICEA
6. National Electrical Code - NEC
7. National Electrical Manufacturer's Association - NEMA
8. National Electrical Safety Code - NESC
9. InterNational Electrical Testing Association - NETA
10. National Fire Protection Association - NFPA
11. Occupational Safety & Health Administration - OSHA
12. Underwriter's Laboratories, Inc. - UL

The above listed codes and standards are referenced to establish minimum requirements and wherever this Section requires higher grades of materials and workmanship than required by the listed codes and standards, this Section shall apply. In the event a conflict occurs between the above listed codes and standards and this Section, the more stringent requirement shall govern.

1.05 SITE VISIT

A. Each bidder shall visit the site of the proposed work and fully acquaint himself with the conditions there relating to construction and labor, and should fully inform himself as to the facilities involved, and the difficulties and restrictions attending the performance of the Contract.

B. The Bidder shall thoroughly examine and familiarize himself with Drawings, Technical Specifications and all other Bid and Contract Documents. The Contractor, by the execution of the Contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site and acquaint himself with the conditions there existing and the Owner will be justified in rejecting any claim thereof.

1.06 AS-BUILT DRAWINGS:

A. After completion of the electrical installation, the Contractor shall furnish an "as-built"

drawings showing all conduits, cables, cabinets, transformers, light poles, etc. to scale with dimensions where required. Instruction sheets and parts lists covering all operating equipment will be bound into a folder and furnished to the Owner in duplicate.

1.07 INSTRUCTIONS:

A. Within 10 days, after completion and testing of the system, the Contractor shall instruct the Owner's personnel in the proper operations and maintenance of the system, in a 2 hour training session.

B. The Contractor shall furnish at least two (2) complete sets of operating and instruction manuals for the equipment provided under this Contract. These manuals shall detail the operation, testing, and maintenance of the electrical equipment and systems. Manuals shall be provided upon Engineer's request or upon project completion, whichever comes first.

1.08 GUARANTEE

A. Guarantee work of this Section in writing for one year from date of Owner's acceptance. Repair or replace defective materials, equipment, workmanship, and installation that develop within this period, promptly and to Owner's satisfaction and correct damage caused in making necessary repairs or replacements under guarantee with no extra cost to Owner. Contractor shall transfer all equipment warrantees for lighting and other systems to Owner.

1.09 SUBMITTALS

A. Within 10 days after Award of General Contract, submit shop drawings and product data on below listed items for approval. Submit copies as requested.

B. Check, stamp and mark with project name shop drawings and product data before submitting for approval. Specifically indicate on shop drawing transmittal form or by separate letter any deviations from Contract Documents because of standard shop practice or other reason. Rectify with no extra cost to Owner, deviations which escape Engineer's scrutiny and have not been indicated on shop drawings.

C. List of materials and equipment requiring shop drawings shall include:

1. Conduits and Wiring
2. Panelboards
3. Service Cabinets and Equipment
4. Transformer Foundations
5. Meter Sockets
6. Circuit Breakers
7. Concrete Products and Light Bases
8. Wiring Devices and Receptacles
9. Pathway Lighting
10. Sports Lighting
11. Handholes

The Engineer's review shall be only for conformance with the design concept of the project and compliance with the specifications and Drawings. The responsibility of, and the necessity of, furnishing materials and workmanship required by the specifications and Drawings which may not be indicated on the shop drawings is included under the work of this Section.

1.10 INSPECTIONS AND FEES

A. Obtain all necessary permits and licenses, file necessary plans and pay all fees for permits and inspections. Permit fees are the responsibility of the Contractor as part of his bid, as is all coordination with the municipality and the local utility National Grid.

1.11 INTERPRETATION OF DRAWINGS

A. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. Drawings are not intended to specify or show every offset, fitting or component; however, Contract Documents require components and materials whether or not indicated or specified as necessary to make installation complete and operational.

B. Contractor is responsible for all work shown on both Contract Drawings and these written specifications, including work detailed in the specifications and not shown on the drawings and including work shown on the Drawings and not described in the specifications. All ancillary equipment necessary for a complete installation shall be included, even if not shown, detailed or described. For conflicts between the Contract Drawings, written specifications and other contract information, the more stringent requirement shall apply, and the Engineer may direct the Contractor as to what is the preferred option to be provided.

C. Any work installed contrary to, or without review by, the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.

D. Circuit layouts are not intended to show the number of fittings, or other installation details. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment or local codes.

E. As work progresses and for duration of Contract, maintain complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design.

1.12 ELECTRIC UTILITY

A. The Electric Utility for this project is National Grid (Massachusetts Electric Company). All coordination with the Electric Utility is the responsibility of the Contractor, All work and materials for the electric service shall be in accordance with the requirements of the Electric Utility, and are to be met under this Section and included in the bid price of the Contractor, (removal of existing service).

PART 2 – MATERIALS & PRODUCTS

2.01 GENERAL

A. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes.

B. Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified. Materials and equipment shall be Underwriter's Laboratory (UL) listed.

C. The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.

D. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

2.02 RACEWAYS

A. Rigid Metallic Conduit: Listed to Underwriters Laboratories Safety Standard UL6 and ANSI 080.1.

B. Electrical Metallic Tubing (EMT) Listed to Underwriters Laboratories Safety Standard UL 797 Manufactured in accordance with ANSI C80.3

C. Flexible Metallic Conduit: UL I. Liquidtight flexible metal conduit shall be used in wet locations.

D. Polyvinyl Chloride (PVC) Conduit, electrical, gray, Schedule 40 or Schedule 80 as specified, meeting the requirements of UL 651 and NEMA TC-2. If concrete encasement is required, a minimum of 3,000 psi concrete shall be used. All conduits placed under roadways, and subject to vehicular traffic, shall be concrete-encased Schedule 40 (or Schedule 80 as approved).

E. Minimum size of conduit shall be 3/4". Unless indicated on Drawings, conduit sizes can be sized in accordance with National Electric Code (NEC). Conduit bends shall not have kinks or flats, and shall not be less than standard radii.

F. Rigid Galvanized Steel (RGS) conduit shall be used for all power, control signal, and instrumentation wiring, except where noted. Conduit shall be fully threaded at both ends

and each length shall be furnished with one threaded coupling. All 90 degree conduit sweeps shall be RGS.

G. Conduits shall be made electrically continuous at coupling and connections to boxes and cabinets by means of joining fasteners or copper bond wires. Conduit shall be connected to grounded structural steel or the ground network. After assembly all conduit locknuts, all EMT coupling fittings, and all bond wire screws shall be set up tight before installation of wiring. Insulated metallic bushings shall be used on all conduits entering panel cabinets, pull-boxes, and wiring gutters, except on branch lighting circuits.

H. Expansion fittings shall be provided on all conduits as required by the 2020 National Electrical Code, and as required by local and state codes. This includes, but is not limited to, vertical conduit risers coming from below-grade.

2.03 WIRE AND CABLE

A. Unless otherwise noted, conductors for power, lighting, and grounding above grade shall be No. 12 through No. 8 AWG, NEC type THWN/THHN, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG.

B. Conductors for power, lighting, grounding, and control below grade (and in wet locations) shall be No. 2 AWG and larger, NEC type XHHW (or XHHW-2), meeting the requirements of NEMA WC7 and ICEA S-66-524.

C. All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90' C.

2.04 WIRE AND CABLE CONNECTORS AND DEVICES

A. Wire and cable connectors and devices shall meet the requirements of UL 486. Connectors, including miscellaneous nuts, bolts, and washers shall be silicon bronze. Ferrous materials shall not be used.

2.05 BOXES

A. Outlet and Switch Boxes: NEMA OS 1.

B. Pull Boxes, Junction Boxes, and Equipment Enclosures: NEMA ICS 6. Pull boxes, junction boxes, and equipment enclosures shall be of NEMA Type I construction for indoor use, and NEMA Type 3R construction for outdoor or wet location use, unless otherwise noted.

C. Box sizes shall not be less than that required by the Massachusetts Electrical Code.

2.06 WARNING TAPE

A. Warning tape shall be six (6) inches wide, polyethylene not less than 3.5 mil thick with a minimum strength of 1,500 psi. Install 8 inches below final grade. Tape shall be red for

electric conduit, and red or yellow for communication conduit. Tape shall have black lettering on two lines as indicated below:

B. For Electric conduit:

CAUTION CAUTION CAUTION
BURIED ELECTRIC LINE BELOW

C. For Telephone, Fire Alarm and Communication conduit:

CAUTION.CAUTION.CAUTION
BURIED COMMUNICATION LINE BELOW

2.07 PANELBOARDS

A. Panelboards: NEMA PBI, and UL 67. Panelboards shall be door-in-door construction with copper bus. Circuit breakers shall be molded case, thermal magnetic, bolt-on type rated as noted, and rated to match panelboard voltage and interrupting rating. Provide circuit breaker sizes as shown on panel schedules. Provide spare breakers in sizes as directed by Owner or Engineer to fill each panel with spare breakers, above those indicated on panel schedules.

B. The Contractor shall provide the following panelboards:

Panelboard P-1 120/240V, 1-phase, 3-wire, 250A main circuit breaker, 22kA A1C 30 circuit panelboard, (NEMA 1 enclosure with the number and size of circuit breakers as listed on the panel schedules provided in the Contract Drawings.)

Panelboard P-2 120/240V, 1-phase, 3-wire, 60A main circuit breaker, 22kA A1C 8 circuit panelboard, (NEMA 1 enclosure with the number and size of circuit breakers as listed on the panel schedules provided in the Contract Drawings.)

2.08 ELECTRICAL ENCLOSURE & CABINETS

A. The Contractor shall provide outdoor NEMA 3R stainless steel, to contain 120/240V panelboards, receptacles, etc. for power, with space for future equipment.

B. Contractor shall size cabinet to coordinate with sizes of panelboard and equipment to be installed within cabinets. Dimensions shown are typical and are for reference only. Cabinet shall be similar to cabinets installed at the recently renovated Parks (list provided upon request). Cabinet shall include all equipment shown or implied and all equipment shall be installed inside of cabinet without physical conflicts and per NEC, Cabinet shall be sized for all necessary conduits, whether active, spare or future as listed on panelboard schedules.

C. Cabinets shall be manufactured from 11 gauge minimum stainless steel with 12 gauge steel panel, mounted inside. Cabinets to have integral keyed locking mechanism, keyed alike, with provision for pad-lock. Cabinets shall be ventilated type and factory painted

black powder-coat. Cabinets shall have door hold-open latches.

2.09 ELECTRIC HANDHOLES

A. Electric Handholes shall be strong, precast concrete and provided in the dimensions as shown on the Contract Drawings. Electric Handholes shall be unaffected by moisture, freezing temperatures, soil, and sub-soil chemicals.

B. Handholes shall be provided with skid-resistant surface covers, with an Electric or Communications label for power, audio, etc. Handholes and Covers shall be designed for street-rated, heavy duty applications, meeting the requirements of the either: AASHTO HS-20 or ANSI/SCTE 77-2002 Tier 15 loading, with a minimum design load of 15,000 lbs. for both the handhole box and cover. Covers shall include recessed stainless steel captive bolts of a penta-head design. The nuts for the bolts shall be self-centering and corrosion resistant. Handholes shall meet the requirements of the latest edition of the National Electric Code (2020 or later) with regards to structural integrity, installation methods, grounding of the cover and metallic parts, etc. Handholes shall be UL listed for the intended use.

