UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

April 29, 2024

Sent by email to:

Bruce Thompson
de maximis, inc.

Re: EPA Approval of *Remedial Action Work Plan, Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E*, Nuclear Metals Superfund Site, Concord, Massachusetts, dated April 26, 2024

Dear Mr. Thompson:

This letter contains the Environmental Protection Agency's (EPA) approval of the above-referenced *Remedial Action Work Plan, Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E* (the "Phase 1 RAWP") dated April 26, 2024. The Phase 1 RAWP is subject to the terms and conditions specified in the Consent Decree (CD) for Remedial Design / Remedial Action (RD/RA) for the Nuclear Metals, Inc. Site, which has an effective Date of December 6, 2019.

On April 23, 2024, EPA submitted a conditional approval of the Phase 1 RAWP, pending edits to be made to Section 3.2.4 and Drawing C-412 of the Phase 1 RAWP. Both edits were made in the April 26, 2024 submission of the RAWP and EPA approves the edits; therefore, this letter provides final EPA approval to the Phase 1 RAWP.

If there is any conflict between the Performance Standards as stated in the Work Plan and the Performance Standards as stated in the CD and statement of work (SOW), the CD and SOW shall control.

Please do not hesitate to contact me at nierenberg.kara@epa.gov or (617) 918-1435 should you have any questions.

Sincerely,

Kara Nierenberg
EPA Remedial Project Manager

Superfund Emergency Management Division
Massachusetts Section

cc:
Garry Waldeck, MassDEP
Andrew Schkuta, AECOM
Todd Majer, de maximis
Christine Taddonio, de maximis
Jessie McCusker, de maximis
Mark Kelly, H&A
Kevin Trainer, on behalf of CREW
Len Rappoli, 2229 Main Street Oversight Committee

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

April 23, 2024

Sent by email to:

Bruce Thompson
de maximis, inc.

Re: EPA Conditional Approval of *Remedial Action Work Plan, Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E*, Nuclear Metals Superfund Site, Concord, Massachusetts, dated April 16, 2024

Dear Mr. Thompson:

EPA (in consultation with its contractor AECOM and the Massachusetts Department of Environmental Protection) has completed its review of the revised *Remedial Action Work Plan, Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E* (the "Phase 1 RAWP"), dated April 16, 2024. The Phase 1 RAWP was revised in response to EPA's comments dated February 7, 2024 and April 4, 2024. The Phase 1 RAWP is subject to the terms and conditions specified in the Consent Decree (CD) for Remedial Design / Remedial Action (RD/RA) for the Nuclear Metals, Inc. Site, which has an effective Date of December 6, 2019.

EPA approves the Phase 1 RAWP subject to the condition that the following edits are made and the final revised document is resubmitted to EPA:

1. <u>EPA 2/7/24 Specific Comment #11: Section 3.2, Page 9, Paragraph 2.</u> The text states that "excavation of soil will continue until uranium and PCB concentrations in confirmatory samples do not exceed RALs". The following subsections (3.2.1 through 3.2.5) provide minimal details on how confirmation sample results will be used to expand (or limit, in the case of the sphagnum bog) the excavation areas laterally and vertically. Please revise the text (Sections 3.2 through 3.2.5) to provide additional details on locations where contamination will NOT be chased both laterally and vertically by confirmation sample results. If possible, please reference or provide a decision tree for determining when additional excavation will be necessary.

   <u>*de maximis 3/1/24 response:*</u> *(Paragraph 5 included here only.)*

   The following language was added to section 3.2.4 (added text is underlined in italics): "Soil excavation quantities from remediation areas may be adjusted during construction

to accommodate any additional removal deemed necessary after the confirmatory samples are analyzed. However, if RAL exceedances are detected in sidewall samples bordering slope stability excavations (gray hatched areas shown in Appendix B, Drawing C-408), supplemental excavation and subsequent resampling will not be performed beyond the slope stability excavation boundary to chase contamination in these areas".

EPA 4/4/24 follow-up: Section 3.2.4 discusses the confirmation sampling plan for the Cooling Pond areas and specifically states that RAL exceedances in sidewall samples will not result in a lateral expansion of the remedial area. Please address what action will be taken if a sidewall sample exceeds RALs and is located a depth deeper than the adjacent planned stability excavation.

de maximis 4/16/24 Response: *The plan would be to extend the excavation 1 ft. deeper and resample. If the resampled location exceeds the RALs, a marker barrier would be installed, and the location coordinates mapped. The following language was added to section 3.2.4 to address this: "In the event that RAL exceedances are detected in sidewall confirmatory samples, supplemental excavations may be performed to increase the excavation depth by 1 foot, followed by additional confirmatory sample collection. If RAL exceedances persist in supplemental confirmatory samples, a marker barrier will be placed, and sample location coordinates will be recorded." It may be necessary to put an Institutional Control (IC) on this area, but it would only be within the steep in-accessible slope and would need to be further discussed in the IC Plan. It would not be possible to put 10 ft. of cover over this material on the steep side slope. It is also possible that despite RAL exceedances, the residual EPC will not exceed the cleanup goals, indicating that an IC would not be required.*

EPA 4/22/24 follow-up: The above response states that additional sidewall RAL exceedances will be addressed by increasing the excavation depth by 1 foot; however, this will not address the soil triggering the sidewall exceedance. In addition, to be consistent with the text added to Section 3.2.4 Paragraph 2, the last sentence in Paragraph 1 that states "subsequent resampling will not be performed" should be deleted. Please edit the text to state that additional lateral excavations may be performed as necessary based on the results of confirmation samples, but in the case that lateral excavation limits cannot be further expanded due to slope stability concerns, then a marker barrier will be placed and sample location coordinates will be recorded. Implementation of an IC may be required if residual EPCs exceed cleanup goals.

EPA provides the following comments on the revised Phase 1 RAWP (dated April 16, 2024):

1. Appendix B, C-412. The legend for PCB results needs to be colored green and red. Both <1.0 and >1.0 are colored gray. In addition, the legend needs to include an explanation of the historic borings presented (similar to those provided on other drawings that show results of soil borings (i.e. Drawing C-408).

Please submit a final edited version of the Phase 1 RAWP to EPA for inclusion in the site file.

Please do not hesitate to contact me at (617) 918-1435 or at nierenberg.kara@epa.gov should you have any questions in this regard.

Sincerely,

Kara Nierenberg
EPA Remedial Project Manager
Superfund Emergency Management Division
Massachusetts Section

cc:
Garry Waldeck, MassDEP
Andrew Schkuta, AECOM
Todd Majer, de maximis
Christine Taddonio, de maximis
Jessie McCusker, de maximis
Mark Kelly, H&A
Kevin Trainer, on behalf of CREW
Len Rappoli, 2229 Main Street Oversight Committee

de maximis, inc.
200 Day Hill Road
Suite 200
Windsor, CT 06095
(860) 298-0541
(860) 298-0561 FAX

April 16, 2024,

Ms. Kara Nierenberg, PE
Remedial Project Manager
EPA Region 1
5 Post Office Square, Suite 100
Mail Code OSRR 07-4
Boston, MA 02109-3912

Subject: **Nuclear Metals, Inc. Superfund Site**
Remedial Design / Remedial Action
Concord, Massachusetts
Remedial Action Work Plan (RAWP) - Phase 1

Dear Ms. Nierenberg:

The revised Remedial Action Work Plan (RAWP) - Phase 1 - Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E for Site Wide Soils and Sediments, based on comments received on February 7 and April 4, 2024, as required by Paragraph 3.5 of the Statement of Work provided as Appendix B of the Consent Decree (CD) (Civil Action No. 1:19-cv-12097-RGS) for the Remedial Design / Remedial Action (RD/RA) at the subject site has been uploaded to Project Portal for your review and comment.

If you have any further questions or concerns, please contact me.

Sincerely,

Bruce Thompson

Enclosures

Response to Comments received April 4, 2024

Revised Phase I Site Wide Soils & Sediments Remedial Action Work Plan

Please find our response to the comments received on April 4, 2024 on the *Remedial Action Work Plan, Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E*, (the "Phase 1 RAWP") dated March 18, 2024. Each comment is included below, with a response following each comment accordingly below:

General Comments – de maximis RTCs

1. EPA General Comment #1: The *100% Design - Site-wide Sediment and Soils Phase 1* (dated September 22, 2023) included the following site areas: Courtyard, Landfill, Sphagnum Bog, and Cooling Pond. The *Revised Enabling Phase Remedial Activities 100% Design* (dated August 11, 2023) included a plan for pre-characterization Building E. EPA received the *Soil Pre-Characterization Memorandum – Building E and Courtyard Area* (dated January 4, 2024); however, no updated design drawings that reflect the results of the April/May 2023 Building E pre-characterization investigation have been submitted to EPA for review. This Phase 1 RAWP must be updated with approved Building E Design Drawings prior to EPA approval.

   de maximis response: Building E Design Drawings have been added in Appendix B. The following language was added to section 3.2.5 of the revised Phase 1 RAWP to detail the proposed excavation for the Building E footprint based on pre-characterization results: "Proposed excavation within the Building E footprint includes excavation of soils from 0 to 10 feet below ground surface (bgs) and excavation of "impacted" precharacterization grid cells from 10 to 12 feet bgs. Material excavated from 0 to 10 feet bgs and "impacted" material excavated from 10 to 12 feet bgs is proposed for off-Site disposal and will not be reused on-Site. Soils within 10- to 12-foot-interval grid cells exhibiting COC concentrations below ROD cleanup levels ("clean") are proposed to remain in place without being disturbed. The proposed excavation plan for the Building E area is provided in Appendix B, Drawing C-412, and will include an excavation of 12 ft of soil from the footprint of Building E. The proposed excavation and backfilling design will establish 10 feet of "clean" cover material, or confirmatory sampling will be conducted to show at least 10 ft of clean cover".

   EPA follow-up: The response and edited text reference Appendix B, Drawing C-412; however, this drawing is not included in the Phase 1 RAWP. Instead, the Drawings C-402 through C-405 in Appendix B depict four planned phases of excavation/restoration of the Building E footprint. The report text does not include a description of the planned phases. Please address. In addition, please add a drawing showing the excavation cut lines for the Building E area (similar to what is shown on Appendix B, Drawing C-406 (Color Depth Plan Courtyard). Lastly, there were several pre-characterization grid cells where no data was collected during the pre-characterization program. Please clarify if soil from these uncharacterized locations be excavated or if this soil will remain in place.

   Response: The text and Drawings have been updated to include more clearly defined cut elevations on the four-phased drawings, and a color depth plan has been added to show the 12 ft. cut of Building E. Drawing C-412 also shows pre-characterization results for grid cells proposed to remain in place within the Building E footprint. The areas not defined during the pre-characterization will be excavated and assumed to be

contaminated as the abutting cells are also impacted.

Specific Comments – de maximis RTCs

1. EPA Specific Comment #11: Section 3.2, Page 9, Paragraph 2. The text states that "excavation of soil will continue until uranium and PCB concentrations in confirmatory samples do not exceed RALs." The following subsections (3.2.1 through 3.2.5) provide minimal details on how confirmation sample results will be used to expand (or limit, in the case of the sphagnum bog) the excavation areas laterally and vertically. Please revise the text (Sections 3.2 through 3.2.5) to provide additional details on locations where contamination will NOT be chased both laterally and vertically by confirmation sample results. If possible, please reference or provide a decision tree for determining when additional excavation will be necessary.

   de maximis response: (EPA accepts responses from paragraphs 1 through 4. Paragraphs 5 and 6 included here only.)

   The following language was added to section 3.2.4 (added text is underlined in italics): "Soil excavation quantities from remediation areas may be adjusted during construction to accommodate any additional removal deemed necessary after the confirmatory samples are analyzed. However, if RAL exceedances are detected in sidewall samples bordering slope stability excavations (gray hatched areas shown in Appendix B, Drawing C-408), supplemental excavation and subsequent resampling will not be performed beyond the slope stability excavation boundary to chase contamination in these areas".

   EPA follow-up: Section 3.2.4 discusses the confirmation sampling plan for the Cooling Pond areas and specifically states that RAL exceedances in sidewall samples will not result in a lateral expansion of the remedial area. Please address what action will be taken if a sidewall sample exceeds RALs and is located a depth deeper than the adjacent planned stability excavation.

   Response: The plan would be to extend the excavation 1 ft. deeper and resample. If the resampled location exceeds the RALs, a marker barrier would be installed, and the location coordinates mapped. The following language was added to section 3.2.4 to address this: "In the event that RAL exceedances are detected in sidewall confirmatory samples, supplemental excavations may be performed to increase the excavation depth by 1 foot, followed by additional confirmatory sample collection. If RAL exceedances persist in supplemental confirmatory samples, a marker barrier will be placed, and sample location coordinates will be recorded." It may be necessary to put an Institutional Control (IC) on this area, but it would only be within the steep in-accessible slope and would need to be further discussed in the IC Plan. It would not be possible to put 10 ft. of cover over this material on the steep side slope. It is also possible that despite RAL exceedances, the residual EPC will not exceed the cleanup goals, indicating that an IC would not be required.

de maximis response (cont.): *The following language was added to section 3.2.5: "Confirmatory sampling will be performed within the Building E footprint as shown in Appendix B, Drawing C-503. Supplemental excavation and additional confirmatory sampling may be performed if "impacted" material is detected in initial confirmatory samples. However, the excavation will not be vertically advanced below a depth of 12 feet bgs. As described in the Soil Pre-characterization Memo – Building E and Courtyard Area, soil beneath the Building E footprint exhibited varying volumes of "impacted" material to a depth of at least 20 feet below the slab. "Impacted" material detected below 12 feet bgs is proposed to remain in place. The excavation will be backfilled with "clean" material following the removal of "impacted" soils to establish 10 feet of clean cover. If "impacted" material is detected in sidewall confirmatory samples between 0 and 12 feet bgs, minimal supplemental excavation may be performed to laterally expand the excavation, followed by additional confirmatory sample collection at the expanded sidewall location to confirm the removal of "impacted" materials. However, lateral expansion of the Building E excavation is also limited. Excavation limits at the eastern and southern boundaries of the building footprint shall not be advanced beyond the asphalt roadway, as this feature must be maintained for vehicle and equipment mobilization. Excavation limits at the eastern boundary of the building footprint shall not be advanced beyond the proposed Material Processing Area or within areas that may obstruct vehicle passage along the adjacent asphalt roadway. Excavation limits shall not be expanded beyond the northern boundary of the Building E footprint, as this area will be managed as part of the Courtyard and Building C remediation areas."*

EPA follow-up: Section 3.2.5 text should be edited to note that if confirmation sidewall samples exceed clean-up levels and additional excavation cannot be performed due to the need to maintain the roadway, material processing area, encroaching on other site areas, etc. then the excavation will be marked with a marker barrier and performed during the Phase 2 soil excavation work.

Response: The following language was added to section 3.2.5 to address this comment: "If RAL exceedances are detected in sidewall confirmatory samples where lateral excavation limits cannot be further expanded due to the above referenced limiting factors, a marker barrier will be placed along the excavation subgrade and additional excavation and confirmatory sampling will be conducted as part of the Phase 2 Remedial Action".

In addition, the text states "Excavation limits at the eastern [emphasis added] boundary of the building footprint shall not be advanced beyond the proposed Material Processing Area or within areas that may obstruct vehicle passage along the adjacent asphalt roadway." Restrictions on the lateral limits to the east of Building E were detailed in the previous sentence. Was this meant to described lateral limits to the west?

Response: The following language was revised in section 3.2.5 to address this comment (added text underlined in italics): "Excavation limits at the *western* boundary of the building footprint shall not be advanced beyond the proposed Material Processing Area or within areas that may obstruct vehicle passage along the adjacent

asphalt roadway."

Specific Comments – Phase 1 RAWP

1. Section 3.3.3, Page 15. The text states "Restoration in the Courtyard excavation area will be completed as shown in Appendix B, Drawing C-602"; however, Appendix B, Drawing C-602 is of the Cooling Pond restoration plan. Please edit the text and drawings as necessary to correct the reference and to include a restoration plan for the Courtyard area.

   Response: The text has been updated as indicated. The Drawing update is shown as Drawing C-405, Phase 4 grading scheme, which is the Interim grades for the Courtyard following completion of both the Courtyard and Building E excavations.

2. Section 3.3.5, Page 15. For completeness, please clarify that although the current Building E slab is elevated above the surrounding area, the final restoration and regrading will result in a minimum of 10 feet below grade surface for any impacted material left in place below the Building E footprint.

   Response: The Drawings include sections of the Building E pre-characterization data set from 12 to 20 ft. and sections showing that with a 12 ft. cut that building E will have at least 10 ft. of clean cover over the limit of excavation. Supplemental sampling may be necessary in the cells that were not sampled during pre-characterizations program because of obstructions encountered and where supplemental excavation is required to expand excavation areas. Drawing C-406 and C-407 includes these sections and plan views.

   The following language was added to section 3.3.5 to address this comment (added text underlined in italics): "The building slab is currently elevated above the surroundings. *Impacted material proposed to be left in place below the Building E footprint may exist at a minimum depth of 10 feet below grade surface upon the completion of final restoration and regrading*".

3. Section 3.1.1, Page 8, Last Bullet and Appendix B, Drawing C-202. The text states that monitoring wells will be protected or abandoned, as necessary. Drawing C-202 does not accurately reflect the plan for well protection and/or abandonment of wells in the Courtyard area. The drawings states that "UNLESS NOTED FOR ABANDONMENT, MONITORING WELLS SHALL BE PROTECTED IN ACCORDANCE WITH SPECIFICATION 33 29 00, MONITORING WELL ABANDONMENT AND PROTECTION"; however, EPA understands that the plan is to abandon most/all of the wells within the Courtyard area. Please revise the drawing(s) to reflect the current plan for well abandonment. In addition, please include the *Wells Proposed for Decommissioning (Courtyard and Holding Basin Areas) Memo* as an attachment to the revised Phase 1 RAWP once EPA has approved the Memo.

   Response: The text and drawings have been updated. The approved Memorandum for well abandonment is Attached as Appendix F. The following language was added to section 3.1.1 to reference the added appendix: "Monitoring wells proposed for protection and abandonment are detailed in the *Wells Proposed for Decomissioning*

(Courtyard and Holding Basin Areas) memo, included as Appendix F."

4. Section 3.2.1, Page 10, Paragraph 1. The text states that Courtyard excavation drawings are shown on Appendix B, Drawings C-406 and C-407. Please revise the text to provide the correct drawing numbers.

   Response: Appendix B, Drawings C-406 and C-407 do include proposed excavation for the Courtyard area. The following language was added to section 3.2.1 to provide additional details for Drawings C-406 and C-407 and to add a reference to Drawings C-402 through C-405: "Proposed excavation for the Courtyard area is shown on the color depth plan included in Appendix B, Drawing C-406 and cross sections provided in Drawing C-407. The Courtyard excavation is proposed to be completed over the course of four phases of excavation to accommodate access and surface water control as shown in Appendix B, Drawings C-402 through C-405".

5. Appendix B. A number of the drawings in Appendix B, including but not limited to C-100 and C-302, have a number of layers not shown. Please review each figure and confirm that all layers are appropriately shown and features are listed in the legend.

   Response: The drawings have been updated accordingly, and legend items have been omitted or added, as necessary. Layers included in Drawings C-101 and C-102 have been added to Drawing C-100. Layers showing building slabs and septic leaching system proposed for use during Cooling Pond excavation dewatering have been added to Drawing C-302.

6. Appendix B, Drawing C-200. This drawing includes an unlabeled cross-hatched area to the south of Building C and to the west of Building E. Please label or remove this feature.

   Response: The structure referenced in the above comment is the proposed Excavated Material Processing Area for Building E excavation activities. This is an optional processing pad that may or may not be necessary. The appropriate label was added to Appendix B, Drawing C-200.

7. Appendix B, Drawing C-300 and C-301. These drawings include unlabeled features within and to the northwest of the holding basin containment wall. It is assumed that these features are planned ISS injection locations and associated radii. Please label or remove the features.

   Response: The ISS injection points, and the associated radius of influence were removed from the drawings as indicated.

8. Appendix B, C-400. The drawing shows uranium hits in the soil borings along the saddle area in between the Cooling Pond, Holding Basin, and Sphagnum Bog. Please clarify if soil excavation is planned for this area.

   Response: The saddle area referenced in the above comment is proposed for an approximate 2-foot excavation. On Drawing C-400, this area is bound by a solid

black line and labeled to identify that the area is proposed for an estimated 2 ft cut. To the extent practicable, excavation in this area will be completed with a small excavator or by hand to minimize the disruption of the mature trees along the slope to the bog. Confirmatory sampling may be completed following excavation for documentation purposes only, however supplemental excavation will not be performed in this area, as further excavation may disrupt slope stability and sensitive Sphagnum Bog ecosystems.

9. Appendix B, C-401-A. There is a small area of suspected buried metal located to the east of the landfill planned excavation area. Please clarify if this area is planned for excavation.

   Response: The small area of buried metal located to the east of the Landfill will be removed and confirmatory sampling will be conducted following removal of buried material.

10. Appendix D. While EPA does not approve the Contractor HASP, EPA has the following suggested edits to the Contractor HASP:
    a. The Contractor HASP is written for the excavation of Areas of Interest (AOI) 8 and 9 and does not reference the Phase 1 remedial action areas. EPA suggests that the HASP be revised to be applicable to the work to be performed during the Phase 1 Remedial Action work.
    b. Section 1.3 – concrete material should be processed to < 1 ft^3, not <3 ft^3 as written.
    c. Section 5.4 – Chemicals found on-site may also include thorium, arsenic, PAHs, and asbestos.
    d. Section 11.6 – The text states that "deep excavations are not anticipated;" however, the proposed excavation depth for Building is 12 ft bgs. EPA suggests that the text is edited to note deep excavations are planned and the appropriate protections should be taken.

   Response: The HASP contained in Appendix D has been updated as suggested above. This HASP will be part of the Contractor Submittals for the SSS Phase 1 – Courtyard & Building E.

11. Appendix E. EPA has the following comments on Appendix E, Charter Construction Schedule:
    a. ID line item #12, Abatement & Disposal of Transite Pipe, is not discussed anywhere else in the Phase 1 RAWP. Please edit the RAWP text to include a discussion of the removal of transite piping, including a figure or drawing showing the anticipated locations of transite piping (if known).
    b. ID line item #14, Demolition of Butler B3 Concrete Slabs, Walls & Footers & Transport Debris to Waste Processing Area. This line item includes the demolition of the Butler B3 concrete slabs; however, the Butler slabs were not included in either the Phase 1 SSS or the Enabling Phase Remedial Design documents. Please edit the schedule as necessary to remove the work related to the Butler B3 slabs.
    c. ID line item #20, Building E Area. The Drawings in Appendix B show four

phases of work proposed for the excavation and restoration of the Building E and Courtyard areas; however, the project schedule only includes one line item for each the Courtyard excavation and the Building E excavation. Please edit the project schedule and/or the RAWP text to present the proposed phases of excavation and restoration.

Response: The text includes language about managing transite pipe if encountered during Phase 1 SSS excavations. Based on our understanding of where transite pipe is located, Phase 2 work will address transite pipe removal as well. There are no additions to the Phase 1 SSS drawings as it relates to transite pipe. However, there are many utilities being removed as part of this Phase 1 work within the courtyard area and if Transite pipe is encountered it will be managed as described in previous work plans. Charter will arrange for the appropriate subcontractor for abatement of the pipe and verification will be done by EH&E.

The Butler B3 slabs will remain in place until Phase 2 work and the reference to Butler slabs was removed from the schedule accordingly. Lastly, the text was updated to reflect the 4-Phases of excavation and interim grading in the Courtyard and Building E Areas. The schedule shows the duration of the bulk excavation and restoration. The schedule does not show the four phases as that is more of a sequence of events to manage the soil being excavated and allowing for appropriate drainage controls and road access around the site. The schedule is intended to show the general flow of work from start to finish. The updated text provides the details of the four phases of interim grading and restoration.

HALEY ALDRICH

www.haleyaldrich.com

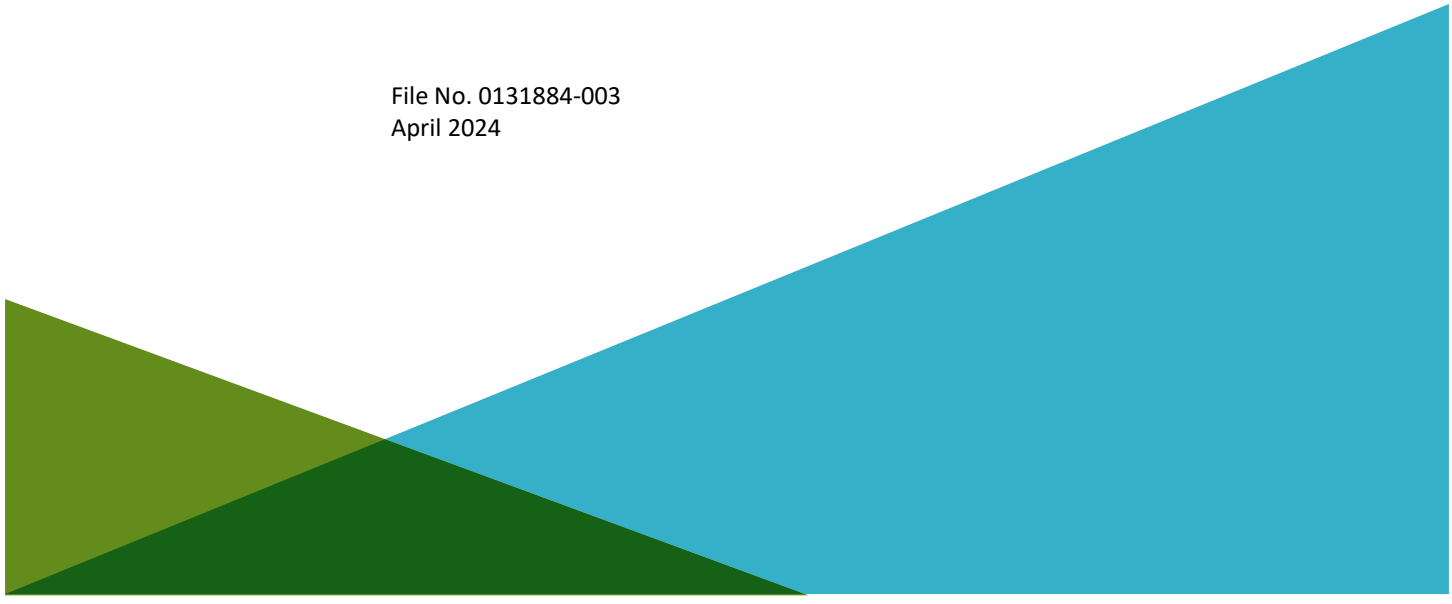
REPORT ON

REMEDIAL ACTION WORK PLAN
PHASE 1 – COURTYARD, LANDFILL, SPHAGNUM BOG, COOLING POND, AND BUILDING E
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

by
Haley & Aldrich, Inc.
Boston, Massachusetts

for
de maximis, inc.
Windsor, Connecticut

File No. 0131884-003
April 2024



HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

26 April 2024
File No. 0131884-003

de maximis, inc.
200 Day Hill Road
Suite 200
Windsor, Connecticut 06095

Attention: Bruce Thompson

Subject: Remedial Action Work Plan
Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E
Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Ladies and Gentlemen:

The purpose of this letter is to transmit the Remedial Action Work Plan (RAWP) for the Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E for the Nuclear Metals, Inc. (NMI) Superfund site located in Concord, Massachusetts in accordance with the requirements set forth in the Statement of Work (SOW). Building E remediation was initially included under the Enabling Phase Remedial Activities 100% Design document; however, it is now being conducted under the Phase 1 remedial action (RA) work outlined in this report. This RAWP includes a review of construction activities associated with the Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E that will be completed by Charter Contracting Company (Charter). Information on project roles and responsibilities, relevant project documents, and the Contractor's Health and Safety Plan (HASP) are also provided in this report.

This report contains the RA information relative to a subsection of the Site-wide Sediment and Soils (Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E). The information relevant to the remaining Site-wide Sediment and Soils (SSS Phase 2) RA will be submitted under separate cover.

Sincerely yours,
HALEY & ALDRICH, INC.

Evelyn Randazzo
Staff Geologist

Mark Kelley, P.E.
Senior Hydrogeologist | Civil Engineer

Enclosures

HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

SIGNATURE PAGE FOR

REPORT ON

PHASE 1 – COURTYARD, LANDFILL, SPHAGNUM BOG, COOLING POND, AND BUILDING E REMEDIAL ACTION WORK PLAN
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

PREPARED FOR

DE MAXIMIS, INC.
WINDSOR, CONNECTICUT

PREPARED BY:

Evelyn Randazzo
Staff Geologist
Haley & Aldrich, Inc.

REVIEWED AND APPROVED BY:

Mark Kelley, P.E.
Senior Hydrogeologist | Civil Engineer
Haley & Aldrich, Inc.

Table of Contents

List of Figures

List of Appendices

List of Abbreviations

Abbreviation	Definition
100% RD	100% Remedial Design
AOI	Area of Interest
bgs	below ground surface
CD	Consent Decree
CFR	Code of Federal Regulations
Charter	Charter Contracting Company
COC	constituent of concern
CQAP	Construction Quality Assurance Plan
cu yd	cubic yard
DDES	Decontamination Decommissioning and Environmental Services, LLC
ddms, inc.	*de maximis* data management solutions
de maximis	*de maximis, inc.*
DETS	Dewatering Effluent Treatment System
DU	depleted uranium
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FSP	Field Sampling Plan
Haley & Aldrich	Haley & Aldrich, Inc.
HASP	Health and Safety Plan
IC	Institutional Control
MassDEP	Massachusetts Department of Environmental Protection
mg/kg	milligrams per kilogram
NMI	Nuclear Metals, Inc.
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	Pre-Design Investigation
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAC	Remedial Action Contractor
RAL	Remedial Action Limit
RAWP	Remedial Action Work Plan
RD	Remedial Design
RDWP	Remedial Design Work Plan
Republic	Republic Services, Inc.

Abbreviation	Definition
RI	remedial investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SD	Settling Defendant
Site	Nuclear Metals, Inc. Superfund Site in Concord, Massachusetts
SOW	Statement of Work
SSS	Site-wide Sediment and Soils
TSCA	Toxic Substances Control Act

1. Introduction

This Remedial Action Work Plan (RAWP) has been prepared on behalf of *de maximis, inc.* (*de maximis*) for the Nuclear Metals, Inc. (NMI) Superfund Site in Concord, Massachusetts (Site). The Phase 1 – Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E 100% Remedial Design (100% RD) Report, submitted on 25 September 2023 and approved by the U.S. Environmental Protection Agency (EPA) on 27 September 2023, and the Enabling Phase Remedial Activities 100% Design document, issued partial approval by the EPA on 6 June 2023, contain the pertinent design information relative to these general Site areas. The *Site-wide Sediment and Soils Remedial Action - Phase 1 Remedial Action Contract Award Extension*, submitted by *de maximis* on 11 November 2023, was approved by the EPA on 13 November 2023. Charter Contracting Company (Charter) was awarded the Phase 1 Remedial Action Contract and will serve as the Remedial Action Contractor (RAC).

This RAWP presents the construction activities planned for remediation within the Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E to remove Site-specific constituents of concern (COCs) as outlined in the Record of Decision (ROD) with a specific focus on the removal of uranium and polychlorinated biphenyl (PCB)-impacted materials, as well as polycyclic aromatic hydrocarbon (PAH), arsenic, and thorium-impacted materials. Information provided in this report includes a summary of the Site background, the proposed work, the proposed equipment and personnel, the general sequencing of the work activities, the layout for material staging and stockpiling areas, and other pertinent construction activity descriptions.

The work will include the following:

- Site preparation, including mobilization of equipment, construction of stormwater diversion features, installation of soil erosion and sediment controls, and expansion of the existing waste staging areas.
- Excavation of contaminated material from the Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E, as well as transport of material to the excavated material processing areas.
- Restoration of excavated areas to design grade and installation of erosion control measures.

The work will be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) requirements. Note that the following supporting deliverables were used to implement the pre-design investigations (PDIs) and will be used again for the upcoming remedial action (RA) work. The following documents were a component of the Remedial Design Work Plan (RDWP) approved by EPA in fall 2020:

- Field Sampling Plan (FSP);
- Quality Assurance Project Plan (QAPP);
- Health and Safety Plan (HASP);
- Emergency Response Plan; and
- Site-wide Monitoring Plan.

Two FSP amendments were submitted as part of the Area of Interest (AOI) 8 and AOI 9 work and detailed the following:

- Perimeter dust monitoring – This FSP amendment was included in the design report as Appendix B dated September 2022.
- The on-Site laboratory for uranium analysis – This amendment was originally included in AOI 8 and AOI 9 RAWP dated 17 November 2022 as Appendix E and was revised on 26 January 2023.

Both FSP amendments are included with this RAWP as Appendix A. Additional amendments to the above plans will be submitted as needed during the progression of work.

Additional documents that will be used to guide the upcoming RA include the *Transportation and Off-Site Disposal Plan* (revised 24 May 2023 and included as Appendix D to the 100% Design Site-wide Sediment and Soils (SSS) Phase 1 - Courtyard, Landfill, Sphagnum Bog, and Cooling Pond document and the *Amendment to AOI 8 and AOI 9 Remedial Action Work Plan, Sampling, Handling, and Disposing of PCBs ≥ 50 ppm* submitted under separate cover dated 5 December 2022).

1.1 SITE DESCRIPTION

The Site is an approximately 46-acre parcel located in the western portion of the Town of Concord, Massachusetts. The Site consists of five former building slabs, a Holding Basin, a Cooling Pond, a former Landfill, and a Sphagnum Bog. Historically, a specialty metals manufacturing facility operated at the Site from 1958 to 2011. NMI was originally a specialty metals research and development facility that was licensed to possess low-level radioactive substances. From 1957 to 1972, the Site was owned and operated by a succession of companies that were engaged principally in specialty metals research and development work. Subsequent to 1972, NMI and related entities owned and operated the Site and developed a large-scale depleted uranium (DU) manufacturing operation. More recently, Site activities included the production of beryllium-aluminum materials.

The areas of focus for this RAWP are listed below and shown in the construction drawings included in Appendices B and C of this report.

- The Courtyard, formerly occupied by underground drain lines which carried process wastes (including acid), cooling water, and stormwater from the facility buildings to the Holding Basin, Sphagnum Bog, and Cooling Water Recharge Pond;
- The Landfill, which was historically used for disposal of solid waste that may have included laboratory waste, drummed materials, and municipal and office waste;
- The edge of the Sphagnum Bog, which was formerly used as a discharge area for supernatant liquid from the Holding Basin and for laboratory sink floor drains located in Building A;
- The Cooling Pond, which was used as a discharge area, primarily for building floor and roof drains at the Site, and overflow drainage from the Holding Basin; and
- Building E, which was used to house the radioactive waste processing operations.

1.2 RELATED PROJECT DOCUMENTS

The following documents have been developed for this project and are summarized below.

1.2.1 Construction Drawings

Construction Drawings have been developed to document and detail the existing conditions, Site preparation and erosion controls, and the proposed remedial activities (primarily excavation).

The Phase 1 SSS RD Construction Drawings are included as Appendix B. The As-Built Drawings for the Enabling Phase of Work are included in Appendix C.

1.2.2 Construction Specifications

Construction Specifications are referenced within the Construction Drawings that detail the construction activities, outline the technical aspects applicable to the work, and are based on the 100% Design SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond document and the Enabling Phase Remedial Activities 100% Design document.

Construction Specifications are included in the Phase 1 – SSS 100% Design Report, dated 22 September 2023, and approved by EPA on 27 September 2023.

1.2.3 Health and Safety Plan

A Site-specific HASP was prepared by the Contractor in accordance with the requirements of Title 29, Code of Federal Regulations (CFR) Part 1910.120 to protect on-Site personnel, visitors, and the public from physical harm and potential exposure to hazardous materials during the remedial activities. The RDWP HASP approved by EPA in September 2020 will also be referenced during the RA, particularly for radiological safety information.

The Contractor HASP is included as Appendix D of this report.

1.3 ROLES AND RESPONSIBILITIES

The key management personnel for the RA are presented below, followed by a description and communication roles of each person or party. A project team organizational chart is provided as Figure 1.

Organization	Role	Contact Information
EPA	Lead regulatory agency overseeing the RD/RA	Kara Nierenberg Remediation Project Manager (RPM) EPA Region 1 5 Post Office Square, MC OSRR07-MI Boston, MA 02109 (617) 918-1435 Nierenberg.Kara@epa.gov

Organization	Role	Contact Information
Massachusetts Department of Environmental Protection (MassDEP)	State regulatory agency involved in project review and providing support to EPA	Garry Waldeck Project Manager MassDEP-BWSC 100 Cambridge Street Suite 900 Boston, MA 02114 garry.waldeck@mass.gov
AECOM	EPA oversight contractor	Andrew Schkuta AECOM 250 Apollo Drive Chelmsford, MA 01824 (781) 290-9448 andrew.schkuta@aecom.com
Settling Defendants (SDs)	Signatories to the Consent Decree (CD); responsible for overall performance of RD/RA	c/o Bruce Thompson of *de maximis* (see below)
de maximis	General and Supervising Contractor	Bruce Thompson Project and Community Involvement Coordinator *de maximis, inc*. 200 Day Hill Road, Suite 200 Windsor, CT 06095 (860) 298-0541 brucet@demaximis.com
de maximis data management solutions (ddms, inc.)	Subcontractor for data management services, including data validation and database management, and maintenance of www.nmisite.org	Database, Website, and GIS, and Project Portal: Heidi R. V. Gaedy, PMP, GISP ddms, inc. 60 Plato Boulevard East, Suite 150, St. Paul, MN 55107 (651) 842-4236 HGaedy@ddmsinc.com Data Validation: Polly Newbold ddms, inc. 186 Center Street, Suite 290 Clinton, NJ 08809 pnewbold@ddmsinc.com
O&M, Inc.	Subcontractor for general work at the Site (Site inspections, maintenance, and snow removal)	Keith Robinson O&M, Inc. 450 Montbrook Lane Knoxville, TN 37919-2705 (865) 691-6254 krobinson@oandm-inc.com

Organization	Role	Contact Information
Haley & Aldrich, Inc. (Haley & Aldrich)	Engineer-of-Record for SSS RD components Engineering and design support	Mark D. Kelley, P.E. (MA) Haley & Aldrich, Inc. 465 Medford Street |Suite 2200 Boston, MA 02129-1400 (617) 886-7338 (office) (857) 498-1276 (mobile) mkelley@haleyaldrich.com
Alpha Analytical Laboratories and GEL Laboratories, LLC	Laboratory analytical services	Dave Sanford, Project Manager Alpha Analytical Laboratories 8 Walkup Drive Westborough, MA 01581 (508) 439-5157 dsanford@alphalab.com Zachary Worsham, Project Manager GEL Laboratories, LLC 2040 Savage Road Charleston, SC 29407 (843) 769-7385 emk@gel.com
Decontamination Decommissioning and Environmental Services, LLC (DDES)	Radiation safety, including screening of materials and equipment	Matt Norton Decontamination Decommissioning and Environmental Services, LLC (DDES) 25 Rundlett Way, Unit 10 Middleton, MA 01949 mdnorton@ddesllc.com
Charter	Construction activities, including excavation and restoration	Charter Contracting Company Christopher Ryan, Senior Project Manager 500 Harrison Avenue Suite 4R Boston, Massachusetts 02118 (978) 420-5106
Republic	Construction activities, including excavation and restoration, and transportation and disposal	Republic Services, Inc. Sherry Frenette, Director of Radioactive Waste Operations 26 R Inner Belt Road Somerville, MA 02143 (702) 912-7925

2. Pre-Construction Preparation Activities

The following pre-construction activities will be completed prior to mobilization:

- Documentation of existing conditions and Site grades within the RA work areas of the Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E and the surrounding areas;
- Construction Sequencing Plan submittal, review, and approval;
- Pre-Construction Site meeting; and
- Notification to DIGSAFE for utility clearance per the FSP prepared as part of the RDWP that was approved by EPA in September 2020.

Site preparation activities to be completed prior to the start of construction are summarized below. Additional details are provided in Section 3.1 of this report.

- Minimal vegetative clearing and surface material removal as necessary to facilitate access and staging;
- Installation of new access roads and improvement of existing access roads;
- Construction of clean backfill stockpiling areas, excavated material stockpiling areas, construction staging areas, and a designated decontamination pad;
- Installation of erosion and sediment controls;
- Construction of surface water and stormwater drainage features;
- Installation of a Dewatering Effluent Treatment System (DETS); and
- Implementation of geotechnical improvements.

3. Construction Activities

The Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E remedial excavations are scheduled to occur over the course of approximately 3.5 years, with an estimated 16 months of active construction. The Charter construction schedule summarizing dates of specific tasks is included as Appendix E. Mobilization and construction activities for the project are scheduled to commence in April 2024, with tasks being scheduled as follows:

- Mobilization and Site Preparation (April 2024)
- Courtyard Soil Excavation (April 2024 to August 2024)
- Building E Soil Excavation (August 2024 to November 2024)
- Landfill Soil Excavation (November 2026 to February 2027)
- Sphagnum Bog Soil Excavation (February 2027 to May 2027)
- Cooling Pond Soil and Sediment Excavation (March 2027 to July 2027)
- Loading of Impacted Materials (April 2024 to December 2027)

3.1 MOBILIZATION AND SITE PREPARATION

Mobilization will include procuring and staging all necessary labor, materials, equipment, tools, and providing supervision to commence the remedial work. It also includes processing of the required submittals, including administrative and procedural requirements for submitting project work plans, product data, samples, and any other submittals required in the Project Specifications. Drawings referenced below are included in Appendix B. Additional details are provided in the Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond 100% RD Report and Enabling Phase Remedial Activities 100% Design document.

3.1.1 Courtyard

- Improvement and extension of existing access road as shown on Appendix B, Drawing C-200 and Details 1 and 2 of Drawing C-700;
- Minimal vegetative clearing and removal of surface paving material. Debris (such as surface materials, building remnants, and/or abandoned piping) will be broken down into pieces less than 1 foot across prior to off-Site disposal. Asphalt and concrete material will be mixed into the prescribed ratio of soils and debris in accordance with the accepting facility waste profile;
- Installation of construction staging and clean backfill stockpile area south of the Landfill area as shown in Appendix B, Drawings C-200, C-202, and Detail 5 of Drawing C-700;
- Installation of designated excavated soil stockpile areas north of AOI 8 as shown on Appendix B, Drawing C-200 and Detail 5 of Drawing C-701. Material processing areas may be expanded as necessary and could include the Building D Slab;
- Construction of pre-excavation drainage improvements, including a temporary drainage swale along the western side of Holding Basin and a connecting riprap-lined channel and Cooling Pond outlet in the southern section of the Cooling Pond, as shown on Appendix B, Drawing C-300 and on Detail 2 of Drawing C-701;

- Installation of erosion and sediment controls, including straw wattles, straw bales, and filter fabric as shown on Appendix B, Drawings C-200 through C-202 and Details on Drawing C-700;
- Construction of decontamination pad south of the Holding Basin as shown in Appendix B, Drawing C-200 through C-202, and Detail 6 of Drawing C-701;
- Catch basin removal on eastern edge of Courtyard as shown in Appendix B, Drawing C-201 was completed during Enabling Phase remedial activities; and
- Protection of or abandonment of existing monitoring wells as necessary. Monitoring wells proposed for protection and abandonment are detailed in the *Wells Proposed for Decomissioning (Courtyard and Holding Basin Areas)* memo, included as Appendix F.

3.1.2 Sphagnum Bog and Landfill

- Implementation of geotechnical improvements to the slope on the western side of the Sphagnum Bog as shown in Appendix B, Drawing C-301, including placement of timber mats, and a bench to the slope. Once excavation is complete, excess soil and debris will be removed from the timber mats, and surfaces will either be swabbed and analyzed for uranium contamination at the on-Site laboratory or radiologically surveyed using a handheld radiation survey meter (sodium iodide detector) before exiting the remediation area;
- Installation of access road along western edge of bog as shown in Appendix B, Drawing C-301 and Detail 9 of Drawing C-700;
- Installation of gravel platforms across the Landfill area as shown in Appendix B, Drawing C-301. Platforms will be constructed using approved dense-grade aggregate overlying 8-ounce geotextile fabric;
- Installation of temporary facilities, including a decontamination pad, temporary erosion and sediment controls, and surface water and stormwater controls;
- Installation of material management, construction staging, and excavated material processing areas as shown in the Construction Drawings included in Appendix B; and
- Monitoring well abandonment and tree removal as detailed in Appendix F and Appendix B, Drawing C-201, respectively.

3.1.3 Cooling Pond

- Removal of two courses or approximately 6 feet of Gabion Wall baskets from the top of the wall for stability during construction.
- Construction of access roads at the eastern edge of the Cooling Pond area and to the DETS staged in Northern Parking Lot, as shown on Appendix B, Drawing C-302.
- Installation of timber mats along edges of the Cooling Pond for excavator stability and along access roads for support, as necessary, as shown in Appendix B, Drawing C-302. Once excavation is complete, excess soil and debris will be removed from the timber mats, and surfaces will either be swabbed and analyzed for uranium contamination at the on-Site laboratory or radiologically surveyed using a handheld radiation survey meter (sodium iodide detector) before exiting the remediation area.

- Installation of the DETS as shown in Appendix B, Drawing C-302 and subsequent dewatering of the Cooling Pond area. The DETS will also be used for stormwater management during Cooling Pond remediation. Surface water and groundwater will be pumped from the pond sediment excavation area, processed through the DETS, and discharged to the existing leach fields in the Northern Parking Lot, as depicted in Appendix B, Drawing C-302. Additional details pertaining to the DETS are included in Section 02 70 00 – Construction Dewatering and Water Management of the specifications included as Appendix A of the *100% Design – Site-Wide Sediment and Soils Phase 1 – Courtyard, Sphagnum Bog, and Cooling Pond Design*, dated 22 September 2023.
- Once dewatering of the Cooling Water Pond starts, timber mats will be installed more toward the Cooling Pond center to access deeper sediment and soils along the side slopes.
- Installation of temporary facilities, including a decontamination pad, and temporary erosion and sediment controls.
- Installation of material management, construction staging, and excavated material processing areas as shown in the Construction Drawings.

3.1.4 Building E

- Concrete slab removal within the Building E footprint. Building B3 slabs will remain in place until the Phase 2 RA;
- Drainage channel installation west of the Holding Basin, as shown in Drawing C-500 and Detail 7 of Drawing C-601 of the Enabling Phase RA As-Built drawing set (Appendix C); and
- Installation of temporary facilities, including a decontamination pad (Appendix B, Drawing C-201 and Detail 6 of C-701), temporary erosion and sediment controls (Appendix B, Drawing C-202), and optional installation of a Material Processing Area west of the Building E footprint (Appendix B, Drawing C-200 and Detail 5 of Drawing C-701). Surface water and stormwater controls (Appendix B, Drawings C-402 through C-405) will be implemented concurrently with the excavation and restoration of the Building E and Courtyard areas.

3.2 EXCAVATIONS

Remedial excavations shall be completed in accordance with the 100% RD SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond and Enabling Phase Remedial Activities 100% Design document. Construction drawings referenced in this section are included in Appendix B.

Confirmatory sampling will be conducted on a 30-foot by 30-foot grid within the excavation footprints to verify that remediation has reduced COCs to exposure point concentrations (EPCs) that will achieve compliance with the Cleanup Levels, using the approach described in the Construction Quality Assurance Plan (CQAP), Sections 3.2 and 6.7. The areas that will be used to calculate EPCs are shown in Drawings C-500, C-501, and C-502. If field evidence such as staining or discoloration is observed in soils, the visually impacted material will be sampled discretely in addition to the proposed confirmatory sample collection, provided that the initially proposed parts of the confirmatory sample composite (grid node and step-out locations) do not include the visually impacted material.

Excavation of soil will continue until uranium and PCB concentrations in confirmatory soil samples do not exceed the Remedial Action Limits (RALs) established in the 100% RD Report/SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond. Further excavation will be completed if uranium

and PCB concentrations are detected above RALs in confirmatory samples, unless otherwise specified. Where RAL exceedances are detected in sidewall samples, the excavation limits will be expanded laterally to remove the associated sample locations, and where RAL exceedances are detected in bottom samples, the excavation depth will be increased. Additional confirmatory sampling will be performed following these supplemental excavations and this process will be repeated until uranium and PCBs are detected below the RALs. Similarly, supplemental excavation and re-sampling may be performed if PAHs, thorium, or arsenic are detected above ROD cleanup levels in previous confirmatory samples. However, excavation expansion is limited in some areas, for which additional details are provided in Sections 3.2.1 through 3.2.5. Confirmatory samples will be screened for total uranium using the on-Site laboratory, prior to final analyses at an off-Site laboratory. A FSP addendum describing the use of the on-Site laboratory was included with the 100% RD Report SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond.

Excavated materials shall be live-loaded for off-Site disposal or transported to the defined excavated material processing areas located north of AOI 8 and west of the Building E footprint, as shown on Appendix B, Drawing C-200 and on Detail 5 of Drawing C-701. If material exceeding Toxic Substances Control Act (TSCA) limits for PCBs is encountered during confirmatory sampling, material will either be live-loaded or stockpiled in a separate waste processing area located south of the Holding Basin as shown in Appendix B, Drawings C-200 through C-202 and on Detail 5 of Drawing C-703, in accordance with 40 CFR §761.65 – Storage for Disposal. Additional information detailing the TSCA material processing area is provided in the 100% RD Report SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond.

Air monitoring shall be conducted per the Perimeter Dust Monitoring Amendment to the FSP dated 26 September 2022 and included in Appendix A. Dust monitoring units will be set up at the start of each workday and will record one reading per minute throughout the duration of the work. The contractor will be equipped to respond with a wetting apparatus within 5 minutes of being notified of an exceedance above the perimeter dust threshold.

3.2.1 Courtyard

The excavation volume is approximately 32,300 cubic yards (cu yd) for the Courtyard and Building E proposed excavation area, as shown on Appendix B, Drawing C-406. Excavation volumes are based on the remedial investigation (RI) and PDI sampling results and removal of samples that exceed the Cleanup Levels. Excavation designs for the AOI 15 Transformer Pad section of the Courtyard are based primarily on PDI results. Designs for the remainder of the Courtyard area (AOI 11) are mainly based on sampling data from the RI.

Proposed excavation for the Courtyard area is shown on the color depth plan included in Appendix B, Drawing C-406 and cross-sections provided in Drawing C-407. The Courtyard and Building E excavation and restoration are proposed to be completed over the course of four phases of excavation to accommodate access and surface water control as shown in Appendix B, Drawings C-402 through C-405. Proposed drainage improvement features are show in details provided in Appendix B, Drawing C-702. The separation of the excavation and restoration into the four phases is more for layout of cut-and-fill volumes and Site access and drainage. Each phase has a cut and/or fill volume. The last phase is how the site will be ultimately restored after the Courtyard and Building E phase of the excavation is completed and the area is restored. These proposed grades are not the final grades for this area, as the limits of excavation of the western boundary of this area are not known at this time. The Phase 2 PDI work to

include characterization of the Building C and D and paved areas will be conducted concurrent with this construction. The limits of the future excavation of Buildings C and D will dictate the finished grades. The limits of excavation of Building E are such that 10 feet of clean cover will be established over contaminated soil within Building E and an Institutional Control (IC) will be established accordingly. The details of these grades and ICs will be part of the Phase 2 work to be implemented in the future. The four proposed phases of excavation and restoration are summarized below:

- Phase 1 – Bulk of excavation along the eastern and central portions of the proposed excavation area and installation of drainage controls for surface water diversion (Appendix B, Drawing C-402).
- Phase 2 – Partial restoration of the area along the eastern edge of the work area, continued excavation to the west, and implementation of additional surface water diversion features (Appendix B, Drawing C-403).
- Phase 3 – Partial restoration continued through the central portion of the work area and continued excavation to the west (Appendix B, Drawing C-404).
- Phase 4 – Completed interim restoration (Appendix B, Drawing C-405).

The Courtyard area excavation will extend to an estimated maximum depth of 10 feet. Confirmatory sampling locations are shown in Appendix B, Drawing C-501. Further excavation may be completed based on confirmatory sampling results. However, excavation will not be expanded down the slope that descends to the Cooling Pond due to concerns about de-stabilizing the slope. The associated Cooling Pond slope, located along the eastern border of the Courtyard, is shown in grey hatching in Appendix B, Drawing C-408. If RAL exceedances are detected in Courtyard sidewall samples along this boundary, supplemental excavation and re-sampling will not be performed within the Cooling Pond slope areas as part of the Courtyard area remediation. The Cooling Pond slope is addressed in the Cooling Pond remediation area.

Additional excavation may be necessary as piping and utilities are uncovered and chased along the piping alignment. If transite pipes are encountered during Phase 1 SSS excavation activities, pipes will be abandoned and disposed of accordingly using a similar approach to that which was reported in the Enabling Phase Remedial Action Report, dated 9 February 2024 and an Asbestos Post-Abatement Visual Inspection Report will be completed following transite pipe abatement. The Contractor will take precautions when excavating in the vicinity of historical acid and other process utility lines for visual signs of leakage to address the situation in a safe manner. The primary method of soil removal from the Courtyard excavation areas will be mechanical excavation.

Concentrations of PCBs exceeding 50 milligrams per kilogram (mg/kg) were detected in soil samples from the Courtyard area (SB-RI-11018 and SB-PD-15011). The Courtyard restricted area, which encompasses these TSCA samples, was excavated and TSCA confirmatory sampling was completed during Enabling Phase remedial activities, as shown in Appendix C, Drawing C-300. The results of confirmatory TSCA sampling did not show samples remaining with concentrations of PCBs exceeding 50 mg/kg; these results were provided to EPA in July 2023 and will be included in future closure reports. As described in the *Enabling Phase Remedial Action Report*, dated 9 February 2024, interim restoration of the TSCA excavation included placement of clean imported fill overlying a marker barrier. Existing imported fill material may be segregated and stockpiled separately from other Site soils for later reuse to the extent possible. However, if contact occurs with underlying Site soils during remedial activities, the imported material will be disposed of off Site with other Site soils. All additional PCB remediation

work will be conducted in accordance with the existing *AOI 8 and 9 RAWP Amendment* and any other existing 100% Design Documents, HASPs, and relevant 40 CFR Part 761 sections.

3.2.2 Landfill

The excavation volume is approximately 5,975 cu yd, as shown on Appendix B, Drawings C-400 and C-401. The excavation area is based on the PDI sampling results in the Landfill and removal of material where samples exceeded the Cleanup Levels. As shown on Drawing C-400, the slope area located north of the Landfill, between the Holding Basin and Sphagnum Bog, is proposed to be excavated to approximately 2 feet below ground surface (bgs) to remove impacted material identified by PDI and RI results. To the extent practicable, excavation in the slope area will be completed with a small excavator or by hand to minimize disruption of mature trees along the slope. Confirmatory sampling may be performed following removal of impacted material for documentation purposes only; however, supplemental excavation will not be performed in this area, as further excavation may disrupt slope stability and sensitive Sphagnum Bog ecosystems. Excavation volumes may be adjusted during construction to accommodate any additional removal deemed necessary after confirmatory samples are collected. Confirmatory sampling locations are shown on Appendix B, Drawing C-500. Excavation limits along the northern boundary of the Landfill excavation shall not be laterally expanded within the bog sediment excavation area shown in Appendix B, Drawings C-400 and C-401 to avoid disrupting the sensitive ecosystem of the Sphagnum Bog. Supplemental excavation and subsequent re-sampling shall not be performed to chase contamination detected in Landfill confirmatory samples collected beyond this bog sediment excavation boundary.

The primary method of soil removal will be by mechanical excavation. Excavation limits may be adjusted to accommodate removal of large metallic debris within areas identified in the geophysical report provided in the *Site-Wide Sediments and Soil Pre-Design Investigation Report*, dated March 2022. Appendix B, Drawing C-401-A shows the Landfill excavation plan overlain with geophysical data. If large debris pieces are encountered during Landfill excavations, debris will be sized to less than 1 foot prior to off-Site disposal and will be mixed into the prescribed ratio of soils and debris in accordance with the accepting facility waste profile, including the above-referenced non-construction metallic debris. If drums, laboratory containers, or similar receptacles are encountered during RA activities, work will be paused in the associated area to evaluate conditions and additional analytical testing may be performed as necessary. The Landfill area will be removed and regraded to establish a platform to reach the limits of excavation along the toe of slope to the limits of the wetland excavation.

As shown in Appendix B, Drawing C-401-A, a small area of suspected buried metal was detected east of the initially proposed Landfill excavation area. A portion of the eastern limit of the proposed Landfill excavation was laterally expanded to include this area of suspected buried metal. The depth of excavation in this area may be adjusted to accommodate attempted removal of the buried debris. Confirmatory sampling will be conducted in this area as shown on Appendix B, Drawing C-500.

3.2.3 Sphagnum Bog

The excavation volume is approximately 1,127 cu yd, as shown in Appendix B, Drawing C-301, Drawing C-400, and Drawing 401. The excavation area is currently based on the EPA ROD proposed excavation depth of 2 feet on the southern and western edges of the Sphagnum Bog. The primary method of soil removal will be mechanical excavation.

The excavation within the Sphagnum Bog will be minimized to protect the sensitive ecosystem. Confirmatory samples will be collected along the outer edge of the Sphagnum Bog excavation area at 30-foot intervals for documentation purposes only as shown on Appendix B, Drawing C-500. The remediation will not be expanded if residual concentrations are above Cleanup Levels. Therefore, no RALs are required for the Sphagnum Bog. Excavation within the bog sediment excavation area is limited to the proposed excavation included in this report. If COCs are detected in confirmatory samples at concentrations above ROD cleanup levels, supplemental excavation and re-sampling will not be performed.

3.2.4 Cooling Pond

The excavation volume is approximately 5,536 cu yd as shown on Appendix B, Drawing C-408. These volumes include additional areas surrounding the Cooling Pond that are outside of the areas requiring remediation, as shown in grey hatching on Appendix B, Drawing C-408. The Cooling Pond excavations shall be performed in accordance with the cross-sections shown on Appendix B, Drawings C-409 and C-410 to maintain stability along the steep Cooling Pond slopes. Soil excavation quantities from remediation areas may be adjusted during construction to accommodate any additional removal deemed necessary after the confirmatory samples are analyzed.

In the event that RAL exceedances are detected in sidewall confirmatory samples bordering slope stability excavations (gray hatched areas shown in Appendix B, Drawing C-408), minimal supplemental excavation and subsequent resampling may be performed to laterally expand the excavation sidewalls as necessary. However, lateral supplemental excavation will not be performed if said excavation has potential to compromise the slope stability. If RAL exceedances are detected in confirmatory samples where further lateral excavation cannot be performed due to slope stability concerns, a marker barrier will be placed and sample location coordinates will be recorded. If residual EPCs exceed cleanup goals, implementation of an IC may be required within the slope stability excavation areas, as these areas are not safely accessible and establishment of 10 feet of clean cover is infeasible along these slopes. Confirmatory sampling locations are shown on Appendix B, Drawing C-502.

Excavations in the southern half of the Cooling Pond area may be completed to a depth of approximately 6 feet; however, they will be refined using groundwater elevation data as described on Appendix B, Drawing C-411. Deeper excavations are required at the toe of the Gabion Wall in the northern section of the Cooling Pond to address deeper uranium and PCB impacts. The primary method of soil removal from the Cooling Pond excavation areas will be by mechanical excavation. A light riprap cover shall be placed over the remedial excavation on the toe of the Cooling Pond slopes to maintain stability as shown in Appendix B, Drawing C-410.

Concentrations of PCBs exceeding 50 mg/kg were detected in soil samples from the Cooling Pond area (SS-PD-04021 and SD-RI-04002). PCB pre-characterization sampling was conducted in August 2023, as shown in Appendix C, Drawing C-400, and detailed in the 100% RD Report SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond. Subsequent excavation, disposal, and confirmatory sampling was completed as a part of the Enabling Phase remedial activities in accordance with TSCA requirements, per 40 CFR Part 761 – Subpart D, Storage and Disposal. The TSCA excavation area and confirmatory TSCA sampling locations are shown in Appendix C, Drawing C-402. The results of confirmatory TSCA sampling did not show samples remaining with concentrations of PCBs exceeding 50 mg/kg; these results were provided in the *Enabling Phase Remedial Action Report*, dated 9 February 2024.

3.2.5 Building E

A pre-characterization sampling program was conducted for Building E from 12 April through 8 May 2023. Pre-characterized material within the limits of excavation which exhibited uranium, thorium, arsenic, PCB, and/or PAH concentrations above ROD Cleanup Levels ("impacted") will be removed from the excavation and disposed of off Site in accordance with the *Transportation and Off-Site Disposal Plan*.

Proposed excavation within the Building E footprint includes excavation of soils from 0 to 12 feet bgs, including areas where pre-characterization sampling was not completed due to refusals encountered during the April 2023 subsurface exploration program. Material excavated from the Building E footprint is proposed for off-Site disposal and will not be reused on-Site. Soils existing below 12 feet bgs are proposed to remain in place without being disturbed. Recent data from the April 2023 pre-characterization program and historical sampling results for soils proposed to be left in place within the Building E footprint are shown in Appendix B, Drawing C-412. The proposed excavation plan for the Building E area is provided in Appendix B, Drawings C-402 through C-405, and will include an excavation of 12 feet of soil from the footprint of Building E.

As shown in Appendix B, Drawings C-402 through C-405, excavation and restoration within the Building E and Courtyard areas will be completed over the course of four phases to accommodate access around the excavation area, as outlined in Section 3.2.1. The proposed phases of excavation and resulting subgrades are designed to allow for access around the Site and to actively manage surface water runoff during the process of excavating the Courtyard and Building E areas. The proposed excavation, backfilling, and sampling design will establish a minimum of 10 feet of cover material exhibiting COC concentrations below ROD Cleanup Levels ("clean") over the final grades to be established in 2027 as part of the Phase 2 work. Additional information regarding Building E pre-characterization and excavation details were provided in the *Soil Pre-characterization Memorandum – Building E and Courtyard Area,* dated January 4, 2024.

Confirmatory sampling will be performed within the Building E footprint as shown in Appendix B, Drawing C-503. Supplemental excavation and additional confirmatory sampling may be performed if "impacted" material is detected in initial confirmatory samples. However, the excavation will not be vertically advanced below a depth of 12 feet bgs. As described in the *Soil Pre-characterization Memo – Building E and Courtyard Area*, soil beneath the Building E footprint exhibited varying volumes of "impacted" material to a depth of at least 20 feet below the slab. "Impacted" material detected below 12 feet bgs is proposed to remain in place. Refer to Appendix B, Drawing C-412 for sample results for soils proposed to be left in place within the Building E footprint.

The excavation will be backfilled with "clean" material following the removal of "impacted" soils to establish a minimum of 10 feet of "clean" cover. If "impacted" material is detected in sidewall confirmatory samples between 0 to 12 feet bgs, minimal supplemental excavation may be performed to laterally expand the excavation, followed by additional confirmatory sample collection at the expanded sidewall location to confirm the removal of "impacted" materials. However, lateral expansion of the Building E excavation is also limited. Excavation limits at the eastern and southern boundaries of the building footprint shall not be advanced beyond the asphalt roadway, as this feature must be maintained for vehicle and equipment mobilization. Excavation limits at the western boundary of the building footprint shall not be advanced beyond the optional Material Processing Area if this feature is implemented during Phase 1 RA work, or within areas that may obstruct vehicle passage along the

adjacent asphalt roadway. Excavation limits shall not be expanded beyond the northern boundary of the Building E footprint, as this area will be managed as part of the Courtyard and Building C remediation areas. If RAL exceedances are detected in sidewall confirmatory samples where lateral excavation limits cannot be further expanded due to the above-referenced limiting factors, a marker barrier will be placed along the excavation subgrade and additional excavation and confirmatory sampling will be conducted as part of the Phase 2 RA.

PCB concentrations exceeding 50 mg/kg were detected from 2 to 4 feet bgs at sample location SB-PD-13031 during Enabling Phase pre-characterization investigations within the Building E footprint. Additional sampling details and analytical results are provided in the *Soil Pre-characterization Memorandum – Building E and Courtyard Area*, dated 4 January 2024. An approximately 20-foot by 20-foot excavation centered around sample location SB-PD-13031 will be conducted to a depth of approximately 4 feet bgs to remove TSCA material using mechanical excavation methods. Excavated material will either be live-loaded or stockpiled in a separate TSCA material processing area located south of the Holding Basin as shown in Appendix B, Drawing C-200 and Detail 5 of Drawing C-703, in accordance with 40 CFR §761.65 – Storage for Disposal.

Following excavation, TSCA confirmatory sampling will be conducted along a 1.5-meter (approximately 5-foot) sampling grid aligned from north to south. Discrete surface samples will be collected at the bottom of the excavation and on the grid intersections and submitted for PCB analysis. PCB remediation work will be conducted in accordance with the existing *AOI 8 and 9 RAWP Amendment* (attached as Appendix B in the *Revised Enabling Phase Remedial Activities 100% Design* document) and relevant 40 CFR Part 761 sections.

3.3 RESTORATION

Restoration of excavation areas shall be completed in accordance with the Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond 100% RD Report and Enabling Phase Remedial Activities 100% Design document. Construction drawings referenced in this section are included in Appendix B. Restoration for the Landfill, Sphagnum Bog, Courtyard, Cooling Pond, and Building E areas are detailed below in Sections 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.3.5 respectively. Temporary erosion controls, such as erosion control fabric, may be necessary to stabilize areas during the winter and early spring seasons. Final restoration is expected to be conducted during summer 2027. The interim grades are intended to allow for stable surfaces for truck movement around the site, completion of ISS work, and implementation of other construction activities around the Holding Basin.

Additional Site restoration will be completed at the staging areas and around the work areas once the straw wattles, crushed stone, geotextile, and all components of the excavated soil stockpile are removed and disposed of properly upon completion of remedial activities. The proposed access roadway improvements will be left in place.

3.3.1 Landfill

Restoration of the Landfill excavation area will be completed as shown on Appendix B, Drawing C-600. The restoration grading is planned to provide an upper and a lower-leveled area for future use and viewing of the Sphagnum Bog area. Imported “clean” backfill or “clean” previously excavated Site soils will be used to restore to the proposed grade as depicted in Appendix B, Detail 4 on Drawing C-702.

3.3.2 Sphagnum Bog

The Sphagnum Bog sediment will be restored approximately to existing grade as shown on Appendix B, Drawing C-600. Wetland sediment and vegetative restoration shall be completed in accordance with Specification 32 30 00 – Wetland and Upland Restoration as shown in Appendix B, Drawing C-601.

The Sphagnum Bog and wetland boundary will be restored with the following considerations to meet the two primary goals:

1. Re-establish pre-excavation grades: Regrading will be achieved by backfilling the excavated area with two distinct Sphagnum Bog layers – the acrotelm and the catotelm. The acrotelm is the upper layer of the Sphagnum Bog (typically the top 30 to 50 centimeters) where plant growth occurs and peat formation begins. The acrotelm has a varying water level and supports both aerobic and anaerobic conditions. The catotelm is the lower accumulated peat layer which is permanently waterlogged and largely anaerobic.

   Following excavation activities, restoration will require harvesting and backfilling with catotelm peat and acrotelm sphagnum/plant material from appropriate donor sites. The most appropriate catotelm material will come from sites where peat has been harvested from a depth profile similar to that of the NMI Sphagnum Bog excavation profile (2- to 3-foot depth). Fortunately, most commercially available peat material is harvested from relatively shallow depths, making it feasible to find a compatible donor source.

   Restoring the acrotelm will involve constructing this layer to mimic original grades and microtopography with acrotelm material from donor sites. In addition to restoring impacts associated with sediment excavation, final grading for the restoration design will consider the historical alterations along the southern shore of the Sphagnum Bog, which has been altered by the placement of fill and the construction of an impermeable cover over a portion of the Old Landfill.

2. Re-establish pre-excavation Sphagnum Bog vegetation communities: In addition to sphagnum mosses that typically compose most of the donor acrotelm material, the planting plan for the acrotelm will be informed by the existing habitat zones discussed above and associated species.

3.3.3 Courtyard

Restoration in the Courtyard excavation area will be completed as shown in Appendix B, Drawing C-405. Restoration will generally follow the original grading; however, it will also include the leveling of some existing mounded areas. Imported backfill or material from the Site with concentrations of COCs below the ROD Cleanup Levels will be used to restore to grade as depicted in Appendix B, Detail 4 of Drawing C-702. Site soils shall not be reused on Site as backfill material unless prior approval is granted from EPA and MassDEP. Details regarding proposed procedures to request on-Site reuse of Site soils will be submitted under separate cover. A temporary stormwater diversion channel will be installed along the eastern boundary of the Courtyard (west of the proposed Holding Basin slurry wall). In addition, an access road will be installed so that continuity around the Site (i.e., ring road) remains in place.

3.3.4 Cooling Pond

Cooling Pond restoration grading is shown on Appendix B, Drawing C-602. The slope stability analysis shows that the restoration slopes and materials selected result in a factor of safety that is at or above the existing slope stability factor of safety. Details of the calculations and assumptions were included in the Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond 100% RD Report. Backfilling materials for the perimeter of the Cooling Pond are outlined in the cross-sections provided in Appendix B, Drawing C-410. Sand borrow and granular fill materials will likely consist of "clean" imported materials. However, "clean" excavated materials derived from Site remediation activities may be used in place of imported material, provided the materials meet the appropriate chemical and physical requirements and receive prior approval from EPA and MassDEP.

3.3.5 Building E

The building slab is currently elevated above the surrounding areas. As shown in the cross-sections provided in Appendix B, Drawing C-412, impacted material proposed to be left in place below the Building E footprint may exist at a minimum depth of 10 feet bgs upon the completion of final restoration and regrading. Restoration of the building slab area will temporarily level the surfaces to the surrounding elevation; they will then be regraded as needed for use as a staging area during the Holding Basin RA. Additional soil sampling may be conducted along the excavation subgrade in areas where pre-characterization was not completed due to refusals encountered during the April 2023 sampling program and where the base of the excavation area may be expanded via supplemental excavation to chase contamination detected in sidewall samples. This additional sampling may be used to determine allowance of clean cover material if restoration grades need to be lowered in these areas during future work. Building E final restoration and grading will be included as a part of the SSS Phase 2 Design submittal.

3.4 CONSTRUCTION QUALITY ASSURANCE

The CQAP dated September 2023, included as Appendix C to the 100% RD Report SSS Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond, describes the planned and systemic activities that provide confidence that the RA construction will satisfy plans, specifications, and related requirements. Confirmatory sampling procedures, RA activity documentation procedures, and construction deficiency tracking procedures are provided in the CQAP.

4. Remedial Action Inspection Report

At the conclusion of the Courtyard, Landfill, Sphagnum Bog, Cooling Pond, and Building E remedial excavations, the Site will be inspected by EPA and the Supervising Contractor. The inspection report will include information on general Site conditions, equipment and material storage, post-construction erosion and sediment control installation, and stormwater drainage feature status. As-built survey documentation of the limits of excavation and locations of confirmatory samples will be included on as-built drawings of the Courtyard, Landfill, Sphagnum Bog, Cooling Pond Areas, and Building E.

References

1. *de maximis, inc.,* 2020. *Remedial Design/Remedial Action Work Plan, Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts*. March.

2. Haley & Aldrich, Inc., 2022a. *Site-Wide Sediments and Soils Pre-Design Investigations, Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts*. March.

3. Haley & Aldrich, Inc., 2022b. *100% Design – Site-Wide Soils and Sediment AOI 8 and 9, Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts*. September.

4. Haley & Aldrich, Inc., 2023a. Enabling Phase Remedial Design Activities, Nuclear Metals Inc., 2229 Main Street, Concord, Massachusetts, dated 28 April.

5. Haley & Aldrich, Inc., 2023b. *100% Design – Site-Wide Sediments and Soils Phase 1 – Courtyard, Landfill, Sphagnum Bog, and Cooling Pond Design, Nuclear Metals Inc., 2229 Main Street, Concord, Massachusetts*. 25 September.

6. U.S. District Court for the District of Massachusetts Eastern Division, 2020. Remedial Design/Remedial Action Consent Decree, Civil Action No. 19-12097-RGS, effective 6 December.

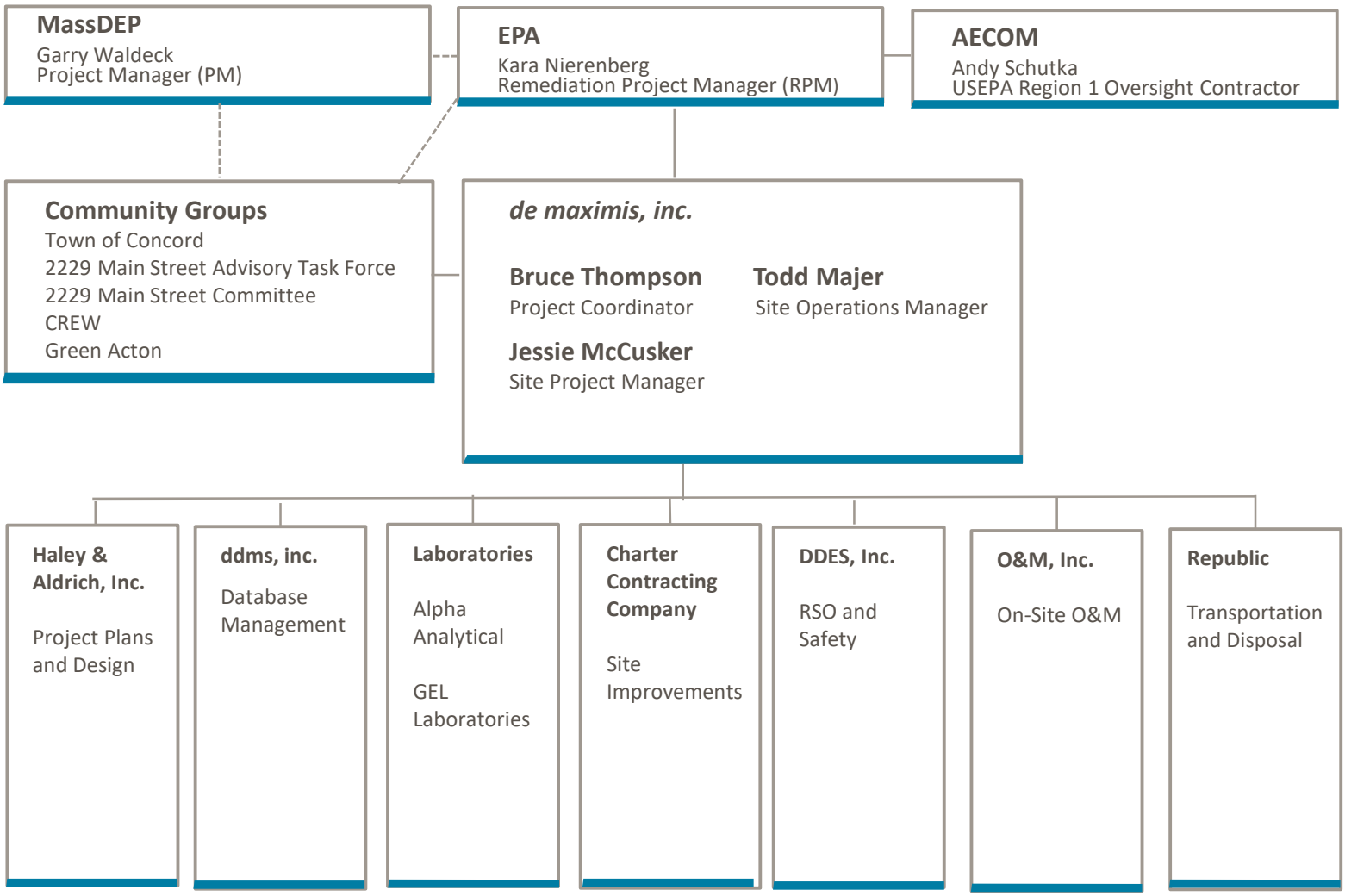
7. U.S. Environmental Protection Agency, 2011. Administrative Settlement Agreement and Order on Consent for Non-Time-Critical Removal Action, Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts, Docket No. CERCLA-01-2011-004 (includes Statement of Work as Appendix C). 9 August.

