Soil Management Plan
ZPB-38 Battery Storage Project
1355 Main Street, Leicester MA

February 2022

ZP Battery DevCO, LLC

FUSS & O'NEILL

108 Myrtle Street
Suite 502
Quincy, MA 02171

Project No. 20210067.L10

FUSS & O'NEILL

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Soil Management Plan
ZPB-38 Battery Storage Project
1355 Main Street, Leicester, Massachusetts

End of Report

1 Introduction

1.1 Background

This Soil Management Plan (SMP) has been developed on behalf of ZP Battery DevCO, LLC (ZPB) for planned construction of a Solar Energy Storage System at 1355 Main Street (Massachusetts Route 9) in Leicester, Massachusetts.

Construction includes development of an approximately one-acre site, including electrical equipment, security features, stormwater controls and related site improvements. The improvements will be constructed on a portion of one approximately 5.4-acre parcel of land, identified by the Town of Leicester (the Town) as Map 26B, Lot A1.

As part of the construction of the project, approximately 5,000 cubic yards of fill material will be imported to the property. Portions of the work area are located within wetland protection buffer zones. Furthermore, the property is located in close proximity to a local Water Resource Protection District.

The Town has enacted a soil management bylaw related to Earth Filling and Removal, which generally requires the following conditions:

- Filling projects importing more than 1,000 cubic yards of material in one calendar year shall obtain a special permit for the soil management activity.
- Soil imported for the purpose of a filling project shall not consist of solid waste as defined at 310 CMR 19.000 or remediation waste as defined at 310 CMR 40.0000, and shall be compatible with the receiving site, as determined by a Licensed Site Professional (LSP).
- The bylaw includes standards for soil management in transport and at the filling site, in order to prevent environmental contamination, nuisance conditions (dust, odors)

This SMP has been developed to establish a soil management framework for the battery storage development project in accordance with this bylaw.

1.2 Purpose and Scope

The purpose of this Soil Management Plan is to provide a site-specific outline for handling soil, specifically imported fill material, at the project site. The Soil Management Plan has been prepared in the context of the Town's Earth Filling and Removal Bylaw. The purpose of this *Soil Management Plan* is to describe appropriate soil handling, storage, transport, and placement consistent with the town's Bylaw and in the context of the proposed site improvements.

The scope of this plan includes the following:

- Health and safety requirements for construction personnel[1];
- Field screening, sampling and laboratory analysis of soil, as necessary.
- Proper handling of soil during transit, storage and placement on-site.

These specific items are included in the subsections below.

1.3 Existing and Proposed Conditions

Site development plans for the property are included as *Appendix A*. Approximately one acre of the northeast portion of the property will be developed for battery storage. Approximately 5,000 cubic yards of fill material will be imported to grade the Site. ZPB plans to import the material from a commercial sand and gravel supplier, though the specific supplier and material source have not been defined at this time.

A soil map is included as *Appendix B*. Soil at the site is mapped as Paxton Fine Sandy Loam, which consists of well-drained fine sandy loam on drumlins, hills or moraines. Portions of the site include reworked, locally-generated soil within the work area. The Site is not a "disposal site" as defined in the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). One disposal site was historically associated with the property, but was located west of the development boundary.[2] The "Activity and Use Limitation" (AUL) boundary associated with that historical disposal site is depicted on the development plans, and is outside of the scope of this plan. As defined in the MCP, the disposal site includes the areas where oil or hazardous material have come to be located as a result of a release, such as a spill. As the limit of the development is outside of the "disposal site" boundary, the new development will not trigger "response actions" or remedial activities in connection with the AUL and disposal site.

Based on the condition of the property in the area where the construction will occur, soil conditions are inferred to be consistent with "natural background" as defined in the MCP, namely:

> *Natural Background means those levels of oil and hazardous material that would exist in the absence of the disposal site of concern, are ubiquitous and consistently present in the environment at and in the vicinity of the disposal site of concern, and are attributable to geologic or ecological conditions. (310 CMR 40.0006)*

As noted below, MassDEP has developed guidance for typical concentrations of certain hazardous materials (e.g. metals) associated with natural background conditions.

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1 Construction workers, inspectors and related project personnel are not employees of Fuss & O'Neill. To the extent necessary, this Soil Management Plan is provided to them for their use in developing their own employee-specific health and safety procedures, and as appropriate, Health and Safety Plan. The contractor is responsible that the worker health and safety plan is implemented to the extent required by the federal Occupational Safety and Health Administration (OSHA) requirements and any other applicable federal, state and local law.

2 Knoll Environmental, Inc. Response Action Outcome, Release Tracking #2-0497, December 15, 2004.

1.4 Regulatory Framework

As noted above, the Leicester Earth Filling and Removal Bylaw contains provisions for filling projects exceeding 1,000 cubic yards of material. The Bylaw contains explicit requirements prohibiting the reuse of remediation waste, solid waste or otherwise regulated soil on the property. Furthermore, the MCP contains a provision, referenced as the "anti-degradation policy," which prohibits reuse or disposal of soil, even at levels less than the MassDEP reportable concentrations, if such soil would be:

> *"Reused at locations where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed or reused."*[3] *(310 CMR 40.0032[3])*

The relationship between fill quality and pre-existing conditions at the receiving site, and the definition of "significantly lower" as used in that section are further clarified via the MassDEP *Similar Soils Provision Guidance*.[4] Generally, the guidance provides presumptive concentrations of oils and hazardous materials (e.g. metals) which may be "similar" to receiving sites where the receiving sites are presumed or documented to meet the definition of "natural" or "anthropogenic" background, as well as provisions for site-specific background determinations and development of site-specific acceptance criteria. As noted above, this Soil Management Plan assumes that the soil on-site is consistent with "natural background." As discussed during the February 1, 2022 Planning Board meeting, the Leicester Planning Board agreed that using the natural background levels in lieu of a site-specific background study for the project would be acceptable.

1.5 Project Team

For the purposes of this Soil Management Plan, the following project team members are identified:

Owner:
WR Enterprises, LLC
1323 Main Street
Leicester, MA 01524

Developer:
ZP Battery DevCO, LLC
10 E. Worcester Street, Suite 3A
Worcester, MA 01604

Licensed Site Professional:
Fuss & O'Neill, Inc.
108 Myrtle Street, Suite 502
Quincy, MA 02171

Civil / Site Engineer:
Hannigan Engineering, Inc.
8 Monument Square
Leominster, MA 01453

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3 MassDEP, 2019. 310 CMR 40.0032(3).

4 MassDEP, 2014. Policy WSC-13-500, Similar Soils Provision Guidance.

2 Soil Acceptance Requirements

The subsections below address the sampling frequency, analytical testing program and acceptance requirements for the soil imported to the project site as fill material.

2.1 Sampling Frequency

As noted above, approximately 5,000 cubic yards of fill material will be imported to the site for use within the project. Fuss & O'Neill proposes that the soil be sampled for laboratory analysis prior to reuse on-site at a rate of one soil sample per 500 cubic yards of imported material (i.e. 10 soil samples to characterize the 5,000 cubic yards imported). Soil samples will be collected by representatives of Fuss & O'Neill while the material is staged at the supplier's facility prior to transport.

To the extent possible, the duration between sampling and proposed import will be minimized (approximately two to three weeks after sampling and before import) to ensure that the stockpiled material remains representative of the material delivered to the project site.

2.2 Analytical Program

Each sample will be submitted to a fixed-based, National Environmental Laboratory Accreditation Program (NELAP)-accredited analytical laboratory for the following suite of analytical methods:

- Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Method 8260
- Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270
- Total Metals (MCP 14 list) by EPA Methods 6010 and 7471
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082
- Extractable Petroleum Hydrocarbon (EPH) Fractions by the MassDEP Method

The laboratory analytical requests will include low-level (RCS-1) reporting limits and the laboratory will be required to certify "presumptive certainty" in accordance with the MassDEP Compendium of Analytical Methods (CAM).[5] Data sets which achieve presumptive certainty under the CAM meet the level of analytical confidence required for human health and ecological risk characterizations under the MCP.

[5] MassDEP Policy WSC-10-320, July 1, 2010. *Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols.*

2.3 Data Evaluation and Acceptance Levels

Fuss & O'Neill will review the analytical data set and compare the data to the "Limiting Soil Concentration" levels for metals and semi-volatile organic compounds as listed on the table in *Appendix C*. In addition to these levels, the following proposed acceptance criteria will apply to other contaminants not listed in *Appendix C*:

- VOCs, and SVOCs not listed on the table: the greater of non-detect or 10% of the RCS-1 reportable concentration (reportable concentrations for sites where sensitive receptors are identified, including residences, schools and daycare facilities).
- PCBs: 0.25 milligrams per kilogram (mg/kg), equal to 25% of the RCS-1 reportable concentration. EPA has documented that PCB background levels typically range from approximately 0.1 to 1.0 mg/kg.[6]
- EPH (each respective fraction): 500 mg/kg, equal to half the RCS-1 reportable concentration of the most conservative individual fraction.

Fuss & O'Neill will review the analytical data set relative to these acceptance levels immediately upon receipt of the analytical data. Soil will not be accepted for import unless these conditions are met. The analytical results will be retained with the project files and will be submitted to the Town upon completion of the project. In order to preserve the representativeness of the data set, soil import will begin as soon as reasonably practicable following the receipt and approval of the analytical data set.

3 General Soil Management Practices

3.1 General

On-site soil and imported fill material will be handled in accordance with the obligations set forth in the *Similar Soils Provision Guidance* and Town bylaw. The contractor will be familiar with the above stated requirements as well as this *Soil Management Plan* before commencing work.

On-site workers must be informed of the requirements of this *Soil Management Plan*. Furthermore, a copy of this *Soil Management Plan* should remain on site for the duration of work involving management of soil and until the hardscaped surfaces of the site (building foundations and paved areas) are fully resurfaced at the conclusion of work.

The Licensed Site Professional (LSP) will evaluate the contractor's earthwork and soil management activities for consistency with the provisions of the S*oil Management Plan,* and the regulations and guidance referenced herein.

[6] MassDEP, 2016. Historic Fill / Anthropogenic Background Public Comment DRAFT Technical Update, Version 1.0, May 2016.

3.2 On-Site Handling and Storage

On-site soil management will be conducted as follows:

1. Prior to the start of work, the Contractor shall contact DigSafe and obtain all relevant clearances and permits for soil disturbance.
2. Erosion controls and site controls (e.g. construction fencing) shall be installed as depicted on the plans and as directed by the site civil engineer.
3. Standard construction and excavation techniques shall be employed, and the Contractor shall be responsible for conducting all soil disturbances in a safe manner.
4. Store excavated soil and fill material in stockpile(s) near the point of reuse, and within the boundary of the site as approved by the Owner. When not adding to or removing from stockpiles, cover with tarps, sheeting or similar materials to prevent windblown dust, erosion and siltation.
5. Place and compact fill material as soon as is practicable during construction. Backfill in lifts and comply with compaction requirements as directed by the site civil engineer. Establish surface cover as soon as is practicable following placement to prevent erosion or siltation. Maintain erosion controls until final cover is established or as directed by the site civil engineer.

During the course of construction, Fuss & O'Neill's LSP and the site civil engineer will periodically inspect the progress of fill management activities to ensure compliance with the general standards herein.

3.3 Transportation

The fill importation activities will generate truck traffic to the project site. A construction entrance, consisting of angular crushed stone, will be installed at the site to control dust at the edge of the work site and prevent dust tracking onto Main Street (Route 9). Soils transported upon public roadways will be covered to minimize fugitive dust, and where necessary, truck tire and undercarriage washing may be employed to minimize tracking of soils onto public roadways.

4 Health and Safety Requirements

Contractors are provided this *Soil Management Plan* so that their personnel who may come in contact with soil may evaluate their health and safety obligations (as determined by their employer). As soil data is generated with regard to the chemical qualities of incoming soil, that data will be shared with members of the project team so that they may consider that data in the context of their health and safety programs.

5 Certification

This plan was prepared by the undersigned:

Daniel LaFrance, PE (MA 51019), LSP (MA 2375)
Environmental Project Manager, Fuss & O'Neill

6 References

Hannigan Engineering, Inc, 2021. *Site Development Plan, Solar Energy Storage System*. Permitting Set dated September 21, 2021, Sheets 1-6.

Knoll Environmental, Inc. Response Action Outcome, Release Tracking #2-0497, December 15, 2004.

Massachusetts Department of Environmental Protection, 2019, *310 CMR 40.0000: Massachusetts Contingency Plan*.

Massachusetts Department of Environmental Protection, 2016. *Historic Fill / Anthropogenic Background Public Comment DRAFT Technical Update, Version 1.0*, May 2016.

Massachusetts Department of Environmental Protection, Policy WSC-10-320, July 1, 2010. *Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols*.

Massachusetts Department of Environmental Protection, 2014. Policy WSC-13-500, *Similar Soils Provision Guidance*.

Town of Leicester, Massachusetts, 2020. *Leicester Zoning By-Laws, Section 5.16 Earth Filling and Removal.*

USDA, 2021. United States Department of Agriculture, Natural Resources Conservation Services Soil Survey Geographic (SSURGO) Data Base, Worcester County, Massachusetts, Southern Part, accessed February 2022.

7 Limitations of Work Product

This document was prepared for the sole use of ZP Battery DevCO, LLC, the only intended beneficiaries of our work. Those who may use or rely upon the report and the services (hereafter "work product") performed by Fuss & O'Neill, Inc. and/or its subsidiaries or independent professional associates, subconsultants and subcontractors (collectively the "Consultant") expressly accept the work product upon the following specific conditions.

1. Consultant represents that it prepared the work product in accordance with the professional and industry standards prevailing at the time such services were rendered.

2. The work product may contain information that is time sensitive. The work product was prepared by Consultant subject to the particular scope limitations, budgetary and time constraints and business objectives of the Client which are detailed therein or in the contract between Consultant and Client. Changes in use, tenants, work practices, storage, Federal, state or local laws, rules or regulations may affect the work product.

3. The observations described and upon which the work product was based were made under the conditions stated therein. Any conclusions presented in the work product were based solely upon the services described therein, and not on scientific or engineering tasks or procedures beyond the scope of described services.

4. In preparing its work product, Consultant may have relied on certain information provided by state and local officials and information and representations made by other parties referenced therein, and on information contained in the files of state and/or local agencies made available at the time of the project. To the extent that such files which may affect the conclusions of the work product are missing, incomplete, inaccurate or not provided, Consultant is not responsible. Although there may have been some degree of overlap in the information provided by these various sources, Consultant did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this project. Consultant assumes no responsibility or liability to discover or determine any defects in such information which could result in failure to identify contamination or other defect in, at or near the site. Unless specifically stated in the work product, Consultant assumes no responsibility or liability for the accuracy of drawings and reports obtained, received or reviewed.

5. If the purpose of this project was to assess the physical characteristics of the subject site with respect to the presence in the environment of hazardous substances, waste or petroleum and chemical products and wastes as defined in the work product, unless otherwise noted, no specific attempt was made to check the compliance of present or past owners or operators of the subject site with Federal, state, or local laws and regulations, environmental or otherwise.

6. If water level readings have been made, these observations were made at the times and under the conditions stated in the report. However, it must be noted that fluctuations in

water levels may occur due to variations in rainfall, passage of time and other factors and such fluctuations may affect the conclusions and recommendations presented herein.