C. Handholes shall be installed flush with final grade.

2.10 CAST-IN-PLACE CONCRETE FOUNDATIONS

A. The Contractor shall provide the materials, labor, and equipment necessary for the installation of cast-in-place concrete foundations, in accordance with these Specifications, Contract Drawings, City requirements, and all applicable codes & regulations.

2.11 PRE-PACKAGED SPORTS LIGHTING SYSTEM

A. The Contractor shall provide a pre-packaged sport lighting system in accordance with Section 26 56 68 (Exterior Athletic Lighting).

2.12 SECURITY CAMERA SYSTEM

A. The Contractor shall provide a security camera system in accordance with Section 26 60 00 – Security Camera System Requirements.

PART 3 - EXECUTION

3.01 GENERAL

A. This Section covers the requirements for installation of materials, proper workmanship, testing, cleaning, grounding, and work methods to be followed by the Contractor. This Section also includes specific instructions and to be used in conjunction with the contract Drawings.

B. Contractor is responsible for coordinating work with other trades, Owner, and Architect's schedule. Work will be coordinated such that systems can be properly located, and

conflicts and delays are avoided. Contractor shall consider commencement of work acceptance of existing conditions.

3.02 MATERIALS AND WORKMANSHIP

A. Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Do not run raceway exposed unless shown exposed on Drawings. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that complete installation shall operate safely and efficiently.

3.03 TESTING, INSPECTION AND CLEANING

A. Test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required at not less than 500 volts. Insulation resistance between conductors and grounds for secondary distribution systems shall meet National Electrical Code (NEC) and International Electrical Testing Association (NETA) requirements.

B. Verify and correct as necessary: voltages, tap settings, trip settings and phasing on equipment from secondary distribution system to point of use. Test secondary voltages at transformers, bus in panelboards, and at other locations on distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.

C. Test lighting fixtures with specified lamps in place for 100 hours. Replace lamps that fail within 90 days after acceptance by Owner at no extra cost to Owner (no exceptions).

D. Provide necessary testing equipment and testing services.

E. Failures or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Replace defective Material.

F. Clean panels and other equipment, Panelboard interiors shall be cleaned and vacuumed. Equipment with damage to painted finish shall be repaired to Engineer's or Architect's satisfaction. After completion of project, clean exterior surfaces of electrical equipment.

3.04 WIRING METHODS

A. Install wire and cables in approved raceways as specified and as approved by authorities that have jurisdiction.

B. Follow homerun circuit numbers and/or notes as shown on drawings to connect circuits to panelboards. Where homerun circuit numbers are not shown on Drawings, divide similar types of connected leads among phase buses so that currents are approximately equal in normal usage.

C. Run concealed conduit in as direct lines as possible with a minimum number of bends, longest possible radius. Run exposed conduit parallel to or at right angles to building/field lines. Bends shall be free from dents or flattening. The exact locations and

routing shall be determined by the Contractor subject to the approval of the Owner and Engineer.

D. Polarity of all electrical connections shall be observed in order to preserve phase relationship in all feeders and equipment.

E. Splices shall be made in neat, workmanlike manner using approved mechanical connectors. After splicing, insulation equal to that on the spliced wires shall be applied at each splice. Splices are permitted only in junction boxes, outlet boxes, or other permanently accessible locations. Splices installed in electric handholes shall be weather and waterproof, pre-molded polymer splices. Hand taping of splices below-grade is not acceptable.

3.05 GROUNDING

A. Bond and ground equipment and systems connected under this Section in accordance with standards of the NEC and other applicable regulations and codes.

B. Conduit system shall be electrically continuous throughout, grounded at service entrance. Equipment frames, enclosures, boxes, etc. shall be grounded by use of green-jacketed (or bare copper) ground sized as per Table 250-95 oldie NEC.

C. Copper fittings for ground connections shall conform to the requirements of ASTM B 30. All bolts, u-bolts, cap screws, nuts, and lock washers for copper fitting shall be of approved corrosion-resisting material. Compression connectors required for all below-grade grounding connections.

D. Ground Rods shall be 5/8" diameter and 8' in length, copperweld as required by applicable codes (NEC, NESC). Bonding connections to ground rods shall be permanent, welded or crimped, with copper connectors. All wire used for grounding shall be no smaller than #4 Awg copper, stranded conductor.

3.06 INSTALLATION OF ELECTRICAL EQUIPMENT

A. Contractor shall furnish and install the following major electrical components, and all necessary minor and expected accessories.

B. Provide, furnish and install all products and work outlined in Part 1 of this Specification Section.

C. Provide new conduit system for lighting and electrical work, in locations as shown on Contract Drawings. Utilize existing empty conduits (installed by others) where possible and install new conduits for a complete and functional system. Provide all new cabling for all electrical equipment listed.

D. Install all equipment in locations as shown on Contract Drawings. All deviations must be approved, in advance by Owner, Architect, and Engineer.

E. Install all equipment per manufacturer's instructions.

F. Balance the lighting, receptacle, and electrical load evenly on all circuits and on all phases of each circuit.

G. Clean-up excavated areas, and restore with new loam & seed, as directed by Owner.

H. Provide complete "As-Built" drawings to Engineer & Owner.

3.07 INSTALLATION OF SECURITY CAMERA SYSTEM

A. The security camera system shall be installed in accordance with Section 26 60 00 – Security Camera System Requirements, and with the Drawings and this Section.

3.08 GUARANTEE AND ACCEPTANCE

A. Any defective elements shall be replaced in part or whole by the Contractor at no cost to the Owner.

END OF SECTION

OSTROW ELECTRIC COMPANY

Contractors • Engineers

9 MASON STREET, WORCESTER, MASSACHUSETTS 01609
ESTABLISHED 1939 TEL. 508-754-2641 FAX. 508-757-1645

ELECTRICAL PRODUCT SUBMITTALS

For

South Worcester Playground
Phase 1 & 2 - 2018
Worcester, MA

ENGINEER
Engineering Advantage, Inc.
880 Main Street, 5th Floor
Waltham, MA 02451

GENERAL CONTRACTOR
Busy Bee Nursery
57 Broad Street, Route 68
Jefferson, MA 01522

SUBMITTED BY:
Ostrow Electric Company
9 Mason Street
Worcester, MA 01609

OK approved as noted
08-14-2018

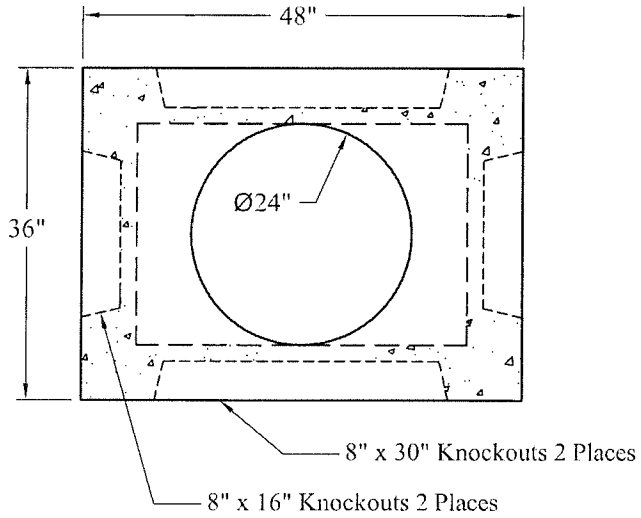
DATE
August 14, 2018

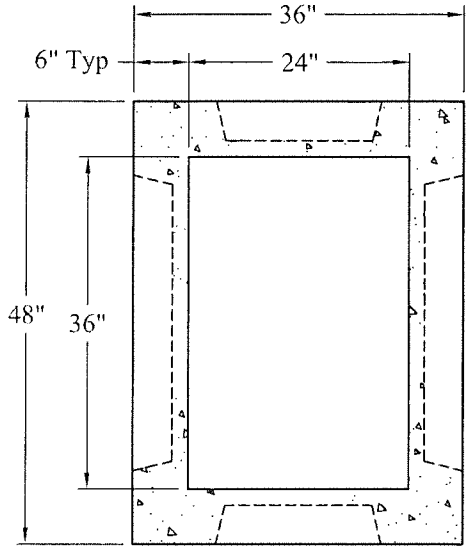
SUBMITTAL	MATERIAL	SUBMISSION
Electrical	Handholes	Resubmittal

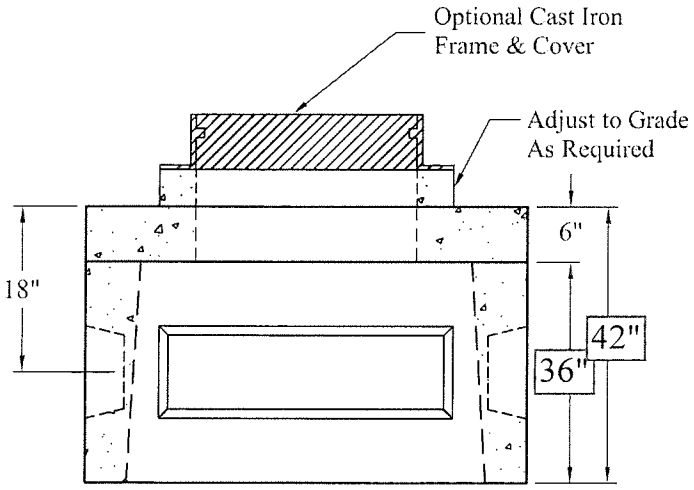
Remarks: Submittal has been reviewed by Ostrow Electric Company and has been found, to the best of our knowledge, to conform to contract documents.