8. U.S. Environmental Protection Agency, 2015. *Record of Decision (ROD), Nuclear Metals, Inc. Superfund Site, Concord, MA*. September.

9. U.S. Environmental Protection Agency, 2016. Administrative Settlement Agreement and Order on Consent for Non-Time-Critical Removal Action for Groundwater, Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts, Docket No. CERCLA-01-2015-008 (includes Statement of Work as Appendix C). 7 July.

FIGURES

Nuclear Metals, Inc.
Project Team
Organizational Chart



HALEY ALDRICH

NUCLEAR METALS, INC. SUPERFUND SITE
2229 MAIN STREET
CONCORD, MASSACHUSETTS

PROJECT TEAM ORGANIZATION CHART

SCALE: NONE
DECEMBER 2023

FIGURE 1

APPENDIX A
FSP Amendments

HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

TECHNICAL MEMORANDUM

26 September 2022
File No. 131884-004

TO: *de maximis, inc.*
Bruce Thompson

FROM: Haley & Aldrich, Inc.
Mark D. Kelley, P.E., Senior Hydrogeologist
Jay Peters, Senior Associate

SUBJECT: Nuclear Metals, Inc. (NMI)
Amendment to Field Sampling Plan
Perimeter Dust Monitoring
Concord, Massachusetts

The purpose of this Memorandum is to provide a supplement to the Field Sampling Plan (FSP) prepared as part of the Remedial Design Work Plan that was approved by the Environmental Protection Agency (EPA) in September 2020. This supplement is for Dust Monitoring during active construction at the NMI Site. This FSP supplement was prepared for the construction at for Area of Interest (AOI) 8 and AOI 9 and will be reviewed and updated as necessary as construction progresses. The dust monitoring is intended to be perimeter air monitoring as described herein. The dust monitoring action levels were established using a risk-based approach as outlined and documented in Attachment B-1.

FENCE-LINE/WORK AREA PERIMETER MONITORING

The Engineer will monitor air quality at the Fence-line/Work Area Perimeter as described in the RAWP including all soil excavations, building slab removal, and sediment excavation activities.

In no instance shall the airborne dust levels at any location on the perimeter surrounding the Limits of Work exceed the lower of 150 *u*g/cubic meter (*u*g/m^3) measured as PM-10 as defined by 310 CMR 6.04 and the values provided in the Table -1 below (presented by Work Area). It is anticipated that MIE Data RAM Portable Real-Time Aerosol Monitor or and equivalent instrument will be used to monitor the perimeter air to determine dust levels during construction activities. A typical instrument cut-sheet is attached as Attachment B-2 for a DustTrak instrument that is an acceptable instrument.

Based on the available soil and sediment quality data and an evaluation of exposure scenarios, the action levels for dust at the perimeter of the RA work areas are as follows, and when implemented will ensure that receptors outside of the fence-line will not experience unacceptable exposures or risks:

Table 1: *Perimeter Dust Thresholds by Work Area*

Work Area	**Dust***
Holding Basin Area (Earthwork and Containment Wall Construction)	130 µg/m^3
AOI 8 and AOI 9 Courtyard, Landfill, Cooling Water Pond, and Sediment Building Slabs and Building Footprint (Building A-D) and Paved Areas and Islands Identified During Penetrator Hunt Survey and Sampling Building E and All other Areas	150 µg/m^{3**}
* Dust levels at the downwind location are "corrected" by subtracting the upwind dust levels, which represents background ambient air quality, with comparison to the noted criteria. The Contractor shall implement active dust control measures before the dust action level in this table is exceeded. The value in this table represents a stop work threshold that, once exceeded, dust generating activities must stop pending the Contractor's resolution of work practices and dust control measures. Work may continue when the work practices and dust control is corrected to the satisfaction of the SD Representative and Engineer. ** This value represents USEPA's National Ambient Air Quality Standard (NAAQS) for particulates (PM_{10}) and, consequently, dust levels cannot exceed this value during the remedial activities (i.e., the 150 µg/m^3 value is a ceiling dust concentration).	

The SD's Representative or Engineer will conduct continuous quantitative dust monitoring at selected upwind and downwind locations (total of two) to monitor effectiveness of the Contractor's dust control measures for the duration of the earthwork operations. Such quantitative dust monitoring will be conducted during the normal 8-hr. workday, except during wet weather, moist ground conditions, or when construction activities and traffic on exposed ground surfaces are limited such that visible nuisance dust conditions are not evident. The location of the dust monitoring stations will be coordinated with the Contractor. Additional dust monitoring may be required in connection with the Contractor's Health & Safety Plan.

The SOPs and the HASP include instrumentation calibration requirements, a description of the monitoring requirements, and the corresponding action levels. At a minimum, perimeter monitoring stations will be located upwind and downwind of each work area.

DUST AND ODOR CONTROL

Mitigation of dust and odor will be performed in accordance with the Temporary Environmental Controls Specification Section 015719. The QAO will periodically check during intrusive activities involving soil, sediment and/or waste movement that the RAC is actively monitoring for fugitive dust and vapors in the work area and at the Site perimeter and that the RAC is implementing appropriate and effective dust and odor control measures. The QAO will immediately report observations of visible dust or detection of noticeable odors at the Site perimeter to the EOR and the RAC. The QAO will monitor the area after the RAC implements dust and/or odor control measures to confirm the effectiveness of the measures. Mitigation measures will be implemented to reduce perimeter dust if the action level is approached for any remedial area. The following measures will be implemented as necessary:

1. Wet suppression shall be used to provide temporary control of dust. Several applications per day may be necessary to control dust, depending upon meteorological conditions and work activity. The Contractor shall apply we suppression on a routine basis, as necessary or directed by the Engineer, to control dust.
2. The wet suppression equipment shall consist of sprinkler pipelines, tanks, tank trucks, or other devises capable of providing regulated flow, uniform spray and positive shut-off. During freezing temperatures, calcium chloride shall be used for dust suppression if necessary.

The Contractor is responsible for performing dust monitoring for worker protection in accordance with the Specification Section 01 35 29 Health and Safety.

Attachment B-1 – Dust Monitoring Action Level Calculations
Attachment B-2 – Cut-Sheet for DustTrak Instrument

ATTACHMENT B1

Dust Monitoring Action Level Calculations

Development of Dust Monitoring Action Levels

This appendix provides documentation for the derivation of action levels for use in monitoring dust that that may be generated during the remedial activities for soil at the NMI Site.

At a minimum, the USEPA National Ambient Air Quality Standard (NAAQS) value for PM_{10} equal to 150 microgram per cubic meter ($\mu g/m^3$) based on a 24-hour time weighted average (TWA) is required as a dust monitoring action level. The NAAQS PM_{10} represents the maximum permissible concentration of dust that is allowed in the air, regardless of any specific compounds that are within the dust (for example, if clean beach sand was being excavated, the NAAQS PM_{10} of 150 microgram per cubic meter [$\mu g/m^3$] would apply).

If the PM_{10} that is generated from soil at a Site contains chemicals of potential concern (COPCs), then an evaluation must be completed to determine if a PM_{10} concentration of 150 $\mu g/m^3$ is protective of potential exposures to nearby receptors. Based on the outcome of that evaluation, a lower PM_{10} may be proposed as an action level to ensure that risks to nearby receptors remain within acceptable levels. When the concentration of COPCs in the PM_{10} are accounted for, monitoring for PM_{10} is widely accepted as a perimeter air monitoring method. The following subsections describe the methodology that has been used to evaluate whether a PM_{10} concentration of 150 $\mu g/m^3$ is protective as a perimeter air monitoring action level.

APPROACH

To determine whether using the PM_{10} NAAQS as a dust monitoring action level is appropriately protective of potential exposure to the COPCs identified in the Final Human Health Risk Assessment (HHRA; Haley and Aldrich, 2013) during the proposed removal activities, concentrations of the COPCs in air were calculated, hypothetical exposures to the COPCs were quantified, and risks were estimated. If the estimated risks were higher than a cancer risk of 1×10^{-4} or a hazard index of 1, PM10 concentrations protective for lower risks were calculated.

EXPOSURE ASSESSMENT

Air concentrations of COPCs were calculated based on an assumption that the total dust concentration in air at the PM_{10} NAAQS level of 150 $\mu g/m^3$, the COPCs in the soil at exposure areas (EAs) within the Site would become airborne in dust, and that the constituent concentrations in dust would be the same as the constituent concentrations in soil. Predicted dust concentrations were calculated based on the highest of the COPC exposure point concentrations (EPCs) in surface and subsurface soil from the future land use EAs evaluated in the HHRA. The EPCs were divided by the particulate emission factor (PEF) to estimate the airborne particulate concentration. A PEF of 6.67×10^6 cubic meter per kilogram (m^3/kg) was derived for residential receptors based on a dust concentration of 150 $\mu g/m^3$. The highest EPCs in surface and subsurface soil from the future land use EAs and the respective predictive dust concentrations are summarized in Table 1.

The exposure pathway considered in this evaluation was inhalation exposure to COPCs in soil via dust inhalation. The primary receptors exposed to the COPCs in the soil were nearby residents assumed to be present at the perimeter of the Site where removal areas have been identified, for the duration of removal activities. For the evaluation of inhalation exposures, the exposure duration was assumed to be 6 years of onsite soil removal activity for an exposure time of 8 hours per day and an exposure frequency of 350 days per year. The six years of exposure was assumed to occur to a young child (ages 1

through 6). This provides a conservative estimate of potential exposures because excavation activities are anticipated to occur fewer than 350 days per year, and the dust action level will be applied at the edge of the excavation areas, meaning that actual dust concentrations at the site perimeter will be lower than at the edge of the excavations.

RISK CHARACTERIZATION

Calculating child resident's exposure is a common and conservative approach to represent risks for residential exposures. Hence, the non-cancer hazard index (HI) and the incremental lifetime excess cancer risk (ILECR) for child receptors were calculated using the following approach:

- Risk and Hazard Index Calculation for dust inhalation: Cancer risks associated with the inhalation of airborne particulates of COPCs, except uranium and thorium, in soil were calculated by multiplying the dust inhalation exposure concentration (EC) with the inhalation unit risk (IUR), as presented below:

  $$EC\ (\mu g/m^3)\ X\ IUR\ (\mu g/m^3)^{-1} = ELCR \qquad (Equation\ 1)$$

  The calculated value is an Excess Lifetime Cancer Risk (ELCR) and represents an upper bound of the probability of an individual developing cancer over a lifetime as the result of exposure to a COPC. Chemical-specific ELCR values were then summed for all COPCs to produce a total ELCR. ECs and ELCRs associated with the carcinogenic effects of the COPCs in the dust at the Site are presented in Table 2 and 4, respectively.

  Non- cancer hazards associated with the inhalation of airborne particulates of COPCs, in soil are calculated by dividing the dust inhalation EC by its reference concentration (RfC), as presented below:

  $$EC\ (\mu g/m^3)\ /\ RfC\ (\mu g/m^3) = HQ \qquad (Equation\ 2)$$

  The calculated value is a hazard quotient (HQ). Chemical-specific HQs were then summed for all COPCs to produce a hazard index (HI). ECs and HIs associated with non-carcinogenic effects of the COPCs in the dust at the Site are presented in Table 3 and 6, respectively.

- Risk Calculation for inhalation exposure to uranium and thorium: Methodology for calculating carcinogenic risks associated with the radionuclides, specifically uranium, thorium, and their isotopes, was presented in the final HHRA (Haley and Aldrich, 2013) and assumed an exposure time of 18 hours per day, an exposure frequency of 161 days per year, and a PEF of 3.35×10^6 m^3/kg. The risks associated with uranium and thorium at a PM_{10} of 150 $\mu g/m^3$ and the highest soil EPCs were derived using an equality that accounts for the differences in the PEFs and receptor exposure assumptions between the HHRA and those applied to evaluation of the dust monitoring action level. Following equation was used for calculating the radionuclide inhalation exposure concentration in the final HHRA (Haley and Aldrich, 2013):

  $$[EPC_i\ X\ 1/PEF\ (m^3/kg)\ X\ 1000\ (g/kg)\ X\ IR\ X\ EF\ X\ ET\ X\ ED]\ X\ IUR = ELCR \qquad (Equation\ 3)$$

  In the final HHRA (Haley and Aldrich, 2013), the highest EPCs for uranium (793 mg/kg) and thorium (7.35 mg/kg) resulted in ELCRs of 8E-9 and 4-10, respectively. Assuming all other exposure factors for exposure to the radionuclides at the Site for residential receptors are the same, ELCRs for uranium and thorium are calculated as follows:

$$8E\text{-}9 / [(161 \times 18)/3.35E+06] = ELCR_{uranium} / [(350 \times 8)/6.67E+06] \text{ and}$$

$$4E\text{-}10 / [(161 \times 18)/3.35E+06] = ELCR_{thorium} / [(350 \times 8)/6.67E+06]$$

For this evaluation, ELCR for uranium and thorium were calculated using the equality presented above, and the calculations are presented in Table 5.

RISK AND HAZARD RESULTS

HI and ELCR values were compared to acceptable risk levels established in the National Contingency Plan (NCP; USEPA, 1990). According to the NCP and USEPA (1991) guidance "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," USEPA uses an HI of unity (i.e., 1) and a 10^{-4} (one in ten thousand) to 10^{-6} (one in one million) risk range as a "target range" within which the USEPA strives to manage risks as part of a Superfund cleanup.

The cumulative ELCR of 5×10^{-6} is within the "target range" for the offsite child resident that may potentially have indirect exposure to the onsite COPCs from inhalation of dust. Total HI of 2 is above the target HI of 1, with manganese as the highest contributor with HQ of 1.6.

MANGANESE HAZARD

A soil concentration of 1,043 mg/kg manganese was calculated for a target HQ of 1, assuming an exposure duration of 6 years, an exposure time of 8 hours per day, an exposure frequency of 350 days per year, and total dust concentration in air at the PM_{10} NAAQS level of 150 µg/m^3. This manganese concentration in soil, for target HQ of 1 was then compared with the manganese EPCs in all future land use EAs. Two future land use EAs were identified where the EPCs for manganese were above the calculated manganese concentration of 1,043 mg/kg in soil for the target HQ of 1: Future A-8 (AOI 14-Off-property) and Future B5 (AOI 1-Holding Basin). The Future A-8 area is not an area where soil remediation is required because the risks calculated in the HHRA were within acceptable levels. Therefore, a corresponding dust concentration for a target HQ of 1 was estimated for Future B-5, as presented in the table below:

Soil Depth Interval	Exposure Area	Manganese EPC (mg/kg)	Dust Concentration Level (µg/m^3)
Subsurface Soil	Future B5- AOI 1 Holding Basin	1,180	133

SUMMARY

These results indicate that the NAAQS PM10 value is protective for the Site COPCs for all future land use EAs except B5. Therefore, an Action Level for PM10 of 150 µg/m^3, equal to the NAAQS for PM10, is protective of potential exposure to Site COPCs which could become airborne during removal activities and is appropriate as a perimeter air monitoring action level for the Site for all remediation areas except the Holding Basin. For the Holding Basin, a dust monitoring action level of 133 µg/m^3 is protective of potential exposure to Site COPCs which could become airborne during removal activities.

References

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2. USEPA. 1989. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. December 1989. EPA/540/1-89/002.

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Enclosures:

Table 1 – Soil and Predicted Outdoor Air Concentrations for Chemicals of Potential Concern: On-Site Receptors
Table 2 – Exposure Concentrations and Chronic Daily Intakes for Carcinogenic Chemicals of Potential Concern in Dust: Residents
Table 3 – Exposure Concentrations and Chronic Daily Intakes for Noncarcinogenic Chemicals of Potential Concern in Dust: Residents
Table 4 – Estimated ILECRs for Chemicals of Potential Concern in Dust: Residents
Table 5 – Estimated ILECRs for Uranium and Thorium from External Exposure to Ionizing Radiation: Residents
Table 6 – Estimated Noncancer HQs/His for Chemicals of Potential Concern in Dust: Residents

TABLES

TABLE 1
SOIL AND PREDICTED OUTDOOR AIR CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN : ON-SITE RECEPTORS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Soil Exposure Point Concentration (mg/kg) [a]	Outdoor Airborne Particulate Exposure Point Concentration [a] (mg/m^3) [b]
Volatile Organic Compounds		
Tetrachloroethene (PCE)	9.3E-04	1.4E-10
Trichloroethene	6.1E-01	9.2E-08
Polycyclic Aromatic Hydrocarbons		
Benzo(a)anthracene	2.1E+00	3.2E-07
Benzo(a)pyrene	2.2E+00	3.4E-07
Benzo(b)fluoranthene	3.5E+00	5.2E-07
Benzo(k)fluoranthene	4.7E-01	7.0E-08
Indeno(1,2,3-cd)pyrene	1.0E+00	1.5E-07
Total Petroleum Hydrocarbons		
TPH (C11-C22) Aromatic	1.8E+02	2.6E-05
Metals		
Aluminum	1.3E+04	1.9E-03
Antimony	1.0E+00	1.5E-07
Arsenic	1.8E+01	2.7E-06
Beryllium	3.5E+00	5.2E-07
Chromium (total)	2.7E+01	4.1E-06
Cobalt	5.6E+00	8.4E-07
Copper	4.6E+02	7.0E-05
Iron	2.0E+04	2.9E-03
Lead	4.9E+01	7.4E-06
Manganese	1.7E+03	2.5E-04
Mercury (inorganic)	3.7E-01	5.5E-08
Molybdenum	1.5E+02	2.2E-05
Thallium	1.5E+00	2.3E-07
Thorium	7.3E+00	1.1E-06
Titanium	7.3E+02	1.1E-04
Tungsten	2.3E+01	3.5E-06
Uranium, soluble salts	7.9E+02	1.2E-04
Vanadium	3.1E+01	4.7E-06
Zirconium	1.9E+01	2.8E-06
Polychlorinated Biphenyls		
Aroclor-1254 (PCB-1254)	1.8E+01	2.7E-06
Aroclor-1260 (PCB-1260)	2.8E+01	4.3E-06

TABLE 1
SOIL AND PREDICTED OUTDOOR AIR CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN : ON-SITE RECEPTORS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Soil Exposure Point Concentration (mg/kg) [a]	Outdoor Airborne Particulate Exposure Point Concentration [a] (mg/m^3) [b]
Semi-Volatile Organic Compounds		
Carbazole	2.7E-01	4.0E-08

Abbreviations:
bgs = Below ground surface
m^3/kg = Cubic meters per kilogram
mg/kg = Milligrams per kilogram
mg/m^3 = Milligrams per cubic meter

Notes:
[a] Highest exposure point concentration (EPC) between surface and subsurface soil for future land use EAs is selected as the EPC for this evaluation.
[b] Outdoor airborne particulate concentration is calculated by dividing the soil EPCs by the particulate emission factor (PEF). For residential receptors, a PEF of 6.7×10^6 m^3/kg was estimated for a dust concentration of 150 $\mu g/m^3$.

TABLE 2
EXPOSURE CONCENTRATIONS AND CHRONIC DAILY INTAKES FOR CARCINOGENIC CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future On-Site Resident, Child
	Soil Pathway
	EC: Particulate Inhalation (mg/m^3)
Volatile Organic Compounds	
Tetrachloroethene (PCE)	3.8E-12
Trichloroethene	3.3E-09
Polycyclic Aromatic Hydrocarbons	
Benzo(a)anthracene	4.6E-08
Benzo(a)pyrene	4.9E-08
Benzo(b)fluoranthene	7.6E-08
Benzo(k)fluoranthene	1.0E-08
Indeno(1,2,3-cd)pyrene	2.2E-08
Total Petroleum Hydrocarbons	
TPH (C11-C22) Aromatic	NC
Metals	
Aluminum	NC
Antimony	NC
Arsenic	7.5E-08
Beryllium	1.4E-08
Chromium (total)	NC
Cobalt	2.3E-08
Copper	NC
Iron	NC
Lead	NA
Manganese	NC
Mercury (inorganic)	NC
Molybdenum	NC
Thallium	NC
Thorium	NA
Titanium	NC
Tungsten	NC
Uranium, soluble salts	NA
Vanadium	NC
Zirconium	NC
Polychlorinated Biphenyls	
Aroclor-1254 (PCB-1254)	7.5E-08
Aroclor-1260 (PCB-1260)	1.2E-07

TABLE 2
EXPOSURE CONCENTRATIONS AND CHRONIC DAILY INTAKES FOR CARCINOGENIC CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future On-Site Resident, Child
	Soil Pathway
	EC: Particulate Inhalation (mg/m^3)
Semi-Volatile Organic Compounds	
Carbazole	NC

Abbreviations:
bgs = Below ground surface
EC = Exposure concentration
mg/m^3 = Milligrams per cubic meter
NA = Not applicable.
NC = Not considered a carcinogen

TABLE 3

EXPOSURE CONCENTRATIONS AND CHRONIC DAILY INTAKES FOR NONCARCINOGENIC CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS

NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future on-Site Resident, Child
	Soil Pathway
	EC: Particulate Inhalation (mg/m^3)
Volatile Organic Compounds	
Tetrachloroethene (PCE)	4.5E-11
Trichloroethene	2.9E-08
Polycyclic Aromatic Hydrocarbons	
Benzo(a)anthracene	NA
Benzo(a)pyrene	1.1E-07
Benzo(b)fluoranthene	NA
Benzo(k)fluoranthene	NA
Indeno(1,2,3-cd)pyrene	NA
Total Petroleum Hydrocarbons	
TPH (C11-C22) Aromatic	NA
Metals	
Aluminum	6.1E-04
Antimony	4.8E-08
Arsenic	8.7E-07
Beryllium	1.7E-07
Chromium (total)	NA
Cobalt	2.7E-07
Copper	NA
Iron	NA
Lead	na
Manganese	8.0E-05
Mercury (inorganic)	1.8E-08
Molybdenum	7.0E-06
Thallium	NA
Thorium	NA
Titanium	NA
Tungsten	NA
Uranium, soluble salts	3.8E-05
Vanadium	1.5E-06
Zirconium	NA
Polychlorinated Biphenyls	
Aroclor-1254 (PCB-1254)	NA
Aroclor-1260 (PCB-1260)	NA

TABLE 3

EXPOSURE CONCENTRATIONS AND CHRONIC DAILY INTAKES FOR NONCARCINOGENIC CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS

NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future on-Site Resident, Child
	Soil Pathway
	EC: Particulate Inhalation (mg/m^3)
Semi-Volatile Organic Compounds	
Carbazole	NA

Abbreviations:

bgs = Below ground surface
EC = Exposure concentration
mg/m^3 = Milligrams per cubic meter
NA = Not applicable or no toxicity value available for inhalation pathway.

TABLE 4
ESTIMATED ILECRS FOR CHEMICALS OF POTENTIAL CONCERN IN DUST:
RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical		Hypothetical Future on-Site Resident, Child	
		Soil Pathway	
		Particulate Inhalation	Cumulative ILECR
Volatile Organic Compounds			
Tetrachloroethene (PCE)		9.9E-16	9.9E-16
Trichloroethene		1.3E-11	1.3E-11
Polycyclic Aromatic Hydrocarbons			
Benzo(a)anthracene		2.8E-09	2.8E-09
Benzo(a)pyrene		3.0E-08	3.0E-08
Benzo(b)fluoranthene		4.6E-09	4.6E-09
Benzo(k)fluoranthene		6.2E-11	6.2E-11
Indeno(1,2,3-cd)pyrene		1.3E-09	1.3E-09
Total Petroleum Hydrocarbons			
TPH (C11-C22) Aromatic		NC	NC
Metals			
Aluminum		NC	NC
Antimony		NC	NC
Arsenic		3.2E-07	3.2E-07
Beryllium		3.4E-08	3.4E-08
Chromium (total)		NC	NC
Cobalt		2.1E-07	2.1E-07
Copper		NC	NC
Iron		NC	NC
Lead		NA	NA
Manganese		NC	NC
Mercury (inorganic)		NC	NC
Molybdenum		NC	NC
Thallium		NC	NC
Thorium	[a]	1.9E-07	1.9E-07
Titanium		NC	NC
Tungsten		NC	NC
Uranium, soluble salts	[a]	3.9E-06	3.9E-06
Vanadium		NC	NC
Zirconium		NC	NC
Polychlorinated Biphenyls			
Aroclor-1254 (PCB-1254)		4.3E-08	4.3E-08
Aroclor-1260 (PCB-1260)		6.6E-08	6.6E-08

TABLE 4
ESTIMATED ILECRS FOR CHEMICALS OF POTENTIAL CONCERN IN DUST:
RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future on-Site Resident, Child	
	Soil Pathway	
	Particulate Inhalation	Cumulative ILECR
Semi-Volatile Organic Compounds		
Carbazole	NC	NC
Cumulative ILECR	**4.8E-06**	**5E-06**

Abbreviations:
bgs = Below ground surface
ILECR = Incremental lifetime excess cancer risk
NA = Not applicable.
NC = Not considered a carcinogen.

Notes:
[a] Inhalation risks for uranium and thorium are calculated in Table 5.

TABLE 5
ESTIMATED ILECRS FOR URANIUM AND THORIUM FROM EXTERNAL EXPOSURE TO IONIZING RADIATION: RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

For Exposure factors:	**EF=161 days/yr; ET=18 hrs/day; PEF=3.35E+09 m^3/kg**
	ILCR
Uranium (EPC = 793 mg/kg)	8E-09
Thorium (EPC = 7.35 mg/kg)	4E-10

For Exposure factors:	**EF=350 days/yr; ET=8 hours/day; PEF = 6.67E+06 m^3/kg**
	ILCR
Uranium (EPC = 793 mg/kg)	4E-06
Thorium (EPC = 7.35 mg/kg)	2E-07

Abbreviations:

days/yr = Days per year
EF = Exposure frequency
ET = Exposure time
hrs/day = Hours per day
m^3/kg = Meters cubed per kilogram
PEF = Particulate emission factor

TABLE 6
ESTIMATED NONCANCER HQS/HIS FOR CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future on-Site Resident, Child	
	Soil Pathway	
	Particulate Inhalation	Total Hazard Index
Volatile Organic Compounds		
Tetrachloroethene (PCE)	1.1E-09	1.1E-09
Trichloroethene	1.5E-05	1.5E-05
Polycyclic Aromatic Hydrocarbons		
Benzo(a)anthracene	NA	NA
Benzo(a)pyrene	5.4E-02	5.4E-02
Benzo(b)fluoranthene	NA	NA
Benzo(k)fluoranthene	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA
Total Petroleum Hydrocarbons		
TPH (C11-C22) Aromatic	NA	NA
Metals		
Aluminum	1.2E-01	1.2E-01
Antimony	1.6E-04	1.6E-04
Arsenic	5.8E-02	5.8E-02
Beryllium	8.3E-03	8.3E-03
Chromium (total)	NA	NA
Cobalt	4.5E-02	4.5E-02
Copper	NA	NA
Iron	NA	NA
Lead	NA	NA
Manganese	1.6E+00	1.6E+00
Mercury (inorganic)	5.9E-05	5.9E-05
Molybdenum	3.5E-03	3.5E-03
Thallium	NA	NA
Thorium	NA	NA
Titanium	NA	NA
Tungsten	NA	NA
Uranium, soluble salts	4.5E-02	4.5E-02
Vanadium	1.5E-02	1.5E-02
Zirconium	NA	NA
Polychlorinated Biphenyls		
Aroclor-1254 (PCB-1254)	NA	NA
Aroclor-1260 (PCB-1260)	NA	NA

TABLE 6
ESTIMATED NONCANCER HQS/HIS FOR CHEMICALS OF POTENTIAL CONCERN IN DUST: RESIDENTS
NUCLEAR METALS, INC. SUPERFUND SITE
CONCORD, MASSACHUSETTS

Chemical	Hypothetical Future on-Site Resident, Child	
	Soil Pathway	
	Particulate Inhalation	Total Hazard Index
Semi-Volatile Organic Compounds		
Carbazole	NA	NA
Total Hazard Index	**1.95E+00**	**2.0E+00**

Abbreviations:
bgs = Below ground surface
NA = Not applicable or no toxicity value available for inhalation pathway.

ATTACHMENT B2

Cut-Sheet for DustTrak Instrument

Knowledge Beyond Measure.

DustTrak™ DRX Aerosol Monitors

Models 8533, 8533EP and 8534

Only DustTrak™ DRX Aerosol Monitors can simultaneously measure both mass and size fraction—no other monitor can do both.

DustTrak™ DRX monitors are battery-operated, data-logging, light-scattering laser photometers that give you real-time aerosol mass readings. They use a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance. From desktop with external pump models to a handheld model, the DustTrak DRX offers a suitable solution for harsh industrial workplaces, construction and environmental sites and other outdoor applications, as well as clean office settings. DustTrak DRX monitors measure aerosol contaminants such as dust, smoke, fumes and mists.

Features and Benefits

All Models

- Real-time mass concentration and size fraction readings, as well as data-logging allow for data analysis during and after sampling.
- Simultaneously measure size-segregated mass fraction concentrations corresponding to PM1, PM2.5, Respirable,PM10, and Total PM size fractions
- Easy-to-use graphical user interface with color touch-screen for effortless operation

Handheld Model (8534)

- Long life internal pump for continuous sampling
- Single-point data collection for walk through surveys
- Lightweight design with ergonomic handle for portable applications

Desktop Models (8533 and 8533EP)

- Energy-efficient, long lasting external pump for continuous, unattended, 24/7, outdoor monitoring applications (Model 8533EP only)
- Long life internal pump for shorter work-shift or IAQ sampling applications (Model 8533)
- Gravimetric reference sampling capability for custom reference calibrations
- Automatic zeroing (with optional zero module) to minimize the effect of zero drift
- STEL alarm setpoint for tracking 15-minute average mass concentrations
- Standard and advanced calibration capabilities for consistent accuracy
- Environmental protected and tamper-proof secure (with an optional environmental enclosure)
- Inlet sample conditioning (with optional heated inlet sample conditioner) to reduce the effect of humidity on photometric mass measurements (for use with an environmental enclosure)
- Cloud Data Management System hosted by Netronix™

Unsurpassed Technology and Performance
DustTrak™ DRX monitors are laser photometers that simultaneously measure five size segregated mass fraction concentrations at once—something no other monitor can do. The desktop, desktop with external pump and handheld monitors are continuous, real-time, 90°, light-scattering laser photometers that simultaneously measure size-segregated mass fraction concentrations corresponding to PM1, PM2.5, Respirable, PM10, and Total PM fractions. They combine both particle cloud (total area of scattered light) and single particle detection to achieve mass fraction measurements.

This size-segregated mass fraction measurement technique is superior to either a basic photometer or optical particle counter (OPC). It delivers the mass concentration of a photometer and the size resolution of an OPC. Typically, photometers can be used at high mass concentration, but they do not give any size information (unless used with size selective inlet conditioners) and significantly underestimate large particle mass concentrations. OPC's provide size and count information; however, they do not provide any mass concentration information and cannot be used in high mass concentration environments. The DustTrak™ DRX can do both.

Handheld Models: Perfect for Walk-Through Surveys and Single-Point Data Collection Applications
The DustTrak™ DRX handheld Model 8534 is lightweight and portable. It is perfect for industrial hygiene surveys, point source location monitoring, indoor air quality investigations, engineering control evaluations/validation, and for baseline trending and screening. Like the desktop models, it has manual and programmable data logging functions. In addition, the handheld model also has a single-point data logging capability for walk-through industrial hygiene surveys and indoor air quality investigations.

Desktop Models: Ideal for Long-Term Surveys and Remote Monitoring Applications
The DustTrak DRX is also offered as a standard desktop (Model 8533), as well as a desktop with external pump (Model 8533EP.) Both models have manual and programmable data logging functions, making them ideal for unattended applications. The standard desktop model is most suitable for indoor, continuous monitoring, while the desktop with external pump is designed for 24/7 unattended, remote monitoring outdoors.

The DustTrak DRX desktop models come with USB (device and host), Ethernet, and analog and alarm outputs allowing remote access to data. User adjustable alarm setpoints for instantaneous or 15-minute short-term excursion limit (STEL) are also available on desktop models. The alarm output with user-defined setpoint alerts you when upset or changing conditions occur.

The DustTrak DRX Desktop Monitors have several unique features:

- External pump (Model 8533EP) with low power consumption for continuous, unattended monitoring in remote outdoor locations.
- Gravimetric sampling capability using a 37-mm filter cassette which can be inserted in-line with the aerosol stream allowing you to perform an integral gravimetric analysis for custom reference calibrations.
- Zeros automatically using the external zeroing module. This optional accessory is used when sampling over extended periods of time. By zeroing the monitor during sampling, the effect of zero drift is minimized.
- STEL alarm feature for tracking 15-minute average mass concentrations when alarm setpoint has been reached for applications like monitoring fugitive emissions at hazardous waste sites.
- Provide for environmental protection and tamper-proof security using an environmental enclosure. This optional accessory encloses the instrument within a waterproof, lockable, custom-designed case.
- Condition the sample air stream before entering the instrument optics using a heated inlet sample conditioner (designed for use with the environmental enclosure.) This optional accessory is used in humid environments. By conditioning the sample, the humidity and water vapor are minimized.
- Standard and advanced calibration capabilities. The DustTrak DRX Aerosol Monitor has two calibration factors: a photometric calibration factor (PCF) and a size calibration factor (SCF). The PCF accounts for the photometric response difference between A1 Test Dust and the aerosol under measurement, while the SCF accounts for the aerodynamic size difference.
  - The primary goal of the standard calibration is to obtain the SCF for the aerosol of interest. The standard calibration process is very easy and does not require comparison to gravimetric samples. Measure with and without a PM2.5 impactor, and the instrument takes the ratio of these two size distributions and compares this reading to the PM2.5 impactor transmission efficiency curve to calculate the SCF. However, the absolute mass concentration may not be as accurate as the advanced calibration.
  - The advanced calibration method yields high size segregated mass concentration accuracy. It involves two separate gravimetric measurements to obtain PCF and SCF in sequence. The advanced calibration will accurately measure size segregated mass concentrations.

Applications	Desktop	Handheld
Aerosol research studies	▪	▪
Baseline trending and screening	▪	▪
Engineering control evaluations		▪
Engineering studies		▪
Epidemiology studies	▪	▪
Indoor air quality investigations	▪	▪
Industrial/occupational hygiene surveys	▪	▪
Point source monitoring		▪
Outdoor environmental monitoring	▪	
Process monitoring	▪	▪
Remote monitoring	▪	

DustTrak™ DRX Aerosol Monitor Features

All Models

- Li-Ion rechargeable batteries
- Internal and external battery charging capabilities
- Outlet port for isokinetic sampling applications
- User serviceable sheath flow and pump filters
- Logged test pause and restart feature
- Logged test programming
  - Color touch screen—either manual mode or program mode
  - TRAKPRO™ Data Analysis Software via a PC
- User adjustable custom calibration settings
- Instantaneous alarm settings with visual and audible warnings
- Real-time graph display
- View statistical information during and after sampling
- On-screen instrument status indicators: FLOW, LASER and FILTER
- Filter service indicator for user preventative maintenance

Desktop Models (8533 and 8533EP)

- Long life external pump (8533EP)
- Internal pump (8533)
- Hot swappable batteries
- Gravimetric reference sample capability
- STEL alarm setpoint

Optional Accessories

- Auto zeroing module
- Protective environmental enclosure (8535)
- Heated inlet sample conditioner (for use with an environmental enclosure)
- Cloud Data Management System as hosted by Netronix™

Handheld Model (8534)

- Long life internal pump
- Single-point data collection for walk through surveys

Easy to Program and Operate

The graphical user interface with color touch-screen puts everything at your fingertips. The easy-to-read display shows real-time mass concentration and graphical data, as well as other statistical information along with instrument pump, laser and flow status, and much more. Perform quick walk-through surveys or program the instrument's advanced logging modes for long-term sampling investigations. Program start times, total sampling times, logging intervals, alarm setpoints and many other parameters. You can even set up the instrument for continuous unattended operation.

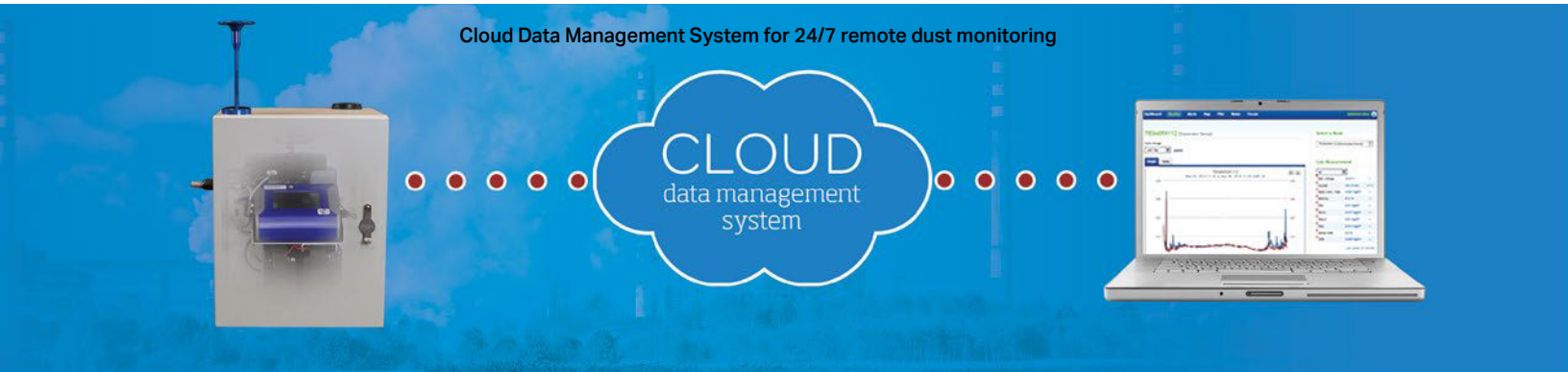
TrakPro™ Software Makes Monitoring Easier than Ever

TrakPro™ Data Analysis Software allows you to set up and program directly from a PC. It even features the ability for remote programming and data acquisition from your PC via wireless communication options or over an Ethernet network. As always, you can print graphs, raw data tables, and statistical and comprehensive reports for recordkeeping purposes.

Battery Performance		
Models 8533 and 8533EP (Typical) 6600 mAH Li-Ion Battery Pack (P/N 801680)	1 Battery	2 Batteries
Battery runtime (hours)	Up to 6	Up to 12
Charge time* (hours) in DustTrak™	4	8
Charge time* (hours) in external battery charger (P/N 801685)	4	8

Model 8534 (Typical) 3600 mAH Li-Ion Battery Pack (P/N 801681)	Battery
Battery runtime (hours)	Up to 6
Charge time* (hours) in DustTrak™	4
Charge time* (hours) in external battery charger (P/N 801686)	4

*Of a fully depleted battery



Specifications

DustTrak™ DRX Aerosol Monitors

Models 8533, 8533EP and 8534

Sensor Type

90° light scattering

Particle Size Range

0.1 to 15 µm

Aerosol Concentration Range

8533 Desktop	0.001 to 150 mg/m^3
8533EP Desktop with External Pump	0.001 to 150 mg/m^3
8534 Handheld	0.001 to 150 mg/m^3

Display

Size Segregated Mass Fractions for PM1, PM2.5, Respirable, PM10 and Total. All displayed

Resolution

±0.1% of reading or 0.001 mg/m^3, whichever is greater

Zero Stability

±0.002 mg/m^3 per 24 hours at 10 sec time constant

Flow Rate

3.0 L/min

Flow Accuracy

±5% of factory set point, internal flow controlled

Temperature Coefficient

+0.001 mg/m^3 per °C

Operational Temp

32 to 120°F (0 to 50°C)

Storage Temp

-4 to 140°F (-20 to 60°C)

Operational Humidity

0 to 95% RH, non-condensing

Time Constant

User adjustable, 1 to 60 seconds

Data Logging

5 MB of on-board memory (>60,000 data points)

45 days at 1 minute logging interval

Log Interval

User adjustable, 1 second to 1 hour

Physical Size (H x W x D)

Handheld	4.9 x 4.8 x 12.5 in. (12.5 x 12.1 x 31.6 cm)
Desktop	5.3 x 8.5 x 8.8 in. (13.5 x 21.6 x 22.4 cm)
External Pump	4.0 x 7.0 x 3.5 in. (10.0 x 18.0 x 9.0 cm)

Weight

Handheld	2.9 lb (1.3 kg), 3.3 lb (1.5 kg) with battery
Desktop	3.5 lb (1.6 kg), 4.5 lb (2.0 kg) – 1 battery, 5.5 lb (2.5 kg) – 2 batteries
External Pump	3.0 lb (1.4 kg)

Communications

8533	USB (host and device) and Ethernet. Stored data accessible using flash memory drive
8533EP	USB (host and device) and Ethernet. Stored data accessible using flash memory drive plus, cable assembly for external pump
8534	USB (host and device). Stored data accessible using flash memory drive

Power–AC

Switching AC power adapter with universal line cord included,115–240 VAC

Analog Out

8533/8533EP	User selectable output, 0 to 5 V or 4 to 20 mA. User selectable scaling range

Alarm Out

8533/8533EP	Relay or audible buzzer Relay Non-latching MOSFET switch ▪ User selectable set point ▪ –5% deadband ▪ Connector 4-pin, Mini-DIN connectors
8534	Audible buzzer

Screen

8533/8533EP	5.7 in. VGA color touchscreen
8534	3.5 in. VGA color touchscreen

Gravimetric Sampling

8533/8533EP	Removable 37 mm cartridge (user supplied)

CE Rating

Immunity	EN61236-1:2006
Emissions	EN61236-1:2006

Specifications are subject to change without notice.

Knowledge Beyond Measure.

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USA	Tel: +1 800 874 2811	**India**	Tel: +91 80 67877200
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France	Tel: +33 1 41 19 21 99	**Singapore**	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		

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HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

TECHNICAL MEMORANDUM

11 November 2022
File No. 131884-004

TO: *de maximis, inc.*
Bruce Thompson

FROM: Haley & Aldrich, Inc.
Mark D. Kelley, P.E., Senior Hydrogeologist
Maris Mann-Stadt, Senior Technical Specialist

SUBJECT: Nuclear Metals, Inc. (NMI)
Amendment to Field Sampling Plan
On-Site Field Laboratory
Concord, Massachusetts

The purpose of this Memorandum is to provide a supplement to the Field Sampling Plan (FSP) prepared as part of the Remedial Design Work Plan that was approved by the Environmental Protection Agency (EPA) in September 2020. This supplement is for the use of an on-Site field laboratory during active construction at the NMI Site (Site) and was prepared for the construction of Area of Interest (AOI) 8 and AOI 9. This document will be reviewed and updated as necessary as construction progresses.

The use of the on-Site lab is intended as a screening tool during confirmation sampling, as described herein, and not a substitute for final analytical confirmation sample analyses.

USE OF ON-SITE LABORATORY FOR SCREENING PURPOSES

A Perkin Elmer Avio 200 ICP Optical Emission Spectrometer (ICP OES) will be operated on-Site by Decontamination Decommissioning and Environmental Services, LLC (DDES) as a screening tool during remedial activities. Confirmatory samples collected during excavation activities will be analyzed in the on-Site laboratory for uranium and concentrations will then be compared to the uranium Remedial Action Level (RAL). Attachment E1 includes the bottom and sidewall RALs for the proposed AOI-8 and AOI-9 limits of excavation. Confirmatory soil samples with concentrations above RALs will be indicative of areas that require additional excavation. In areas requiring additional excavation, the excavations will advance, and new confirmatory samples will be collected, analyzed on-Site for uranium, and compared to the RALs. The process will be repeated until the confirmatory sampling results do not exceed RALs. Once confirmatory soil samples meet the uranium RALs using the on-Site lab, the confirmatory samples will be submitted for analysis of the relevant contaminants of concern (COCs) at the relevant off-Site laboratory.

ON-SITE LABORATORY DESCRIPTION

The on-Site ICP OES will be housed in a trailer separate from other field activities. Use of the ICP OES during AOI 8 and AOI 9 work is considered a pilot program and as such, the on-Site analytical process may continue to evolve and be updated. A description of the current on-Site analytical process is included as Attachment E2: AVIO-220 ICP-OES Operation Manual, Procedure No: LP-NMI-005.

The detection limit (DL) for any ICP-OES system analyzing Uranium is 10 parts per billion (ppb). However, the sample matrix will affect the DL and on-Site calibration is required to verify the true Site-related DL. This work is ongoing and updates to the reporting limit will be included in future versions of the AVIO-220 ICP-OES Operation Manual, Procedure No: LP-NMI-005.

An overview of a Perkin Elmer Avio ICP Optical Emission Spectrometer (OES) is included as Attachment E3 for the.

Attachment E1 – Remedial Action Limits for Uranium
Attachment E2 – AVIO 220 ICP-OES Operation Manual, Procedure No: LP-NMI-005
Attachment E3 – Avio® ICP Optical Emission Spectrometer Overview

ATTACHMENT E1

Remedial Action Limits for Uranium

Attachment E1 *(CQAP Table C1)*
Remedial Action Levels for Uranium
Nuclear Metals
Concord, Massachusetts
File No. 131884

Excavation Area	Confirmatory Samples and Remedial Action Levels					
	Bottom (number samples)	RAL (mg/kg) [a]	Rationale	Sidewall (number samples)	RAL (mg/kg) [a]	Rationale
AOI 8 [b]	62	4.0	Highest that can remain in all bottom confirmatory samples and achieve residual EPC that does not exceed cleanup goal	28	6.4	Highest concentration in samples bordering exposure area
AOI 9 [c]	16	2.7	Cleanup goal; highest anticipated to remain based on design cut lines is 1.9 mg/kg	12	3.6	Highest concentration in samples bordering exposure area

ABBREVIATIONS AND NOTES:
mg/kg: milligram per kilogram
RAL - Remedial Action Level
[a] RALs are identified in the CQAP, Appendix C of the 100% AOI 8 and AOI 9 Remedial Design, Attachment C-1, Part 2.
[b] Numbers of bottom and sidewall samples are defined by the confirmatory soil sampling grids (Figure C-4) of the CQAP.
[c] Numbers of bottom and sidewall samples are defined by the confirmatory soil sampling grids (Figure C-5) of the CQAP.

ATTACHMENT E2

AVIO 220 ICP-OES Operation Manual, Procedure No: LP-NMI-005

de maximis, inc.

200 Day Hill Road
Suite 200
Windsor, CT 06095
(860) 298-0541
(860) 298-0561 FAX

January 26, 2023

Ms. Kara Nierenberg, PE
Remedial Project Manager
U.S. Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100
Mail Code OSRR 07-4
Boston, MA 02109-3912

Subject: Nuclear Metals, Inc. Site, Concord, Massachusetts
Responses to Comments on AOI 8 & 9 Remedial Action Work Plan

Dear Ms. Nierenberg:

Attached please find additional responses to EPA's December 13, 2022 comments on the AOI 8 & 9 Remedial Action Work Plan submitted in accordance with Section 4.1 of the Statement of Work attached as Appendix B to the Consent Decree (CD) (Civil Action No. 1:19-cv-12097-RGS) for the Remedial Design / Remedial Action (RD/RA).

A Response to Comments (RTC) was submitted on December 27, 2022 with the understanding that DDES would prepare an updated Standard Operating Procedure (SOP) for the on-site Inductively Coupled Plasma (ICP) analysis for total uranium and include the determination of the Method Detection Limit.

We have included the previous RTC and have added the additional responses (in red) and also attached the aforementioned SOP LP-NMI-005 Preparation of Soil and Samples and Analysis with AVIO-220 ICP-OES for the on-site laboratory analysis for total uranium. This also includes a determination of the Method Detection Limit based on Title 40 Code of Federal Regulation (CFR) 136 Appendix B – Definition and Procedure for the Determination of Method Detection Limit – Revision 2.

Please contact me if you have any questions.

Sincerely,

Bruce Thompson
Project Coordinator

Attachment

cc: Garry Waldeck, MassDEP
Settling Defendants
Matt Norton,

Responses to EPA Comments on the AOI 8 & 9 Remedial Action Work Plan dated December 13, 2022:

1. **Appendix E, FSP Addendum, Attachment E2, General Comment.** The Standard Operating Procedure (SOP) for soil sample analysis of total recoverable uranium appears to have been adapted from an SOP of analysis of aqueous samples and appears to have retained non-applicable artifacts. For example, the purpose states the procedure is for "soluble Depleted Uranium (DU) in aqueous samples". There are many instances of these artifacts, including discussion of "suspended solids", "pretreatment samples", reporting results as "dissolved". Please review the SOP as appropriate for soil samples, including using appropriate units (mg/kg), or when aqueous units are used, for clarity, their equivalent in mg/kg for a sample (i.e. when adding an aqueous spiking solution to a sample). Please address.

Response: The procedure was adapted from an SOP for both aqueous and solid samples. We are currently revising the proposed method to reflect the current methods being used to determine Total Uranium in soils. We will remove language associated with the analysis of aqueous samples. We will be revising major portions of the procedure associated with Quality Control based on the completed protocol.

The procedure has been revised to better reflect the refined procedure for the preparation of soil samples and operation of the Avio 220 ICP-OES based on the method developed in conjunction with PerkinElmer staff. All references to aqueous sample preparation have been removed from the procedure. The method now only references the preparation of soil samples for Total Uranium analysis. The Quality Assurance methods have also been revised to include the use of an internal standard for each sample, continuing calibration blank (CCB), and continuing calibration verification (CCV).

2. **Appendix E, FSP Addendum, Attachment E2, General Comment.** For completeness it is recommended that a summary table of Measurement Performance Criteria (similar to Worksheet #12 in a UFP-QAPP) be provided in the SOP.

Response: We will add a summary table based on Worksheet #12 in the UFP-QAPP as requested for the ICP-OES instrument performance criteria.

A Summary of Measurement Performance Criteria for the Avio 220 ICP-OES was added as Attachment A as requested.

3. **Appendix E, FSP Addendum, Attachment E2, Section 1.0.** As this analytical technique does not distinguish between uranium isotopes, please remove the reference to depleted uranium.

Response: We will remove references to Depleted Uranium from the procedure and replace with Total Uranium.

The references to Depleted Uranium have been removed from the procedure and replaced with Total Uranium.

4. Appendix E, FSP Addendum, Attachment E2, Section 6.1.5.4. For clarity, please provide a more detailed description for "Si QC samples".

Response: We will remove the discussion of Si QC samples, as it is not applicable to the Total Uranium Analysis.

The discussion of Si QC samples has been removed, as it is not applicable to the Total Uranium Analysis.

5. Appendix E, FSP Addendum, Attachment E2, Section 7.1.1. Please provide a more detailed reference for "PerkinElmer Training".

Response: This section will be revised to reflect that PerkinElmer assisted with the method development, quality assurance parameters, and add additional detail regarding the onsite training.

The training section has been revised to read: PerkinElmer staff assisted in the analytical method development for the field screening of Total Uranium. As part of this method development PerkinElmer provided hands-on training in the operation and maintenance of the instrument. This procedure now details the step-wise operation of the ICP-OES. PerkinElmer trained staff will use this procedure to train new analysts. Only personnel trained by PerkinElmer or a PerkinElmer Technician may disassemble or trouble-shoot the performance of the instrument.

6. Appendix E, FSP Addendum, Attachment E2, Section 7.2.3.2. The text references the MDL (assumed to method detection limit), but the SOP does not describe how the MDL has been determined for use at the current time. In addition, the FSP Addendum does not identify the MDL for this method within the Addendum. The cover letter at the beginning of Appendix E identifies the detection limit (DL) as 10 ppb. Please clarify and address.

Response: We will add details on how the Method Detection Limit (MDL) has been determined, and the specific MDL established for the method.

This section has been revised to read: The Method Detection Limit (MDL)was calculated based on Title 40 Code of Federal Regulation (CFR) 136 Appendix B – Definition and Procedure for the Determination of Method Detection Limit – Revision 2 using the following formula.

$$MDL_S = t_{(n-1,\ 1-\alpha=0.99)} S_S$$

where:

MDL_s = the method detection limit based on spiked samples

$t_{(n-1,\ 1-\alpha = 0.99)}$ = the Student's *t*-value appropriate for a single-tailed 99th percentile *t* statistic and a standard deviation estimate with n-1 degrees of freedom. See Addendum Table 1.

S_s = sample standard deviation of the replicate spiked sample analyses.

Seven (7) low-level Total Uranium Blank Spike replicates of 1.00 parts per billion (ppb) were prepared and analyzed to determine the standard deviation (SD) of the sample set. The SD was then multiplied by 3.143, the student-t value for the degrees of freedom from the Addendum Table 1. The MDL for Total Uranium is calculated to be 1.06 parts per billion (ppb) for this sample analysis method.

We recognize that it is important to determine the MDL with real world samples. To establish a real-world baseline MDL for the system, seven (7) background samples that have been collected and analyzed over the previous three (3) months were selected. The results of the calculations following the method in Title 40 Code of Federal Regulation (CFR) 136 Appendix B – Definition and Procedure for the Determination of Method Detection Limit – Revision 2 showed that the MDL for Total Uranium using actual soil samples is 6.6 ppb.

On a quarterly basis, the Lab Supervisor will examine background-level soil samples as on-going verification, determine the MDL, and update, if necessary.

7. Appendix E, FSP Addendum, Attachment E2, Section 8.2.1. The text reference Standard Methods. However Standard Methods (full title is "Standard Methods for the Examination of Water and Wastewater") is used for aqueous samples. Please provide a reference for the basis of the preparation and digestion of soil samples procedure.

Response: This reference will be changed to EPA Method 3050B: Acid Digestion of Sediments, Sludges, and Soils to better reflect the methods being used for the field lab screening.

The method now references Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium; SW-846, EPA Method 3050B Rev. 2: Acid Digestion of Sediments, Sludges, and Soils to best reflect the sample preparation methods being used for the field lab screening.

Nuclear Metals, Inc. Superfund Site
Health Physics Procedures

PREPARATION OF SOIL SAMPLES AND ANALYSIS WITH A PERKINELMER AVIO-220 ICP-OES

PROCEDURE NO: LP-NMI-005

January 2023

Prepared by: _____ Date: _____

Technical Review: _____ Date: _____

RSO Approval: _____ Date: _____

Revision No. 1

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the preparation and analysis of soil samples for total uranium. Soil samples are treated with concentrated acids and heated, to dissolve uranium for analysis.

The acid digestate is subsequently analyzed by Inductively and Coupled Plasma – Optical Emission Spectrometry (ICP-OES) to determine the uranium concentration in the digestate, from which the concentration in the original soil sample, in mg/kg is then calculated. This procedure provides laboratory personnel guidelines and precautions for using the Perkin Elmer AVIO-220 plus ICP-OES.

2.0 APPLICABILITY

This program applies to the onsite analysis of solid samples for uranium in support of soil clearance for the Remedial Design and Remedial Action (RD/RA) at the Nuclear Metals Inc. (NMI) Site in Concord, MA. This procedure applies to all personnel preparing and analyzing soil samples for uranium, using the Perkin Elmer AVIO-220 MAX ICP-OES in the onsite laboratory.

3.0 PREREQUISITES

The handling and processing of potentially radioactive samples shall be conducted by trained and qualified personnel only. The sample preparation process involves the use of corrosive chemicals. These individuals will be trained on the following plans and procedures and authorized to use these materials by the Chemical Hygiene Officer. A record of the persons trained, date of the training, and trainer shall be maintained in the laboratory.

- Nuclear Metals Superfund Site-Specific Chemical Hygiene Plan (NMI CHP)
- LP-NMI-001: Gross Alpha and Beta Measurements of Liquids
- LP-NMI-002: Gross Alpha and Beta Measurements of Solids
- LP-NMI-003: Radiation Lab Procedures and Safety Guidelines
- LP-NMI-004: Working with Corrosive Materials

4.0 SAFETY

4.1 Health and Safety

For specific hazards, consult the SDS for compounds listed in section 6.0 of this SOP (SDS on file).

4.1.1 Use, store, and dispose of chemicals per the NMI CHP.

4.1.2 The reagents used in the sample preparation are corrosive. Avoid ingestion or inhalation and direct contact with the skin.

4.1.3 Digestion is to be performed under a fume hood. Hoods should be checked before sample prep. There is an electronic flow monitor mounted on the hood face. A green light will indicate an acceptable hood flow rate. Do not prep samples if the hood is not working correctly.

4.2 Protective Equipment

Wear appropriate Personal Protective Equipment (PPE) per NMI CHP and applicable SOPs. The minimum PPE for laboratory work is safety glasses, a lab coat, disposable nitrile gloves, and closed-toed shoes.

4.3 Spills and Contamination

Clean up spills immediately. A Spill Kit is located in the laboratory and shall be readily accessible.

5.0 APPARATUS AND EQUIPMENT

5.1 Heat Block

The heat block must be capable of maintaining the temperature of the acid digestate between 85-90 degrees Celsius. The temperature must be maintained within ±5°C once the samples reach 85°C and maintain this temperature range during the digestion process described in Section 8.0. The temperature is measured using a temperature blank comprised of a 50 ml DigiTube filled with deionized water (DI) placed in the heat block in the same fashion as a sample. An infrared thermometer shall be used to measure the liquid temperature. A measurement shall be taken at least twice a day, once at the beginning of a batch and at the end of batch. This measurement shall be recorded in the Heater Block Plate Temperature Monitoring Log. This log shall be kept in the laboratory and available for inspection by the Lab Supervisor. Report to the Lab Supervisor if the hot plate or liquid temperatures are not within range. If the sample is over temperature a new sample shall be digested. If a sample is under the temperature specifications, it must be brought to the proper temperature and maintained at the temperature for the appropriate time, depending on the step in the digestion process where the excursion occurs.

5.2 Hoods

In addition to using the continuous flow monitor for daily hood flow checks, personnel will conduct airflow checks monthly to ensure the fume hood is operating correctly. This check shall be performed with a calibrated hood velocity instrument. An acceptable flow range is 60 to 100 LFM. This measurement shall be recorded in the Hood Face Velocity Log. This log shall be kept in the laboratory and available for inspection by the Lab Supervisor. Do not use the hood and contact the Lab Supervisor if flow rates are substandard.

5.3 Drying and heating chamber

Samples will be heated and dried in a Binder Model ED 23 drying and heating chamber. The chamber temperature should be verified using an infrared thermometer to ensure the digital display is accurate. The oven shall be set to a temperature of 60 °C. This measurement shall be taken at least twice a day, every day samples are prepared. This measurement shall be recorded in the Heating Chamber Temperature Monitoring Log. This log shall be kept in the laboratory and available for inspection by the Lab Supervisor. Notify Lab Supervisor if the temperature disparity is greater than 25% (45 to 75 °C).

5.3.1 If the heating chamber is found to be below specification, samples can still be digested if they are completely dry. To confirm dryness, weigh the sample again and place it back in the heating chamber for 15 minutes. If the sample loses less than 1% of mass in 15 minutes, it is dry and acceptable for use.

5.3.2 If the heating chamber is found to be above specification, but below 100°C the samples can still be used. If a sample has been exposed to temperatures above 100°C, it must be discarded, and a new sample prepared.

6.0 REAGENTS AND STANDARDS

6.1 Chemicals/Reagents

6.1.1 All chemicals and reagents will be transported in secondary containment and stored in designated areas.

6.1.2 Compressed Argon tanks shall be secured from tipping.

6.1.3 ASTM Type I deionized water will be used for analysis.

6.1.4 Ultra Pure chemicals and Ultra High Purity gases, or better, will be used for all metal analyses. Standards will be supplied with a Certificate of Analysis showing the Manufacturer's number, Description, Lot number, Expiration date, Labeled and Measured values, and Traceability to the National Institute of Standards and Technology (NIST) Standard Reference Materials (SRMs). All reagents will be logged on the bottle and dated to the date received and opened with the analyst's initials, following all SOPs for chemical receiving. No chemical or reagent will be used past its expiration date. All expired reagents will be disposed of properly.

6.1.4.1 **$HN0_3$ (Nitric Acid)** - Ultrapure or Ultrexgrade or equivalent. For ICP-OES blanks and dilutions, mix 5% in reagent water to make a 5% HNO_3 solution.

6.1.4.2 **H_20_2 (Hydrogen Peroxide)30%** - Ultrapure or Ultrexgrade or equivalent.

6.1.5 Standard stock solutions: All standard stock solutions used will be NIST traceable. All serial dilutions are to be made using calibrated volumetric pipettes.

6.1.6 Calibration Solutions: A series of five solutions shall be made to complete a daily calibration of the ICP-OES instrument. Calibration must be established for the ICP-OES before analyzing samples each day of operation. The concentrations of the five solutions are listed in table 6.1.6 below.

Table 6.1.6 – Calibration Standards Concentrations

Standard Solution Name	Elements	Standard Solution Concentration
Cal Blank	N/A	0.0 mg/L
Cal 1	U	0.01 mg/L
Cal 2	U	0.1 mg/L
Cal 3	U	0.4 mg/L
Cal 4	U	20 mg/L

6.1.7 Continuing Calibration Blank (CCB) Solutions

6.1.7.1 A CCB solution shall be made with reagent water that contains 5% Nitric Acid by volume. A CCB shall be analyzed before every sample batch, every ten samples, and after each batch. The CCB shall be run immediately after the CCVH standard.

6.1.8 ICP Continuing Calibration Verification (CCV) Solutions

6.1.8.1 Table 6.1.7.1 lists the recommended spike concentrations for the Continuing Calibration Verification Low Concentration (CCVL) Stock Solution and the Continuing Calibration Verification High Concentration (CCVH) for ICP analyses. Prepare the CCV Solutions by adding sufficient primary stock solutions for uranium to create the Spike Stock Solution concentration indicated in the table.

Table 6.1.7.1 - Recommended ICP CCV Concentrations

Standard Solution Name	Elements	Stock Solution Concentration	Concentration in QC Samples
CCVL	U	0.01 mg/L	0.01 mg/L
CCVH	U	2.0 mg/L	2.0 mg/L

6.1.8.2 For each batch of samples analyzed, a CCVL, CCVH, and CCB control standard shall be analyzed before each batch, every ten samples, and at the end of each batch to verify the instrument's performance. The order of the control standards shall always be CCVL, CCVH, then CCB.

6.1.9 Internal Standard Solution

6.1.9.1 Table 6.1.8.1 lists the recommended concentrations for the Internal Standard that will be added to each field sample, standard and QC sample to evaluate the metal recovery efficiency of the instrument. Indium will be used as the internal standard.

Table 6.1.8.1- Recommended ICP Internal Standard Concentrations

Standard ID	Element(s)	Stock Solution Concentration	Final Spiked Concentration in QC Samples
1	In	0.2 mg/L	0.02 mg/L

6.1.9.2 The Internal Standard is added to each sample automatically just before the nebulizer at 10% of the volume. The same amount is added to all field samples, blanks, initial calibration, and continuing calibration standards.

7.0 QUALITY ASSURANCE/ QUALITY CONTROL

7.1 Quality Assurance

7.1.1 **Analyst Training:** Analysts must be trained by an experienced analyst and follow this procedure. This training must be documented as noted in section 3.0 of this document.

7.1.2 **Quality Control Requirements:** The quality control requirements section covers the following topics: 1) Quality control limits, 2) Quality control - instrument performance, and 3) Laboratory (Method).

7.1.2.1 **Adherence to the QAPP:** A Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) worksheet is provided as Appendix A to this document. It provides a quality control roadmap for soil screening at the NMI Field Laboratory.

7.1.2.2 **Safety Practices:** General and customary safety practices and those included in instrument manufacturer's manuals and approved methods will be strictly followed. Safety Data Sheets will be consulted before using any new or unknown chemical/reagent.

7.1.3 **Contamination:** The following precautions contribute to avoiding inorganic contaminants.

7.1.3.1 All glassware will be cleaned according to the following procedure:

7.1.3.1.1 **After use:**

- Wash with detergent (Alconox or Contrad), by hand or in a pipette washer, as appropriate.
- Rinse with tap water twice.
- Rinse with filtered DI water.

7.1.3.2 **Acid Testing:** Nitric acid blanks will be analyzed with every new lot of acid before usage. Upon receipt, a sample of each new acid lot is tested for metals content using ICP, as appropriate, before being used for preparations for analysis on these instruments. The acid test samples will be prepared by starting with step 8.2.7 of this procedure without the use of a solid sample. This analysis will evaluate any possible contamination due to the acids used. Record this testing in the Acids Logbook before placing the new lot of acid into use.

7.1.3.3 **Containers:** Use metal-free containers for all prepped samples and standards. Certification provided by the supplier indicating the containers are metal free will be stored in the QA files.

7.2 Quality Control:

7.2.1 **Quality Control Requirements:** The minimum requirements consist of an initial demonstration of laboratory capability and periodic analysis of laboratory reagent blanks, fortified blanks, and other laboratory solutions as a continuing check on the performance of the measurement system. Analyst capability will be measured by comparing data generated in the on-site laboratory against analysis data from the offsite laboratory. The laboratory must maintain performance records that define the quality of the data thus generated.

Method Detection Limit (MDL)was calculated based on Title 40 Code of Federal Regulation (CFR) 136 Appendix B – Definition and Procedure for the Determination of Method Detection Limit – Revision 2 using the following formula.

$$MDL_S = t_{(n-1,\ 1-\alpha=0.99)} S_S$$

where:

MDL_s = the method detection limit based on spiked samples

$t_{(n-1,\ 1-\alpha = 0.99)}$ = the Student's *t*-value appropriate for a single-tailed 99th percentile *t* statistic and a standard deviation estimate with n-1 degrees of freedom. See Addendum Table 1.

S_s = sample standard deviation of the replicate spiked sample analyses.

Seven (7) low-level Total uranium Standard replicates of 10.0 parts per billion (ppb) were prepared and analyzed to determine the standard deviation (SD) of the sample set. The SD was then multiplied by 3.143, the student-t value for the degrees of freedom from the Addendum Table 1. The MDL for Total uranium is calculated to be 1.06 parts per billion (ppb) for this sample analysis method.

Uranium is found in nature and it is important to determine the MDL with real world samples. To establish a real-world baseline MDL for the system, seven (7) samples that have been collected and analyzed over the previous three (3) months were selected. The results of the calculations following the method in Title 40 Code of Federal Regulation (CFR) 136 Appendix B – Definition and Procedure for the Determination of Method Detection Limit – Revision 2 showed that the MDL for Total Uranium using actual soil samples is 6.6 ppb.

7.2.2 **Continuing MDL Study:** On a quarterly basis, the Lab Supervisor will analyze background level soil samples and determine the MDL. The MDL should be maintained below 10.0ppb.

7.2.3 Internal Standard

7.2.3.1 Each sample is spiked with a 0.02 mg/L Indium standard.

7.2.3.2 Internal Standard Control limits:

- 75% to 125% recovery of true value added

7.2.3.3 **Corrective Action -** If the internal standard recovery is outside of specification, retain the digestate. Implement a corrective action procedure to identify the root cause. Note corrective actions in the logbook. If the control limit is not met or cause cannot be determined by the analyst, contact Lab Supervisor. Reanalyze all samples from the batch once the root cause has been determined and corrected.

7.2.4 Continuing Calibration Blank (CCB)

7.2.4.1 The CCB is a reagent blank used to assess presence of contamination in the instrument.

7.2.4.2 **Control Limits-** Concentration should be 0 ppb ± 2ppb in order to proceed with analysis.

7.2.4.3 **Frequency-** The CCB shall be run after the CCVL and CCVH. It shall be run before each batch of samples, once every ten samples, and at the end of every batch.

7.2.4.4 **Corrective Action -** If the CCB analysis does not meet the criteria, retain the digestate. Implement a corrective action procedure to identify the root cause. Note corrective actions in the logbook. If the control limit is not met or cause cannot be determined by the analyst, contact Lab Supervisor. Reanalyze all samples from the batch once the root cause has been determined and corrected.

7.2.4.5 **Check –** Once the root cause has been determined, rerun CCV standards once to determine if the second analysis meets the criteria.

7.2.5 Continuing Calibration Verification Standards (CCVL and CCVH)

7.2.5.1 The uranium concentration of the CCVL will be 10 ppb.

7.2.5.2 The uranium concentration of the CCVH will be 2,000 ppb.

7.2.5.3 **Control Limits-** The control limits are 75% - 125% of the concentration.

7.2.5.4 **Frequency-** The CCVL and CCVH shall be run before each batch of samples, once every ten samples, and at the end of every batch.

7.2.5.5 **Corrective Action -** If the CCV analysis does not meet the criteria, retain the digestate. Implement a corrective action procedure to identify the root cause. Note corrective actions in the logbook. If the control limit is not met or cause cannot be determined by the analyst, contact Lab Supervisor. Reanalyze all samples from the batch once the root cause has been determined and corrected.

7.2.5.6 **Check** – Once the root cause has been determined, rerun CCV standards once to determine if the second analysis meets the criteria.

7.2.6 **Replicates:** One sample per week will be randomly selected to be digested and analyzed as a replicate. The validation criterion is 20% relative percent difference.

8.0 PROCEDURE

8.1 Sample Preparation

8.1.1 **Preservation-** All samples will be prepared following this procedure. Soil or other solid samples will be stored in the laboratory refrigerator until analysis. The refrigerator will be checked once daily to ensure the temperature is less than 6°C. This temperature check shall be recorded in the Refrigerator Temperature Log.

8.1.2 **Sample Holding Time-** The holding time for soil samples is six months from collection to digestion. Digestates may be held for up to 14 days before analysis.

8.1.3 Samples will be brought to the ICP lab with a signed Chain-of-Custody. The sample identifications will be verified, and the sample receipt section will be signed. The analyst receiving the samples will inspect the sample containers and compare them against the Chain of Custody. The analyst will ensure that sample IDs and collection dates and times match the Chain of Custody. Samples will retain their field nomenclature throughout the onsite lab. No lab IDs are permitted. Once verified, the analyst will sign the Chain of Custody and take possession of the samples. Samples will be stored in the lab refrigerator to be processed. Once samples are removed from the refrigerator, sample tracking will migrate from the Chain of Custody to the laboratory logbook.

8.2 Solid Sample Total Recoverable Metals Preparation Procedure for ICP-OES

8.2.1 Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium; SW-846, EPA Method 3050B Rev. 2: Acid Digestion of Sediments, Sludges, and Soils.

8.2.2 Prepare batch QC samples as described in section 6.1 using the spiking solutions described in section 6.1.7.

8.2.3 The entire volume of the soil sample shall be homogenized and passed through a #10 screen. A representative sample (10-20 grams) is placed in a pre-labeled uranium free, aluminum dish, dried at 60°C for 1 hour, and weighed every 10 minutes thereafter until the sample has a consistent weight. Alternatively, the sample can be dried at 60°C for a minimum of 2 hours. Note the time that each sample was placed in the

8.2.4 The entire dried solid fraction is ground by hand in a GLASS mortar to achieve homogeneity and then transferred back to the aluminum drying dish.

8.2.5 Label a 50 ml disposable DigiTube for each sample. Each DigiTube is then placed on a calibrated analytical balance. The user shall hit the tare button to account for the weight of the DigTube. An sample of approximately 1.0-gram of the ground and dried soil is then transferred to the DigiTube, and the net sample weight is recorded in the lab log book.

8.2.6 Place the remainder of the sample in a capped petri dish labeled with the sample ID and stored for additional analysis as needed.

8.2.7 Add 10 ml of ultrapure Nitric Acid to the DigiTube, cover it with a reflux disk, and place it in a heating block adjusted to 103.5° C to achieve an internal sample temperature of 85-90°C. Reflux WITHOUT BOILING for 10 minutes.

8.2.8 Add 5 ml of concentrated ultrapure Nitric Acid to the DigiTube, replace the cover, and reflux WITHOUT BOILING for 30 minutes.

8.2.9 Remove the DigiTube from the hot plate and cool for 10 minutes. Add 3 ml of ultrapure 30% Hydrogen Peroxide in 1 mL increments. Hydrogen peroxide should react after each addition but should not be allowed to effervesce so high that sample is lost out of the top of the tube. Add DI water as needed to control the speed of the reaction. Cover the tube, return to the hot plate for 10 minutes, and heat. After 10 minutes have elapsed, confirm that any effervescence has subsided. If not, allow the sample 10 more minutes before continuing to the next step.

8.2.10 Bring the total volume up to 40 mL with DI Water. Affix a 0.45-micron DigiFilter to the DigiTube and insert the plug into the opening closest to the DigiTube. Affix a new, labeled 50 mL DigiTube to the other end of the filter and secure. Turn on the vacuum pump located on the floor. Invert the assembly and place it on the vacuum manifold, empty tube down. Insert the vacuum port into the LOWEST opening and open the vacuum valve. Remove the previously inserted plug. The vacuum will draw the filtrate into the bottom DigiTube. Discard filter and top DigiTube. Bring the total volume of the sample to 50 ml using filtered DI water.

8.2.11 Mix the sample well by rocking the DigiTube back and forth by hand and transfer the DigiTube to the sample rack for ICP-OES analyses.

9.0 AVI-220 ICP-OES OPERATION

9.1 Requirements

9.1.1 Personnel operating the Avio-220 shall be trained on the instrument by a PerkinElmer representative or Supervisor.

9.1.2 Personnel performing maintenance operations or troubleshooting shall be trained by a PerkinElmer representative or be a PerkinElmer Service Technician.

9.2 ICP-OES Startup

9.2.1 Check all calibration standards, DI water, rinse solution, and waste collection tank levels. Empty or replenish as necessary. The Supervisor will determine the concentrations for the standards and post them in a conspicuous place in the laboratory. They are also listed in Table 6.1.6 of this document.

9.2.2 Ensure the Syngistix software is open. This software operates the mechanics of the ICP and autosampler.

9.2.3 Open the compressed Argon cylinder and ensure the pressure reads 100 psi (± 10%).

9.2.4 Peristaltic Pump Setup

9.2.4.1 Three (3) positions are used on the peristaltic pump from rear to front. Each tube type is designated with a color code and has different diameters.

- Waste Removal (Red)
- Sample Delivery (Black)
- Internal Standard Delivery (Orange and Blue)

9.2.4.2 Stretch the pump tubing over the rollers and lock the tabs into their specific locations. The tubing shall be removed from tension when the instrument is not in use.

9.2.4.3 Go to the INSTRUMENT tab in the Syngistics software and open the PLASMA CONTROL window. Turn on the PUMP for 30 seconds to align the peristaltic tubing.