7. Except as noted in the work product, no quantitative laboratory testing was performed as part of the project. Where such analyses have been conducted by an outside laboratory, Consultant has relied upon the data provided, and unless otherwise described in the work product has not conducted an independent evaluation of the reliability of these tests.

8. If the conclusions and recommendations contained in the work product are based, in part, upon various types of chemical data, then the conclusions and recommendations are contingent upon the validity of such data. These data (if obtained) have been reviewed and interpretations made by Consultant. If indicated in the work product, some of these data may be preliminary or screening-level data and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time and other factors.

9. Chemical analyses may have been performed for specific parameters during the course of this project, as described in the work product. However, it should be noted that additional chemical constituents not included in the analyses conducted for the project may be present in soil, groundwater, surface water, sediments or building materials at the subject site.

10. Ownership and property interests of all documents, including reports, electronic media, drawings and specifications, prepared or furnished by Consultant pursuant to this project are subject to the terms and conditions specified in the contract between the Consultant and Client, whether or not the project is completed.

11. Unless otherwise specifically noted in the work product or a requirement of the contract between the Consultant and Client, any reuse, modification or disbursement of documents to third parties will be at the sole risk of the third party and without liability or legal exposure to Consultant.

12. In the event that any questions arise with respect to the scope or meaning of Consultant's work product, immediately contact Consultant for clarification, explanation or to update the work product. In addition, Consultant has the right to verify, at the party's expense, the accuracy of the information contained in the work product, as deemed necessary by Consultant, based upon the passage of time or other material change in conditions since conducting the work.

Appendix A

Site Development Plans

SITE DEVELOPMENT PLAN
SOLAR ENERGY STORAGE SYSTEM (ESS)
1355 MAIN STREET
IN
LEICESTER, MASSACHUSETTS
SEPTEMBER 21, 2021
REVISIONS THROUGH OCTOBER 19, 2021

VICINITY MAP SCALE: 1" = 1000'

APPLICANT:

ZP BATTERY DEVCO, LLC
BRENDON GOVE
10 E. WORCESTER STREET, SUITE 3A
WORCESTER, MASSACHUSETTS 01604

OWNER:

WR ENTERPRISES, LLC
1323 MAIN STREET
LEICESTER, MASSACHUSETTS 01420

CIVIL ENGINEER & LAND SURVEYOR:

HANNIGAN ENGINEERING, INC.
8 MONUMENT SQUARE
LEOMINSTER, MASSACHUSETTS 01453
TEL: (978) 534-1234

PLAN INDEX

PERMITTING SET - NOT FOR CONSTRUCTION

3010- ZP BATTERY DEVCO, LLC C-17-38 (OCTOBER 19, 2021)

NOTE: PROPERTY LINES AND STRUCTURE LOCATIONS ARE BASED ON MASSGIS AND ARE APPROXIMATE IN NATURE.

1000FT PROPERTY OFFSET

RESIDENTIAL 2 DISTRICT

HIGHWAY BUSINESS–INDUSTRIAL DISTRICT (HB–1)

1478 MAIN ST (SF RES)
1472 MAIN ST (SF RES)
1454 MAIN ST (SF RES)
1438 MAIN ST (MF RES)
VACANT
1430 MAIN STREET (COUNTRY CLUB)
1434 MAIN STREET (MULTI–FAMILY RES)
1475 MAIN ST (SF RES)
1 MOUNT PLEASANT AVE (SF RES)
1469 MAIN ST (SF RES)
1455 MAIN ST (SF RES)
1445 MAIN ST (COMMERICAL)
2 MOUNT PLEASANT AVE (SF RES)
4 MOUNT PLEASANT AVE (SF RES)
3 MOUNT PLEASANT AVE (SF RES)
6 MOUNT PLEASANT AVE (SF RES)
5 MOUNT PLEASANT AVE (SF RES)
8 MOUNT PLEASANT AVE (SF RES)
7 MOUNT PLEASANT AVE (SF RES)
10 MOUNT PLEASANT AVE (SF RES)
9 MOUNT PLEASANT AVE (SF RES)
11 MOUNT PLEASANT AVE (SF RES)
MAIN STREET (ROUTE 9)
MOUNT PLEASANT AVE
BUSINESS–RESIDENTIAL–1 DISTRICT (BR–1)
RESIDENTIAL–1 DISTRICT (R1)
1439 MAIN ST (VACANT)
142 RAWSON ST (SF RES)
1342 MAIN STREET (SF RES)
1340 MAIN STREET (SF RES)
1326 MAIN STREET (SINGLE FAMILY RES)
1360 MAIN STREET (MUNICIPAL)
1350 MAIN STREET (SF RES)
LOCUS
HIGHWAY BUSINESS–INDUSTRIAL DISTRICT (HB–1)
RESIDENTIAL–1 DISTRICT (R1)
SHEET 2 & 3 : PROJECT AREA
WATER RESOURCE PROTECTION DISTRICT
1000FT PROPERTY OFFSET
27 FELIX ST (MF RES)
25 FELIX ST (SF RES)
VACANT
59 LAKE AVE (SF RES)
49 LAKE AVE (SF RES)
2 FELIX ST (SF RES)
43 LAKE AVE (SF RES)
5 FELIX ST (SF RES)
25 LAKE AVE (SF RES)
LAKE AVENUE
32 LAKE AVE (SF RES)
17 LAKE AVE (SF RES)
15 LAKE AVE (SF RES)
1296 MAIN STREET (MULT–FAMILY RES)
312 MAIN ST (SF RES)
1286 MAIN ST (COMMERICAL)
1284 MAIN ST (MF RES)
278 MAIN ST (SF RES)
1274 MAIN ST (SF RES)
1248 MAIN ST (SF RES)
CENTRAL BUISNESS DISTRICT (CB)
1000FT PROPERTY OFFSET
1323 MAIN ST (COMMERICAL)
1279 MAIN ST (MF RES)
271 MAIN ST (MF RES)
1263 MAIN ST (MF RES)
22 RAWSON ST (SF RES)
9 RAWSON ST (SF RES)
30 RAWSON ST (SF RES)
RAWSON STREET
6 KING COURT (SF RES)
15 KING COURT (MF RES)
10 KING COURT (SF RES)
18 KING COURT (SF RES)
KING COURT
17 KING COURT (SF RES)
20 KING COURT (SF RES)
19 KING COURT (SF RES)
22 KING COURT (SF RES)
25 KING COURT (SF RES)
27 KING COURT (SF RES)
44 RAWSON ST (SF RES)
54 RAWSON ST (SF RES)
46 RAWSON ST (SF RES)
58 RAWSON ST (SF RES)
66 RAWSON ST (MF RES)
77 RAWSON ST (SF RES)
80 RAWSON ST (SF RES)
82 RAWSON ST (SF RES)
84 RAWSON ST (SF RES)
86 RAWSON ST (SF RES)
88 RAWSON ST (SF RES)
90 RAWSON ST (SF RES)
92 RAWSON ST (SF RES)
79 RAWSON ST (SF RES)
81 RAWSON ST (SF RES)
83 RAWSON ST (SF RES)
0 RAWSON ST (MUNICIPAL)
RAWSON STREET
1000FT PROPERTY OFFSET

PROJECT INFORMATION

LAND INFORMATION

MAP/PARCEL:	26B/A1
DEED BOOK–PAGE:	65218/149
EXISTING FRONTAGE:	794.29'
EXISTING AREA:	5.44 ACRES

ZONING INFORMATION

ZONING DISTRICT: HIGHWAY BUSINESS–INDUSTRIAL 1 (HB–1)

DIMENSIONAL REQUIREMENTS:

MINIMUM AREA:	60,000 S.F.
MINIMUM FRONTAGE:	200'
MAXIMUM HEIGHT:	55'
MINIMUM SETBACKS:	
FRONT YARD:	50'
SIDE YARD:	50'
REAR YARD:	50'

GENERAL NOTES:

1. PROPERTY LINE INFORMATION BASED DEEDS AND PLANS OF RECORD. NO CERTIFICATION OF PROPERTY LINES SHOWN ON THIS PLAN IS INTENDED OR IMPLIED BY HANNIGAN ENGINEERING, INC. TOPOGRAPHIC INFORMATION IS THE RESULT OF AN ON–THE–GROUND TOPOGRAPHIC SURVEY BY HANNIGAN ENGINEERING, INC. IN JULY OF 2021.
2. AREAS SUBJECT TO PROTECTION UNDER THE WETLANDS PROTECTION ACT HAVE BEEN DELINEATED BY CARON ENVIRONMENTAL CONSULTING ON MARCH 26, 2021. THESE AREAS ARE DEPICTED ON THE PLANS BASED ON FIELD SURVEY LOCATION DURING THE TOPOGRAPHIC SURVEY.
3. LOCATION OF ALL UTILITIES ARE APPROXIMATE AS SHOWN AND BASED UPON VISIBLE STRUCTURES AT THE TIME OF THE FIELD SURVEY. LOCATION OF EXISTING UTILITIES AND SUBSURFACE STRUCTURES, WHETHER OR NOT SHOWN ON THESE PLANS, SHALL BE DETERMINED BY THE CONTRACTOR, MARKED IN THE FIELD, AND REVIEWED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR SHALL BE AWARE OF THE OBLIGATION TO ALL UTILITY COMPANIES AND AGENCY AS WELL AS DIG–SAFE PRIOR TO EXCAVATION. (SEE NOTE)
4. NOTIFICATION REQUIREMENTS SHOWN ON THIS PLAN SHALL NOT RELIEVE THE CONTRACTOR OF ANY OTHER REQUIREMENTS WHICH MAY EXIST UNDER LOCAL, STATE, OR FEDERAL JURISDICTION TO WHICH THE CONTRACTOR IS OBLIGATED.
5. RELOCATION OF AND/OR CONNECTION TO EXISTING UTILITIES SHALL BE PERFORMED IN ACCORDANCE WITH PROVISIONS OF THE APPROPRIATE UTILITY COMPANY AND/OR REGULATORY AGENCY.
6. UNLESS OTHERWISE SPECIFIED, ALL MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF THE TOWN OF LEICESTER AND THE MASS DOT SPECIFICATIONS OF HIGHWAYS AND BRIDGES.
7. ALL SLOPES UNLESS OTHERWISE SPECIFIED, SHALL BE LOAMED AND SEEDED FOR STABILIZATION.
8. ANY DEVIATIONS IN DESIGN AS SHOWN SHALL REQUIRE A REVIEW AND APPROVAL OF THE DESIGN ENGINEER OR FIRM. CHANGES MADE IN THE FIELD MADE WITHOUT AUTHORIZATION SHALL BE SUBJECT TO REVIEW BY THE ENGINEER AND APPROPRIATE APPROVING AUTHORITY. EXPENSES INCURRED TO BRING THE UNAUTHORIZED CHANGES TO ACCEPTABLE CONFORMANCE SHALL BE BORNE BY THE COMPANY OR CONTRACTOR MAKING THE UNAUTHORIZED CHANGE.
9. ANY MATERIALS DISCOVERED ON–SITE WHICH ARE NOT SUITABLE FOR USE IN THE PROJECT AS SHOWN ON THIS PLAN SHALL BE REMOVED AND HAULED OFF–SITE TO AN APPROPRIATELY LICENSED FACILITY.
10. PLANS TO BE REVIEWED BY APPLICABLE UTILITY AGENCIES FOR COMPLIANCE WITH REGULATIONS. FINAL LOCATION IS SUBJECT TO CHANGE.
11. APPLICANT SHOULD BE AWARE OF OBLIGATIONS TO COMPLY WITH CHAPTER 131, SECTION 40 OF THE MASSACHUSETTS GENERAL LAWS, OTHERWISE KNOWN AS THE WETLANDS PROTECTION ACT, AND THE ASSOCIATED REGULATIONS (310 CMR 10.00)
12. STOCKPILING OF MATERIAL SHALL NOT BE PERMITTED WITHIN ANY AREAS SUBJECT TO PROTECTION UNDER THE WETLANDS PROTECTION ACT WITHOUT PRIOR APPROVAL BY THE LOCAL CONSERVATION COMMISSION. STOCKPILES SHALL BE PLACED IN A SUITABLE LOCATION AND SURROUNDED BY A ROW OF STAKED HAY BALES FOR EROSION CONTROL.
13. AREAS OF FILL TO BE COMPACTED TO A MINIMUM 95% DRY DENSITY IN AREAS WITHIN ROADWAYS AND UTILITY EASEMENTS. OTHER AREAS OF FILL TO BE COMPACTED TO A MINIMUM 90% DRY DENSITY. ALL FILL MATERIALS ARE TO BE CLEAN FILL, FREE OF DELETERIOUS MATERIALS AND DEBRIS.
14. ALL SIDEWALKS AND RAMPS TO CONFORM TO REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA), AS REQUIRED. SEE ARCHITECTURAL PLANS FOR CONFORMANCE REQUIREMENTS FOR PROPOSED BUILDINGS.
15. THE AREA PROPOSED FOR DEVELOPMENT IS NOT WITHIN A 100 YEAR FLOOD PLAIN PER F.E.M.A. FIRM PANEL #25013 0781 E, DATED: JULY 4, 2011. COMPLIANCE WITH APPLICABLE REGULATIONS IS REQUIRED.
16. ALL REINFORCED CONCRETE PIPE TO BE CLASS III UNLESS OTHERWISE NOTED.
17. PRE–CONSTRUCTION CONFERENCE SHALL BE HELD PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
18. ALL UTILITIES ARE TO BE INSTALLED BY A LICENSED UTILITY CONTRACTOR LICENSED BY THE TOWN OF LEICESTER.