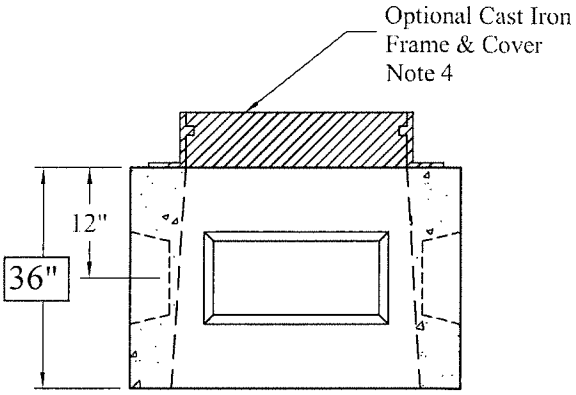
William H. Robinson, Jr.
Project Manager

1-800-639-2199 Fax (603) 224-2927









Est Weight:

Top Slab:	660 Lbs
Base:	2355 Lbs
Total:	2955 Lbs

General Notes

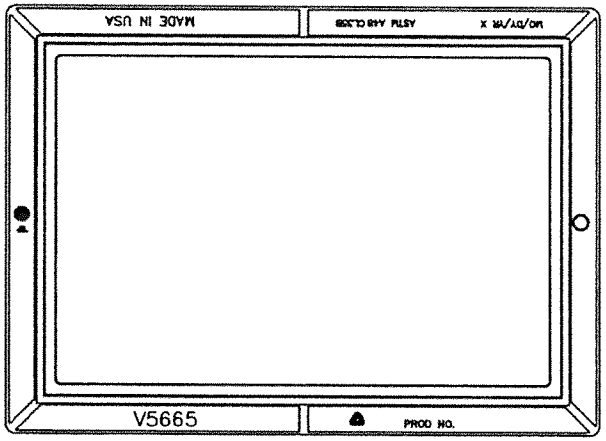
1.) Concrete fc: 4.000 psi @ 28 Days Minimum
2.) Reinforcement Steel: ASTM A615 Grade 60 Rebar
3.) Design Loading: AASHTO-HS20-44
4.) Rectangular Cover N1878 B72

Phoenix Precast Products	24" x 36" x 36" Pull Box
P/N:	

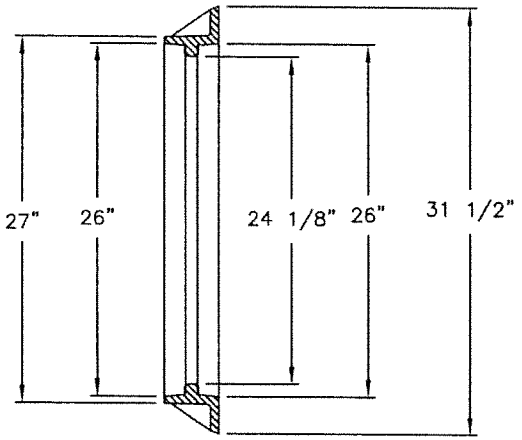
Phoenix Precast Products

77 Regional Drive Concord, NH 03301

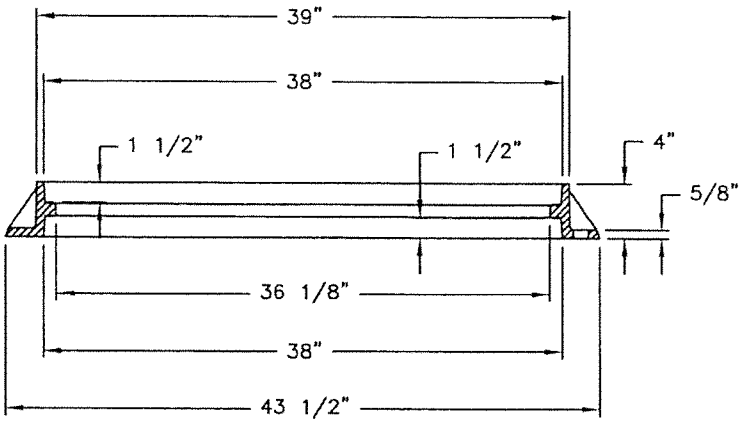
V5665 Frame



PLAN VIEW



FRAME SECTION



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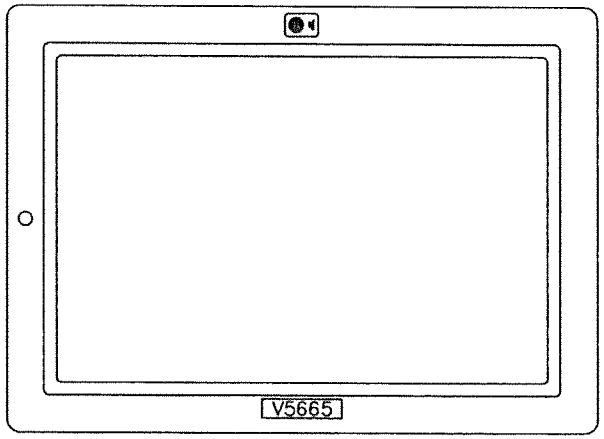


TOP FLANGE VIEW

Product Number

45665010

Design Features

-Materials
Gray Iron (CL35B)
-Design Load
Heavy Duty
-Open Area
n/a
-Coating
Undipped
- Designates Machined Surface

Certification

- ASTM A48
-
-
-Country of Origin: USA

Drawing Revision

05/02/2003 Designer: DEW
09/08/2016 Revised By: DVD

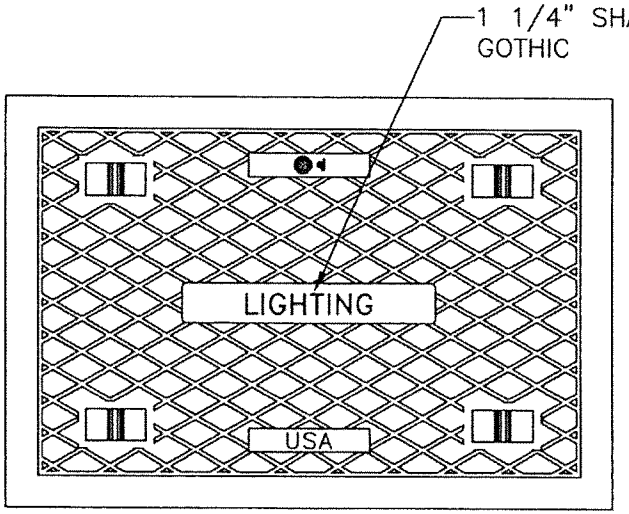
Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

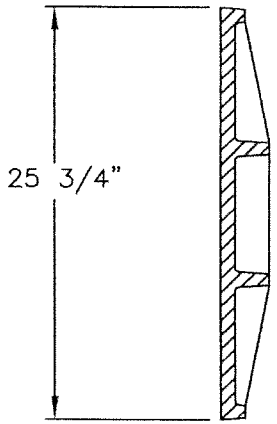
Contact

800 626 4653
ejco.com

V6665 Cover



COVER TOP VIEW



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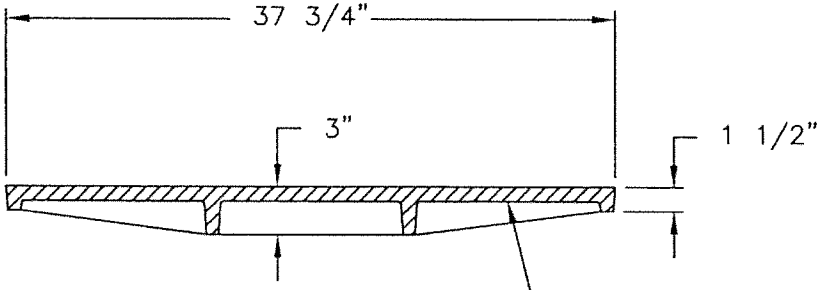

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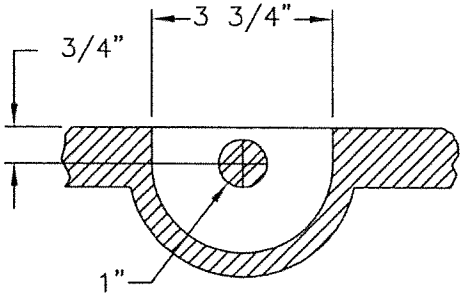


(4) TYPE 4 STAINLESS STEEL PICKBARS

PICKBAR DETAIL

Product Number

46665022

Design Features

-Materials
Gray Iron (CL35B)
-Design Load
Heavy Duty
-Open Area
n/a
-Coating
Undipped
- Designates Machined Surface

Certification

- ASTM A48
-
-
-Country of Origin: USA

Drawing Revision

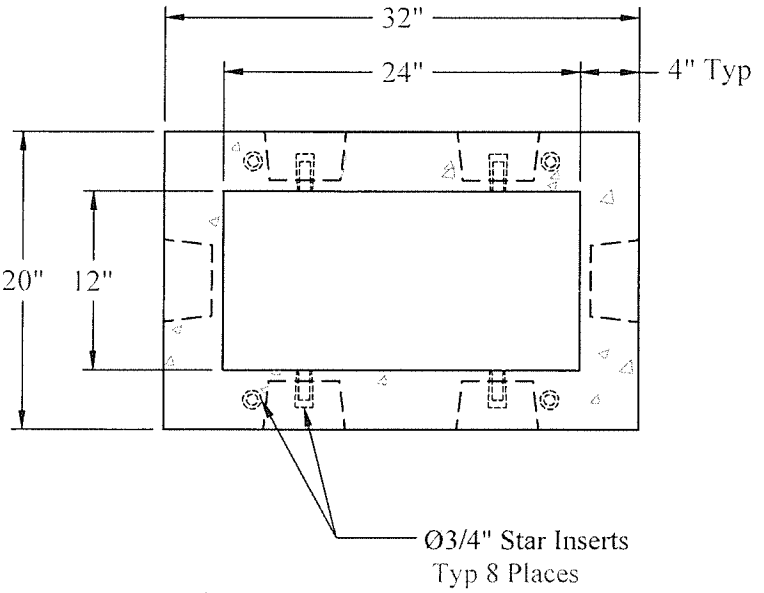
06/12/2006 Designer: TCL
6/3/2015 Revised By: DAE

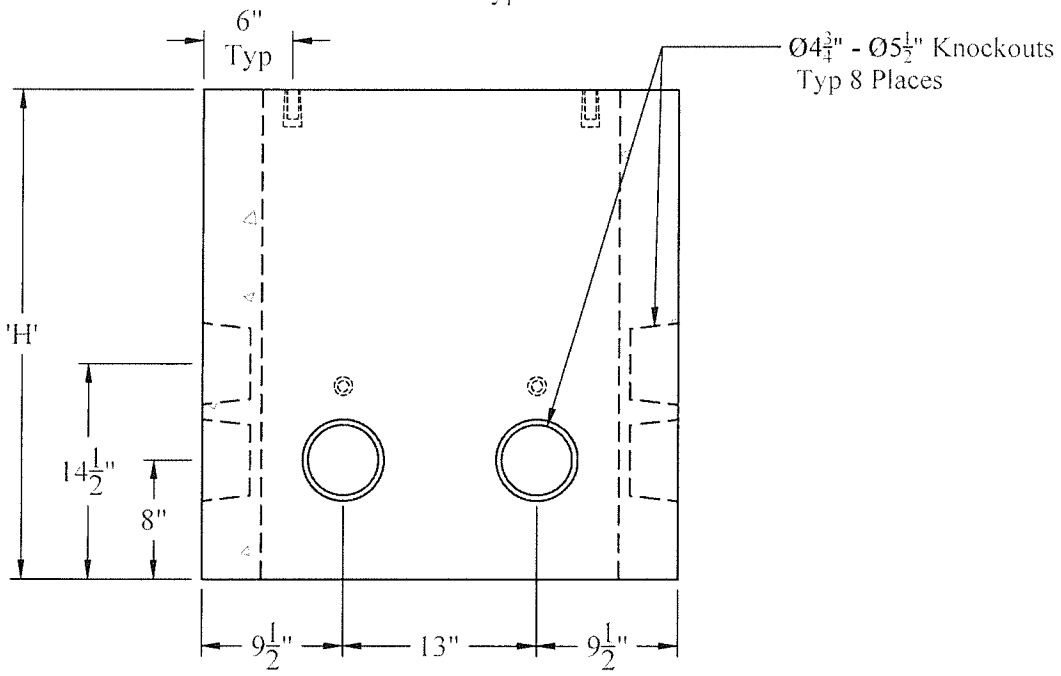
Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact
800 626 4653
ejco.com

1-800-639-2199 Fax (603) 224-2927





Dim 'H'	Est Weight:	P/N:
20"	600 Lbs	HH-12X24BOSSHT
33"	1,000 Lbs	HH-12X24BOSTALL