9.2.4.4 Ensure the tubing is not twisted or kinked before locking the retention clamps down on the rollers.

9.2.4.5 Place the Internal Standard intake tube into DI water. Move Auto-Sampler to position 52 (Media Blank) and start peristaltic up again.

9.2.4.6 Observe the peristaltic pump and tubing operation. Engage the pump until bubbles are visible in the waste line.

9.2.5 Plasma Ignition

9.2.5.1 Go to the INSTRUMENT tab in the Syngistix software, open the PLASMA CONTROL window, and turn on the Plasma.

9.2.5.2 The startup will take approximately 3 minutes.

9.2.5.3 Allow the unit to warm up for 30 minutes before performing an analysis. The ICP-OES will heat up and automatically go through optical optimization during this period.

9.2.5.4 Be sure the Auto-Sampler and Internal Standard intake tubes are always below the liquid level. Add liquid to Calibration Blank, Calibration Standards, CCB, CCV, or rinse water reservoir as needed to maintain acceptable levels

9.2.5.5 Make sure the waste line is clearing excess sample liquid from the nebulizer. A constant stream of bubbles should be visibly present in the waste line.

9.3 Sample Analysis

9.3.1 Go to the ANALYSIS tab in the Syngistix software and select open METHOD. Open method Total U 10-200

9.3.2 Then click SAMPLE INFO to open the Sample Information Editor window and enter Batch ID as YYYYMMDD-1. The last number shall be changed to indicate the number of sample batches analyzed that day. Also, enter the same Batch ID number in the file description box.

9.3.3 A CCVL, CCVH, and CCB, in that order, shall be run at the beginning of every batch, every ten (10) samples and at the end of every sample batch.

- For CCB and CCV samples, leave the Initial Sample Weight box blank and;
- Enter 50 in the Sample Prep Volume

9.3.4 Enter the Autosampler Location of the sample under the A/S Location column. Then enter each Sample ID as designated on the sample container. Enter the Initial Sample Weight of the sample. Sample weight refers to the original mass of material placed into the DigiTube for digestion and can be retrieved from the laboratory notebook. Input 50 for the Sample Prep Volume column to assign the sample volume of 50 mL. Place the open sample in the corresponding A/S Location.

9.3.5 Open the Analysis window and select Rebuild List. The entered sample information will now appear. Select Analyze All if this is the first sample batch of the day. Analyze All will perform the daily calibration before analyzing the samples listed. Select Analyze Samples if this is a subsequent batch of samples to analyze only samples and calibration has been completed for that day.

9.3.6 Observe consumable materials levels during the analysis to ensure they are maintained. These include:

- 1% Nitric Acid Rinse Water
- Internal Calibration Standard
- Argon Gas
- CCB and CCV Samples

9.3.7 The autosampler will move to the rinse position when the sample analysis is complete for the batch.

9.3.8 To prevent the rinse solution from depleting and generating excess liquid waste, always keep a 5% Nitric Acid solution in position 52. If the machine is done with a batch of samples but not ready to be shut down, follow these steps;

- Click the INSTRUMENT Tab
- Click Go To Location
- Enter position 52
- Hit OK

9.4 Sample Data

9.4.1 Go to the RESULTS tab in the Syngistix software and select open DATA VIEWER to observe sample results as they are obtained. When the analysis is finished for the batch of samples, choose Export All and use the Batch ID to name the Excel file.

9.5 Shutdown Procedure

9.5.1 Remove and cap all sample DigiTubes from heating blocks and power off using the rear toggle switches.

9.5.2 Verify vacuum pump is powered off.

9.5.3 Power off the Binder drying oven.

9.5.4 Send the probe to position 52 using the steps in 9.3.8 to rinse with 5% Nitric Acid Solution while simultaneously removing the hose from the internal standard and place into DigiTube filled with DI water. Do this for at least two minutes.

9.5.5 Send the probe to the load position by selecting LOAD RACKS for a minimum of two minutes while simultaneously moving the hose from the internal standard to a dry DigiTube.

9.5.6 Continue running the pump until the waste lines run dry.

9.5.7 Power off PLASMA from the PLASMA CONTROL menu.

9.5.8 Power off the pump.

9.5.9 Release retention clamps on the peristaltic pump and disengage all hoses to relieve tension. Examine peristaltic hoses for kinks or general wear, replace them as needed, and at least every two weeks.

9.5.10 Remove sample media from loading racks and dispose of liquids into the waste collection tank.

9.5.11 Check levels of calibration solutions, waste tank, DI Water, and rinse solution and empty or replenish as needed.

9.5.12 Ensure HVAC controls are set for the appropriate climate before leaving. Remote temperature monitoring will alert specific operators via e-mail if a power loss is detected or if temperatures fall below 50°F or rise above 110°F.

10.0 DATA REPORTING

10.1 Requirements

10.1.1 Syngistix Software – Saves a complete record of all analytical parameters from each analysis. Personnel will export the data from the DATA VIEWER window daily. Daily CSV delimited files will be saved for ProjectPortal upload.

10.1.2 The corrective actions section covers the following topics: 1) Out-of-control data procedures 2) Corrective action logbooks

Attachment A

QAPP Worksheet 12-5

QAPP Worksheet #12-5 Measurement Performance Criteria (Total Uranium in Soil)

Matrix	Soil
Analytical Group	Metals (Field ICP)
Concentration Level	All

Sampling Procedure[1]	**Analytical Method/SOP[2]**	**Data Quality Indicators (DQIs)**	**Laboratory Measurement Performance Criteria[4]**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**	**Data Validation Criteria**
N/A	Method 3050B/ LP-NMI-005	Accuracy/Bias/ Contamination	0 ppb ± 2 ppb (CCB)	CCB (equipment, method)	S&A	Sample concentrations ≤ CCB concentration will be qualified not detected
		Accuracy/Bias/ Precision	10 ppb (CCVL) 2000 ppb (CCVH	CCV	A	%R 75-125
		Accuracy/ Sensitivity	%R of 20 ppb In	Internal Standard	A	%R 75 to 125%
		Precision	RPD <20%	Weekly Laboratory duplicate	A	RPD ≤20%

ATTACHMENT E3

Avio® ICP Optical Emission Spectrometer Overview

Avio® 200 ICP Optical Emission Spectrometer

For research use only. Not for use in diagnostic procedures.

PerkinElmer®
For the Better

PERFORMANCE VALUE AND EASE OF USE IN ONE COMPACT PACKAGE

Capable of handling even the most difficult, high-matrix samples without dilution, the Avio® 200 system brings a whole new level of performance and flexibility to ICP.

What's more, that unprecedented performance comes with unparalleled ease-of-use. Unique hardware features and the industry's most intuitive software combine to make multi-element measurements as easy as single-element analyses.

The smallest ICP on the market, Avio 200 offers efficient operation, reliable data, and low cost of ownership by delivering:

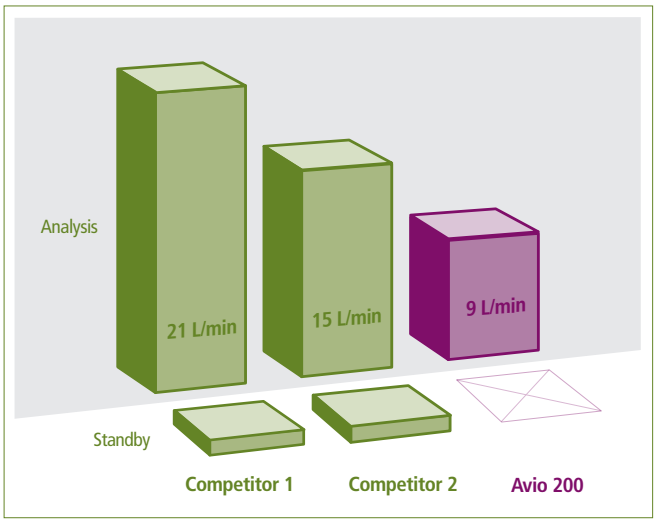
- The lowest argon consumption of any ICP
- The fastest ICP startup (spectrometer ready in just minutes from power on)
- Superior sensitivity and resolution for all elements of interest
- Extended linear range with dual viewing technology

Reliable. Capable. Affordable. The Avio 200 is everything you're looking for in an ICP.

Avio 200 ICP-OES

WHY JUST ENGINEER WHEN YOU CAN PIONEER

Designed to meet the most challenging of customer needs – and exceed them – the Avio 200 ICP allows you to run more samples more cost-efficiently than ever before with an array of unique and proprietary features.



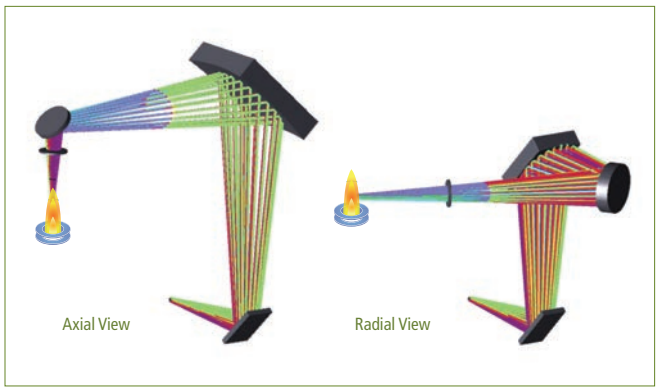
The Avio 200 operates with a plasma flow of 8 L/min and a total argon gas flow of 9 L/min, compared to 21 L/min required by other systems.

Low cost of ownership

Avio's proprietary Flat Plate™ plasma technology generates a robust, matrix-tolerant plasma using half the argon of other systems, giving you:

- Faster return on investment
- Superior uptime and productivity by eliminating the need for cooling and maintenance associated with traditional load coils

Plus, for added efficiencies, PerkinElmer's Dynamic Wavelength Stabilization feature lets you go from power on to analysis in just minutes, allowing you to freely turn off the instrument when not in use.



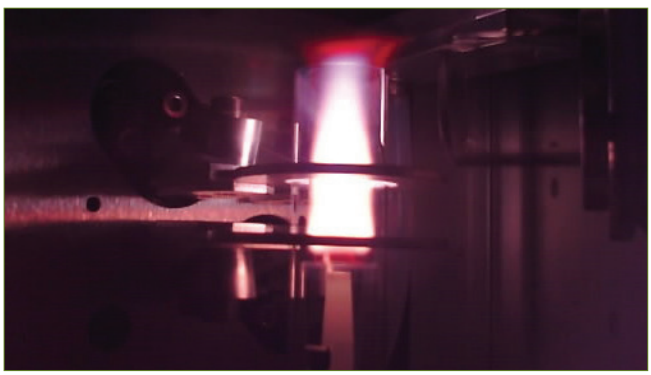
Avio's unique vertical Dual View optical system ensures the widest working range and excellent detection limits.

Uncompromising Dual View capability

Unlike synchronous vertical Dual View ICP systems that compromise performance in order to provide axial and radial viewing, the Avio 200 system's Dual View capability measures every wavelength with no loss of light or sensitivity. Even elements at high (>500 nm) or low (<200 nm) wavelengths can be measured with complete confidence, no matter the concentrations.

The Avio system's unique Dual View design also offers an extended linear dynamic range, enabling:

- Minimized sample preparation and dilution
- High and low concentrations measured in the same run
- Better quality control and more accurate results
- Fewer reruns



PlasmaCam allows easy viewing of the plasma and surrounding components for easy method development and troubleshooting.

Integrated plasma viewing camera

Simplify your method development and enjoy the convenience of being able to monitor your plasma remotely with the Avio 200 system's PlasmaCam™ technology. An industry first, the color camera lets you:

- View the plasma in real time
- Perform remote diagnostics
- See sample introduction components

Revolutionary PlasmaShear system for argon-free interference removal

To remove interferences during axial viewing, you need to eliminate the cool tail plume of the plasma. No instrument does it more effectively, reliably, or economically than the Avio 200.

While other ICPs use as much as 4 L/min of argon to remove the plume, the Avio system's unique PlasmaShear™ technology runs on air. No need for ionization suppressants. No high-maintenance, high-extraction systems or cones. Just a fully integrated, fully automated interference-removal system that delivers problem-free axial analysis.

CCD detector for unmatched accuracy and precision

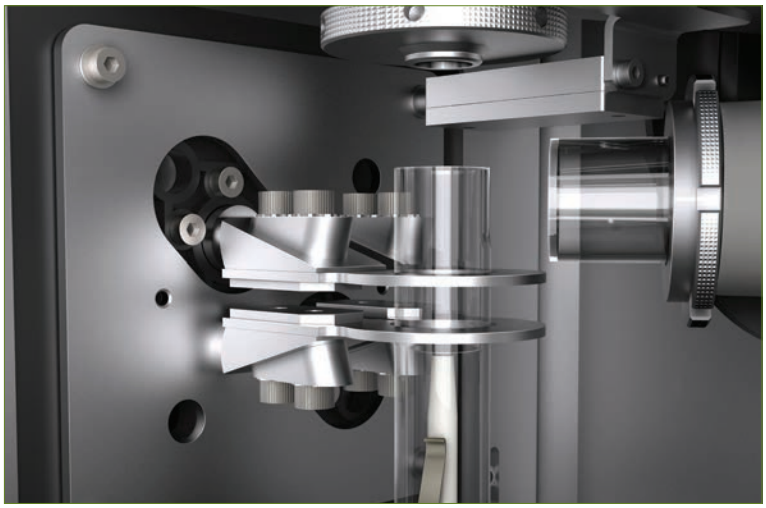
With its full wavelength capability, the powerful charge-coupled device (CCD) detector on the Avio 200 system delivers exactly the right answer, time after time.

Unlike traditional sequential systems featured in other instruments, the Avio system's CCD detector measures the wavelength range around the emission line of interest – **simultaneously** – for superior precision. It also performs simultaneous background correction measurements during an analysis to further enhance accuracy and sensitivity.

Vertical plasma with quick-change torch mount for unsurpassed matrix flexibility

Quickly and easily adjusted without tools, even when the ICP is running, the Avio 200 system's vertical torch delivers greater sample flexibility and simplified maintenance. Uniquely designed, the torch mount features:

- A removable injector that is independent of the torch for less maintenance and potential for breakage
- Automatic self-alignment to provide consistent depth setting even after removal
- Compatibility with a variety of nebulizers and spray chambers for added flexibility



Avio's proprietary Flat Plate plasma technology provides a more compact, robust, and stable plasma than traditional helical coil systems.

Avio's vertical torch design delivers greater sample flexibility and simplified maintenance.

MULTI-ELEMENT ANALYSIS MADE EASY

Avio is the ideal ICP platform for AA users requiring multi-element capabilities. Not only does it allow you to measure more elements at lower levels, it does so without added complexity or cost. In fact, the Avio 200 can shorten your analysis times by eliminating the need to dilute samples. Step up to the superior all-around performance of a solution that is:

- As easy to use as your AA with no flammable gases
- As cost-efficient as your AA (with no lamps to buy when you run new elements)
- The same size as your AA

Plus, it utilizes the intuitive, cross-platform Syngistix™ software package unique to PerkinElmer atomic spectroscopy instruments.

ENHANCING PERFORMANCE FROM THE INSIDE OUT

Flat Plate Plasma Technology

- More robust and stable plasma
- Unsurpassed matrix tolerance
- Lowest argon consumption (half that of traditional load coils)
- Less maintenance

Vertical Torch

- Optimal performance for any sample type
- Quick and easy to adjust for simple maintenance
- Torch mount ensures easy, accurate realignment after removal

Small Footprint

- 65 x 76 x 81 cm (W x D x H)
- Saves valuable laboratory bench space

Color PlasmaCam

- Simplifies method development by allowing continuous viewing of the plasma
- Remote diagnostic capabilities for superior uptime

Dual View

- Optimizes plasma viewing – both axial and radial
- Measures elements with high and low concentrations in the same run, regardless of wavelength

New 4-Channel, 12-Roller Peristaltic Pump

- Delivers greater sample-introduction flexibility
- Enhances and optimizes stability

PlasmaShear System

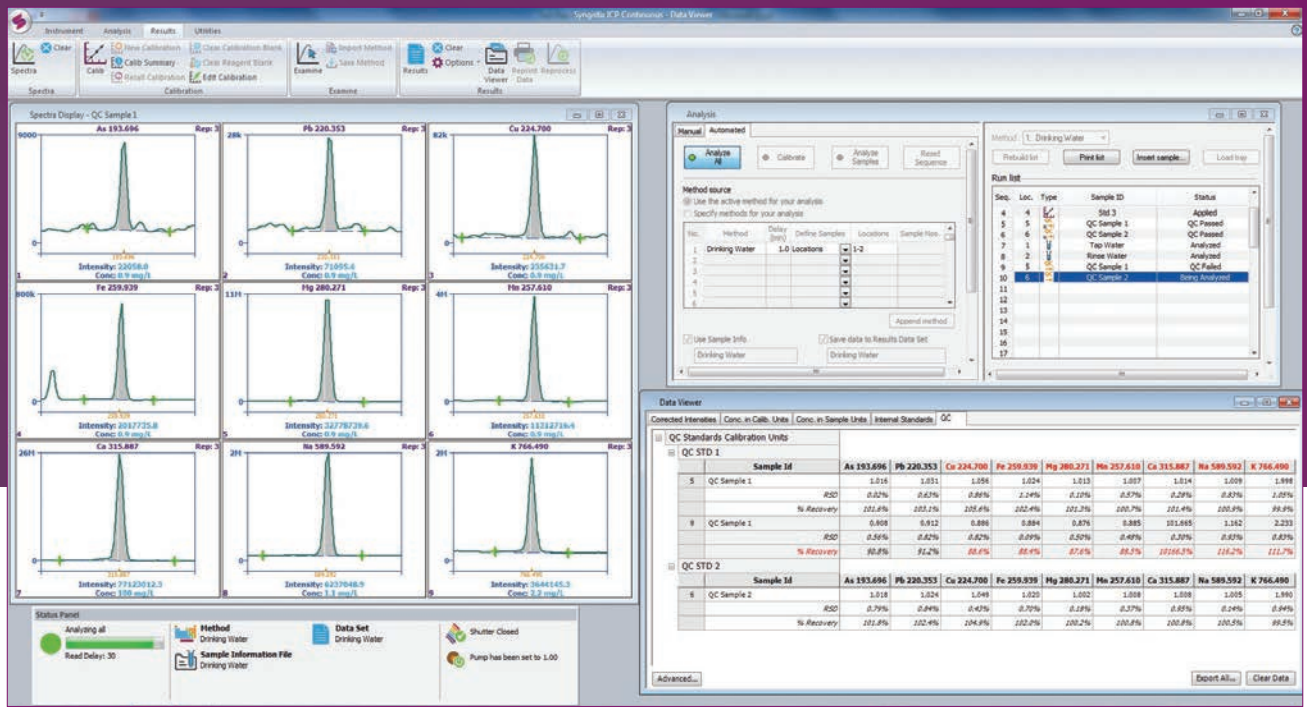
- Argon-free interference removal
- Maintenance-free design (no cones to clean or high extraction systems)

INTERACT WITH A MORE INTUITIVE INTERFACE

The Avio 200 runs using Syngistix for ICP software. Powerful, flexible, and simple, this cross-platform package offers:

- An intuitive, left-to-right, icon-based design
- Built-in, preset methods for faster, easier operation, requiring minimal training
- Extensive QC options to ensure quality data

Designed to mirror your workflow, the Syngistix interface walks you through every step of an analysis – from instrument setup to results – for consistent, efficient, reliable operation. Enjoy more functionality with fewer clicks from start to finish.



Instrument Startup/ Optimization

Status Panel displays real-time information on key instrument components so you can monitor the entire system at a glance.

Continuous Graphics allows real-time monitoring of instrument performance while optimizing instrument parameters.

Simple Method Development

Preset Methods offer faster, simpler operation and accurate, reliable data.

Method Editor organizes parameters into logical groups – spectrometer, sampler, processing, calibration, checks, and QC – and allows measurement times to be selected for optimum speed and productivity.

Enhanced Productivity

Multicomponent Spectral Fitting (MSF) offers simple, reliable interference removal by letting you isolate the analytical signal from the measured spectra for superior accuracy, precision, and detection limits.

Cross-Tab Data Viewer displays results in an easy-to-read, elements-across format for simpler review and analysis.

Data Analysis

Data Reprocessing lets you adjust everything from background correction points to your calibration curve after data collection to optimize the measurement of a particular sample without having to re-run it.

Status Panel features a graphic progress bar showing the percentage of an analysis that has been completed. Managing your system – and your time – has never been easier.

INconX™ Mobile Status App

This feature allows you to monitor and manage your Avio 200 from anywhere, any time, using your mobile device. Check an ongoing analysis, manage multiple users, even control functions like turning the plasma on and off.

ACCESSORIZE YOUR SYSTEM OPTIMIZE YOUR RESULTS

PerkinElmer makes it easy to get the most out of your Avio 200 system with a full range of accessories and consumables designed to optimize performance, streamline your workflow, and generate faster, more accurate results.

Titan MPS™ microwave sample preparation system

Easy to load and easy to use, the Titan MPS delivers simple, safe, cost-effective microwave sample preparation, optimizing performance by constantly monitoring and adjusting digestion conditions during operation.

SPB digestion blocks

When conducting routine sample preparation, PerkinElmer's SPB blocks are ideal for any open-vessel digestion/heating method requiring a temperature below 180 °C.

S10 Autosampler

Turn your Avio 200 ICP-OES into an efficient, fully automated analytical workstation with the addition of an S10 Autosampler. Ruggedly designed, the S10 features corrosion-resistant components to ensure long-term reliability, reproducibility, and precise performance.

ICP consumables and supplies

Nebulizers/Spray Chambers – Scott/Cross Flow and Cyclonic/Meinhard options available.

Injectors – Full selection of alumina, quartz, and sapphire versions.

PerkinElmer Pure Standards – More than 300 single- and multi-element standards, each with a certificate of analysis documenting quality, stability, and reliability.

Torches – Exclusive, one-piece, demountable quartz models designed for quick, easy replacement.

Expand Your Expectations of a Lab Services Provider

Optimize your Avio 200 ICP-OES with our comprehensive suite of services from PerkinElmer OneSource® Laboratory Services. From instrument service and repair to analytics and optimized scientific workflows, OneSource Laboratory Services provides all the tools you need to increase your lab efficiencies and get more out of your ICP. Far beyond the traditional model of a laboratory services company, OneSource Laboratory Services becomes an integral part of your business, providing a high level of technical support and scientific expertise. Expect more from your laboratory services provider and discover our comprehensive set of tools to help empower your science and drive your business.

OneSource® Laboratory Services

THE MOST TRUSTED NAME IN ELEMENTAL ANALYSIS

From AA to ICP-OES and ICP-MS, we have been at the forefront of elemental analysis for more than 50 years. Join forces with us and give your laboratory the benefits of cutting-edge instrumentation, consistently excellent consumables, and the industry's largest and most trusted service and knowledgeable support network.

With thousands of installed instruments throughout the world, PerkinElmer has the experience and resources needed to offer you the best in ICP-OES.

With the Avio 200, we're once again pushing the boundaries of ICP instrumentation, providing a platform that gives you:

- Ten times faster startup – minutes vs. hours
- Half the argon consumption of other ICP systems
- 100% sample matrix flexibility

Discover the ICP that offers unsurpassed matrix tolerance and the lowest argon consumption on the market. Finally, there's a solution that gives you exactly what you need in terms of capability and affordability.

For more information, visit perkinelmer.com/avio200

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

PerkinElmer®

For a complete listing of our global offices, visit www.perkinelmer.com/ContactUs

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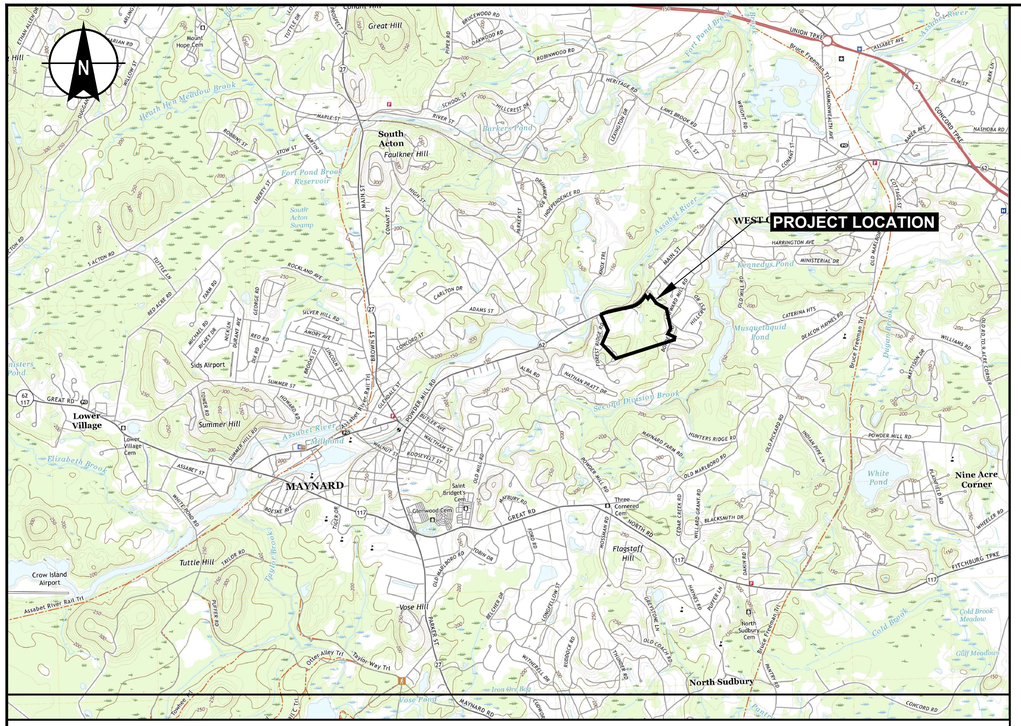
APPENDIX B
100% Sitewide Sediment and Soils Remedial Design
Phase 1 Drawings



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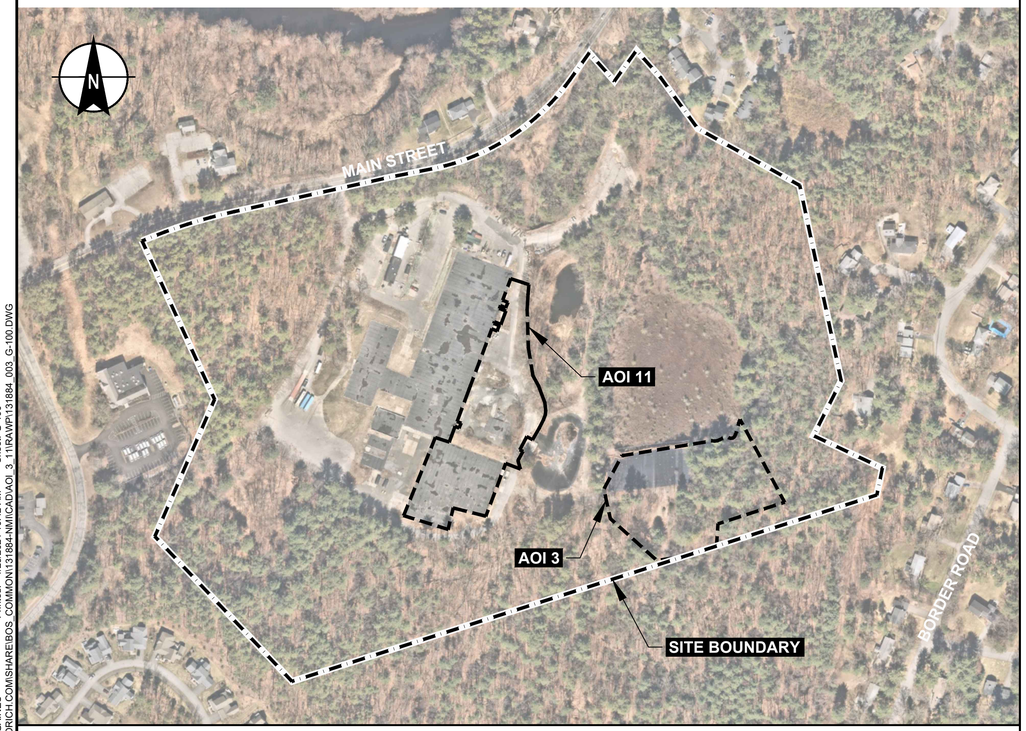

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Printed: 4/23/2024 10:42 AM
Sheet: G-100

NUCLEAR METALS, INC.
COURTYARD, LANDFILL, SPHAGNUM BOG, AND COOLING POND
RAWP REMEDIAL DESIGN

100% SITEWIDE SEDIMENT AND SOILS REMEDIAL DESIGN
PHASE 1
CONCORD, MASSACHUSETTS
APRIL 2024

DRAWING INDEX

SHEET NO.	SHEET TITLE	DESCRIPTION
1	G-100	TITLE SHEET AND DRAWING INDEX
2	G-101	NOTES
3	G-102	LEGEND
4	C-100	EXISTING CONDITIONS SITE OVERVIEW
5	C-101	EXISTING CONDITIONS LANDFILL
6	C-102	EXISTING CONDITIONS COURTYARD AND COOLING POND
7	C-200	SITE PREPERATION AND EROSION CONTROL OVERVIEW
8	C-201	SITE PREPARATION AND EROSION CONTROLS LANDFILL
9	C-202	SITE PREPARATION AND EROSION CONTROLS COURTYARD AND COOLING POND
10	C-300	COURTYARD PRE-EXCAVATION DRAINAGE IMPROVEMENTS AND GRADING
11	C-301	PRE-EXCAVATION PLAN FOR SPHAGNUM BOG SEDIMENT EXCAVATION
12	C-302	PRE-EXCAVATION PLAN COOLING POND
13	C-400	EXCAVATION PLAN LANDFILL
14	C-401	COLOR DEPTH PLAN LANDFILL
15	C-401-A	LANDFILL EXCAVATION AND GEOPHYSICAL DATA
16	C-402	EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 1
17	C-403	EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 2
18	C-404	EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 3
19	C-405	RESTORATION PLAN COURTYARD AND BUILDING E - PHASE 4
20	C-406	COLOR DEPTH PLAN COURTYARD AND BUILDING E
21	C-407	EXCAVATION CROSS-SECTIONS – COURTYARD AND BUILDING E
22	C-408	EXCAVATION PLAN FOR COOLING WATER POND SLOPES
23	C-409	EXCAVATION PLAN COOLING WATER POND
24	C-410	EXCAVATION SECTIONS COOLING POND
25	C-411	GROUNDWATER / SURFACE WATER INTERACTION SECTION
26	C-412	POST EXCAVATION BUILDING E FOOTPRINT
27	C-500	CONFIRMATORY SAMPLING LOCATIONS LANDFILL AND SPHAGNUM BOG
28	C-501	CONFIRMATORY SAMPLING LOCATIONS COURTYARD
29	C-502	CONFIRMATORY SAMPLING LOCATIONS COOLING WATER POND
30	C-503	CONFIRMATORY SAMPLING LOCATIONS BUILDING E
31	C-600	SITE RESTORATION PLAN LANDFILL AND BOG SEDIMENT
32	C-601	WETLAND RESTORATION PLAN
33	C-602	SITE RESTORATION PLAN COOLING POND
34	C-700	SITE PREPARATION DETAILS (1 OF 2)
35	C-701	SITE PREPARATION DETAILS (2 OF 2)
36	C-702	CONSTRUCTION DETAILS
37	C-703	TSCA EXCAVATED MATERIAL PROCESSING AREA DETAIL

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

Project No.:	131884
Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA

Stamp:

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

TITLE SHEET AND DRAWING INDEX

G-100

Sheet: 1 of 37

GENERAL

1. THE TERM "OWNER" REFERS TO DE MAXIMIS, INC.
2. THE TERM "ENGINEER" REFERS TO HALEY & ALDRICH, INC.
3. THE TERM "CONSTRUCTION MANAGER" REFERS TO TBD.
4. THE TERM "CONTRACTOR" REFERS TO ENTITIES CONTRACTED BY THE CONSTRUCTION MANAGER TO COMPLETE THE WORK.
5. THE TERM "WORK" REFERS TO ALL CONSTRUCTION RELATED ACTIVITIES PERFORMED IN ACCORDANCE WITH CONTRACT DOCUMENTS.
6. THE TERM "CONTRACT DOCUMENTS" REFERS TO DRAWINGS, SPECIFICATIONS, CONTRACT TERMS, AND OTHER DOCUMENTS CREATED FOR THE EXPRESSED PURPOSE OF COMPLETING THE WORK.
7. MEANS AND METHODS OF CONSTRUCTION ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE SUFFICIENT TO ACHIEVE THE PERFORMANCE OBJECTIVES OF THE PROJECT AS DESCRIBED IN THE SUBCONTRACTOR DOCUMENTS.
8. DETAILS TAKE PRECEDENCE OVER GENERAL DRAWINGS. WHERE NOTES CONFLICT WITH ANY DRAWING, THE MOST RESTRICTIVE SHALL APPLY. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING. NO CHANGES OR ADDITIONS TO THE SCOPE OF WORK DEPICTED HEREIN SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.
9. HORIZONTAL SURVEY DATUM SHALL BE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NORTH AMERICAN DATUM OF 1927 (NAD27). VERTICAL SURVEY DATUM SHALL BE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
10. LIMITS OF THE WORK AREA ARE INDICATED ON THE DRAWINGS. CONFINE ALL SITE ACTIVITIES WITHIN THE WORK AREAS INDICATED. ADDITIONAL CONSTRUCTION AREAS REQUIRED TO COMPLETE THE WORK, BUT NOT WITHIN THE LIMITS INDICATED, SHALL NOT BE PERMITTED.
11. ALL DESIGN EXCAVATION LIMITS AND VOLUMES ARE BASED ON REMOVAL TO MEET RECORD OF DECISION (ROD) CLEANUP STANDARDS BUT ARE NOT CONSIDERED FINAL. LIMITS OF EXCAVATION AND TOTAL VOLUMES MAY BE ADJUSTED BASED ON FUTURE REMEDIAL ACTION LEVEL (RAL) CALCULATIONS IN FUTURE DESIGN DRAWING PACKAGES.

SURVEY NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. BENCH MARK INFORMATION:

   TEMPORARY BENCH MARKS SET:

   TGS-1: MAGNETIC NAIL SET UP 1'ON THE SOUTHERLY SIDE OF UTILITY POLE AT THE INTERSECTION OF MAIN STREET AND THE DRIVEWAY TO #2228 MAIN STREET. ELEVATION=151.79'

   TGS-2: MAGNETIC NAIL SET UP 1' IN UTILITY POLE. ELEVATION=167.98'

   TBM PS-1: CHISEL SQUARE SET IN NORTHWEST CORNER OF LIGHT POLE BASE ELEVATION=172.60'

   TBM PS-2: CHISEL SQUARE SET IN NORTHWEST CORNER OF LIGHT POLE BASE ELEVATION=193.53'
3. ELEVATIONS WERE ESTABLISHED BY GPS OBSERVATIONS ON APRIL 17, 2020 AND CONVERTED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
4. CONTOUR INTERVAL EQUALS ONE (1) FOOT.
5. BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X" (UNSHADED), AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (F.E.M.A) FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR MIDDLESEX COUNTY, MASSACHUSETTS, MAP NUMBER 25017C0358F, TOWN OF CONCORD COMMUNITY NUMBER 250189, PANEL NUMBER 0358F, HAVING AN EFFECTIVE DATE OF JULY 7, 2014.
6. PLANIMETRIC SITE FEATURES WERE OBTAINED BY AERIAL MAPPING AND CONTOURS FROM LIDAR PREPARED BY BLUE SKY GEOSPATIAL, LTD. RECEIVED ON JUNE 3, 2020. ADDITIONAL FEATURES WERE VERIFIED BY INSTRUMENT SURVEYS BY FELDMAN LAND SURVEYORS BETWEEN APRIL 14 TO JUNE 16, 2020.
7. WETLAND DELINEATION SKETCH PREPARED BY COMPREHENSIVE ENVIRONMENTAL, INC. (CEI) WAS PROVIDED ON APRIL 29, 2020.
8. THE SEPTIC SYSTEM, AS SHOWN HEREON, WAS SCALED FROM A PLAN ENTITLED "PARKING AND SEPTIC SYSTEM LAYOUT", BY C. E. MAGUIRE, INCORPORATED, DATED JANUARY, 1982 AND IS APPROXIMATE ONLY.
9. THE UTILITIES ON THE SITE, AS SHOWN HEREON, WERE SCALED FROM DRAWING PRSCP_POST_REMOVAL_SITE_CONDITIONS.DWG AND ARE APPROXIMATE ONLY.
10. UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. THERE IS NO ASSUMED RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUBSURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUBSURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO EXCAVATION.
11. ELEVATIONS AND CONTOURS SHOWN IN THE HOLDING BASIN WITHIN THIS DRAWING SET ARE CONSIDERED APPROXIMATE AND BASED ON CONSTRUCTION THAT WILL BE COMPLETED PRIOR TO THE IMPLEMENTATION OF THE 100% SSS PHASE 1 REMEDIAL ACTION.

PROJECT SCOPE

1. THE PROJECT SCOPE IS AS FOLLOWS:
   - 1.1. ESTABLISH SITE CONTROLS AND CONSTRUCTION FACILITIES.
   - 1.2. DEMOLISH SURFACE FINISHES.
   - 1.3. INSTALL PRE-GRADING DRAINAGE FEATURES.
   - 1.4. PERFORM REMEDIAL GRADING.
   - 1.5. PERFORM FINAL GRADING.
   - 1.6. RESTORATION OF WORK AREA.

HEALTH AND SAFETY

1. CONTRACTOR SHALL PREPARE A CONTRACTOR'S HEALTH AND SAFETY PLAN (CHASP) TO BE APPROVED BY THE ENGINEER AND/OR CONSTRUCTION MANAGER.
2. THE CONTRACTOR SHALL PERFORM THE WORK IN SUCH A MANNER THAT THE SAFETY OF THE WORKERS IS ASSURED. THIS SHALL INCLUDE PROVISIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).
3. CONTRACTOR SHALL COMPLY AT ALL TIMES WITH THE SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS NOTED IN CONTRACTOR'S HASP, WITH ALL OSHA REQUIREMENTS, AND WITH THE OWNER'S SAFETY RULES.
4. CONSTRUCTION MANAGER SHALL CONDUCT DAILY SAFETY MEETINGS WHICH MUST BE ATTENDED BY ALL ONSITE CONTRACTOR PERSONNEL.
5. EXCAVATIONS SHALL BE PERFORMED IN ACCORDANCE WITH OSHA REGULATIONS AND STANDARDS. WHEN REMOVING UTILITIES OR EXCAVATING WITHIN 5 FT OF UTILITIES, AN AIR KNIFE EXCAVATION METHOD OR HAND DIGGING SHALL OCCUR. FOR MARKED UTILITIES THAT HAVE BEEN CONFIRMED TO BE INACTIVE, A HAND EXCAVATION WITHIN 1 TO 2 FT OF THE UTILITY LINE SHALL OCCUR. THE SUBCONTRACTOR IS RESPONSIBLE FOR CONTACTING DIG ALERT, AND ARE SOLELY RESPONSIBLE FOR CONFIRMING LOCATIONS OF UNDERGROUND UTILITIES.
6. WORK ON ELECTRICAL SYSTEMS MAY ONLY OCCUR AFTER THE ELECTRICAL HAZARD IS MITIGATED BY USE OF LOCK-OUT/TAG-OUT CONTROLS. SUBCONTRACTOR SHALL DE-ENERGIZE ELECTRICAL CHARGE PRIOR TO ANY MODIFICATION OR MOVEMENT OF ELECTRICAL SYSTEMS INCLUDING THOSE THAT DO NOT EXPOSE WIRING OR INTERIOR ELECTRICAL COMPONENTS.
7. THE CONTRACTOR TO MAINTAIN SAFE DISTANCE REQUIREMENTS FOR ALL THE ABOVE GROUND POWER DISTRIBUTION AND TRANSMISSION WIRES AND STRUCTURES.
8. PLACE ALL SAFETY DEVICES, CONSTRUCTION ROAD SIGNING, AND CONSTRUCTION SIGNING PRIOR TO ANY SITE MOBILIZATION, CONSTRUCTION, EXCAVATION AND DRILLING. THE SUBCONTRACTOR SHALL PROVIDE THE NECESSARY FLAG PERSONS FOR MOBILIZATION OF TRUCKS, EQUIPMENT AND PERSONNEL AS NEEDED. PROPERLY SECURE WORK AREAS AT THE END OF EACH WORKDAY.

COMPLIANCE AND STANDARDS

1. CONTRACTOR SHALL OBTAIN ANY/ALL NECESSARY CONSTRUCTION PERMITS AND SCHEDULE ANY REQUIRED INSPECTIONS. THE CONTRACTOR SHALL MAINTAIN COPIES OF ANY PERMITS AT THE JOB SITE FOR AGENCY INSPECTION AND PROVIDE A COPY TO THE ENGINEER AND/OR CONSTRUCTION MANAGER PRIOR TO BEGINNING WORK.
2. WORK SHALL COMPLY WITH ALL NATIONAL, STATE, AND LOCAL LAWS, REGULATIONS, CODES, REQUIREMENTS AND STANDARDS, INCLUDING REVISIONS TO DATE OF CONTRACT OR REVISIONS TO THE CONTRACT. UNLESS OTHERWISE SPECIFIED, THE LATEST EDITIONS OR REVISIONS OF THESE CODES AND STANDARDS SHALL BE ENFORCED:
   - 2.1. OSHA EXCAVATION REGULATIONS AND STANDARDS
   - 2.2. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
   - 2.3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
   - 2.4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
   - 2.5. NATIONAL ELECTRIC CODE (NEPA)

WORKING HOURS

1. CONSTRUCTION ACTIVITIES SHALL BE CONDUCTED BETWEEN 7:00 AM AND 5:00 PM MONDAY THROUGH FRIDAY UNLESS OTHERWISE APPROVED BY THE ENGINEER AND/OR CONSTRUCTION MANAGER. NIGHT OR SATURDAY WORK MAY BE APPROVED BY CONSTRUCTION MANAGER UPON REQUEST.

ENVIRONMENTAL CONTROLS

1. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE AND FEDERAL REQUIREMENTS TO MINIMIZE DUST, NOISE, STORMWATER IMPACTS, AND OTHER NUISANCE ACTIVITIES.
2. CONTRACTOR SHALL ESTABLISH, MAINTAIN, INSPECT AND REPAIR ALL STORMWATER AND EROSION AND SEDIMENTATION CONTROLS (BMPS) AS NEEDED TO CONTROL SEDIMENT AND RUNOFF FROM DISTURBED PROJECT AREAS, AND/OR REQUIRED BY PROJECT ENVIRONMENTAL PERMITS.
3. CONTRACTOR SHALL MONITOR THE EFFECTIVENESS OF ENVIRONMENTAL CONTROLS AND SUPPLEMENT OR MODIFY THEM AS NEEDED BASED ON SITE OPERATIONS TO MAINTAIN COMPLIANCE WITH THE PERMIT CONDITIONS AND CONTRACT DOCUMENTS.
4. CONTRACTOR SHALL PROVIDE STORM WATER RUN-ON AND RUN-OFF CONTROLS FOR OPEN EXCAVATIONS AND STOCKPILES. STOCKPILES MUST BE APPROVED IN WRITING BY THE ENGINEER AND/OR CONSTRUCTION MANAGER AND IN ACCORDANCE WITH APPLICABLE PERMITS AND CONTRACT DOCUMENTS.
5. ANY SURFACE WATER OR STORM WATER WHICH COLLECTS IN EXCAVATED AREAS SHALL BE CONTAINED, TREATED, AND DISCHARGED OR DISPOSED OF APPROPRIATELY IN ACCORDANCE WITH APPLICABLE PERMITS AND CONTRACT DOCUMENTS. CONTRACTOR SHALL SAMPLE, ANALYZE, AND BASED ON ANALYTICAL RESULTS, APPROPRIATELY MANAGE OF AT THE CONTRACTOR'S EXPENSE.
6. CONTRACTOR SHALL PROVIDE STORM DRAIN INLET PROTECTION.
7. CONTRACTOR SHALL PROVIDE DUST CONTROL AND ENSURE VISIBLE DUST DOES NOT CROSS THE PROPERTY LINE.
8. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL MATERIALS DESIGNATED FOR REMOVAL FROM THE PROJECT SITE, UNLESS DIRECTED OTHERWISE BY THE CONSTRUCTION MANAGER.

SITE PREPARATION AND MAINTENANCE

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS AND LOCATIONS SHOWN PRIOR TO COMMENCING WORK. ANY CONFLICTS WITH DETAILS AND NOTES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER AND/OR CONSTRUCTION MANAGER IN WRITING.
2. THE CONTRACTOR SHALL MAINTAIN AN ORDERLY AND CLEAN JOB SITE. THE CONTRACTOR SHALL REMOVE AND PROPERLY STORE OR DISPOSE OF ALL CONSTRUCTION RELATED TRASH, DEBRIS, AND EXCESS MATERIALS AT THE END OF EACH WORK SHIFT.
3. THE CONTRACTOR'S LAYDOWN AREA FOR MATERIALS SHALL BE COORDINATED WITH THE ENGINEER AND/OR CONSTRUCTION MANAGER, AND OTHER CONTRACTORS (IF APPLICABLE). SECURITY FOR CONTRACTOR'S EQUIPMENT AND MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR.
4. TEMPORARY CONSTRUCTION UTILITY CONNECTIONS SHALL BE APPROVED AND PERMITTED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
5. CONTRACTOR SHALL PREPARE THE WORK AREAS AND WORKING SURFACE IN ACCORDANCE WITH THE TEMPORARY CONTROLS AND SITE ACCESS DRAWINGS.
6. CONTRACTOR SHALL COORDINATE WITH DE MAXIMIS TO CLEAR VEGETATION WITHIN THE WORK AREA LIMITS AS REQUIRED.
7. VEHICLES AND EQUIPMENT SHALL ONLY ENTER/EXIT THE SITE BY LOCATIONS SPECIFIED ON THESE PLANS.

UTILITIES AND EXISTING INFRASTRUCTURE

1. CONTRACTOR SHALL LOCATE ALL UTILITIES AND PROTECT THEM FROM DAMAGE UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ANY UTILITIES DAMAGED BY THE CONTRACTOR AND PROVIDE FOR SERVICE CONTINUATIONS DURING REPAIRS AT NO EXPENSE TO THE ENGINEER, CONSTRUCTION MANAGER, OR OWNER.
2. UTILITY LOCATIONS DEPICTED WITHIN THE PROJECT BOUNDARIES ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE UTILITY LOCATIONS AND DEPTHS, AND IDENTIFYING UNDOCUMENTED UTILITIES PRIOR TO CONSTRUCTION. EXCAVATIONS SHALL BE CONDUCTED BY HAND OR AIR-KNIFE IF WITHIN FIVE FEET OF SUSPECTED UTILITIES OR WITHIN 2 FEET OF A UTILITY SATISFACTORILY EXPOSED BY POTHOLING AS DETERMINED BY THE ENGINEER AND/OR CONSTRUCTION MANAGER. UTILITIES, IF ANY, THAT ARE NOT TO BE DEMOLISHED AND ARE EXPOSED DURING EXCAVATION SHALL BE SUPPORTED BY BRACES OR OTHERWISE PROTECTED DURING CONSTRUCTION ACTIVITIES.
3. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL DOCUMENT THE QUANTITY, SIZE, DIMENSIONS AND LOCATION OF ALL PRE-EXISTING LANDSCAPING, HARDSCAPE, CONCRETE SIDEWALK CRACKS, CONCRETE CULVERT CRACKS, CONDITION OF ASPHALT DIMENSIONS, STRIPING, SIGN POST LOCATIONS, FENCING, PIPING, UTILITY LINES, CURBS AND PAINTING, UTILITY BOX LIDS AND OTHER EXISTING CONDITIONS WHICH THE CONTRACTOR SHALL BE REQUIRED TO RESTORE TO THEIR PRE-EXISTING CONDITION. DOCUMENTATION SHALL BE PROVIDED IN A MEMORANDUM FORMAT. USE OF TABLES AND PHOTOGRAPHS ARE ACCEPTABLE.
4. THE PROPOSED AND EXISTING UNDERGROUND AND ABOVE GROUND FACILITIES, STRUCTURES, UTILITIES, SURFACE FEATURES AND NATURAL FEATURES SHOWN HEREON ARE BASED ON FIELD SURVEYS AND RECORD DOCUMENTS. OTHER FACILITIES MAY EXIST NOT DISCOVERED THROUGH THE RECORD CHECK. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION, BOTH VERTICAL AND HORIZONTAL, OF ALL UTILITIES FROM THE APPROPRIATE UTILITY COMPANIES AND ONE CALL 811 SERVICES. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
5. TAKE ALL NECESSARY MEASURES TO PREVENT DAMAGE TO ADJACENT AND NEARBY STRUCTURES, PAVEMENT, FENCING AND LANDSCAPING. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF THE ROADS, TREES AND NEARBY PUBLIC AND PRIVATE PROPERTY AND PUBLIC RIGHT OF WAYS FROM ANY SITE CONSTRUCTION/ EQUIPMENT DAMAGE CAUSED BY THE CONTRACTOR'S EQUIPMENT. ALL DAMAGE SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE ENGINEER, CONSTRUCTION MANAGER, OR OWNER. REMOVE AND STORE ANY FENCING OR OTHER ITEMS NEEDED TO BE REMOVED TO PERFORM THE WORK AND RETURN TO THE ORIGINAL CONDITION AT THE COMPLETION OF ALL WORK. REMOVE AND STORE ANY CURB, FENCING OR OTHER ITEMS NEEDED TO BE REMOVED TO PERFORM THE WORK AND RETIRE TO THE ORIGINAL CONDITION AT THE COMPLETION OF ALL WORK. PERMANENT FENCING REMOVED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR TO THE ORIGINAL LOCATION AND CONDITION TO THE SATISFACTION OF THE OWNER AND CONSTRUCTION MANAGER.

EXCAVATION AND BACKFILLING

1. ALL OPEN EXCAVATIONS SHALL BE SUPPORTED IN ACCORDANCE WITH APPLICABLE OSHA REQUIREMENTS.
2. OPEN TRENCHES SHALL BE COMPLETELY SURROUNDED BY TEMPORARY SAFETY FENCING OR COVERED BY TRAFFIC RATED STEEL PLATES AT ALL TIMES WHEN WORK IS NOT BEING DONE IN THE IMMEDIATE AREA. THE SAFETY FENCING AND/OR STEEL PLATES SHALL BE MAINTAINED UNTIL THE TRENCH IS BACKFILLED AND COMPACTED TO MATCH EXISTING GRADE.
3. THE CONTRACTOR SHALL PROVIDE TRENCH PLATES AND TRAFFIC CONTROL, AS NECESSARY TO MAINTAIN NORMAL SITE ACCESS AND TRAFFIC FLOW. A 25 FOOT WIDE EMERGENCY FIRE VEHICLE LANE MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE APPROVED BY ENGINEER AND/OR CONSTRUCTION MANAGER.
4. PRIOR TO BACKFILL, ANY DEVIATION FROM THE PLANNED WORK SHOULD BE CAPTURED AND NOTED ON REDLINES DRAWINGS. SURVEY DATA OR FIELD MEASUREMENTS ARE BOTH ACCEPTABLE METHODS FOR DOCUMENTING INSTALL LOCATIONS..
5. THE CONTRACTOR SHALL NOT BACKFILL THE EXCAVATIONS UNLESS WRITTEN APPROVAL IS PROVIDED BY THE ENGINEER AFTER SOIL TESTING. IF ENGINEER DETERMINES LOCAL CONDITIONS REQUIRE IMMEDIATE BACKFILL OF TRENCH, PRESSURE TESTING MAY OCCUR AFTER BACKFILLING IN THE PRESENCE OF THE ENGINEER.
6. CONTRACTOR SHALL DESIGN AND INSTALL TEMPORARY SUPPORT OF EXCAVATION (SOE) AS NEEDED FOR EXCAVATIONS DEEPER THAN 4 FEET TO PROTECT WORKERS AND/OR ADJACENT INFRASTRUCTURE. CONTRACTOR SHALL REMOVE ALL TEMPORARY SOE ELEMENTS UPON COMPLETION OF THE WORK TO THE SATISFACTION OF THE ENGINEER. A PRE-ENGINEERED TRENCH BOX MAY BE USED IN PLACE OF AN ENGINEER DESIGNED SOE SYSTEM.
7. SAFE INGRESS AND EGRESS MEASURES SHALL BE USED DURING EXCAVATION ACTIVITIES.
8. ASPHALT AND CONCRETE MATERIAL SHALL BE BROKEN DOWN INTO PIECES LESS THAN 1' ACROSS. METAL REBAR AND OTHER DEBRIS SHALL BE BROKEN DOWN INTO 1' PIECES, PER FACILITY RECEIVING REQUIREMENTS. REFER TO SPECIFICATION 02 41 00 DEMOLITION.

RESTORATION

1. SURFACES SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS SHOWN ON THE DRAWINGS.
2. FEATURES INCLUDING BUT NOT LIMITED TO FENCING, IRRIGATION, CURBS, SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS SHOWN ON THE DRAWINGS AND INDICATED IN THE SPECIFICATIONS.
3. BACKFILL EXCAVATION AND RESTORE THE WORK AREA PER THE DRAWINGS.

AS-BUILT DRAWINGS

1. CONTRACTOR SHALL PROVIDE A SET OF AS-BUILT DRAWINGS WITH REDLINE MARKUPS DEPICTING THE PRECISE LOCATION OF ALL COMPONENTS INCLUDED IN THE CONSTRUCTION DOCUMENTS AND INDICATE CLEARLY ANY FIELD ADJUSTMENTS MADE THAT DEVIATE FROM THE DESIGN PLANS.
2. CONTRACTOR SHALL SURVEY SUBGRADE ELEVATIONS FOLLOWING FINAL EXCAVATION GRADES, AND SURVEY FINISHED GRADES AFTER BACKFILLING. DETAILS OF THE RESTORED FEATURES INCLUDING MATERIAL TYPES SHALL BE INCLUDED IN THE AS-BUILT SURVEY AND SHALL BE PROVIDED IN AUTOCAD 2018 OR NEWER FORMAT AS WELL AS IN A PDF.

SUGGESTED CONSTRUCTION SEQUENCE

1. MOBILIZE.
2. INSTALL EROSION AND SEDIMENTATION CONTROLS IN THE WORK AREA INCLUDING FIBER ROLLS, SILT FENCES, CHECK DAMS, STRAW WATTLES, AND STRAW BALES. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES, EXISTING SITE ACCESS PATH IMPROVEMENT, AND WHEEL WASH. PROTECT-IN-PLACE FEATURES AS REQUIRED.
3. CONSTRUCT EXCAVATED SOIL STOCKPILE AND GRANULAR FILL MATERIAL STOCKPILE AREAS.
4. CLEAR AND GRUB THE EXCAVATION AREAS WITHIN THE AREA OF WORK INCLUDING PAVEMENT REMOVAL AS REQUIRED.
5. INSTALL POND DEWATERING TREATMENT SYSTEM PRIOR TO COOLING POND WORK
6. EXCAVATE AND PLACE SOIL AS REQUIRED AS PART OF THE PRE-GRADING DRAINAGE IMPROVEMENT.
7. EXCAVATE SOILS AS REQUIRED TO MEET THE GRADES INDICATED ON THE PLANS.
8. ALLOW FOR ENGINEER TO SAMPLE AND ANALYZE BOTTOM AND SIDEWALL OF EXCAVATION AT VARIOUS LOCATIONS AS SHOWN ON THE PLAN. ALLOW FOR UP TO 30 DAYS.
9. EXCAVATE ADDITIONAL SOIL AS REQUIRED BASED ON SAMPLE RESULTS.
10. COMPACT AND BACKFILL GRANULAR FILL AS REQUIRED TO MAKE FINAL GRADES.
11. RESTORE SITE AS INDICATED.
12. REMOVE TEMPORARY FEATURES AND FACILITIES.
13. DEMOBILIZE.

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

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Designed By:	HA
Checked By:	HA
Approved By:	HA

Stamp:

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

NOTES

G-101

Sheet: 2 of 37

CIVIL FEATURES / SURVEY DATA

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARDRAIL
- EXISTING GROUND CONTOUR (99)
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- STONE WALL
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- ELECTRICAL BOX (ELB)
- TREE/SHRUB
- STAIRS
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- HYDRANT
- WATER/GAS SHUT OFF/GATE
- GUY WIRE
- UTILITY POLE
- BOLLARD
- POST
- GATE POST (GP)
- SIGN
- TRANSFORMER
- ELECTRIC METER (EM)
- ASPHALT
- CONCRETE
- GRAVEL

- HISTORICAL SAMPLE LOCATION
- PROPOSED SAMPLE LOCATION
- N: XXXXX.XX E: XXXXX.XX — EXCAVATION CORNER COORDINATE
- LIMIT OF EXCAVATION
- 99 — 1 FT PROPOSED CONTOUR
- PROPOSED DRAIN PIPE
- PRE-CAST CONCRETE BLOCKS
- STRAW WATTLES
- STRAW BALES
- TRUCK ROUTE
- PROPOSED TRUCK PATH
- PROPOSED LAYDOWN / STOCKPILE AREA
- PROPOSED DEMOLITION AREA
- PRECAST CONCRETE BLOCKS
- MATERIAL PROCESSING AREA

DEFINITIONS

CI = CAST IRON

CS = COATED STEEL

PL = PLASTIC

RCP = REINFORCED CONCRETE PIPE

12" D (CL) = PIPE SIZE AND MATERIAL

BIT = BITUMINOUS

CB = CONCRETE BOUND

CC = CONCRETE CURB

CONC = CONCRETE

HP = HIGH PRESSURE

IP = IRON PIPE

IR = IRON ROD

R = RIM ELEVATION

RET = RETAINING

SB = STONE BOUND

SGC = SLOPED GRANITE CURB

VGC = VERTICAL GRANITE CURB

WF = WIRE FENCE

NMI = NUCLEAR METALS, INC.

SOE = SUPPORT OF EXCAVATION

TYP = TYPICAL

O.C. = ON CENTER

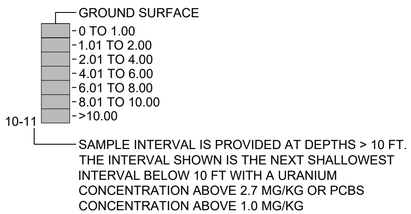
NAD83 = NORTH AMERICAN DATUM OF 1983

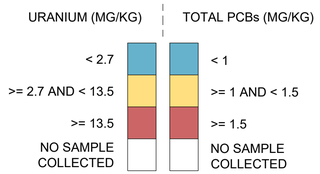
NGVD29 = NATIONAL GEODETIC VERTICAL DATUM OF 1929

PLAN SHEET DATA

- AOI-8-1 — PROFILE REFERENCE (PROFILE AOI8-1)
- 1 / C-700 — DETAIL REFERENCE (DETAIL 1 ON SHEET C-700)
- AREA OF CUT
- AREA OF FILL

SAMPLE LEGEND





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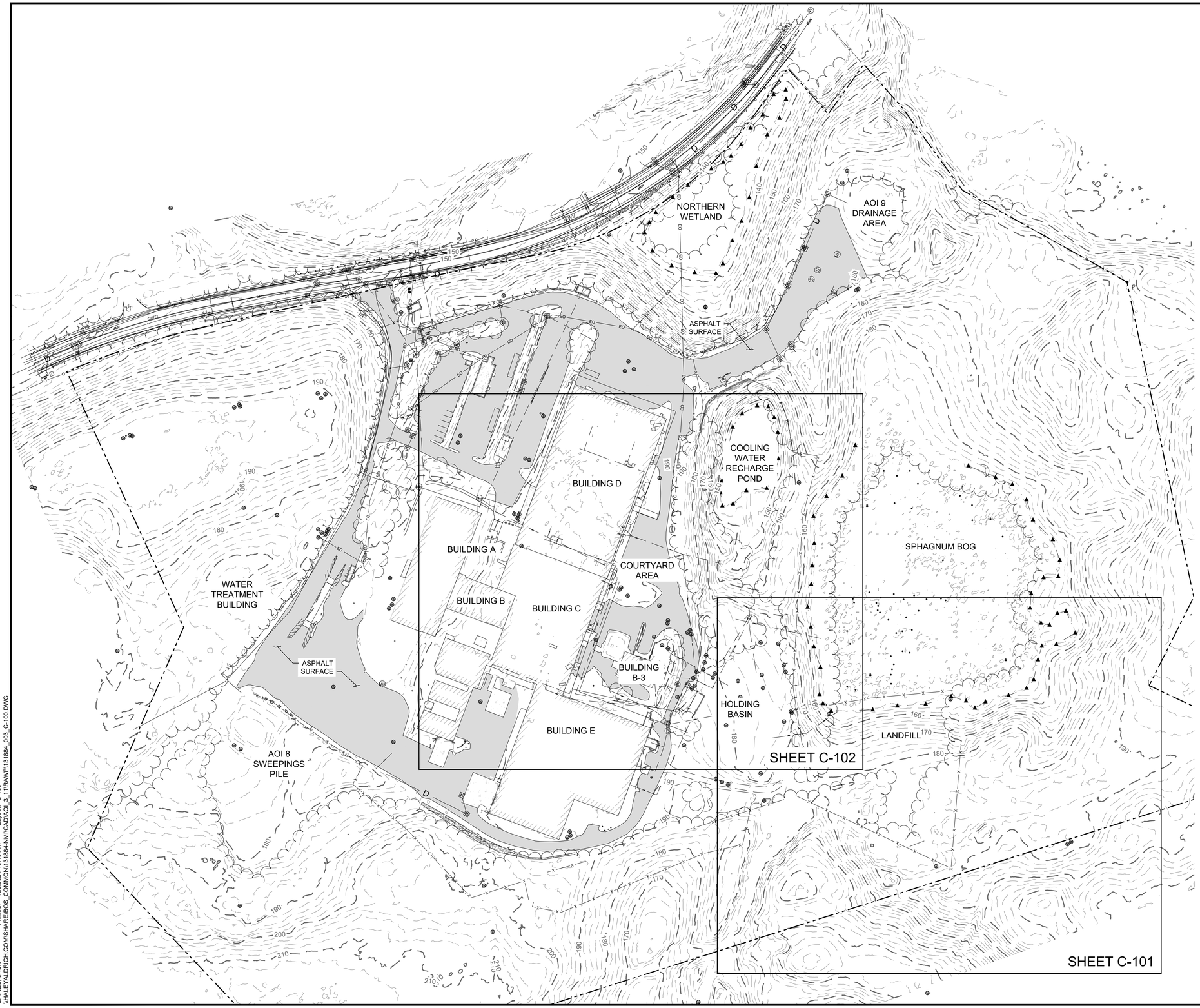
LEGEND

G-102



LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARDRAIL
- 2 FT EXISTING GROUND CONTOUR
- 10 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101.
   FOR LEGEND SEE G-102.

0 80 160 240 320
SCALE IN FEET

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NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXISTING CONDITIONS SITE OVERVIEW

C-100

Sheet: 4 of 37

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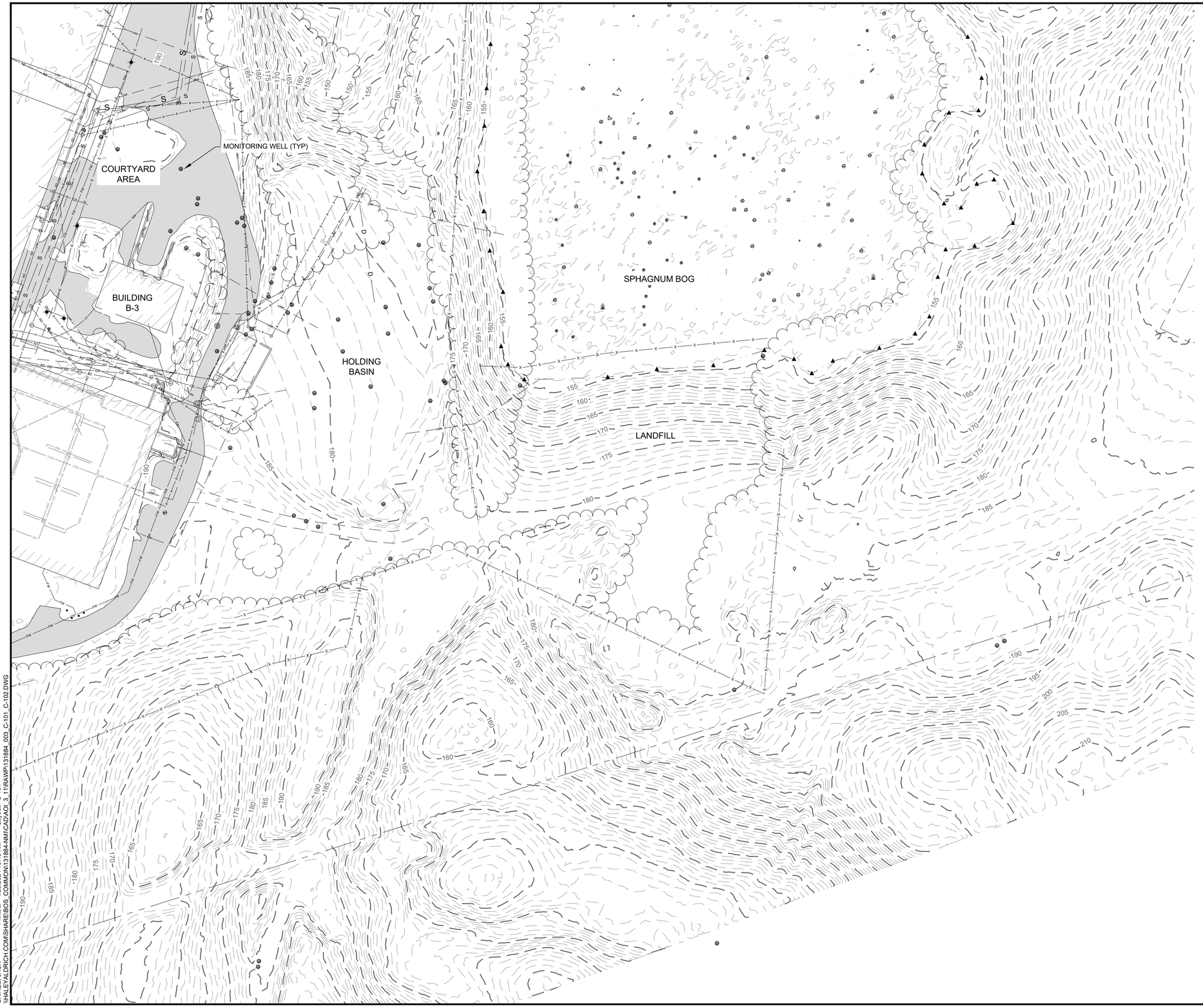

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- ACID DRAIN LINE
- ACID WASTE LINE
- COOLING DRAIN
- WATER WELL LINE
- FIRE LOOP WATER LINES
- HYDRANT LINE
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.

0 40 80 120 160
SCALE IN FEET

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

Project No.:	131884
Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
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NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXISTING CONDITIONS LANDFILL

C-101

Sheet: 5 of 37

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LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- ACID DRAIN LINE
- ACID WASTE LINE
- COOLING DRAIN
- WATER WELL LINE
- FIRE LOOP WATER LINES
- HYDRANT LINE
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.

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CONCORD, MASSACHUSETTS

EXISTING CONDITIONS COURTYARD AND COOLING POND

C-102

Sheet: 6 of 37

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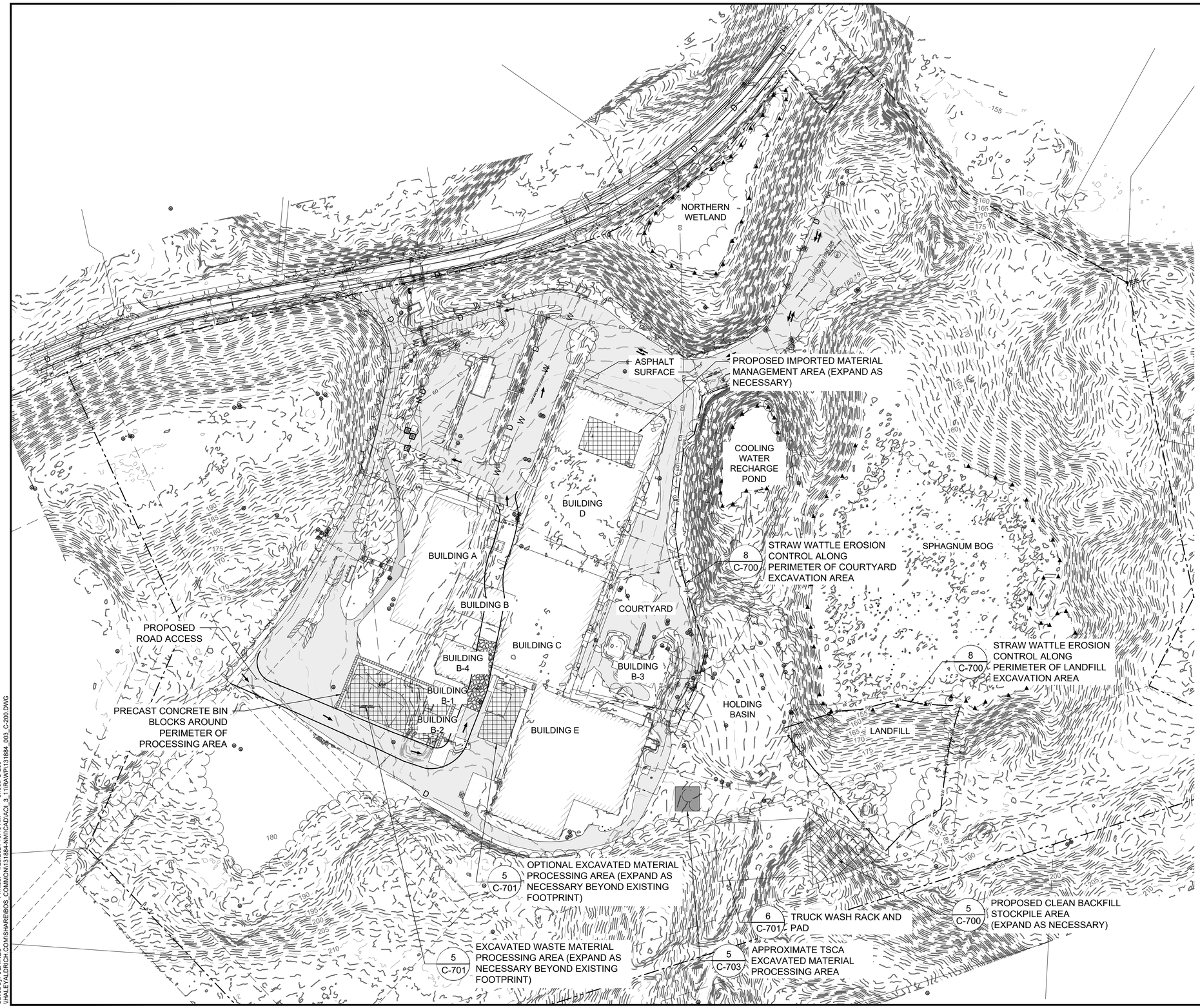

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- STRAW WATTLE
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PRE-CAST CONCRETE BLOCKS
- TRUCK ROUTE
- PROPOSED TRUCK PATH
- PROPOSED LAYDOWN / STOCKPILE AREA
- PROPOSED DEMOLITION AREA
- MATERIAL PROCESSING AREA
- TSCA EXCAVATED MATERIAL PROCESSING AREA

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-102.
2. TREE CLEARING LIMITS ARE APPROXIMATE. ADDITIONAL CLEARING MAY BE NECESSARY AS THE WORK PROGRESSES.

0 80 160 240 320
SCALE IN FEET

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COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

SITE PREPERATION AND EROSION CONTROL OVERVIEW

C-200

Sheet: 7 of 37

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LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PRE-CAST CONCRETE BLOCKS
- TRUCK ROUTE
- PROPOSED TRUCK PATH
- PROPOSED LAYDOWN / STOCKPILE AREA
- PROPOSED DEMOLITION AREA
- MATERIAL PROCESSING AREA
- TSCA EXCAVATED MATERIAL PROCESSING AREA
- STRAW WATTLE

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. UNLESS NOTED FOR ABANDONMENT, MONITORING WELLS SHALL BE PROTECTED IN ACCORDANCE WITH SPECIFICATION 33 29 00, MONITORING WELL ABANDONMENT AND PROTECTION.

0 40 80 120 160
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AND COOLING POND
SSS PHASE 1
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CONCORD, MASSACHUSETTS

SITE PREPARATION AND EROSION CONTROLS LANDFILL

C-201

Sheet: 8 of 37

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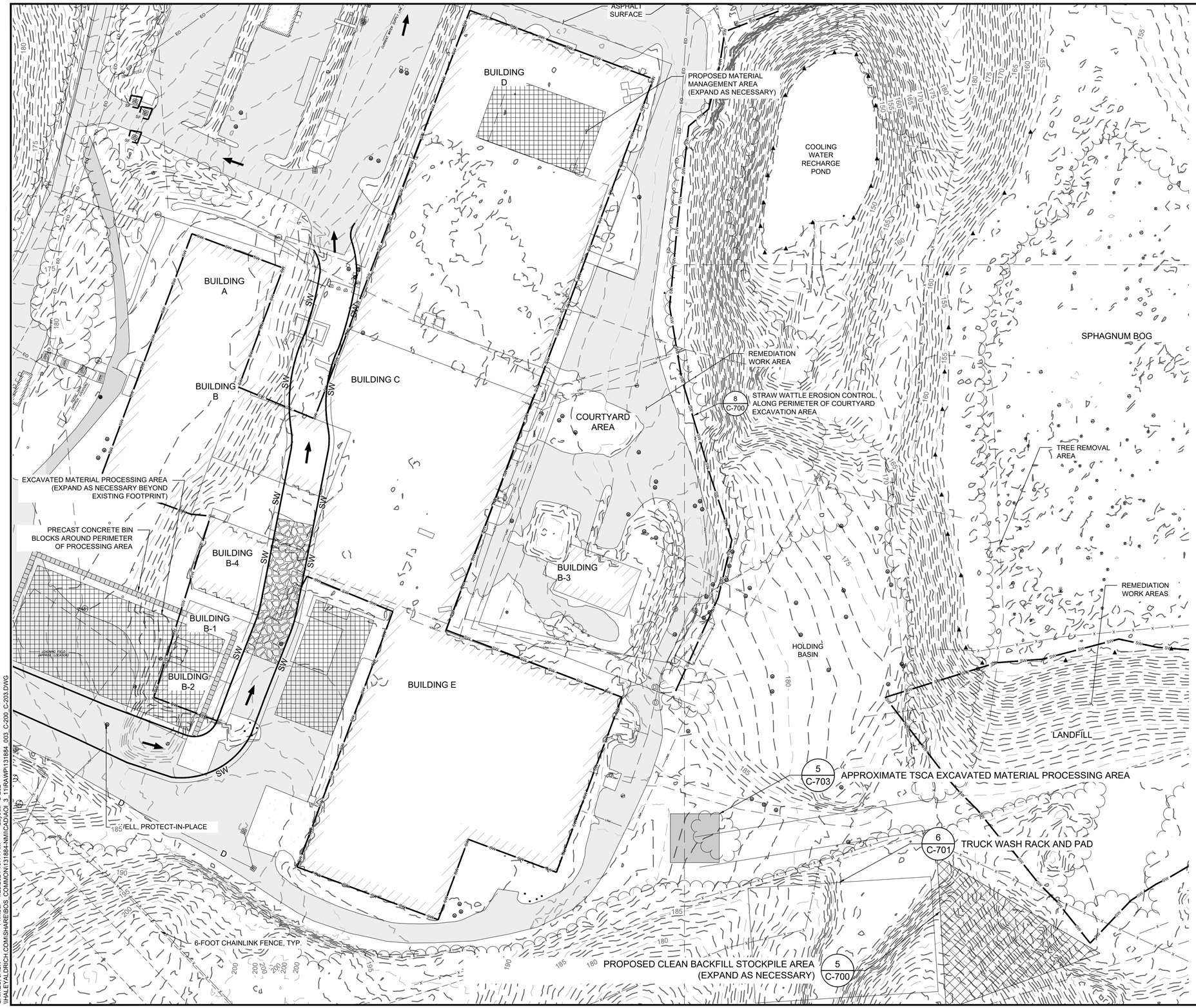

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PRE-CAST CONCRETE BLOCKS
- TRUCK ROUTE
- PROPOSED TRUCK PATH
- PROPOSED LAYDOWN / STOCKPILE AREA
- PROPOSED DEMOLITION AREA
- MATERIAL PROCESSING AREA
- TSCA EXCAVATED MATERIAL PROCESSING AREA
- SW STRAW WATTLE

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.