NO.	DATE	REVISIONS	BY
1	10/19/21	PEER–REVIEW COMMENT	CMA

COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER M ANDERSON CIVIL No. 55312 REGISTERED PROFESSIONAL ENGINEER
10-19-21

APPLICANT:
ZP BATTERY DEVCO, LLC
BRENDON GOVE
10 E. WORCESTER STREET, SUIT 3A
WORCESTER, MASSACHUSETTS 01604

OWNER:
WR ENTERPRISES, LLC
1323 MAIN STREET
LEICESTER, MASSACHUSETTS 01524

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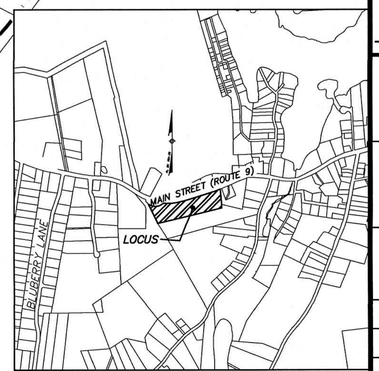
(978) 534-6060 (F)
WWW.HANNIGANENGINEERING.COM

LOCUS PLAN IN LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

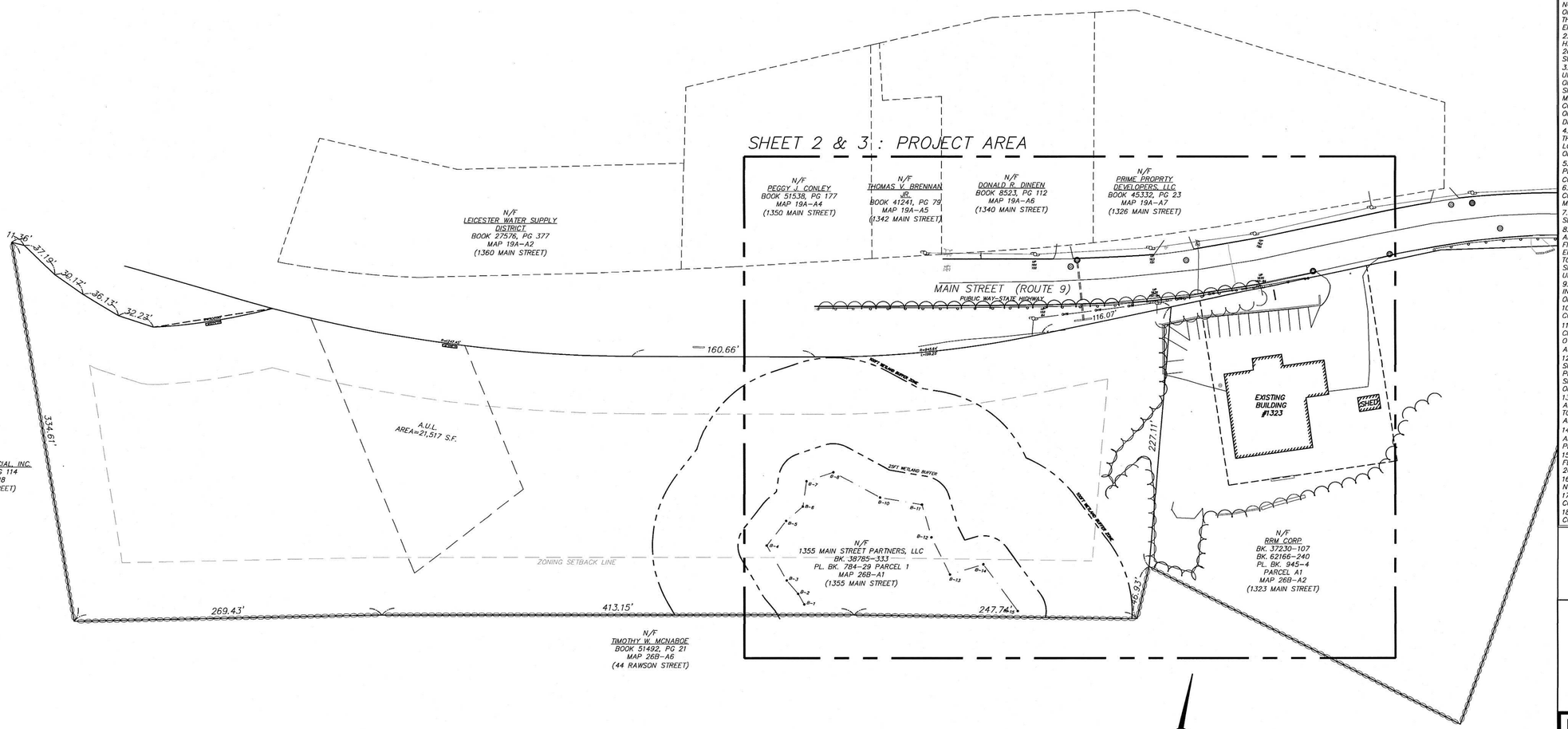
GRAPHIC SCALE: 1"=120'

0 100 150 200 300 400 500 FEET
0 10 20 30 40 60 80 100 120 140 METERS



LOCUS PLAN SCALE: 1":1000'

CALC: CMA	DRWN: CMA	SCALE: 1"=120'
CHKD: WDH	APPD: WDH	DATE: SEP 21, 2021
SRV: JEF	FB: 71–22	JOB NO: 3010
TAB: (1) LOCUS	SHEET 1 OF 6	PLAN NO:C–17–38



PROJECT INFORMATION

LAND INFORMATION

MAP/PARCEL:	26B/A1
DEED BOOK-PAGE:	65218/149
EXISTING FRONTAGE:	794.29'
EXISTING AREA:	5.44 ACRES

ZONING INFORMATION

ZONING DISTRICT: HIGHWAY BUSINESS-INDUSTRIAL 1 (HB-1)

DIMENSIONAL REQUIREMENTS:

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COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER M ANDES
CIV.
No. 50...
REGISTERED PROFESSIONAL ENGINEER
10-19-21

HANNIGAN ENGINEERING, INC.
CIVIL ENGINEERS & LAND SURVEYORS

8 MONUMENT SQUARE
LEOMINSTER, MASSACHUSETTS 01453
(978) 534-1234 (T)
(978) 534-6060 (F)
WWW.HANNIGANENGINEERING.COM

INDEX PLAN
IN
LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

GRAPHIC SCALE: 1"=50'

0 10 20 30 40 50 75 100 150 200 FEET
0 5 10 15 20 30 40 50 60 METERS

APPLICANT:
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OWNER:
WR ENTERPRISES, LLC
1323 MAIN STREET
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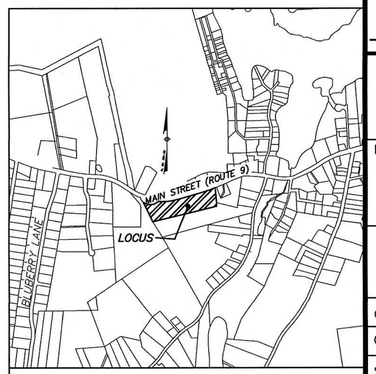

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CHKD: WDH	APPD: WDH	DATE: SEP 21, 2021
SRV: JEF	FB: 71-22	JOB NO: 3010
TAB: (2) INDEX	SHEET 2 OF 6	PLAN NO:C-17-38

N/F
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BOOK 51538, PG 177
MAP 19A–A4
(1350 MAIN STREET)

N/F
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MAP 19A–A5
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MAP 19A–A6
(1340 MAIN STREET)

N/F
PRIME PROPRTY DEVELOPERS, LLC
BOOK 45332, PG 23
MAP 19A–A7
(1326 MAIN STREET)

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INV=112.04

12" HDPE

24" OUTLET
INV=108.0±

UP 164 152
UP 163 151
UP 162 150
UP 162S 150–84
UP 163S 151–84
UP 152 84

R=945.64'
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100FT WETLAND BUFFER ZONE

25FT WETLAND BUFFER

109FT WETLAND BUFFER ZONE

EDGE OF PAVEMENT

EXISTING BUILDING #1323

SHED

GRAVEL AREA

227.11'

16.93'

247.74'

B–1
B–2
B–3
B–4
B–5
B–6
B–7
B–8
B–10
B–11
B–12
B–13
B–14
B–15

N/F
WR ENTERPRISES, LLC
BK 65218–149
PL BK. 784–29 PARCEL 1
MAP 26B–A1
(1355 MAIN STREET)

N/F
RRM CORP
BK. 37230–107
BK. 62166–240
PL. BK. 945–4
PARCEL A1
MAP 26B–A2
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BOOK 51492, PG 21
MAP 26B–A6
(44 RAWSON STREET)

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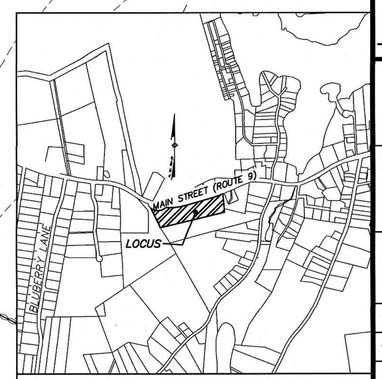

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NO.	DATE	REVISIONS	BY
1	10/19/21	PEER–REVIEW COMMENT	CMA

COMMONWEALTH OF MASSACHUSETTS
David J LeRoy No. 47416 REGISTERED PROFESSIONAL LAND SURVEYOR
David J. LeRoy 10-22-21

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CIVIL ENGINEERS & LAND SURVEYORS
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EXISTING CONDITIONS PLAN
IN
LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

GRAPHIC SCALE: 1"=20'
0 5 10 15 20 25 30 40 50 75 FEET
0 1 2 3 4 5 10 15 20 25 METERS

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TAB: (3) EXCOND	SHEET 3 OF 6	PLAN NO: C–17–38

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DCB–A
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INV=112.04

12" HDPE

24" OUTLET
INV=108.0±

UP 164 152
UP 163 151
UP 162 150
UP 162S 150–84
UP 163S 151–84
UP 152 84

E114x5
H5x0
46.0'

PROVIDE CRUSHED STONE APRON–SWALE ALONG TOE OF SLOPE AND PROVIDE STONE CHECKDAMS – – – APPROXIMATELY 25–FOOT ON–CENTER (SEE DETAIL)

PROVIDE VERTICAL QUICK CONNECT STAND PIPE (SUBJECT TO FINAL DESIGN)

EXISTING FENCE (TO REMAIN)

R=945.64'
L=199.25'

15.4 FT

NOTE: MAXIMUM HEIGHT OF SOLAR ENERGY SYSTEM NOT TO EXCEED 12–FEET

22.3 FT

PROVIDE DRY PIPE MANIFOLD FOR FIRE SUPPRESSION SYSTEM (FINAL SIZE TO BE DETERMINED BY MANUFACTURER)

100FT WETLAND BUFFER ZONE

EROSION CONTROL:
STAKED STRAWWATTLE AND SILT FENCE (SEE DETAIL)

EROSION CONTROL:
PROVIDE STAKED STRAWBALES WITH SILTFENCE FENCE DOWNGRADIENT OF DRAINAGE WAY(SEE DETAIL)

PROPOSED SECURITY FENCE (SEE DETAIL)

PROVIDE CONCRETE PADS FOR CONTAINER STORAGE

PAD ELEV=102.6±
PAD ELEV=103.9±
PAD ELEV=105.4±
PAD ELEV=106.6±

ACCESS GATE

PROVIDE KNOX BOX AT ENTRANCE GATE FOR EMERGENCY SERVICES ACCESS

EXISTING BUILDING #1323

SHED

PROPOSED ELECTRICAL EQUIPMENT

UNDERGROUND ELECTRICAL CONDUIT (SEE NOTE)

ACCESS GATE

24.0 FT GRAVEL ACCESS DRIVE (SEE DETAIL)

PROVIDE RIP–RAP SLOPE STABILIZATION (SEE DETAIL)

25FT WETLAND BUFFER

BASIN ACCESS

4" SUBDRAIN
INV=87.9±
(HIGH POINT)

BERM ELEV=92.0±

DB BASIN #1
BOTTOM ELEV=89.0±

100FT WETLAND BUFFER ZONE

FE#1
INV=87.0±

EMERGENCY SPILLWAY ELEV=91.0±

EROSION CONTROL:
STAKED STRAWWATTLE AND SILT FENCE (SEE DETAIL)

EROSION CONTROL:
PROVIDE STAKED STRAWBALES WITH SILTFENCE FENCE DOWNGRADIENT OF BASIN OUTLET (SEE DETAIL)

247.74'

B–1 B–2 B–3 B–4 B–5 B–6 B–7 B–8 B–10 B–11 B–12 B–13 B–14 B–15

N/F
WR ENTERPRISES, LLC
BK 65218–149
PL BK. 784–29 PARCEL 1
MAP 26B–A1
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HIGHWAY BUSINESS–INDUSTRIAL DISTRICT (HB–1)
RESIDENTIAL–1 DISTRICT (R1)

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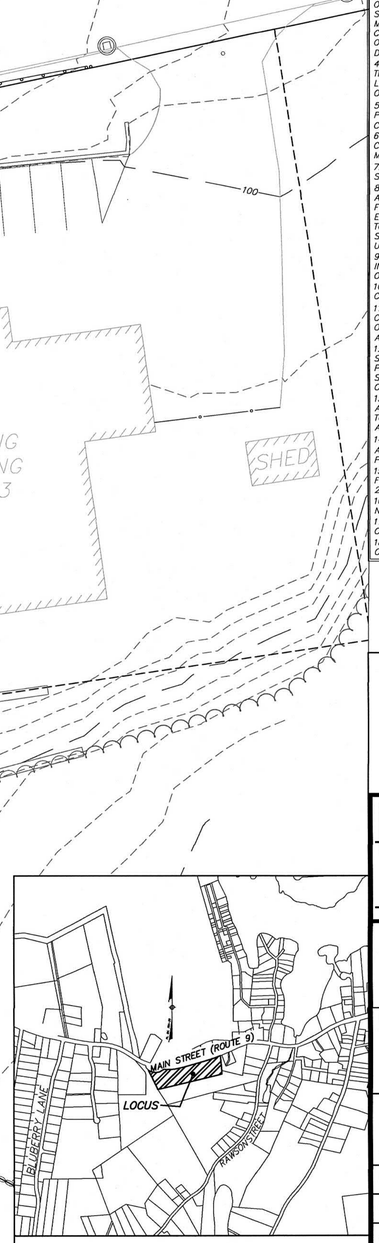

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COMMONWEALTH OF MASSACHUSETTS
CHRISTOPHER M. ANDERSON
CIVIL
No. 55372
REGISTERED PROFESSIONAL ENGINEER
10-19-21

HANNIGAN ENGINEERING, INC.
CIVIL ENGINEERS & LAND SURVEYORS
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LEOMINSTER, MASSACHUSETTS 01453 (978) 534-6060 (F)
WWW.HANNIGANENGINEERING.COM

SITE DEVELOPMENT PLAN
IN
LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

GRAPHIC SCALE: 1"=20'

0 5 10 15 20 25 30 40 50 75 FEET
0 1 2 3 4 5 10 15 20 25 METERS

CALC: CMA	DRWN: CMA	SCALE: 1"=20'
CHKD: WDH	APPD: WDH	DATE: SEP 21, 2021
SRV: JEF	FB: 71–22	JOB NO: 3010
TAB: (4) SDP	SHEET 4 OF 6	PLAN NO: C–17–38

EROSION & SEDIMENTATION CONTROL PLAN

GENERAL:

1. THE PURPOSE OF THIS PLAN IS TO PRESENT A PREVENTIVE METHOD OF CONSTRUCTION TO MINIMIZE THE IMPACT OF THE CONSTRUCTION ACTIVITIES UPON WETLAND AND OTHER SENSITIVE AREAS. THE DATA CONTAINED ON THIS PLAN IS INTENDED TO SUPPLEMENT THE DEVELOPER OR CONTRACTORS' EXPERTISE AND IS NOT MEANT TO CIRCUMVENT LOGICAL DECISIONS REQUIRED BY A VARIETY OF FIELD CONDITIONS INCLUDING WEATHER AND THE TYPE OF EQUIPMENT AVAILABLE TO THE CONTRACTOR.

2. THE CONTRACTOR IS TO BE AWARE OF THE REQUIREMENTS AND OBLIGATIONS TO COMPLY WITH CHAPTER 131, SECTION 40 OF THE MASSACHUSETTS GENERAL LAWS, OTHERWISE KNOWN AS THE WETLANDS PROTECTION ACT, AND ITS ASSOCIATED REGULATIONS (310 CMR 10.00). CERTAIN PERMITS IN THE FORM OF AN ORDER OF CONDITIONS, OR OTHER FORMAT, MAY BE REQUIRED FOR THE CONSTRUCTION AS DEPICTED ON THIS PLAN. THESE PERMITS SHALL BE REVIEWED AND ADHERED TO BY THE CONTRACTOR THROUGHOUT THE CONSTRUCTION PROCESS. THE CONTRACTOR SHALL ALSO MAINTAIN COPIES OF ALL PERMITS ON SITE AT ALL TIMES.