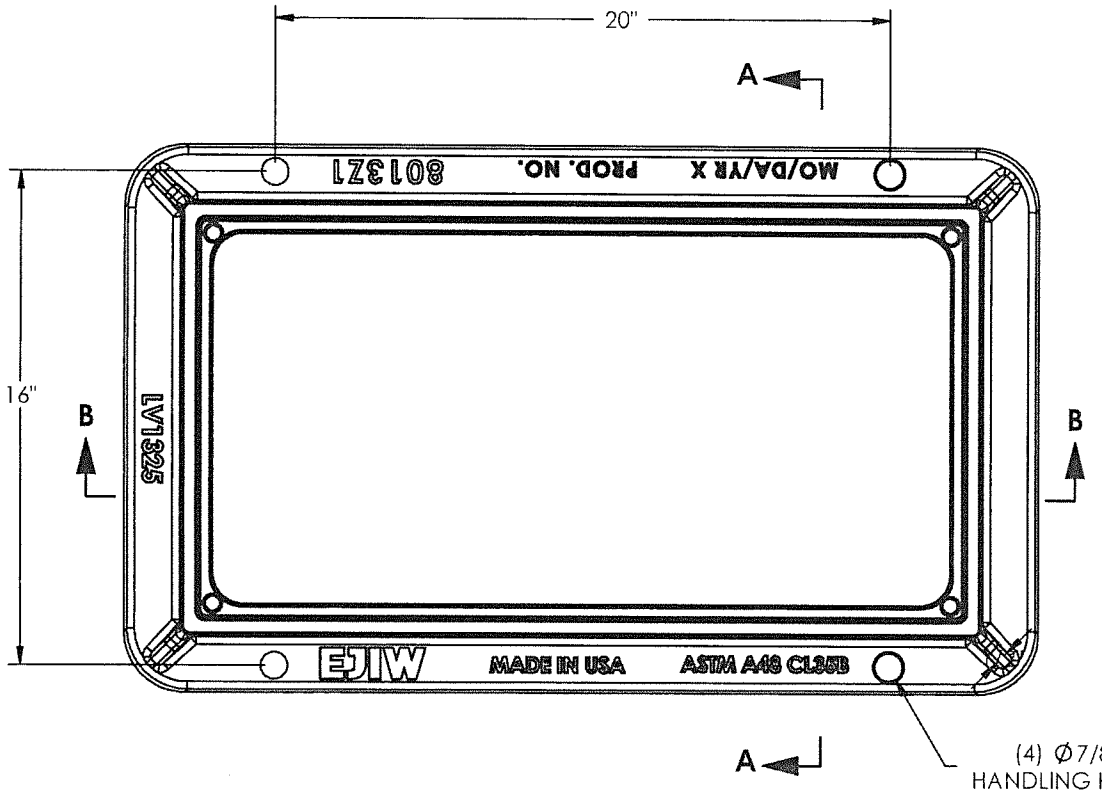
General Notes

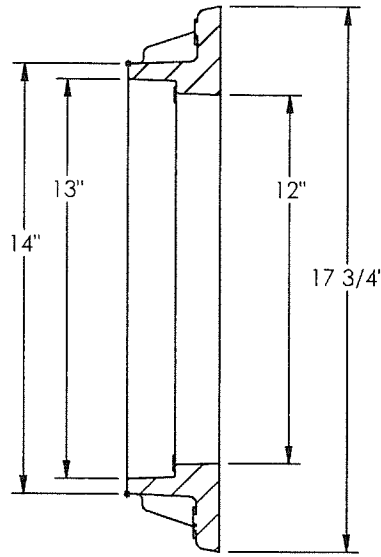
1. Concrete: fc = 4,000 psi @ 28 Days Minimum
2. Steel Reinforcement Conforms to Latest ASTM Specification: ASTM A-615, Grade 60 Black Deformed Bars
3. Boston Standard Pull Box

Phoenix Precast Products	12" x 24" Electric Handhole

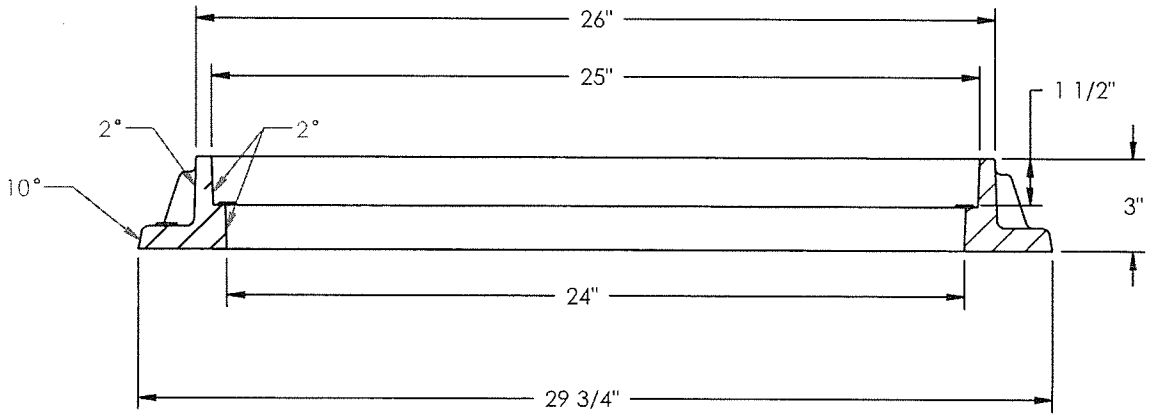
77 Regional Drive Concord, NH 03301

Phoenix Precast Products





SECTION A-A



SECTION B-B

EJIW EAST JORDAN IRON WORKS EST.1883

800-626-4653

www.ejiw.com

MADE IN USA

PRODUCT NUMBER

00801312

CATALOG NUMBER

8013Z1

LV1325 FRAME

LOAD RATING

HEAVY DUTY

COATING

UNDIPPED

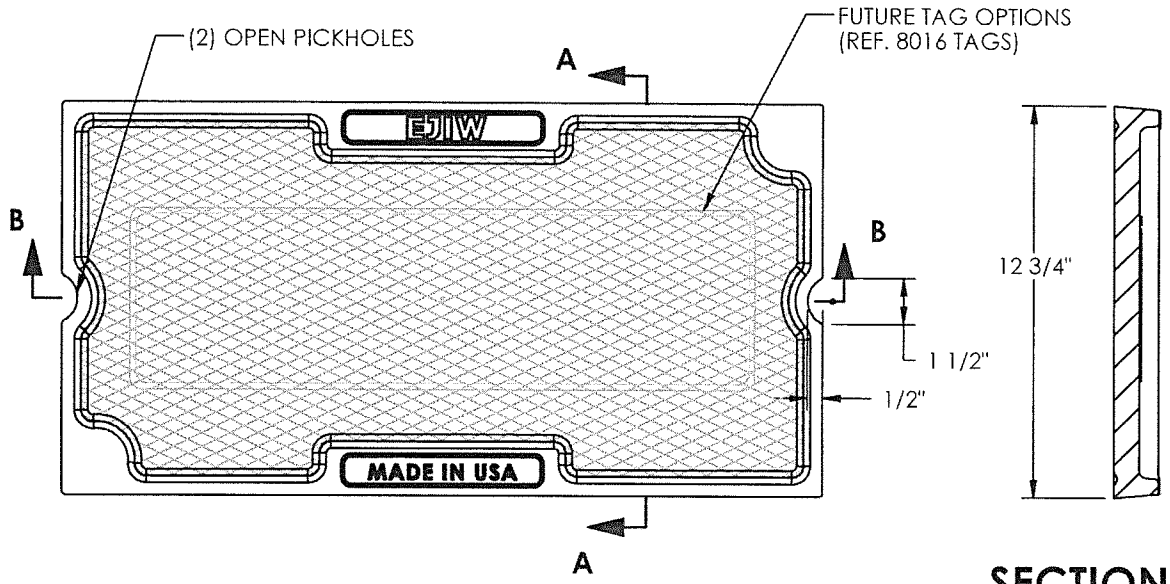
SPECIFICATION

FRAME-GRAY IRON
ASTM A48 CL35B

OPEN AREA
NA

√ DESIGNATES
MACHINED SURFACE

DRAWN	DATE
SBB	4/10/2009
LAST REVISED	DATE
DEW	6/29/2009



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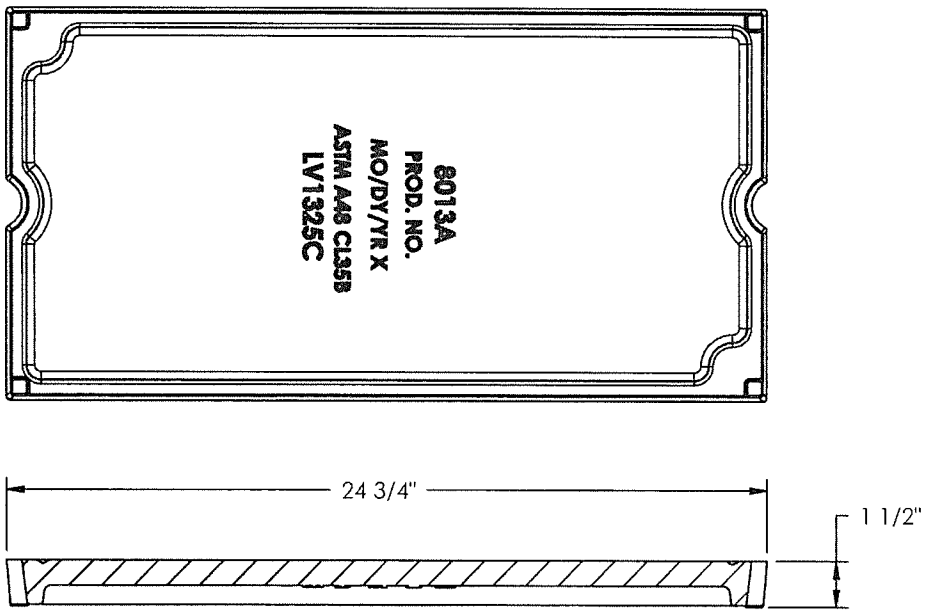