N

0 40 80 120 160
SCALE IN FEET

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Fax: 617.886.7600
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CONCORD, MASSACHUSETTS

SITE PREPARATION AND EROSION CONTROLS COURTYARD AND COOLING POND

C-202

Sheet: 9 of 37

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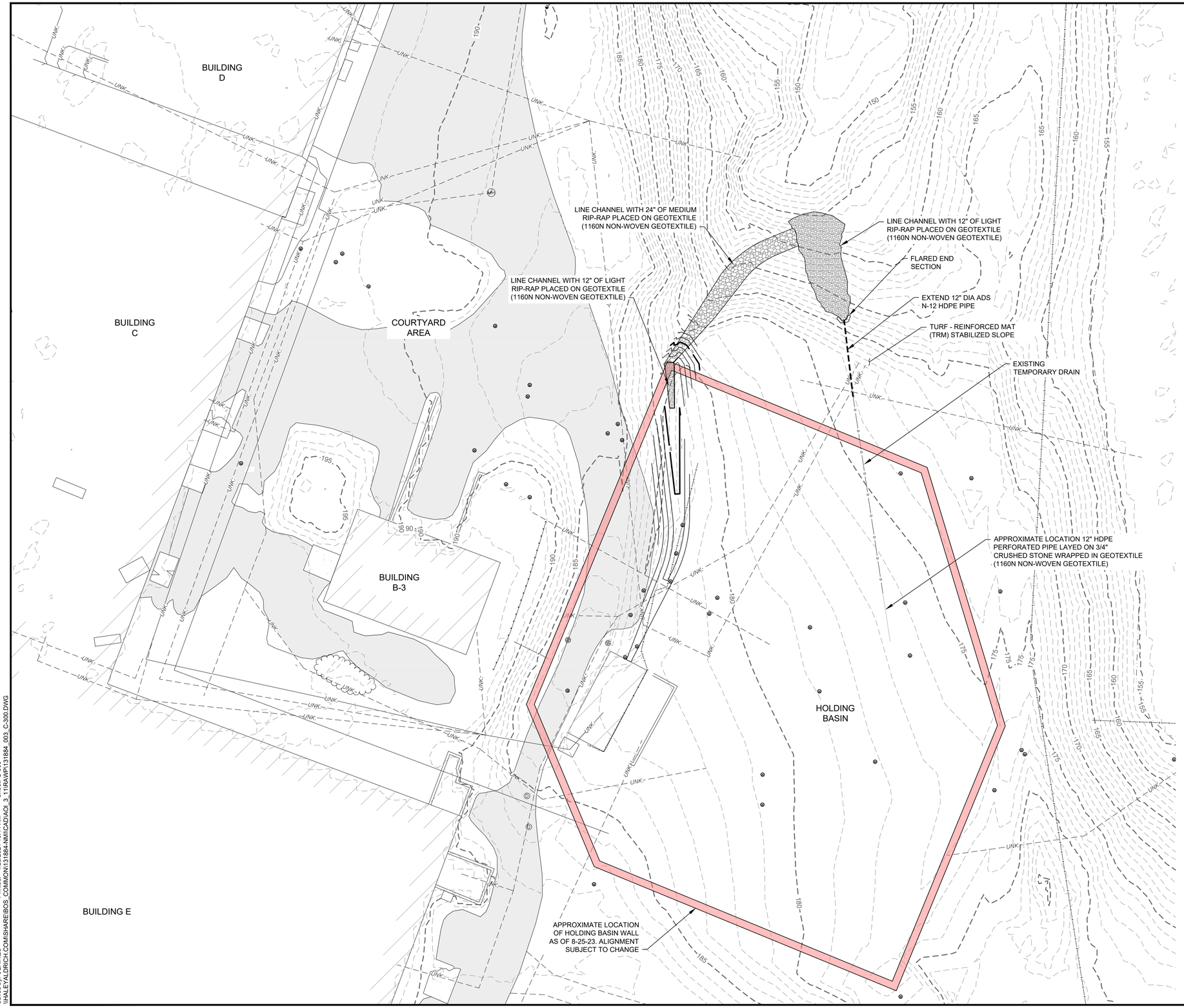

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

0 20 40 60 80
SCALE IN FEET

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CONCORD, MASSACHUSETTS

COURTYARD PRE-EXCAVATION DRAINAGE IMPROVEMENTS AND GRADING

C-300

Sheet: 10 of 37

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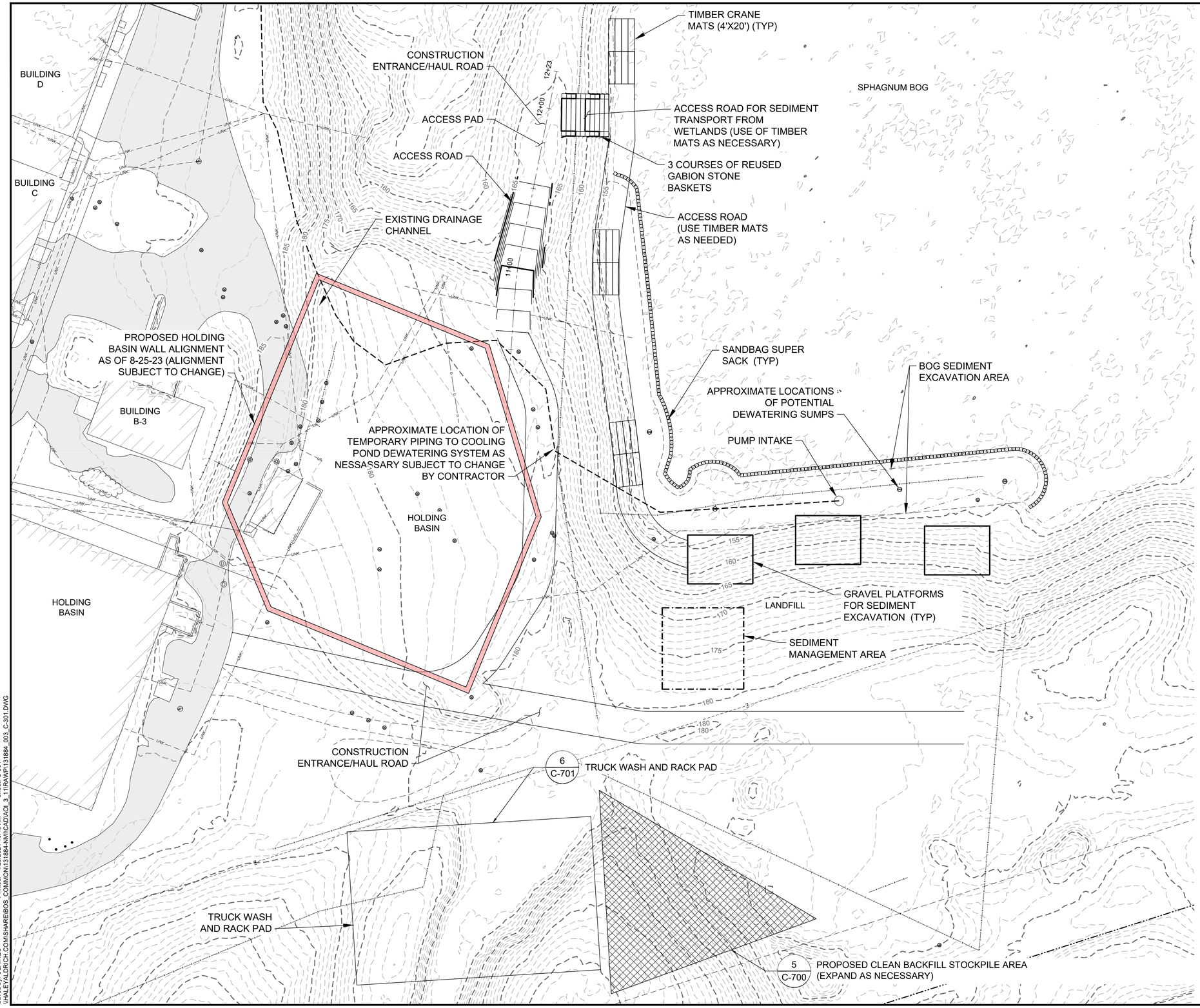

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- TEMPORARY PIPING
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PRE-CAST CONCRETE BLOCKS
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- SANDBAG SUPER STACK (TYP)
- PROPOSED LAYDOWN / STOCKPILE AREA

BOG SEDIMENT EXCAVATION VOLUME:
CUT: 1,127 CY.
FILL: 0 CY.
NET: 1,127 CY. <CUT>

0 30 60 90 120
SCALE IN FEET

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CONCORD, MASSACHUSETTS

PRE-EXCAVATION PLAN FOR SPHAGNUM BOG SEDIMENT EXCAVATION

C-301

Sheet: 11 of 37

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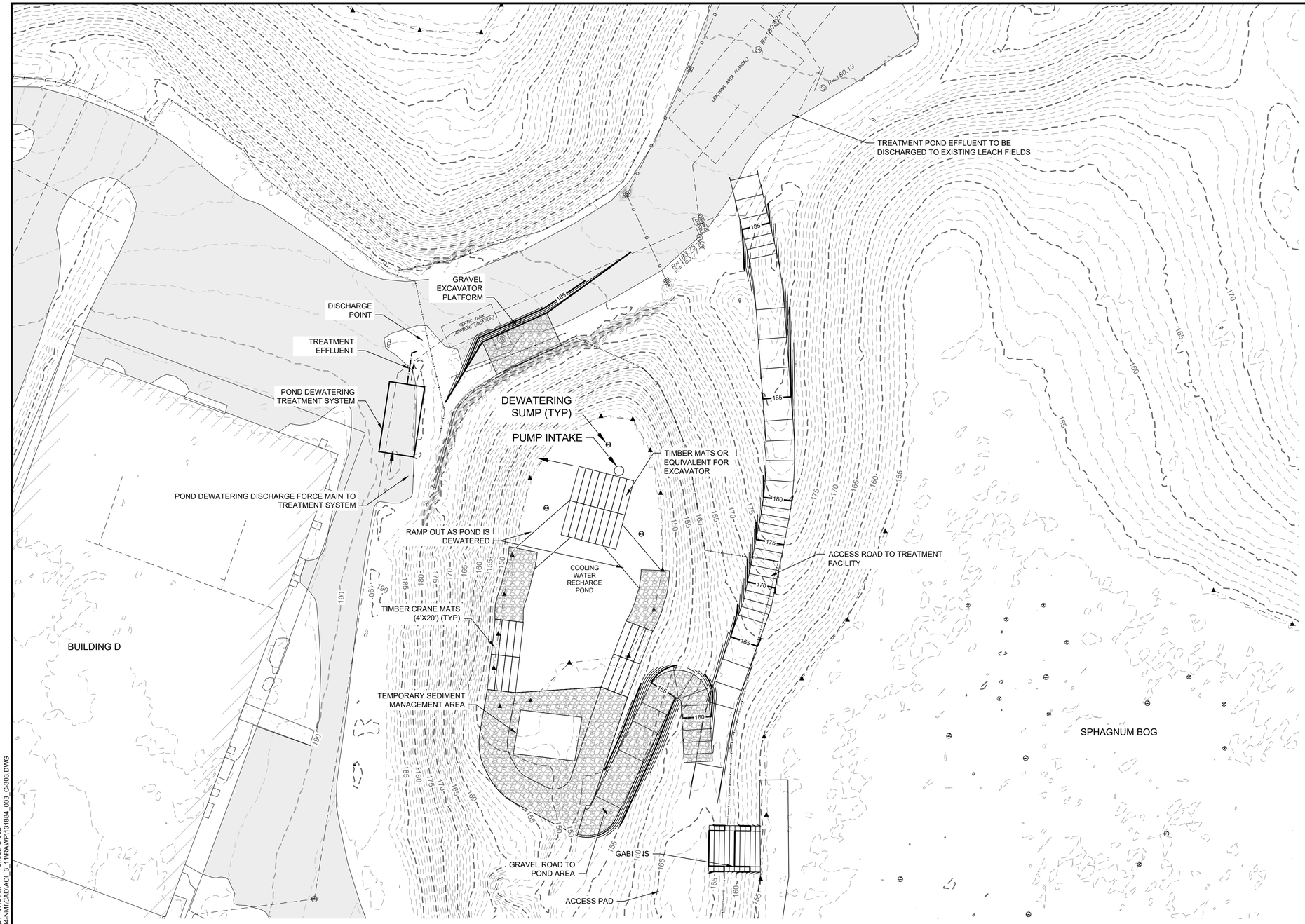

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
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- WATER LINE
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- VEGETATION BOUNDARY
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- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

N

0 30 60 90 120

SCALE IN FEET

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CONCORD, MASSACHUSETTS

PRE-EXCAVATION PLAN COOLING POND

C-302

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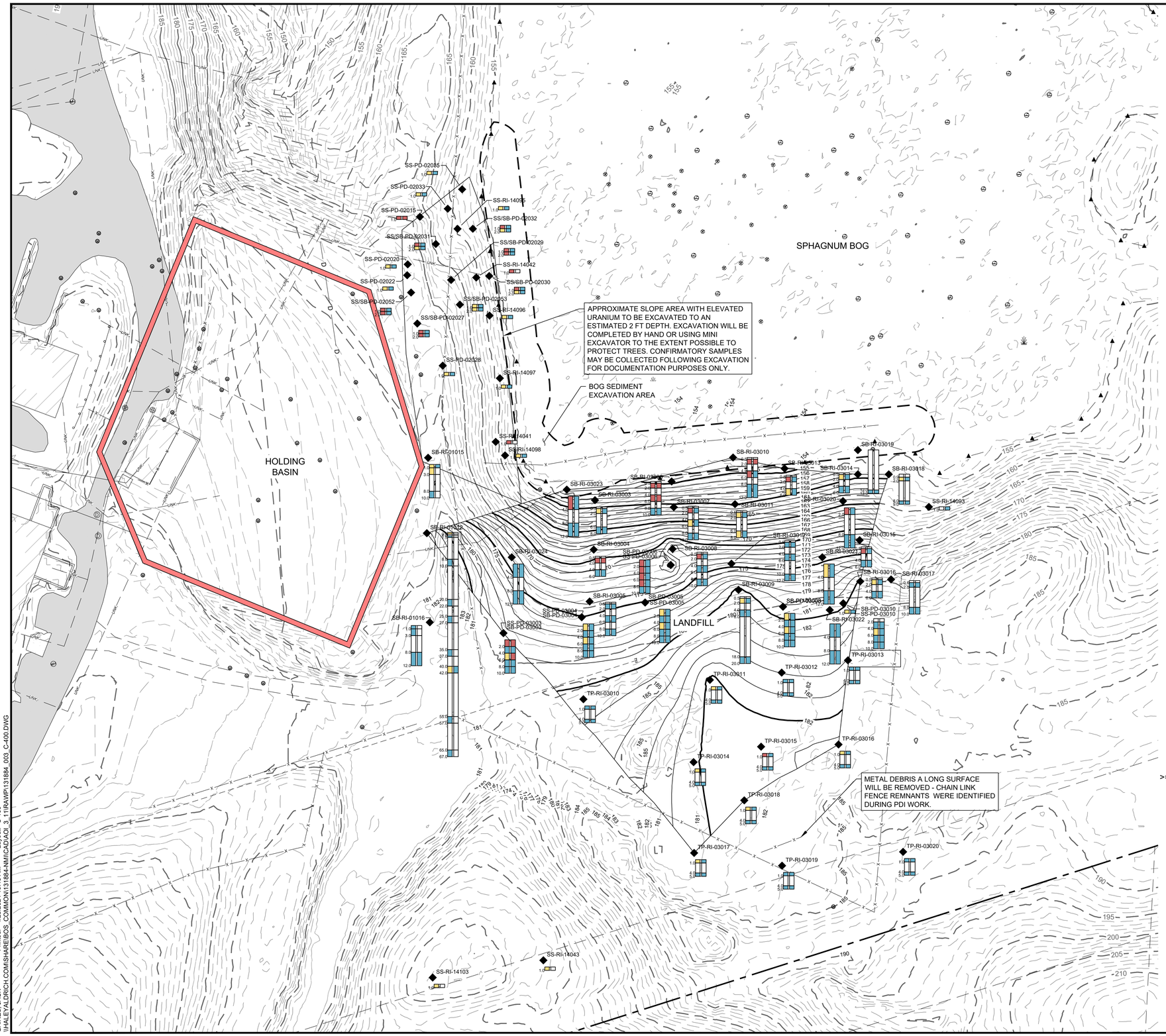

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
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- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

SAMPLE LEGEND

GROUND SURFACE

- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED LANDFILL EXCAVATION VOLUME = 5,975 CY. TOTAL ESTIMATED BOG SEDIMENT EXCAVATION VOLUME = 1,127 CY.
3. CONTOURS MAY BE ADJUSTED TO INCORPORATE CONSTRUCTIBILITY FEEDBACK FROM SELECTED CONTRACTOR.

0 30 60 90 120
SCALE IN FEET

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EXCAVATION PLAN LANDFILL

C-400

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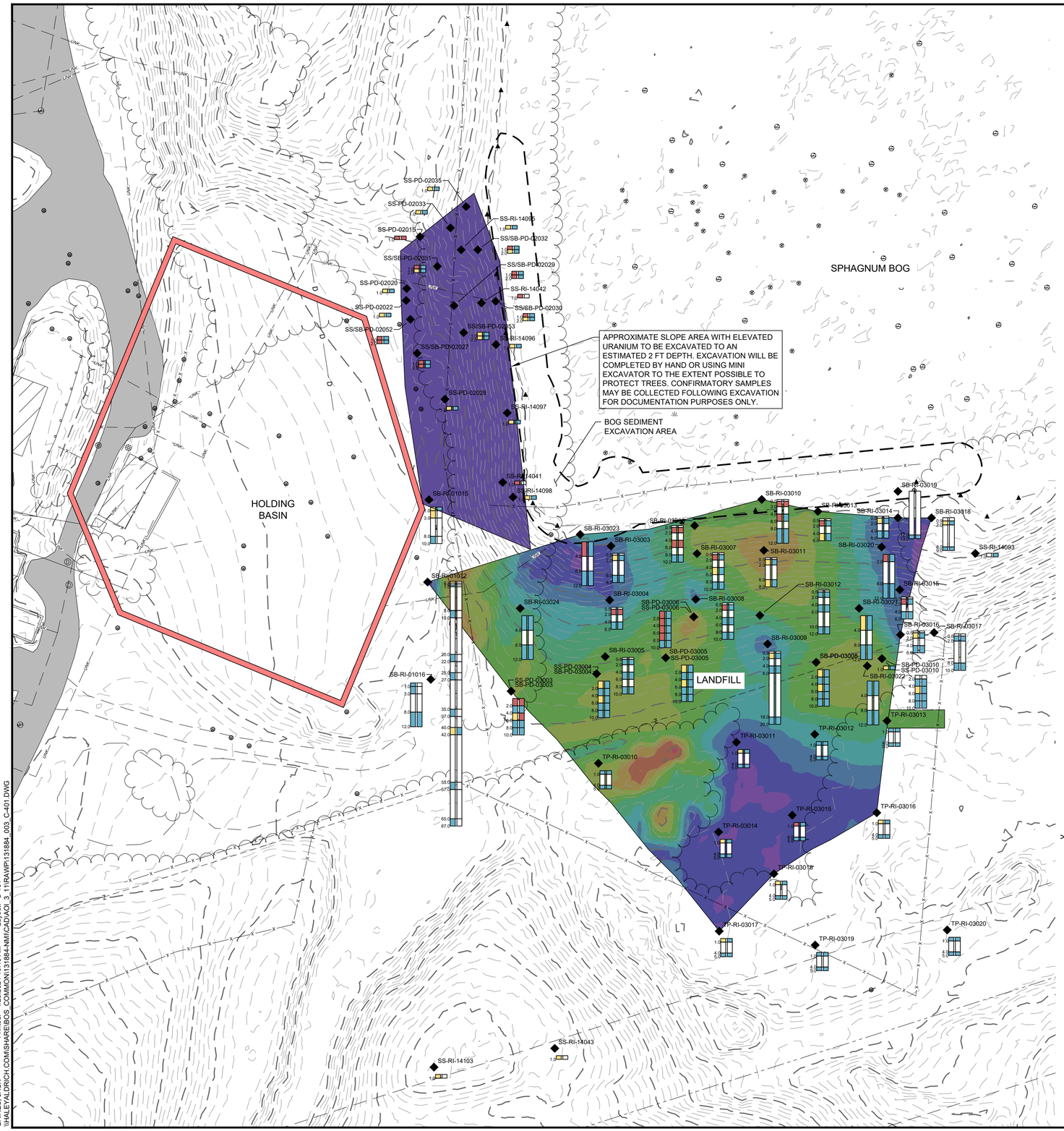

EXCAVATION DEPTH TABLE	
DEPTH RANGE (FEET)	COLOR
0 - 1	
1 - 2	
2 - 3	
3 - 4	
4 - 5	
5 - 6	
6 - 7	
7 - 8	
8 - 9	
9 - 10	

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
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- CONCRETE
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

SAMPLE LEGEND

- GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 — SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED LANDFILL EXCAVATION VOLUME = 5,975 CY. TOTAL ESTIMATED BOG SEDIMENT EXCAVATION VOLUME = 1,127 CY.
3. CONTOURS ARE SHOWN ON DRAWING C-400 AND MAYBE ADJUSTED BASED ON CONTRACTOR'S FEEDBACK.

N

0 30 60 90 120

SCALE IN FEET

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

Project No.:	131884
Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

COLOR DEPTH PLAN LANDFILL

C-401

Sheet: 14 of 37

GAINES, JACK
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-401.DWG
Layout: C-401
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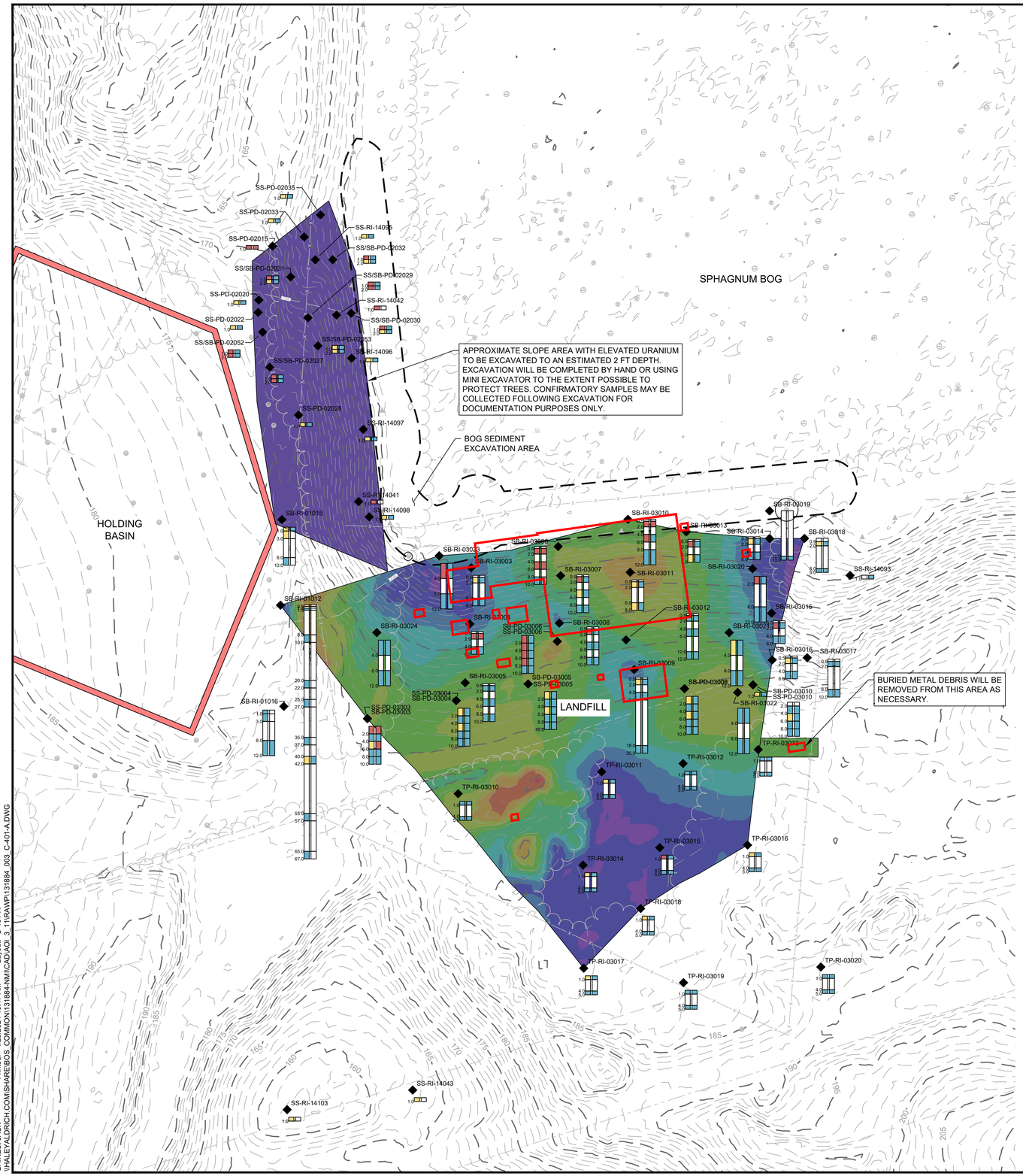

EXCAVATION DEPTH TABLE	
DEPTH RANGE (FEET)	COLOR
0 - 1	
1 - 2	
2 - 3	
3 - 4	
4 - 5	
5 - 6	
6 - 7	
7 - 8	
8 - 9	
9 - 10	

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 — SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED LANDFILL EXCAVATION VOLUME = 5,975 CY. TOTAL ESTIMATED BOG SEDIMENT EXCAVATION VOLUME = 1,127 CY.
3. CONTOURS ARE SHOWN ON DRAWING C-400 AND MAYBE ADJUSTED BASED ON CONTRACTOR'S FEEDBACK.
4. APPROXIMATE AREA OF EM61-INFERRED SIGNIFICANT AMOUNTS OF BURIED METAL ARE BASED ON RESULTS FROM THE NOVEMBER 2020 GEOPHYSICAL SURVEY REPORT

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- EM61-INFERRED SIGNIFICANT AMOUNTS OF BURIED METAL.

0 30 60 90 120
SCALE IN FEET

HALEY ALDRICH

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
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Fax: 617.886.7600
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Rev.	Description	By	Date
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NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

LANDFILL EXCAVATION AND GEOPHYSICAL DATA

C-401-A

Sheet: 15 of 37

GAINES, JACK
Printed: 4/23/2024 10:47 AM Layout: C-401-A
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-401-A.DWG

ASPHALT SURFACE

CONCRETE SURFACE

ASPHALT SURFACE

6-FOOT CHAINLINK FENCE, TYP.

BUILDING A

BUILDING B

BUILDING C

BUILDING D

BUILDING E

BLDG B-4

BLDG B-2

COOLING WATER RECHARGE POND

HOLDING BASIN

PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23

PROPOSED PHASE 1 ACCESS ROAD ALIGNMENT (ROAD LOCATION DETERMINED IN FIELD DEPENDING ON UTILITY EXCAVATION LIMITS)

TSCA AREA - TO BE EXCAVATED AND SAMPLED SEPARATELY

LOCATION ID: SB-PD-13031
[PCB]: 55.300 MG/KG
DEPTH: 2 TO 4 FT

2 C-407

1 C-407

3 C-407

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- 2023 PRE-CHARACTERIZATION SAMPLING LOCATION

NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 32,300 CY. (CUT)

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 — SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

N

0 40 80 120 160
SCALE IN FEET

HALEY ALDRICH

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Rev.	Description	By	Date
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NUCLEAR METALS, INC.
COURTYARD, LANDFILL,SPHAGNUM BOG, AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 1

C-402

Sheet: 16 of 37

GAINES, JACK
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-402.DWG
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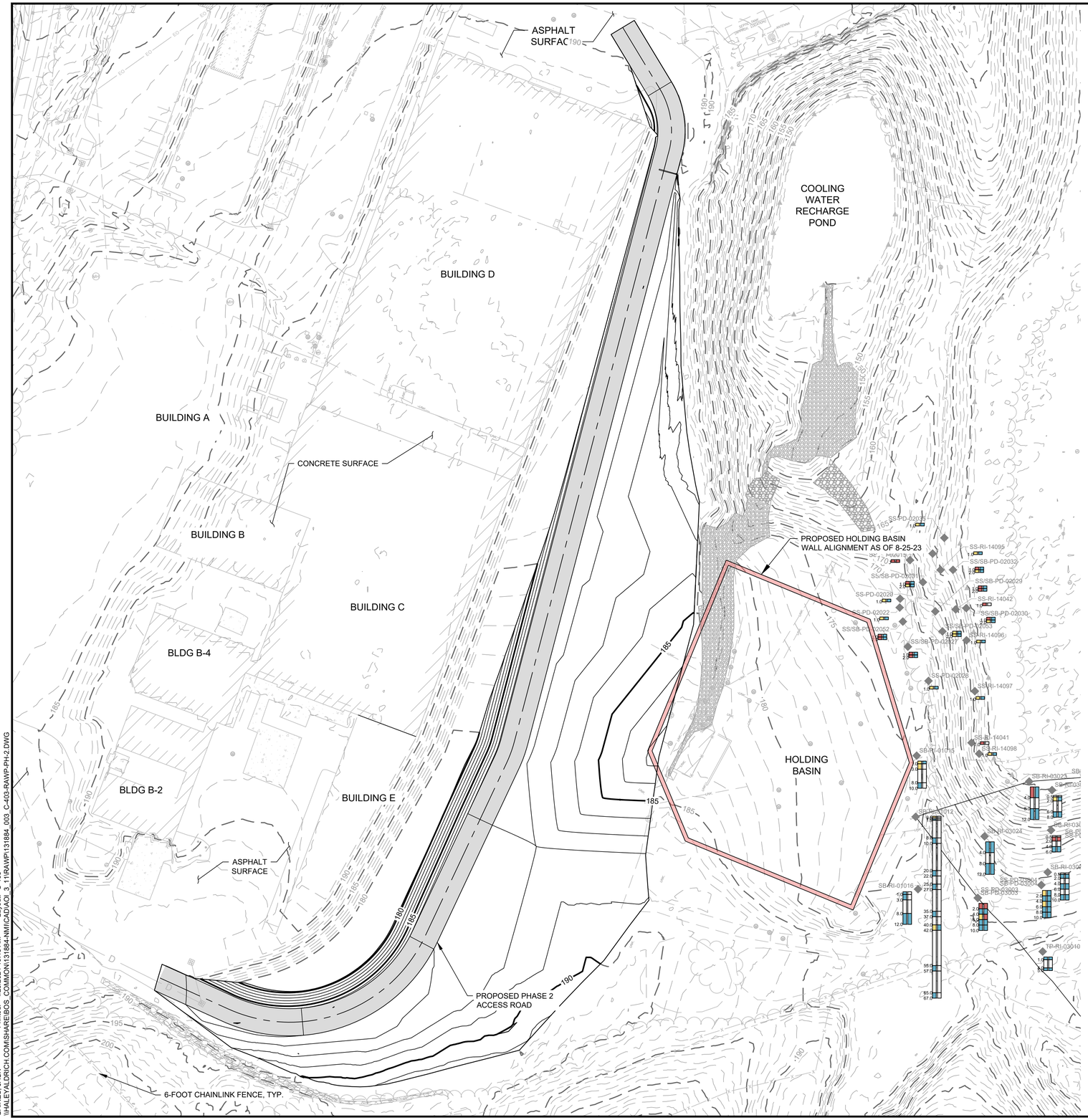

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- 2023 PRE-CHARACTERIZATION SAMPLING LOCATION

NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 15,250 CY. (FILL)

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 — SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

N

0 40 80 120 160
SCALE IN FEET

HALEY ALDRICH

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
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Project No.:	131884
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Date:	APRIL 2024
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Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 2

C-403

Sheet: 17 of 37

GAINES, JACK
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-403-RAWP-PH-2.DWG
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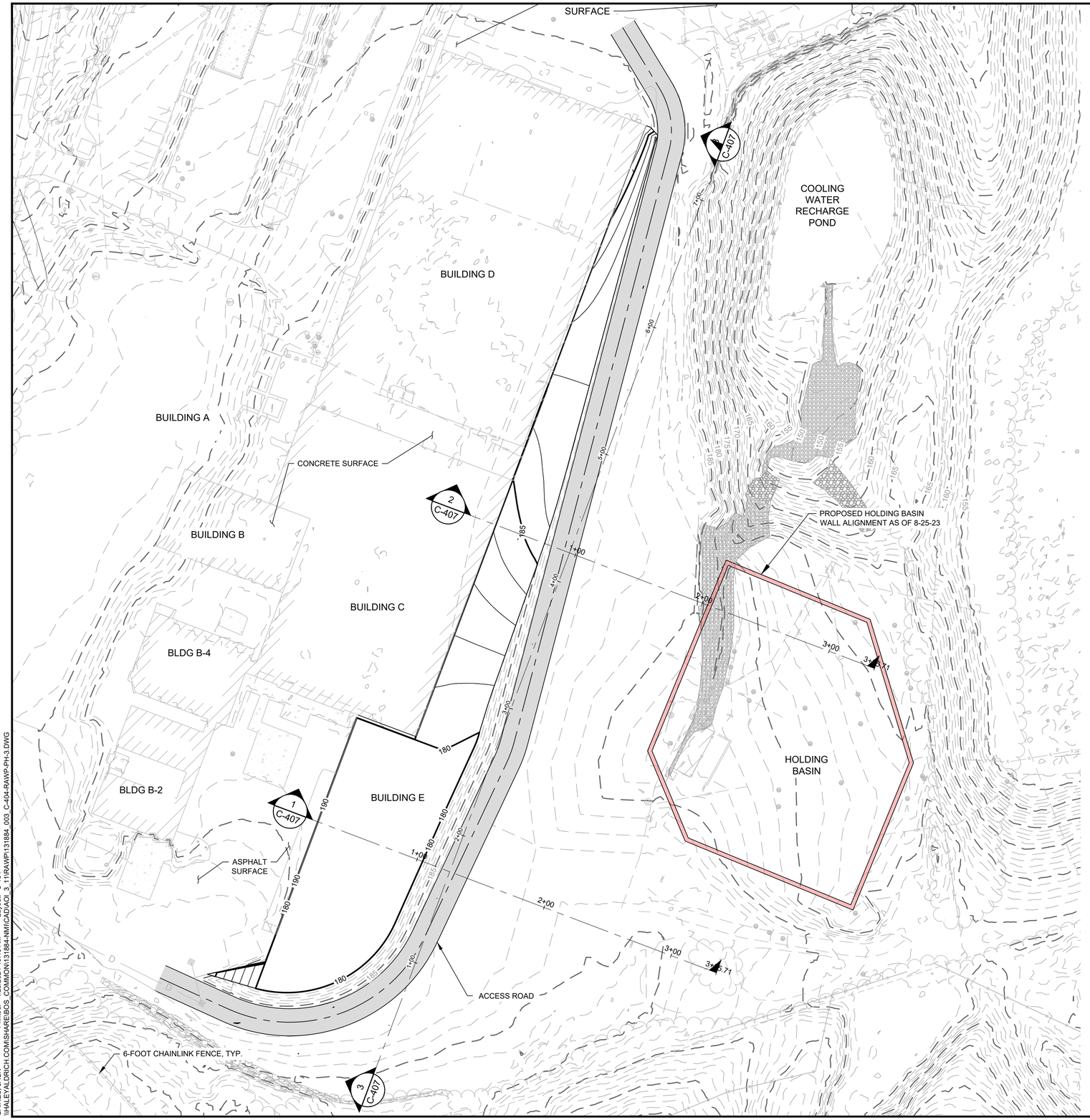

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- 2023 PRE-CHARACTERIZATION SAMPLING LOCATION

NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 4,400 CY. (CUT)

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

0 40 80 120 160
SCALE IN FEET

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
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KEY PLAN
NOT TO SCALE

Project No.:	131884
Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXCAVATION PLAN COURTYARD AND BUILDING E - PHASE 3

C-404

Sheet: 18 of 37

GAINES, JACK
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\CAD\AOI_3_11\RAWP\131884_003_C-404-RAWP-PH-3.DWG
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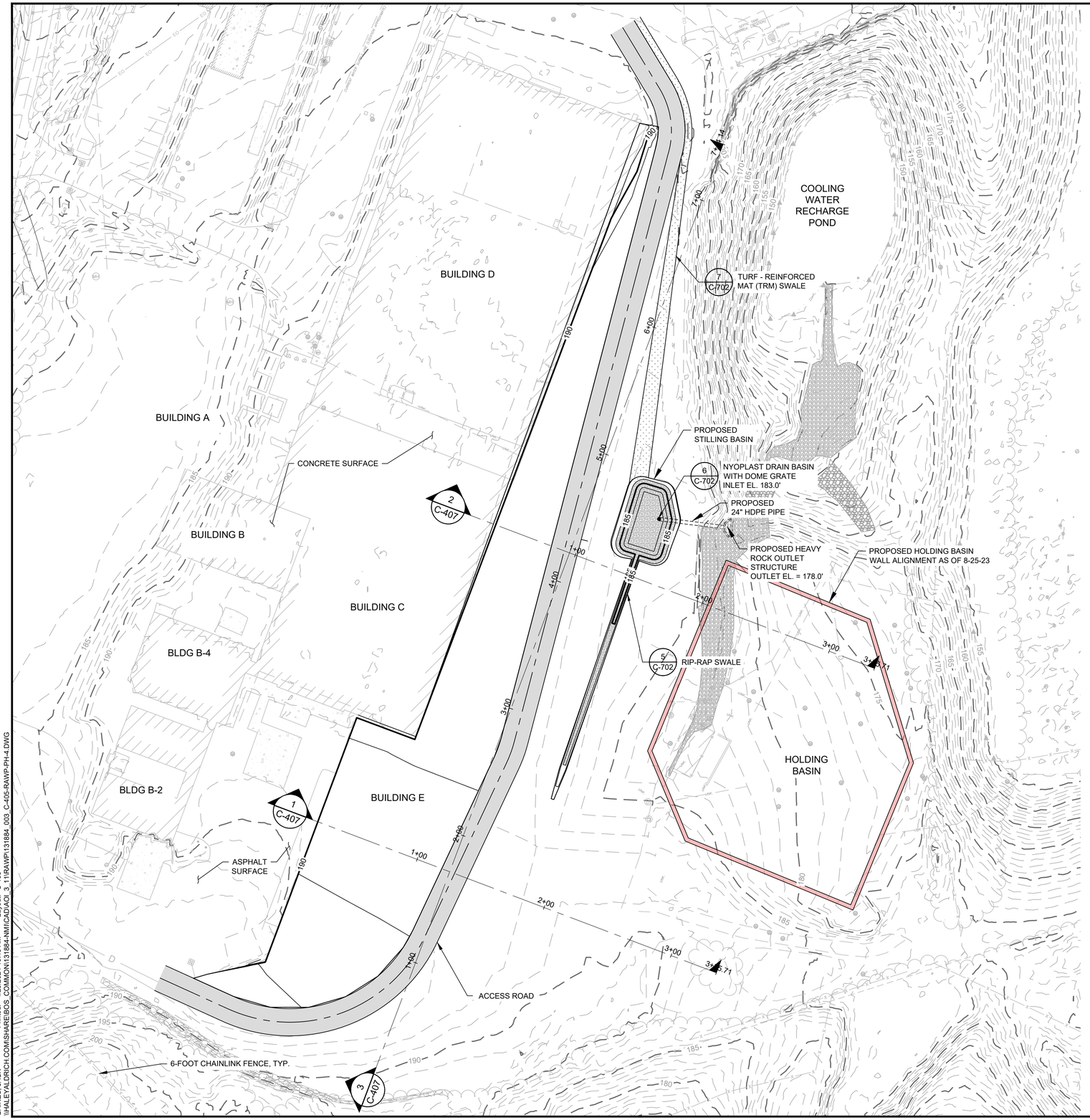

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- 2023 PRE-CHARACTERIZATION SAMPLING LOCATION

NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 7,200 CY. (FILL)

N

0 40 80 120 160

SCALE IN FEET

HALEY ALDRICH

HALEY & ALDRICH, INC.
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Boston, MA 02129-1400
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Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

RESTORATION PLAN COURTYARD AND BUILDING E - PHASE 4

C-405

Sheet: 19 of 37

GAINES, JACK Printed: 4/23/2024 10:49 AM Layout: C-405
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-405-RAWP-PH-4.DWG

EXCAVATION DEPTH TABLE	
DEPTH RANGE (FEET)	COLOR
0 - 1	
1 - 2	
2 - 3	
3 - 4	
4 - 5	
5 - 6	
6 - 7	
7 - 8	
8 - 9	
9 - 10	
10 - 11	
11 - 12	
12 - 13	
13 - 14	
14 - 15	

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 32,300 CY. (CUT)
3. THE EXCAVATION GRADES SHOWN ARE THE MINIMUM CUT LINES. DRAWINGS C-402-C404 SHOW THE OVERALL CUT OF THE COURTYARD AND BUILDING E IN A SEQUENCE OF EXCAVATION AND GRADING TO MEET THE MINIMUM CUT SHOWN ON THIS DRAWING.

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

0 40 80 120 160
SCALE IN FEET

HALEY ALDRICH

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Project No.:	131884
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Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL, SPHAGNUM BOG,
AND COOLING POND
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2229 MAIN STREET
CONCORD, MASSACHUSETTS

COLOR DEPTH PLAN COURTYARD AND BUILDING E

C-406

Sheet: 20 of 37

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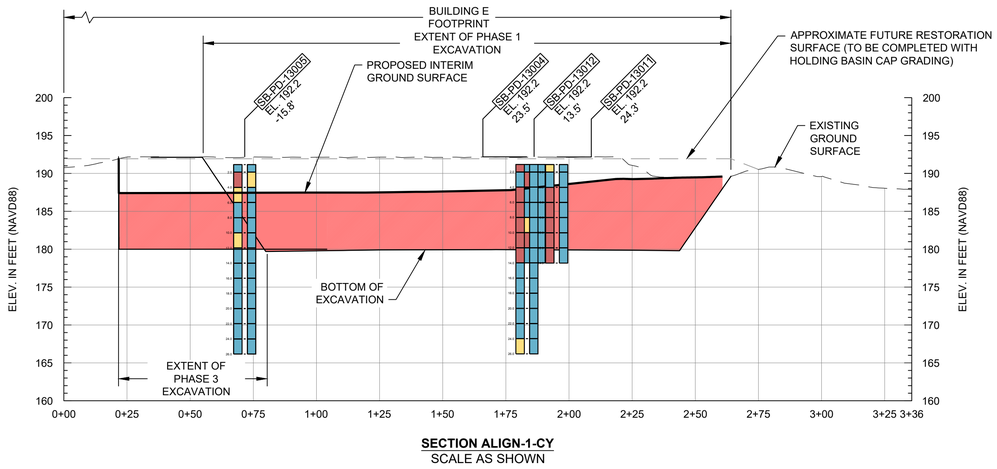
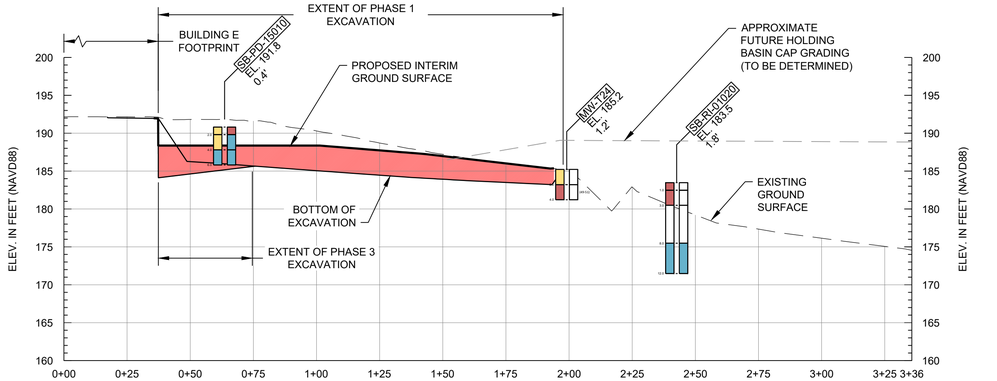
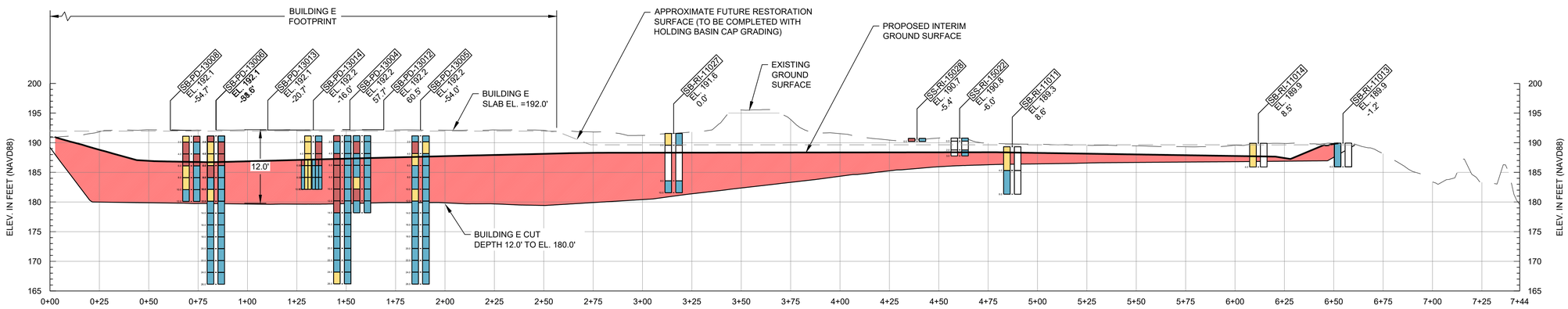


SECTION ALIGN-1-CY
SCALE AS SHOWN



SECTION ALIGN-2-CY
SCALE AS SHOWN



SECTION ALIGN-3-CY
SCALE AS SHOWN

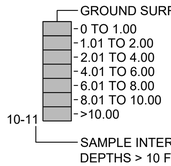
SECTION LEGEND

EXISTING GROUND SURFACE

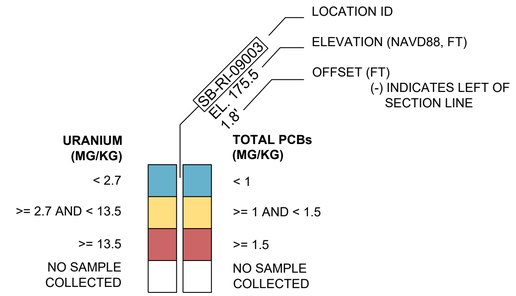
PROPOSED BOTTOM OF EXCAVATION AND ASSOCIATED CUT AREAS

PROPOSED RESTORATION

SAMPLE LEGEND

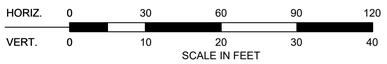


SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG



NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.



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Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
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Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXCAVATION CROSS-SECTIONS – COURTYARD AND BUILDING E

C-407

Sheet: 21 of 37

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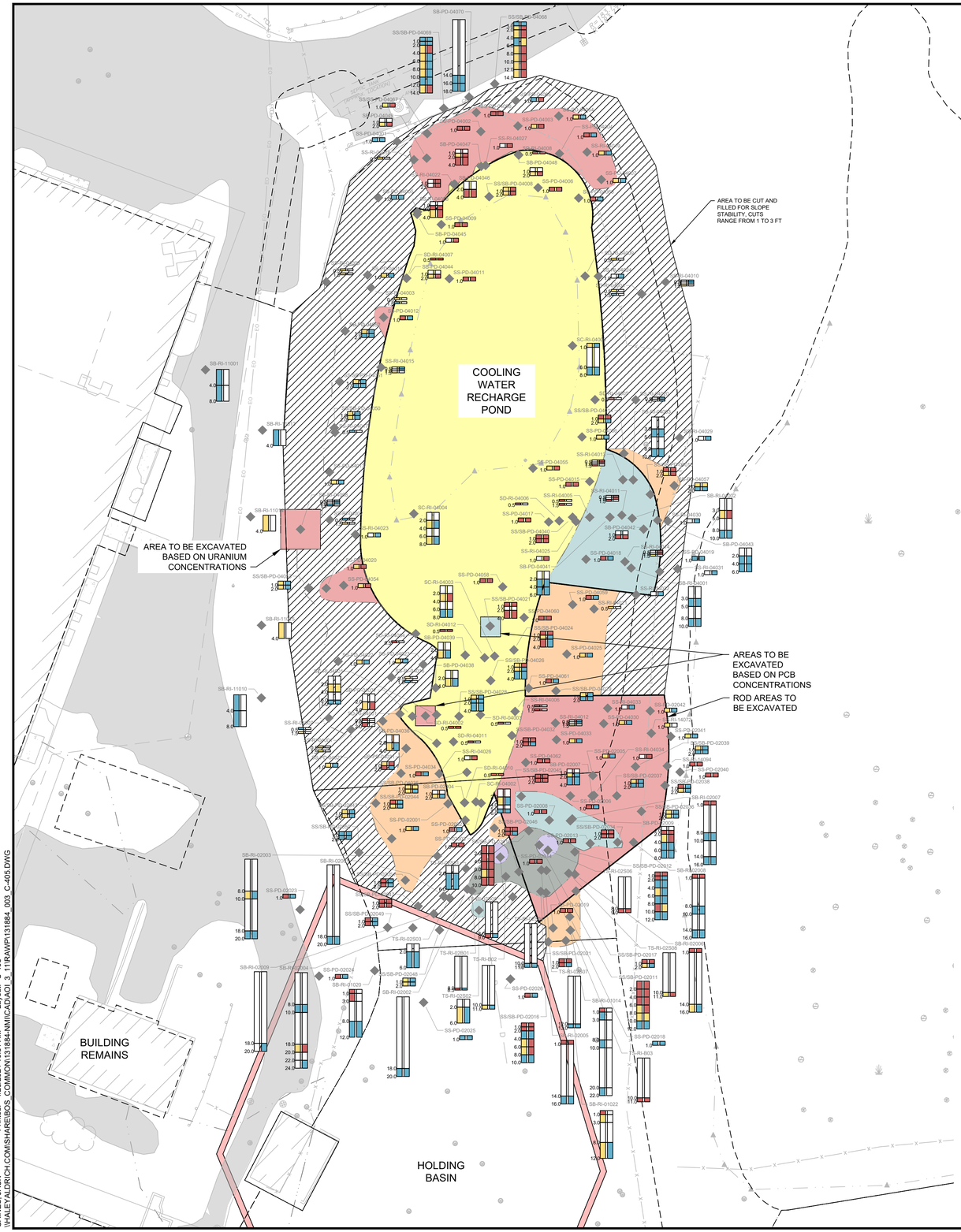
\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\CAD\AOI_3_11\RAWP\131884_003_C-404.DWG



LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- AREAS TO BE CUT AND FILLED FOR SLOPE STABILITY, CUTS RANGE FROM 1 TO 3 FT.
- ADDITIONAL AREA TO BE EXCAVATED BASED ON SAMPLE CONCENTRATIONS
- ORIGINAL SITE AREA OF INTEREST (AOI) BOUNDARY
- ROD AREAS TO BE EXCAVATED

N

0 30 60 90 120

SCALE IN FEET

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 5,536 CY. (CUT)

LOCATION ID
ELEVATION (NAVD88, FT)
OFFSET (FT)
(-) INDICATES LEFT OF SECTION LINE

SB-RI-09003
EL. 175.5
1.8'

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

EXCAVATION DEPTH IN FEET

- 0.00 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 3.00
- 3.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- 11.00

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AND COOLING POND
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EXCAVATION PLAN FOR COOLING WATER POND SLOPES

C-408

Sheet: 22 of 37

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LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- LIMITS OF EXCAVATION

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. WETLAND SEDIMENT AND VEGETATIVE RESTORATION SHALL BE COMPLETED IN ACCORDANCE WITH SPECIFICATION 32 30 00, WETLAND AND UPLAND RESTORATION.
3. TOTAL ESTIMATED EXCAVATION VOLUME = 5,536 CY

0 30 60 90 120
SCALE IN FEET

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EXCAVATION PLAN COOLING WATER POND

C-409

Sheet: 23 of 37

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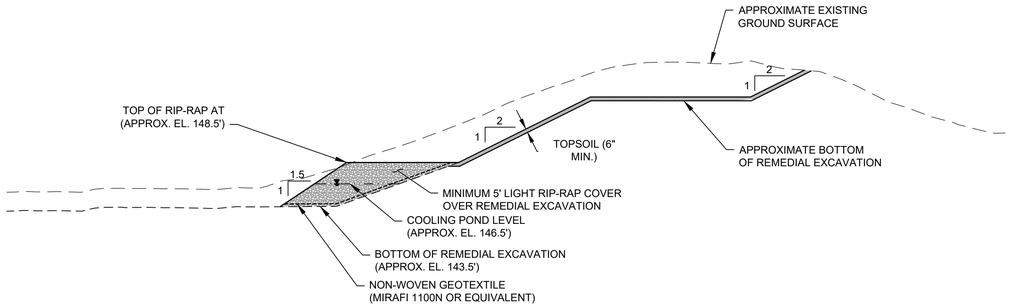
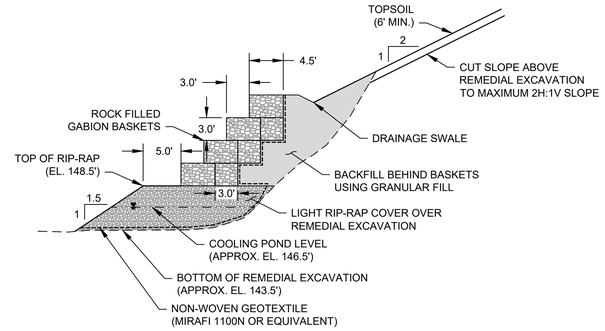
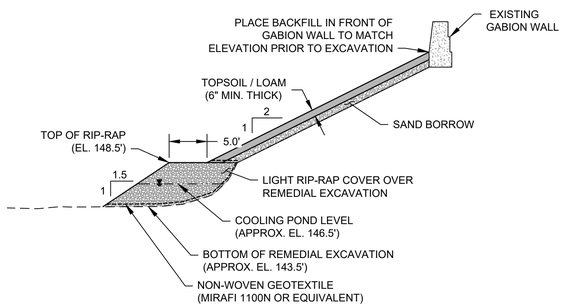


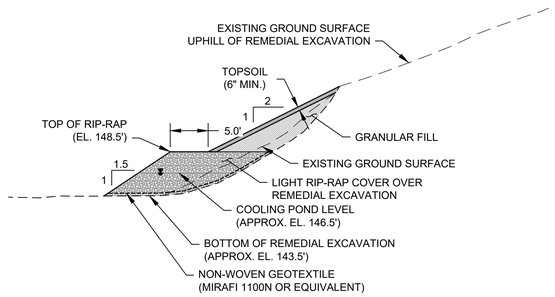
2 / C-406 — TYPICAL CROSS SECTION AT SECTION 2
NOT TO SCALE



3 / C-406 — TYPICAL CROSS SECTION AT SECTION 3
NOT TO SCALE



4 / C-406 — TYPICAL CROSS AT SECTION 4
NOT TO SCALE



5 / C-406 — TYPICAL CROSS SECTION WITH FILL TO FLATTEN SLOPE
NOT TO SCALE

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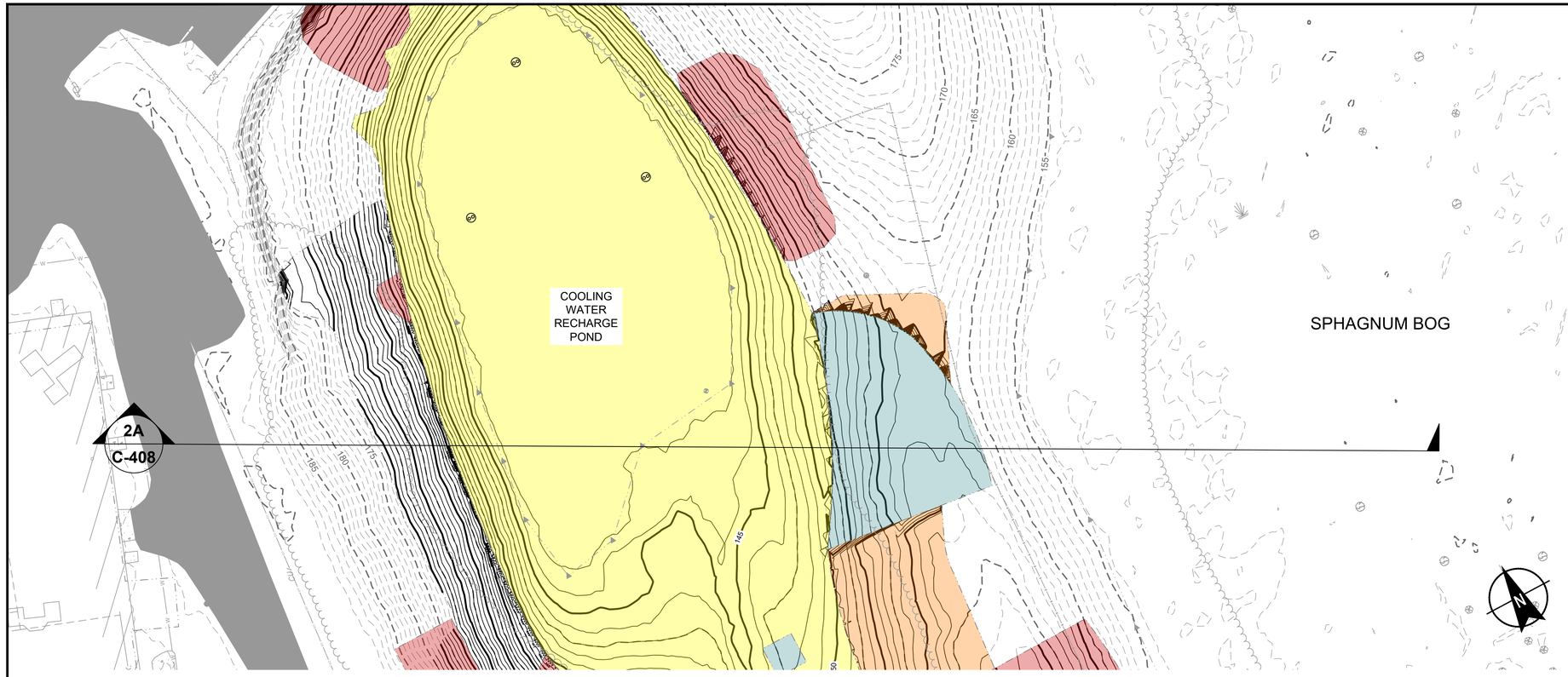
EXCAVATION SECTIONS COOLING POND

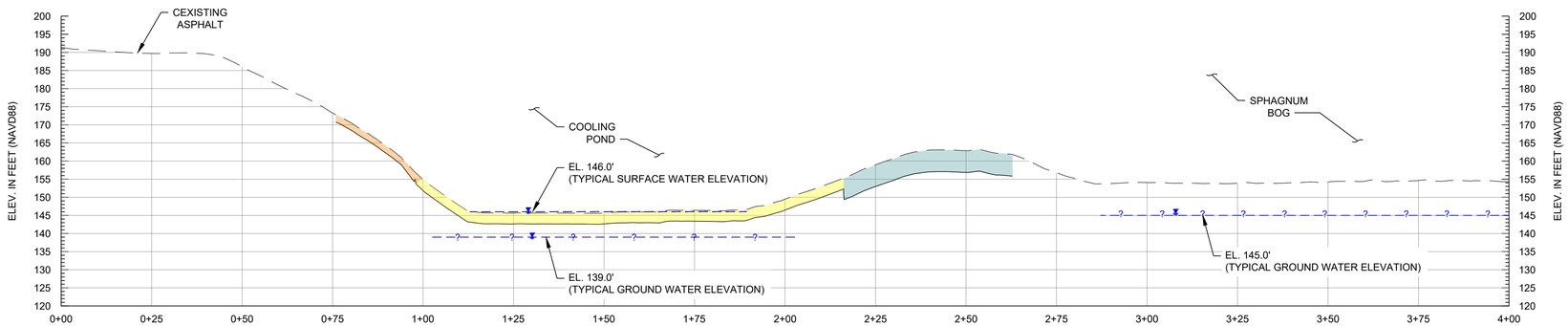
C-410

Sheet: 24 of 37



LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- LIMITS OF EXCAVATION



SECTION ALIGN-2A
SCALE AS SHOWN

HORIZ. 0 20 40 60 80
VERT. 0 20 40 60 80
SCALE IN FEET

EXCAVATION DEPTH IN FEET

- 0.00 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 3.00
- 3.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- 11.00

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. PRIOR TO EXCAVATION OF COOLING WATER POND SEDIMENT, THE MEAN LOW GROUNDWATER ELEVATION WILL BE DEFINED.

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AND COOLING POND
SSS PHASE 1
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GROUNDWATER / SURFACE WATER INTERACTION SECTION

C-411

Sheet: 25 of 37

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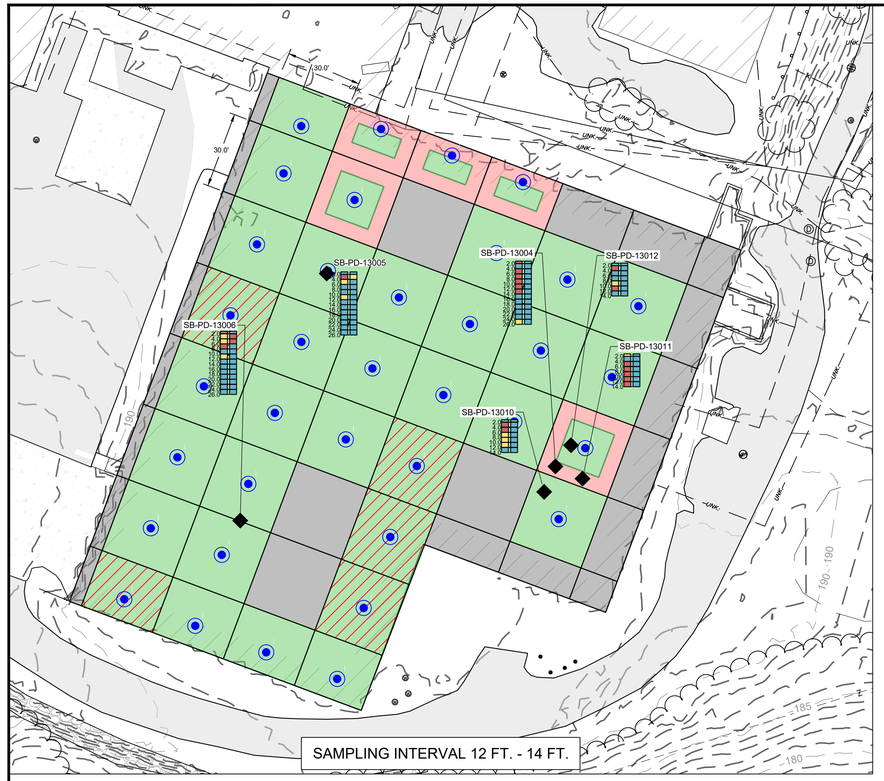
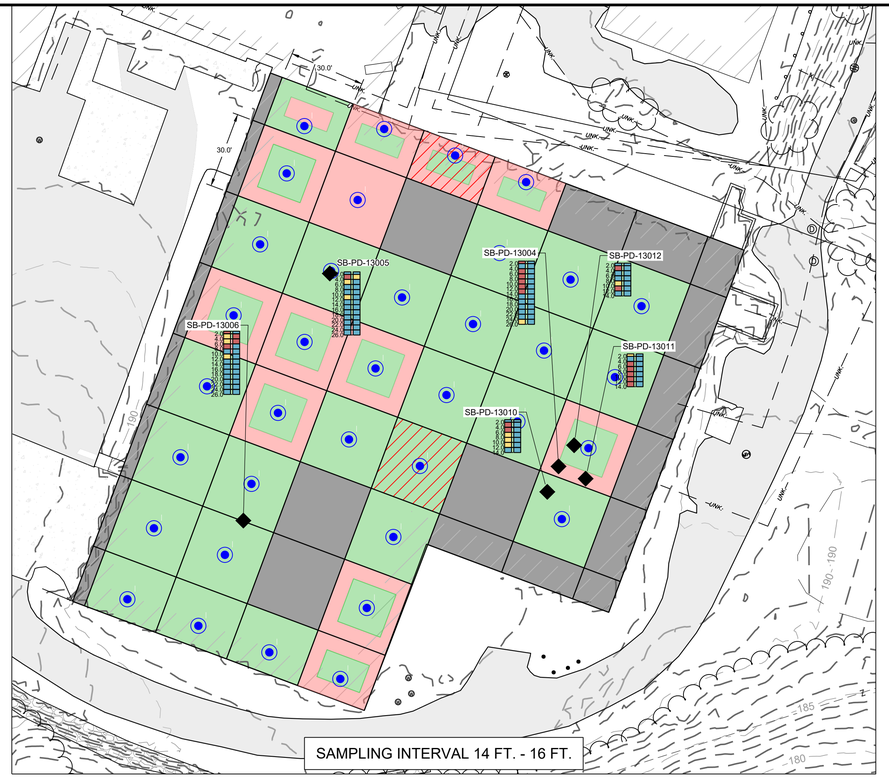
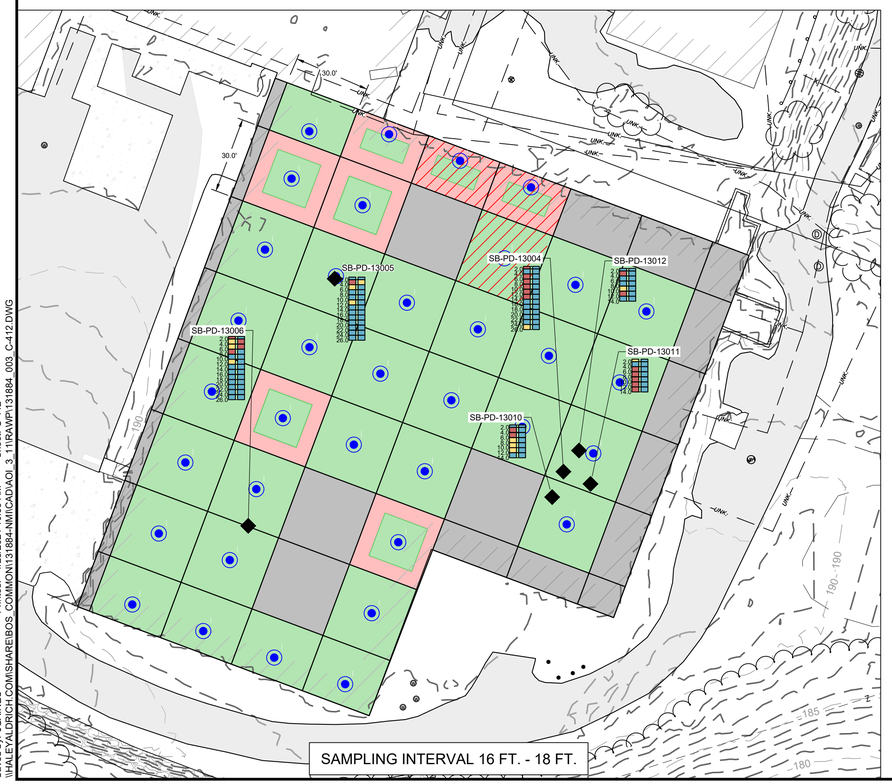
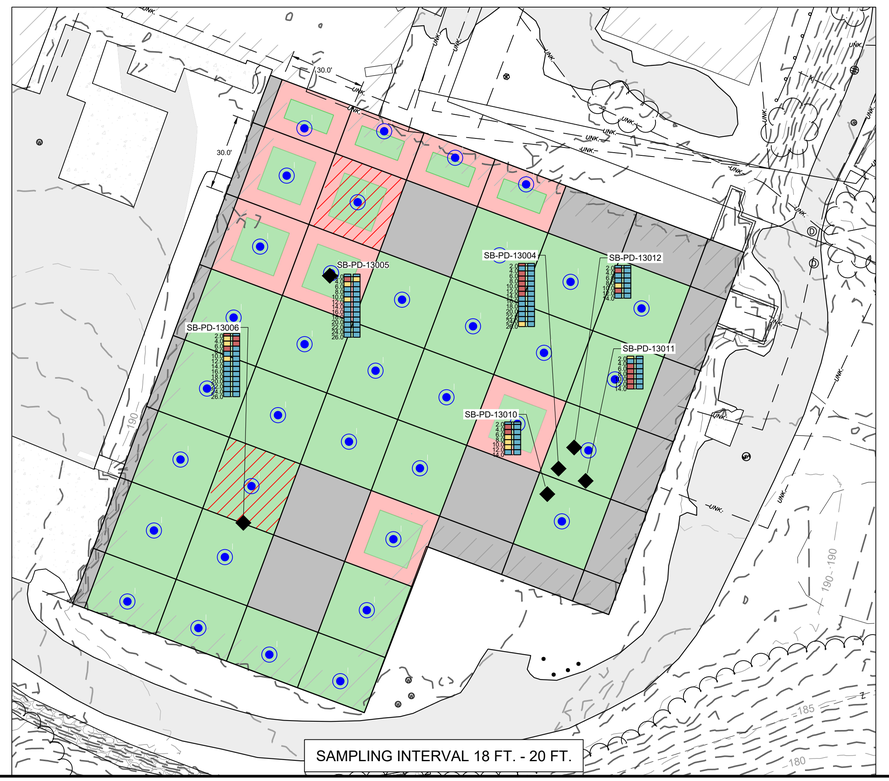
Sheet: C-411







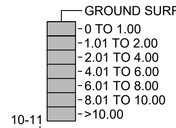


LEGEND

- BUILDING SLAB
- 1 FT EXISTING GROUND CONTOUR
- 100 5 FT EXISTING GROUND CONTOUR
- ASPHALT
- CONCRETE
- GRAVEL
- SUPPLEMENTAL PRE-CHARACTERIZATION BORINGS/ GEOPROBES
- PCB OVER ROD CLEANUP LEVEL (PCB>1.0 MG/KG)
- URANIUM OVER ROD CLEANUP LEVEL (U>2.7 MG/KG)
- PCB UNDER ROD CLEANUP LEVEL (PCB<1.0 MG/KG)
- URANIUM UNDER ROD CLEANUP LEVEL (U<2.7 MG/KG)
- ARSENIC, ThORIUM, AND/OR PAH CONCENTRATIONS ABOVE ROD CLEANUP LEVEL.
  ROD CLEANUP LEVELS:
  ARSENIC>13.7 mg/kg;
  ThORIUM>7.4 mg/kg,
  BENZO(A)ANThRACENE>0.34 mg/kg;
  BENZO(A)PYRENE>0.22 mg/kg;
  BENZO(B)FLUORANTENE>0.34 mg/kg;
  IDENO(1,2,3-CD)PYRENE>0.34 mg/kg
- NO DATA/NO SAMPLE COLLECTED

NOTE:
OUTER BOX = URANIUM RESULTS
INNER BOX = PCB RESULTS
RED = CONCENTRATION OVER ROD CLEANUP LEVEL
GREEN = CONCENTRATION UNDER ROD CLEANUP LEVEL

SAMPLE LEGEND



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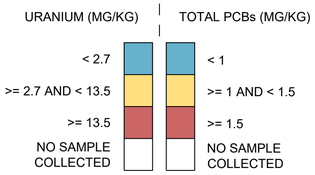

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POST EXCAVATION BUILDING E FOOTPRINT

C-412

Sheet: 26 of 37

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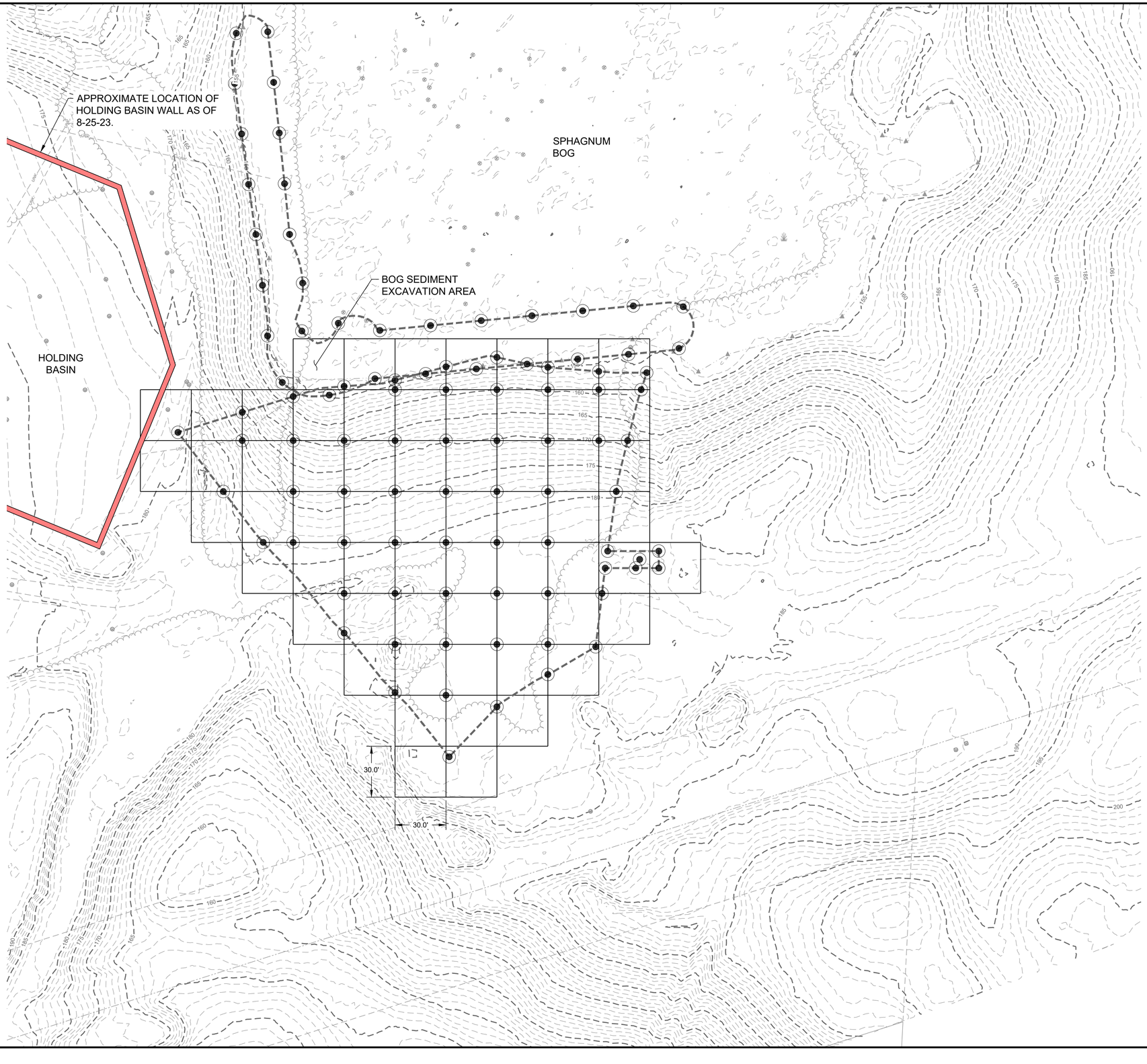

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- PROPOSED CONFIRMATORY SAMPLING LOCATION
- RISK BOUNDARY
- 30' X 30' GRID SAMPLING AREA

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. CONFIRMATORY SAMPLES SHALL BE COLLECTED ON THE BORDER OF THE BOG. HOWEVER, NO ADDITIONAL EXCAVATION OF THE BOG SEDIMENTS WILL BE PERFORMED. THE CONFIRMATION SAMPLES ARE BEING COLLECTED FOR DOCUMENTATION ONLY.