3. IF CHANGES IN THE PROJECT ARE REQUIRED DUE TO FIELD CONDITIONS THE DEVELOPER/CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER FOR REVIEW OF THESE CONDITIONS. UPON REVIEW, AND PRIOR TO THE IMPLEMENTATION OF ANY CHANGE, THE CONTRACTOR AND THE ENGINEER SHALL MEET WITH THE APPROPRIATE LOCAL AND/OR STATE OFFICIAL, OR ITS AGENT, TO DETERMINE IF THE CHANGE REQUIRES MODIFICATION TO EXISTING APPROVED PERMITS.

4. ALTERATION AND/OR DESTRUCTION OF WETLAND AREAS WITHOUT PRIOR CONSENT OF THE CONSERVATION COMMISSION IS PROHIBITED. SILTATION PLUMES, ILLICIT DISCHARGES, OR INADVERTANT ALTERATION SHALL BE CONSIDERED AS ACTIVITIES NOT PERMITTED BY THE ORDER AND SHALL BE REPORTED TO THE CONSERVATION COMMISSION ALONG WITH THE PROPOSED MITIGATIVE MEASURES.

5. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE EROSION AND SEDIMENT CONTROL BARRIER SHALL BE INSTALLED AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL MAINTAIN THE EROSION CONTROL BARRIER UNTIL ALL WORK IS COMPLETE AND ALL AREAS HAVE BEEN STABILIZED. THE REMOVAL OF SEDIMENT CONTROL DEVICES SHALL BE ONLY UPON THE APPROVAL OF THE CONSERVATION COMMISSION.

6. EROSION AND SEDIMENTATION CONTROL DEVICES, SUCH AS CHECK DAMS, SEDIMENT BASINS, ETC. ARE TO BE INSTALLED AS SHOWN ON THE SITE DEVELOPMENT PLANS WITH ASSOCIATED DETAILS, AS APPROPRIATE.

7. CONSTRUCTION OPERATIONS SHALL NOT CAUSE NOTICEABLE SEDIMENTATION PLUMES TO OCCUR ON OR SURROUNDING THE PROJECT. SHOULD SEDIMENT EXTEND BEYOND THE EROSION CONTROL BARRIERS, THE CONTRACTOR SHALL STOP WORK AND INSTALL ADDITIONAL MITIGATION MEASURES TO PREVENT FURTHER SEDIMENTATION.

8. NO MATERIAL SUBJECT TO EROSION SHALL BE STOCKPILED OVERNIGHT WITHIN 100 FEET OF ANY WETLAND AREAS WITHOUT PROPER EROSION AND SEDIMENTATION DEVICES IN PLACE.

9. EQUIPMENT SHALL NOT BE PARKED WITHIN WETLAND OR BUFFER AREAS EXCEPT DURING ACTUAL OPERATIONS REQUIRING SAID EQUIPMENT.

10. ACCUMULATED SEDIMENT ALONG EROSION CONTROL BARRIERS SHALL BE PERIODICALLY REMOVED AND DISPOSED OF BY THE CONTRACTOR AS REQUIRED BY THE CONSERVATION COMMISSION OR AS DIRECTED BY THE ENGINEER.

EROSION CONTROL METHODS:

1. IT IS OF GREAT IMPORTANCE THAT CONCENTRATION OF RUNOFF BE AVOIDED IN ORDER TO PREVENT THE TRANSPORT OF SEDIMENT.

2. THE PRIMARY EROSION CONTROL METHOD TO BE UTILIZED IS TO LIMIT THE AREA OF DISTURBANCE DURING CONSTRUCTION ACTIVITIES. THIS IS ACCOMPLISHED BY PROMPT STABILIZATION OF DISTURBED AREAS UPON COMPLETION OF SEQUENCES OF CONSTRUCTION.

3. EROSION AND SEDIMENT CONTROL DEVICES SUCH AS HAY BALES, SILT FENCES, DIVERSION BERMS, ETC. SHALL BE UTILIZED FOR THE PROTECTION OF THE AREAS BEYOND THE LIMIT OF CONSTRUCTION.

DEMARCATION OF SENSITIVE AREAS:

1. IT IS RECOMMEND THAT BARRIERS BE PLACED ON THE SITE TO CONTROL THE LIMITS OF THE DISTURBANCE. AS AN EXAMPLE, HAY BALE BARRIERS PROVIDE SUCH DEMARCATION AND OTHER METHODS SUCH AS LOG BARRIERS, ROPE WITH FLAGGING, ETC. MAY BE UTILIZED.

2. CARE SHOULD BE TAKEN IN THE OPERATION OF EQUIPMENT, SUCH THAT ONLY THE MINIMUM AREA NEEDED TO BE ALTERED IS DISTURBED.

1. ACCESS TO THE SITE SHALL BE MADE IN THE AREA OF A PERMANENT DRIVEWAY OR ROADWAY UNLESS DOING SO WOULD RESULT IN A TRAFFIC HAZARD.

2. AN AREA OF CRUSHED STONE SHALL BE PLACED AT THE DRIVEWAY ENTRANCE TO INSURE THAT MUD IS NOT TRACKED ONTO THE EXISTING ROAD (SEE CONSTRUCTION ENTRANCE DETAIL). IF MUD IS INADVERTENTLY TRACKED ONTO THE ROAD, IT SHOULD BE PROMPTLY REMOVED.

3. LABORERS VEHICLES SHALL BE PARKED IN A DESIGNATED AREA AS TO MINIMIZE DISTURBED SURFACES AND TO INSURE THAT RUTS ARE NOT CREATED AND WHICH COULD CARRY WATER TO A WETLAND OR OTHER SENSITIVE AREA.

4. SUITABLE MEASURES SHALL BE TAKEN TO INSURE THAT LARGE DELIVERY TRUCKS SERVICING THE SITE DO NOT DAMAGE TO AREAS OF EXISTING VEGETATION OR CAUSE DISTURBANCE TO STABILIZED AREAS.

ORDERLY CONSTRUCTION PROCEDURES:

1. THE CONTRACTOR SHALL PERFORM SITE CONSTRUCTION IN A MANNER WHICH WILL INSURE THE STABILIZATION OF AREAS IN PROXIMITY OF OR TRIBUTARY TO WETLAND AREAS AS SOON AS POSSIBLE.

2. EROSION CONTROL DEVICES SUCH AS HAY BALE BARRIERS, SILT FENCES AND MULCH SHALL BE BROUGHT TO THE SITE AND STOCKPILED PRIOR TO INITIATING CONSTRUCTION.

3. THE CONTRACTOR SHALL PROVIDE AREAS FOR THE TEMPORARY STORAGE OF CONSTRUCTION DEBRIS. CONSTRUCTION DEBRIS SHALL NOT BE ALLOWED TO ACCUMULATE FOR AN EXTENDED PERIOD OF TIME.

CLEARING:

1. LAND CLEARING SHALL BE PERFORMED IN PHASES CONSISTENT WITH ACTUAL CONSTRUCTION REQUIREMENTS. FINAL LAND CLEARING SHALL BE LIMITED TO RETURN TO GRADE SLOPES.

2. TREES SHALL BE CUT FOR ENTIRE SITE LEAVING SUMPS IN PLACE TO MAINTAIN SOIL STABILIZATION.

3. STUMPS SHALL BE PULLED AND STOCKPILED FOR GRINDING.

4. BRUSH AND BRANCHES SHOULD BE CHIPPED AND UTILIZED FOR WOOD MULCH IF PRACTICAL.

5. VEHICLES UTILIZED IN THE CLEARING OPERATION SHOULD NOT TRAVERSE WETLANDS OR FLOWING BROOKS OR STREAMS WITHOUT PRIOR APPROVAL FROM THE LOCAL CONSERVATION COMMISSION OR AGENT.

ROUGH GRADING:

1. THE ROUGH GRADING OF THE SITE SHALL FOLLOW THE FILL AND EXCAVATION SEQUENCES AS DESCRIBED ON THE CONSTRUCTION PHASING PLANS. SLOPES SHALL BE MAINTAINED AWAY FROM WETLANDS AND SENSITIVE AREAS AS MUCH IS PRACTICAL.

2. DURING THIS PROCESS THE EROSION POTENTIAL IS HIGH. SUFFICIENT EROSION CONTROL BARRIERS SHOULD BE KEPT IN PROXIMITY TO THE WORK AREA TO ALLOW QUICK ACTION SHOULD EROSION BECOME AN ISSUE AND TO INSURE THAT NO SEDIMENT REACHES WETLANDS OR OTHER SENSITIVE AREAS.

3. IN AREAS OF CUT AND/OR FILL WHERE SLOPES COULD DIVERT WATER TOWARD WETLAND AREAS, DIVERSION TRENCHES AND/OR SWALES SHOULD BE CONSIDERED AND IMPLEMENTED TO DIVERT WATER AWAY FROM THESE AREAS.

4. STEEP SIDE SLOPES IN EXCAVATION OR FILL SHOULD BE AVOIDED.

5. DISTURBED AREAS SHALL BE STABILIZED BY LOAMING AND SEEDING OR RIPRAPPED IMMEDIATELY AFTER THE FINISH GRADE HAS BEEN MET. IF FINAL GRADING DOES NOT OCCUR DURING THE GROWING SEASON, THESE AREAS SHALL BE MULCHED WITH HAY WITH A TACKIFIER, IF NECESSARY SLOPED AREAS MAY REQUIRE ADDITIONAL CONTROLS SUCH AS EROSION CONTROL SOCKS OR HAYBALES.

6. A GROUND COVER SUFFICIENT TO RETAIN SOILS IN A STABILIZED CONDITION MUST BE PROVIDED WITHIN 14 WORKING DAYS, SEASON PERMITTING, ON ANY PORTION OF THE TRACT UPON WHICH FURTHER ACTIVE CONSTRUCTION IS NOT BEING UNDERTAKEN.

DRAINAGE:

1. IF DRAINAGE PIPES OR SWALES ARE TO BE INSTALLED, THEY SHALL BE CONSTRUCTED FROM DOWNSTREAM UP AND CONSTRUCTION SHALL INCLUDE THE PLACEMENT OF OUTFALL RIPRAP AND OTHER MITIGATIVE MEASURES SHOWN ON THE PLAN.

2. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, HAY BALES OR OTHER SUITABLE METHODS TO ENTRAP SEDIMENT SHALL BE PLACED DOWNSTREAM.

3. THE TOE OF EMBANKMENTS SHALL BE STABILIZED IMMEDIATELY, MULCHED AND TACKED DOWN BY SUITABLE MEANS.

CREATION OF DETENTION BASIN:

1. THE DETENTION BASIN HAS BEEN PLACED AS A SEPARATE ITEM TO EMPHASIZE THE IMPORTANCE OF EROSION CONTROL DURING ITS CONSTRUCTION.

2. THE PRIMARY EROSION CONTROL METHOD FOR BASIN CONSTRUCTION, AS WELL AS FOR THE SITE IS THE RAPID STABILIZATION OF ALL SURFACES. SECONDARY IN IMPORTANCE IS THE CONCENTRATION OF RUNOFF BE AVOIDED IN ORDER TO PREVENT THE TRANSPORT OF SEDIMENT.

3. DURING CONSTRUCTION, THE FILL AND EXCAVATION SEQUENCES SHOWN ON THE CONSTRUCTION PHASING PLANS, ALONG WITH THE DETAILS PROVIDED IN THIS PLAN SET SHALL BE UTILIZED. THESE SEQUENCES REQUIRE THAT SLOPED AREAS LEFT FOR ANY PERIOD OF TIME NOT SLOPED TOWARDS THE WETLAND OR SENSITIVE AREA, BUT RATHER BACK INTO THE FILL MATERIAL.

4. THE BASIN BERM IS TO BE CONSTRUCTED BY EQUIPMENT WORKING ON STABLE MATERIAL ONLY. HAY BALES SHALL BE PLACED AT THE TOE OF SLOPE UNTIL SURFACES ARE STABILIZED.

5. NO EXCAVATION WITHIN THE BASIN SHALL COMMENCE UNTIL THE BERM IS IN PLACE.

6. CARE SHOULD BE TAKEN TO INSURE THAT ORGANIC MATERIAL REMOVED FROM THE BASIN AREA IS RESERVED FOR FINISH GRADING AND THE STABILIZATION OF DISTURBED AREAS.

7. IF DEWATERING IS NECESSARY, PUMPING TO A SETTLING BASIN SHALL BE PERMITTED IF SETTLING BASIN IS CONSTRUCTED, MAINTAINED AND OPERATED EFFECTIVELY.

8. AT NO TIME SHALL RUNOFF CARRYING SEDIMENT BE ALLOWED TO FLOW TO THE WETLANDS OR SENSITIVE AREAS.

9. THE WORK AREA SHALL REMAIN FREE OF LITTER AND DEBRIS AT ALL TIMES AND MONITORED ON A DAILY BASIS TO ENSURE COMPLIANCE.

10. ALL MATERIALS STOCKPILED SHALL BE LOCATED, MULCHED OR OTHERWISE TREATED TO INSURE THAT MATERIALS CONTAINED, THEREIN, AREA NOT CARRIED INTO THE WETLANDS.

11. ANY MATERIALS BLOWN OR CARRIED BY WATER AWAY FROM THE CONSTRUCTION SITE OR INTO THE WETLAND AREAS SHALL BE PROMPTLY REMOVED AS REQUIRED BY THE LOCAL CONSERVATION COMMISSION.

12. A GEOTECHNICAL FILTER FABRIC SHALL BE PLACED OVER THE BASIN SUBDRAIN DURING CONSTRUCTION TO PREVENT SEDIMENT FROM ENTERING AND CLOGGING THE DRAIN. THE FABRIC SHALL BE REMOVED FOR BASIN PREPARATION FOR FINAL STABILIZATION.

GRUBBING AND STRIPPING:

1. TOP SOIL SHALL BE RETAINED AND STOCKPILED FOR LANDSCAPING PURPOSES.

2. GRUBBING AND STRIPPING OF SLOPES LEADING TO WETLAND AREAS SHOULD NOT BE UNDERTAKEN DURING PERIODS OF INTENSE RAINFALL.

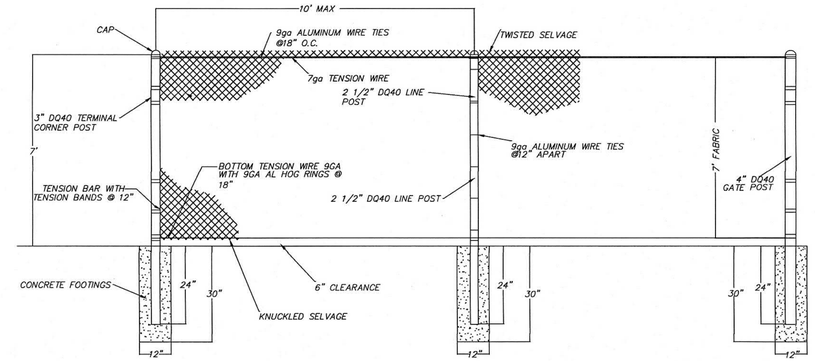
3. TOP SOIL STOCKPILE LOCATIONS ARE DEPICTED ON THE SITE DEVELOPMENT PLAN. THE EROSION CONTROL PLAN, AND/OR THE CONSTRUCTION PHASING PLAN AND SHALL BE ADHERED TO.