SECTION B-B

EJIW EAST JORDAN IRON WORKS EST.1883

800-626-4653
www.ejiw.com
MADE IN USA

PRODUCT NUMBER
00801321

CATALOG NUMBER
8013A

MANHOLE COVER

LOAD RATING
HEAVY DUTY

COATING
UNDIPPED

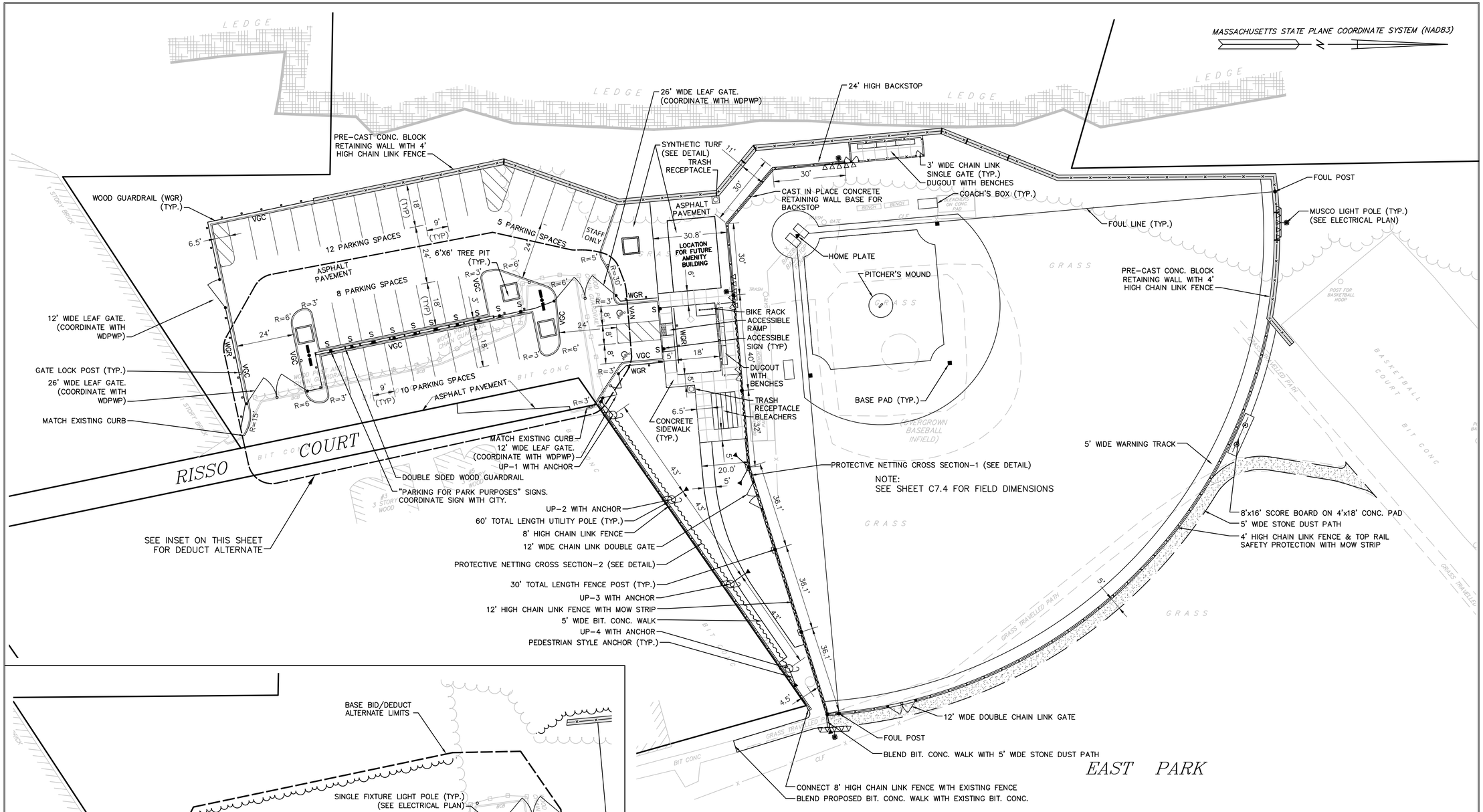
SPECIFICATION

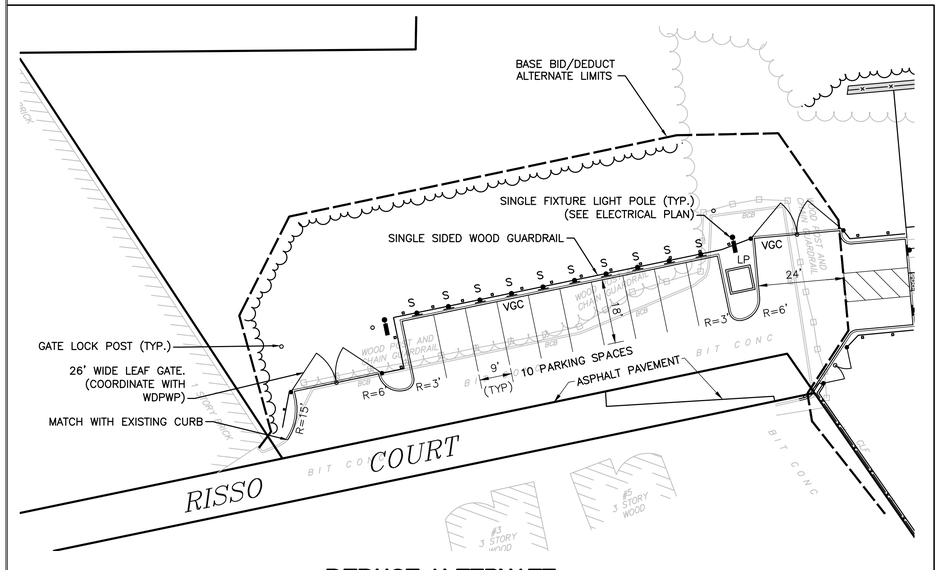
COVER - GRAY IRON
ASTM A48 CL35B

OPEN AREA
N/A

√ DESIGNATES MACHINED SURFACE

DRAWN	DATE
SBB	05/28/08
LAST REVISED	DATE
SBB	04/13/09





FOR NOTES, REFERENCES AND LEGEND SEE SHEET C1.1.

PREPARED FOR:

WORCESTER DEPARTMENT OF PUBLIC WORKS AND PARKS (WDPWP)

50 OFFICER MANNY FAMILIA WAY
WORCESTER, MASSACHUSETTS

PREPARED BY:

BEALS AND THOMAS

BEALS AND THOMAS, INC.
144 Turnpike Road, Suite 210
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.bealsandthomas.com

5		
4		
3		
2	08/16/2023	REVISED FOR ADDENDUM
1	08/07/2023	REVISED FOR BIDDING
0	06/30/2023	ISSUED FOR BIDDING
ISSUE DATE		DESCRIPTION

NBB	NBB	DJL/JRM	JRM
DES	DWN	CHK'D	APP'D

PROJECT:

EAST PARK RENOVATION

180 SHREWSBURY STREET
WORCESTER, MASSACHUSETTS

SCALE: 1" = 20' DATE: JUNE 30, 2023

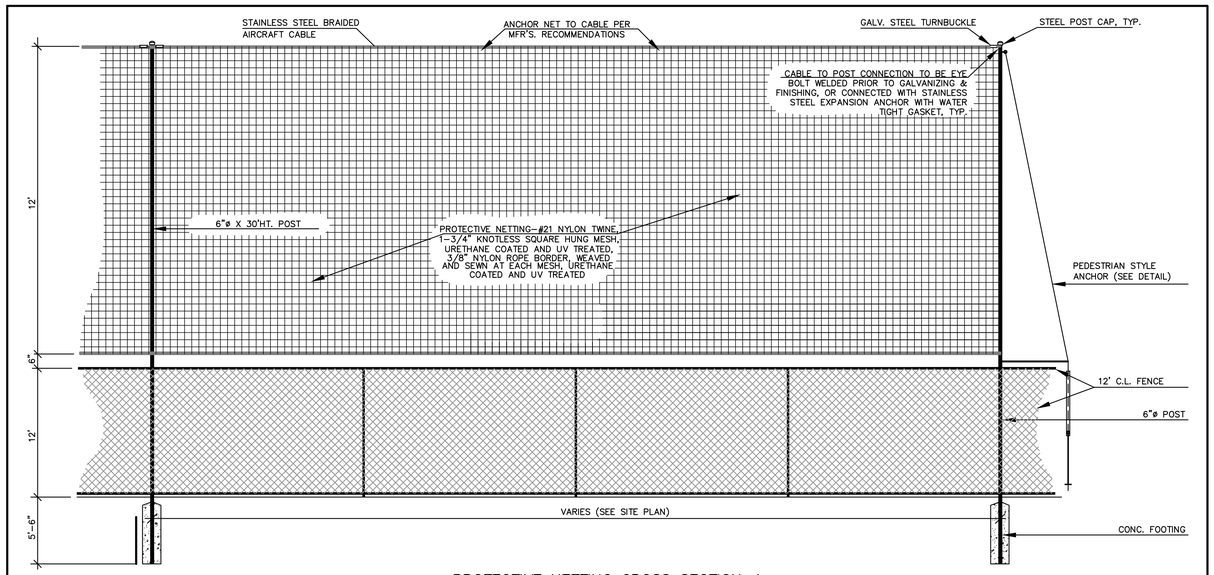
METERS 0 5 10 15
FEET 0 10 20 40 60

LAYOUT AND MATERIALS PLAN

B+T JOB NO.3131.02

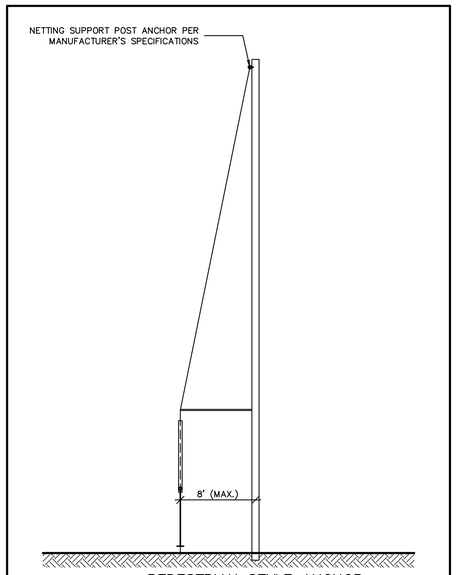
B+T PLAN NO. 31310OP003B-002

C3.1



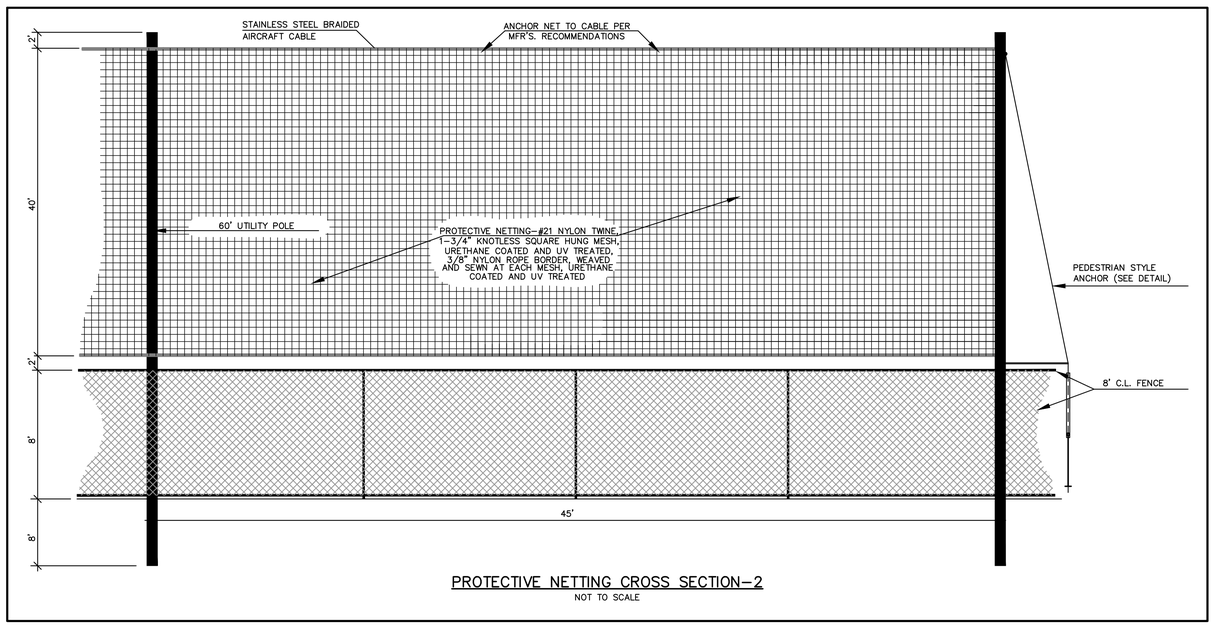
PROTECTIVE NETTING CROSS SECTION–1

NOT TO SCALE



PEDESTRIAN STYLE ANCHOR

NOT TO SCALE



PROTECTIVE NETTING CROSS SECTION–2

NOT TO SCALE

FOR NOTES, REFERENCES AND LEGEND SEE SHEET C1.1.