N

0 30 60 90 120
SCALE IN FEET

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CONFIRMATORY SAMPLING LOCATIONS LANDFILL AND SPHAGNUM BOG

C-500

Sheet: 27 of 37

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COOLING WATER RECHARGE POND

BUILDING D

IF SIDEWALL SAMPLES ARE OVER RALs, AND SLOPE IS NOT STABLE. A MARKER BARRIER WILL BE PLACED AND BACKFILL PLACED TO ESTABLISH STABLE SLOPES.

BUILDING A

CONCRETE SURFACE

BUILDING B

BLDG B-4

BUILDING C

BUILDING B-3

BLDG B-1

BLDG B-2

BUILDING E

30.0'

30.0'

APPROXIMATE LOCATION OF HOLDING BASIN WALL AS OF 8-25-23.

HOLDING BASIN

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
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- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- PROPOSED CONFIRMATORY SAMPLING LOCATION
- RISK BOUNDARY
- 30' X 30' GRID SAMPLING AREA

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.

N

0 30 60 90 120

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CONFIRMATORY SAMPLING LOCATIONS COURTYARD

C-501

Sheet: 28 of 37

GAINES, JACK
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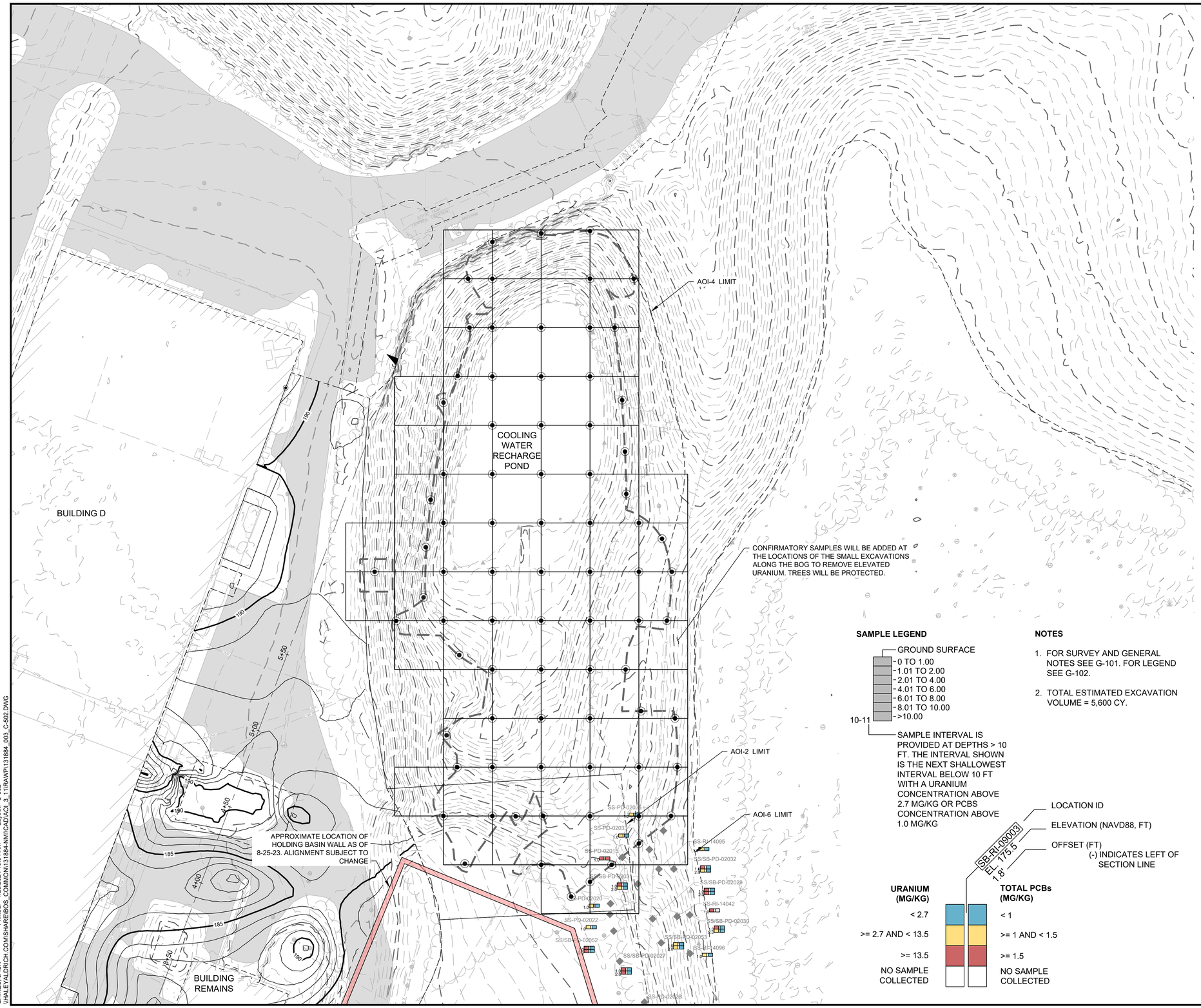

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 100 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- PROPOSED CONFIRMATORY SAMPLING LOCATION
- RISK BOUNDARY
- 30' X 30' GRID SAMPLING AREA

SAMPLE LEGEND

GROUND SURFACE
- 0 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- >10.00

10-11 SAMPLE INTERVAL IS PROVIDED AT DEPTHS > 10 FT. THE INTERVAL SHOWN IS THE NEXT SHALLOWEST INTERVAL BELOW 10 FT WITH A URANIUM CONCENTRATION ABOVE 2.7 MG/KG OR PCBS CONCENTRATION ABOVE 1.0 MG/KG

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 5,600 CY.

SB-RI-09003 — LOCATION ID
EL. 175.5 — ELEVATION (NAVD88, FT)
1.8 — OFFSET (FT) (-) INDICATES LEFT OF SECTION LINE

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

N

0 30 60 90 120
SCALE IN FEET

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HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

Project No.:	131884
Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

CONFIRMATORY SAMPLING LOCATIONS COOLING WATER POND

C-502

Sheet: 29 of 37

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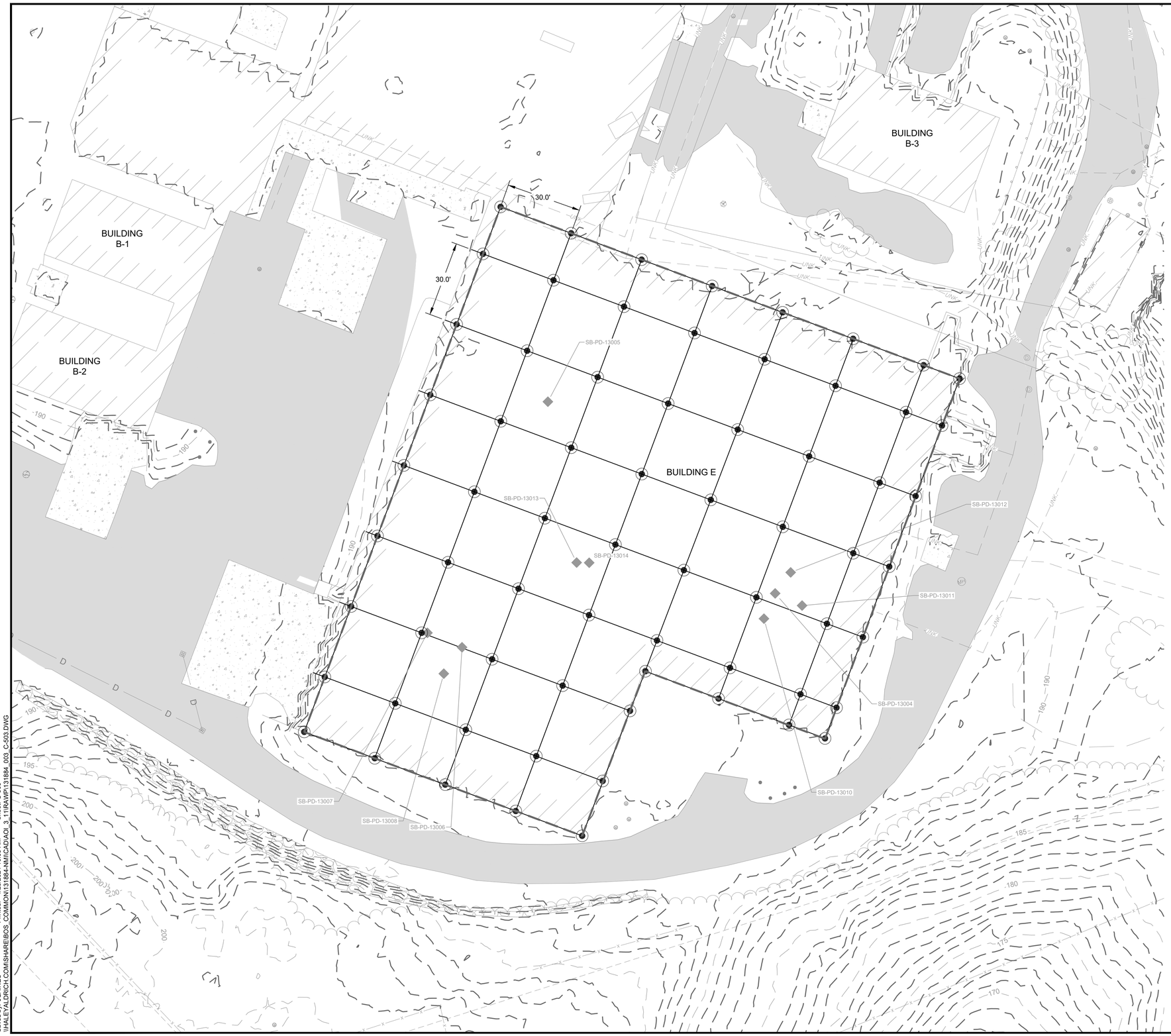

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
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- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- PROPOSED CONFIRMATORY SAMPLING LOCATION
- RISK BOUNDARY
- 30' X 30' GRID SAMPLING AREA

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. SAMPLE LOCATIONS WILL BE ADJUSTED BASED ON INSTITUTIONAL CONTROLS (ICS). A MINIMUM OF 10 FT. OF CLEAN COVER OVER CONTAMINATED SOILS WILL BE ESTABLISHED FOR FINAL GRADING TO BE DETERMINED AS PART OF PHASE 2 WHERE BUILDING C AND D GRADES WILL BE DETERMINED AND FINISHED GRADES WILL BE ESTABLISHED ACCORDINGLY.
3. THE INTERIM GRADES ESTABLISHED AS SHOWN AS SHOWN ON PHASE 4 GRADING OF THE COURTYARD AND BUILDING E WILL BE WILL BE INTERIM GRADES FOR ALLOWING FUTURE INVESTIGATIONS OF BUILDING C AND D, AND FOR THE COMPLETION OF ISS WITH ADEQUATE DRAINAGE CONTROLS TO MINIMIZE EROSION.

N

0 20 40 60 80
SCALE IN FEET

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
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Rev.	Description	By	Date
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NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

CONFIRMATORY SAMPLING LOCATIONS BUILDING E

C-503

Sheet: 30 of 37

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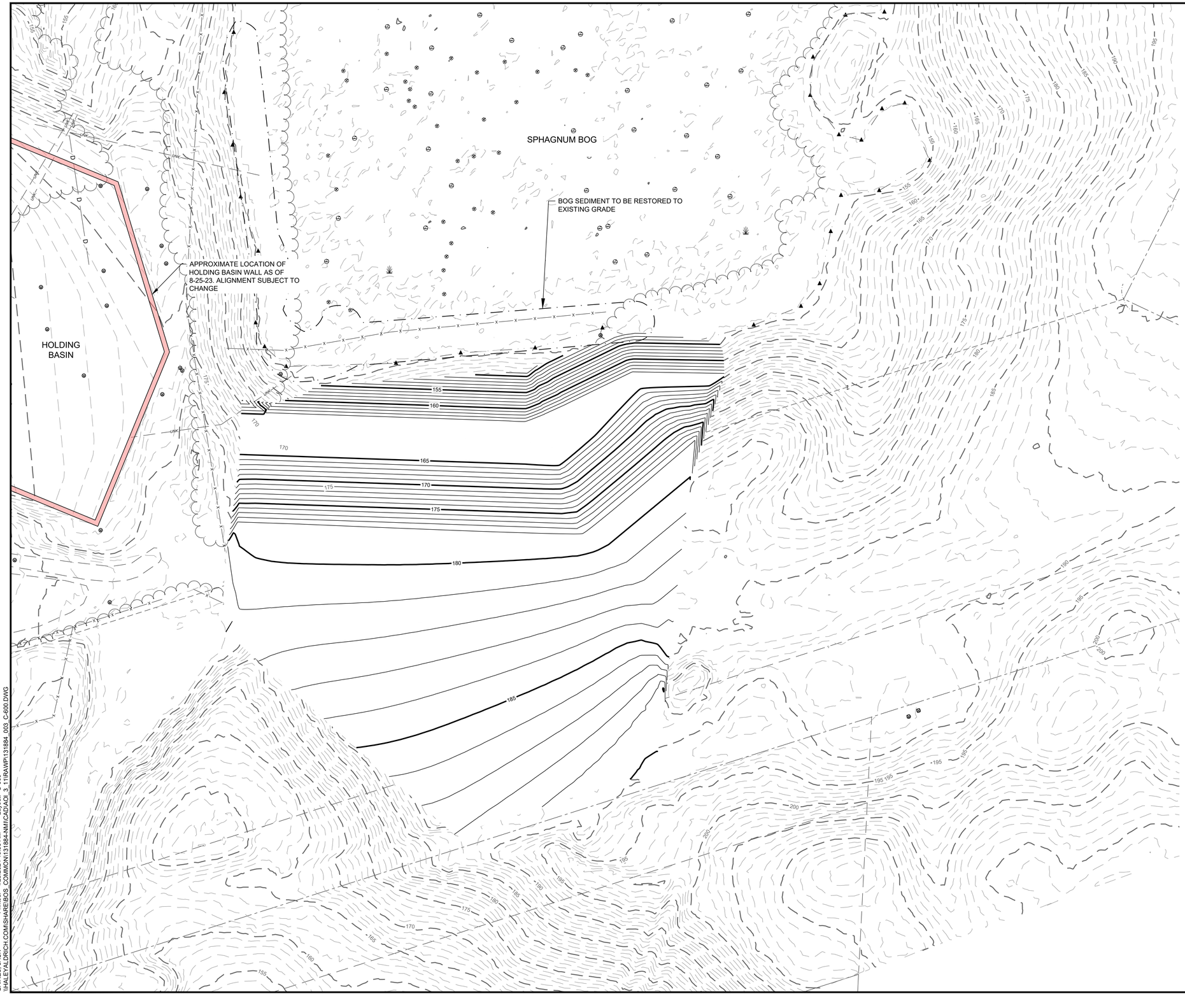

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. WETLAND SEDIMENT AND VEGETATIVE RESTORATION SHALL BE COMPLETED IN ACCORDANCE WITH SPECIFICATION 32 30 00, WETLAND AND UPLAND RESTORATION.

N

0 30 60 90 120
SCALE IN FEET

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

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COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
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2229 MAIN STREET
CONCORD, MASSACHUSETTS

SITE RESTORATION PLAN LANDFILL AND BOG SEDIMENT

C-600

Sheet: 31 of 37

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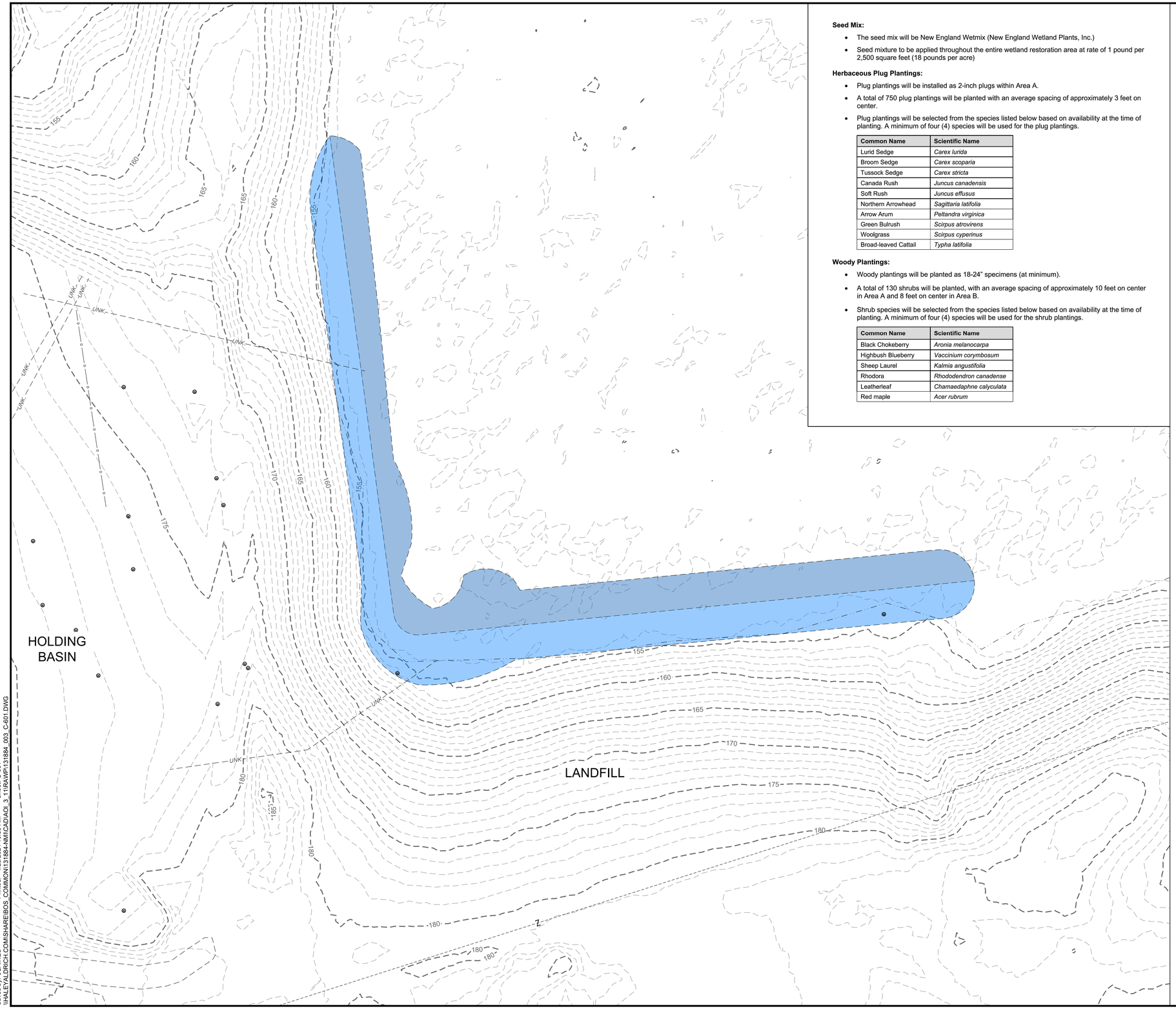

Seed Mix:

- The seed mix will be New England Wetmix (New England Wetland Plants, Inc.)
- Seed mixture to be applied throughout the entire wetland restoration area at rate of 1 pound per 2,500 square feet (18 pounds per acre)

Herbaceous Plug Plantings:

- Plug plantings will be installed as 2-inch plugs within Area A.
- A total of 750 plug plantings will be planted with an average spacing of approximately 3 feet on center.
- Plug plantings will be selected from the species listed below based on availability at the time of planting. A minimum of four (4) species will be used for the plug plantings.

Common Name	Scientific Name
Lurid Sedge	*Carex lurida*
Broom Sedge	*Carex scoparia*
Tussock Sedge	*Carex stricta*
Canada Rush	*Juncus canadensis*
Soft Rush	*Juncus effusus*
Northern Arrowhead	*Sagittaria latifolia*
Arrow Arum	*Peltandra virginica*
Green Bulrush	*Scirpus atrovirens*
Woolgrass	*Scirpus cyperinus*
Broad-leaved Cattail	*Typha latifolia*

Woody Plantings:

- Woody plantings will be planted as 18-24" specimens (at minimum).
- A total of 130 shrubs will be planted, with an average spacing of approximately 10 feet on center in Area A and 8 feet on center in Area B.
- Shrub species will be selected from the species listed below based on availability at the time of planting. A minimum of four (4) species will be used for the shrub plantings.

Common Name	Scientific Name
Black Chokeberry	*Aronia melanocarpa*
Highbush Blueberry	*Vaccinium corymbosum*
Sheep Laurel	*Kalmia angustifolia*
Rhodora	*Rhododendron canadense*
Leatherleaf	*Chamaedaphne calyculata*
Red maple	*Acer rubrum*

WETLAND RESTORATION AREAS:

AREA A = 5,990.00 SF.

AREA B = 5,385.00 SF.

TOTAL = 11,375.00 SF.

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
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- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST

N

0 20 40 60 80

SCALE IN FEET

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Tel: 617.886.7400
Fax: 617.886.7600
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NUCLEAR METALS, INC.
COURTYARD,
LANDFILL,SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

WETLAND RESTORATION PLAN

C-601

Sheet: 32 of 37

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LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
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- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)

RESTORATION VOLUME:
CUT: 1,228 CY.
FILL: 7,119 CY.
NET: 5892 CY. <FILL>

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. WETLAND SEDIMENT AND VEGETATIVE RESTORATION SHALL BE COMPLETED IN ACCORDANCE WITH SPECIFICATION 32 30 00, WETLAND AND UPLAND RESTORATION.

0 30 60 90 120
SCALE IN FEET

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AND COOLING POND
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RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

SITE RESTORATION PLAN COOLING POND

C-602

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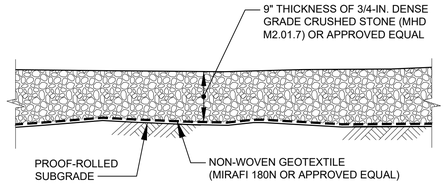
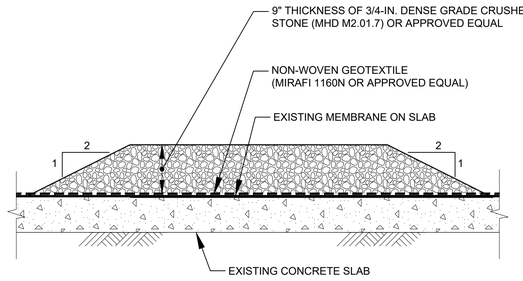


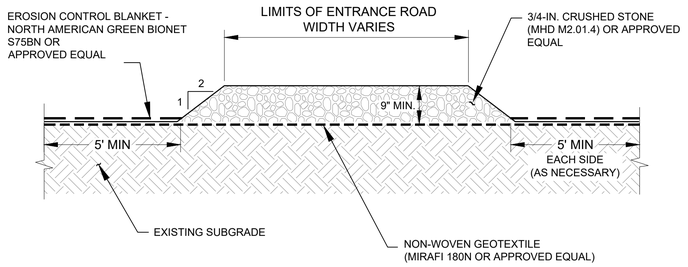
1 PROPOSED TRUCK ROAD DETAIL (ADJACENT TO BUILDING A)

SCALE: NOT TO SCALE



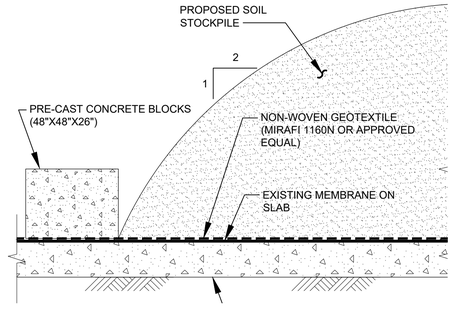
2 PROPOSED TRUCK ROADWAY OVER EXISTING BUILDING SLAB

SCALE: NOT TO SCALE



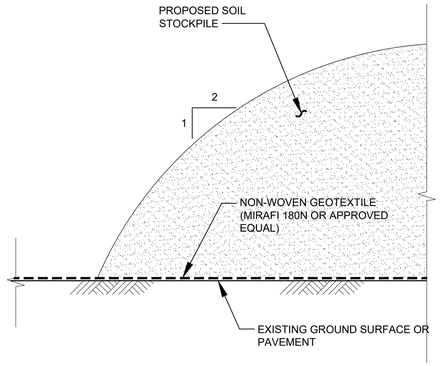
3 PROPOSED TRUCK ROADWAY IN WOODED AREAS

SCALE: NOT TO SCALE



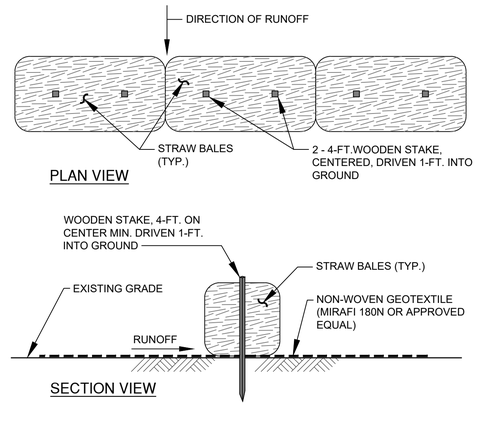
4 EXISTING CLEAN BACKFILL STOCKPILE AREA DEATIL

SCALE: NOT TO SCALE



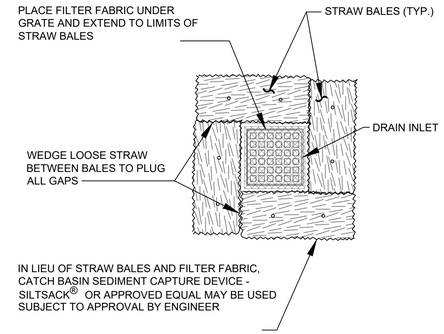
5 PROPOSED CLEAN FILL SOIL STOCKPILE AREA

SCALE: NOT TO SCALE



6 PROPOSED STRAW BALE INSTALLATION

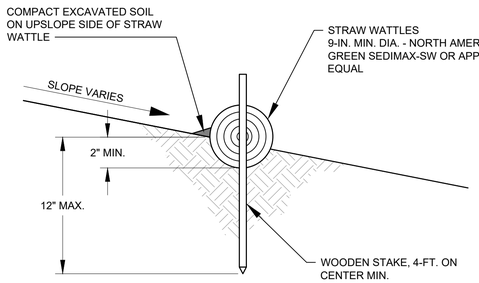
SCALE: NOT TO SCALE



NOTE
STRAW BALE LOCATION TO BE DETERMINED BY SITE FIELD ENGINEER

7 PROPOSED STRAW BALE EROSION CONTROL AROUND DRAIN INLET

SCALE: NOT TO SCALE

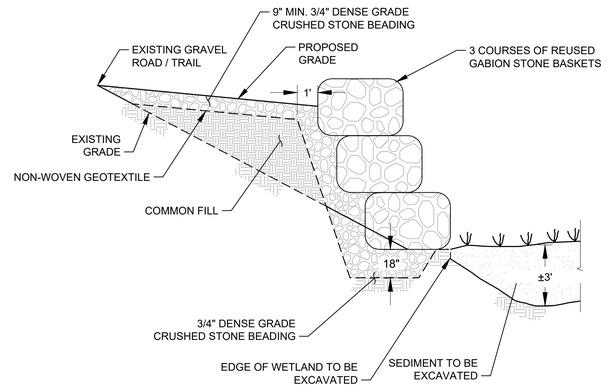


NOTES

1. STRAW BALE LOCATION TO BE DETERMINED BY SITE FIELD ENGINEER
2. NO DISTURBANCE TO THE DOWN SLOPE AREA.

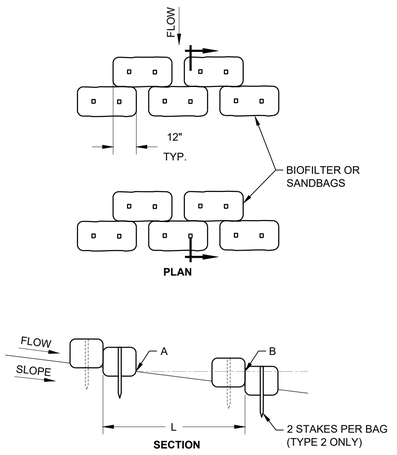
8 PROPOSED STRAW WATTLE EROSION CONTROL

SCALE: NOT TO SCALE



9 PROPOSED ACCESS ROAD FOR SEDIMENT TRANSPORT FROM WETLANDS

SCALE: NOT TO SCALE



BARRIER SPACING		
GRADE	SLOPE	MAX. SPACING
< 10%	1:10	300'
10% TO < 15%	1:10 TO > 1:7.5	150'
15% TO < 20%	1:7.5 TO > 1:5	100'
20% TO ≤ 30%	1:5 TO ≥ 1:3	50'
> 30%	< 1:3	25'

NOTES:

1. INSTALL BARRIERS PARALLEL WITH CONTOURS.
2. DRIVE STAKES FLUSH WITH TOP OF BAG AND INTO UNDISTURBED GROUND A MIN. OF 12". (TYPE 2 ONLY). STAKES MAY BE OMITTED IF BAGS ARE PLACED ON PAVED SURFACE.
3. SPACE BAGS (L) SO POINTS "A" AND "B" ARE OF EQUAL ELEVATION.
4. TYPE 2 USES BIOFILTER BAGS TYPE 4 USES SANDBAGS.

10 SANDBAG INSTALLATION DETAIL

SCALE: NOT TO SCALE

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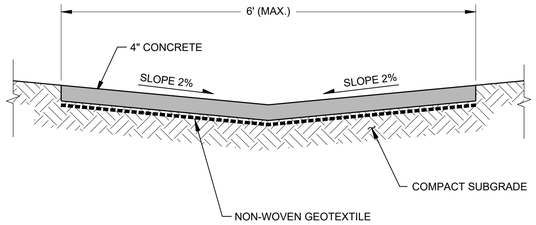
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

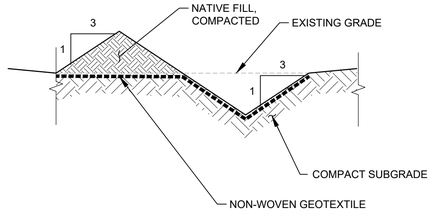
SITE PREPARATION DETAILS (1 OF 2)

C-700

Sheet: 34 of 37



1 CONCRETE V-DITCH
SCALE: NOT TO SCALE



2 DRAINAGE SWALE
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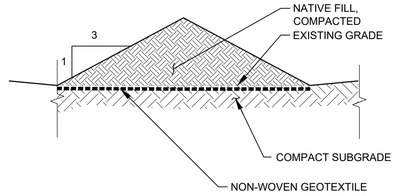

3 DRAINAGE BERM
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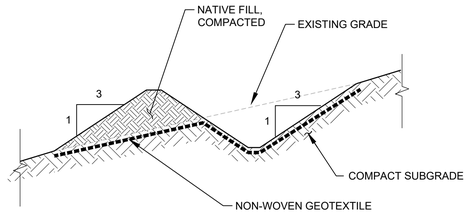

4 DETENTION POND
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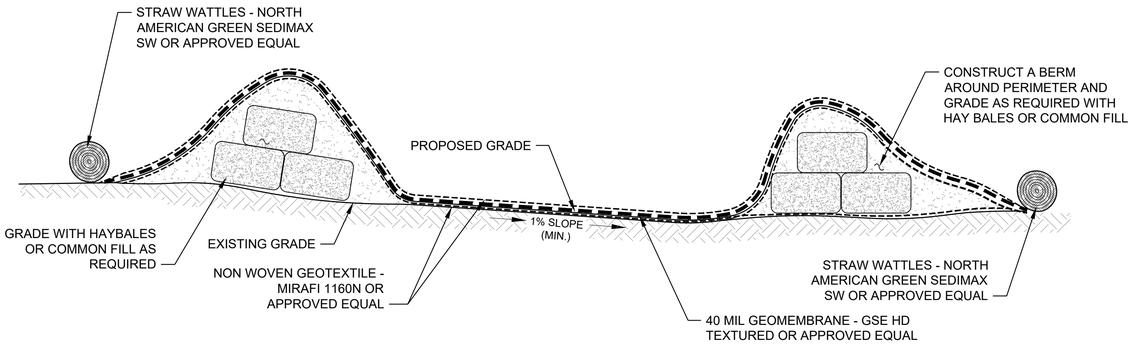
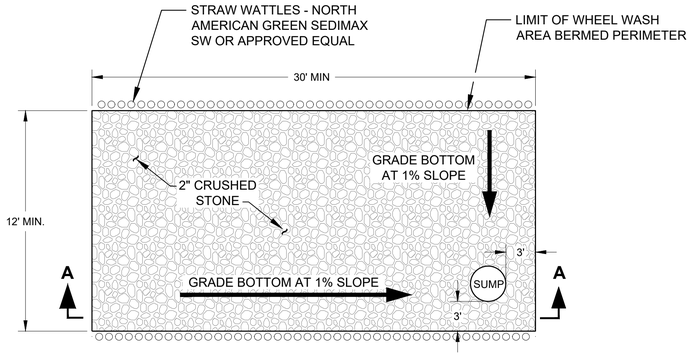


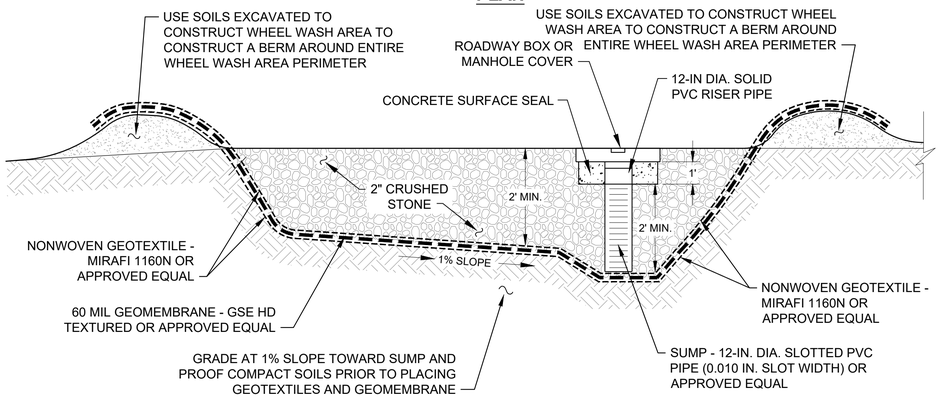
5 EXCAVATED MATERIAL PROCESSING AREA
SCALE: NOT TO SCALE

WHEEL WASH AREA NOTES:

1. WATER PUMPED FROM SUMP SHALL BE PUMPED TO THE DEWATERING EFFLUENT TREATMENT AREA AND TREATED IN ACCORDANCE WITH SECTION 312319 CONSTRUCTION DEWATERING AND WATER TREATMENT.
2. AT END OF CONSTRUCTION, ALL MATERIALS FROM THE WHEEL WASH AREA SHALL BE EXCAVATED AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE ENGINEER. THE EXCAVATION SHALL BE BACKFILLED WITH DENSE GRADE TO MATCH THE SURROUNDING ACCESS ROAD.
3. BLEND THE WHEEL WASH AREA WITH THE ADJACENT ROADWAY.
4. CONSTRUCT A BERM AROUND ENTIRE WHEEL WASH AREA AS SHOWN.
5. SUBGRADE CONDITION TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACEMENT OF GEOTEXTILES AND GEOMEMBRANE. IF SUBGRADE CONDITION IS DETERMINED BY THE ENGINEER TO BE UNSUITABLE, A 4-IN. MIN. SAND LAYER MAY BE REQUIRED BETWEEN THE LOWER GEOTEXTILE AND THE GEOMEMBRANE.



PLAN



SECTION A - A

6 WHEEL WASH / DECONTAMINATION PAD (AS NECESSARY)
SCALE: NOT TO SCALE

HALEY ALDRICH

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

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Scale:	SHOWN
Date:	APRIL 2024
Drawn By:	HA
Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

Rev.	Description	By	Date
A	100% DESIGN	H&A	04/23/24

NUCLEAR METALS, INC.
COURTYARD,
LANDFILL, SPHAGNUM BOG,
AND COOLING POND
SSS PHASE 1
RAWP REMEDIAL DESIGN
2229 MAIN STREET
CONCORD, MASSACHUSETTS

SITE PREPARATION DETAILS (2 OF 2)

C-701

Sheet: 35 of 37

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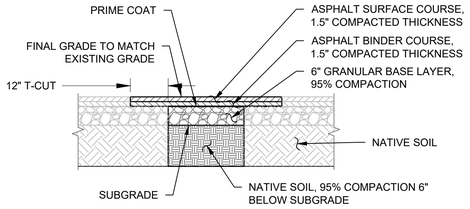

1 ASPHALT RESTORATION
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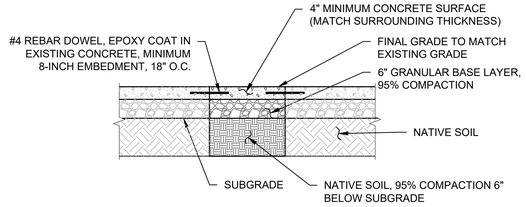

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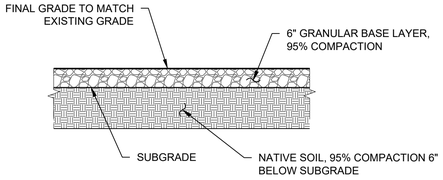

3 GRAVEL RESTORATION
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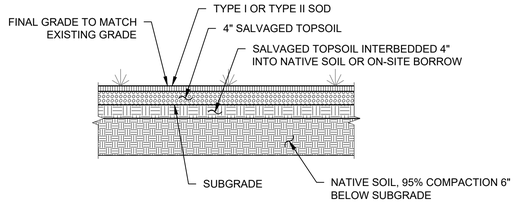
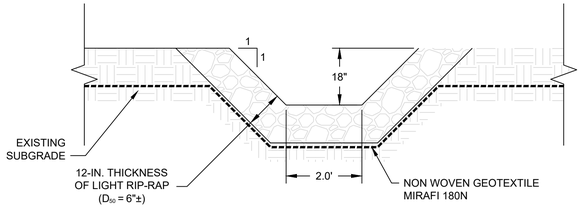


4 VEGETATIVE RESTORATION
SCALE: NOT TO SCALE

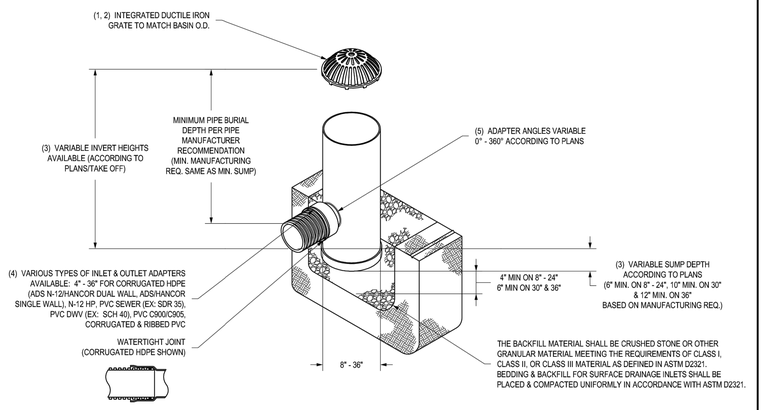


5 RIP-RAP SWALE DETAIL
SCALE: NOT TO SCALE

GENERAL NOTES FOR RESTORATION:

1. SOILS EXCAVATED ON-SITE SHALL NOT BE REUSED ON-SITE AS BACKFILL MATERIAL UNLESS PRIOR APPROVAL IS GRANTED FROM THE EPA AND MASSDEP.

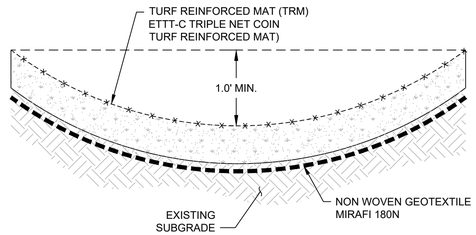
NYOPLAST DRAIN BASIN WITH DOME GRATE



1 - 8" - 30" DOME GRATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - 8" & 10" DOME GRATES FIT ONTO THE DRAIN BASINS WITH THE USE OF A PVC BODY TOP. SEE DRAWING NO. 7001-110-045.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 36").
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.
6 - 8" - 30" DOME GRATES HAVE NO LOAD RATING.

DRAWN BY EBC	MATERIAL	ADS Nyloplast	3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com
DATE 03-25-10			
REVISED BY NMH	PROJECT NO./NAME	TITLE	DRAIN BASIN WITH DOME GRATE QUICK SPEC INSTALLATION DETAIL
DATE 06-12-18			
DWG SIZE A	SCALE 1:40 SHEET 1 OF 1	DWG NO. 7001-110-307	REV E

6 NYOPLAST DRAIN BASIN WITH DOME GRATE DETAIL
SCALE: NOT TO SCALE



7 TURF - REINFORCED MAT (TRM) SWALE DETAIL
SCALE: NOT TO SCALE

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Stamp:	

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CONCORD, MASSACHUSETTS

CONSTRUCTION DETAILS

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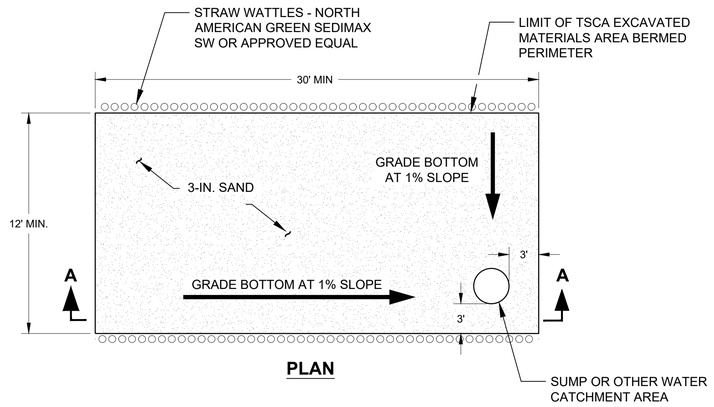
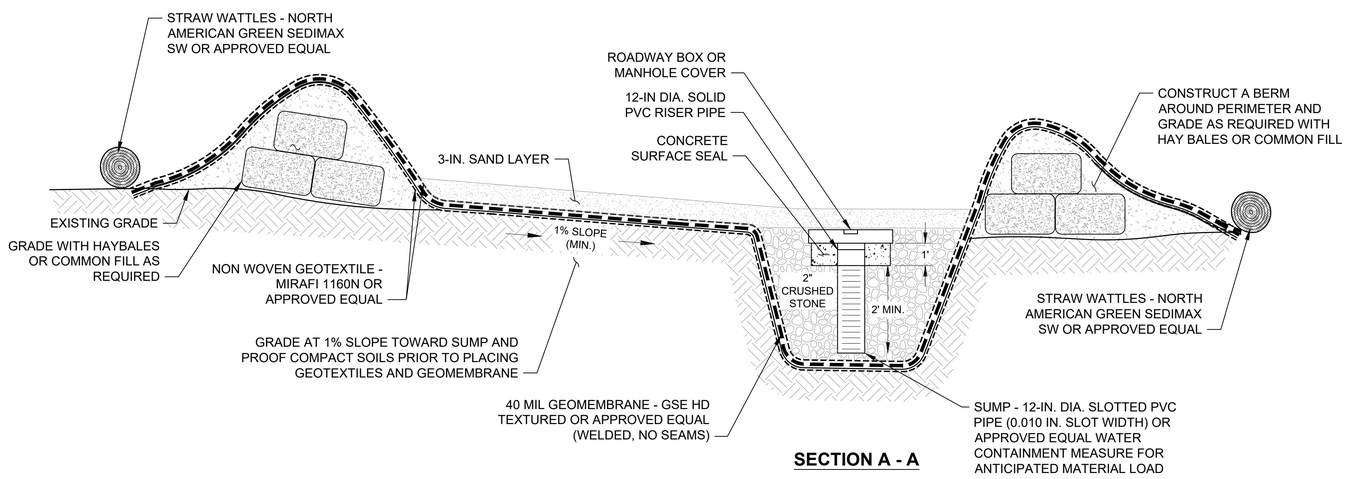


PLAN



SECTION A - A

TSCA EXCAVATED MATERIAL PROCESSING AREA NOTES:

1. SUBGRADE CONDITION TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACEMENT OF GEOTEXTILES AND GEOMEMBRANE. IF SUBGRADE CONDITION IS DETERMINED BY THE ENGINEER TO BE UNSUITABLE, A 4-IN. MIN. SAND LAYER MAY BE REQUIRED BETWEEN THE LOWER GEOTEXTILE AND THE GEOMEMBRANE.
2. WATER PUMPED FROM SUMP SHALL BE COLLECTED AND DISPOSED OF OFF-SITE. ONCE THE DEWATERING EFFLUENT TREATMENT (DETS) AREA IS CONSTRUCTED, WATER WILL BE PUMPED TO THE DETS AND TREATED IN ACCORDANCE WITH SECTION 312319 CONSTRUCTION DEWATERING AND WATER TREATMENT.
3. AT END OF CONSTRUCTION, ALL MATERIALS FROM THE TSCA EXCAVATED MATERIAL PROCESSING AREA SHALL BE EXCAVATED AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE ENGINEER. CONFIRMATORY SAMPLING WILL BE CONDUCTED ON UNDERLYING MATERIAL AFTER TSCA EXCAVATED MATERIALS PROCESSING AREA IS DISASSEMBLED.
4. 40 MIL GEOMEMBRANE MUST BE WELDED OR ONE CONTINUOUS PIECE.

5 TSCA EXCAVATED MATERIAL PROCESSING AREA
SCALE: NTS

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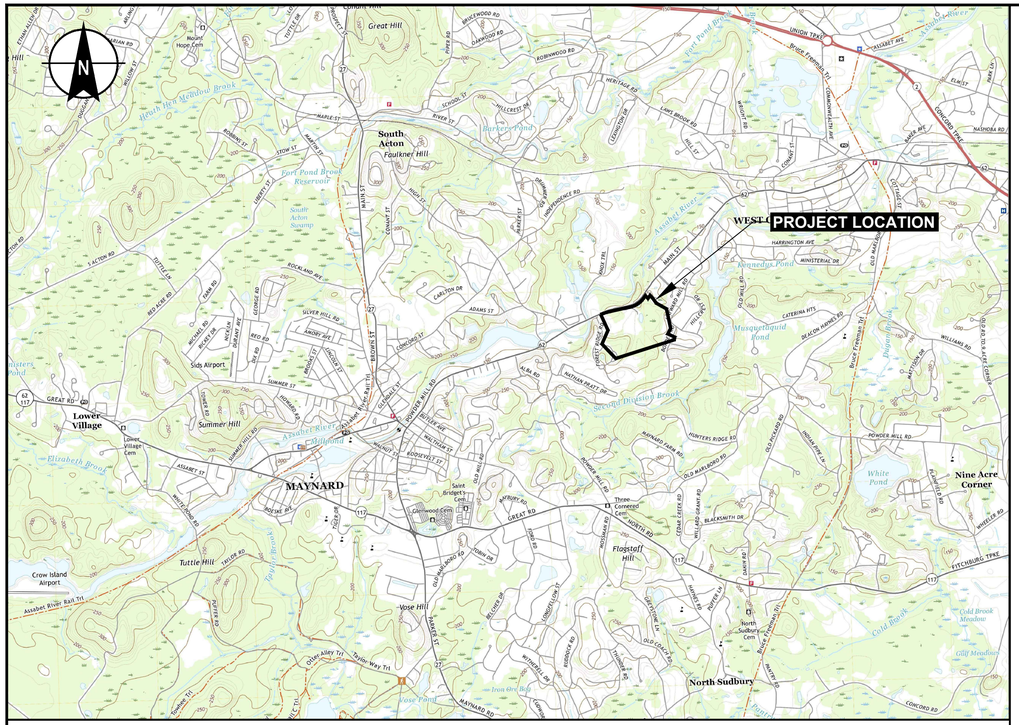
CONCORD, MASSACHUSETTS

TSCA EXCAVATED MATERIAL PROCESSING AREA DETAIL

C-703

Sheet: 37 of 37

APPENDIX C
Enabling Phase Remedial Action As-Built Drawings

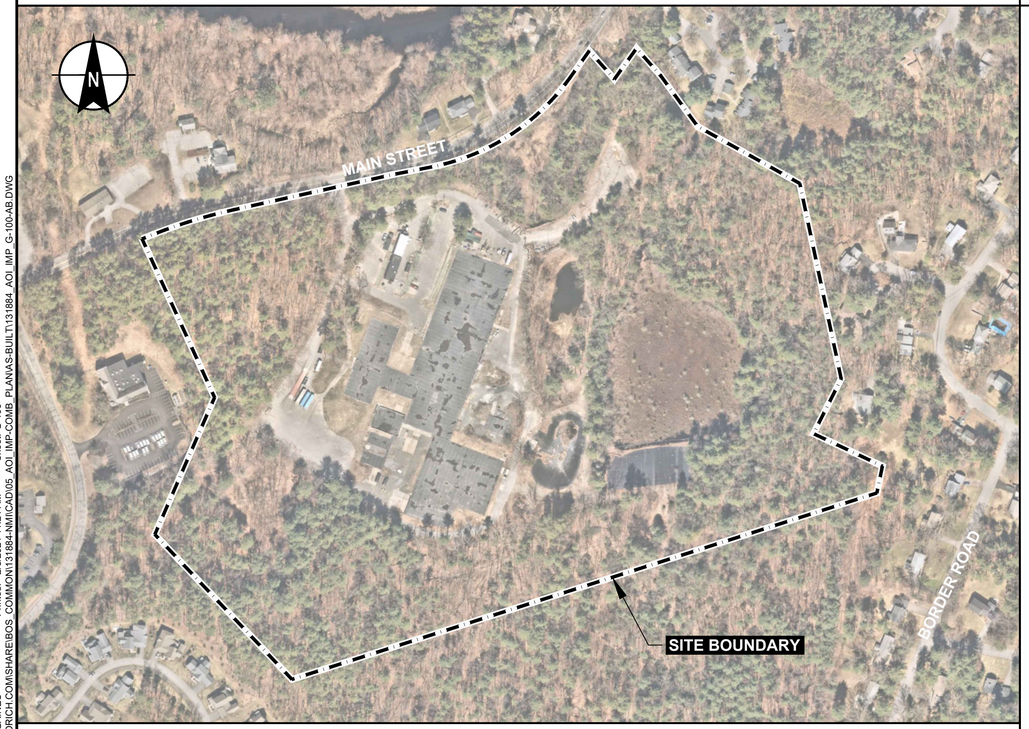


SITE LOCUS

TOPO SOURCE: BASE MAP DEVELOPED FROM THE CITY OF COLUMBUS, IN NORTH USGS TOPOGRAPHIC QUADRANGLE MAP, DATED 2016.

0 2500 5000

SCALE IN FEET



SITE AERIAL

MAP SOURCE: IMAGERY © 2022 NEARMAP, HERE

0 200 400

SCALE IN FEET

NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

CONCORD, MASSACHUSETTS
FEBRUARY 2024

DRAWING INDEX

SHEET NO.	SHEET TITLE	DESCRIPTION
1	G-100	TITLE SHEET AND DRAWING INDEX
2	G-101	GENERAL NOTES
3	G-102	LEGEND
4	C-100	SITEWIDE EXISTING CONDITIONS
5	C-101	EXISTING CONDITIONS BUILDING A AREA
6	C-102	EXISTING CONDITIONS HOLDING BASIN AND COURTYARD
7	C-200	ENABLING PHASE ACTIVITIES - BUILDING A AREA SAMPLING LOCATIONS
8	C-201	INTERIM EXCAVATION GRADING PLAN FOR BUILDING A AREA
9	C-202	INTERIM GRADING PLAN - BUILDING A AREA
10	C-203	RESTORATION PLAN - BUILDING A AREA
11	C-300	LIMIT OF COURTYARD TSCA SOIL EXCAVATION AND RESTORATION PLAN
12	C-400	COOLING POND TSCA SAMPLING LOCATIONS PRE-EXCAVATION
13	C-401	HOLDING BASIN AND COOLING POND EXCAVATION GRADING PLAN
14	C-402	COOLING POND TSCA RESULTS
15	C-403	EXCAVATION PLAN FOR COOLING WATER SLOPES
16	C-500	INTERIM GRADING OF THE HOLDING BASIN
17	C-501	INTERIM HOLDING BASIN PLAN & PROFILES
18	C-600	DETAILS (1 OF 2)
19	C-601	DETAILS (2 OF 2)
20	C-602	TSCA DETAILS

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Approved By:	HA

Stamp:

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Rev.	Description	By	Date
A	AS-BUILTS	H&A	02/09/24

NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

TITLE SHEET AND DRAWING INDEX

G-100

Sheet: 1 of 20

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GENERAL

1. AS-BUILT SURVEY DATA PROVIDED BY US ECOLOGY, INC. (REPUBLIC) SUBCONTRACTED SURVEYOR, A-PLUS CONSTRUCTION SERVICES, INC. AS SUBMITTAL 017. THE DRAWINGS INCLUDING THE AS-BUILT SURVEY WERE PROVIDED ON 8 DECEMBER 2023, AND UPDATED ON 20 DECEMBER 2023.
2. THE TERM "OWNER" REFERS TO DE MAXIMIS, INC. (DE MAXIMIS) AS A REPRESENTATIVE FOR SETTLING DEFENDANTS.
3. THE TERM "ENGINEER" REFERS TO HALEY & ALDRICH, INC.
4. THE TERM "CONTRACTOR" REFERS TO ENTITIES CONTRACTED BY DE MAXIMIS, INC TO COMPLETE THE WORK.
5. THE TERM "WORK" REFERS TO ALL CONSTRUCTION RELATED ACTIVITIES PERFORMED IN ACCORDANCE WITH CONTRACT DOCUMENTS.
6. THE TERM "CONTRACT DOCUMENTS" REFERS TO DRAWINGS, SPECIFICATIONS, CONTRACT TERMS, AND OTHER DOCUMENTS CREATED FOR THE EXPRESSED PURPOSE OF COMPLETING THE WORK.
7. MEANS AND METHODS OF CONSTRUCTION ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE SUFFICIENT TO ACHIEVE THE PERFORMANCE OBJECTIVES OF THE PROJECT AS DESCRIBED IN THE SUBCONTRACTOR DOCUMENTS.
8. DETAILS TAKE PRECEDENCE OVER GENERAL DRAWINGS. WHERE NOTES CONFLICT WITH ANY DRAWING, THE MOST RESTRICTIVE SHALL APPLY. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING. NO CHANGES OR ADDITIONS TO THE SCOPE OF WORK DEPICTED HEREIN SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.
9. HORIZONTAL SURVEY DATUM SHALL BE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NORTH AMERICAN DATUM OF 1927 (NAD27). VERTICAL SURVEY DATUM SHALL BE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
10. LIMITS OF THE WORK AREA ARE INDICATED ON THE DRAWINGS. CONFINE ALL SITE ACTIVITIES WITHIN THE WORK AREAS INDICATED. ADDITIONAL CONSTRUCTION AREAS REQUIRED TO COMPLETE THE WORK, BUT NOT WITHIN THE LIMITS INDICATED, SHALL NOT BE PERMITTED.

SURVEY NOTES

1. THE BASEMAP AND ELEVATION SURVEY WERE PROVIDED BY FELDMAN LAND SURVEYORS IN THE "EXISTING CONDITIONS PLAN" DATED MAY 15, 2020.
2. BENCH MARK INFORMATION:

   TEMPORARY BENCH MARKS SET:

   TGS-1: MAGNETIC NAIL SET UP 1'ON THE SOUTHERLY SIDE OF UTILITY POLE AT THE INTERSECTION OF MAIN STREET AND THE DRIVEWAY TO #2228 MAIN STREET. ELEVATION=151.79'

   TGS-2: MAGNETIC NAIL SET UP 1' IN UTILITY POLE. ELEVATION=167.98'

   TBM PS-1: CHISEL SQUARE SET IN NORTHWEST CORNER OF LIGHT POLE BASE ELEVATION=172.60'

   TBM PS-2: CHISEL SQUARE SET IN NORTHWEST CORNER OF LIGHT POLE BASE ELEVATION=193.53'
3. ELEVATIONS WERE ESTABLISHED BY GPS OBSERVATIONS ON APRIL 17, 2020 AND CONVERTED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (**NGVD29**).
4. CONTOUR INTERVAL EQUALS ONE (1) FOOT.
5. BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X" (UNSHADED), AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (F.E.M.A) FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR MIDDLESEX COUNTY, MASSACHUSETTS, MAP NUMBER 25017C0358F, TOWN OF CONCORD COMMUNITY NUMBER 250189, PANEL NUMBER 0358F, HAVING AN EFFECTIVE DATE OF JULY 7, 2014.
6. PLANIMETRIC SITE FEATURES WERE OBTAINED BY AERIAL MAPPING AND CONTOURS FROM LIDAR PREPARED BY BLUE SKY GEOSPATIAL, LTD. RECEIVED ON JUNE 3, 2020. ADDITIONAL FEATURES WERE VERIFIED BY INSTRUMENT SURVEYS BY FELDMAN LAND SURVEYORS BETWEEN APRIL 14 TO JUNE 16, 2020.
7. WETLAND DELINEATION SKETCH PREPARED BY COMPREHENSIVE ENVIRONMENTAL, INC. (CEI) WAS PROVIDED ON APRIL 29, 2020.
8. THE SEPTIC SYSTEM, AS SHOWN HEREON, WAS SCALED FROM A PLAN ENTITLED "PARKING AND SEPTIC SYSTEM LAYOUT", BY C. E. MAGUIRE, INCORPORATED, DATED JANUARY, 1982 AND IS APPROXIMATE ONLY.
9. THE UTILITIES ON THE SITE, AS SHOWN HEREON, WERE SCALED FROM DRAWING PRSCP_POST_REMOVAL_SITE_CONDITIONS.DWG AND ARE APPROXIMATE ONLY.
10. UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. THERE IS NO ASSUMED RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUBSURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUBSURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

PROJECT SCOPE

1. THE PROJECT SCOPE IS AS FOLLOWS:
   - 1.1. ESTABLISH SITE CONTROLS AND CONSTRUCTION FACILITIES.
   - 1.2. DEMOLISH SURFACE FINISHES.
   - 1.1. INSTALL PRE-GRADING DRAINAGE FEATURES
   - 1.2. PERFORM REMEDIAL GRADING.
   - 1.3. PERFORM FINAL GRADING.
   - 1.4. RESTORATION OF WORK AREA.

HEALTH AND SAFETY

1. CONTRACTOR SHALL PREPARE A CONTRACTOR'S HEALTH AND SAFETY PLAN (CHASP) TO BE APPROVED BY THE ENGINEER AND/OR OWNER.
2. THE CONTRACTOR SHALL PERFORM THE WORK IN SUCH AS MANNER THAT THE SAFETY OF THE WORKERS IS ASSURED. THIS SHALL INCLUDE PROVISIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).
3. CONTRACTOR SHALL COMPLY AT ALL TIMES WITH THE SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS NOTED IN CONTRACTOR'S HASP, WITH ALL OSHA REQUIREMENTS, AND WITH THE OWNER'S SAFETY RULES.
4. OWNER SHALL CONDUCT DAILY SAFETY MEETINGS WHICH MUST BE ATTENDED BY ALL ONSITE CONTRACTOR PERSONNEL.
5. EXCAVATIONS SHALL BE PERFORMED IN ACCORDANCE WITH OSHA REGULATIONS AND STANDARDS. SUBCONTRACTOR SHALL EXCAVATE BY AIR KNIFE OR HAND DIGGING WHEN EXCAVATING WITHIN 2 FEET OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THE DRAWINGS, SUBCONTRACTOR IS RESPONSIBLE FOR CONTACTING DIG ALERT, AND ARE SOLELY RESPONSIBLE FOR CONFIRMING LOCATIONS OF UNDERGROUND UTILITIES.
6. WORK ON ELECTRICAL SYSTEMS MAY ONLY OCCUR AFTER THE ELECTRICAL HAZARD IS MITIGATED BY USE OF LOCK-OUT/TAG-OUT CONTROLS. SUBCONTRACTOR SHALL DE-ENERGIZE ELECTRICAL CHARGE PRIOR TO ANY MODIFICATION OR MOVEMENT OF ELECTRICAL SYSTEMS INCLUDING THOSE THAT DO NOT EXPOSE WIRING OR INTERIOR ELECTRICAL COMPONENTS.
5. THE CONTRACTOR TO MAINTAIN SAFE DISTANCE REQUIREMENTS FOR ALL THE ABOVE GROUND POWER DISTRIBUTION AND TRANSMISSION WIRES AND STRUCTURES.
6. PLACE ALL SAFETY DEVICES, CONSTRUCTION ROAD SIGNING, AND CONSTRUCTION SIGNING PRIOR TO ANY SITE MOBILIZATION, CONSTRUCTION, EXCAVATION AND DRILLING. THE SUBCONTRACTOR SHALL PROVIDE THE NECESSARY FLAG PERSONS FOR MOBILIZATION OF TRUCKS, EQUIPMENT AND PERSONNEL AS NEEDED. PROPERLY SECURE WORK AREAS AT THE END OF EACH WORKDAY.

COMPLIANCE AND STANDARDS

1. CONTRACTOR SHALL OBTAIN ANY/ALL NECESSARY CONSTRUCTION PERMITS AND SCHEDULE ANY REQUIRED INSPECTIONS. THE CONTRACTOR SHALL MAINTAIN COPIES OF ANY PERMITS AT THE JOB SITE FOR AGENCY INSPECTION AND PROVIDE A COPY TO THE ENGINEER AND/OR OWNER PRIOR TO BEGINNING WORK.
2. WORK SHALL COMPLY WITH ALL NATIONAL, STATE, AND LOCAL LAWS, REGULATIONS, CODES, REQUIREMENTS AND STANDARDS, INCLUDING REVISIONS TO DATE OF CONTRACT OR REVISIONS TO THE CONTRACT. UNLESS OTHERWISE SPECIFIED, THE LATEST EDITIONS OR REVISIONS OF THESE CODES AND STANDARDS SHALL BE ENFORCED:
   - 2.1. OSHA EXCAVATION REGULATIONS AND STANDARDS
   - 2.2. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
   - 2.3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
   - 2.4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
   - 2.5. NATIONAL ELECTRIC CODE (NEPA)

WORKING HOURS

1. CONSTRUCTION ACTIVITIES SHALL BE CONDUCTED BETWEEN 7:00 AM AND 5:00 PM MONDAY THROUGH FRIDAY UNLESS OTHERWISE APPROVED BY THE ENGINEER AND/OR OWNER. NIGHT OR SATURDAY WORK MAY BE APPROVED BY OWNER UPON REQUEST.

ENVIRONMENTAL CONTROLS

1. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE AND FEDERAL REQUIREMENTS TO MINIMIZE DUST, NOISE, STORMWATER IMPACTS, AND OTHER NUISANCE ACTIVITIES.
2. CONTRACTOR SHALL ESTABLISH, MAINTAIN, INSPECT AND REPAIR ALL STORMWATER AND EROSION AND SEDIMENTATION CONTROLS (BMPS) AS NEEDED TO CONTROL SEDIMENT AND RUNOFF FROM DISTURBED PROJECT AREAS, AND/OR REQUIRED BY PROJECT ENVIRONMENTAL PERMITS.
3. CONTRACTOR SHALL MONITOR THE EFFECTIVENESS OF ENVIRONMENTAL CONTROLS AND SUPPLEMENT OR MODIFY THEM AS NEEDED BASED ON SITE OPERATIONS TO MAINTAIN COMPLIANCE WITH THE PERMIT CONDITIONS AND CONTRACT DOCUMENTS.
4. CONTRACTOR SHALL PROVIDE STORM WATER RUN-ON AND RUN-OFF CONTROLS FOR OPEN EXCAVATIONS AND STOCKPILES. STOCKPILES MUST BE APPROVED IN WRITING BY THE ENGINEER AND/OR OWNER AND IN ACCORDANCE WITH APPLICABLE PERMITS AND CONTRACT DOCUMENTS.
5. ANY SURFACE WATER OR STORM WATER WHICH COLLECTS IN EXCAVATED AREAS SHALL BE CONTAINED, TREATED, AND DISCHARGED OR DISPOSED OF APPROPRIATELY IN ACCORDANCE WITH APPLICABLE PERMITS AND CONTRACT DOCUMENTS. CONTRACTOR SHALL SAMPLE, ANALYZE, AND BASED ON ANALYTICAL RESULTS, APPROPRIATELY MANAGE OF AT THE CONTRACTOR'S EXPENSE.
6. CONTRACTOR SHALL PROVIDE STORM DRAIN INLET PROTECTION.
7. CONTRACTOR SHALL PROVIDE DUST CONTROL AND ENSURE VISIBLE DUST DOES NOT CROSS THE PROPERTY LINE.
8. THE CONTRACTOR SHALL LEGALLY DISPOSE OF ALL MATERIALS DESIGNATED FOR REMOVAL FROM THE PROJECT SITE, UNLESS DIRECTED OTHERWISE BY THE OWNER.

SITE PREPARATION AND MAINTENANCE

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS AND LOCATIONS SHOWN PRIOR TO COMMENCING WORK. ANY CONFLICTS WITH DETAILS AND NOTES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER AND/OR OWNER IN WRITING.
2. THE CONTRACTOR SHALL MAINTAIN AN ORDERLY AND CLEAN JOB SITE. THE CONTRACTOR SHALL REMOVE AND PROPERLY STORE OR DISPOSE OF ALL CONSTRUCTION RELATED TRASH, DEBRIS, AND EXCESS MATERIALS AT THE END OF EACH WORK SHIFT.
3. THE CONTRACTOR'S LAYDOWN AREA FOR MATERIALS SHALL BE COORDINATED WITH THE ENGINEER AND/OR OWNER, AND OTHER CONTRACTORS (IF APPLICABLE). SECURITY FOR CONTRACTOR'S EQUIPMENT AND MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR.
4. TEMPORARY CONSTRUCTION UTILITY CONNECTIONS SHALL BE APPROVED AND PERMITTED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
5. CONTRACTOR SHALL PREPARE THE WORK AREAS AND WORKING SURFACE IN ACCORDANCE WITH THE TEMPORARY CONTROLS AND SITE ACCESS DRAWINGS.
6. CONTRACTOR SHALL CLEAR VEGETATION WITHIN THE WORK AREAS LIMITS AS REQUIRED.
7. VEHICLES AND EQUIPMENT SHALL ONLY ENTER/EXIT THE SITE BY LOCATIONS SPECIFIED ON THESE PLANS.

UTILITIES AND EXISTING INFRASTRUCTURE

1. CONTRACTOR SHALL LOCATE ALL UTILITIES AND PROTECT THEM FROM DAMAGE UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ANY UTILITIES DAMAGED BY THE CONTRACTOR AND PROVIDE FOR SERVICE CONTINUATIONS DURING REPAIRS AT NO EXPENSE TO THE ENGINEER, OR OWNER.
2. UTILITY LOCATIONS DEPICTED WITHIN THE PROJECT BOUNDARIES ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE UTILITY LOCATIONS AND DEPTHS, AND IDENTIFYING UNDOCUMENTED UTILITIES PRIOR TO CONSTRUCTION. EXCAVATIONS SHALL BE CONDUCTED BY HAND OR AIR-KNIFE IF WITHIN FIVE FEET OF SUSPECTED UTILITIES OR WITHIN 2 FEET OF A UTILITY SATISFACTORILY EXPOSED BY POTHOLING AS DETERMINED BY THE ENGINEER AND/OR OWNER. UTILITIES, IF ANY, THAT ARE NOT TO BE DEMOLISHED AND ARE EXPOSED DURING EXCAVATION SHALL BE SUPPORTED BY BRACES OR OTHERWISE PROTECTED DURING CONSTRUCTION ACTIVITIES.
3. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL DOCUMENT THE QUANTITY, SIZE, DIMENSIONS AND LOCATION OF ALL PRE-EXISTING LANDSCAPING, HARDSCAPE, CONCRETE SIDEWALK CRACKS, CONCRETE CULVERT CRACKS, CONDITION OF ASPHALT DIMENSIONS, STRIPING, SIGN POST LOCATIONS, FENCING, PIPING, UTILITY LINES, CURBS AND PAINTING, UTILITY BOX LIDS AND OTHER EXISTING CONDITIONS WHICH THE CONTRACTOR SHALL BE REQUIRED TO RESTORE TO THEIR PRE-EXISTING CONDITION. DOCUMENTATION SHALL BE PROVIDED IN A MEMORANDUM FORMAT. USE OF TABLES AND PHOTOGRAPHS ARE ACCEPTABLE.
4. THE PROPOSED AND EXISTING UNDERGROUND AND ABOVE GROUND FACILITIES, STRUCTURES, UTILITIES, SURFACE FEATURES AND NATURAL FEATURES SHOWN HEREON ARE BASED ON FIELD SURVEYS AND RECORD DOCUMENTS. OTHER FACILITIES MAY EXIST NOT DISCOVERED THROUGH THE RECORD CHECK. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION, BOTH VERTICAL AND HORIZONTAL, OF ALL UTILITIES FROM THE APPROPRIATE UTILITY COMPANIES AND ONE CALL 811 SERVICES. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
5. TAKE ALL NECESSARY MEASURES TO PREVENT DAMAGE TO ADJACENT AND NEARBY STRUCTURES, PAVEMENT, FENCING AND LANDSCAPING. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF THE ROADS, TREES AND NEARBY PUBLIC AND PRIVATE PROPERTY AND PUBLIC RIGHT OF WAYS FROM ANY SITE CONSTRUCTION/ EQUIPMENT DAMAGE CAUSED BY THE CONTRACTOR'S EQUIPMENT. ALL DAMAGE SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE ENGINEER, OWNER, OR OWNER. REMOVE AND STORE ANY FENCING OR OTHER ITEMS NEEDED TO BE REMOVED TO PERFORM THE WORK AND RETURN TO THE ORIGINAL CONDITION AT THE COMPLETION OF ALL WORK. REMOVE AND STORE ANY CURB, FENCING OR OTHER ITEMS NEEDED TO BE REMOVED TO PERFORM THE WORK AND RETIRE TO THE ORIGINAL CONDITION AT THE COMPLETION OF ALL WORK. PERMANENT FENCING REMOVED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR TO THE ORIGINAL LOCATION AND CONDITION TO THE SATISFACTION OF THE OWNER.

EXCAVATION AND BACKFILLING

1. ALL OPEN EXCAVATIONS SHALL BE SUPPORTED IN ACCORDANCE WITH APPLICABLE OSHA REQUIREMENTS.
2. OPEN TRENCHES SHALL BE COMPLETELY SURROUNDED BY TEMPORARY SAFETY FENCING OR COVERED BY TRAFFIC RATED STEEL PLATES AT ALL TIMES WHEN WORK IS NOT BEING DONE IN THE IMMEDIATE AREA. THE SAFETY FENCING AND/OR STEEL PLATES SHALL BE MAINTAINED UNTIL THE TRENCH IS BACKFILLED AND COMPACTED TO MATCH EXISTING GRADE.
3. THE CONTRACTOR SHALL PROVIDE TRENCH PLATES AND TRAFFIC CONTROL, AS NECESSARY TO MAINTAIN NORMAL SITE ACCESS AND TRAFFIC FLOW. A 25 FOOT WIDE EMERGENCY FIRE VEHICLE LANE MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE APPROVED BY ENGINEER AND/OR OWNER.
4. PRIOR TO BACKFILL, ANY DEVIATION FROM THE PLANNED WORK SHOULD BE CAPTURED AND NOTED ON REDLINES DRAWINGS. SURVEY DATA OR FIELD MEASUREMENTS ARE BOTH ACCEPTABLE METHODS FOR DOCUMENTING INSTALL LOCATIONS..
5. THE CONTRACTOR SHALL NOT BACKFILL THE EXCAVATIONS UNLESS WRITTEN APPROVAL IS PROVIDED BY THE ENGINEER AFTER SOIL TESTING. IF ENGINEER DETERMINES LOCAL CONDITIONS REQUIRE IMMEDIATE BACKFILL OF TRENCH, PRESSURE TESTING MAY OCCUR AFTER BACKFILLING IN THE PRESENCE OF THE ENGINEER.
6. CONTRACTOR SHALL DESIGN AND INSTALL TEMPORARY SUPPORT OF EXCAVATION (SOE) AS NEEDED FOR EXCAVATIONS DEEPER THAN 4 FEET TO PROTECT WORKERS AND/OR ADJACENT INFRASTRUCTURE. CONTRACTOR SHALL REMOVE ALL TEMPORARY SOE ELEMENTS UPON COMPLETION OF THE WORK TO THE SATISFACTION OF THE ENGINEER. A PRE-ENGINEERED TRENCH BOX MAY BE USED IN PLACE OF AN ENGINEER DESIGNED SOE SYSTEM.
7. SAFE INGRESS AND EGRESS MEASURES SHALL BE USED DURING EXCAVATION ACTIVITIES.
8. ASPHALT AND CONCRETE MATERIAL SHALL BE BROKEN DOWN INTO PIECES LESS THAN 3' ACROSS. REFER TO SPECIFICATION, 02 41 00 DEMOLITION.