4. WHEN WORKING IN THE VICINITY OF WETLANDS, TOP SOIL SATURATED WITH WATER SHALL BE REMOVED, AND CONTAINED PRIOR TO BEING USED.

5. AREAS LEADING TO WETLANDS SHALL HAVE HAY BALE BARRIERS INSTALLED ACROSS THEM IN ARCS POINTING DOWN THE HILL AT INTERVALS SUFFICIENT TO MITIGATE RUNOFF CARRYING SEDIMENT.

6. DURING PERIODS OF INTENSE RAINFALL, OR IF THE PROJECT IS TO BE LEFT FOR A PERIOD OF TIME, CONSIDERATION SHOULD BE GIVEN TO SUPPLEMENT HAY BALE BARRIERS WITH EITHER CRUSHED STONE OR ARMORED BARRIERS. CONSIDERATION MAY ALSO BE GIVEN TO DIVERTING RUNOFF INTO TEMPORARY SEDIMENTATION CONTROL AREAS.

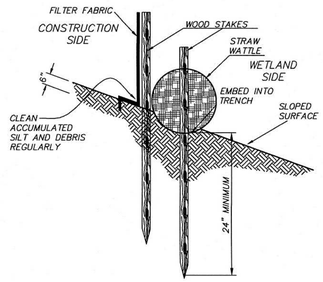
7. WHENEVER PRACTICAL, NATURAL VEGETATION SHALL BE RETAINED, PROTECTED AND SUPPLEMENTED.



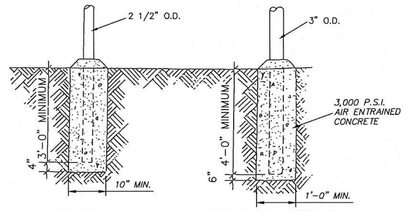
CHAIN LINK FENCE DETAIL
NO SCALE

NOTES:
COLOR OF ALL MATERIALS ARE GALVANIZED
INCLUDES 1QTY 20' WIDE DOUBLE GATE
GATE POSTS 4"
TERMINAL POSTS 3"
LINE POSTS 2.5"
TOP TENSION WIRE 7ga HOG RING WITH STEEL CORE
TENSION BANDS @ 12"
WIRE 9ga TENSION WIRE TO MATCH FABRIC.
BOTTOM TENSION WIRE WITH 9ga AL HOG RINGS
DOME CAPS RAIL ENDS
9ga TIE WIRES WITH STEEL CORE
3" BRACE BANDS

STEEL CORE GALVANIZED with 9ga PVC EXTRUDED POLY VINYL CHLORIDE (PVC) COATED STEEL CHAIN LINK FABRIC AS PER ASTM F668 CLASS 1

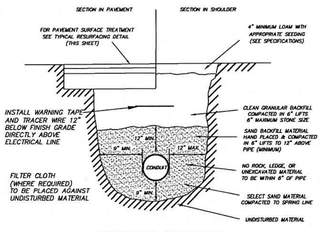


STRAW WATTLE DETAIL
NO SCALE



LINE POST — CORNER AND GATEPOST

FENCE POST DETAIL
NO SCALE



CONDUIT TRENCH
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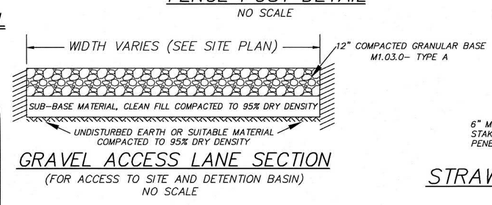
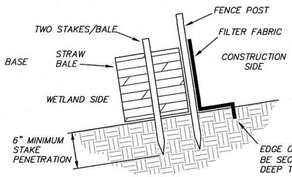
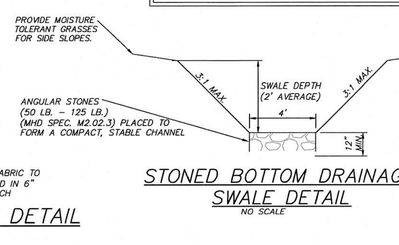


GRAVEL ACCESS LANE SECTION
(FOR ACCESS TO SITE AND DETENTION BASIN)
NO SCALE

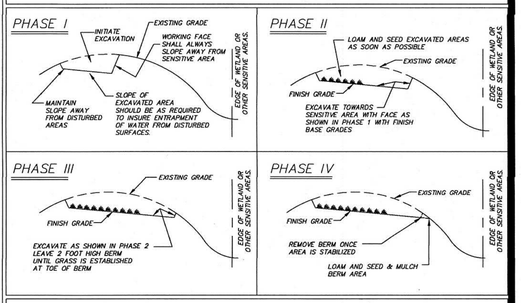


STRAW BALE WITH SILT FENCE DETAIL
NO SCALE

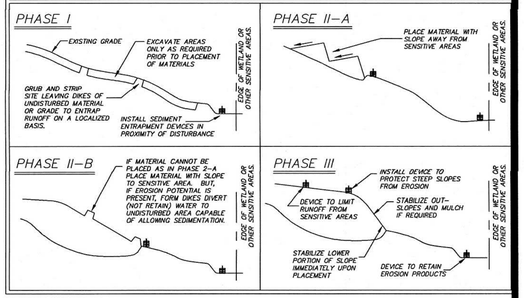


STONED BOTTOM DRAINAGE SWALE DETAIL
NO SCALE

EXCAVATION SEQUENCE
NO SCALE



FILL SEQUENCE
NO SCALE

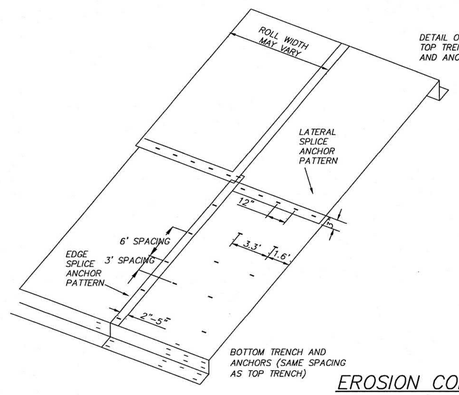


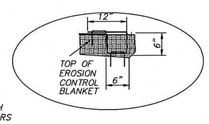
"FACILITY NAME"
OWNER CONTACT INFORMATION
(###) ### - ####
OPERATOR CONTACT INFORMATION
(###) ### - ####
EMERGENCY CONTACT INFORMATION
(###) ### - ####

TYPICAL PROJECT SIGN
NO SCALE
24" x 24"
SIGNS TO BE PLACED AT ENTRANCE OF PROJECT SITE

DANGER
NO TRESPASSING

PERIMETER SIGNAGE
NO SCALE
12" x 9"
SIGNS TO BE PLACED ALONG FENCELINE AT 50 FT INTERVALS





DETAIL OF TOP TRENCH AND ANCHORS

PROCEDURES FOR INSTALLATION OF EROSION CONTROL BLANKET:

1) PREPARE SLOPES WITH FINAL GRADING AND LOAM PLACEMENT. RAKE AND SMOOTH FINAL SURFACE, APPLY APPLICABLE SEED MIX.

2) START AT THE TOP OF SLOPE BY ANCHORING BLANKETS IN A 6" DEEP x 6" WIDE ANCHOR TRENCH. PLACE BLANKETS, STAPLE (8" STAPLES), BACKFILL AND COMPACT WITH FABRIC OVERLAP OF 12".

3) ROLL BLANKETS DOWN THE SLOPE. STAPLE THE OPEN BLANKET EDGE USING ONE ROW OF STAPLES AT 2' INTERVALS. THE INTERIOR OF THE BLANKET SHOULD BE STAPLED USING A 2' WIDE x 3' HIGH STAPLE PATTERN. BE SURE TO LAY BLANKETS LOOSLY ON THE GROUND ALLOWING A GOOD CONTACT BETWEEN SOIL AND BLANKETS.

4) USE AN 6" OVERLAP BETWEEN BLANKET SPLICES. USE A SINGLE ROW OF STAPLES TO ANCHOR BLANKETS TOGETHER.

5) PROVIDE 6"x 6" ANCHOR TRENCH AT TOE OF SLOPE.

6) EROSION CONTROL BLANKET TYPE SHALL BE PROPERLY SELECTED FOR SOIL CONDITIONS AND MAXIMUM ALLOWABLE SLOPE.

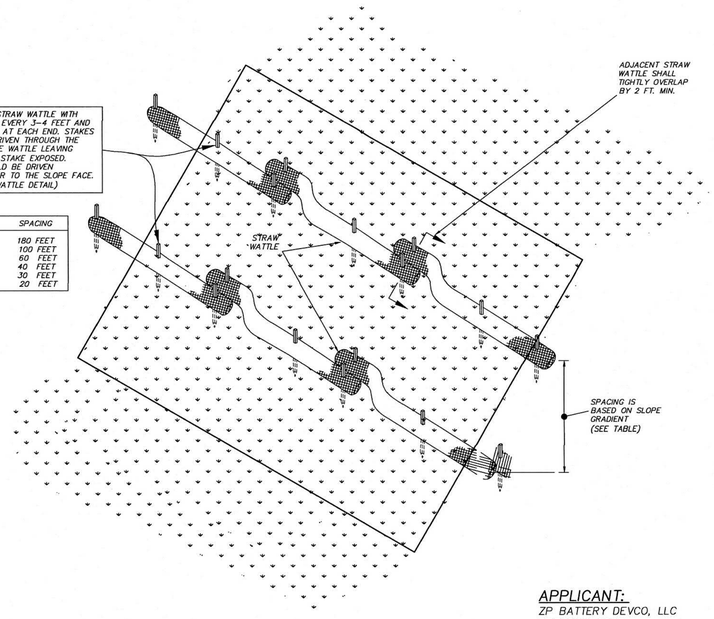
7) ANY/ALL METALLIC ANCHORS SHALL BE PROMPTLY REMOVED ONCE THE VEGETATIVE COVER HAS BEEN ESTABLISHED.

8) GRASS SEED VARIETY SHALL BE PROPERLY CHOSEN FOR SPECIFIC SITE CONDITIONS (SHADE OR SUN, ETC.)

EROSION CONTROL BANKET PLACEMENT
NO SCALE

SECURE THE STRAW WATTLE WITH WOOD STAKES EVERY 3-4 FEET AND WITH A STAKE AT EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING 2-3" OF THE STAKE EXPOSED. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE. (SEE STRAW WATTLE DETAIL)

SLOPE	SPACING
1%	180 FEET
4%	100 FEET
9%	60 FEET
14%	40 FEET
18%	30 FEET
30%	20 FEET



EROSION CONTROL SLOPE DETAIL

APPLICANT:
ZP BATTERY DEVCO, LLC
BRENDON GOVE
10 E. WORCESTER STREET, SUIT 3A
WORCESTER, MASSACHUSETTS 01604
OWNER:
WR ENTERPRISES, LLC
1323 MAIN STREET
LEICESTER, MASSACHUSETTS 01524

NO.	DATE	REVISIONS	BY
1	10/19/21	PEER-REVIEW COMMENT	CMA

COMMONWEALTH OF MASSACHUSETTS — CHRISTOPHER M ANDERSON — CIVIL — No. 55373 — REGISTERED PROFESSIONAL ENGINEER

HANNIGAN ENGINEERING, INC.
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8 MONUMENT SQUARE (978) 534-1234 (T)
LEOMINSTER, MASSACHUSETTS 01453 (978) 534-6060 (F)
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CONSTRUCTION DETAILS IN LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

CALC: CMA	DRWN: CMA	SCALE: NA
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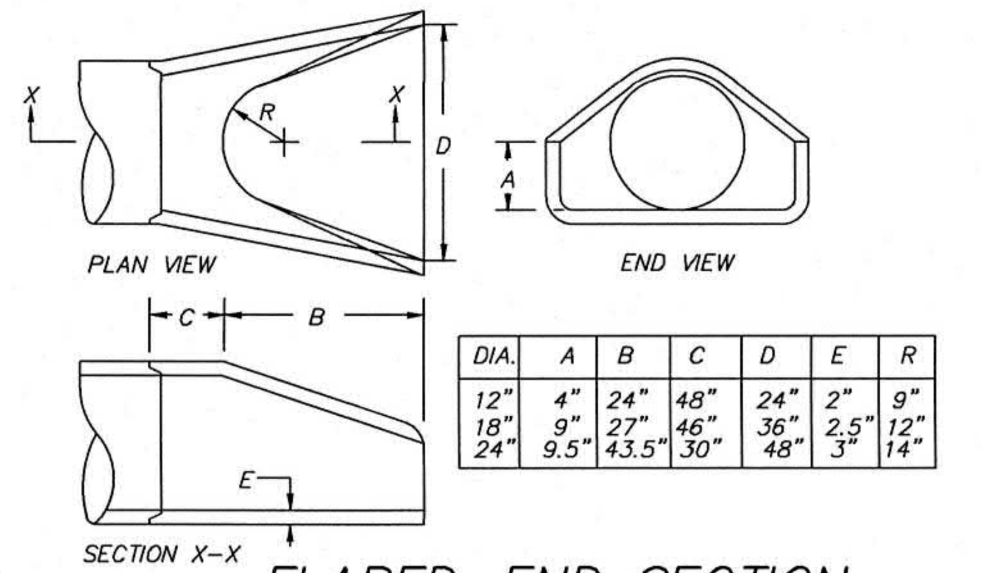
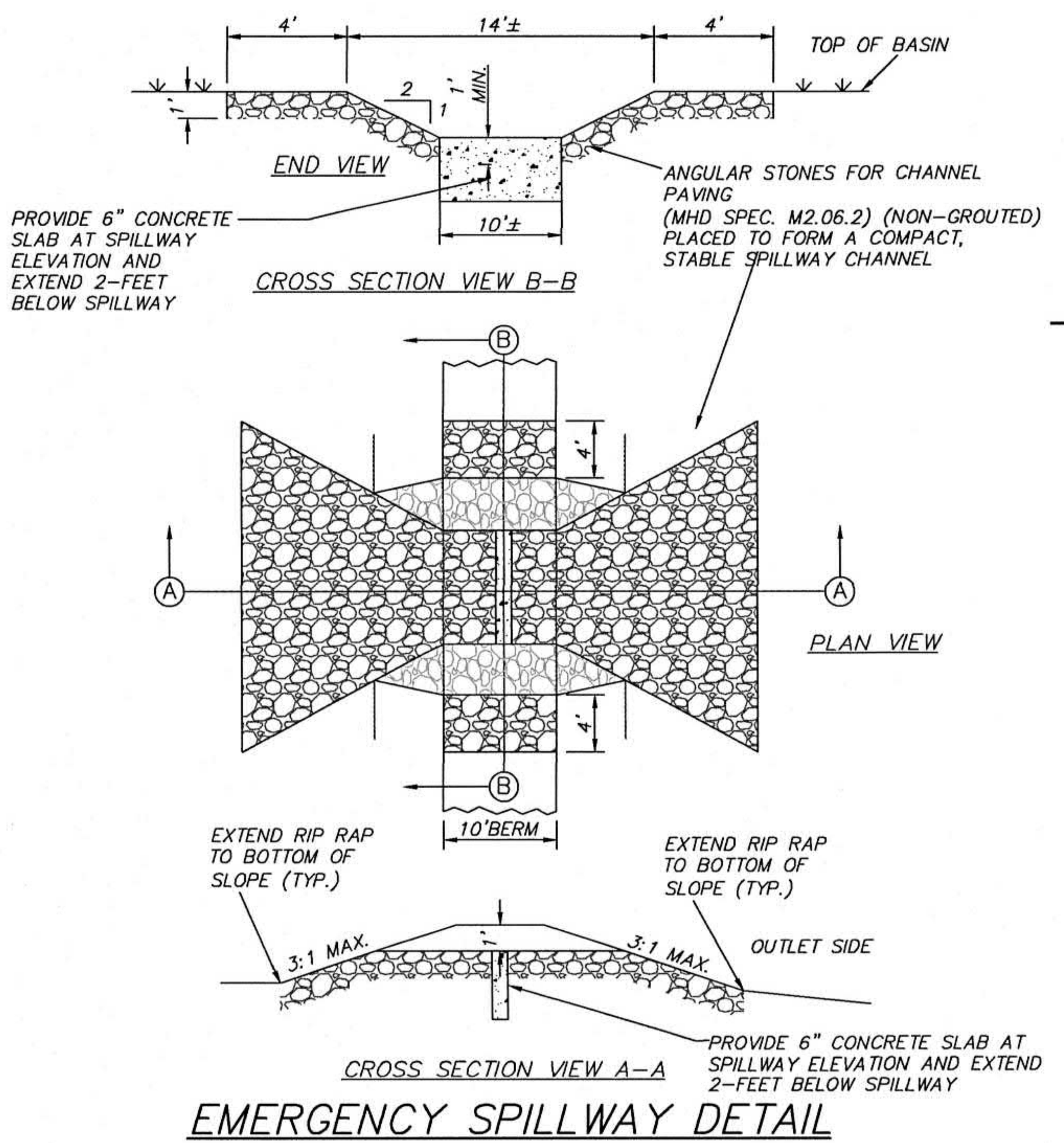