PREPARED FOR:

WORCESTER DEPARTMENT OF PUBLIC WORKS AND PARKS (WDPWP)

50 OFFICER MANNY FAMILIA WAY
WORCESTER, MASSACHUSETTS

PREPARED BY:

BEALS AND THOMAS

BEALS AND THOMAS, INC.
144 Turnpike Road, Suite 210
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.bealsandthomas.com

5		
4		
3		
2	08/16/2023	REVISED FOR ADDENDUM
1	08/07/2023	REVISED FOR BIDDING
0	06/30/2023	ISSUED FOR BIDDING
	ISSUE DATE	DESCRIPTION

NBB	NBB	DJL/JRM	JRM
DES	DWN	CHK'D	APP'D

PROJECT:

EAST PARK RENOVATION

180 SHREWSBURY STREET
WORCESTER, MASSACHUSETTS

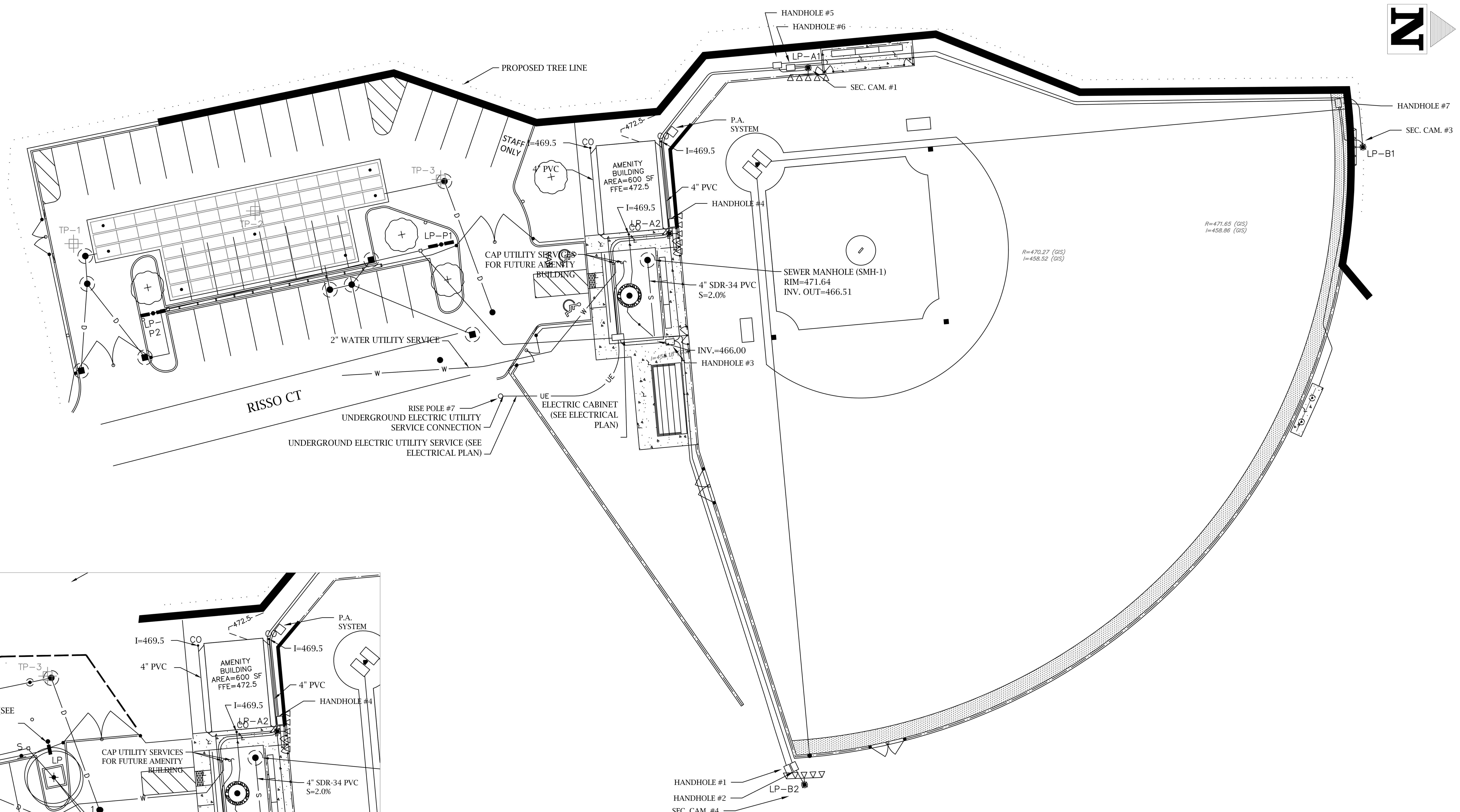
SCALE: AS NOTED DATE: JUNE 30, 2023

SITE DETAILS #6

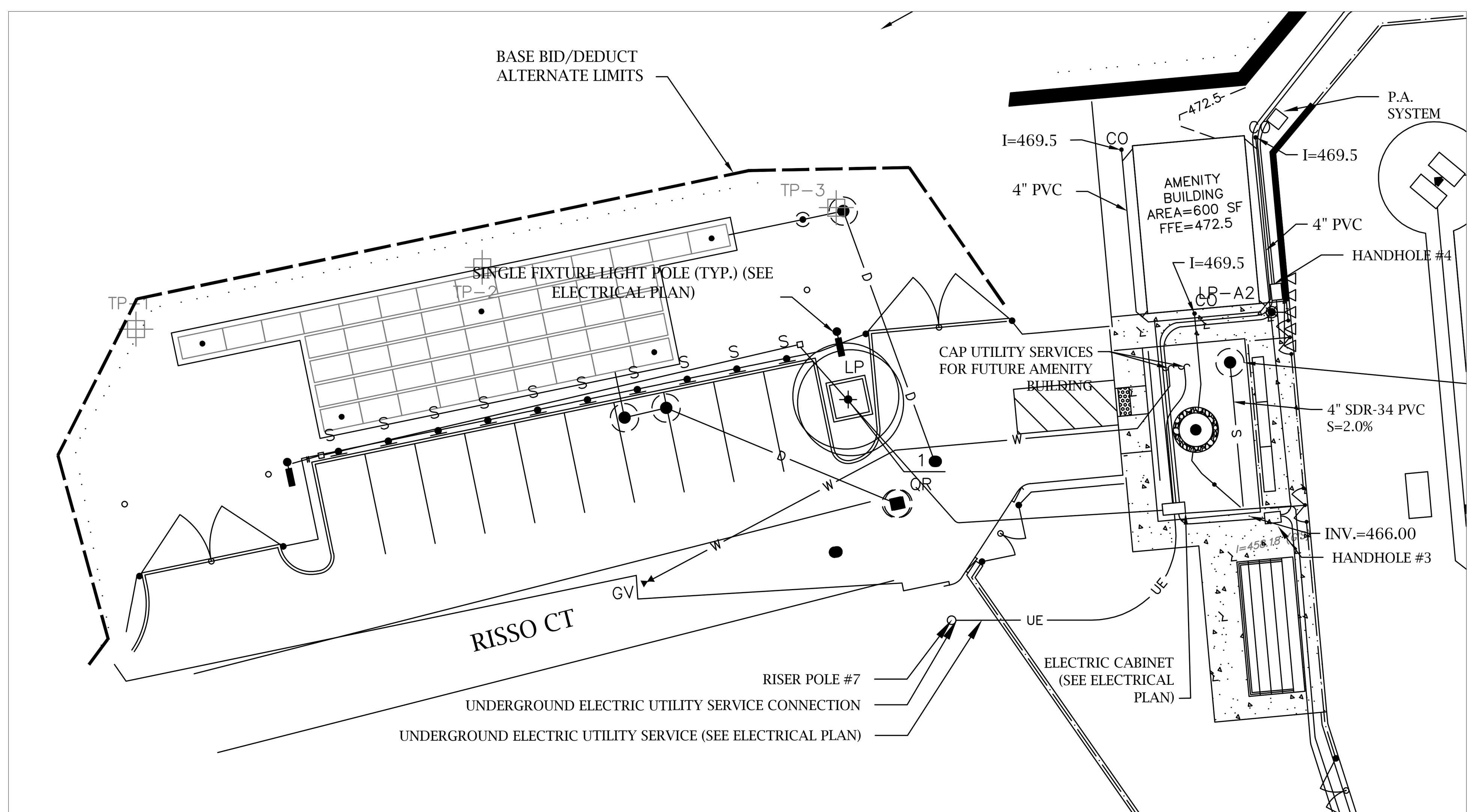
B+T JOB NO.3131.02

B+T PLAN NO. 313102P004B–008

C7.6



PROPOSED TREE LINE
HANDHOLE #5
HANDHOLE #6
LP-A1
SEC. CAM. #1
HANDHOLE #7
SEC. CAM. #3
LP-B1
STAFF ONLY
I=469.5
CO
4" PVC
AMENITY BUILDING AREA=600 SF FFE=472.5
P.A. SYSTEM
I=469.5
4" PVC
HANDHOLE #4
I=469.5
LP-A2
TP-1
TP-2
TP-3
LP-P1
LP-P2
CAP UTILITY SERVICES FOR FUTURE AMENITY BUILDING
SEWER MANHOLE (SMH-1) RIM=471.64 INV. OUT=466.51
4" SDR-34 PVC S=2.0%
INV.=466.00
HANDHOLE #3
2" WATER UTILITY SERVICE
RISSO CT
RISE POLE #7
UNDERGROUND ELECTRIC UTILITY SERVICE CONNECTION
UNDERGROUND ELECTRIC UTILITY SERVICE (SEE ELECTRICAL PLAN)
UE
ELECTRIC CABINET (SEE ELECTRICAL PLAN)
HANDHOLE #1
HANDHOLE #2
SEC. CAM. #4
LP-B2



BASE BID/DEDUCT ALTERNATE LIMITS
SINGLE FIXTURE LIGHT POLE (TYP.) (SEE ELECTRICAL PLAN)
TP-1
TP-2
TP-3
I=469.5
CO
4" PVC
AMENITY BUILDING AREA=600 SF FFE=472.5
P.A. SYSTEM
I=469.5
4" PVC
HANDHOLE #4
I=469.5
LP-A2
CAP UTILITY SERVICES FOR FUTURE AMENITY BUILDING
4" SDR-34 PVC S=2.0%
INV.=466.00
HANDHOLE #3
RISSO CT
RISER POLE #7
UNDERGROUND ELECTRIC UTILITY SERVICE CONNECTION
UNDERGROUND ELECTRIC UTILITY SERVICE (SEE ELECTRICAL PLAN)
UE
ELECTRIC CABINET (SEE ELECTRICAL PLAN)