RESTORATION

1. SURFACES SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS SHOWN ON THE DRAWINGS.
2. FEATURES INCLUDING BUT NOT LIMITED TO FENCING, IRRIGATION, CURBS, SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS SHOWN ON THE DRAWINGS AND INDICATED IN THE SPECIFICATIONS.
3. BACKFILL EXCAVATION AND RESTORE THE WORK AREA PER THE DRAWINGS.

AS-BUILT DRAWINGS

1. CONTRACTOR SHALL PROVIDE A SET OF AS-BUILT DRAWINGS WITH REDLINE MARKUPS DEPICTING THE PRECISE LOCATION OF ALL COMPONENTS INCLUDED IN THE CONSTRUCTION DOCUMENTS AND INDICATE CLEARLY ANY FIELD ADJUSTMENTS MADE THAT DEVIATE FROM THE DESIGN PLANS.
2. CONTRACTOR SHALL SURVEY FINAL GRADES AND RESTORED FEATURES. SURVEY INFORMATION SHALL BE PROVIDED IN AUTOCAD 2018 OR NEWER FORMAT

SUGGESTED CONSTRUCTION SEQUENCE

1. MOBILIZE.
2. INSTALL EROSION AND SEDIMENTATION CONTROLS IN THE WORK AREA INCLUDING FIBER ROLLS, SILT FENCES, CHECK DAMS, STRAW WATTLES, AND STRAW BALES. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES, EXISTING SITE ACCESS PATH IMPROVEMENT, AND WHEEL WASH. PROTECT-IN-PLACE FEATURES AS REQUIRED.
3. CONSTRUCT EXCAVATED SOIL STOCKPILE AND GRANULAR FILL MATERIAL STOCKPILE AREAS.
4. CLEAR AND GRUB THE EXCAVATION AREAS WITHIN THE AREA OF WORK INCLUDING PAVEMENT REMOVAL AS REQUIRED.
5. EXCAVATE AND PLACE SOIL AS REQUIRED AS PART OF THE PRE-GRADING DRAINAGE IMPROVEMENT.
6. EXCAVATE SOILS AS REQUIRED TO MEET THE GRADES INDICATED ON THE PLANS.
7. ALLOW FOR ENGINEER TO SAMPLE AND ANALYZE BOTTOM AND SIDEWALL OF EXCAVATION AT VARIOUS LOCATIONS AS SHOWN ON THE PLAN. ALLOW FOR UP TO 30 DAYS.
8. EXCAVATE ADDITIONAL SOIL AS REQUIRED BASED ON SAMPLE RESULTS.
9. COMPACT AND BACKFILL GRANULAR FILL AS REQUIRED TO MAKE FINAL GRADES.
10. RESTORE SITE AS INDICATED.
11. REMOVE TEMPORARY FEATURES AND FACILITIES.
12. DEMOBILIZE.

NOTE TO REVIEWERS

1. RAD SAFETY REQUIREMENTS TO BE PROVIDED.
2. RAD SAFETY OFFICER DETAILS AND REQUIREMENTS TO BE PROVIDED
3. NOTES FOR BUILDING NTCRA TO BE PROVIDED

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

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NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

GENERAL NOTES

G-101

Sheet: 2 of 20

GAINES, JACK
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\\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\CAD\05_AOI_IMP-COMB_PLANS\AS-BUILT\131884_AOI_IMP_G-101_G-102-AB.DWG

CIVIL FEATURES / SURVEY DATA

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARDRAIL
- EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- ABANDONED LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- STONE WALL
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- ELECTRICAL BOX
- TREE/SHRUB
- STAIRS
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- HYDRANT
- WATER/GAS SHUT OFF/GATE
- GUY WIRE
- UTILITY POLE
- BOLLARD
- POST
- GATE POST
- SIGN
- TRANSFORMER
- ELECTRIC METER
- STUMP
- ASPHALT
- CONCRETE
- GRAVEL

- HISTORICAL SAMPLE LOCATION
- PROPOSED SAMPLE LOCATION
- EXCAVATION CORNER COORDINATE (X: 7.3285, Y: 19.6249)
- LIMIT OF EXCAVATION
- 1 FT PROPOSED CONTOUR
- PROPOSED DRAIN PIPE
- PRE-CAST CONCRETE BLOCKS
- STRAW WATTLES
- STRAW BALES
- TRUCK ROUTE
- PROPOSED TRUCK PATH
- PROPOSED LAYDOWN / STOCKPILE AREA
- PROPOSED DEMOLITION AREA
- PRECAST CONCRETE BLOCKS
- MATERIAL PROCESSING AREA

DEFINITIONS

CI = CAST IRON

CS = COATED STEEL

PL = PLASTIC

RCP = REINFORCED CONCRETE PIPE

12" D (CL) = PIPE SIZE AND MATERIAL

BIT = BITUMINOUS

CB = CONCRETE BOUND

CC = CONCRETE CURB

CONC = CONCRETE

HP = HIGH PRESSURE

IP = IRON PIPE

IR = IRON ROD

R = RIM ELEVATION

RET = RETAINING

SB = STONE BOUND

SGC = SLOPED GRANITE CURB

VGC = VERTICAL GRANITE CURB

WF = WIRE FENCE

NMI = NUCLEAR METALS, INC.

SOE = SUPPORT OF EXCAVATION

TYP = TYPICAL

O.C. = ON CENTER

NAD83 = NORTH AMERICAN DATUM OF 1983

NGVD29 = NATIONAL GEODETIC VERTICAL DATUM OF 1929

PLAN SHEET DATA

AOI-8-1 — PROFILE REFERENCE (PROFILE AOI8-1)

1 / C-700 — DETAIL REFERENCE (DETAIL 1 ON SHEET C-700)

URANIUM (MG/KG)	TOTAL PCBs (MG/KG)
< 2.7	< 1
>= 2.7 AND < 13.5	>= 1 AND < 1.5
>= 13.5	>= 1.5
NO SAMPLE COLLECTED	NO SAMPLE COLLECTED

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

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NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

LEGEND

G-102

Sheet: 3 of 20

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 2 FT EXISTING GROUND CONTOUR
- 10 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- ABANDONED LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.

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465 Medford Street, Suite 2200
Boston, MA 02129-1400
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Fax: 617.886.7600
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NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

SITEWIDE EXISTING CONDITIONS

C-100

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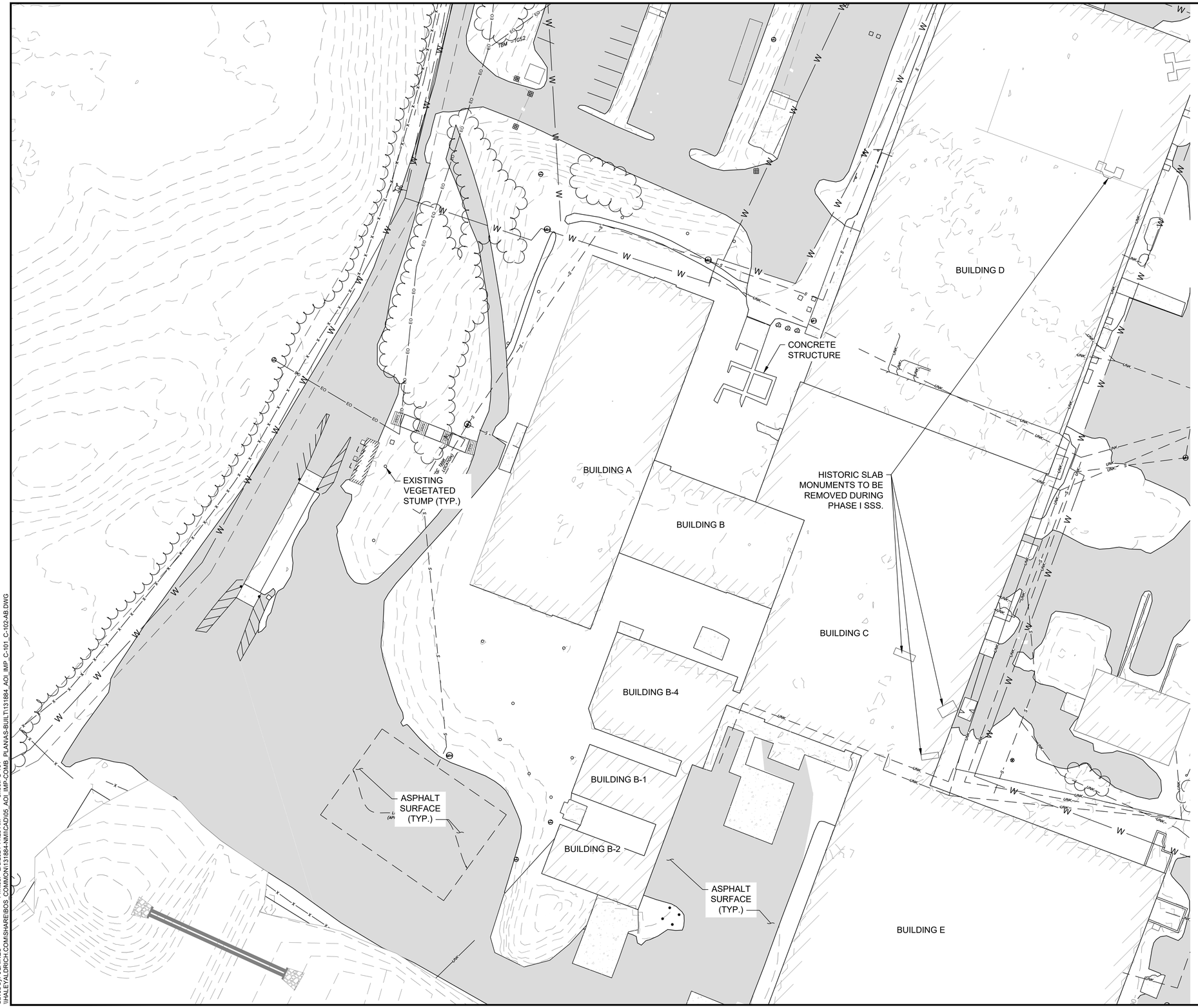

LEGEND

- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 2 FT EXISTING GROUND CONTOUR
- 10 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
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- OVERHEAD ELECTRICAL LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
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- STORM DRAIN
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www.haleyaldrich.com

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ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXISTING CONDITIONS BUILDING A AREA

C-101

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CONCRETE STRUCTURE

BUILDING C

G A

HISTORIC SLAB MONUMENTS TO BE REMOVED DURING PHASE I SSS.

BUILDING B

BUILDING C

BUILDING B-4

ING B-1

2

ASPHALT SURFACE (TYP.)

BUILDING E

CATCH BASIN, RIM ELEVATION 186.02 FT

CATCH BASIN, RIM ELEVATION 186.81 FT

SLOPED STONE RETAINING WALL

HOLDING BASIN

EXISTING TANK HOUSE

LEGEND

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 2 FT EXISTING GROUND CONTOUR
- 10 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRICAL LINE
- OVERHEAD ELECTRICAL LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- MONITORING OR PRODUCTION WELL
- STORM DRAIN
- ELECTRICAL BOX
- ASPHALT
- CONCRETE
- GRAVEL

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Tel: 617.886.7400
Fax: 617.886.7600
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ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXISTING CONDITIONS HOLDING BASIN AND COURTYARD

C-102

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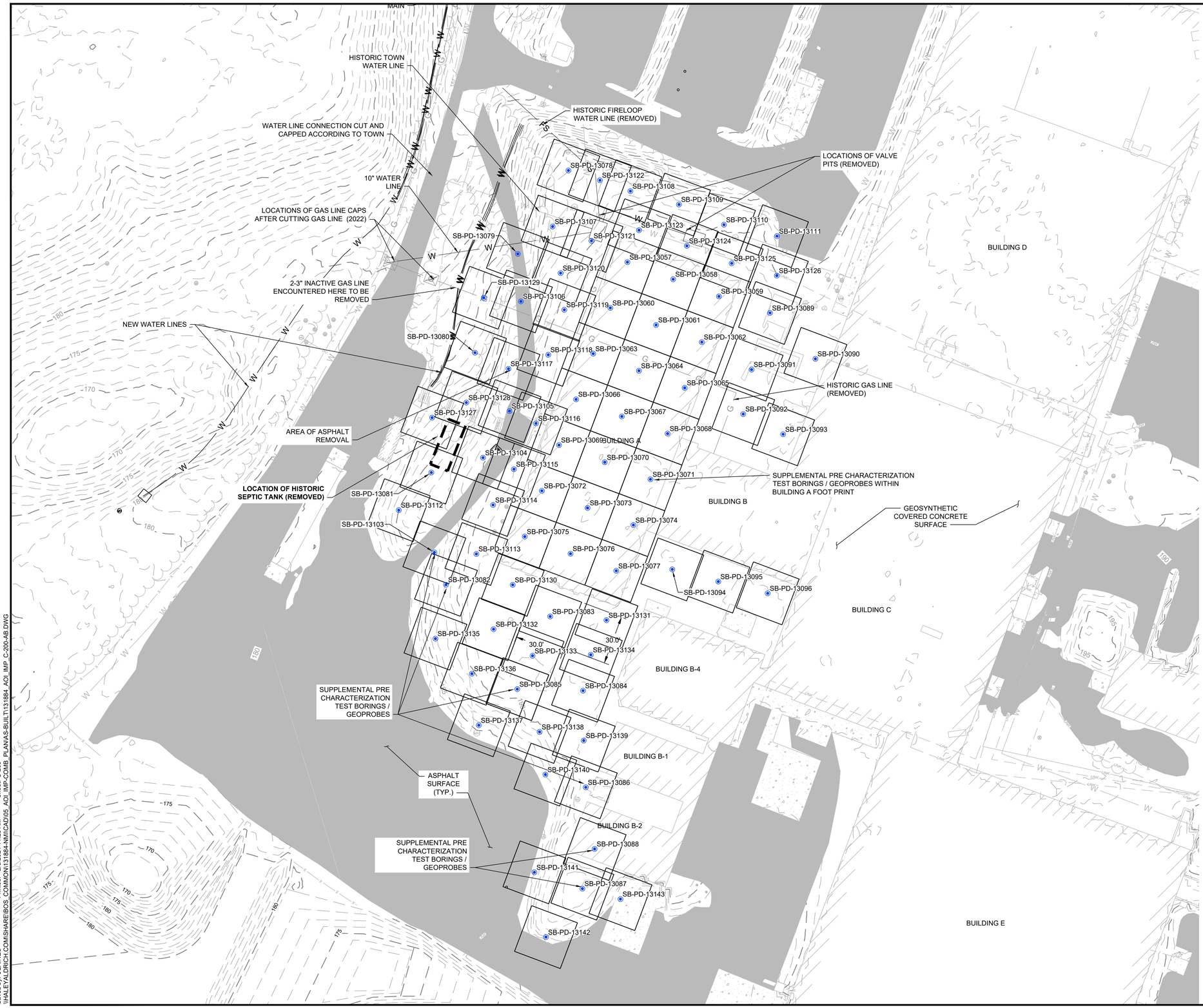

LEGEND

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRICAL LINE
- OVERHEAD ELECTRICAL LINE
- UNKNOWN UTILITY
- HISTORIC GAS LINE
- HISTORIC FIRELOOP WATER LINE
- VEGETATION BOUNDARY
- MONITORING OR PRODUCTION WELL
- STORM DRAIN
- ELECTRICAL BOX
- ASPHALT
- CONCRETE
- GRAVEL
- APROXIMATE LIMIT OF WORK FOR UTILITY REMOVAL AND REGRADING
- SUPPLEMENTAL PRE-CHARACTERIZATION BORINGS/ GEOPROBES

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Boston, MA 02129-1400
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ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

ENABLING PHASE ACTIVITIES - BUILDING A AREA SAMPLING LOCATIONS

C-200

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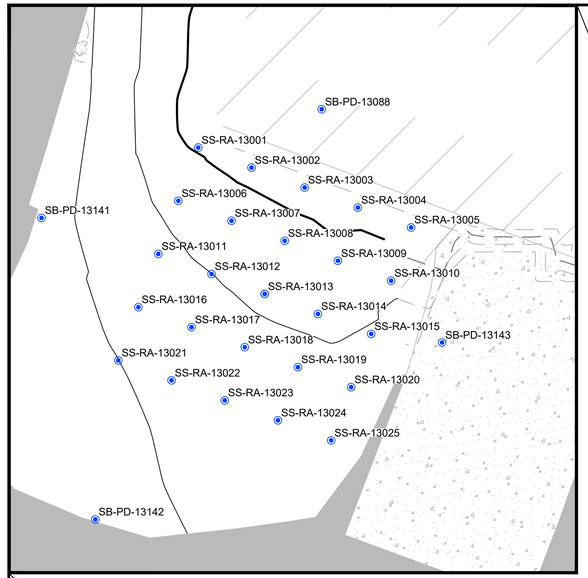

TSCA KNOB

GAS LINE CONFIRMED TO BE CUT AND CAPPED AT SITE ENTRANCE FROM MAIN STREET

INACTIVE 6" GAS LINE ENCOUNTERED HERE, BELIEVED TO RUN ALONG THE WEST SIDE OF THE ROAD

TOWN WATER MAIN

START OF OVERHEAD ELECTRIC LINE (OE) (REMOVED)

END OF OVERHEAD ELECTRIC LINE (OE) (REMOVED)

ASPHALT SURFACE (TYP.)

MONITORING WELL (TYP.)

THIS PORTION OF THE WATERLINE REMAINS AND WILL BE REMOVED IN PHASE II.

LIMITS OF ASBESTOS WATER LINE REMOVED

LIMITS OF TSCA KNOB

BUILDING A

BUILDING B

BUILDING B-1

BUILDING B-4

BUILDING C

BUILDING D

BUILDING E

TANK HOUSE

CONCRETE VAULT

LEGEND

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 2 FT PROPOSED GROUND CONTOUR
- 10 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRICAL LINE
- OVERHEAD ELECTRICAL LINE
- UNKNOWN UTILITY
- HISTORIC GAS LINE
- HISTORIC FIRELOOP WATER LINE
- VEGETATION BOUNDARY
- MONITORING OR PRODUCTION WELL
- STORM DRAIN
- ELECTRICAL BOX
- ASPHALT
- CONCRETE
- GRAVEL
- APROXIMATE LIMIT OF WORK FOR UTILITY REMOVAL AND REGRADING
- SUPPLEMENTAL PRE-CHARACTERIZATION BORINGS/ GEOPROBES

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Tel: 617.886.7400
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2229 MAIN STREET
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INTERIM EXCAVATION GRADING PLAN FOR BUILDING A AREA

C-201

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LEGEND

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
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- VEGETATION BOUNDARY
- MONITORING OR PRODUCTION WELL
- STORM DRAIN
- ELECTRICAL BOX
- ASPHALT
- CONCRETE
- GRAVEL

0 40 80 120 160
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NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

INTERIM GRADING PLAN - BUILDING A AREA

C-202

Sheet: 9 of 20

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Sheet: C-202

LEGEND

- SITE BOUNDARY
- FORMER BUILDING SLAB
- TRAILER BUILDING
- CHAIN LINK FENCE
- GUARD RAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- D — STORM DRAIN LINE
- S — SANITARY SEWER LINE
- W — WATER LINE
- E — ELECTRICAL LINE
- EO — OVERHEAD ELECTRICAL LINE
- UNK — UNKNOWN UTILITY
- G — HISTORIC GAS LINE
- FS — HISTORIC FIRELOOP WATER LINE
- VEGETATION BOUNDARY
- MONITORING OR PRODUCTION WELL
- STORM DRAIN
- ELECTRICAL BOX
- ASPHALT
- CONCRETE
- GRAVEL

0 40 80 120 160
SCALE IN FEET

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2229 MAIN STREET
CONCORD, MASSACHUSETTS

RESTORATION PLAN - BUILDING A AREA

C-203

Sheet: 10 of 20

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ASPHALT SURFACE (TYP.)

MONITORING WELL (TYP.)

HISTORIC SLAB MONUMENTS TO BE REMOVED

COOLING WATER RECHARGE POND

BUILDING D

SB-RI-11014

SB-RI-11010

COURTYARD RESTRICTED AREA, BACKFILLED WITH MIRAFI 160N AND 6" SAND

SB-PD-15011
TSCA LOCATION WITH PCB CONCENTRATIONS ABOVE 50 MG/KG

SB-RI-11018
TSCA LOCATION WITH PCB CONCENTRATIONS ABOVE 50 MG/KG

CURRENT LIMITS OF TSCA AREA

SB-RI-11026

SB-RI-11029

SB-RI-11012

SB-RI-11028

TANK HOUSE

HOLDING BASIN

BUILDING E

SS-RA-15001
SS-RA-15002
SS-RA-15003
SS-RA-15004
SS-RA-15005
SS-RA-15006
SS-RA-15007
SS-RA-15008
SS-RA-15009
SS-RA-15010
SS-RA-15011
SS-RA-15012
SS-RA-15013
SS-RA-15014
SS-RA-15015
SS-RA-15016
SS-RA-15017
SS-RA-15018
SS-RA-15019
SS-RA-15020
SS-RA-15021
SS-RA-15022
SS-RA-15023
SS-RA-15024
SS-RA-15025
SS-RA-15026
SS-RA-15027
SS-RA-15028
SS-RA-15029
SS-RA-15030
SS-RA-15031
SS-RA-15032
SS-RA-15033
SS-RA-15034
SS-RA-15035
SS-RA-15036
SS-RA-15037
SS-RA-15038
SS-RA-15039
SS-RA-15040
SS-RA-15041
SS-RA-15042
SS-RA-15043
SS-RA-15044
SS-RA-15045
SS-RA-15046
SS-RA-15047
SS-RA-15048
SS-RA-15049
SS-RA-15050
SS-RA-15051
SS-RA-15052
SS-RA-15053
SS-RA-15054

20.00'

20.00'

SEE TABLES IN REPORT FOR ANALYTICAL TESTING RESULTS

0 5 10 15 20
SCALE IN FEET

N

0 30 60 90 120
SCALE IN FEET

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NUCLEAR METALS, INC.
ENABLING PHASE REMEDIAL ACTION
AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

LIMIT OF COURTYARD TSCA SOIL EXCAVATION AND RESTORATION PLAN

C-300

Sheet: 11 of 20

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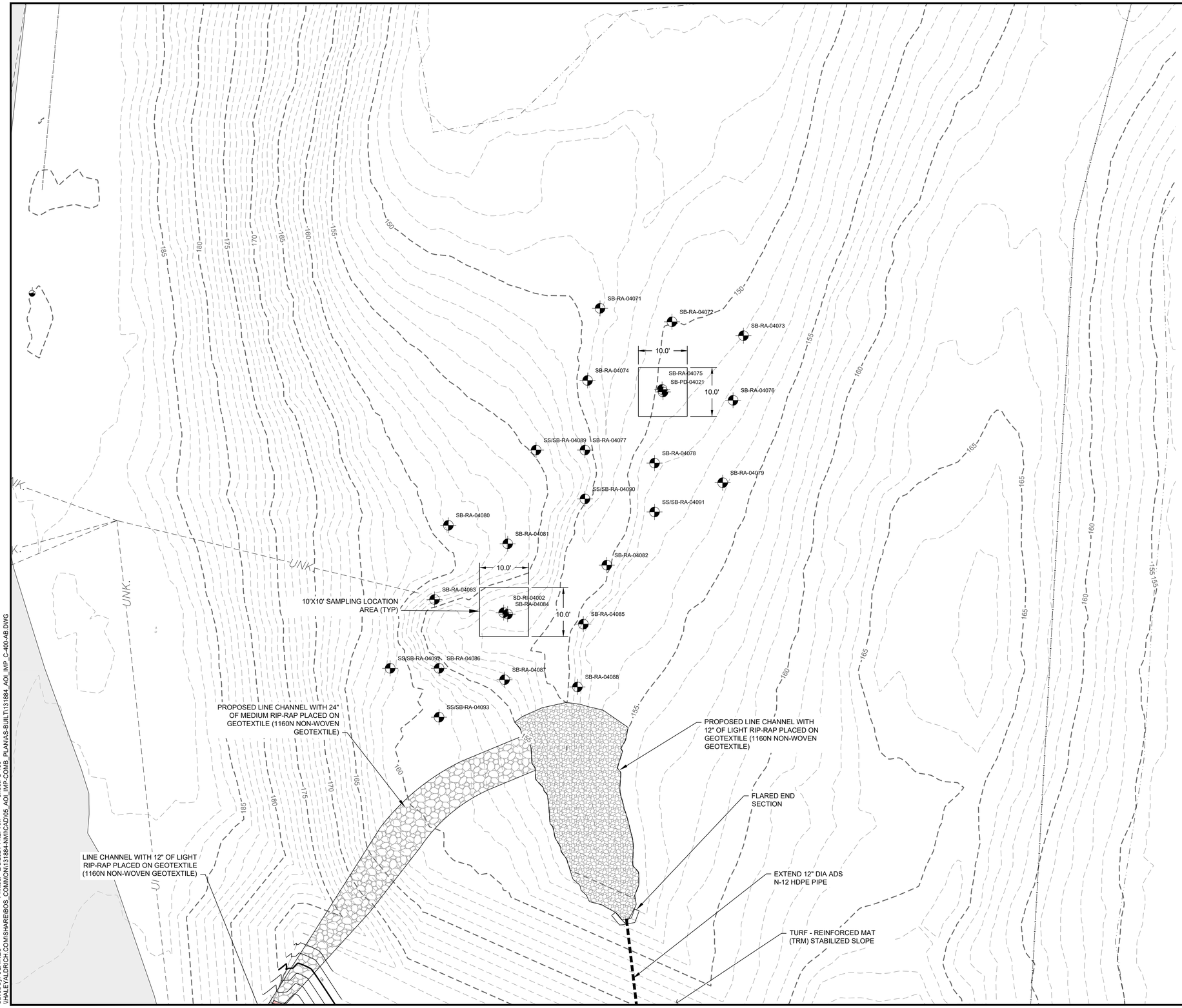

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- PRE-CAST CONCRETE BLOCKS

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2229 MAIN STREET
CONCORD, MASSACHUSETTS

COOLING POND TSCA SAMPLING LOCATIONS PRE-EXCAVATION

C-400

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MANHOLE REMAINS PIPE FROM MANHOLE TO TOE OF SLOPE FILLED WITH LEAN FLOW FILL.

COURTYARD AREA

MANHOLES CUT DOWN 3 FT BELOW GRADE PIPES AND STRUCTURES BACKFILLED WITH LEAN FLOW FILL.

REMOVED OF CATCH BASIN STRUCTURES.

TANK HOUSE REMAINS - PREVIOUSLY BACKFILLED WITH FLOW FILL

HOLDING BASIN

PROPOSED CONTAINMENT WALL

STEAM GAUGE

LEGEND

- 1 FT PROPOSED GROUND CONTOUR
- 100 — 5 FT PROPOSED GROUND CONTOUR
- PROPOSED WALL ALIGNMENT
- PROPOSED ISS LOCATION
- PREVIOUS ISS LOCATION
- PROPOSED RELOCATED ISS LOCATION
- BUILDING SLAB
- x — CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 100 — 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
- 100 — 5 FT PROPOSED GROUND CONTOUR
- D — STORM DRAIN LINE
- S — SANITARY SEWER LINE
- W — WATER LINE
- E — ELECTRIC LINE
- EO — OVERHEAD ELECTRICAL LINE
- C — CABLE LINE
- G — GAS LINE
- T — TELEPHONE LINE
- X(ABD) — ABANDONED LINE
- UNK — UNKNOWN UTILITY
- WETLAND BOUNDARY
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

N

0 20 40 60 80

SCALE IN FEET

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2229 MAIN STREET
CONCORD, MASSACHUSETTS

HOLDING BASIN AND COOLING POND EXCAVATION GRADING PLAN

C-401

Sheet: 13 of 20

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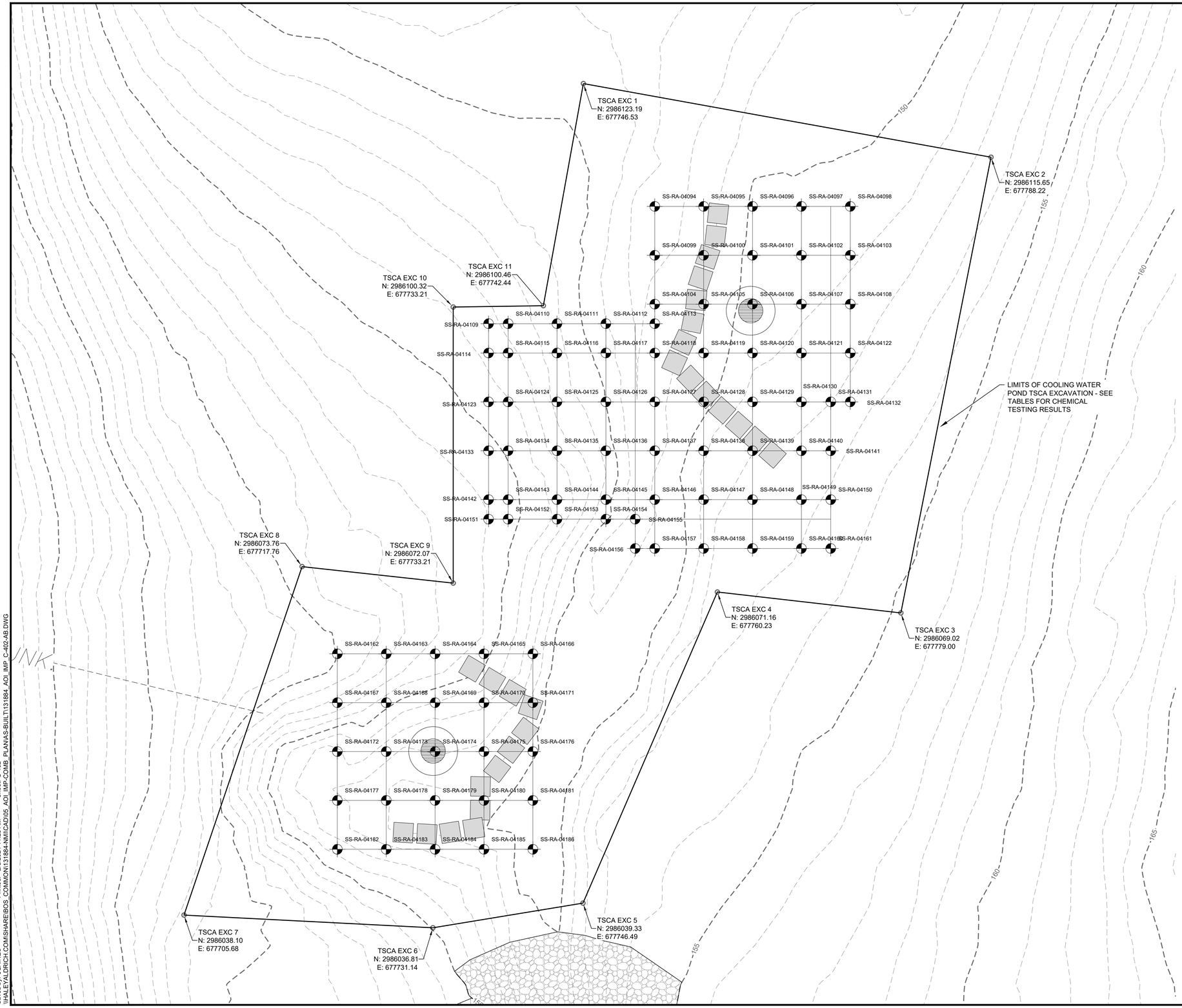

LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- 1 FT PROPOSED GROUND CONTOUR
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- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
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- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
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- CONCRETE
- GRAVEL
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2229 MAIN STREET
CONCORD, MASSACHUSETTS

COOLING POND TSCA RESULTS

C-402

Sheet: 14 of 20

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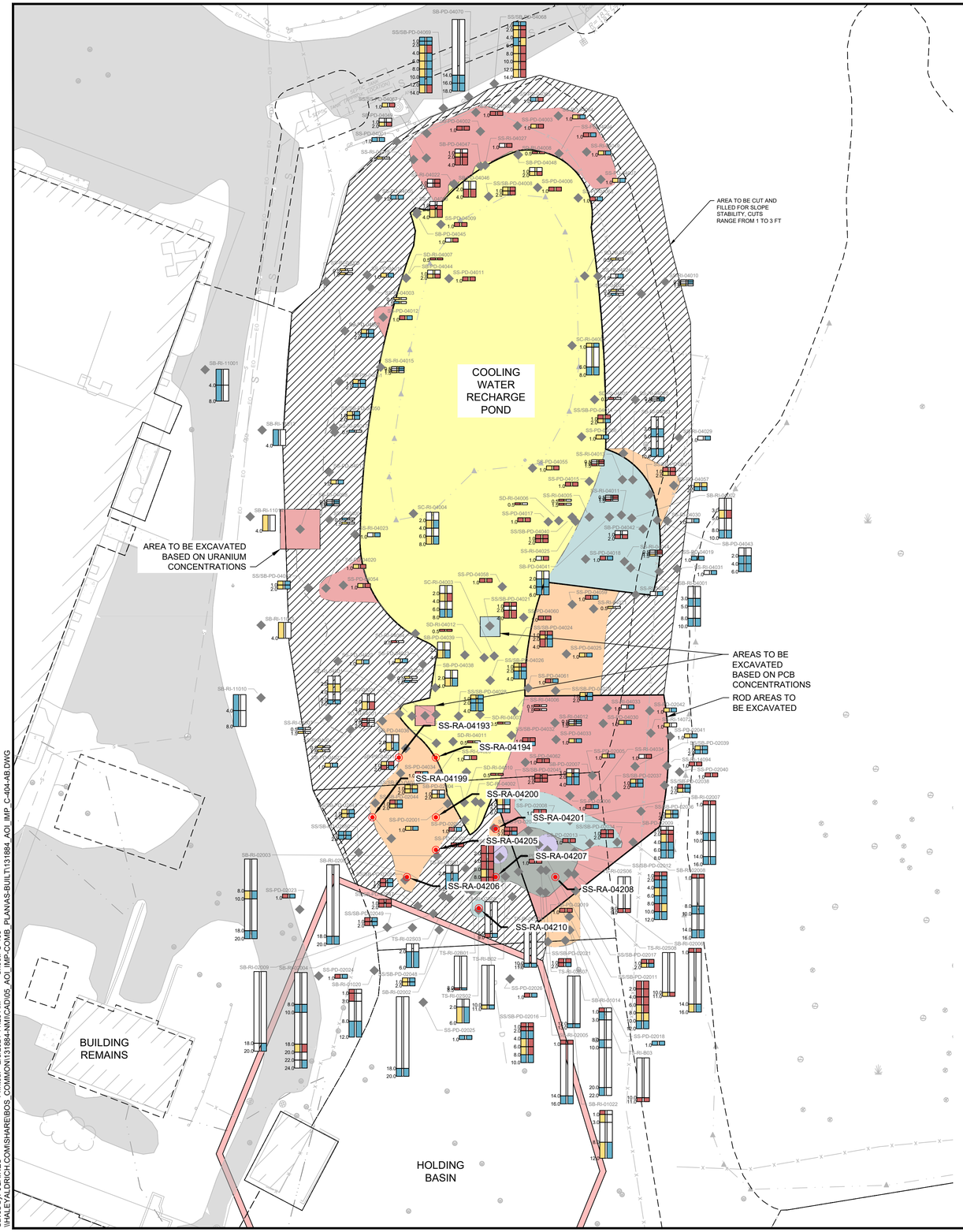
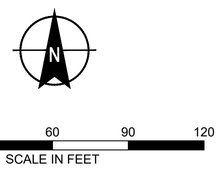
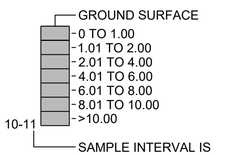


POINT ID	NORTHING	EASTING	SAMPLE ELEVATION	PROPOSED FINAL GRADE ELEVATION
SS-RA-04193	2986033.834	677717.9444	157.7	168.4
SS-RA-04194	2986033.834	677736.533	152.1	162.2
SS-RA-04199	2986003.825	677704.6667	163.5	173.5
SS-RA-04200	2986003.834	677736.5883	154.2	164.3
SS-RA-04201	2985998.016	677766.5883	151	163.1
SS-RA-04205	2985987.493	677736.5883	156.5	168.6
SS-RA-04206	2985973.834	677722.058	159.8	174.7
SS-RA-04207	2985973.834	677766.5883	156.8	169.1
SS-RA-04208	2985973.834	677796.5883	160.2	172.1
SS-RA-04210	2985958.196	677758.157	157.7	175.0

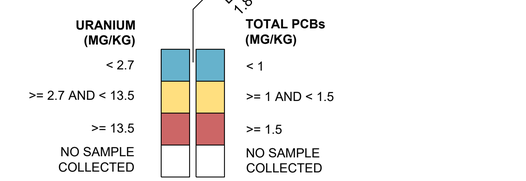


SAMPLE LEGEND



NOTES

1. FOR SURVEY AND GENERAL NOTES SEE G-101. FOR LEGEND SEE G-102.
2. TOTAL ESTIMATED EXCAVATION VOLUME = 5,536 CY. (CUT)



LEGEND

- SITE BOUNDARY
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
- STORM DRAIN LINE
- SANITARY SEWER LINE
- WATER LINE
- ELECTRIC LINE
- OVERHEAD ELECTRICAL LINE
- CABLE LINE
- GAS LINE
- TELEPHONE LINE
- UNKNOWN UTILITY
- WETLAND BOUNDARY
- VEGETATION BOUNDARY
- TREE/SHRUB
- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL
- LIMITS OF EXCAVATION
- PROPOSED HOLDING BASIN WALL ALIGNMENT AS OF 8-25-23 (ALIGNMENT SUBJECT TO CHANGE)
- HISTORICAL SAMPLING LOCATION
- AREAS TO BE CUT AND FILLED FOR SLOPE STABILITY, CUTS RANGE FROM 1 TO 3 FT.
- ADDITIONAL AREA TO BE EXCAVATED BASED ON SAMPLE CONCENTRATIONS
- ORIGINAL SITE AREA OF INTEREST (AOI) BOUNDARY
- ROD AREAS TO BE EXCAVATED

EXCAVATION DEPTH IN FEET

- 0.00 TO 1.00
- 1.01 TO 2.00
- 2.01 TO 3.00
- 3.01 TO 4.00
- 4.01 TO 6.00
- 6.01 TO 8.00
- 8.01 TO 10.00
- 11.00

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2229 MAIN STREET
CONCORD, MASSACHUSETTS

EXCAVATION PLAN FOR COOLING WATER SLOPES

C-403

Sheet: 15 of 20

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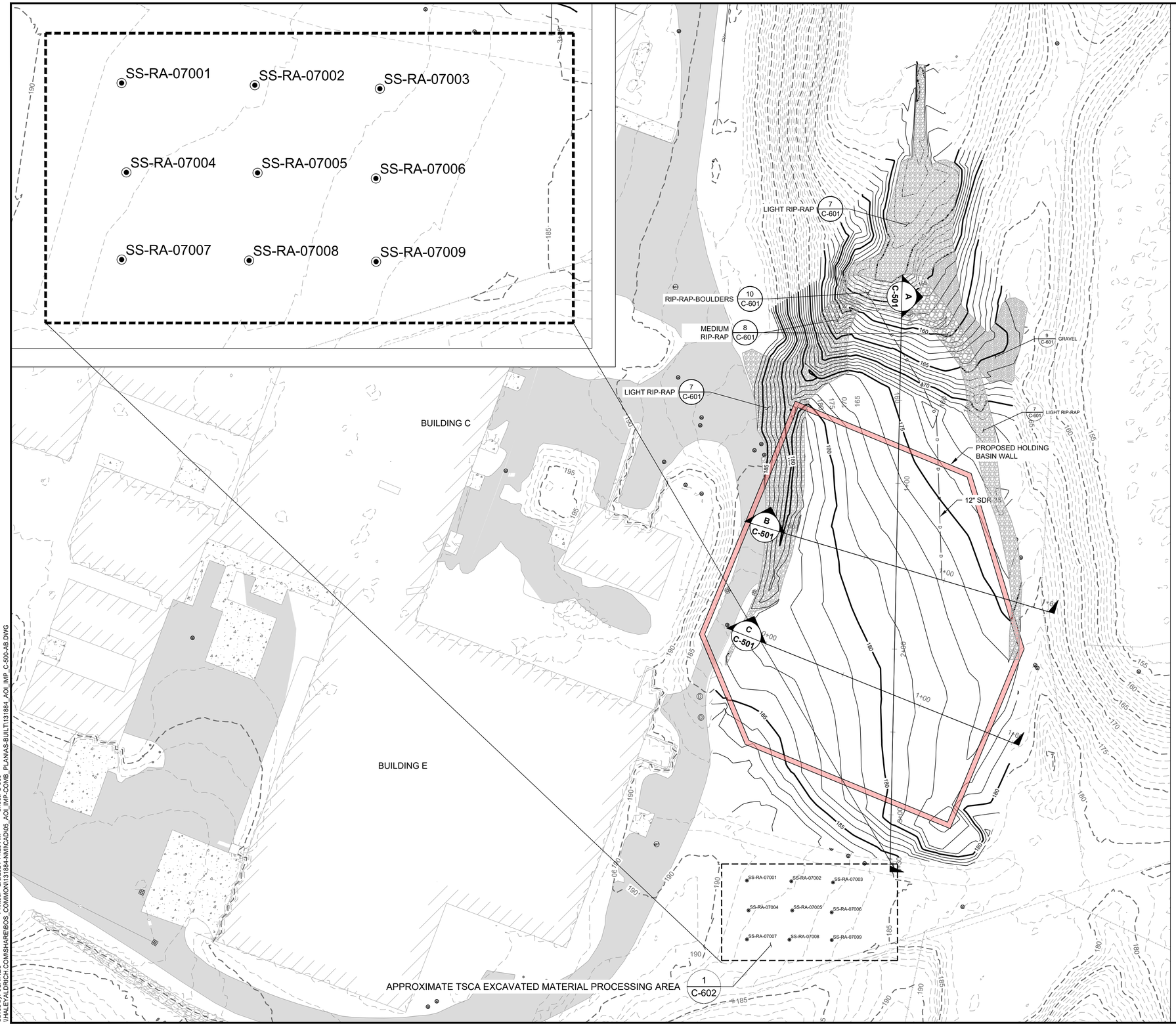

LEGEND

- 1 FT PROPOSED GROUND CONTOUR
- 5 FT PROPOSED GROUND CONTOUR
- PROPOSED WALL ALIGNMENT
- PROPOSED ISS LOCATION
- PREVIOUS ISS LOCATION
- PROPOSED RELOCATED ISS LOCATION
- BUILDING SLAB
- CHAIN LINK FENCE
- GUARDRAIL
- 1 FT EXISTING GROUND CONTOUR
- 5 FT EXISTING GROUND CONTOUR
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- MONITORING OR PRODUCTION WELL
- CATCH BASIN
- SEWER/DRAIN/ELECTRIC/TELEPHONE/ GENERAL MANHOLE
- UTILITY POLE
- POST
- ASPHALT
- CONCRETE
- GRAVEL

NOTE:

1. INTERIM HOLDING BASIN GRADING SOIL REMOVAL VOLUME IS APPROXIMATELY 985 CUBIC YARDS.
2. INTERIM HOLDING BASIN GRADING SOIL FILL VOLUME IS APPROXIMATELY 8500 CUBIC YARDS.
3. THE DEMOLITION OF THE TANK HOUSE INCLUDES REMOVAL OF THE CONCRETE SLAB, FOUNDATION WALLS AND FOOTINGS. THE TANK HOUSE BELOW GRADE SPACE WAS BACKFILLED WITH FLOWABLE FILL OR LEAN CONCRETE. THIS MATERIAL WILL REQUIRE REMOVAL BY HOE-RAM OR OTHER MECHANICAL EQUIPMENT.

N

0 30 60 90 120

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2229 MAIN STREET
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INTERIM GRADING OF THE HOLDING BASIN

C-500

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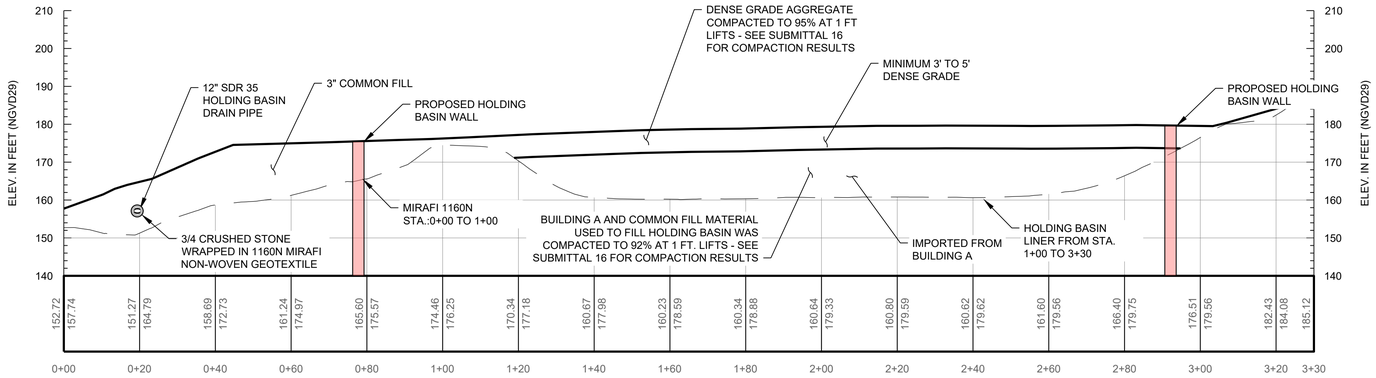

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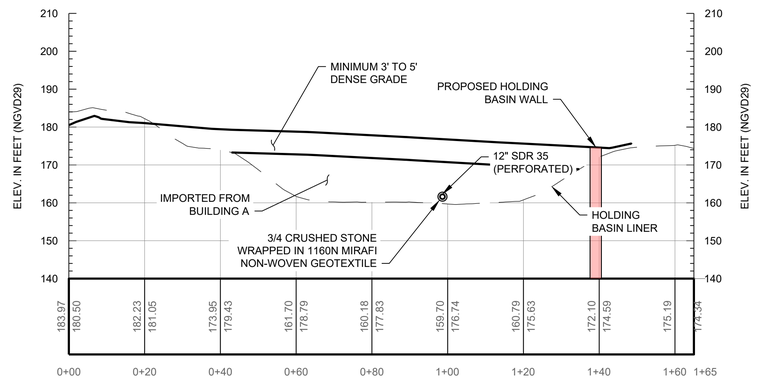

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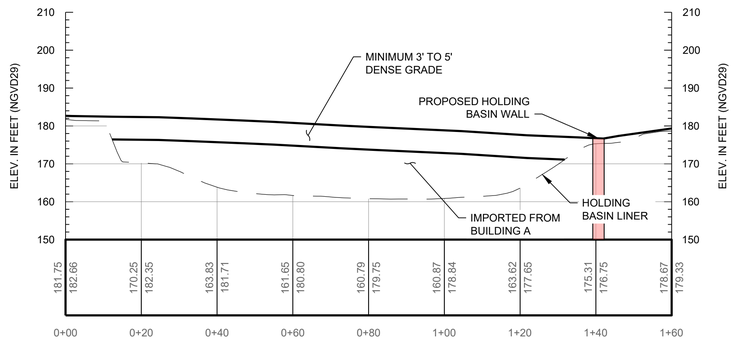

C SECTION C
SCALE: AS SHOWN

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VERT. 0 20 40 60 80
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AS-BUILT DRAWINGS

2229 MAIN STREET
CONCORD, MASSACHUSETTS

INTERIM HOLDING BASIN PLAN & PROFILES

C-501

Sheet: 17 of 20

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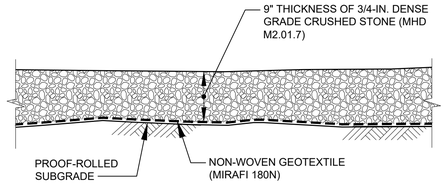
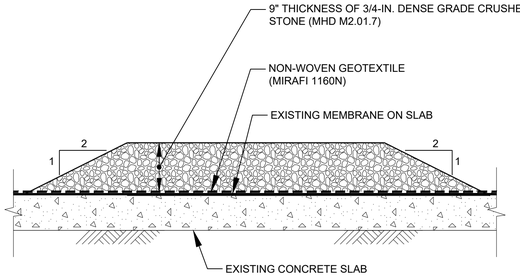


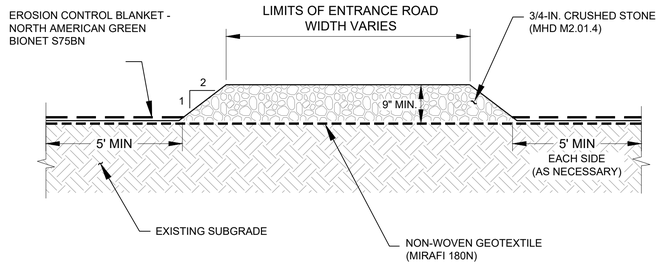
1 TRUCK ROADWAY DETAIL (ADJACENT TO BUILDING A)

SCALE: NOT TO SCALE



2 TRUCK ROADWAY OVER EXISTING BUILDING SLAB

SCALE: NOT TO SCALE



3 TRUCK ROADWAY IN WOODED AREAS

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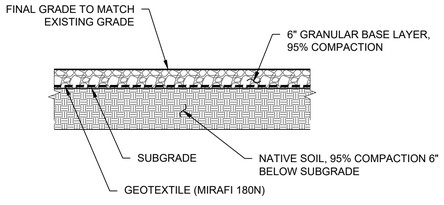

3 GRAVEL RESTORATION

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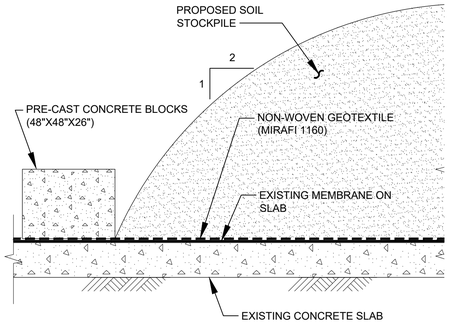

5 CLEAN BACKFILL STOCKPILE AREA DETAIL

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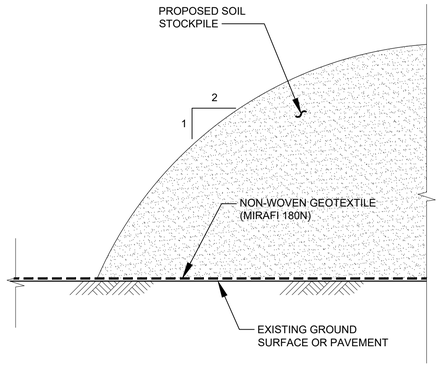

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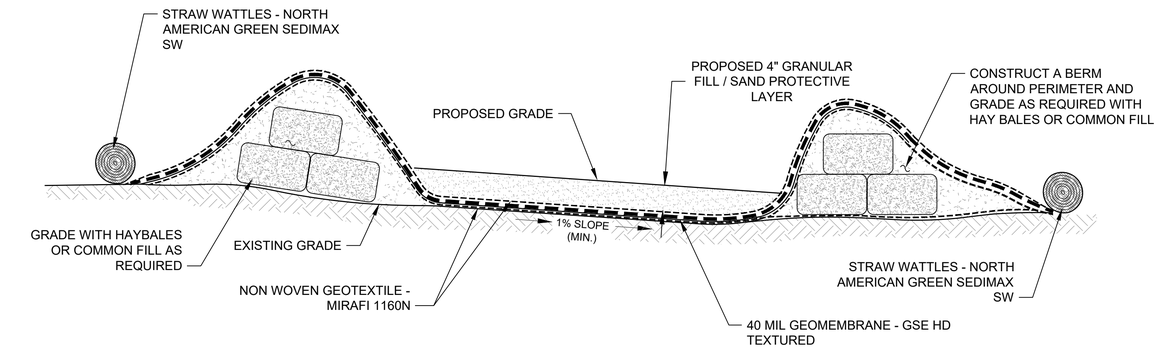

7 EXCAVATED MATERIAL PROCESSING AREA

SCALE: NOT TO SCALE

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HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
www.haleyaldrich.com

Project No.:	131884
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Designed By:	HA
Checked By:	HA
Approved By:	HA
Stamp:	

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2229 MAIN STREET
CONCORD, MASSACHUSETTS

DETAILS (1 OF 2)

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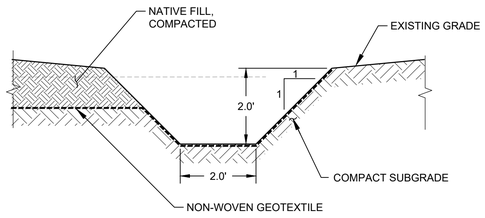

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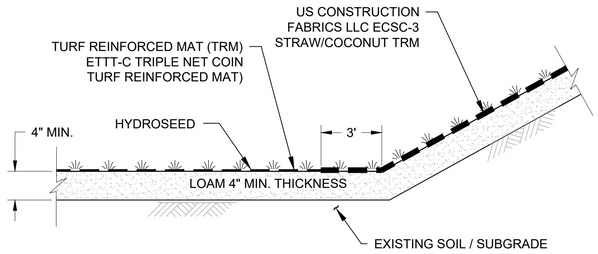

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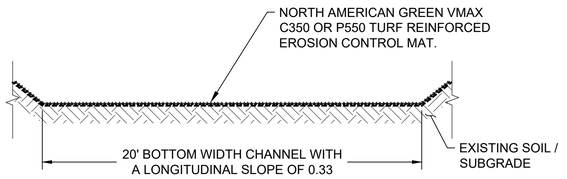

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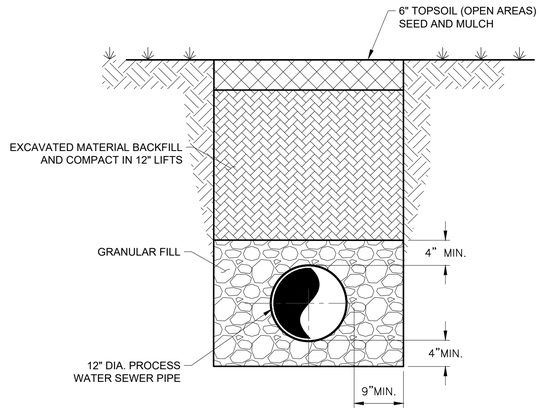

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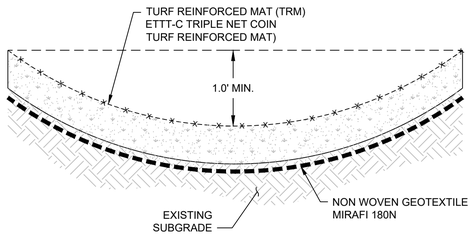

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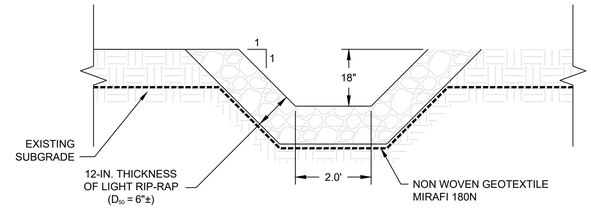

6 RIP-RAP BUILDING A SWALE DETAIL
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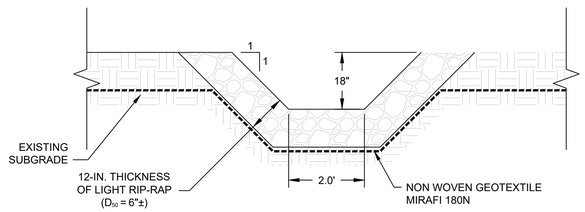

7 LIGHT RIP-RAP HOLDING BASIN SWALE DETAIL
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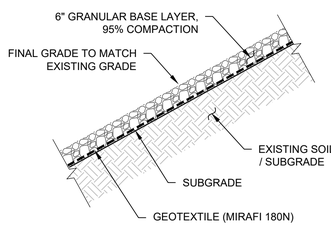

9 GRAVEL HOLDING BASIN SLOPE DETAIL
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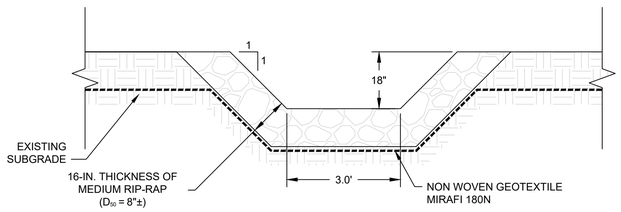

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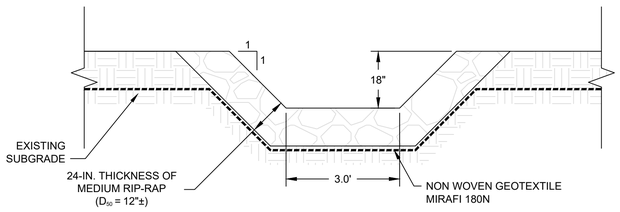

10 RIP-RAP HOLDING BASIN BOULDER SWALE DETAIL
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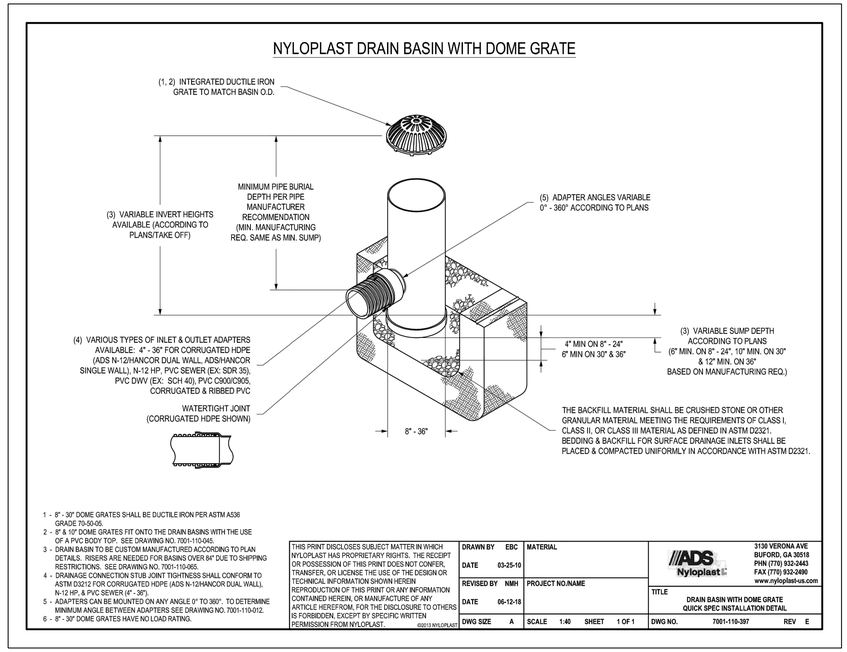

11 NYOPLAST DRAIN BASIN WITH DOME GRATE DETAIL
SCALE: NOT TO SCALE

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Boston, MA 02129-1400
Tel: 617.886.7400
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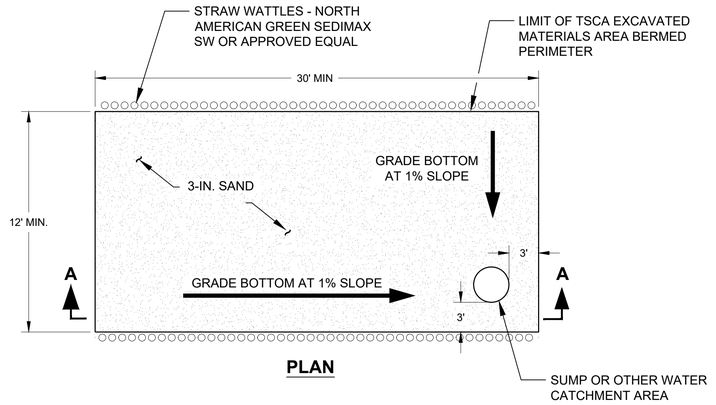
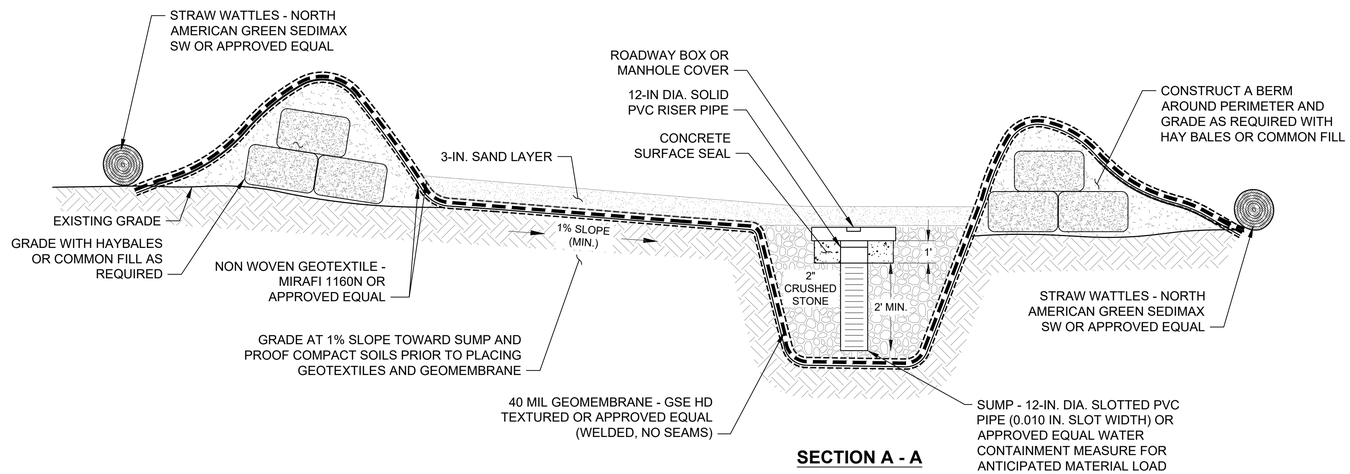


PLAN



SECTION A - A

1 TSCA EXCAVATED MATERIAL PROCESSING AREA
SCALE: NTS

TSCA EXCAVATED MATERIAL PROCESSING AREA NOTES:

1. SUBGRADE CONDITION TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACEMENT OF GEOTEXTILES AND GEOMEMBRANE. IF SUBGRADE CONDITION IS DETERMINED BY THE ENGINEER TO BE UNSUITABLE, A 4-IN. MIN. SAND LAYER MAY BE REQUIRED BETWEEN THE LOWER GEOTEXTILE AND THE GEOMEMBRANE.
2. WATER PUMPED FROM SUMP SHALL BE COLLECTED AND DISPOSED OF OFF-SITE. ONCE THE DEWATERING EFFLUENT TREATMENT (DETS) AREA IS CONSTRUCTED, WATER WILL BE PUMPED TO THE DETS AND TREATED IN ACCORDANCE WITH SECTION 312319 CONSTRUCTION DEWATERING AND WATER TREATMENT.
3. AT END OF CONSTRUCTION, ALL MATERIALS FROM THE TSCA EXCAVATED MATERIAL PROCESSING AREA SHALL BE EXCAVATED AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE ENGINEER. CONFIRMATORY SAMPLING WILL BE CONDUCTED ON UNDERLYING MATERIAL AFTER TSCA EXCAVATED MATERIALS PROCESSING AREA IS DISASSEMBLED.
4. 40 MIL GEOMEMBRANE MUST BE WELDED OR ONE CONTINUOUS PIECE.

HALEY ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Tel: 617.886.7400
Fax: 617.886.7600
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TSCA DETAILS

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APPENDIX D
Contractor Health and Safety Plan

Plan Title: **Health and Safety Plan**

Project Title: COURTYARD & BUILDING E - ENABLING PHASE 1 REMEDIAL ACTIVITIES
2229 Main Street
Concord, Massachusetts

Prepared For: Todd Majer
De maximis, Inc
135 Beaver Street
Fourth Floor
Waltham, Massachusetts 02452

Prepared By: Charter Contracting Company, LLC
500 Harrison Avenue, Suite 4R
Boston, MA 02118-2439
T: 857-246-6800

Contract No.:

Charter No.: 2-1822

Date: April 3, 2024

Revision No.: 01

Chris Ryan, Sr. Project Manager
T: 978-420-5106 |E: cryan@charter.us

April 3, 2024
Date

Karen Long, CHST, CUSP, Senior Health & Safety Officer
T: 857-260-0491 | E: klong@charter.us

April 3, 2024
Date

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APPENDIX B – Emergency Response Plan

Emergency Route Map

Emergency Contacts

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1. SITE DESCRIPTION AND EVALUATION

1.1. INTRODUCTION

The purpose of this Health and Safety Plan (HASP) is to establish in detail the procedures and protocols necessary for protecting workers and the general public from the potential hazards associated with environmental remediation activities to be performed at the Nuclear Metals Superfund Site 2229 Main Street, Concord, MA. The property is herein referred to as the ("Site"/"Facility").

This HASP is intended to achieve the following project objectives:

- Summarizes the project organization and responsibilities
- Establishes procedures for preventing accidents, injuries and illnesses
- Identifies hazards – Job Safety Analysis (JSA) / Pre-Task Plan (PTP)
- Discusses the personal protective equipment that may be used at the Site
- Identifies personnel health and safety training requirements
- Summarizes the monitoring techniques to be used
- Establishes emergency response procedures
- Describes the medical surveillance program
- Identifies that appropriate first aid equipment is available
- Provides for accident record keeping
- Establishes a schedule for safety inspections

This HASP is to be implemented during ongoing contract work. This HASP is intended to address the potential hazards associated with the handling and management of impacted material, as well as, other activities which may be encountered during the execution of the contract. There is always potential for exposure to potentially hazardous conditions which can be loosely defined as those conditions and chemicals that are capable of causing harm to persons, property, or the environment. For the purposes of developing and implementing this plan, it is not possible to address all potential hazards associated with handling hazardous wastes, hazardous materials, and toxic substances. The intent of this document is to provide general information about potential or suspected hazardous and toxic substances on a site.

1.2. SITE BACKGROUND

The Site encompasses the property located at 2229 Main Street in Concord, MA as shown on Figure 2-1 and downgradient properties where groundwater contamination has come to be located. The NMI property includes a sphagnum bog, a cooling water recharge pond, a former landfill and a holding basin. The Site is

surrounded by residential and woodland areas to the east and south, light commercial and industrial areas to the west, and Main Street (Route 62) and the Assabet River to the north.

Past operations at the Site involved fundamental research and development in physical metallurgy, chemical metallurgy, engineering and product development, fuel element development and manufacture, and high temperature materials (Nuclear Metals, Inc (NMI), 1961). In September 1972, NMI employees purchased the operation. After the 1972 purchase, NMI developed a large-scale depleted uranium (DU) manufacturing operation, which included, but was not limited to, the manufacturing of penetrators, or bullets, from DU as a defense contractor for the United States (US) Army. Other work included manufacture of DU shields and counterweights, manufacture of metal powders, beryllium and beryllium alloy parts production, and manufacture of specialty titanium parts.

On October 1, 1997, NMI was renamed Starmet Corporation. Starmet, its subsidiaries, affiliates, and related entities (collectively, the Starmet Parties) continued to perform small scale operations at the Site through October 2011. On May 12, 2003, the Massachusetts Department of Public Health – Radiation Control Program (MADPHRCP) modified Starmet's Radioactive Materials License to allow only possession of radioactive materials on-site. On October 1, 1997, NMI was renamed Starmet Corporation. Starmet, its subsidiaries, affiliates, and related entities (collectively, the Starmet Parties) continued to perform small scale operations at the Site through October 2011. Starmet vacated the property on November 2, 2011. The Radioactive Materials License was terminated by the MADPH-RCP on November 8, 2011.

The Site was placed on the National Priorities List (NPL) on June 14, 2001. As required by an Administrative Order on Consent (AOC) dated June 13, 2003, a Remedial Investigation/ Feasibility Study (RI/FS) was completed for the Site. EPA issued the Record of Decision (ROD) in September 2015. The ROD describes the selected remedy for the Site and is the basis for the RD/RA CD and SOW which detail the activities to be undertaken

1.3. SCOPE OF WORK/APPLICABILIY/SPECIFIC WORK ACTIVITIES

The Site activities required for the execution of the contract will be performed and managed by Charter Contracting Company LLC (Charter). The scope of work has been broken up into the the following tasks:

- Mobilization
  - Implement Site Health & Safety Plan; Complete personnel radiological training;
  - Construct material handling and laydown area, and decontamination area;
  - Furnish & install temporary facilities, storage, utilities, dust & odor controls, stormwater controls, monitoring well protection, temporary access roadways;
  - Establish Survey Controls & Layout;
- Courtyard
  - Remove existing stormwater diversion channel & backfill channel;
  - Soil excavation & transport to stockpile area for off-site disposal;
  - Backfill & compact excavated areas, common fill;

  - Demolish existing concrete slab, former Butler Building 3;
  - Demolish concrete electric pedestals;
  - Transport to Waste Processing Area and stage for off-site disposal;
  - Restore disturbed areas, topsoil & seeding;
  - Install stormwater drainage channel;
  - Install temporary access road;
  - Abatement of asbestos pipe (if found in excavation);
  - Loadout waste materials for transport to disposal facilities.
- Building E
  - Demolition of Building E Slab;
  - Soil excavation & transport to stockpile area for off-site disposal;
  - Backfill and compact excavated areas, common fill;
  - Loadout waste materials for transport to disposal facilities;
  - Install catch basin in driveway.
- Demobilization
  - Decontaminate equipment;
  - Remove temporary facilities, storage, utilities, dust & odor controls, monitoring well protection, temporary access roadways and equipment.

1.4. • SITE PREPARATION

Site Preparation activities to be completed prior to any site work include:

- Locate and mark out below grade utilities
- Mobilize personnel and equipment to the site
- Setup temporary facilities
- Setup temporary electrical and lighting as necessary
- Setup temporary water

1.4.1. UTILITY LOCATING

Dig Safe® is contacted (1-888-340-7233) a minimum of 72 hours prior to any intrusive work activities at the Project Site. Utilities identified by Dig Safe® and on-Site review of utilities with the Resident Engineer are incorporated into the work activity planning for those locations. Identified utilities are clearly marked and protected, and if necessary, relocated or temporarily disabled during work activities. Shut downs of utilities are coordinated with the Resident Engineer/CM to prevent impact to other Site operations.

Overhead utilities were noted during survey of the Site to identify potential conflicts and are included in work plans where equipment (e.g. excavators) could potentially come in contact. Overhead utilities that conflict with a necessary construction activity are either de-energized during the work activity or if that is not a feasible option, temporarily relocated as needed.

If an unknown/unidentified utility/drainage structure is discovered during remediation, excavation work is stopped, and the Resident Engineer immediately notified. The unknown utility is investigated to determine if it is an active or abandoned utility and will be addressed as directed by the Resident Engineer.

1.4.2. SITE ACTIVITIES

After completion of site preparation activities, Charter performs the following site work:

- Where applicable, coordinating work with the Radiation Safety Officer (RSO), identified as Decontamination Decommissioning and Environmental Services, LLC (DDES), including training staff as required by radiation safety protocols for the site.
- Installing soil erosion and sediment control measures in accordance with approved Plan.
- Clearing existing trees and vegetation.
- Excavating, stockpiling, and backfilling with onsite soils and fill soils, as required during construction
- Construction of a temporary excavated soil stockpile and grubbed material stockpile area.
- Site restoration in accordance with the plan.
- Demobilization

1.4.3. DEMOBILIZATION

Charter performs the following activities to demobilize and complete the Project:

- Removal of temporary facilities and Site/access controls upon completion of the Work
- Clear the Site of construction equipment and debris, repair any erosion or runoff related damage, and grade and cover areas utilized during the work
- Soil erosion and sediment control measures are removed upon authorization by Construction Oversight Engineer / Resident Engineer
- Perform post-construction condition surveys
- Perform final Site clean-up and conduct inspection
- Submit Final Reports and As-Built drawings as described in the Contract

2. KEY SITE PERSONNEL/RESPONSIBILITIES

Project Manager (PM): Chris Ryan

- Oversee implementation and enforcement of the HASP and safety program on the project.
- Delegate responsibility to the SSHO and the Site Supervisor as necessary and ensure that they are trained to handle the responsibility capably.

- Promote safety awareness programs.

Site Superintendent/SSHO: Luis Medina

Carry out instructions of the Project Manager (PM) and the SSHO relating to the implementation of various mandatory safety policies and procedures, as well as, what task to be performed. The SSHO and Superintendent will ensure the personnel are escorted while on site by an assigned escort.

- Be familiar with Federal, State, Local and the contractor's general safety rules and regulations.
- Make inspection tours and continuously check for unsafe conditions or practices.
- Keep in close contact with foreman to advise them about safety deficiencies in their work areas.
- Show personal interest in safety by setting an example through actions and attitude.
- See that Supervisor/foreman does not permit their workers to take unnecessary risks and give them proper instructions for working safely.
- Recognize that the safety of employees under his supervision is a top priority.
- Ensure that personnel and subcontractor personnel attend Daily Health and Safety briefings conducted prior to each day's work.
- Ensure air monitoring is consistent with Section 10 of this HASP

Responsibilities of the SSHO include:

- The SSHO is responsible for continuous daily implementation and enforcement of the HASP on-site. The SSHO consults with, and reports to, Charter's Director of Health and Safety and Sr. Safety & Health Officer. The SSHO selects the proper levels of protection based on the details of this plan and in consultation with the Safety Team
- The SSHO is responsible for preparing and maintaining daily safety briefing attendance sheets and associated reports, including the daily JHA(s).
- The SSHO makes decisions on upgrade/downgrade of personal protective equipment Prior to mobilization and continually through the duration of the work the SSHO must inspect the Site and document area-specific and worker-specific protection requirements.
- The SSHO makes decisions on the need to evacuate the worksite in the event of an emergency situation and will implement the Emergency Response Plan under such circumstances.
- The SSHO conducts daily jobsite safety meetings and JHA preperation.
- The SSHO performs air monitoring of active work zones
- The SSHO performs noise exposure monitoring as needed
- The SSHO has stop-work authorization, which he/she executes upon determination of an imminent safety hazard, emergency situation or other potentially dangerous situations such as detrimental weather conditions. In addition to the SSHO, all project personnel have stop-work authorization in the event of unforeseen safety related hazard or condition. Authorization to resume work is issued by the SSHO in conjunction with the Project Manager (PM).

- The SSHO is trained and certified in First Aid, CPR, and Universal Precautions for Blood borne Pathogens Training.

Additional key personnel and alternates will be added to this list as they become available, or when changes are made on the project. Workers on-site are made aware of the key health & safety personnel, roles and responsibilities, the chain-of-command, and how to contact them. The Emergency contact list (provided in the ERP; Appendix B) will be provided and posted conspicuously onsite.

Field Personnel: TBD

Field personnel include employees, representatives and subcontractors. Field personnel take direction regarding safety and health issues from the SSHO.