DIA.	A	B	C	D	E	R
12"	4"	24"	48"	24"	2"	9"
18"	9"	27"	46"	36"	2.5"	12"
24"	9.5"	43.5"	30"	48"	3"	14"

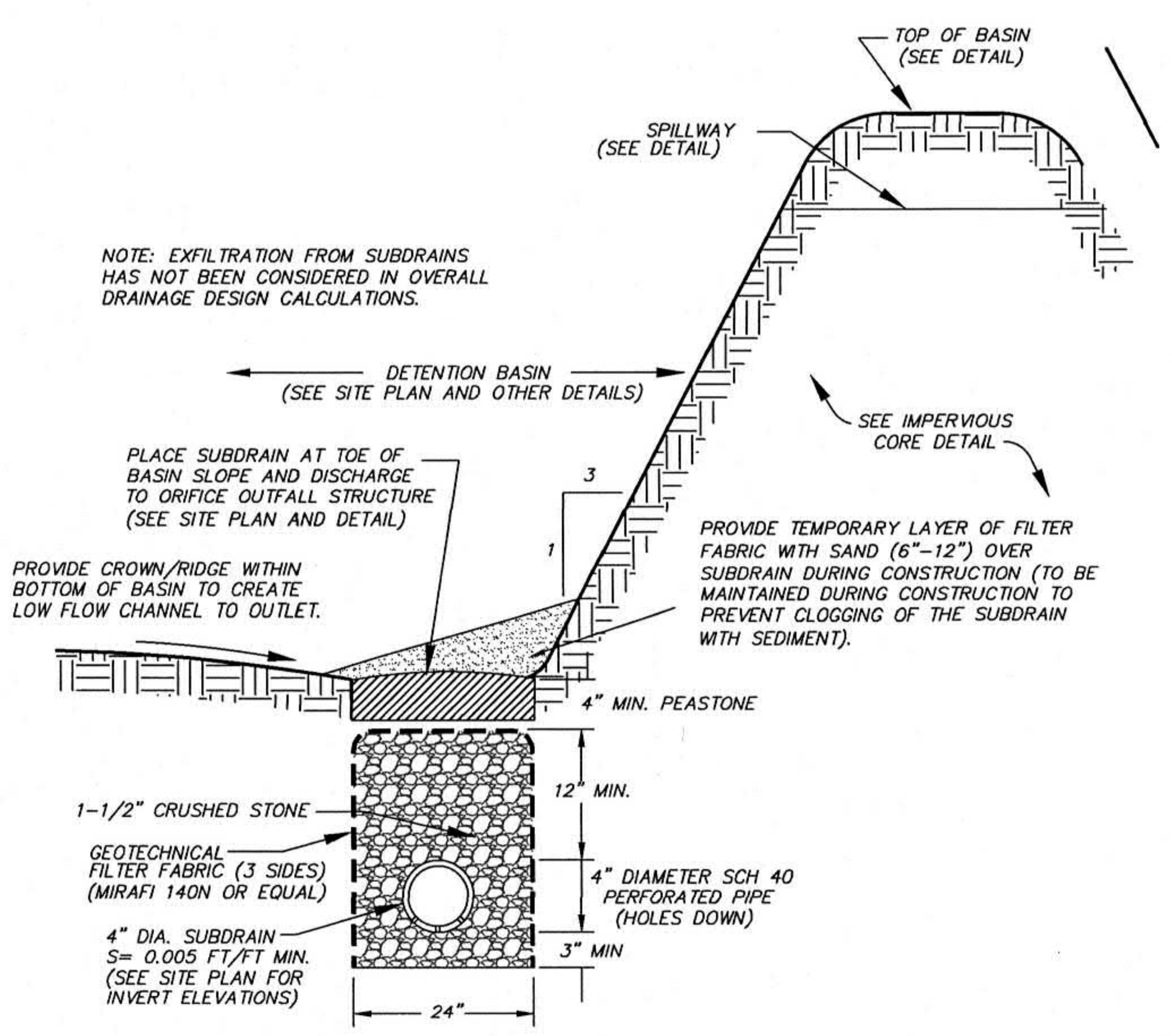
FLARED-END SECTION

NO SCALE



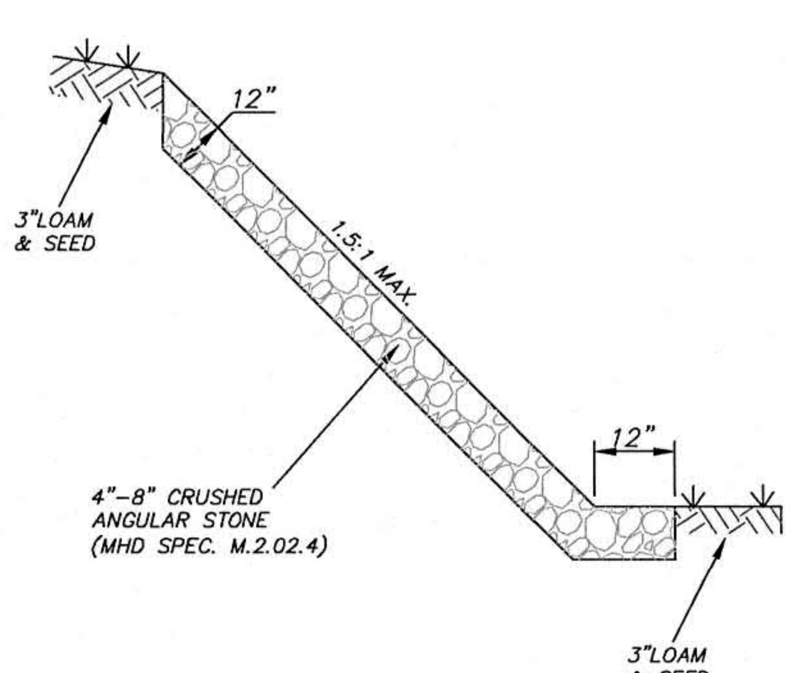
EMERGENCY SPILLWAY DETAIL

NO SCALE



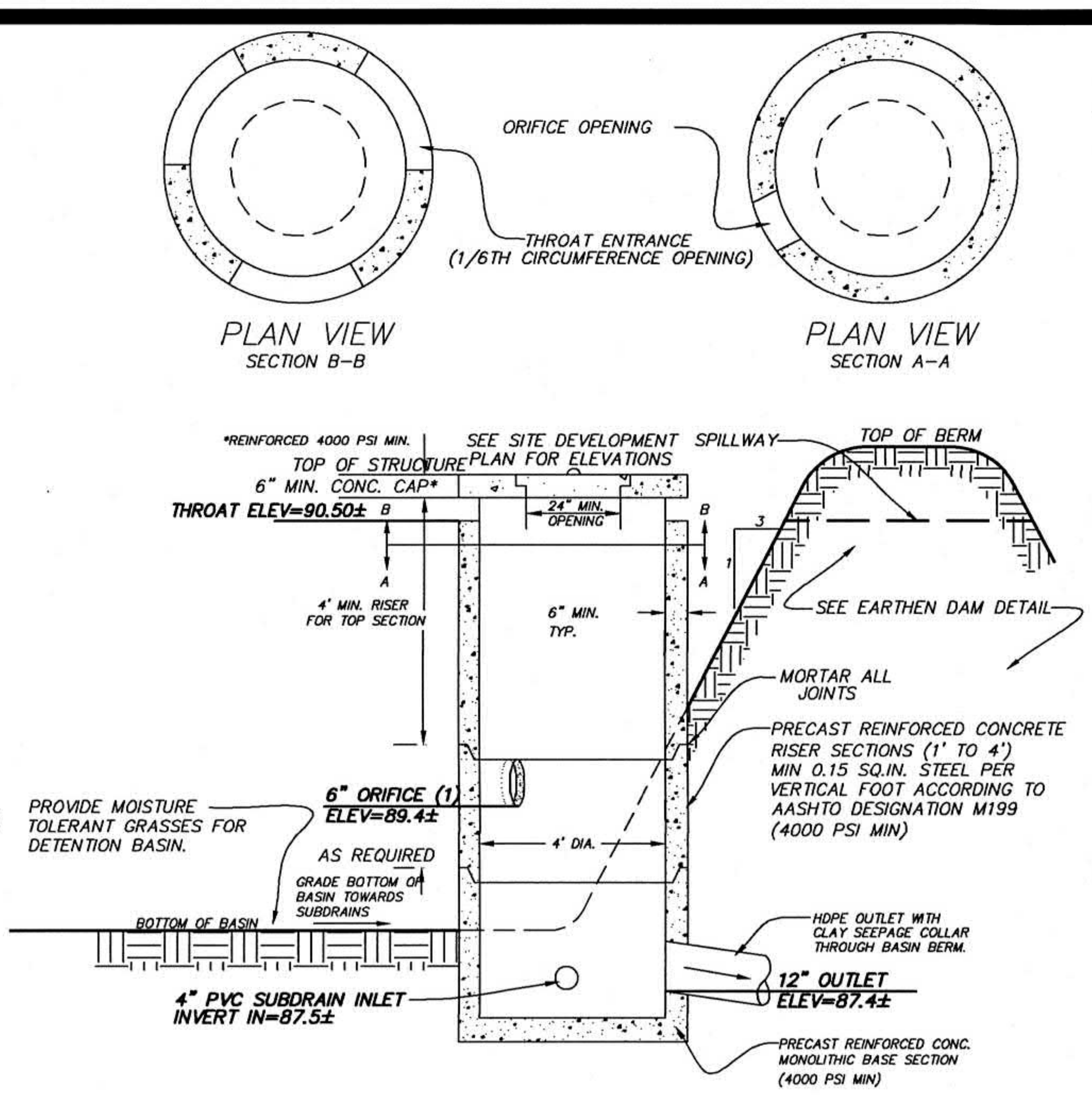
DETENTION BASIN 4"-SUBDRAIN DETAIL

NO SCALE



1.5:1 RIP RAP SLOPE DETAIL

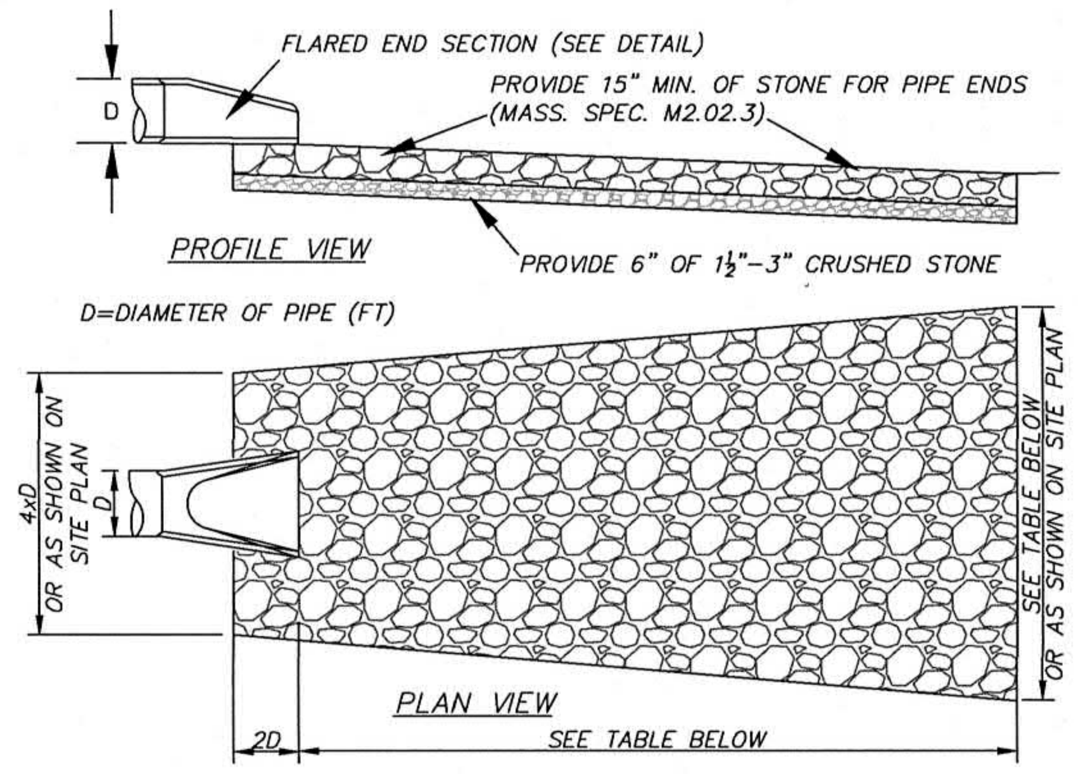
NO SCALE



D-BASIN OUTLET STRUCTURE #11

WITH 1/6TH CIRCUMFERENCE THROAT OPENINGS

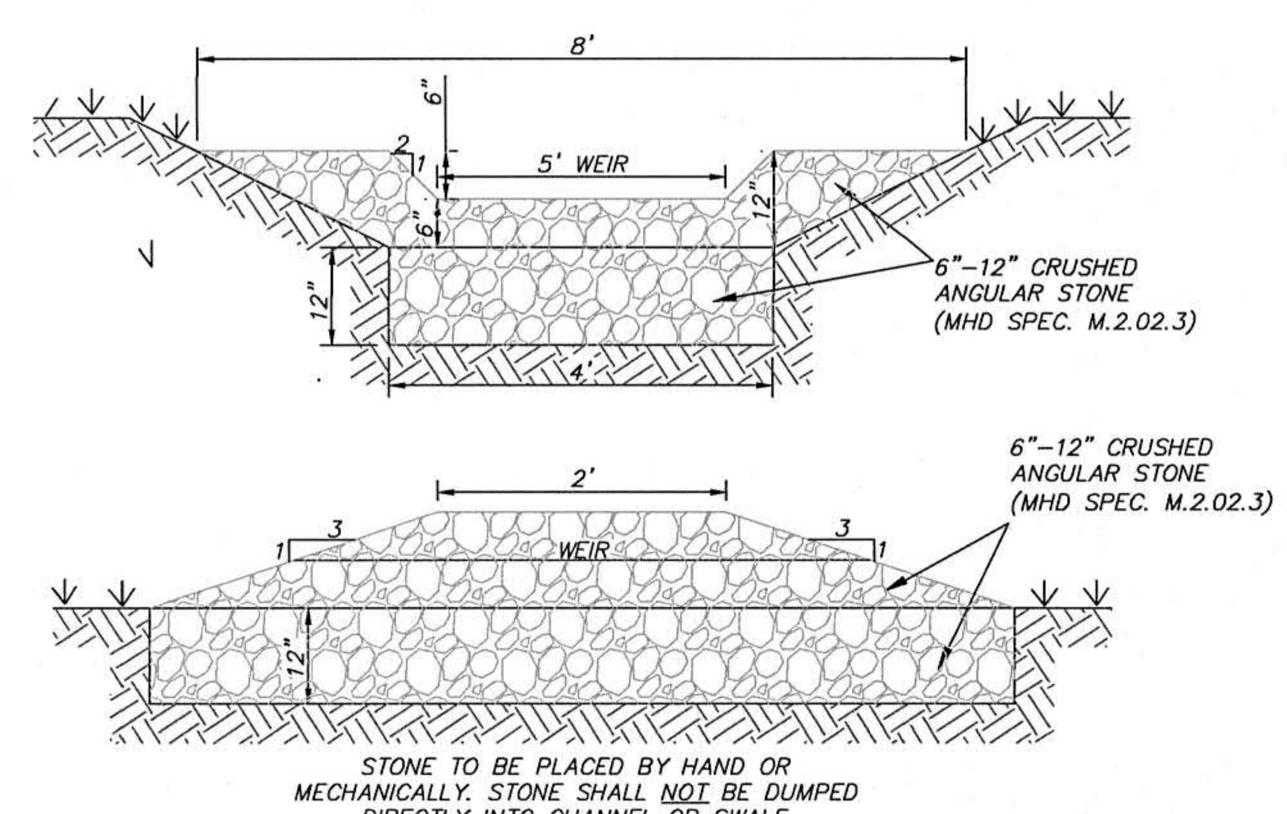
NO SCALE



RIP RAP APRON DETAIL

NO SCALE

RIP-RAP APRON DIMENSIONING TABLE		
PIPE DIAMETER	LENGTH	TERMINUS WIDTH
12-INCH (FE#1)	10.0 FEET	10.0 FEET

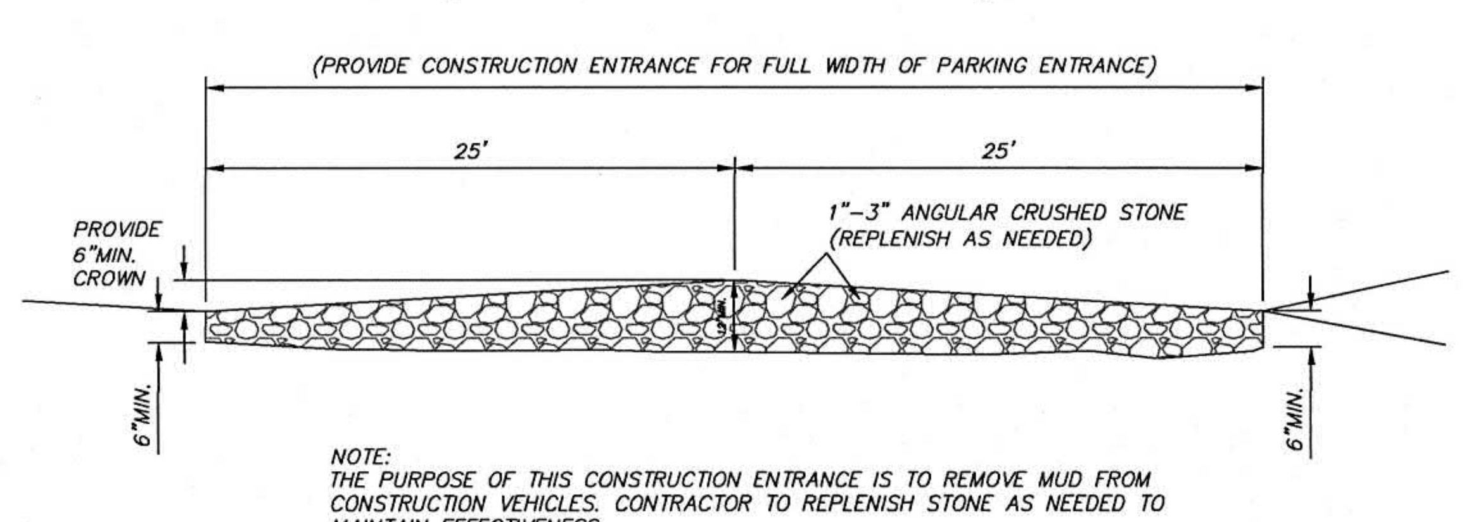


STONE TO BE PLACED BY HAND OR MECHANICALLY. STONE SHALL NOT BE DUMPED DIRECTLY INTO CHANNEL OR SWALE.

ROCK CHECK DAM

NO SCALE

(SEE PLAN FOR LOCATIONS AND ELEVATIONS)

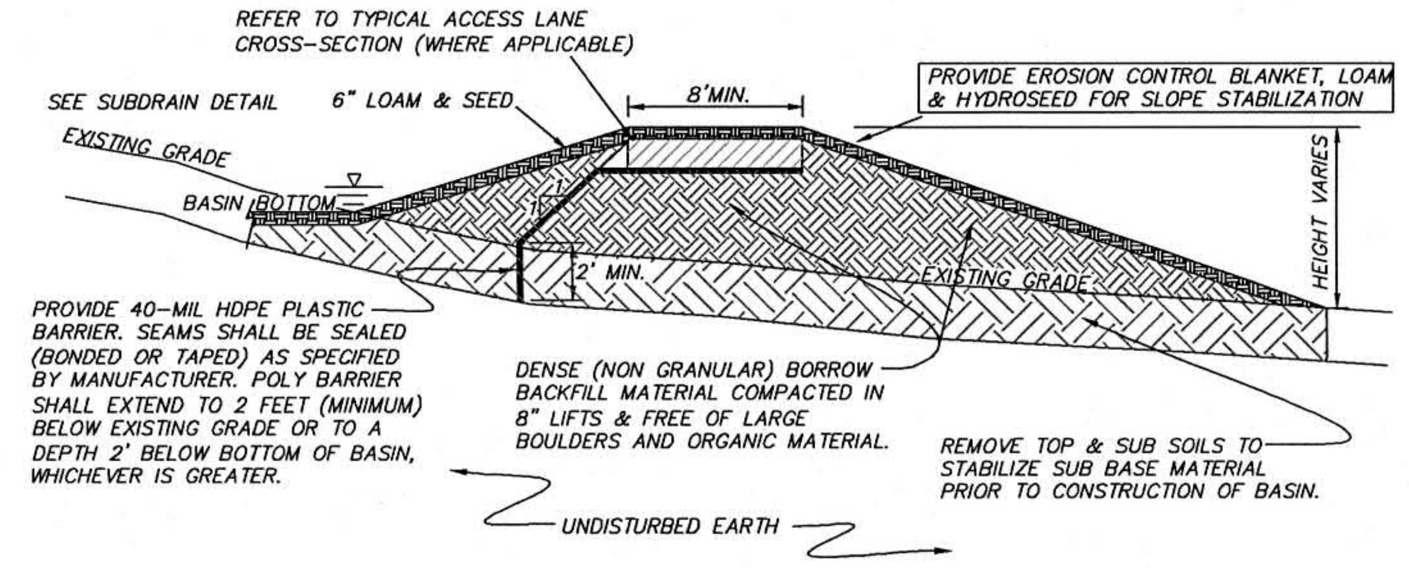


NOTE:
THE PURPOSE OF THIS CONSTRUCTION ENTRANCE IS TO REMOVE MUD FROM CONSTRUCTION VEHICLES. CONTRACTOR TO REPLENISH STONE AS NEEDED TO MAINTAIN EFFECTIVENESS.

CONSTRUCTION ENTRANCE

NO SCALE

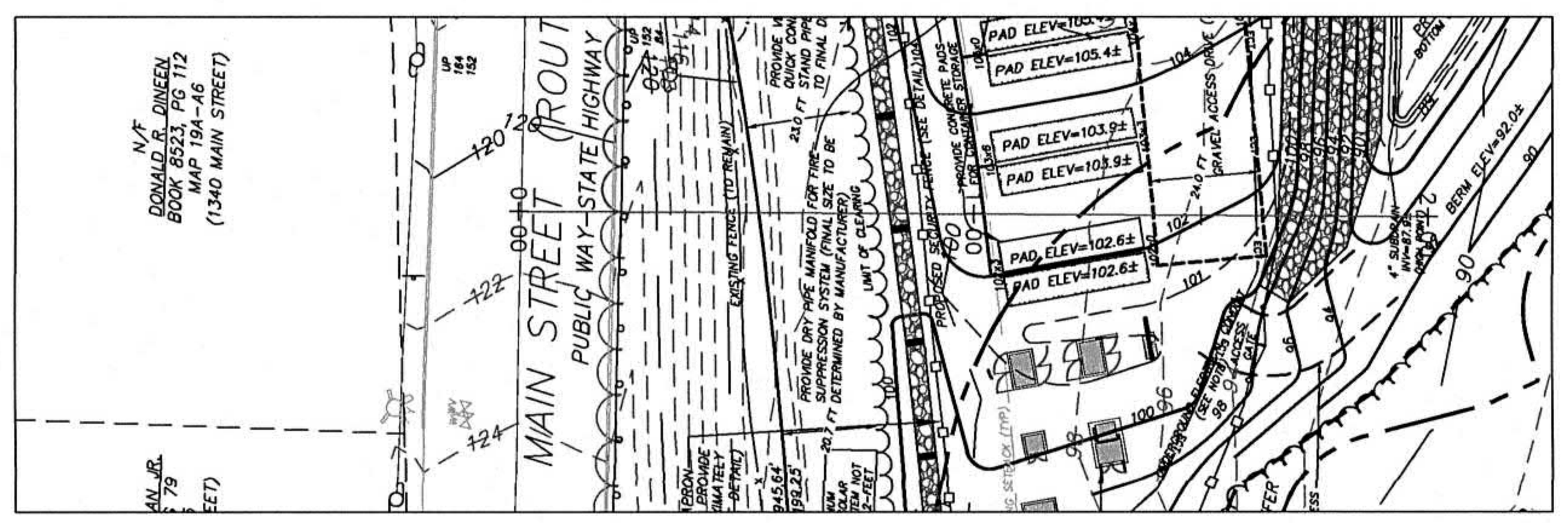