DEDUCT ALTERNATE
SCALE - 1"=20'

FOR CONCEPTUAL PURPOSES ONLY
NOT FOR CONSTRUCTION

PROJECT: EAST PARK (CRISTOFORO COLUMBO PARK)

BAR SCALE:
METERS 0 5 10 15
FEET 0 10 20 40 60
SCALE: 1"=20'

DESIGNED FOR:
BEALS + THOMAS
BEALS AND THOMAS, INC.
144 Turnpike Road
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.bealsandthomas.com

REV.	DATE	REVISION DESCRIPTION	DRAWN	ENG'R	CHKD	APVD
D	08/16/2023	REVISED FOR ADDENDUM				
C	07/25/23	ISSUED FOR REVIEW	CD	CPO	CPO	CPO
B	06/06/23	ISSUED FOR REVIEW	CD	CPO	CPO	CPO
A	05/08/23	ISSUED FOR REVIEW	CD	CPO	CPO	CPO

STATE LIC. No. XXXXX

ASPLUNDH ENGINEERING SERVICES
NEW ENGLAND OFFICE
25 FORBES BLVD., SUITE 1 FOXBORO, MA 02035
PHONE: 781-821-0121

EAST PARK (CRISTOFORO COLUMBO PARK)
938 SHREWSBURY ST., WORCESTER, MASSACHUSETTS
SITE PLAN

PROJ. NO. A224550
DWG. NO. E-1
SCALE 1" =20'-0"
SIZE D
SHEET 1 of 1

POLE IDENTIFICATION

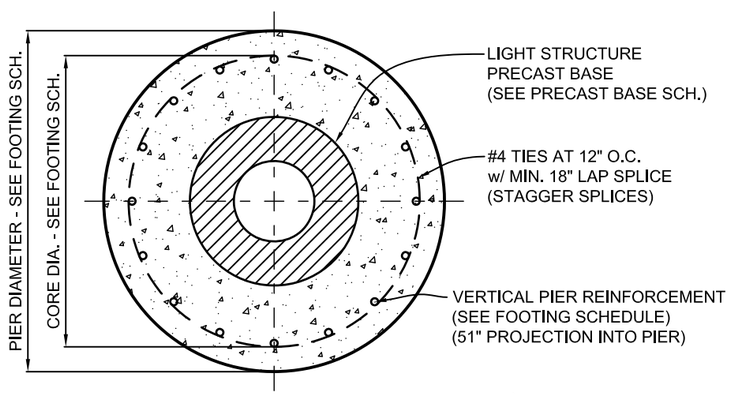
POLE DESIGNATION	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIX. PER XARM)	FIXTURE AND ACCESSORIES EPA (FT^2)
A1, A2	LSS70C	4B	5 (3)	23.2
B1	LSS70C	4B	7 (5)	25.9
B2	LSS80C	6B	15 (5) / (6)	40.9

- POLES A1 & A2 HAVE (2) MUSCO LED FIXTURE(S) AT 35'-0" INCLUDED IN SCHEDULE.
- EACH POLE HAS (1) SPEAKER(S) AT 30'-0" INCLUDED IN SCHEDULE EPA.
- POLE B2 HAS (3) MUSCO LED FIXTURE(S) AT 27'-0" INCLUDED IN SCHEDULE.
- EACH POLE HAS (1) CREE OSQ FIXTURE(S) AT 25'-0" INCLUDED IN SCHEDULE.
- EACH POLE HAS (1) CAMERA(S) AT 20'-0" INCLUDED IN SCHEDULE EPA.
- POLE B1 HAS (1) MUSCO LED FIXTURE(S) AT 15'-6" INCLUDED IN SCHEDULE.
- EACH POLE HAS (1) CAMERA BOX AT 10'-0" INCLUDED IN SCHEDULE EPA.

PRECAST BASE ID FOR SPREAD FOOTING

PRECAST BASE TYPE	PRECAST BASE WEIGHT (1.)	PRECAST BASE LENGTH (1.)	PROJECTION ABOVE TOP OF PIER	STANDARD EMBEDMENT (1.)	OUTSIDE DIAMETER	CUT LENGTH OFF BOTTOM (2.)	EMBEDMENT INTO PIER & FOOTING (3.)
4B	3,490 LBS	22'-0"	8'-0"	14'-0"	15.75"	8'-0"	6'-0"

1. PRECAST BASE WEIGHT, LENGTH AND STANDARD EMBEDMENT ARE PRECUT PROPERTIES
2. EPOXY COAT NEW BOTTOM SURFACE OF PRECAST BASE AFTER CUTTING
3. EMBEDMENT EQUALS 4'-6" PIER HEIGHT PLUS 1'-6" DEPTH INTO FOOTING



A SPREAD FOOTING PIER DETAIL

SCALE: NOT TO SCALE

CONCRETE/REINFORCEMENT NOTES

CONCRETE SHALL COMPLY WITH THE FOLLOWING ASTM STANDARDS: MIXTURE WITH ASTM C-94, PORTLAND CEMENT WITH ASTM C-150 TYPE I, AGGREGATES (MAX 0.75") WITH ASTM C-33 AND BE IN CONFORMANCE WITH ACI 318. CONCRETE SHALL BE AIR-ENTRAINED (COMPLY WITH ASTM C-260), HAVE A MAXIMUM WATER-CEMENT RATIO, w/cm = 0.45 AND HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4,500 PSI.

DESIGN SLUMP LIMITS ARE 4" MINIMUM AND 6" MAXIMUM. THE JOB SITE SLUMP MAY BE INCREASED BY THE USE OF A WATER REDUCING AGENT MEETING ASTM C494-92.

CONCRETE REINFORCEMENT SHALL COMPLY WITH ASTM A615 GRADE 60 AND BE IN CONFORMANCE WITH ACI 315 & 318.

CONCRETE MUST ATTAIN DESIGN STRENGTH PRIOR TO POLE INSTALLATION AND FIXTURE MOUNTING.

DESIGN NOTES

DESIGN PARAMETERS:
WIND: V_{ult} = 124 MPH, V_{asd} = 96 MPH (EXPOSURE C, RISK CATEGORY II) PER MASSACHUSETTS STATE BUILDING CODE - 780 CMR, 9TH EDITION (IBC 2015 / ASCE 7-10).

GEOTECHNICAL PARAMETERS:
SPREAD FOOTING ALLOWABLE BEARING PRESSURE: 1,500 PSF
DRILLED PIER AXIAL RESISTANCE:
NATURAL SAND 1,500 PSF END BEARING (*OR NATURAL SOILS 150 PSF SKIN FRICTION, TO BE VERIFIED BY THE GEOTECHNICAL ENGINEER*)
ALLOWABLE LATERAL SOIL BEARING PRESSURE:
DISREGARD (GRADE TO -4'-0");
EFFECTIVE UNIT WEIGHT & FRICTION ANGLE PER GEOTECH REPORT (BELOW -4'-0").
IN ACCORDANCE WITH MASSACHUSETTS STATE BUILDING CODE - 780 CMR, 9TH EDITION, CHAPTER 18.

SPREAD FOOTINGS: OVER EXCAVATE 0'-6" BELOW THE BOTTOM OF THE SPREAD FOOTING TO PLACE SIX INCHES OF ¾" CRUSHED STONE AS PRESCRIBED IN THE GEOTECH REPORT.

DESIGN SOIL PARAMETERS ARE AS NOTED. ACTUAL ALLOWABLE SOIL PARAMETERS MUST BE VERIFIED ON SITE. REFERENCE SOILS AND FOUNDATION REPORT, NO. O372.00, PREPARED BY NORTHEAST GEOTECHNICAL, INC.; NORTH ATTLEBOROUGH, 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 LICENSED 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.

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.

PRELIMINARY

NOT FOR CONSTRUCTION

EAST PARK
LITTLE LEAGUE
FIELD LIGHTING
WORCESTER, MA

musco Lighting
CORPORATE: 100 1st AVE WEST
OSKALOOSA, IA 52577
(800) 825-6020

STRUCTURAL ENGINEERS, P.C.
114 NICHOLAS DRIVE
MARSHALLTOWN, IOWA 50158
PHONE NUMBER: 641-752-6334
EMAIL: MSL.INFO@SEPC.BIZ