Attend and participate in the daily tailgate safety briefings and follow the health and safety practices including in this HASP and noted in the Pre-Task Plan/Safe Work Permit for the tasks specified that day.

Note: Subcontractors will sign off and incorporate Charter's Site Specific HASP (this document). Subcontractors will submit Job Safety Analysis' to Charter, for each scope of work they will be performing.

Field personnel who will be working in the vicinity of environmentally impacted site materials must be trained fully in compliance with 1910.120(e)(3),(4), (8) and (9), including 40 hours of classroom training, 24-hour "on the job" training and a current 8-hour refresher course and annual medical monitoring by an occupational physician.

Personnel or subcontractor personnel not expected to encounter environmentally impacted materials will be required to have appropriate training for the specific task they are performing. The SSHO will be responsible for determining the likelihood of potential exposure to environmentally impacted materials for a specific task. The SSHO will then determine the minimum required training for that task.

Note: The Engineer will be notified of any task where Charter will be using non-HAZWOPER 40 Hour trained personnel. Non-HAZWOPER 40 Hour trained personnel will be briefed by the SSHO on site hazards. The SSHO and Superintendent will direct the personnel where to work and

3. STOP WORK AUTHORITY

Should any unforeseen safety-related factor, hazard, or condition which poses a potential threat of physical injury or harm to Site personnel, or the environment become evident during the performance of the Work, all Site personnel shall have authority regulations to issue a Stop Work Directive. In addition, the Engineer and Owner have authority to issue a Stop Work directive upon observation of a safety-related factor, hazard, or condition of potential injury or harm to the environment.

If a Stop Work directive is issued Charter will immediately take prudent corrective action to secure the Work and provide safe conditions for Site personnel and the environment. This corrective action will be followed by a written incident report. Charter will conduct an investigation and provide a written report incorporating results of the investigation if directed to do so by the Engineer.

Stop Work directives will be obeyed. Failure by personnel to obey a Stop Work directive will result in disciplinary action up to and including immediate dismissal.

4. INCIDENT REPORTING PROCEDURES

Definitions:

Accident: An undesired event that results in personal injury or property damage.

Incident: An unplanned, undesired event that adversely affects completion of a task.

Near-Miss: Event or condition in which no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.

In the event of a safety incident or Stop Work directive; including injuries, "near-misses" and vehicle accidents occurring during the performance of the work, **Charter will Immediately (within 30 minutes or as soon as possible after the situation has stabilized) verbally report to the CM and the Engineer the occurrence of any and health and safety accidents and incidents. Charter will fully investigate the incident and shall follow up with a written incident report.** The report shall include a root-cause analysis identifying contributing factors relating to the incident, and a description of the corrective actions that will be taken to prevent recurrence.

Injuries, accidents and illnesses occurring as a result of or during on-Site work must be recorded on Charter's or affected Subcontractor's OSHA 300 and 301 or equivalent forms. Charter will report injuries to the appropriate authorities, including OSHA if necessary, and to the CM and Engineer immediately.

Arrangements with an ambulance service, medical professionals, and hospitals for the emergency treatment of employees, if required, will be made prior to commencing work on the Site. The Owner and Engineer will not furnish any emergency medical treatment.

5. HAZARD ASSESSMENT

5.1. COVID-19

All personnel entering the site will be required to comply with Charter's Covid-19 policy.

5.2. Site Hazards

The potential hazards for this project have been categorized into chemical hazards, site hazards, activity hazards, and physical hazards.

- Chemical hazards are associated with chemicals and substances that may present an immediate danger to life and health (IDLH) hazard, acute or chronic effects, or may be listed as hazardous under OSHA, CERCLA, SARA, RCRA, 40 CFR 261.3, 49 CFR 171.8, or DOT 49 CFR 172.101
- Site hazards are defined as hazards associated with the general site conditions. Site hazards include topography, ground conditions, active utilities, climate and weather conditions, traffic etc.
- Activity hazards are associated with the activity and work performed by the Charter personnel and any subcontractors on-site. Activity hazards include construction work and earth moving, etc.
- Physical hazards are associated with materials, structures, equipment, machinery, etc., that present a physical danger to personnel.

Material characterization will be conducted to evaluate potential hazards based on the level of impact through air monitoring and chemical analysis. If Site conditions suggest the existence of a situation more hazardous than anticipated or if an unplanned release, fire, explosion or other emergency occurs, Site personnel evacuate the immediate area. The hazard level and level of protection are reevaluated with the assistance and approval of the SSHO.

5.3. HAZARD COMMUNICATION

All Charter personnel have received training on the Charter Hazard Communication Program. Safety Data Sheets (SDS), which provide information on health effects and other hazards associated with chemicals used on the project are available onsite . SDS's are reviewed during Site safety meetings. These daily briefings will include discussion on known hazards for each of the respective tasks listed in Section 1.3. If further contaminants or hazards are identified, they will be addressed immediately, as well as, discussed with site personnel at the next Site safety meeting. A copy of Charter's Hazard Communication program will be available onsite.

Charter will immediately notify the Engineer in writing of any hazardous condition that is discovered or observed on the Site, and the corrective measures planned or taken to eliminate or minimize the hazard. The HASP and JHA's will be revised as needed to address the discovered hazard. Hazard reporting will be completed as a near miss report.

5.3.1. CONTAINER LABELING

All containers received on site will be inspected to ensure the following: (1) All containers will be clearly labeled as to the contents; (2) the appropriate hazard warnings will be noted; and (3) the name and address of the manufacturer will be listed. All drums or bins to be shipped off the site will have a label affixed with the following information:

(1) The identity of the waste generator, (2) the waste matrix (e.g. soil, water, product), and (3) the date of waste generation.

(2) Container labeling is included as a part of Charter's Hazard Communication Program.

5.4. CHEMICAL HAZARDS

Many potential chemicals at the site can affect the body if they are inhaled, come in contact with the eyes or skin, or are ingested. These materials may be released during material handling. The primary concerns are for skin contact and inhalation exposure to impacted subsurface media and dangerous fugitive vapor/gas emissions. Atmospheric monitoring will be conducted to define the level of personal protection needed.

The following chemical information is presented for the types of materials that may be encountered at the Site. The detailed information on these materials was obtained from:

- American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices for 2023.
- Safety Data Sheets.
- National Institute for Occupational Safety & Health (NIOSH) Pocket Guide to Chemical Hazards - 2010.

The following is a list of chemicals and compounds that may potentially be found on-site either in the form of existing contamination or in products used in remediation. Safety Data Sheets (SDS) for each chemical product (e.g. gasoline) listed below, providing information such as the chemical's characteristics, health hazards, protection, exposure limits (**see Table 5.3-2**), and first aid procedures, are kept on-site. These chemicals include:

- Benzene/Toluene/Ethyl Benzene/Xylenes (gasoline)
- Diesel Fuel
- Cadmium and Nickel (concrete)
- Dust/Silica
- depleted uranium (DU)
- polychlorinated biphenyls (PCBs)
- thorium
- arsenic
- PAH's
- asbestos

The chemical materials in **Table 5.3-1** can be encountered in the following media:

Table 5.3-1 Chemical Materials	
Physical State	**Media**
Solid	Soil, other solid wastes, dust (Portland Cement)
Gaseous	Fugitive Vapors
Sludge / Sediment / Semi solids	Residual wastes, placed solid wastes, soil water free product interfaces

Exposures above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range.

Table 5.3-2 Exposure Limits					
Contaminants of Concern					
Contaminant	**TLV TWA**	**TLV STEL**	**PEL TWA**	**PEL STEL**	**IDLH**
Asbestos	0.1 f/cc	1.0 f/cc	0.1 f/cc	1.o f/cc	------
Benzene	0.5 ppm	2.5 ppm	1.0 ppm (skin)	5.0 ppm	500ppm (ca)
Ethyl Benzene	100 ppm	125 ppm	100 ppm	---	800ppm
Fuel Oil / Diesel	100 ppm	---	500 ppm	---	20000 mg/m^3
Cadmium	0.01 mg/m^3	---	0.002 mg/m^3	0.005 mg/m^3	9 mg/m^3
Nickel	0.05 ppm	---	1 mg/m^3	---	10 mg/m^3
Silica	0.025 mg/m^3	0.1 mg/m^3	50 ug/m^3	25 ug/m^3	---
Gasoline	300 ppm (skin)	500 ppm (skin)	---	---	500 ppm
Toluene	200 ppm	---	200 ppm	300 ppm (ceil)	500 ppm
Trichloroethylene					1000 ppm
Uranium	0.2 mg/m3	0.6 mg/m3	0.25 mg/m3		10 mg/m3
PCB's 42% skin	1.0 mg/m3	2.0 mg/m3	1.0 mg/m3	2.0 mg/m3	
Vinyl Chloride	1 ppm	5 ppm	1 ppm	5 ppm	500 ppm
Xylene	100 ppm	---	100 ppm	---	900 ppm
	Skin – indicates the potential for dermal absorption.				
	CEIL - indicates the ceiling limit or the upper limit acceptable excursions above the TWA.				
	Ca - indicates that a chemical is considered to be carcinogenic.				
	* - Notice of Intended Change				

Also presented are the OSHA Permissible Exposure Limits (PELs). The PEL values are enforceable standards presented either as an 8-hour TWA or a 15-minute STEL. The immediately dangerous to life and health (IDLH) value represents a maximum concentration from which one could escape within 30 minutes without any escape-impairing symptoms or any irreversible health effects. Other relevant health-based information that applies to this health and safety plan or to the employee's right to know, in compliance with Right-to-Know requirements of OSHA, is discussed in the toxicity summaries for each of the chemicals of concern.

5.5. SITE, ACTIVITY AND PHYSICAL HAZARDS

Site, activity and physical hazards, which may be encountered during contract execution, include incidents associated with heavy equipment operation, overhead/tripping hazards normally associated with excavation operations, and explosive and/or flammable conditions. Excessive noise levels may be generated

from air compressors, heavy construction equipment, etc. As a precaution, hearing protection will be available to be worn when working around construction-related equipment or when deemed necessary. In areas where sound levels exceed the OSHA PEL (90 dBA) and where personnel will spend extended time (>1 hour) hearing protection will be required.

Depending on seasonal weather conditions, there is some potential for workers on-site to be affected by heat stress and/or cold exposure. Site activities scheduled for the warmer months may require the use of personal protective equipment. Hypothermia may also be a consideration since site activities will continue through colder weather. The SSHO will monitor for heat stress or cold exposure in accordance with this HASP.

Electrical storms could potentially impact operations. Visible lightning and audible thunder are action limits for suspending operations and personnel seeking shelter. Work activities will resume 30 minutes after the last observed lightning or audible thunder.

A summary of task-specific hazards and control measures is presented in Table 5-4.1 – Physical Hazards. Table 5-4.1 is an abbreviated look at potential physical hazards to be encountered and a more detailed analysis is available in Job Safety Analysis Tables. Air monitoring and Action Levels are presented in the Air Monitoring Section (Section 10) of this HASP.

Table 5-4.1 Physical Hazards

Task(s)	Hazard	Description	Prevention / Monitoring Techniques
Site tasks	Slips, trips, falls, vehicle traffic, noise	From various debris on ground, cluttered conditions, equipment, slippery footing, Heavy equipment/vehicles	Ensure buddy system awareness and good housekeeping practices. High Viz PPE required on-site, Hearing protection
Site Tasks	Hand Injury	From various site activities involving the use of an employee's hands.	All On-site employees must review the **Charter PPE Program**
Hand and Power Tool Use	Bodily Injury (Cuts, Lacerations, Hand, Face, Eye, Burn), Fire, Electrocution	From various hazards created by the use of Hand and Power Tools	All On-site employees who are using hand or power tools must review the **Charter Standard Operating Procedure - Hand and Power Tool Use** prior to using hand and power tools
Overhead Power Lines	Electrocution	No Overhead Power lines are anticipated to be located at the job site, however, if found.	Charter will contact the Utility Owner and confirm voltages and clearance distances. Charter will stage signs warning of the overhead power lines every 50 feet and use spotters if necessary. Charter will flag any low lines that are potentially hazardous.

Table 5-4.1 Physical Hazards			
Task(s)	**Hazard**	**Description**	**Prevention / Monitoring Techniques**
Rigging, Lifting, Demolition	Overhead, Struck by, Pinch points	When loading / offloading / moving / setting equipment	Competent Person for Demolition will inspect and document structure safety conditions daily to ensure structure safety prior to any personnel entering a structure in the process of being demolished. Qualified Rigger, Qualified Signal person, Inspect Rigging, Tag lines, Use spotter if necessary, Communication with operator.
Excavation, Sampling, Backfilling	Pinch points, sharp corners, restricted movement, explosion/fire/Hazardous Atmosphere	From "tight" spaces and clearances; objects and components	Competent Person for Excavations will inspect and document excavation safety conditions daily to ensure excavation safety prior to any personnel entering an excavation. Mandatory use of ambient air monitoring equipment to monitor atmosphere inside excavation when personnel are present(Comply with 1926.651(g) Subpart P) Ensure clear work area, good housekeeping, move unnecessary equipment, utilize buddy system, place guards on machinery, and wear gloves where appropriate.
Site tasks	Heat Stress, Cold Stress	Associated with protective garment use, respiratory protection and exposure	Ensure adequate work/rest schedule; buddy system; dress appropriately for weather. Provide shaded areas for breaks
Excavation, Backfilling, Soil Processing, Soil Load Out	Struck by Equipment	From accidental contact with heavy equipment during remedial activities	Competent Person for Excavations will inspect and document excavation safety conditions daily to ensure excavation safety prior to any personnel entering an excavation. Excavators, Loaders, dump trucks, and other equipment equipped with backup alarms. Employees remain clear of swing radius and rotating parts of equipment. Use spotters near live utilities. Utilize Hi-Viz clothing
Site tasks	Inclement weather	High winds, lightning, hail, etc.	Restrict work in exposed areas, seek shelter, and terminate work activities.
Site tasks	Struck By	Vehicle Traffic	Utilize Hi-Viz Clothing, enforce on Site Speed limit, establish work zones.

5.6. CONFINED SPACE ENTRY

Confined space entry is not expected for this project. If confined space entry is required for this project and/or tasks listed in this HASP, the HASP will be modified accordingly, and all applicable regulations adhered to.

5.7. HOT WORK

Hot Work is not expected for this project. If Hot Work is required for this project and/or tasks listed in this HASP, the HASP will be modified accordingly, and all applicable Safety requirements and applicable regulations adhered to. A Hot Work Permit will be obtained prior to implementing the work.

5.8. SMOKING

Smoking is not allowed the work areas.

5.9. Weapons

Weapons of any type are not allowed on Charter Worksites

5.10. NATURAL GAS

Natural gas pipelines will be identified prior to mobilization. See subsurface clearance section (Section 5.8).

5.11. UTILITIES / SUBSURFACE CLEARANCE (SSC)

To initiate project field activity Charter will review site conditions and project requirements with on-site project management personnel. This will be accomplished by way of an internal project kickoff meeting among project management, estimating, health & safety, field operations personnel, and major subcontractor representatives. Additionally, the following activities will also be initiated:

- Charter will perform utility location.
- Prior to the beginning of work, Charter will contact and coordinate with utility companies and mark out existing utilities. Utility mark outs will be maintained for the duration of the project
- Operations personnel will verify existing field conditions (including utilities) as depicted on the Contract Drawings and assess further information needs.
- Visit the Site to review details of the Work and working conditions and to verify dimensions in the field including headroom and interferences from adjacent structures and utilities. Notify Engineer in writing of any discrepancy before performing any Work.
- Consult official records of existing utilities, both surface and subsurface, and their connection, to be fully informed on existing conditions and limitations as they apply to this Work and its relation to other Work.
- File for and obtain necessary permits (excluding those provided by the Owner) and provide other required documents.
- Clear utilities:

- Contact DIGSAFE, 811 to coordinate clearance of Site utilities a minimum of 72 hours before the start of any intrusive Site activities.
- Prior to excavation: locate, expose, and identify derelict or active subsurface utilities within the excavation footprint. **Hydro Excavation (soft excavation) and/or Hand digging should be performed within 24 inches of known utility lines** unless more stringent requirements are specified by laws or regulations, or the utility Owner. If the Engineer determines that over-excavation beyond the currently designated excavation footprint is required, then subsurface utilities within the expanded footprint must also be located, exposed, and identified using the same methods.
- Field-locate and protect existing underground and overhead utilities to remain within the Limits of Work in accordance with the requirements of authorities having jurisdiction. If utilities are to remain in place, provide adequate means of protection during earthwork and construction operations including temporary support, disconnection, or re-routing of utilities.
- Locate and mark-out known below grade utilities.
- Coordinate with the Engineer to confirm utility locations.
- Cut, cap, remove, and properly dispose of utilities designated by the Engineer (if necessary).
- Verify the voltage of overhead utilities with the utility owner and establish clearances for work proximate to overhead utilities. Post ground-level warning signs every 50 feet below overhead utilities on site.
- Compile and compare utility location information from these sources; identify and obtain further information as needed
- Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Engineer immediately for direction. Cooperate with Engineer in keeping services and facilities in operation. Repair damaged utilities to satisfaction of the Engineer. Do not interrupt existing utilities serving facilities occupied and used by others.
- Assume that gas lines are pressurized.
- Protect Site features (such as monitoring wells) designated by the Engineer to remain after the Work is complete.

5.12. SPILL CONTAINMENT

The SSHO and the contractor supervisory personnel are familiar with the notification requirements for chemical spills. A Spill Response Plan is prepared that provides detailed information regarding protection of soil and water resources, dust control, odor, and air pollution control, spill control and spill notification and response procedures. In addition, contractor and subcontractor personnel can recognize spills, and know the links of communication for notification. Emergency contact information will be posted in the administrative areas and the designated fueling areas to be identified on-site. The SSHO will modify spill containment procedures, as required, as chemicals are brought to the project for use.

Once a spill has been recognized and appropriate client/site notifications have been made, the SSHO will institute appropriate spill control and countermeasures. The following response principals apply:

- Follow contingency and evacuation procedures in this plan. Alert the Engineer and implement the Emergency Response Plan. Spills regardless of size shall be reported to the Engineer.
- For spills less than 10 gallons, contain the spill to the smallest area possible, through the use of absorbents and site equipment to build berms. Prevent to the extent possible, the migration of spills to nearby sewers, drainage structures, open waters, and other sensitive human and environmental receptors. For small hazards, such as spills of petroleum products less than 10 gallons, the spill will be handled by The Contractor Emergency Response Personnel subject to the Engineer's determination. The Engineer must be notified prior to proceeding with clean – up. Refer to the Emergency Phone List and Project Contact List provided in the Emergency Response Plan for the phone numbers of key personnel and emergency response contractors to be notified for cleanup of large spills for which the Contractor Emergency Response Personnel do not have approval to handle.
- Conduct and complete the response in accordance with applicable local, state and federal regulations. Seek assistance from the Engineer and appropriate authorities (i.e., the MA DEP, EPA, NRC) in determining the extent and completeness of the spill response.
- For spills 10 gallons or greater, contain the spill to the smallest area possible, as noted above. Subject to the Engineer's determination, notify the appropriate emergency response contractor, where applicable. Coordinate with the Engineer to determine the methods to be employed for collection, storage, and the ultimate disposal of contaminated materials. Applicable hazardous waste regulations are to be adhered to.

5.13. HAZARDS CONTROL

In order to conduct a Task in the safest possible manner, the hazard(s) associated with a Task need to be identified so that appropriate hazard control(s) can be implemented and used by personnel conducting these Task(s). This process is called a "Job Safety Analysis" (JSA). To aid in the JSA process, the associated Task(s) (as outlined in Section 1.3) are correlated against the anticipated hazards. A "Relative Hazard/Risk Rating" is also provided in order to identify which hazards pose the greatest risk to personnel but more importantly, what hazard controls should be implemented. To aid in this evaluation, each hazard below is referenced to applicable Control Mechanisms located in specific sections of the HASP and applicable JSA(s) in Appendix B.

Table 5.10-1 Control Mechanisms provides a description of the potential hazards associated with individual types of equipment, work processes, or features; physical site/environmental conditions; and means or measures to protect against such hazards. "Job Safety Analyses" describe the specific job steps for each task, the task-specific hazards involved in or possible from that task, and the critical actions which need to be taken to prevent, avoid, eliminate, or mitigate such hazards.

Table 5-10.1 Hazards and Control Mechanisms

Today's Activities (Check Each)	Task Number(s)	Hazards	Relative Hazard /Risk Rating*	Hazard Controls Mechanism and/or JSA (See HASP)
☐	2 - 7	Chemical Hazards	NA☐ Low☒ Medium☐ High☐	HASP 5.2: Chemical Hazards
☐	2, 4-7	Dust/Fumes/Particulates	NA☐ Low☐ Medium☒ High☐	HASP 10.3: Dust, Vapor, and Odor Control Plan
☐	2 - 7	Job Zone Control	NA☐ Low☐ Medium☒ High☐	HASP 8.0 Site Control Plan; All JSAs
☐	2 - 7	Heat	NA☐ Low☐ Medium☒ High☐	HASP 12.1 Heat Exposure: All JSAs
☐	2 - 7	Cold	NA☐ Low☐ Medium☒ High☐	HASP 12.2 Cold Exposure; All JSAs
☐	2 - 7	Severe Weather	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards; HASP 12: Adverse Weather Conditions
☐	2 - 7	Exposure to Bloodborne Pathogens	NA☐ Low☐ Medium☒ High☐	HASP 13: Bloodborne Pathogens
☐	2 - 7	Walking/Working Surfaces	NA☐ Low☐ Medium☒ High☐	JSA 2: Housekeeping
☐	2 - 7	Slips, trips, falls	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards; JSA 2: Housekeeping
☐	2 - 7	Hand Injury	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3: Physical Hazards; JSA 2: General Labor
☐	2 - 7	Overhead, Struck by, Pinch Points	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards; JSA 6 Unloading Equipment
☐	2 - 7	Collapse of Excavation Walls	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards; JSA 18: Excavation & Backfilling
☐	2 - 7	Noise	NA☐ Low☐ Medium☒ High☐	HASP 10: Air and Noise Monitoring; All JSA's
☐	2, 4-7	Live Electrical Equipment	NA☐ Low☐ Medium☒ High☐	JSA 5, 12, 22
☐	2 - 7	Poor Lighting	NA☐ Low☒ Medium☐ High☐	HASP 11.2 Engineering Controls
☐	2 - 7	Overhead Hazards	NA☐ Low☒ Medium☐ High☐	HASP 5.8 Utility Clearance; JSA 5 Utility Clearance

Table 5-10.1 Hazards and Control Mechanisms

Today's Activities (Check Each)	Task Number(s)	Hazards	Relative Hazard /Risk Rating*	Hazard Controls Mechanism and/or JSA (See HASP)
☐	2 - 7	Traffic Management (Vehicle, pedestrian interference)	NA☐ Low☐ Medium☒ High☐	JSA 7 Traffic Control
☐	2 - 7	Heavy machinery	NA☐ Low☐ Medium☒ High☐	HASP 11.7; JSA 12 Heavy Equipment
☐	2 - 7	Struck by Equipment	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards; JHA 12 Heavy Equipment
☐	2 - 7	Explosion, fire/hazardous atmosphere	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards
☐	2, 4-6	Trenching/Excavation	NA☐ Low☐ Medium☒ High☐	HASP Table 5.3 Physical Hazards, HASP 11.6 Excavation/Trenching; JSA 12, 18
☐	2 - 7	Vehicle use	NA☐ Low☒ Medium☐ High☐	HASP 11.10 Vehicle Use; All JSAs
☐	2, 4-7	Elevated heights (<4ft)	NA☐ Low☒ Medium☐ High☐	HASP 11.9 Working from Heights
☐	2, 4-7	Elevated heights (>4ft)	NA☐ Low☒ Medium☐ High☐	HASP 11.9 Working from Heights
☐	2 - 7	Overhead/underground utilities	NA☐ Low☐ Medium☒ High☐	HASP 5.3 Physical Hazards; HASP 5.8 Utility Clearance; JSA 5 Utility Clearance
☐	2 - 7	Powered hand tools	NA☐ Low☒ Medium☐ High☐	HASP 5.3 Physical Hazards
☐	2 - 7	Electrically powered equipment	NA☐ Low☒ Medium☐ High☐	HASP Table 5.3 Physical Hazards
☐	2 - 7	Cutting devices/tools	NA☐ Low☐ Medium☒ High☐	JSA 4: General Labor
☐	2 - 7	Material handling, ergonomics	NA☐ Low☐ Medium☒ High☐	JSA 6: Loading and Unloading of Materials
☐	2 - 7	Poisonous/irritating plants	NA☐ Low☒ Medium☐ High☐	HASP 14: Natural Hazards
☐	2 - 7	Insects/rodents/snakes	NA☐ Low☒ Medium☐ High☐	HASP 14: Natural Hazards
☐	2 - 7	Ticks, mosquitos	NA☐ Low☒ Medium☐ High☐	HASP 14: Natural Hazards
☐	2 – 7	Employees working early/late	NA☐ Low☒ Medium☐ High☐	HASP 11.5: Safe Work Practices

Table 5-10.1 Hazards and Control Mechanisms				
Today's Activities (Check Each)	**Task Number(s)**	**Hazards**	**Relative Hazard /Risk Rating***	**Hazard Controls Mechanism and/or JSA (See HASP)**
☐	Note: A single hazard may be listed under several Tasks. In this case, use the highest Severity ranking of the tasks evaluated as the overall ranking.			

*Relative Hazard/Risk Rating

When evaluating a Task against a specific hazard, the evaluator should:

1. Determine how frequently you will be conducting the Task and generally be exposed to the Hazard while on-site;
2. Determine the duration (i.e., the amount of time) you will spend conducting the Task; and
3. Determine the Severity that the Task/Hazard may cause using Table 5. When assessing the severity, assume the hypothetical injury was a result of the task being conducted improperly and that PPE was not being worn:
   - **Minimal Severity** would require first aid and/or the property/equipment damage is limited to minor wear and tear, scratches, dents (still functional);
   - **Moderate Severity** requires professional medical attention and/or the property/equipment damage necessitates repair but not replacement; and
   - **High Severity** requires immediate medical attention/life threatening and/or the property/equipment damage is significant and requires replacement.

Table 7: *Relative Risk Rating Decision Table				
The Hazard…	**Has No Severity**	**Has Minimal Severity**	**Has Moderate Severity**	**Has High Severity**
Is Not Present (i.e., 0% of your on-site time does not expose you to this Hazard)	NA	NA	NA	NA
Is Rarely Present (i.e., <25% of your on-site time exposes you to this Hazard)	NA	LOW	LOW	MED
Is Sometimes Present (i.e., 25%-<50% of your time exposes you to this Hazard)	NA	LOW	MED	HIGH
Is Frequently to Constantly Present (i.e., 50% to 100% of your time exposes you to this Hazard)	NA	MED	HIGH	HIGH

6. TRAINING REQUIREMENTS

6.1. BASIC TRAINING REQUIREMENTS

Personnel working in the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ) (e.g., where the potential exists for contact with hazardous materials) shall complete training and have site experience conforming to the requirements of 29 CFR 1910.120(e). Personnel are also required to have received 8-hours of refresher training annually thereafter

Personnel or subcontractor personnel not expected to encounter environmentally impacted materials will be required to have appropriate training for the specific task they are performing. The SSHO will be responsible for determining the likelihood of potential exposure to environmentally impacted materials for a specific task. The SSHO will then determine the minimum required training for that task.

Personnel, anticipated to wear a respirator more than 30 days, shall receive medical surveillance and be trained in the contents of Charter's, "Respiratory Protection Program,"

Competent persons will be required to be identified prior to the site activities starting. These individuals have been identified by their employer and are capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees. These individuals are knowledgeable of the applicable standards and are also authorized by their employer to take prompt corrective actions to correct or eliminate the hazards.

6.2. SITE-SPECIFIC TRAINING

Site-specific employee training to minimize on-site hazards will be provided to address the activities, procedures, monitoring and equipment for the field operations and will be completed before work starts. This training will include identifying the names of personnel and alternate personnel responsible for site safety.

In addition, this training, at a minimum, will include the following:

- Site description and history
- Project activities, including coordination with other contractors
- Radiologic Training for specific site operations
- Hazard evaluation
- On-site safety responsibilities
- Site Control and work zones
- Medical monitoring, in accordance with and 1910.120 (f)

- Atmospheric monitoring
- Personal protection, clothing, and equipment
- Decontamination procedures
- Emergency procedures
- Review of site-specific Safety Data Sheets (SDS)
- Safe work practices
- Other elements covered in this HASP

This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safe operations. Training will also include emergency response provisions including emergency preparedness, location of assembly areas, proper entry and exit procedures for the Exclusion Zone, warning systems, incident management, location of emergency equipment, and driving route to hospital. Daily site safety meetings will be documented using the Daily Safety Briefing Form**.**

6.3. SAFETY BRIEFINGS

Project personnel will be given briefings by the SSHO on a daily basis at the beginning of each work day to further assist site personnel in conducting their activities safely. Briefings will also be provided for new operations, changes in work practices, or if site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices when performance deficiencies are identified during routine daily activities or as a result of safety audits.

6.4. SAFETY AUDITS

The SSHO and members of the Charter Safety Team will conduct regular safety audits of field operations and subcontractor performance to review for compliance with health and safety policies and procedures and this plan. Daily operations will adhere to the protocols outlined in this HASP and will be enforced by the SSHO.

6.5. FIRST AID AND CPR

OSHA requires that a minimum of one On-Site person be trained and certified to provide emergency medical response. These requirements must be a minimum of Basic (or Standard) First Aid and Cardio Pulmonary Resuscitation (CPR) under established universal precautions. The SSHO, his alternate and supervisory personnel are trained and certified to administer First Aid and CPR. These courses will be consistent with requirements of the American Red Cross, American Heart Association, or National Safety Council. Individuals who may administer First Aid and CPR will receive blood-borne pathogens training. First Aid/CPR assistance by individuals on-site will be on a Good Samaritan basis. Either the SSHO or the alternate are to be on-site when work is occurring.

7. MEDICAL SURVEILLANCE PROGRAM

A medical surveillance program shall be provided in accordance with 29 CFR 1910.120 (f), 1926.65 (f). Personnel performing field work involving hazardous materials are required to have passed periodic medical examination by an occupational physician that is consistent with 29 CFR 1910.120(f), and if applicable 29 CFR 1926.59 and 1926.62.

Additional medical testing may be required in consultation with an occupational physician if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance (e.g. If lead is present and exposure is greater than the action levels, additional monitoring requirements may have to be implemented).

Subcontractors will maintain the medical records for their own employees, in accordance with OSHA's Access to Records, and provide written documentation certifying that each employee at the Site has met the requirements of the Medical Surveillance Program. The pre-employment physical should provide this information. The pre-assignment and annual examinations are essentially the same in content and may include:

- An updated medical and occupational history
- A screening physical examination
- Blood and urine laboratory tests (including lead)
- Chest x-ray (where required by physician)
- Electrocardiogram
- Pulmonary function tests
- Audiometry
- Visual acuity test
- Other tests authorized by the occupational physician.
- Respirator fit testing as necessary

7.1. EMERGENCY MEDICAL TREATMENT

Provisions for emergency medical treatment are detailed in the Emergency Response Plan (Appendix B). They will include:

- An individual qualified to render first aid and CPR on a Good Samaritan Basis.
- First aid kits in compliance with OSHA requirements and emergency first aid stations in the immediate work vicinity. Universal precautions are to be used for first aid operations.

- Conspicuously posted phone numbers and procedures for contacting ambulance services, fire department, police and medical facilities.
- Maps and directions to the hospital are provided on the Emergency Route Map shown in the **Appendix B**.

8. SITE CONTROL PLAN

The purposes of the Site Control Plan discussed in this section are to maintain order at the Site and to minimize chemical and physical hazards to on-site personnel, visitors and the public. Site control work zones will include an Exclusion Zone, a Contamination Reduction Zone and a Support Zone. The work zones, as well as the other portions of the HASP, will be coordinated with the Engineer. Site control plans will be completed once areas and locations of contaminants have been identified at the start of field activities.

The extent and relative positions of the control zones will change during progressive stages of the project. The limits of these control zones will be adjusted as Site-specific conditions relative to contaminant conditions become well defined. Control zones will be designated for each work area. These changes from the original defined field parameters will be made available to the Engineer. Site fencing, caution tape, signage, barricades, or other appropriate measures will be used for land–side work to physically separate the work zones defined below.

8.1. SUPPORT ZONE

The Support Zone, or cold zone, is considered the uncontaminated area and will be identified by the SSHO when field activities begin. The Support Zone should be located upwind, upstream, and uphill from the Exclusion Zone and within the limits of the construction boundaries, but away from areas designated for stockpiled material awaiting chemical characterization. The Support Zone for the work at the Site is within the limits of the construction but not near any areas identified for excavation or other types of intrusive activities.

The Support Zone contains the temporary administrative facilities, which provide for team communications, emergency response and coordination of daily field operations. Communications equipment is located in this area. Appropriate sanitary facilities, safety, medical, and support equipment is identified and kept in this area. Boundaries for the Support Zone are separated from public access through the use of site fencing and other barricades to physically separate the work zones. Signage is also used to demarcate zones.

8.2. CONTAMINATION REDUCTION ZONE

A Contamination Reduction Zone, also known as a warm zone or decontamination zone, is a safety buffer that limits access to the Exclusion Zone. The Contamination Reduction Zone is established at the perimeter of the Exclusion Zone and provides physical separation of the Support Zone and Exclusion Zone.

The Contamination Reduction Zone provides an entry for personnel, vehicles and equipment into the Exclusion Zone and an exit area for decontamination of personnel, materials and equipment from the Exclusion Zone. The Contamination Reduction Zone will be surrounded with a suitable temporary barricade system to physically separate the work zones and to allow for adjustments to the size and location due to changing site conditions.

Operations within the Contaminant Reduction Zone require specialized training and equipment, including portable eyewash, potable water, soap, towels, medical supplies, plastic garbage bags, fire extinguishers, extra PPE and decontamination supplies.

8.3. EXCLUSION ZONE

The Exclusion Zone, or hot zone, is the area containing or suspected of containing contaminated materials and the soil processing areas. Since work activities will be conducted at different locations within the property, construction fence will be used to delineate the EZ. Entrance into the EZ will be through an access road. The CRZ and decontamination facilities will be located outside the construction fence line immediately adjacent to the entrance gate to the EZ.

The Exclusion Zone includes and encompasses areas that have been identified as excavation areas. The fence line around the area serves as the perimeter of the Exclusion Zone. The Exclusion Zone is to be clearly marked by orange construction fencing and signage.

Access and egress from the Exclusion Zone will be through the Contamination Reduction Zone following procedures described in the Decontamination Section of this HASP. Activities within the Exclusion Zone require specialized training and experience, appropriate PPE, and pre-planning.

8.4. STAGING / STORAGE AREA

For this project clean soils for use as fill will be stored on Site. Erosion control measures and other support items will also be stored onsite in proper containment.

8.5. PERSONNEL AND SMALL EQUIPMENT DECONTAMINATION

Personnel and small equipment decontamination areas will be established on-site. Personnel will decontaminate or dispose of soiled protective clothing and equipment (i.e. disposable boots and gloves,

etc.) in the Contamination Reduction Zone. Refer to Section 11.0 - Decontamination of this document for further decontamination procedures.

8.6. HEAVY EQUIPMENT DECONTAMINATION

To prevent off-site transport of contamination, contaminated construction equipment and vehicles will be decontaminated at a fixed temporary decontamination area in the Contamination Reduction Zone immediately after exiting the Exclusion Zone.

Vehicles and equipment requiring decontamination shall be washed sufficiently to remove visible soil, sediment, and other residuals from the vehicle body, undercarriage, and tires, and no visible tracking of soil, sediment, or residuals onto public roadways occurs, as visually confirmed by Engineer.

All liquid and other materials (i.e. non-disposable, PPE, etc.) generated as part of the decontamination process will be collected, handled, stored and disposed of with other remediation waste generated on site. Wheel wash stations will be constructed at the exit of the exclusion zone out of HDPE liner, geotextile and gravel. Liquid will be collected in a sump and pumped to a fractionation tank for treatment and disposal.

Prior to leaving the Site, material transport vehicles and containers will be inspected for evidence of contamination (including inside of wheels and undercarriage). Trucks leaving the Site will proceed to a decontamination station for cleaning prior to exiting onto public roads.

1. Brush off equipment using a broom and/or brushes on the decontamination pad.

2. If necessary, at the decontamination pad, heavy equipment shall be pressure washed before leaving the Site.

3. Equipment leaving the Site will be decontaminated. In addition, any equipment previously utilized to excavate impacted material will be decontaminated prior to use in backfilling (e.g. excavator bucket).

4. Decontamination pads must ensure that the largest piece of equipment can be adequately decontaminated. Overspray must be controlled at the decontamination pads.

5. Soils collected from the decontamination pads shall be bulked with the related impacted material.

When necessary, wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it shall be done on an area stabilized with crushed stone which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through use of sand bags, gravel, boards, or other approved methods.

The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public right-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto adjacent paved road surfaces must be removed immediately.

Process equipment and storage tanks requiring removal of residual material shall be cleaned sufficiently to remove visible contamination from both the interior and the exterior of the equipment and tanks, as visually confirmed by Engineer.

Bulky debris and soil bins shall be cleared of soil, sediment, residuals, and washed sufficiently to remove visible residuals, as visually confirmed by Engineer.

Ice Melt and/or Sand will be applied when necessary at the entrance and exit of the Site as a preventive measure to mitigate ice build-up on the roadways during cold weather conditions.

Decontamination pads will be constructed in accordance with Project Drawings.

8.7. SITE VISITORS

The site will be a secured site and employees and visitors will need to sign in and out for accountability. Visitors will be briefed on the health and safety requirements contained in this HASP and specific to the daily tasks, and required to sign the HASP before being allowed to access the site.Visitors are required to report to the SSHO prior to accessing the Site. The SSHO will determine the purpose of individual visits, and will document decisions regarding their access to the Site. If granted limited access, visitors must sign in and out under the SSHO's direction daily for the duration of their approved visit. Under no circumstances will visitors be allowed to interfere with or participate in operations within the scope of the construction or field activities.

If required, the SSHO will establish a designated Level D area as an observation point for visitors during intrusive activities. This designated area will be located to offer proximate viewing of site operations, and positioned such that visitors in no way may inhibit site access, logistics, or general operations. Further, the SSHO will locate the viewing areas such that visitors present are at minimal risk of exposure to site hazards.

Prior to gaining access to designated viewing areas described above, visitors must provide the SSHO with documented compliance with Section 5 of the HASP, comply with other applicable sections, and satisfy additional conditions placed on them as deemed appropriate by the SSHO to assure visitor safety. The SSHO or designee will escort Site visitors throughout the Site.

8.8. EMPLOYEE ALARM SYSTEM

The employee alarm system will provide warning for necessary emergency actions or for reaction time for safe escape of employees from the workplace or the immediate work area, or both; be capable of being perceived above ambient noise or light levels by employees in the affected portions of the workplace; and, be distinctive and recognizable as a signal to evacuate the work area or to perform actions designated under the emergency action plan. The SSHO and Supervisory personnel will carry portable radios allowing contact with field personnel at all times. Compressed air containers will also be available to signal and alert workers in case of an emergency.

In addition, Charter communicates to its employees and subcontractors the following:

- Explain to its employees the preferred means of reporting an emergency.
- Establish procedures for sounding emergency alarms in the workplace.
- Post emergency telephone numbers near employee notice boards and other conspicuous locations when telephones serve as a means of reporting emergencies. Where a communications system also serves as the employee alarm system, emergency messages have priority over non-emergencies.
- Assurance that devices, components, combinations of devices or systems constructed and installed comply with this standard is approved.
- Assurance that employee alarm systems are restored to normal operating condition as promptly as possible after each test or alarm.
- Assure spare devices and components subject to wear or destruction are available in sufficient quantities and locations for prompt restoration of the system.
- Employee alarm systems are restored to normal operating conditions except when undergoing repairs or maintenance.

8.9. MEDICAL TREATMENT AND FIRST AID

Workers are informed of locations and directions to locations where emergency medical attention may be received. A road map displaying the most direct route to the appropriate medical facilities and an emergency phone list will be posted at the work Site. The SSHO will assign individuals with the responsibility of driving the Contractor's vehicle to the hospital. The designated drivers will be familiar with the most direct route and time required to reach the hospital. The Emergency Route Map is presented in **Appendix B**. A copy of the map will be posted at the job Site and provided for Charter and subcontractor vehicles on-site.

An Emergency Contact list is presented **in Appendix B**. Local EMS professionals have in-depth knowledge of local hospitals and current capabilities and make the final choice as to the most appropriate medical facility for the patient.

Depending on the seriousness of the injury, treatment may be given at the Site by trained contractor personnel. For more serious injuries, additional assistance may be required at the Site, or the victim may be transferred to an appropriate medical facility.

Lifesaving care will be instituted as long as it is safe for the caregiver to do so. If the scene is not safe or presents a hazard to rescuers or other workers, then the Concord Fire Department will be notified and emergency services will be activated (911). Decontamination procedures, as applicable, are implemented prior to medical treatment.

In the event of minor injury and minimal contamination, medical care may be rendered immediately without considering decontamination. Outer garments can be removed provided this does not cause delays, interfere with treatment, or aggravate the injury. Respiratory protection must always be removed and chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic or blankets to help prevent contamination of medical personnel and/or the interior of transfer vehicles. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim, unless it is suspected that the individual has been contaminated with a highly toxic or corrosive material that could cause serious injury or loss of life. For minor medical material problems or injuries, the normal decontamination procedure should be followed.

Injuries from contaminant inhalation can be treated only by qualified physicians. If eye or skin contamination occurs, immediate measures must be taken to counteract its effects. First aid treatment generally involves flushing the affected areas with water and assessing the need for further medical attention.

When protective clothing is grossly contaminated, contaminants may be transferred to the wearer or to treatment personnel, and cause injuries. Unless severe medical problems could be created by splashing, the protective clothing should be rinsed as rapidly as possible, and carefully removed.

8.10. OFF-SITE TRESPASSERS

In the event that off-site trespassers are encountered, Charter shall contact the Concord Police Department, who's contact information is in the Emergency Contact List.

9. PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective clothing and equipment (PPE) is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered at a hazardous substance site. No single combination of protective equipment and clothing is capable of protecting against potential hazards. PPE should be used in conjunction with other protective methods and its effectiveness evaluated periodically per OSHA standard 29 CFR 1910.120(c)(h)(5).

The use of PPE can itself create significant worker hazards. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. However, over-protection, as well as under-protection, can be hazardous and should be avoided where possible. Two basic objectives of any PPE program should be to protect the wearer from safety and health hazards and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. The attached JSAs, applicable to each task identified on the PTP/SWP, will specify the required PPE.

Worker Hazards associated with Protective Equipment

- Heat stress
- Physical stress
- Psychological stress
- Impaired vision
- Impaired mobility
- Impaired communication

Personnel are responsible for their own health and safety in regards to jobsites. Personnel shall maintain awareness of site conditions and exercise sound judgment when confronted with an unsafe and/or potentially hazardous condition. If presented with an unsafe and/or hazardous situation, personnel shall follow a safe course of action and evacuate the scene. Personnel shall not re-enter a scene until it is deemed safe by the SSHO.

9.1. GENERAL

Personal protective equipment (PPE) for general operations will be consistent with the requirements of 29 CFR 1910 Subpart I, “Personal Protective Equipment.” Basic levels of protection for hazardous waste operations will be selected in accordance with the provisions of 29 CFR 1910.120(g) (3), “Personal Protective Equipment Selection,” and 1926.65, and 40 CFR 311. There are several manuals and guidebooks available for evaluating the performance of PPE.

The PPE selection will be based on hazards specific to work activities, as well as anticipated duration of activity. Procedures for establishment, implementation, and enforcement of maintenance, storage, decontamination, disposal, proper fitting, and training will be implemented by the SSHO and PM. Further provisions for evaluation of effectiveness, medical concerns, and extreme conditions will also be addressed.

Modification to basic PPE ensembles may be necessary for specific operations. In these cases, further definition will be provided by review of specific hazards, conditions, and proposed operational requirements and by conducting monitoring at the particular operation. Protection may be upgraded or downgraded, as deemed appropriate by the SSHO with notification to the Engineer.

Charter's **PPE PROGRAM** will be followed by onsite employees.

9.2. LEVELS OF PROTECTION

OSHA has established four levels of PPE to be used to reduce exposure of workers to chemical, physical and biological hazards (29 CFR 1910.120 (B)).

The material of the clothing must be compatible with the chemicals of concern and the task being performed. PPE must be able to resist tears, abrasions, punctures, and temperature effects. Chemical suits are tested by the manufacturer to be compatible with certain chemicals. Each manufacturer can provide data on the rated chemical, penetration levels, degradation time, and incompatible chemicals.

Contact lenses are not to be worn on-site by personnel exposed to hazardous chemicals. Contact lenses can interfere with proper eye-wash techniques and may act as a barrier, trapping chemicals between the lens and the eye.

9.2.1. Level A Protection

Level A offers the greatest protection from hazardous materials. It is used at sites where there are extremely hazardous materials or unknown materials. It is also used for sites that present a significant hazard from splashes, vapors, gasses, and particulates. This level consists of:

- Positive pressure self-contained breathing apparatus (SCBA)
- Total encapsulating chemical protective suit
- Chemically resistant inner and outer gloves and boots
- Boots with steel toe/ shank or Safety Toe Boot
- Hardhat
- Disposable outer suit (optional)
- Reflective Vest

No work will be conducted in Level A. In the event that Level D is not adequate for worker protection, Site operations will be immediately suspended, Engineer notified and PPE requirements evaluated by the SSHO.

9.2.2. Level B Protection

Level B protective clothing is used in situations where atmospheric quality or contamination is a concern, but there is limited concern regarding skin hazards. Level B protective clothing includes:

- Full one piece chemical resistant suit
- Outer rubber boots with steel toe or shank

- Outer nitrile or neoprene gloves and inner disposable chemical resistant gloves
- Full-face self-contained positive pressure or pressure-demand breathing apparatus (SCBA) or supplied air-line respirator
- Reflective Vest
- Hardhat

No work will be conducted in Level B. In the event that Level D is not adequate for worker protection, Site operations will be immediately suspended, Engineer notified and PPE requirements will be evaluated by the SSHO.

9.2.3. Level C Protection

Level C protective clothing consists of an upgrade from Level D (or Modified Level D). Level C will be used in work areas where the chemical or chemical concentrations present an inhalation hazard. Use of respirators will be an appropriate measure against airborne contaminants. Level C may not be used in areas where atmospheric quality is degraded by asphyxiates or poor ventilation, or where conditions are not known. Level C protective equipment includes:

- Full-face or half-face air-purifying respirator (NIOSH approved) fitted with appropriately rated cartridges (acid gas / organic vapor / High Efficiency Particulate Air filter (HEPA) cartridges).
- Hardhat.
- Safety Glasses.
- Steel-toe Boots
- Disposable Tyvek coveralls.
- Disposable nitrile inner gloves and nitrile outer gloves.
- Reflective safety vest.
- Disposable or reusable rubber outer boots.

9.2.4. Level D Protection

Level D is assumed to be the initial PPE level. Level D personal protective clothing and equipment includes:

- Work clothes or uniform
- Hardhat.
- Face and eye protection from safety glasses / goggles/ face shield.
- Reflective safety vest or Hi-Viz Clothing (shirt/sweatshirt with reflective strips).
- Safety Toe Boots/shoes

- Leather or other equal work gloves shall be worn when conducting work activities with hands.
- Noise protection - as warranted by noise monitoring
- Personal Floatation Device (PFD) – On or near the water (within 10 feet)

9.2.5. Modified Level D Protection

- Work clothes or uniform
- Disposable or reusable (as appropriate), Tyvek coveralls - required when splashing by contaminated liquids is a possibility. Thicker coveralls may be selected for heavy spill risk (e.g., Modified Level D).
- Hardhat.
- Face and eye protection from safety glasses / goggles/ face shield.
- Reflective safety vest or Hi-Viz Clothing (shirt/sweatshirt with reflective strips).
- Safety Toe Boots/shoes
- Disposable nitrile gloves - required when handling and collecting soil and water samples.
- Outer nitrile gloves - required when splashing by contaminated liquids is expected to be heavy or excessive (e.g., Modified Level D).
- Leather or other equal work gloves shall be worn when conducting work activities with hands.
- Chemically resistant or disposable outer boots (e.g., Modified Level D).
- Noise protection - as warranted by noise monitoring
- Personal Floatation Device (PFD) – On or near the water (within 10 feet)

9.3. RESPIRATORY PROTECTION

Whenever possible, respiratory hazards are engineered out of the work environment. Engineering controls may include increased ventilation, dust or vapor suppression, or other mechanisms to eliminate the respiratory hazard.

If engineering controls are not a viable option, or do not adequately control exposure, then a personal respirator plan shall be implemented. Charter employs a Respiratory Protection Program. Respirator types can vary from simple particulate filtering face masks, to half-face or full-face masks with specialized filter cartridges, to supplied air or self-contained breathing apparatus (SCBA).

Any respirator or facemask used at the Site will be appropriately rated for the work performed and Site-specific contaminants, and meet NIOSH approval guidelines. Only individuals who have been trained and fit-tested within 12 months, and have received medical approval will be permitted to use a respirator.

Air-purifying respirators and face masks are not used in environments where contaminants are present in a form or at concentrations that may be an immediate danger to life and health (IDLH), or in oxygen deficient atmospheres. These conditions require SCBA or supplied air systems.

9.4. ANTICIPATED PROTECTION FOR SITE OPERATIONS

Most routine daily operations at the Site which do not involve the potential for impacted material contact will require personal protective equipment Level D. These include mobilization/demobilization, setup, heavy equipment operation, truck operations, construction, paving, landscaping and support activities.

Independent of the level of protection used, workers at the Site at all times except when in offices, vehicles, or equipment will be required to wear proper work clothes (short pants and tank-top shirts are prohibited), safety boots/shoes, safety glasses, hard hat, reflective safety vest or high visibility clothing with reflective strips, and be clean shaven to allow proper respirator fit (when necessary).

Tasks where contact with soil may occur require the use of PPE. The following are tasks that have been identified for this project with their anticipated PPE level:

- Mobilization Operations – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Housekeeping – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Fueling – Level D (Chemical Resistant, Rubber, Nitrile, or Rubber Coated Cotton Gloves)
- General Labor – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Utility Clearance and Identification – Level D (Leather Palm or Rubber Coated Cotton Gloves) Electrical PPE to be determined by the utility company.
- Unloading of Equipment and Materials – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Traffic Control-Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Cold/Hot weather Work – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Surveying – Level D (Surveyor to determine gloves with appropriate dexterity)
- Hot Work for Welding , Splicing – Level D (Leather Protective Hot Work Gloves and PPE)
- Heavy Equipment Operation – Level D (Leather Palm, Rubber Coated Cotton, or mechanics Gloves) *Gloves not required to be worn while operating, only for maintenance.
- Construction Staging/Materials Management Area – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Erosion / Sedimentation / Storm water Controls Installation/Removal – Level D (Leather Palm or Rubber Coated Cotton Gloves)
- Excavation and Backfilling – Modified Level D (SSHO to determine gloves appropriate for task);

- Clearing and Grubbing, including Tree Clearing – Modified Level D(SSHO to determine gloves appropriate to task (ie. Chain Saw operations)
- Demobilization Operations – Level D (Leather Palm or Rubber Coated Cotton Gloves)

If critical action levels, as specified in the following sections, are exceeded unexpectedly, and based on evaluation of the conditions, if unanticipated respiratory protection is deemed necessary, then the work will be stopped, the Engineer notified and the SSHO will evaluate before upgrading the levels of protection. Action levels used to determine the need to upgrade or downgrade the levels of protection are described in the Air Monitoring section of this HASP.

10. AIR AND NOISE MONITORING

The Engineer or consultant is responsible for daily air monitoring. The Engineer or consultant will perform perimeter dust monitoring. Charter may conduct additional air and noise monitoring as determined by the Safety Team. Additional monitoring will conducted as described below.

Charter may perform monitoring for dust in the Exclusion Zone and other areas outside the exclusion zone (such as the material loading area) within the site perimeter when required.

The activities will be sequenced in an efficient manner, to minimize the period during which excavations are open. Although no odors are expected during the proposed work, If the excavation generates appreciable odors additional actions will be taken to minimize odors.

ACTION LEVELS

The following action levels as measured in the breathing zone during work activities will be in effect during the entire project.

Particulate Matter (Perimeter Readings)

Courtyard & Building E Work Areas:

Particulates Level no visible dust <150 ug/m^3 Continue work

Particulates Level visible dust ≥150 ug/m^3 above background Implement engineering controls/dust suppression

Holding Basin Area:

Particulates Level no visible dust <130 ug/m^3 Continue work

Particulates Level visible dust ≥130 ug/m^3 above background Implement engineering controls/dust suppression

Notes: Action Levels presented above are for 15 – minute sustained readings within the breathing zone.

10.1. DUST AND ODOR CONTROL PLAN

Charter is required to perform adequate control of dust and objectionable odors during Work daily to achieve the perimeter limits established for the project in accordance with the Air Monitoring Plan. This may include the use of vapor suppression activities (i.e., minimize or stop soil disturbance, use of engineering controls) and/or and dust suppression activities (i.e. water trucks and/or water mist).

DECONTAMINATION PROCEDURES

Decontamination is the procedure to remove hazardous substances from employees and equipment to the extents necessary to preclude foreseeable health effects. It also prevents cross contamination between personnel, eliminates the potential for bringing contaminants home, and improves quality control and assurance with environmental sampling.

It is important to note the time duration of decontamination procedures. Many factors, such as environmental temperature, air supply, contamination and breakthrough potential will affect the time that personnel can remain within the PPE. Factors such as work duration, distance from Contaminant Reduction Zone to Exclusion Zone, work effort, and physical condition may also affect the ability of personnel to remain within PPE.

Decontamination is handled in several phases: gross or primary, secondary, and tertiary. These phases may be altered based on contamination or other conditions.

- Gross (primary) decontamination is the removal or neutralization of a majority of the contaminant. Gross decontamination is performed either in the Exclusion Zone or at the start of the Contaminant Reduction Zone. It is always assumed that there is a residual contamination present after gross decontamination.
- Secondary decontamination is the removal or neutralization of most of the residual contamination. This is performed in the middle of the Contaminant Reduction Zone. It is presumed that contamination is present after secondary decontamination.
- Tertiary decontamination and PPE removal is the final phase of decontamination. Remaining contamination is removed, and remaining PPE is discontinued. This is performed at the end of the Contaminant Reduction Zone, prior to the Support Zone. Contaminated PPE is placed in covered containers within the Contaminant Reduction Zone.

There are several mechanisms of decontamination that can be used to decontaminate personnel and equipment. Each technique has particular positive and negative aspects in regards to personnel, resources, and time constraints. A particular technique for decontamination may work well for one contaminant, but not another. Several techniques of decontamination include: emulsification, chemical reaction and degradation, disinfection, dilution, absorption, and physical removal.

- Emulsification is the production of a suspension of material. The contaminant is emulsified into a form that is immiscible and insoluble in water. Emulsifying agents are typically used for non-polar liquids and

insoluble solids. Emulsifying agents can include surfactant, soap, or detergents, check with manufacturer's recommendations for use.

- Chemical reaction is a process that neutralizes, degrades, or chemically alters the contaminant. Chemical neutralization may not assure that hazards are eliminated, and reactions may be difficult or dangerous to perform. Chemical neutralization may cause exothermic or endothermic reactions and may damage PPE or living tissue.
- Disinfection with chemicals or bleach is used to destroy biological or pathological compounds.
- Absorption of chemicals into another substance.
- Physical removal of contaminants by brush / wipes / vacuum/water.

Decontamination procedures are to be tailored to the specific hazards of the Site and will vary in complexity and the number of steps, depending on the level of hazard and the employee's exposure to the hazard. Decontamination procedures and PPE decontamination will vary depending on the specific substance, since one procedure or method will not work for all substances. Evaluation of decontamination methods and procedures should be performed, as necessary to assure that employees are not exposed to hazards by reusing PPE (29 CFR 1910.120 (H) (3)).

The SSHO determines the level of decontamination necessary based on the evaluation of specific work activities and the potential degree of contamination encountered. Temporary Contamination Reduction Zones are established at sampling locations. Appropriate levels of Decontamination Equipment are provided as deemed necessary by the SSHO.

10.2. PERSONNEL AND SMALL EQUIPMENT

Personnel perform decontamination in the personal decontamination area upon entering the Contamination Reduction Zone. The SSHO is responsible for ensuring personal protective equipment is decontaminated before being reissued.

Decontamination of personnel in Modified Level D will consist of the removal and disposal of coveralls, disposable boots (when worn), and gloves. Boot wash stations and trash receptacles will be set up.

Decontamination of personnel using Level C protective equipment will consist of:

- Removal and disposal of boot covers.
- Removal and disposal of coveralls.
- Removal and disposal of outer gloves.

Washing boots or other non-disposable protective equipment (i.e., hard hat, safety glasses/goggles, etc.) suspected of being contaminated using soap solution followed by potable water rinse. Collected decontamination fluids must be collected for disposal.

- Removal, cleaning, and storage of respiratory equipment.
- Removal and disposal of inner gloves.

Contaminated wash solutions and PPE will be disposed of at an appropriate approved disposal facility. Hand tools and other small equipment will be decontaminated as needed by washing in decontamination basins. The Contractor will supply washing facilities with an adequate supply of potable water for personal hygiene.

Personnel decontamination stations must be equipped with a boot wash rack capable of containing contact water and decontamination residuals, and side walls to prevent splash and overspray. The boot wash rack will be constructed so that solid decontamination residuals can easily be removed using hand tools such as flat-bladed shovels. Personal decontamination stations must be protected from the sun and rain with a temporary fabric structure that encompasses the boot wash rack and a seating area

10.3. CONTAMINATION PREVENTION

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure worker hygiene by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Know the limitations of PPE being used
- Do not walk through areas of obvious or known contamination
- Do not handle or touch contaminated materials directly
- Do not sit or lean on potentially contaminated surfaces
- Make sure PPE has no cuts or tears prior to donning
- Fasten closures on suits, covering with tape, if necessary
- Take particular care to protect any skin injuries
- Stay upwind of airborne contaminants
- Do not carry cigarettes, gum, food, or candy into contaminated areas
- Wash hands and face before eating and drinking
- Do not smoke, eat, or drink in contaminated areas
- Shower at the end of the workday

Sampling/Monitoring

- Cover instruments with clear plastic, leaving openings for sampling ports, sensor points.
- Bag sample containers prior to placement of sample material into containers.

Heavy Equipment

- Limit the surface area of equipment that comes into contact with contamination.
- Follow procedures detailed in Operations Work Plan.

General

- If contaminated tools are to be placed on non-contaminated equipment for transport to the decontamination pad, use plastic to keep the non-contaminated equipment clean.
- Place spoils from excavation work so as not to be in the expected paths of individuals.
- Keep excavated soils out of the way of workers.

11. ACCIDENT PREVENTION PLAN

The Job Safety Analysis Tables for each component of work anticipated for this project are presented in **Appendix B** of this HASP. These Job Safety Analysis tables are used to identify the hazards associated with a particular task as well as identify controls to abate them. These tables are meant as a starting point in the hazard evaluation process. The SSHO reviews and revises these tables before a task is started. These tables are then reviewed with project personnel before the start of each new task and periodically during the course of the work.

11.1. STANDARD OPERATING PROCEDURES

Charter is responsible for supplying the equipment to perform the excavation and other intrusive activities. The operator(s) is adequately trained, licensed, if applicable, and experienced with the type of equipment. Safety precautions are strictly followed, such as support of excavation, use of stabilizers and equipment swing radius. The swing zone of an excavator is marked, and personnel are briefed on the dangers associated with swing areas. Workers in the area of heavy machinery acquire visual contact with the operator before entering into a zone impacted by the equipment.

11.2. ENGINEERING CONTROLS

The following engineering controls will be implemented during Site operations:

- Excavations and trenches will be secured by a combination of the following: fences, caution tape, shielding barriers or barricades.
- Support of Excavation (SOE) where appropriate
- Roll-over Protection on Heavy Equipment (ROPS)
- Equipment Operator Seat-belt use

- Provide lights for night work/low light conditions
- Swing Areas demarcated Provide a dedicated flag person to manage truck traffic along public ROWs (if deemed necessary by the CM)
- Trucks and heavy equipment will have a functional back-up or movement alarm which are a maximum of 5dB(A) above ambient noise (Noise Mitigation)
- Limit use of air or gasoline driven saws (Noise Mitigation)
- Use electric instead of diesel or gas powered equipment where feasible (Noise Mitigation)
- Limit equipment idling (Noise Mitigation)
- Secure vehicle and equipment parts to secure against rattling and banging (Noise Mitigation)
- Equipment powered by internal combustion engines shall be equipped with a muffler (Noise Mitigation)
- Construct temporary enclosures around noisy equipment or activities if feasible (Noise Mitigation)
- Phase work so that different vibration inducing activities do not occur at the same time (Vibration Mitigation)
- Route heavy traffic away from sensitive structures (Vibration Mitigation)
- Grade surface irregularities to prevent the generation of impact noise and vibrations by vehicles (Vibration/Noise Mitigation)

11.3. SAFETY EQUIPMENT

Basic emergency and first aid equipment will be available at the Support Zone and/or the Contamination Reduction Zone, as appropriate. This includes communications equipment, first aid kit, a heavy blanket for hypothermia treatment, emergency eyewash, fire extinguishers, toilets, hand wash station, and other safety-related equipment.

11.4. COMMUNICATIONS

11.4.1. Two Way Radios

Hand-held units are used as much as possible by field teams for communication between Exclusion Zone operations and the Support Zone. Communication Equipment will be located in the Support Zone for communication with emergency support services/facilities.

11.4.2. Compressed Air (Air Horn)

Universal signals will be used to direct employees to evacuate a work area in the event of an emergency and congregate at the designated muster point. The muster point will be identified by the SSHO at the beginning of the project and conveyed to site personnel during each daily tailgate safety briefing. The SSHO will brief employees on the recognition of the universal signals.

The following signals will be used to indicate an emergency situation:

- One long blast repeated three times at five second intervals - Man down
- Three short blasts repeated three times at five second intervals - Evacuate site
- Alternating short and long blasts - All clear

11.4.3. Hand Signals

Hand signals will be used between spotters and operators. These signals are very important when working with heavy equipment and will be agreed upon between the spotter and operator. Basic hand signals are to be known and understood by workers and reviewed at the safety meeting. These hand signals are shown in **Table 12-1**. Hand signals for crane operations are shown in **Table 12-2.**

Table 12-1: Basic Hand Signals

Signal	Meaning
Closed fist	Stop
Waving hand	Okay to move; Backing up trucks
Thumbs up	OK; I'm alright; I understand
Thumbs down	No; negative

11.5. SAFE WORK PRACTICES

The following safe work practices will be implemented during Site operations:

- Prior to the start of work, this HASP, and applicable JSAs and PTP/SWP, will be reviewed and conspicuously posted, and emergency phone numbers will be posted. Emergency phone numbers will include hospital, ambulance, fire and police.
- Only properly trained and equipped personnel will be allowed to work in potentially contaminated areas.
- Regular work shifts will be limited to 12 hours with the potential for shifts exceeding 12 hours needing Charter Safety Director's approval. Fatigue of personnel will be a point of emphasis for the SSHO.
- The number of personnel and equipment in the excavation areas will be kept to a minimum, consistent with safe Site operations.

- Workers adhere to the "buddy system" while working in the Exclusion Zone and in designated exclusion areas. Radio contact is maintained between pairs on-site in order to assist each other in case of emergencies.
- Workers do not exit an Exclusion Zones until soiled equipment and clothing have been removed and decontaminated or properly disposed of.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer, ingestion, and inhalation of potentially contaminated materials is prohibited. Personnel will wash hands and face before eating and drinking.
- As necessary, personnel will thoroughly wash their hands and faces upon leaving the Exclusion Zones.
- Contact with potentially contaminated materials and surfaces are to be avoided. Personnel are to comply with contamination control measures.
- Personnel with facial hair or other face piece seal obstructions will not be permitted to work where respirators are required.
- Work is only conducted if adequate illumination is provided, i.e., visual observation is not impaired due to loss of daylight conditions.
- Sampling personnel are not to work near operating heavy equipment.
- No application of cosmetics in areas with contamination (Exclusion Zone).

11.6. EXCAVATION / TRENCH HAZARD

Deep excavations and trenching are anticipated for this project and appropriate earthwork measures will be taken to ensure worker safety. Collapsing of trench sidewalls may occur during excavation and trenching activities. The area around trenches and excavations will be demarcated to prevent access by personnel not involved in the work. Charter's competent person for excavations will evaluate the condition of the excavation prior to personnel entering as well as the beginning of each shift, after any rainfall event or other water event. The Excavation Jobsite Checklist will be completed by the competent person. This individual will be identified prior to the start of excavation related activities. Actions to minimize the potential for hazards related to these activities include:

- Excavation and trenching activities will be in accordance with OSHA 29 CFR 1926 (p) and 29 CFR 1910.650 – 1910.652.
- Lay back slope to a stable pitch. The construction Contractor's competent person must inspect sloping.
- Equipment and excavated material is to be placed no closer than 2 feet from the edge of the backfill.
- Install Temporary Excavation Support System around excavation areas that cannot be safely sloped.
- Heavy equipment not required for work activity will be kept away from the excavation.
- Personnel will not be permitted to enter the excavation without shielding or sloping in place.

11.7. MACHINERY AND MECHANIZED EQUIPMENT

Actions to be taken to minimize the potential for hazards related to the operation of machinery and other mechanized equipment include:

- Licensed & experienced operators will operate machinery.
- If needed, crane Lift Plan(s) will be prepared for proposed lifting or hoisting activities. These plans will include detailed information regarding the lift such as: Cut sheets of crane; Lift capacity; Weight(s) of items to be lifted; Crane swing radius; Location of crane; Wind speed restrictions; Hoisting and associated supports; and a description of how restricted area will be demarcated.
- Machinery will be inspected daily before use.
- Equipment will be outfitted with audible back-up or movement alarms
- Safety features such as belts, harnesses and warning lights/alarms will be used throughout these activities.
- Tag lines will be used when lifting items.
- Equipment will be locked-out and tagged-out prior to conducting repairs or maintenance. The person who placed a lock/tag will only remove their lock/tag.
- Equipment capable of stopping, lowering and holding at least the full test load shall be provided.
- Riding on load, hoods, hammers, buckets, material hoists, etc. not meant for personnel is prohibited.
- The operator of hoisting equipment will not perform any other work or leave his/her position at the controls until the load has been safely landed or returned to ground level.
- Adequate clearance is maintained between moving or rotating parts of the equipment and fixed objects to allow for passage of personnel.

11.8. HAZARDOUS MATERIALS

A Hazardous Material (Department of Transportation) is defined as any substance or material in a quantity or form that poses an unreasonable risk to health, safety, or property when transported. A hazardous substance (Environmental Protection Agency) is any substance designated under the Clean Water Act and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that pose a threat waterways and the environment when released. An extremely hazardous substance presents a hazard to the community during an emergency spill or release, as a result of its toxicity, chemical, and physical properties (required reporting under SARA Title III). Hazardous waste (DOT & EPA) is a substance that is ignitable, corrosive, reactive, toxic, or which may pose a substantial or potential hazard to human health and safety or the environment when improperly managed.

Actions to be taken to minimize the potential for hazards (refer to Section 3.0) related to personnel who may come in contact with hazardous materials include:

- Hazardous materials expected to be on-site will be discussed at the morning safety meeting. The HASP, including SDS copies, will be kept on-site.
- Workers will use appropriate Personal Protective Equipment for each phase of work, as described in Section 7.0/JSAs.
- Worker exposure will be monitored by the SSHO to ensure an adequate level of protection.
- Standard Operating Procedures will be followed for loading and sealing containers and trucks, which may contain hazardous materials.
- Control zones will be established as described in Section 6.0.
- The directives of the SSHO will be followed for emergency supplies, response and spill cleanup procedures.
- If a spill occurs, the area will be sampled and tested to assure complete cleanup. Local, State, Federal and Owner requirements will be followed to eliminate the spill and reduce impact to off-site receptors.

11.9. WORKING FROM HEIGHTS

Fall protection is not required for work conducted at heights less than 4 feet above ground level except when that fall is into or onto another hazard. However, when the potential for work at varying heights exists, or the potential that implementation of the scope of work may increase the height at which work is being conducted, hazards associated with work at heights should be considered. Further, a mechanism for monitoring and documenting the potential changing conditions and a contingency plan for controlling potential hazards should be included in the site-specific HASP.

In the event that unanticipated conditions resulting in work at heights greater than 4 feet (1.2 m) are encountered during implementation of the scope of work, site work should be stopped immediately and the SSHO be informed.

Work up to four feet (1.2 meters) in height presents an increased risk of slips, trips, and falls and an increased severity of injury. Working off the back of a pick up or sport utility vehicle is a common low height situation encountered in the field. When ascending and descending a truck bed, dock or other raised structure implement best work practices like two-person teams and safe, deliberate movements.

The best fall protection control is to eliminate the hazard through the use of engineering controls or modification of the scope of work. However, at times hazards are identified during the course of project work or develop as a result of changing site conditions. If dangerous or unexpected work conditions are identified, site work should be stopped immediately and the SSHO informed and the appropriate controls shall be implemented before work begins again.

In general, due to the tasks included in the scope of work, the hazards associated with working at heights can be anticipated in advance and depending on the objectives of the work, cannot be avoided.

Hazard controls shall be documented in the site-specific HASP. At a minimum, the HASP shall include the hazards and risks associated with working at heights and control methods and will detail the required steps for protecting employees from fall hazards. Fall protection includes but is not limited to personal fall arrest systems consisting of a full body harness, a lifeline, and an attachment point. HS department notification and additional training is required for job tasks that involve fall protection equipment (i.e., body harness and lifeline, etc.).

Charter will provide training to ensure that the purpose, function, and proper use of fall protection is understood by employees and that the knowledge and skills required for the safe application, and usage is acquired by employees. Training will be conducted prior to job assignment and will include, as a minimum the types of fall protection equipment appropriate for use; recognition of applicable fall hazards associated with the work location and the work to be completed; and load determination and balancing requirements. All other employees whose work operations are or may be in an area where fall protection devices may be utilized, will be instructed to an awareness level concerning hazards associated with fall protection operations.

11.10. VEHICLE USE

Work areas and site conditions must be considered when designating and selecting a vehicle for use (i.e., rental or company-owned). The vehicle shall be maintained in safe working order as required by the manufacturer. This would include a routine preventive maintenance schedule for servicing and checking of safety-related equipment. Special consideration should be taken when weather conditions reduce the safety and visibility while driving. Appropriate measures should be taken while driving during inclement weather including snow, icy and/or wet conditions; high winds; hail, heavy rains; debris or other impairments to safe driving caused by natural weather.

Special-use vehicles (e.g., All-Terrain Vehicles (ATV), snowmobiles, etc.) are vehicles with a light engine or electric motor, other than construction equipment, and are not intended and/or allowed for highway use. These vehicles may not have seat belts and **do not** meet substantial roll over protection standards (ROPS).

When operating vehicles, the following general practices will be followed:

- All vehicles will be operated in accordance with the manufacturer's requirementsand specifications.
- Drivers should use prudent judgment and proceed cautiously when driving on non-paved roads. If using a rental car, ensure that the rental agreement allows driving on non-paved roads.
- Drivers will adhere to all site, local and state traffic laws including, but not limited to use of a hands-free device when speaking on a mobile phone. TEXTING WHILE DRIVING ANY VEHICLE IS STRICTLY PROHIBITED.
- Operators of special-use vehicles shall be trained by a competent person–senior Charter personnel or otherwise. At a minimum, the training will be hands-on and the operator shall demonstrate basic

skills prior to the conclusion of the training exercise. All individuals are required meet all training aspects before vehicle operation. This training shall be documented with the SSHO prior to the start of work.

- Vehicles shall remain on flat surfaces at all times and shall not be operated on slopes steeper than a 30 percent grade;
- Daily inspections of vehicles for safety and maintenance will be required (i.e., fluid leaks/levels, tire pressure, tire surfaces, lights, fuel levels, brakes, etc.).
- Speed limits shall be maintained relative to legal requirements, safe operating speeds for the vehicle and in compliance with any facility-specific directives.
- Make sure the engine is turned OFF before dismounting the vehicle.
- Avoid driving over any extreme obstacles (i.e. wood/logs, fences, boulders, etc.).
- Operation is limited to the daylight hours, if possible.
- Do not carry passengers.
- Slow down before coming to a stop.
- Shut engine down prior to refueling.
- Each driver will have a valid driver's license.

11.11. MISCELLANEOUS HAZARDS

Actions to be taken to minimize the potential for hazards associated with on-site activities not previously addressed (e.g., operation of power tools, vehicular traffic control, etc.) include:

- Only trained personnel are to use power tools. Operation of power tools will be as specified by the manufacturer. American National Standards Institute (ANSI) rated safety glasses and protective guards will be employed. Ground fault circuit interrupters will be used on electrical connections.
- DOT approved containers will be used to store fuels. Fuel Storage Tanks will be appropriately grounded.
- Shutdown of engines will be performed prior to any fueling/refueling or servicing activities. Power cords will be disconnected when not in use.
- A fire extinguisher will be on hand in each work area and rated ABC for minor fire suppression applications.
- Open flames are not allowed in the work area.
- Equipment will be inspected and removed from service and locked out and tagged out if not in good working condition.
- The SSHO will brief employees of potential traffic hazards before starting activities involving exposure to traffic.
- Personnel are to wear fluorescent orange safety vests with orange, white or yellow reflector materials (ANSI Class 2).

- No smoking, eating, or drinking will be allowed in the Exclusion and Contamination Reduction Zones. Employees will be allowed to eat, drink, and rest only in designated areas.
- Construction barricades, warning signs, traffic cones and other devices are used appropriately to minimize potential exposures to vehicular traffic.

12. ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SSHO will determine if work can continue without endangering the health and safety of field workers. Some items to be considered before determining if work should continue are:

- Intensity of adverse weather conditions
- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries
- Treacherous weather-related working conditions
- Slip and fall conditions from water, ice and precipitation
- Limited visibility
- Potential for electrical storms
- Water reactivity of chemicals
- Offsite migration potential and worsening of Site conditions / incident
- Electrical Services in standing water

12.1. HEAT EXPOSURE

Heat exposure is a function of activity, temperature, humidity, solar intensity, work heat (welding, cutting), and PPE (Tyvek). The body will react to heat by attempting to shed excess heat. Signs and symptoms of heat exposure include:

- Muscle cramping
- Dizziness and disorientation
- Nausea and vomiting
- Altered levels of consciousness
- Headache
- Loss of consciousness
- Cold clammy skin (dangerous sign of excessive sweating)
- Hot dry skin (extremely dangerous sign of dehydration)

12.1.1. Heat Stress

Heat stress is localized reactions of muscles, typically in the legs and abdomen, to heat. It is caused by activity and operations in heat without appropriate rest breaks or rehydration. It is easily preventable with appropriate breaks and fluids.