NOTE: FOUNDATION FOR BERM CONSTRUCTION SHALL BE CLEARED OF ALL TOP SOIL, ROCKS, DEBRIS, STUMPS, ETC. TO A FIRM SURFACE. IN NO CASE SHALL THIS EXCAVATION BE LESS THAN 12 INCHES SUBGRADE SHALL BE SCARIFIED AND MOISTENED TO A DEPTH OF 3 INCHES PRIOR TO PLACEMENT OF FILL.

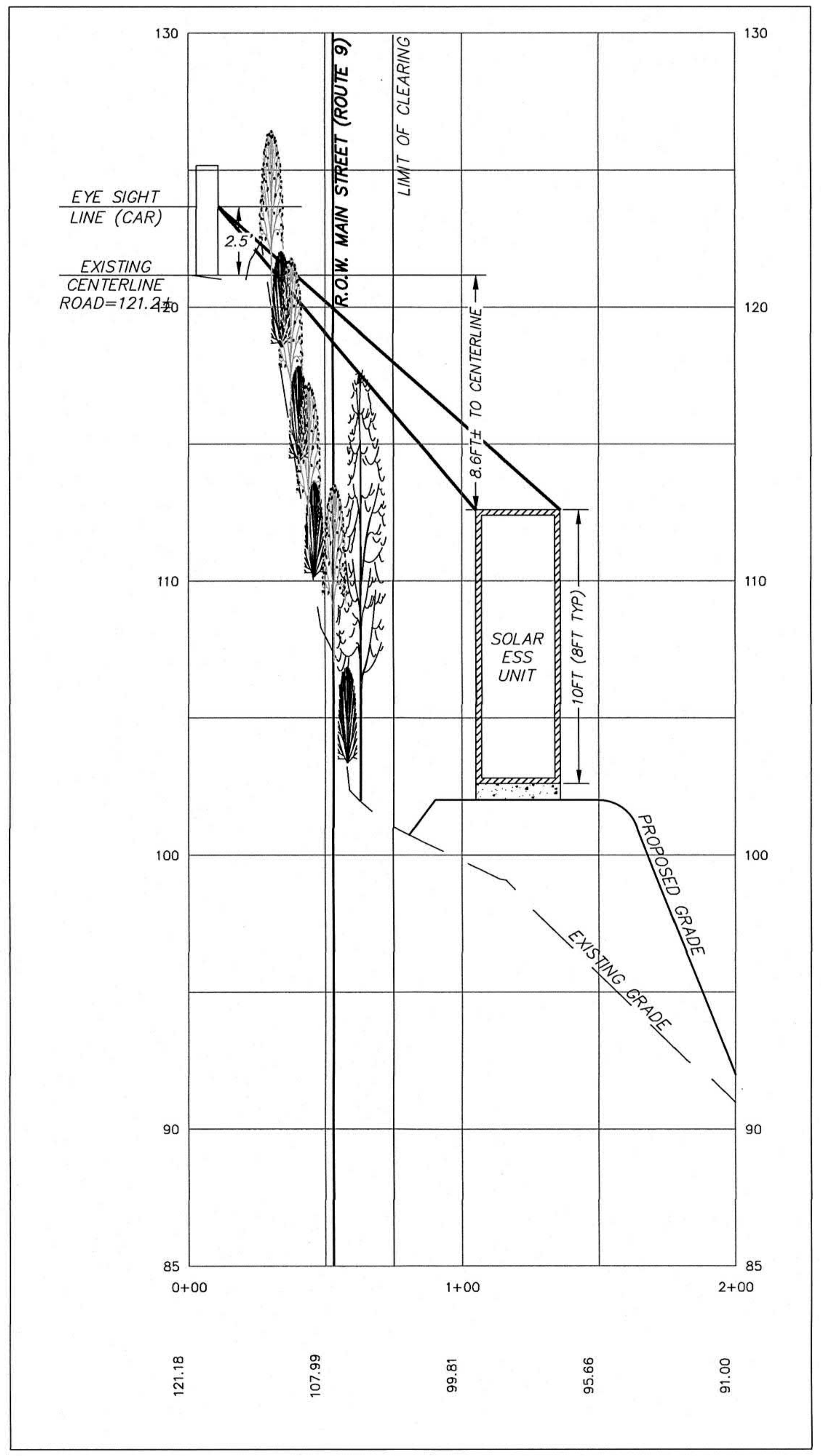


DETENTION BASIN BERM

(REQUIRED FOR DETENTION BASIN CONSTRUCTION)

NO SCALE





PROJECT SIGHT LINE

HORIZONTAL SCALE=1":40' VERTICAL SCALE=1":4'

STORMWATER OPERATION AND MAINTENANCE PLAN

THE FOLLOWING SHALL BE CONSIDERED THE OPERATION & MAINTENANCE PLAN (OMP) FOR THE STORMWATER COLLECTION FACILITY FOR THIS DEVELOPMENT. THIS OMP HAS BEEN PREPARED IN ACCORDANCE WITH THE STORMWATER MANAGEMENT POLICY AS ISSUED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

I. SYSTEM OWNERSHIP

THE SYSTEM SHALL INCLUDE THE DRAINAGE INFRASTRUCTURE AND ALL OF ITS COMPONENTS AS SHOWN ON THE SITE DEVELOPMENT PLANS, INCLUDING THE DETENTION FACILITIES AND OUTFALL AREAS OF THE DRAINAGE SYSTEM. THE STRUCTURES OF THE SYSTEM SHALL INCLUDE THE DRAINAGE SWALES AND THE OUTFALL & CONTROL STRUCTURES. THE SYSTEM SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DETAILS AND THE APPROVED PLANS.