DRAWING TITLE: POLE AND FOUNDATION
SCALE: SEE PLAN
NOTES: SCAN #224497C

PROJECT NUMBER 224497

DATE 17 AUGUST 2023

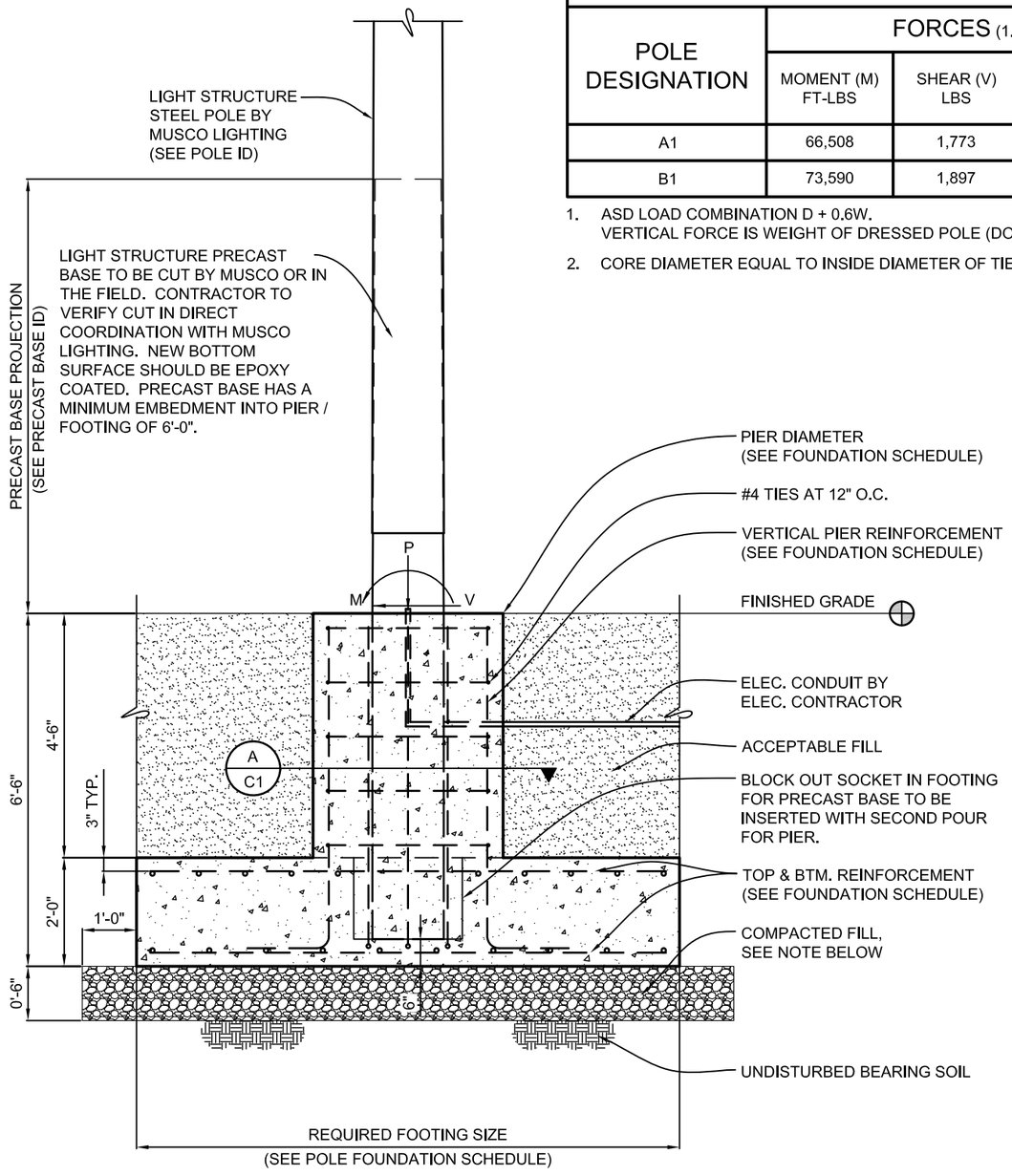
DRAWING NUMBER C1

OF THREE

SPREAD FOOTING FOUNDATION SCHEDULE

POLE DESIGNATION	FORCES (1.)			FOOTING			PIER			
	MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS	SIZE	THICKNESS	REINFORCEMENT TOP & BOTTOM (TOTAL) QUANTITY - SIZE	DIAMETER INCHES	CORE DIA. INCHES (2.)	VERTICAL REINFORCING	HORIZONTAL TIES
A1	66,508	1,773	2,060	9'-6" x 9'-6"	2'-0"	(48) 12 - #6's EACH WAY	42	35	16 - #6	#4 @ 12"
B1	73,590	1,897	2,236	9'-6" X 9'-6"	2'-0"	(48) 12 - #6'S EACH WAY	42	35	16 - #6	#4 @ 12"

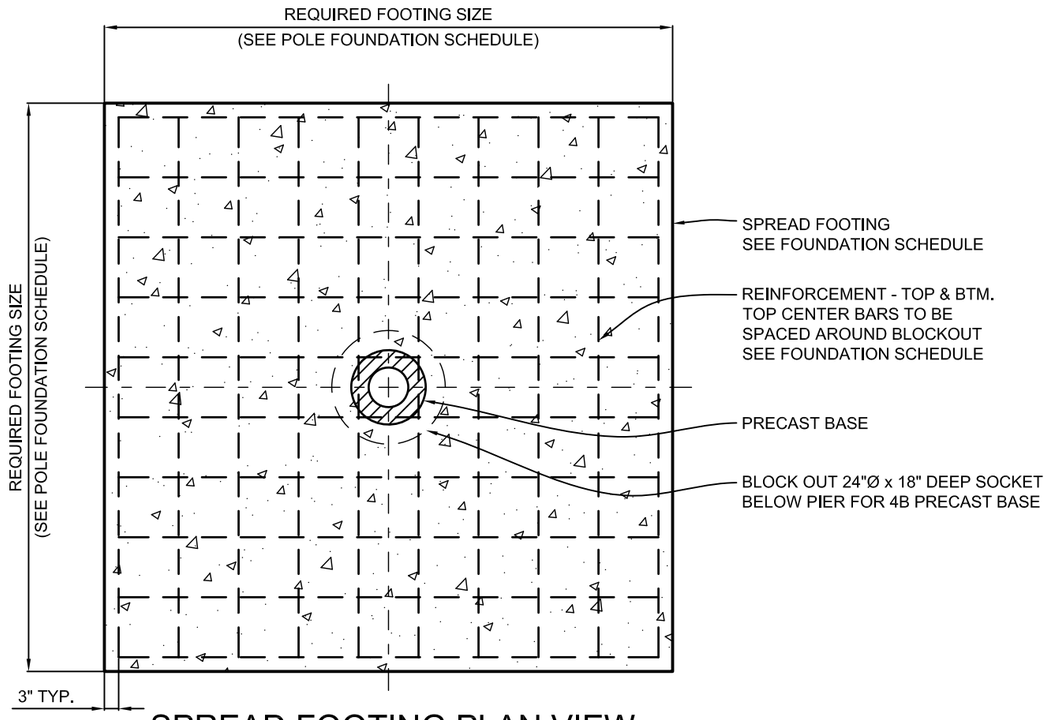
1. ASD LOAD COMBINATION D + 0.6W.
   VERTICAL FORCE IS WEIGHT OF DRESSED POLE (DOES NOT INCLUDE PRECAST BASE WEIGHT).
2. CORE DIAMETER EQUAL TO INSIDE DIAMETER OF TIES.



SPREAD FOOTING ELEVATION

SCALE: NOT TO SCALE

NOTE:
OVER EXCAVATE 0'-6" BELOW THE BOTTOM OF THE SPREAD FOOTING TO PLACE SIX INCHES OF ¾" CRUSHED STONE AS PRESCRIBED IN THE GEOTECH REPORT.



SPREAD FOOTING PLAN VIEW

SCALE: NOT TO SCALE

PRELIMINARY

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224497

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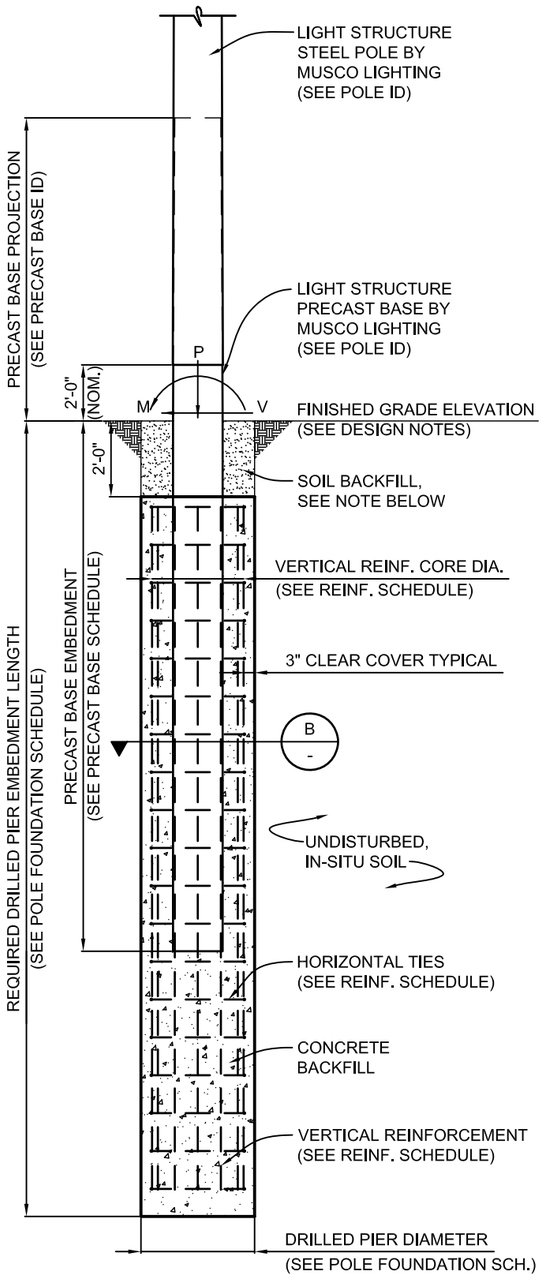
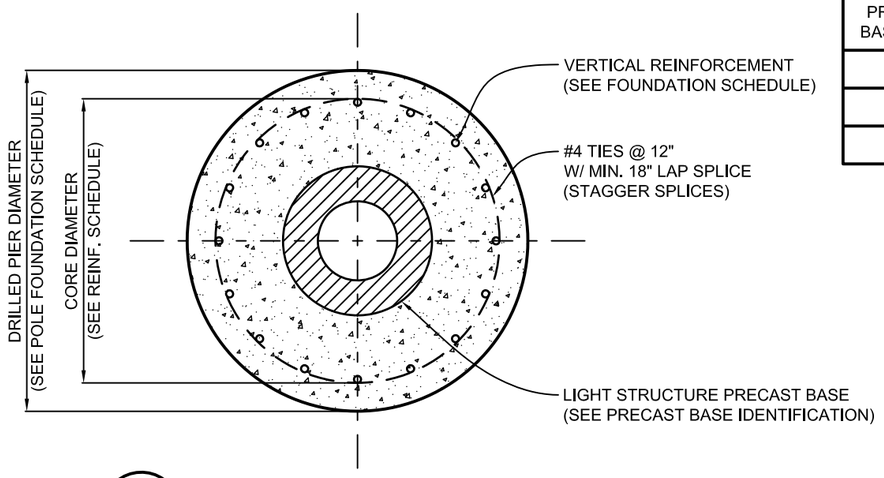
OF THREE



DRILLED PIER ELEVATION

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).



B DRILLED PIER DETAIL

SCALE: NOT TO SCALE

INSTALLATION NOTE (POLES A2 & B2 ONLY):
CONCRETE TO BE PLACED IN A CONTINUOUS POUR OR A COLD JOINT WILL BE ACCEPTABLE AT THE BOTTOM OF THE PRECAST BASE. TWO POUR: WITH THE REINFORCEMENT IN PLACE, THE CONCRETE BELOW THE BOTTOM OF THE PRECAST BASE MAY BE POURED AND ALLOWED TO SET UP LONG ENOUGH TO SUPPORT WEIGHT OF PRECAST BASE. THEN THE PRECAST BASE MAY BE SET IN PLACE AND THE REST OF THE CONCRETE CONCRETE BACKFILL POURED. DEPENDING ON THE DEPTH TO GROUND WATER AT THE TIME OF INSTALLATION, THE TWO POUR METHOD UTILIZING A COLD JOINT MAY NOT BE FEASIBLE.

DRILLED PIER FOUNDATION SCHEDULE

POLE DESIGNATION	FORCES (1.)			DRILLED PIER			REINFORCING		
	MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS	DIAMETER INCHES	EMBEDMENT DEPTH	CONCRETE BACKFILL YD^3 (2.)	CORE DIAMETER INCH (3.)	VERTICAL REINFORCING	HORIZONTAL TIES
A2	66,508	1,773	2,060	42	20'-0"	5.9	35	16 - #6	#4 @ 12"
B2	142,709	3,043	4,232	42	32'-0"	9.4	35	16 - #6	#4 @ 12"

1. ASD LOAD COMBINATION D + 0.6W.
VERTICAL FORCE IS WEIGHT OF DRESSED POLE (DOES NOT INCLUDE PRECAST BASE WEIGHT).
2. MINIMUM CONCRETE BACKFILL VOLUME, SITE CONDITIONS MAY REQUIRE ADDITIONAL BACKFILL.
3. CORE DIAMETER EQUAL TO INSIDE DIAMETER OF TIES.

PRECAST BASE ID FOR DRILLED PIERS

PRECAST BASE TYPE	PRECAST BASE WEIGHT	PRECAST BASE LENGTH	PROJECTION ABOVE GRADE	STANDARD EMBEDMENT	OUTSIDE DIAMETER
4B	3,490 LBS	22'-0"	8'-0"	14'-0"	15.75"
6B	6,930 LBS	26'-1"	8'-1"	18'-0"	20.56"
REFERENCE POLE ID TABLE ON SHEET C1 FOR POLE TO PRECAST BASE TYPES					

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