UPON THE COMPLETION OF CONSTRUCTION THE DRAINAGE SYSTEM DESCRIBED ABOVE AND AS DEPICTED ON THE SITE PLANS SHALL BECOME PROPERTY OF THE LAND OWNER, WITH SPECIFIC EASEMENT RIGHTS TO THE OPERATOR OF THE SOLAR SYSTEM TO MAINTAIN THE DRAINAGE SYSTEM AS DEPICTED ON THE APPROVED PLANS. SAID EASEMENT RIGHTS SHALL BE SPECIFICALLY DESCRIBED IN LEASE DOCUMENTS FOR THE PROJECT.

II. RESPONSIBLE PARTIES

THE OPERATOR OF THE SOLAR SYSTEM SHALL BE CONSIDERED THE RESPONSIBLE PARTY FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER MANAGEMENT SYSTEM. THE SYSTEM SHALL INCLUDE THE DRAINAGE INFRASTRUCTURE AND ALL OF ITS COMPONENTS AS SHOWN ON THE APPROVED PLANS. THE SYSTEM SHALL ALSO INCLUDE THE DETENTION FACILITIES AND THE OUTFALL AREAS OF THE DRAINAGE SYSTEM.

III. INSPECTION & MAINTENANCE SCHEDULE

THE FOLLOWING MAINTENANCE SCHEDULE SHALL BE FOLLOWED IN ORDER TO MAINTAIN THE EFFECTIVENESS OF THE STORMWATER MANAGEMENT SYSTEM.

STRUCTURE TYPE	INSPECTION	MAINTENANCE	TASK
RIP/RAP APRONS	TWICE A YEAR	EVERY 10 YEARS	REMOVE DEBRIS & ADD STONE
SUBDRAINS	TWICE A YEAR	EVERY 4 YEARS	REPLACE PEASTONE
DETENTION BASINS	MONTHLY (MAY-OCT)	MONTHLY (MAY-OCT)	MOW GRASS AREAS & REMOVE DEBRIS REMOVE SEDIMENT IF PRESENT
OUTFALL STRUCTURES: SPILLWAYS	TWICE A YEAR	EVERY 10 YEARS	REMOVE DEBRIS & ADD STONE

NOTE: THE DETENTION BASINS ON THIS PROJECT MAY GROW VEGETATION IN THE BOTTOM WHICH MAY INCLUDE SPECIES PART OF THE WETLAND PROTECTION ACT. THESE PLANTS SHALL NOT BE CONSTRUED AS HAVING PROTECTION UNDER THE ACT AND SHALL BE CONSIDERED OPPORTUNISTIC GROWTH PLANTS. ADDITIONALLY, THIS AREA SHALL NOT BE CONSIDERED A CONSTRUCTED WETLAND.

SEEDING OPERATION AND MAINTENANCE PLAN

I. RESPONSIBLE PARTIES

THE OPERATOR OF THE SOLAR SYSTEM SHALL BE CONSIDERED THE RESPONSIBLE PARTY FOR THE OPERATION AND MAINTENANCE OF THE GRASS & VEGETATION. THE VEGETATION SHALL INCLUDE ALL OF ITS AREAS AS SHOWN ON THE APPROVED PLANS. THE SYSTEM SHALL ALSO INCLUDE THE GRASSED AREAS AROUND THE PANELS AND DRAINAGE STRUCTURES.

II. INSPECTION & MAINTENANCE SCHEDULE

THE FOLLOWING MAINTENANCE SCHEDULE SHALL BE FOLLOWED IN ORDER TO MAINTAIN THE VEGETATED AREAS

ACTIVITY	MAINTENANCE	TASK
GRASS CUTTING	MONTHLY	GRASS HEIGHT TO BE ALLOWED TO GROW TO A HEIGHT OF NO MORE THAN 18 INCHES AND BE CUT TO A HEIGHT OF 4 TO 6 INCHES.

III. APPROPIATE SEED MIX AND APPLICATION RATES

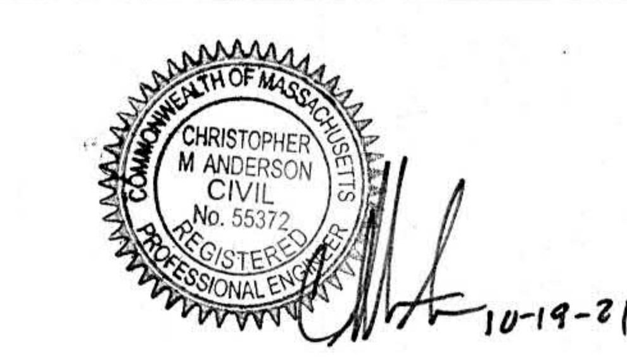
THE FOLLOWING SEED SCHEDULE SHALL BE FOLLOWED IN ORDER TO PROPERLY MAINTAIN VEGETATED AREAS

SEED TYPE (NATIVE SEED REQUIRED)	APPLICATION RATE	% OF MIX
WILDFLOWER SEED MIX	5 TO 10 POUNDS PER ACRE	50%
WHITE CLOVER SEED MIX	3 TO 5 POUNDS PER ACRE	10%
KENTUCKY BLUEGRASS	80 TO 100 POUNDS PER ACRE	40%

IV. HERBICIDES & PESTICIDES

THERE WILL NO HERBICIDES OR PESTICIDES USED ON THIS PROJECT.

NO.	DATE	REVISIONS	BY
1	10/19/21	PEER-REVIEW COMMENT	CMA



HANNIGAN ENGINEERING, INC.

CIVIL ENGINEERS & LAND SURVEYORS

8 MONUMENT SQUARE
LEOMINSTER, MASSACHUSETTS 01453

(978) 534-1234 (T)
(978) 534-6060 (F)

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CONSTRUCTION DETAILS

IN

LEICESTER, MASSACHUSETTS

PREPARED FOR:
ZP BATTERY DEVCO, LLC
BRENDAN GOVE
10 E WORCESTER STREET SUITE 3A
WORCESTER, MASSACHUSETTS 01604
TEL:

APPLICANT:
ZP BATTERY DEVCO, LLC
BRENDON GOVE
10 E. WORCESTER STREET, SUIT 3A
WORCESTER, MASSACHUSETTS 01604

OWNER:
WR ENTERPRISES, LLC
1323 MAIN STREET
LEICESTER, MASSACHUSETTS 01524

CALC: CMA	DRWN: CMA	SCALE: NA
CHKD: WDH	APPD: WDH	DATE: SEP 21, 2021
SRV: JEF	FB: 71-22	JOB NO: 3010
TAB: (5-6) DET	SHEET 6 OF 6	PLAN NO: C-17-38

Appendix B

Soil Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Worcester County, Massachusetts, Southern Part

1355 Main Street, Leicester MA

February 11, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

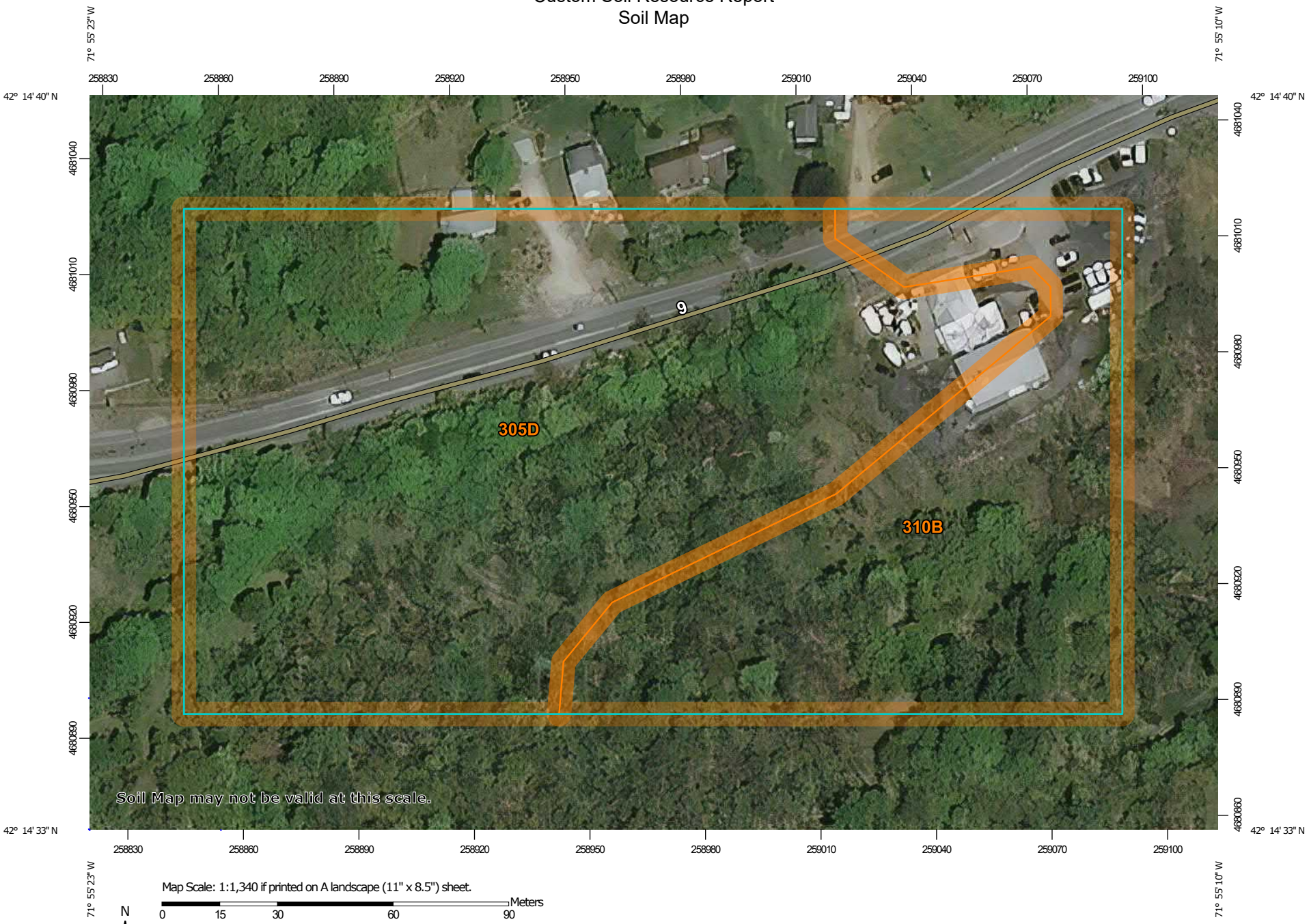
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 14, Sep 3, 2021

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

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
305D	Paxton fine sandy loam, 15 to 25 percent slopes	5.3	66.8%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	2.6	33.2%
Totals for Area of Interest		**7.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Worcester County, Massachusetts, Southern Part

305D—Paxton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2w67j
Elevation: 0 to 1,450 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 1 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope

Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

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Appendix C

MassDEP Similar Soil Acceptance Levels

Table 2.
Limits to the Concentration of OHM In Soil for Re-Use
Assuming Natural Background Conditions at an RCS-1 Receiving Location

OIL OR HAZARDOUS MATERIAL	Concentration In "Natural" Soil mg/kg	Rule-of-Thumb Multiplier	Multiplied Value mg/kg	RCS-1 mg/kg	Limiting[1] Soil Concentration mg/kg	
ACENAPHTHENE	0.5	10	5	4	<	4
ACENAPHTHYLENE	0.5	10	5	1	<	1
ALUMINUM	10,000	2.5	25000		<	25000
ANTHRACENE	1	10	10	1000	<	10
ANTIMONY	1	10	10	20	<	10
ARSENIC	20	7.5	150	20	<	20
BARIUM	50	7.5	375	1000	<	375
BENZO(a)ANTHRACENE	2	10	20	7	<	7
BENZO(a)PYRENE	2	10	20	2	<	2
BENZO(b)FLUORANTHENE	2	10	20	7	<	7
BENZO(g,h,i)PERYLENE	1	10	10	1000	<	10
BENZO(k)FLUORANTHENE	1	10	10	70	<	10
BERYLLIUM	0.4	10	4	90	<	4
CADMIUM	2	10	20	70	<	20
CHROMIUM (TOTAL)	30	7.5	225	100	<	100
CHROMIUM(III)	30	7.5	225	1000	<	225
CHROMIUM(VI)	30	7.5	225	100	<	100
CHRYSENE	2	10	20	70	<	20
COBALT	4	10	40		<	40
COPPER	40	7.5	300		<	300
DIBENZO(a,h)ANTHRACENE	0.5	10	5	0.7	<	0.7
FLUORANTHENE	4	10	40	1000	<	40
FLUORENE	1	10	10	1000	<	10
INDENO(1,2,3-cd)PYRENE	1	10	10	7	<	7
IRON	20,000	2.5	50000		<	50000
LEAD	100	5	500	200	<	200
MAGNESIUM	5,000	2.5	12500		<	12500
MANGANESE	300	5	1500		<	1500
MERCURY	0.3	10	3	20	<	3
METHYLNAPHTHALENE, 2-	0.5	10	5	0.7	<	0.7
NAPHTHALENE	0.5	10	5	4	<	4
NICKEL	20	7.5	150	600	<	150
PHENANTHRENE	3	10	30	10	<	10
PYRENE	4	10	40	1000	<	40
SELENIUM	0.5	10	5	400	<	5
SILVER	0.6	10	6	100	<	6
THALLIUM	0.6	10	6	8	<	6
VANADIUM	30	7.5	225	400	<	225
ZINC	100	5	500	1000	<	500

[1] Concentration of OHM in soil must be LESS THAN (not equal or greater than) this value.