12.1.2. Heat Exhaustion

The body attempts to cool itself with sweating. As it reaches the breaking point, a condition known as heat exhaustion develops. Heat exhaustion can rapidly develop into heat stroke. Treatment of heat exhaustion includes:

- Stop work.
- Decontaminate as appropriate.
- Allow to rest.
- Re-hydrate victim with water only.
- Remove heavy clothing, PPE, or wet clothes.
- Allow victim to cool off, provide dry and wet towels to maintain body temperature.
- If victim condition does not improve in 15 minutes, arrange transport to emergency medical facility.

12.1.3. Heat Stroke

Heat stroke is a life threatening medical condition due to the body's inability to shed excess heat. The exposure to excessive heat causes the body to dehydrate itself due to the continued attempt of sweating. The skin becomes hot and dry and the body starts to go into shock, as there is not enough fluid to function effectively. Heat stroke can lead to cardiac problems, respiratory problems, liver and kidney problems and rapidly lead to death. Heat stroke must be treated by an emergency medical facility. Treatment of heat stroke includes:

- Stop work
- Decontaminate as appropriate
- Remove heavy clothing, PPE, or wet clothes
- Allow victim to cool off, provide wet towels to reduce body temperature
- Contact 911 for treatment to emergency medical facility

12.1.4. Prevention of Heat Exposure

Prevention of heat exposure is easy and effective. The SSHO visually monitors personnel for signs of heat stress as well as monitors the current Heat Index during project operations Monitoring will begin by the SSHO when the air temperature reaches 70^{o}F or when the heat index is greater than 75^{o}F.

The SSHO will consult the PM and Project Superintendent to determine daily tasks, PPE requirements and the required level of effort by personnel (light, moderate and heavy) when temperatures are forecast to exceed 70^0 F. In addition, field personnel will be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress:

- Workers become gradually acclimatized when exposed to hot conditions. Workers exposure to hot conditions must be done gradually over approximately 5 - days for newer workers to become acclimatized. Workers who have not worked in hot environmental temperatures for two weeks must be allowed to acclimatize upon their return.
- Provision of adequate liquids to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. As a guide, 1-2 cups (8oz) of water every 20 minutes should be consumed.
- Replacement fluids should consist of water and smaller quantities of a commercial electrolyte mixes such as Gatorade. Avoid caffeinated and or sweetened drinks. Water should have a palatable (pleasant and odor-free) taste and have a temperature between 50^o F and 60^o F, if possible.
- Employees exposed to solar radiation with potential for sunburn, should be encouraged to use sun screen with a sun protection factor (SPF) of 30 or greater, and should wear hats, long sleeve shirts, sunglasses and other protective attire.
- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
- Personnel breaks are to be taken in a cool and shaded-rest area (77^o F is best).
- Employees are to remove impermeable protective garments during rest periods.
- Employees are not to be assigned other tasks during rest periods.
- Employees are briefed on the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

12.1.5. Heat Stress Monitoring

- Every worker who works in extraordinary conditions that increase the risk of heat stress should be personally monitored. The conditions include wearing semipermeable or impermeable clothing when the temperature exceeds 70oF or when the heat index is greater than 75oF.
- Personal monitoring will be performed by a person with a current first aid certification (SSHO) and who is trained to recognize symptoms of heat stress.
- Personal monitoring can be done by checking the heart rate, recovery heart rate, and oral temperature.

- To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute (bpm), shorten the next work period by one third and maintain the same rest period.
- The recovery heart rate can be checked by comparing the pulse rate taken at 30 seconds with the pulse taken at 2.5 minutes after the rest break starts. A pulse rate below 90 bpm indicates a satisfactory recovery. A pulse rate at 2.5 minutes at or above 90 bpm, but lowered by a difference of 10 or more bpm from the 30 second reading indicates a recovery with continued monitoring. A pulse rate at 2.5 minutes at or above 90 bpm, but lowered by a difference of less than 10 bpm from the 30 second reading indicates no recovery and is sign of heat stress.
- Check temperature with a clinical thermometer at the start of the rest period. If the oral temperature exceeds 99.6^{o}F, shorten the next work cycle by one third. A worker with a temperature exceeding 100.6^{o}F will not be permitted to wear impervious clothing (Tyvek)
- When strenuous work is to be performed in impervious clothing with the Heat Index Chart reading at or above 90^{0}F (see Chart below), work cycles will be reduced to 1 hour, followed by a 15 minute rest period cycle. Strenuous work will be defined as the following: Intense arm and trunk work, carrying loads, shoveling, pushing or pulling heavy loads, lifting 10 lbs. 14 times per minute or 25 lbs. 10 times per minute. When performing work in direct sunlight 15 degrees should be added to the Heat Index reading.

12.2. COLD EXPOSURE

Persons working outdoors in temperatures at or below freezing may be subject to injury from cold exposure. Extreme cold for a short time may cause severe injury to the surface of the body (frostbite), or result in profound generalized cooling of the body core (hypothermia), resulting in coma and death. Areas of the body, which have high surface area-to-volume ratio such as fingers, toes, ears, are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10^{o}F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18^{o}F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

12.2.1. Frostbite

Frostbite is a localized injury resulting from cold. It occurs when skin tissue becomes cold enough and freezes. Frostbite of the extremities can range from minor to severe and characterized by:

- Skin has a waxy or white appearance
- Skin is cold and pale

- Tingling or numb
- Prevention of frostbite is vital. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for symptoms of frostbite at each break. The onset is painless and gradual--you may never know you have been injured until it is too late.

Treatment of frostbite includes:

- Bring the victim indoors.
- Remove any wet clothes and replace with dry/warm blankets.
- If fully conscious, allow the patient to drink warm fluids. Avoid alcoholic, carbonated or caffeinated drinks.
- Submerge the affected body part in warm water (102 F to 105 F). Keep affected part submerged for 30 minutes. Do not use heat lamps or hot water bottles to rewarm the part.
- Do not break blisters.
- Cover affected areas with sterile, soft, dry material.
- Do not rub the frostbitten part.
- Do not apply ice, snow, gasoline, or anything cold on frostbite.
- Do not place the victim part near a hot stove.
- Keep victim warm and get immediate medical care. After thawing, the victim should try to move the injured areas a little, but no more than can be done alone (without medical help).
- If the victim has more than one body part affected, or presents with large surface are affected, then the victim should be transported to a hospital for medical evaluation.

12.2.2. Hypothermia

Hypothermia is caused by exposure to temperatures less than 80oF. It is caused when the body cannot adjust for decreased environmental temperature. It does not have to be below freezing to cause hypothermia. Symptoms of hypothermia include:

- Shivering.
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 F.
- Decreased mental status including unconsciousness.
- Glassy stare.
- Decreased pulse, and respiratory rate.
- Freezing of the extremities.

Hypothermia is life threatening and should be treated immediately. Treatment should include:

- Remove patient from exposure.
- Removal of wet clothes and application of warm/dry blankets.

- Continuous monitoring of patient. Do not leave him/her alone.
- If fully conscious, allow the patient to drink warm fluids. Avoid alcoholic, carbonated or caffeinated drinks.
- If patient is or becomes unconscious, or does not respond to treatment, then immediate transport to medical facility is required.

12.2.3. Prevention of Cold Exposure and Injury

Preventative measures can save a lot of time and money and personnel in the long run. Preventative measures include:

- Clothing and PPE that is appropriate to the environment and task being performed
- Personnel should keep a change of clothes on-site
- Modifying work activities to account for wind chill and cold
- Appropriate breaks and fluids to maintain body temperature
- Workers exposed to temperatures below -10 F with wind speeds of more than 5 miles per hour should be medically certified by the Physician as suitable for such exposure. The ultimate responsibility for delaying or curtailing work at the Site due to inclement weather rests with the SSHO.

13. BLOODBORNE PATHOGENS

Exposure to Blood borne pathogens presents a very real risk to any workers dealing with machinery, construction, or other areas with potential injury. Used hypodermic needles could potentially be found at this Site, and if found, personnel are to contact the SSHO. Handling of soils without gloves will not be permitted. With any injury resulting in cuts, lacerations, and bleeding, there is a potential exposure to Blood borne pathogens, including hepatitis B, and human immunodeficiency virus (HIV).

The OSHA standard (29 CFR 1910.1030) applies to employees that have potential exposure to blood or potentially infectious materials. While the standard is defined for maritime applications rather than construction applications, construction workers (and similar) are covered under the General duty clause (section 5(a) (1)). OSHA defines blood as human blood, human blood components, or products made from human blood. OHSA defines other potentially infectious materials as saliva, semen, vaginal secretions, cerebrospinal fluid, synovial, plural, pericardial, peritoneal, and amniotic fluids

Employees that are trained and designated to render first aid or medical assistance as part of their job duties are required to be made aware of the hazards associated with blood borne pathogens and must be given the opportunity to receive appropriate vaccinations (consult with professional medical personnel in regards to appropriate vaccinations). Clean – up kits are available on-site at the same location of First Aid Supplies.

13.1. EXPOSURE CONTROL PLAN

Universal precautions (also known as body substance isolation precautions), including medical rated disposal gloves must be worn in first aid and medical treatment. These precautions will include face shields and splash protection as necessary.

Reporting procedures for medical incidents and Blood borne pathogen exposures includes names and first aid providers, a description of the incident, including date and time, and if an exposure incident occurred. These reports must be filed with SSHO prior to end of shift.

If there is an exposure to blood borne pathogens, the SSHO and Engineer are notified and the exposed worker will wash exposed body parts with warm soapy water and seek immediate medical attention.

13.2. DECONTAMINATION AND DISPOSAL

Equipment that may become contaminated during the work is to be decontaminated prior to servicing and/or shipping off-site. Washing and scrubbing contaminated equipment with a 10% bleach solution can achieve decontamination of blood borne pathogens. Gloves, face shield, and appropriate splash protection is to be used to decontaminate equipment.

Materials that have been contaminated with blood or body fluids that cannot be appropriately decontaminated is bagged in a plastic biohazard container (29 CFR 192.25). These biohazard materials must be disposed of at an appropriate facility. Contaminated materials that must be bagged and disposed consist of any materials that contain liquid or semi-liquid blood, or caked blood. Contaminated material should be bagged and given to Ambulance or medical personnel for appropriate disposal.

Needles or “sharps,” including items used for IV access, phlebotomy, or injections will not be used at the jobsite. Sharps containers will not be provided. Any personnel requiring the use of sharps, i.e. diabetics requiring frequent, self-administered injections, will provide appropriate containers and dispose of personal waste.

Clothing can be cleaned at an appropriate dry cleaner. The dry cleaner organization is to be notified of the contaminated material and be advised to the potential hazards. Contaminated laundry is to be bagged or containerized as to eliminate potential of soak-through or leakage of fluids. Employees should not be permitted to take contaminated clothing home and launder it.

14. NATURAL HAZARDS

14.1. BEES / HORNETS / WASPS

Bees, hornets, and wasps can present a hazard. They can become a distraction or nuisance, or may present a greater hazard due to stings.

Some personnel may be highly allergic to the venom present in stings. This is a serious condition and can result in death. These personnel typically carry special devices known as an “epi-pen,” to counteract the body’s response to the venom. The SSHO will maintain a record of any individuals on Site with a known insect allergy. If a person is stung and requires administration of an “epi-pen,” then the SSHO should assist the patient with the use of the device. These pens are a temporary measure and require further evaluation at a medical facility. Contact an ambulance for emergency transport of the individual to the hospital. Do not transport patient by car. The use of epi-pens by anyone other than the individual it is prescribed to is restricted by law.

Remove any implanted stingers by scraping the area with a credit card. Do not pinch the stinger with finders or tweezers; this will force the stinger to inject more venom, increasing the pain.

If any nests of bees, hornets, or wasps are discovered, notify the SSHO. The SSHO then takes appropriate steps to reduce or eliminate the hazard.

14.2. POISON IVY / POISON OAK / POISON SUMAC

If someone should come in contact with poison ivy, poison sumac, or poison oak, the individual should immediately wash the affected area with Ivy Cleaner provided in the first aid kit. If a rash develops, it should be treated at a medical facility as soon as possible. Some individuals are highly allergic to poison ivy, poison sumac, or poison oak. If exposed, seek immediate medical attention.

14.3. ANIMALS - RATS / RODENTS / RACCOONS

Care should be taken with respect to rodents. If rodents should be noticed then the Engineer and SSHO should be notified so the appropriate pest control personnel can be contacted.

There are a wide variety of bacteria, viruses, and diseases associated with rodents and similar animals. While there is the potential for bites and attacks, it is rare, due to the activity level on a jobsite. Most animals will steer clear of human activity and only approach the site at night.

Any incident regarding bites and animal attacks need to be reported to local authorities (Police). Have patient transported by ambulance to Emergency medical facility for evaluation of the bite/attack. The SSHO will initiate a stop work order pending the investigation by Police or Animal Control.

14.4. AVIANS - PIGEONS / SEAGULLS

Birds can present a nuisance at a jobsite, in term of noise, excrement, and activity around eating areas. Bird excrement is considered a hazardous substance. There are a wide variety of fungal and viral organisms that reside in bird droppings. These organisms can be spread by direct contact or inhalation. It is important to note that nesting at air intake ports, such as ventilation shafts, have been known to spread fungal spores into buildings, where they are easily inhaled.

Histoplasma capsulatum is a fungus that is found in pigeon excrement. This fungus can cultivate in piles of droppings and emit spores. These spores can be inhaled and cause the respiratory infection "histoplasmosis." Histoplasmosis exhibits symptoms similar to the flu, and can persist for several weeks. Any suspected exposure or flu-like symptoms should be evaluated by a Doctor.

Other concerns regarding birds are associated fleas, ticks, and other parasites. These various insects can be spread when birds clean themselves in water sources, where they can attach to personnel walking by.

Care should also be exercised when pigeon or sea gull droppings are encountered. Appropriate PPE, including gloves and facemasks, should be used when dealing with these types of material in order to avoid direct contact or inhalation. It is important to report any bird colonies or infestations to supervisor or SSHO. Bird infestations should be handled by a pest control professional with experience in bird control.

14.5. TICKS – DEER / DOG

Ticks are extremely prevalent in the warmer months at the project site. Particular care should be taken to protect personnel. Deer tick nymphs and adults may carry germs that cause Lyme Disease, babesiosis or human granulocytic anaplasmosis (ehrlichiosis). American dog ticks can carry germs that cause Rocky Mountain spotted fever and tularemia.

Ticks are generally found in wooded or grassy habitats, near the ground. Deer Ticks may be active year-round, but spring, summer and fall are seasons of high risk. Dog ticks are most active in spring and summer.

Personnel should use appropriate insect repellants as well as wear light colored clothing. Personnel should perform regular tick checks.

If ticks are found and are attached to the skin they should be removed at once using a tick removal kit. Wash hands thoroughly after handling a tick. The SSHO should be notified.

15. RECORDKEEPING

The following records and reports will be established and retained by the contractor.

- Visitors log
- Accident/Incident/Exposure Reports
- Pre-Task Plan / Safe Work Permit
- Daily Project Progress Report
- Air Monitoring Records
- Employee Training Certificates
- Health and Safety Audit Reports
- Instrumentation Calibration Logs
- Safety Data Sheets
- Equipment Inspection Reports
- Logs and reports are provided to the Engineer by the Contractor on a daily basis.

16. PLAN ACKNOWLEDGEMENT

By their signature, the following undersigned certify that this Plan has been read, or otherwise communicated to them. They further certify that they completely understand this plan and will follow its procedures for the protection of the health and safety of persons entering upon this Site.

Name	Company	Date

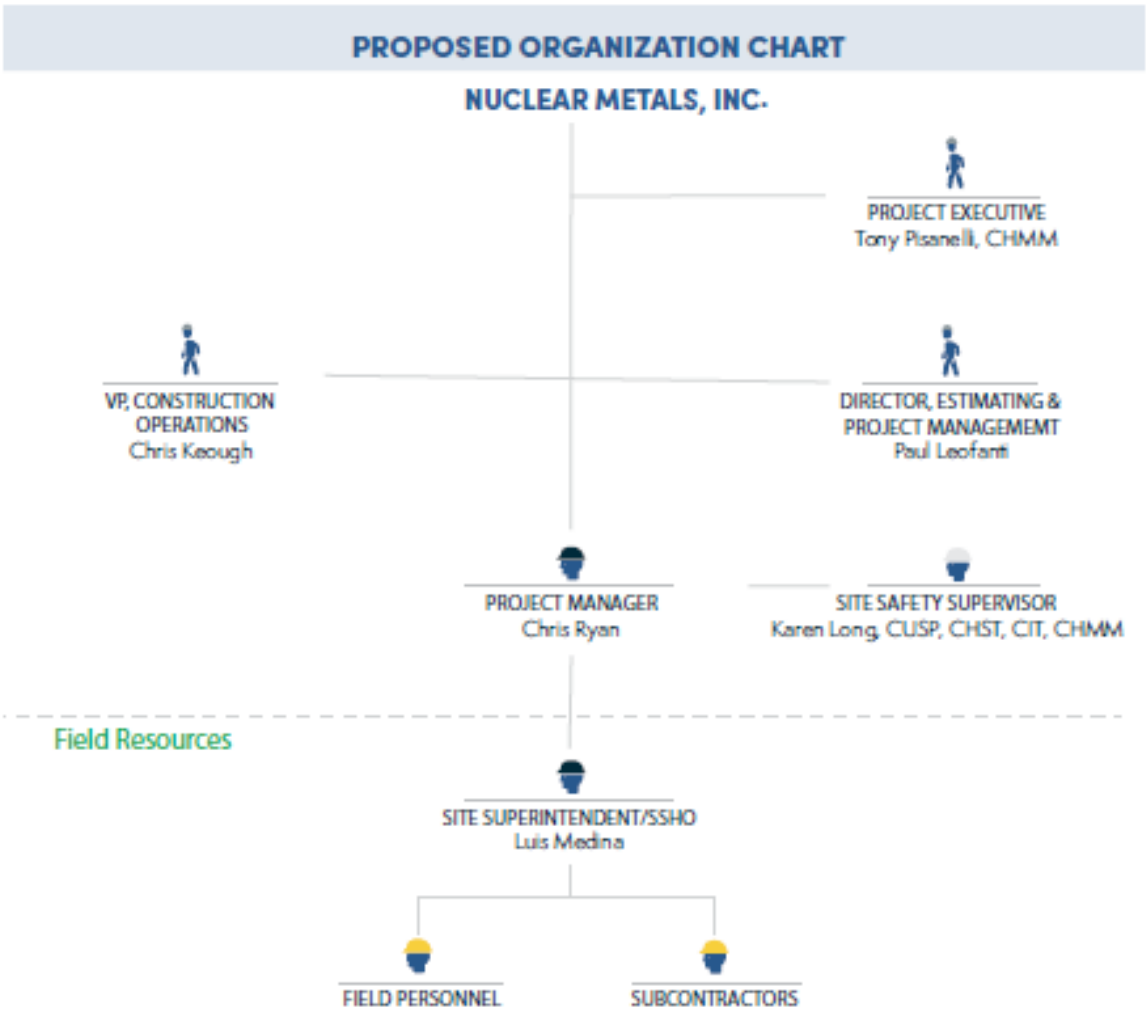
APPENDIX A

Health & Safety Organization Chart

and

Personnel Resumes

Project Safety Organization Chart



ANTHONY PISANELLI, CHMM

SENIOR VICE PRESIDENT

Tony has 39 years of experience in leading the successful completion of complex remediation, civil, and marine construction projects. He has extensive experience in the excavation, dewatering, and management of MGP impacted soils and sediments. As Charter's Vice President, Tony provides senior-level program management and is accountable for overall project performance and client satisfaction while serving as the lead point of contact in resolving project or contract issues. Tony possesses intimate knowledge of the estimation, planning, and execution of remedial, marine, and upland civil construction projects.

EDUCATION

- MS, Environmental Engineering & Hydrology, University of Vermont
- BS, Environmental Science/ Environmental Engineering, Clark University/ Worcester Polytechnic Institute

ACADEMIC/ PROFESSIONAL REGISTRATIONS & TRAINING

- Certified Hazardous Materials Manager (CHMM - #12620)
- OSHA 40 Hr HAZWOPER Training and 8 Hr Refresher
- USACE Construction Quality Management for Contractors Training
- University of Pennsylvania - Wharton School of Management, Business Foundations Executive Program

SELECTED PROJECT EXPERIENCE

- Muddy River Flood Risk Mitigation & Restoration, USACE New England District, Boston, MA
- Blackburn & Union Privileges Superfund Site, Lewis Pond Asbestos Sediment Removal, WR Grace & Covidien LP, Woodard & Curran, Inc., Walpole, MA
- Iron Horse Park OU3 - AOC 3A & 3B Wetland Remediation and Capping, Pan Am Railways, North Billerica, MA
- SRSNE Superfund Site Remediation & Landfill Closure, SRSNE Site Group, de maximis, Inc., Southington, CT
- Phase 2 Decommissioning, Mount Tom Power Plant Remediation, Holyoke, MA
- Sutton Brook Disposal Area Superfund Site Remediation, EMI, Tewskbury, MA
- National Grid Tidewater Remediation, Phases 1-3, Pawtucket, RI
- Phase III Baseliner Expansion, Four Hills Landfill, Nashua, NH
- Areas B&G Remedy at Erie Street Former MGP Site, Elizabeth, NJ
- Former Pratt Oil Works Acidic Soils IRM, Waste Management, Queens, NY
- Beverly MGP Remedy Implementation & Facilities Consolidation, National Grid, MA
- Former Camden Gas Plant Parcels 1B & 4 MGP Soil Remediation, Confidential, Camden, NJ
- Former Camden Coke Plant Sediment Remediation, Confidential Client, Camden, NJ
- Encore Boston Harbor Phase 1 ISS and Soil Remediation, Wynn Design, Everett, MA
- Squamscott River MGP Soil & Sediment Remediation, Unitil, Exeter, NH
- Allens Avenue Former MGP Site Remediation, National Grid, Providence, RI
- L&D Landfill Power Plant Demolition and Soil Excavation, Waste Management, Mount Holly, NJ
- Kin-Buc Soil Excavation and Line Conveyance, Waste Management, Edison, NJ
- Soil Remediation, HATCO Chemical, Fords, NJ
- Tank Removals and Fuel-Impacted Soil Remediation, GSE, Summit, NJ
- Boat Slip MGP Coal Tar Dredging & Capping Remediation, Eversource
- Berry Bay Dam at Ossipee Lake Replacement, Dam No. 088014, NHDES, Effingham & Freedom, NH

CHRIS KEOUGH

VICE PRESIDENT, CONSTRUCTION

Chris is responsible for the safe, high-quality performance of Charter's Field Operations overseeing personnel and equipment resources. He ensures that all personnel have the proper training, equipment and tools to perform their jobs with a high level of proficiency, and fosters a success-oriented, accountable environment within field operations. He has served in every role across a construction company from project engineer to superintendent to project manager to executive operational. Chris has worked on numerous complex, large-scale, high-profile projects, including landfill construction and closure, harbor and wetland dredging, deep excavation, tunnel, bridge, and railroad projects.

EDUCATION

BS, Civil Engineering, Northeastern University, 1992

ACADEMIC/ PROFESSIONAL REGISTRATIONS & TRAINING

OSHA 30 Hr Construction Safety Training

- Confined Space Training
- Competent Person Training

SELECTED PROJECT EXPERIENCE

- Muddy River Flood Risk Mitigation & Restoration, USACE New England District, Boston, MA
- Blackburn & Union Privileges Superfund Site, Lewis Pond Asbestos Sediment Removal, WR Grace & Covidien LP, Woodard & Curran, Inc., Walpole, MA
- Iron Horse Park OU3 - AOC 3A & 3B Wetland Remediation and Capping, Pan Am Railways, North Billerica, MA
- Phase 2 Decommissioning, Mount Tom Power Plant Remediation, Holyoke, MA
- Phase III Baseliner Expansion, Four Hills Landfill, Nashua, NH
- 254 Lynnway Shoreline Stabilization, Economic Development & Industrial Corporation of Lynn, MA
- Mount Tom Waste Fly Ash TurboSorp Solids Handling, Transport & Disposal, Engie, Holyoke, MA
- Beverly Pier Demolition, National Grid, Beverly, MA
- Memorial Pond Dredging, Walpole, MA
- Former Belle Mead Army Depot Remediation, Hillsborough, NJ
- 60 Hartwell Street Abatement and Demolition, Fall River, MA
- Crossroads Landfill Cap and Closure, Norridgewock, ME
- Phase IV MGP Implementation, 40-42 Quinsigamond Road, Worcester, MA
- Carver Site Preparation, Carver, MA
- Former Dunham Bush Remediation, West Hartford, CT
- Landfill 1 Remediation, Orrington, ME
- Lanes Cove Breakwater Rehabilitation, Ipswich Bay, Gloucester, MA
- Lewis Pond Sediment Removal, Walpole, MA
- Middleborough Landfill Phase IIIC - Baseliner Expansion, Middleborough, MA
- Ryan Park Remediation, Norwalk, CT
- St. Albans Soil Removal, St. Albans, VT
- Southbridge Landfill Slope Closures, Southbridge, MA
- Former Black and Decker Storage Area Remediation, East Greenwich, RI
- Wheaton Glass Ada Pond Sediment Remediation, Millville, NJ
- MBTA Greenbush Old Colony Commuter Rail
- Camp Harborview Pier

PAUL LEOFANTI

DIRECTOR - ESTIMATING & PROJECT MANAGEMENT

Paul has 27 years of environmental remediation, site civil , marine construction, and demolition experience, where he has served in the capacity of a Field Engineer, Site Superintendent, Estimator, and Project Manager. In his current role as Director of Estimating and Project Management for Charter, Paul works closely with Engineer/Owner's Representative to ensure their projects are executed and delivered on schedule and within budget. Paul is actively involved in overseeing projects and working directly with our Project Managers on a daily basis to monitor and review safety, productivity, schedule and budget.

EDUCATION

BS, Civil Engineering, Worcester Polytechnic Institute, Worcester, MA

ACADEMIC/ PROFESSIONAL REGISTRATIONS & TRAINING

OSHA 40 Hr HAZWOPER

- OSHA 8 Hr HAZWOPER Refresher
- OSHA 10 Hr Construction Safety
- EBC Dam Management Program

PROFESSIONAL BACKGROUND

- Chief Estimator, Charter, Boston, MA 2018-Present
- Manager - Construction Operations - New England/Senior Project Manager, Charter, Boston, MA, 2015-2018
- Estimator and Project Manager, J.H. Lynch & Sons, Inc., Cumberland, RI, 2002-2015
- Project Manager and Field Engineer, Kiewit Construction Company, Northeast District, 1993-2002

SELECTED PROJECT EXPERIENCE

- Muddy River Flood Risk Mitigation & Restoration, USACE New England District, Boston, MA
- Blackburn & Union Privileges Superfund Site, Lewis Pond Asbestos Sediment Removal, WR Grace & Covidien LP, Woodard & Curran, Inc., Walpole, MA
- Iron Horse Park OU3 - AOC 3A & 3B Wetland Remediation and Capping, Pan Am Railways, North Billerica, MA
- SRSNE Superfund Site Remediation & Landfill Closure, SRSNE Site Group, de maximis, Inc., Southington, CT
- Phase 2 Decommissioning, Mount Tom Power Plant Remediation, Holyoke, MA
- Phase IV Remedy Implementation, 39 Water Street (Powwow River), National Grid, Amesbury MA
- Stiles Reservoir Dam Reconstruction, Stiles Lake Water District, Leicester, MA
- Bartlett Brook North Stormwater Treatment Improvements, Stonehedge & Laurel Hill, South Burlington, VT
- Charles River Dredging, Charles River Reservation, DCR, Boston & Watertown, MA
- Blackwater River Local Flood Protection Project, Salisbury, MA
- Encore Boston Harbor Phase I Remediation, Everett, MA
- Textron Former Gorham Site Sediment Remediation & Capping, Providence, RI
- Rhode Island Resource Recovery Corporation, Superfund Landfill Cap Construction
- Rhode Island Resource Recovery Corporation, Cedar Swamp Brook Relocation
- Rhode Island Resource Recovery Corporation, Pond Dredging
- Rhode Island Resource Recovery Corporation, Landfill Cap Construction
- Rhode Island Department of Environmental Management, Burlingame State Park - Water System Upgrades

CHRIS RYAN

PROJECT MANAGER

Chris has 26 years experience managing construction projects ranging from $3-$80M, including estimating, scheduling, constructability reviews, quality control, and subcontractor management. He handles environmental remediation, civil construction, and building construction projects for government and private sector clients. Chris supervises multidisciplinary personnel and procures subcontractors ranging from electricians and general contractors to specialty engineering. He tracks and monitors cost and schedule, prepares material submittals and plans to include work, safety, sampling, quality control, and contingency/emergency response plans.

EDUCATION

BS, Civil Engineering, Wentworth Institute of Technology

AS, Building Construction, Wentworth Institute of Technology

ACADEMIC/ PROFESSIONAL REGISTRATIONS & TRAINING

OSHA 30 Hr Construction Safety Training

OSHA 40 Hr HAZWOPER Initial & 8 Hr Annual Refresher

OSHA 8 Hr HAZWOPER Supervisor Training

OSHA 10 Hr Construction Safety Training

USACE Construction Quality Management for Contractors Training

First Aid/CPR/AED

SELECTED PROJECT EXPERIENCE

- Iron Horse Park Superfund Site, OU3 AOC 3A & 3B, AOC 1 Wetland Remediation and Capping, North BIllerica, MA ERM Consulting/Pan Am Railways
- Hopedale Landfill Construction, Operation & Closure, CTI, Hopedale, MA
- Wheaton Glass / Ada Pond Sediment Remediation, Rio Tinto, Millville, NJ
- Lanes Cove Breakwater Rehabilitation, Ipswich Bay, Gloucester Public Works Department, Gloucester, MA
- Crossroads Landfill Final Closure, Waste Management of ME, Norridgewock, ME
- Landfill 1 & 2 Remediation & Closure, Plant Area Earth Support, CDM Constructors, Orrington, ME
- Southerly Stream & North Drainage Ditch Remediation, CDM Constructors, Orrington, ME
- Scrap Metal Yard Remediation, CDM Constructors, Orrington, ME
- Areas B&G Remedy at Erie Street Former MGP Site, Elizabeth, NJ
- Salt Marsh Creation - Rivers End, New Bedford, MA
- USACE Former Fort Devens Reservation, Devens, MA
- Phase IV Remedy Implementation, American Fiber & Finishing, Colrain, MA
- West PCB Area Remediation, North Grafton & Millbury, MA
- Glenview Landfill, Capping and Closure, Chelmsford, MA

FEATURED PROJECT EXPERIENCE

IRON HORSE PARK SUPERFUND SITE, OU3 AOC 3A & 3B, WETLAND REMEDIATION AND CAPPING, NORTH BILLERICA, MA ERM CONSULTING/PAN AM RAILWAYS

Chris served as the Project Manager for the OU3 AOC 3 wetland remediation and capping executed last year at the Iron Horse Park Superfund Site. Charter supplied and installed 350 lf of steel sheet piling along perimeter of consolidation area as well as furnished and installed 156,560 sqft/ 3.6-acres of 60-mil LLDPE geomembrane and 340-mil geocomposite.

LUIS MEDINA

SITE SUPERINTENDENT

Luis has more than 14 years of relevant experience directing and supervising environmental remediation and heavy civil construction projects that present difficult logistical challenges. Luis has a thorough understanding of construction operations including supervising and coordinating environmental and site civil construction. He has direct responsibility for coordinating and safely managing site work crews and subcontractors in order to maintain schedule and budget requirements; coordinating field activities with project owners, engineers and architects; preparing and maintaining daily job reports, employee time records and subcontractor reports; site layout and field control; traffic management; site safety; and quality control.

PROFESSIONAL CERTIFICATIONS & TRAINING

OSHA 30 Hr Construction Safety Training

OSHA 40 Hr HAZWOPER Initial Training & 8 Hr Annual Refresher

First Aid/CPR/AED

Confined Space Entrant/Attendant Training

40 Hr Asbestos Contractor/Supervisor Training

Asbestos Supervisor's License

MA Hoisting License

OSHA Crane Signalman Training

Fundamentals of Rigging

SELECTED PROJECT EXPERIENCE

- Lynn Landfill Cap Repair Project Lynn Landfill Company, Lynn, MA
- Parcel 55/56 Lynn MGP Hanson Street ISS Remediation, Lynn, MA
- Lynn Gear Works & Lynn 21 4kV Gateways, National Grid, Lynn, MA
- Lynn 21 Demolition, National Grid, Lynn, MA
- Lawrence Transload Facility, Lawrence, MA
- Wheaton Glass/Ada Pond Remediation, Rio Tinto, Millville, NJ
- Areas B&G Remedy at Erie Street Former MGP Site, Elizabeth, NJ
- Former Belle Mead Army Depot Site Remediation, GSA, Hillsborough, NJ
- Glenview Landfill, Capping and Closure, Chelmsford, MA
- SRSNE Superfund Site Remediation & Landfill Closure, SRSNE Site Group, de maximis, Inc., Southington, CT
- Newport Naval Station Building 86 Demolition, Newport, RI
- Perkins Place Brownfields Redevelopment, Lowell, MA
- Noranda Forge Fin Site, Newtown, CT
- Fort Devens Demolition, Devens, MA

FEATURED PROJECT EXPERIENCE

FORMER BELLE MEAD ARMY DEPOT REMEDIATION, HILLSBOROUGH, NJ

Luis served as the project Superintendent for the remediation of the Former Belle Mead Army Depot Remediation in Hillsborough, NJ. The scope of work included consolidating and capping PAH and metal-impacted soil within an 18-acre low permeability cap. The 235-acre site is divided into 25 excavation zones where the team is excavating the top 1-2 feet of topsoil in 30'x30' grids. Luis displayed excellent leadership and communication skills when faced with the challenge of simultaneously managing several crews dispersed throughout the 235 acre site.

KAREN LONG, CUSP, CHST, CIT, CHMM

SITE SAFETY SUPERVISOR

Karen has 29 years of experience as an Occupational Health and Safety professional. Karen specializes in evaluating safety hazards and chemical hazards in both industrial and non-industrial work places and outdoor environments. As a Senior Safety and Health Officer for Charter she reports to our Health and Safety Director and oversees construction field activities. She achieves her primary objective, which is to facilitate injury and illness free work environments, through keen observation and supervision of job site activities, and promotion of a zero accident philosophy.

EDUCATION

BA, Political Science, University of New Hampshire

AS, Engineering, University of New Hampshire

AA, Animal Science, University of New Hampshire

Certificate Program, Hazardous Materials Management, Tufts University

Major, (Retired), US Army

PROFESSIONAL BACKGROUND

Senior Safety and Health Officer, Charter, 2017 - Present

Senior EH&S Consultant, RPF Environmental, 2010 - 2017

Owner, Amethyst Environmental, 1992-2010

Transportation Corp, US Army, 1978 - 1995

LICENSES/CERTIFICATIONS

- Certified Utility Safety Professional (CUSP)
- Certified Instructional Trainer (CIT-97669) with OSHA endorsement, Board of Certified Safety Professionals
- Certified Construction Health & Safety Technician (CHST-13358), Board of Certified Safety Professionals
- Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management
- Certified Environmental Inspector, Environmental Assessment Association, 12180
- Construction Industry Technician, NEF, 2009-12008
- OSHA 10 & 30 Hr Construction Safety Training
- OSHA 8 Hr Supervisor Training
- OSHA 40 Hr HAZWOPER Initial & 8 Hr Refresher Training
- OSHA 2055 Cranes in Construction Training
- OSHA 5400 Trainer in Occupational Safety and Health Standards for the Maritime Industry
- OSHA 5410 Maritime Industry Safety Training
- Certified, 40 Hr Health & Safety & 8 Hr Refresher, 29 CFR 1910.120, AOHS, IEE & RPF
- NIOSH 582- Asbestos Analysis-AOHS
- 40 Hr EM 385-1-1 Safety Training
- Supervisory Training for Hazardous Waste Health & Safety Professionals, USEPA
- Certified Level II Firefighter, State of NH, Department of Safety
- Environmental Field Sampling, USEPA, IEE
- Chemical Protective Equipment, USFA, Maryland
- Asbestos Worker, AOHS
- Asbestos Contractor-Supervisor, AOHS
- AHERA Asbestos Inspector, AOHS
- NFPA Hot Work Safety Training
- USACE Construction Quality Management for Contractors
- Member, Occupational Safety & Health Educational Committee, National Safety and Health Council
- National Association of Women in Construction (NAWIC)-Past President
- NAWIC Education Foundation, Past President
- Member - Environmental Assessment Association
- Member - National Association of Sewer Service Contractors

APPENDIX B

Emergency Response Plan

Emergency Route Map

Emergency Contacts

Plan Title: **Appendix B - Emergency Response Plan**

Project Title: Courtyard & Building E - Enabling Phase 1 Remedial Activities
Nuclear Metals, Inc.
Concord, Massachusetts

Prepared For: Todd Majer
De maximis, Inc
135 Beaver Street
Fourth Floor
Waltham, Massachusetts 02452

Prepared By: Charter Contracting Company, LLC
500 Harrison Avenue, Suite 4R
Boston, MA 02118-2439
T: 857-246-6800

Contract No.:

Charter No.: 2-1822

Date: February 8, 2024

Revision No.: 00

April 3, 2024

Chris Ryan, Sr. Project Manager
T: 978-420-5106 |E: cryan@charter.us

Date

April 3, 2024

Karen Long, CHST, CUSP, CIT, Senior Health & Safety Officer
T: 857-260-0491 | E: klong@charter.us

Date

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TABLE OF CONTENTS

1. SITE DESCRIPTION AND EVALUATION

1.1. INTRODUCTION

The purpose of this site-specific Emergency Response Plan (ERP) is to establish in detail the procedures and protocols necessary for protecting workers and the public from the potential hazards associated with activities to be performed at the Nuclear Metals Superfund Site 2229 Main Street, Concord, MA.. The property is herein referred to as the ("Site"/"Facility").

In general, to the project scope is to:

- Mobilization
  - Implement Site Health & Safety Plan; Complete personnel radiological training;
  - Construct material handling and laydown area, and decontamination area;
  - Furnish & install temporary facilities, storage, utilities, dust & odor controls, stormwater controls, monitoring well protection, temporary access roadways;
  - Establish Survey Controls & Layout;
- Courtyard
  - Remove existing stormwater diversion channel & backfill channel;
  - Soil excavation & transport to stockpile area for off-site disposal;
  - Backfill & compact excavated areas, common fill;
  - Demolish existing concrete slab, former Butler Building 3;
  - Demolish concrete electric pedestals;
  - Transport to Waste Processing Area and stage for off-site disposal;
  - Restore disturbed areas, topsoil & seeding;
  - Install stormwater drainage channel;
  - Install temporary access road;
  - Abatement of asbestos pipe (if found in excavation);
  - Loadout waste materials for transport to disposal facilities.
- Building E
  - Demolition of Building E Slab;
  - Soil excavation & transport to stockpile area for off-site disposal;
  - Backfill and compact excavated areas, common fill;
  - Loadout waste materials for transport to disposal facilities;
  - Install catch basin in driveway.
- Demobilization
  - Decontaminate equipment;
  - Remove temporary facilities, storage, utilities, dust & odor controls, monitoring well protection, temporary access roadways and equipment.

Hazards associated with this work may include slip, trip and fall injury, excavation collapse, weather exposures, struck-by moving equipment, exposure to fugitive dust emissions and chemical exposures potentially above the Permissible Exposure Limit (PEL).

The Site activities required for the execution of the contract will be performed and managed by Charter Contracting Company LLC (Charter).

This ERP is intended to address the activities identified above and those required by contract. The ERP is limited to identification and response to unknown or unplanned conditions associated with the construction and remediation related activities proposed for the project.

This ERP does not address issues associated with other site activities, performed by others, that may be occurring concurrently with this contract. The ERP shall be implemented during on-going contract work at the Site.

The ERP will be implemented in the event of an unplanned accident or injury, spill or release of a chemical more than its Reportable Quantity or other environmental incident.

2. ORGANIZATION AND KEY PERSONNEL

2.1. INTRODUCTION

Implementation of the comprehensive safety and health program is a key management responsibility. This Emergency Response Plan includes a listing of health and safety personnel, and a description of their specific responsibilities for implementation of the program. Clear lines of authority, consistent with good operating policies and procedures, have been established for enforcing safety compliance. The qualifications of the site safety and health personnel are included in the appendices.

2.2. SITE SAFETY AND HEALTH OFFICER (SSHO) Luis Medina

The SSHO will be on-site in the event this plan is implemented when oils or hazardous materials are encountered or when Personal Protective Equipment (PPE) above Modified Level D is required based on-site conditions or monitoring. (Refer to Section 9.0 of the Health and Safety Plan (HASP) for a detailed description of PPE requirements). The SSHO identified for this project has experience at sites where hazardous materials were present. Refer to the HASP for the Project Organization Chart and resumes of key Project personnel.

The experience of the SSHO includes work at Level B, C and D sites; specialized training in personal and respiratory protective equipment, program implementation, and use of air monitoring instrumentation and methodology; a working knowledge of Federal and State safety and health regulations; current certification in first aid and cardio-pulmonary resuscitation; and 40-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Regulations (HAZWOPER) training, current refresher certificates, and medical monitoring approval in addition to supervisory training.

The SSHO monitors work locations for employee health and safety purposes, as well as document any employee exposures and/or substance releases that may occur through the course of this project. The SSHO is trained and experienced to be proficient in the proper use and limitations of equipment that he may be utilizing. The SSHO is responsible for operating the air monitoring equipment, assisting in implementing the ERP and performing any other duties assigned to him.

The SSHO is empowered to deny access to the site or restrict the presence of any persons (under his/her control) and has the authority to cease activities on-site if and when conditions present uncontrollable risks to site personnel and off-site receptors. The SSHO shall also be responsible for coordinating, conducting and documenting any required training activities, performing and maintaining recordkeeping duties, and carrying out any other duties specified by site management.

The SSHO is the main contact for any on-site emergencies. Except in an emergency, the SSHO may modify the approved ERP only after consultation and concurrence of the Engineer and Charter.

The SSHO will be familiar with matters pertinent to this project and shall assist in the implementation of the ERP as required. This includes field supervision; maintaining contamination control zones; enforcing safe work practices and decontamination procedures; ensuring proper use of personal protective equipment; and communicating modified safety requirements to site personnel.

2.3. PRECONSTRUCTION SAFETY CONFERENCE

Prior to the start of construction, Charter shall conduct a safety conference to discuss the hazards anticipated on the site, training on hazard recognition, response to emergencies, explanation of site activities, purchasing safety supplies, identifying safety personnel, decontamination procedures, levels of PPE required, air monitoring activities, and other topics deemed relevant to the safety of the site workers.

2.4. SITE CONTROL

Site control zones will be established to contain potential hazards associated with contamination within the smallest area possible. The SSHO will ensure that each employee has the proper PPE for the area or zone in which he or she is to perform work. Only authorized persons are to be permitted access to the Exclusion Zone and Contamination Reduction Zone. Entrance to these areas is restricted by means of regulated personnel flow. The purpose of this ERP is to establish in detail the procedures and protocols necessary for protecting workers and the public from potential hazards encountered during the excavation, sampling, handling, and storage of encountered waste.

This section defines the work zone delineations, site communication, and site access control measures to be employed.

2.4.1. Exclusion Zone

The Exclusion Zone (contamination work zone) is the area or areas where contamination is known to exist. These are the areas where exposure to this contamination could cause risk to health of on-site workers in the absence of PPE defined for that area. For this project, open excavations containing impacted soil will be identified as Exclusion Zone areas. The location of the Exclusion Zone will be amended based on the actual locations of the encountered impacted material, where the material must be managed or in the event other unanticipated contaminated media is encountered.

Special precautions are taken to ensure that pedestrians and non-authorized personnel are not allowed in or near areas where Site operations are occurring. Danger tape, and temporary construction fencing is used to delineate the Exclusion Zone around excavation, sampling, and storage areas. A suitable means of securing the area is to be installed around the boundaries of the excavation (e.g. a 4-ft temporary (high visibility) construction fencing). No eating or smoking is allowed anywhere within the limits of the Exclusion Zone.

The required PPE for use by personnel working in or entering the Exclusion Zone is documented in the HASP. Access to the Exclusion Zone is restricted to on-site and contractor personnel who are wearing the proper PPE and whom have received the required site training and medical clearance. Workers will sign the logbook in the Support Zone prior to entering and when leaving the Exclusion Zone.

2.4.2. Contamination Reduction Zone

The Contamination Reduction Zone is a buffer zone between the Exclusion Zone and the Support Zone, and is located at the interface of the two zones. Personnel, equipment and vehicle decontamination stations such as washing stations are located in this area. The Contamination Reduction Zone serves as an area to decontaminate personnel, equipment, and vehicles prior to entering the Support Zone. If necessary, clothing change facilities for reusable PPE are located in the Contamination Reduction Zone. The Contamination Reduction Zone extends approximately 20-feet beyond the Exclusion Zone on one or more sides as required for site access. Access to the Exclusion Zone is to be through the Contamination Reduction Zone. Separate points are marked for entering and exiting the Contamination Reduction Zone so that employees entering do not have to pass through the decontamination area.

2.4.3. Support Zone (Non-Contaminated)

This is the area outside of the Contamination Reduction Zone, where there is no potential for contact with contaminants. The Support Zone contains the following: work rest area, portable restroom, water service, support operations, radio communications, transportation, and storage facilities. The Support Zone is located outside the limits of the designated exclusion zones, and away from areas designated for contaminated soil handling. Eating and drinking of fluids are permitted only in this area and only after site workers have properly decontaminated themselves.

2.4.4. Access and Egress Patterns

Specific movement patterns of both project personnel and equipment through designated site control zones shall be maintained during routine operations at the project site. The following movement pattern is utilized to assure compliance with this Plan. The movement shall be monitored by the SSHO or other project management personnel.

2.4.5. Access Procedure

- Site personnel are to log-in at the project trailer prior to proceeding on-site.
- Access to the Exclusion Zone and Contamination Reduction Zone is limited to properly trained on-site contractor and subcontractor personnel and Engineer representatives. Visitors are restricted to the Support Zone, unless approved by the Project Manager and the SSHO. These personnel shall have proper protective equipment and have proof of training.
- Personnel proceed to the Exclusion Zone through designated entrance locations that are clearly marked.

- Access to control zones by routine personnel shall be monitored by the SSHO or other on-site project management personnel.
- Heavy equipment accesses the Exclusion Zone through designated equipment routes.

2.4.6. Exiting Procedure

- Personnel shall exit the Exclusion Zone through the designated Contamination Reduction Zone.
- Prior to proceeding from the Contamination Reduction Zone to the Support Zone, personnel are required to undergo designated decontamination activity.
- Once decontamination is complete, site personnel may proceed to the Support Zone prior to leaving the site. Do not reenter the Exclusion Zone or Contamination Reduction Zone.
- Equipment on-site shall proceed from the Exclusion Zone to the Contamination Reduction Zone and undergo appropriate decontamination prior to proceeding to the Support Zone.
- Adherence to these specific exiting procedures shall be monitored by the SSHO.

2.4.7. Site Communication

It is always critical to maintain two-way communication on-site , to protect the safety of on-site employees, and to expedite the decision-making process, in the event contamination is encountered. A cellular telephone shall be located with the SSHO, in the event emergency services are required. Requests for emergency services will take place through the SSHO.

Verbal communication and hand signals may be used to communicate among workers on the site. Compressed air horns will also be used to play an integral part in the communication process. They will be used to signal evacuation of a work site in the event of an emergency such as a spill, release, uncontrolled fire, or explosion. In addition, visual, voice or radio communications must be maintained while working on-site.

The following signals will be used to indicate an emergency:

- One long blast repeated three times at five second intervals - Man down
- Three short blasts repeated three times at five second intervals - Evacuate site
- Alternating short and long blasts - All clear

In the event of an emergency on-site, the Incident Command System will be implemented. The SSHO shall serve as the Incident Commander and will be replaced on the

arrival of the senior member of the responding Fire Department or Police Department. Also if Charter discovers unknown, unforeseen, sudden or potentially hazardous conditions, or environmental conditions inconsistent with known existing conditions, Charter shall notify the Engineer and Owner immediately.

2.4.8. Signs

The Contractor shall post warning signs designed to provide guidance and direction to on-site personnel and visitors. The signs at the job trailer shall be posted in locations approved by the Engineer, and should be large enough to visibly see from a reasonable distance.

- Visitor Signs - Signs shall be posted directing visitors to the project trailer.
- No Smoking - No smoking signs shall be posted in areas of high visibility immediately adjacent to the Exclusion Zones.

2.4.9. Engineering Controls

There is potential for special engineering controls for dust control on this project. The need for dust suppression will be established using monitoring equipment. Dust suppression in the form of light water sprays, water truck, and dust suppressants will be implemented as required to control dust during construction activities and excavation. The need for odor control will be based on olfactory observation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the SSHO may pose a safety hazard to the workers, or nearby members of the community. Work will only resume after the Engineer and the Contractor have met and determined that a modification or changes to the controls are sufficient to meet the project requirements or work can be phased so that existing controls are more effective.

2.4.10. Dust/Odor Control

Dust Control and Odor Control will be an important issue on this site. The following precautions will be taken to control the release of dust and vapors both on- and off-site:

- Trucks will be covered before leaving the site.

- Trucks will be carefully loaded to prevent spillage of dirt on the ground or on exterior truck bodies.
- Equipment/trucks will pass through the decontamination area before leaving the Exclusion Zone.

Personnel, vehicles and equipment used during the handling of soils and materials shall be decontaminated before leaving the excavation Exclusion Zone using work site procedures contained in the HASP.:

Charter is required to perform adequate control of dust, vapor and noise during Work to achieve the perimeter limits established for the project in accordance with project specifications. This may include the use of vapor suppression activities (i.e., minimize or stop soil disturbance) and/or and dust suppression activities (i.e. water trucks and/or water mist).

2.5. TRAINING AND SITE BRIEFING/EDUCATION

Charter will present a safety briefing, in the form of a Pre-Task Plan and Safe Work form, to inform employees and visitors who will be performing work in or entering the Exclusion Zone or Contamination Reduction Zone during field operations. This briefing will cover the special hazards and procedures to control these hazards. Charter and subcontractor employees, Engineer and visitors shall complete this briefing before working in identified portions of the site. A copy of training records for workers completing this training shall be kept by Charter and provided with the required submittals.

The SSHO shall keep records of training for on-site personnel and site visitors. Copies of the training records for workers associated with the project will be made available upon request. Workers and visitors shall sign a daily log before entering the Contamination Reduction Zone or Exclusion Zone. The locations of the Contamination Reduction Zone and Exclusion Zone areas are identified by locations on the project plans.

The SSHO will also document safety incidents, including injuries, “near-misses” and vehicle accidents occurring during the performance of the work. These reports will include at a minimum a description of the incident, parties and/or equipment involved and the date and time of the incident. In the event of a reportable incident/injury, Charter notify the Construction Manager as soon as possible and no later than within 30 minutes of the incident/ injury.

2.5.1. Training Requirements

Site personnel who will be entering any of the Exclusion Zone or Contamination Reduction Zone areas once the ERP is in effect will be required to provide proof of having

received training which meets the initial 40-hour and current annual 8-hour refresher training for hazardous waste site workers as described in 29 CFR 1910.120. Site personnel are required to have Hazard Communication Training (HAZCOM) which meets the OSHA Construction Industry requirements detailed in 29 CFR 1926.59.

This plan will go into effect at any time when employees are exposed or have the potential to be exposed to a chemical at concentrations that exceed an applicable OSHA Permissible Exposure Limit.

2.5.2. Site Safety and Health Briefing

Personnel covered by this ERP will be required to read and understand this document. Prior to any on-site activity involving the proposed work, on-site personnel and visitors will be required to attend a Site, Safety and Health Briefing from the SSHO or other designated, qualified person. This is applicable to on-site personnel located within the Exclusion, Contaminant Reduction, and Support Zones who are involved with site work, and visitors who will enter either the Exclusion Zone or Contamination Reduction Zone. Periodic updates will be undertaken by the SSHO when operational or site conditions change or when designated refreshers are so warranted. The topics to be covered by the training include the entire contents of the ERP with emphasis on emergency procedures, areas of restricted access, methods of decontamination and general safety.

Workers shall be informed of locations and directions to locations where emergency medical attention may be received.

Ambulance services are available twenty-four hours per day, by contacting the Concord Fire Department via the statewide-enhanced emergency telephone number 9-1-1. Any employee who is seriously injured shall be transported to the hospital by certified/trained EMS personnel and properly equipped EMS vehicles.

3. EMERGENCY EQUIPMENT AND FIRST AID SUPPLIES

3.1. EMERGENCY MEDICAL TREATMENT/FIRST AID

First aid will be rendered to any person injured on-site, as appropriate by any individual trained in First Aid/CPR/Universal Precautions. At least one trained person will be on-site during contract work. First aid kits will be kept in the project trailer and in each Supervisor or Foremen's vehicle. These kits are intended to treat emergency needs.

Following initial treatment, the injured person will then be transported for further examination and/or treatment. The preferred transport method is a professional emergency transportation service; however, when this is not readily available or would result in excessive delay, other transport is authorized. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

3.2. DECONTAMINATION

If an injury occurs in an Exclusion Zone area, provisions for decontamination of the victim will be made. Decontamination will be done at a location that is convenient to the area where the Emergency Response actions are occurring, in an upwind location. However, life-threatening conditions may preclude normal decontamination procedures. In such cases, arrangements will be made with the medical facility and transporter.

The decision to decontaminate a victim is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving treatment. If decontamination does not interfere with essential treatment, it will be performed and will include a wash, rinse and/or cut off protective clothing and equipment.

If decontamination cannot be done, the victim will be wrapped in blankets, plastic or rubber to reduce contamination of other personnel. Emergency and off-site medical personnel will be alerted to potential contamination. A site person familiar with the incident and the chemicals will be sent if available.

3.3. EMERGENCY EYE WASH STATIONS AND FIRST AID KITS

Portable eyewash bottles will be maintained in the Decontamination Zone and in the office trailer. The locations will be moved with the location of the work. The eyewash stations will consist of sealed, labeled bottles of eyewash solution. These bottles will be periodically inspected and replaced if the seal is broken, or the contents appear to be dirty or contaminated. Hand wash stations will be provided.

4. EMERGENCY PLAN/CONTINGENCY PROCEDURES

4.1. EMERGENCY/CONTINGENCY PLAN

This section identifies the emergency contingency planning undertaken for operations at the site and includes further information to be used under emergency conditions such as emergency telephone numbers, routes to emergency medical facilities and emergency signals. The ERP is prepared as a separate stand-alone section and a separate submittal.

The ERP applies to unanticipated personal injuries sustained on the site, fires, explosions, personnel injuries or the discovery of or contact with hazardous materials that could be detrimental to human health or the environment. The ERP may cover events such as but not limited to:

- Levels of Total Volatile Organic Compounds (VOCs) more than the action levels.
- Levels of depleted uranium in excess of the action levels
- Spills or leaks of chemicals or petroleum products considered posing imminent and/or substantial hazards. The ERP would be used in conjunction with the Spill Control & Countermeasure Plan.
- Other perceived threats.

4.2. PRE-EMERGENCY PLANNING/CHAIN-OF-COMMAND

In the event of an emergency, the SSHO shall implement the Incident Command System. Supervisors will have assigned duties including waiting for emergency vehicles, counting employees and directing traffic on-site. The SSHO shall assume the role of the Interim Incident Commander and shall be replaced by the responding senior member of the Fire Department or Police Department. The local Fire and Police officials shall be informed of the nature type and scope of the work prior to initiating the work. This will be done in an effort to make these officials aware of the work and to notify these officials of the potential need to provide emergency medical services and firefighting capabilities at the site in the event an emergency occurs.

4.3. SITE EVACUATION AUTHORITY

When conditions warrant site evacuation, the work party will proceed upwind of the work site and notify the SSHO and field office of site conditions. The PM, Site Supervisor or SSHO have authority to order an evacuation of the site. The Engineer shall be notified, immediately, or as soon as practically possible.

4.4. EVACUATION PROCEDURES

Withdrawal Upwind - When conditions that endanger the safety or health of workers warrant moving away from the work site, the crew will relocate upwind at a distance of approximately 150-feet or farther, as indicated by site monitoring instruments and wind sock(s).

This location will be discussed with employees on a daily basis. The meeting location will be clearly marked. If possible, it is anticipated that this meeting location will be in the Support Zone adjacent to the project facilities.

A signal to evacuate will be given by the SSHO using an air horn, radio, telephone or similar means capable of relaying the message. Once workers are at the site, a “head count” will be taken to make certain workers are accounted for. During safety briefings, the location will be presented. In the event of withdrawal, the SSHO and a member of the crew (via “buddy system”) may return to the work site to determine if the condition noted is transient or persistent. If persistent levels of air contaminants remain, an alarm should be sounded to notify personnel of the situation and the need to leave the site. The site management will be notified of conditions. This alarm will be given using both a compressed air horn and portable radios, using a pre-arranged signal or tone, or message.

The following signals will be used to indicate an emergency situation:

- One long blast repeated three times at five second intervals - Man down
- Three short blasts repeated three times at five second intervals - Evacuate site
- Alternating short and long blasts - All clear

When site access is restricted, thus hindering escape, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes. Charter and our subcontractors will have designated "counters" with the responsibility to account for employees and visitors in the event of an evacuation.

In the event any workers are not accounted for, the Incident Commander will notify the responding Fire Department, so that a search can be promptly initiated. In no case should any worker go out to initiate a search themselves until the “all clear” signal; has been given.

4.5. NATURAL GAS

Natural gas transmission and distribution lines will be located and marked prior to any mass excavation.

4.6. CRITIQUE OF RESPONSE

In the event the Incident Command system is implemented, a critique and follow-up will be conducted as soon as practical, and no later than one day following the implementation of the program. The critique is to find out the strengths and weaknesses of the system in the event future incidents occur, and to share lessons learned with supervisory personnel on-site. A written report of

the incident should be prepared as soon as practical, and no later than two days after the critique meeting.

5. SPILL CONTROL AND COUNTERMEASURES

5.1. OVERVIEW

In the event of a spill or release of an oil or hazardous material on the project site,the following procedures shall be implemented. The SSHO assumes the role of the Incident Commander for the Spill Response until relived by the responding senior member of the Fire or Police Department (if contacted) or the responding environmental contractor.

Trained individuals respond to the release with the goal of assessing and containing the release. The role of the team is not to clean the spill or release, but rather to prevent injury to employees working in the area and to minimize the environmental impact. Spill responders have been identified and will be contacted in the event of a spill.

5.2. SPILL SUPPLIES

A supply of containment materials will be stored on-site in the event of a spill or release. At a minimum, these supplies shall include the following: absorbent booms and/or pads; non-sparking hand tools, empty approved metal transfer or over pack drums; absorbent mineral materials, barrier tape/fencing and pylons, appropriate PPE and air monitoring equipment. It is anticipated that heavy equipment (excavators, front-end loaders, skid steer loaders or backhoes) will be available on-site to manage spill events. Vacuum trucks or Vactor trucks for recovery of large quantities of liquid waste can be secured from the emergency response subcontractors identified below.

5.3. SPILL RESPONSE PROCEDURES

On notification of a spill or release, the trained individuals meet upwind of the site to receive their assignments from the Incident Commander and to don required PPE. The team first evaluates the spill or release to determine whether it poses an immediate risk of fire or explosion. The nature and quantity of the material is identified. Once a plan of action has been implemented, the team may at their option, attempt to contain or stabilize the spill but not move forward into cleaning of the spill. Three spill responders have been identified as having the appropriate training and equipment to quickly clean the spill and decontaminate the site. These responders are:

- Clean Harbors, Inc. 800-645-8265

- ACV Enviro 800-876-9699
- Environmental Services Inc. 860-528-9500

5.4. INCIDENT REPORTING

If an accident or some other incident meeting the definitions set forth in the HASP such as an explosion, release to groundwater or the environment, or an exposure to toxic chemical levels as described in the MADEP regulations occurs during the course of the project, the Owner, Owner's Engineer and the MADEP (if applicable) shall be notified by telephone immediately and receive a written notification within 24-hours. The report shall include the following items:

- Name, organization, telephone number and location of the Contractor
- Name and title of the reporting individual
- Date and time of accident or incident
- Location of accident or incident
- Summary of accident or incident
- Cause of accident or incident
- Casualties (fatalities, disabling injuries) with description
- Medical Treatment administered
- Witness information
- Details of any existing chemical hazard or contamination
- Estimated property damages
- Nature of damage; Impact on contract schedule
- Action taken by Contractor to ensure health and safety
- Other damage or injuries sustained (public or private)

6. AIR MONITORING

The Engineer is responsible for daily air monitoring. They will be monitoring dust visually, but will have personal air monitors (PID, PDR1000) available. Charter may conduct additional air monitoring as determined by the Safety Team. Additional monitoring will be conducted as described below.

Charter may perform monitoring for dust in the Exclusion Zone and other areas outside the exclusion zone (such as the material loading area) within the site perimeter when required.

The activities will be sequenced in an efficient manner, to minimize the period during which excavations are open. Although no odors are expected during the proposed work, If the excavation generates appreciable odors additional actions will be taken to minimize odors.

ACTION LEVELS

The following action levels as measured in the breathing zone during work activities will be in effect during the entire project.

Particulate Matter (Exclusion Zone Readings)

Particulates Level no visible dust <130 ug/m^3	Continue work
Particulates Level visible dust ≥130 ug/m^3	Implement engineering controls/dust suppression

Particulate Matter (Perimeter Readings)

Particulates Level no visible dust <130 ug/m^3	Continue work
Particulates Level visible dust ≥130 ug/m^3	Implement engineering controls/dust suppression

Notes: Action Levels presented above are for 15 – minute sustained readings within the breathing zone.

6.1. DUST AND ODOR CONTROL PLAN

Charter is required to perform adequate control of dust and objectionable odors during Work daily to achieve the perimeter limits established for the project in accordance with the Air Monitoring Plan. This may include the use of vapor suppression activities (i.e., minimize or stop soil disturbance, use of engineering controls) and/or and dust suppression activities (i.e. water trucks and/or water mist).

Additionally, Level C PPE (full-face or half-face air purifying respirators with organic vapor cartridge/P100 or equivalent), is to be worn when potentially contaminated particulates become airborne.

6.2. EMERGENCY MEASUREMENTS

Under emergency conditions, the actual concentrations at any given section of the work area may not be known and the potential exists for an over exposure. In this case, a higher available level of protection will be selected when initiating the measurement and then level of PPE will be decreased if concentrations are below the thresholds shown above.

6.3. OPERATION PROCEDURES

The following procedures shall be maintained during routine activity associated with the site control procedures:

- A copy of the HASP shall be maintained on-site.
- Personnel shall be instructed in the contents of the HASP and this Plan.
- Proper delineation of site control zones will be maintained, and signs placed in visible locations.
- Copies of access and egress procedures will be posted on the project bulletin board located at the command center.
- Access and exiting routes are contained in this report for both equipment and personnel. They shall also be posted on the project bulletin board located in the Support Zone.
- Procedures for assisting personnel stuck in mud and location of rescue supplies

Any modifications to the plan including delineation of work zone boundaries shall be approved prior to implementation and personnel shall be briefed in the modification prior to implementation.

7. MEDICAL SERVICES

7.1. General Medical Treatment

The name of the hospital facility for Medical Treatment is **Emerson Polo Emergency Center 133 Old Road, Concord, MA. The** phone number is 978-369-1400. The emergency route is described in Figure 7-1 below.

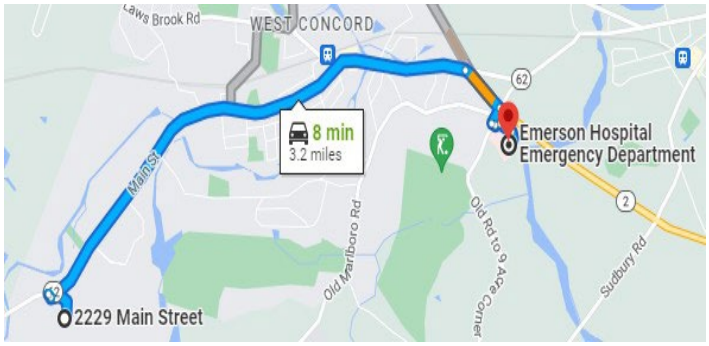
Emergency Route Map

Emerson Polo Emergency Room @ Emerson Hospital

2229 Main Street, Concord, MA

TO

133 Old Road, Concord, MA



2229 Main Street
1. Head east on Main Street 3 miles
2. Turn right onto Rte 2
3. Turn right onto Old Road to 9 Acre Corner
4. Turn left into Emerson Hospital

Destination will be on the right

Emerson Hospital

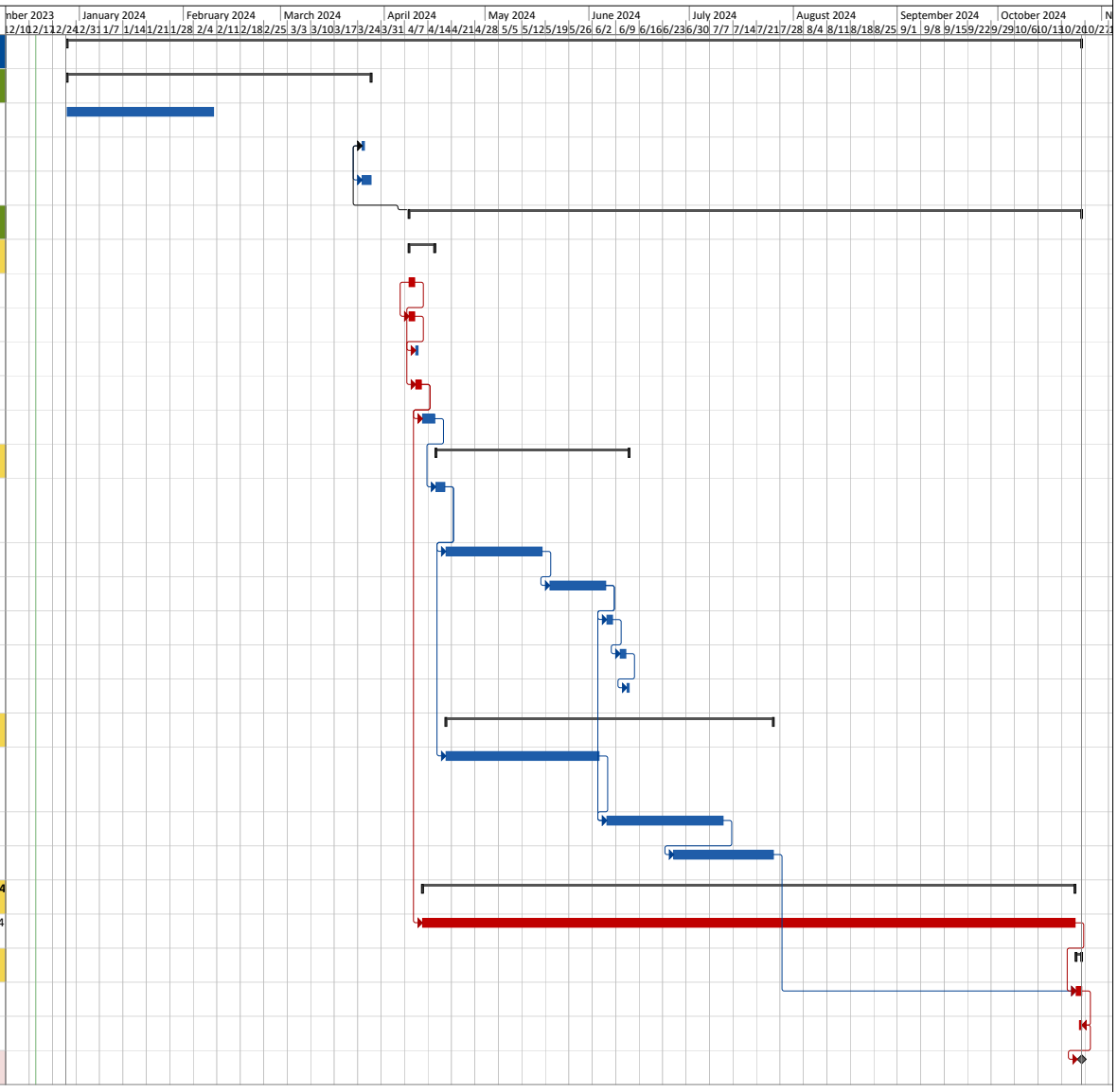
Emergency Contact Numbers

EMERGENCY Police/Ambulance/Fire/Rescue	911
(Non- Emergency) Concord Police Department	(978) 318-3400
(Non- Emergency) Concord Fire Department	(978) 318 3488
Hospital – Emerson Hospital	(978) 369-1400
Physician – Concentra	(401) 738-8100
National Response Center	(800) 424-8802
Poison Control Center	(800) 222-1222
Env. Services – Clean Harbors (Cranston)	(401) 431-1847
Env. Services – ACV Environmental	(800) 876-9699
Env. Services - Environmental Services Inc.	(800) 528-9500
MA Dig Safe	811
OSHA – Boston South Area Office	(617) 565-6924
MA DEP – Spill Reporting	(888) 304-1133
Charter Emergency Contact - Ed Price Karen Long	(617) 565-6924 (857) 260 0491
Charter Project Manager – Chris Ryan	(978)-420-5106
Charter Site Superintendent/SSHO- Luis Medina	(857) 300 0556

APPENDIX E
Charter Construction Schedule

Proposed Construction Schedule
Courtyard & Building E Soil Remediation
Nuclear Metals, Inc., Concord, MA

ID	Task Name	Duration	Start	Finish
1	**Courtyard & Building E Remedial Action**	**210 days**	**Thu 12/28/23**	**Fri 10/25/24**
2	**Preconstruction Activities (Notice of Award 12/28/2023)**	**62 days**	**Thu 12/28/23**	**Wed 3/27/24**
3	Submittal Preparation, Review, & Approval	30 days	Thu 12/28/23	Fri 2/9/24
4	Pre-construction Meeting	1 day	Mon 3/25/24	Mon 3/25/24
5	Dig Safe Notification	3 days	Mon 3/25/24	Wed 3/27/24
6	**Construction Activities (4/8/2024)**	**141 days**	**Mon 4/8/24**	**Fri 10/25/24**
7	**Mobilization & Site Preparation**	**6 days**	**Mon 4/8/24**	**Mon 4/15/24**
8	Mobilize Personnel & Equipment to Site; Site Specific Training	2 days	Mon 4/8/24	Tue 4/9/24
9	Establish Survey Control & Existing Conditions Survey	2 days	Mon 4/8/24	Tue 4/9/24
10	Protection of Existing Monitoring Wells	1 day	Wed 4/10/24	Wed 4/10/24
11	Erosion & Sediment Controls	2 days	Wed 4/10/24	Thu 4/11/24
12	Abatement & Dispoal of Transite Pipe	2 days	Fri 4/12/24	Mon 4/15/24
13	**Courtyard Remedial Action**	**41 days**	**Tue 4/16/24**	**Wed 6/12/24**
14	Demolition of Butler B3 Concrete Slabs, Walls & Footers & Transport Debris to Waste Processing Area	3 days	Tue 4/16/24	Thu 4/18/24
15	Soil Excavation & Transport to Waste Processing Area	21 days	Fri 4/19/24	Fri 5/17/24
16	Furnish & Install Approved Granular Backfill Material	12 days	Mon 5/20/24	Wed 6/5/24
17	Install Stormwater Drainage Channel	2 days	Thu 6/6/24	Fri 6/7/24
18	Furnish & Install Topsoil	2 days	Mon 6/10/24	Tue 6/11/24
19	F&I Hydroseed Topsoil Areas	1 day	Wed 6/12/24	Wed 6/12/24
20	**Building E Area**	**68 days**	**Fri 4/19/24**	**Thu 7/25/24**
21	Demolition of Building E Concrete Slabs, Walls & Footers & Transport Debris to Waste Processing Area	31 days	Fri 4/19/24	Mon 6/3/24
22	Soil Excavation & Transport to Waste Processing Area	24 days	Thu 6/6/24	Wed 7/10/24
23	Furnish & Install 3" Common Backfill	21 days	Wed 6/26/24	Thu 7/25/24
24	**Load-Out Impacted Materials**	**135 days**	**Fri 4/12/24**	**Wed 10/23/24**
25	Loadout of Impacted Materials - Courtyard & Building E	135 days	Fri 4/12/24	Wed 10/23/24
26	**Demobilization**	**2 days**	**Thu 10/24/24**	**Fri 10/25/24**
27	Remove Temporary Facilities & Erosion Controls	2 days	Thu 10/24/24	Fri 10/25/24
28	Demobilize Personnel & Equipment	1 day	Fri 10/25/24	Fri 10/25/24
29	**Substantial Completion**	**0 days**	**Fri 10/25/24**	**Fri 10/25/24**



APPENDIX F
Wells Proposed for Decomissioning (Courtyard and Holding Basin Areas) Memorandum

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

VIA ELECTRONIC MAIL

April 11, 2024

Bruce Thompson
de maximis, inc.

Re**:** EPA Approval of *Wells Proposed for Decommissioning (Courtyard and Holding Basin Areas)* memo*,* for the Nuclear Metals Inc. Superfund Site, Concord, Massachusetts, dated April 10, 2024

Dear Mr. Thompson:

EPA has completed its review of de maximis' memo, *Wells Proposed for Decommissioning (Courtyard and Holding Basin Areas)* (the "Memo"), dated April 10, 2024. The Memo is subject to the terms and conditions specified in the Consent Decree (CD) for Remedial Design / Remedial Action (RD/RA) for the Nuclear Metals Inc. Site, which has an effective date of December 6, 2019.

The Memo was revised in response to EPA's comments submitted on April 4, 2024. EPA has reviewed and hereby approves the *Wells Proposed for Decommissioning (Courtyard and Holding Basin Areas)* memo for the Nuclear Metals Inc. Superfund Site. The Memo covers the proposed for decommissioning of 28 wells in the Courtyard and Holding Basin Areas ahead of the 2024 construction season at the Nuclear Metals Inc. Superfund Site. Well decommissioning activities are approved to begin as planned on April 15, 2024.

If there is any conflict between the Performance Standards as stated in the Work Plan and the Performance Standards as stated in the CD and statement of work (SOW), the CD and SOW shall control.

Please do not hesitate to contact me at (617) 918-1435 or at nierenberg.kara@epa.gov should you have any questions in this regard.

Sincerely,

Kara Nierenberg
Remedial Project Manager

Superfund Emergency Management Division
Massachusetts Section

cc: Garry Waldeck, MassDEP
Andy Schkuta, AECOM
Todd Majer, de maximis
Jessie McCusker, de maximis
Christine Taddonio, de maximis
Mark Kelley, H&A

HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617. 886. 7400

TECHNICAL MEMORANDUM

Revised 10 April 2024
26 March 2024
File No. 0131884-003

TO: *de maximis, inc.*
Bruce Thompson

FROM: Haley & Aldrich, Inc.
Dale Salinger, Principal Technician
Mark Kelley, P.E., Senior Hydrogeologist

SUBJECT: Wells Proposed for Decommissioning (Courtyard and Holding Basin Areas)
Nuclear Metals, Inc.
Concord, Massachusetts

The purpose of this memorandum is to provide information on wells proposed for decommissioning in the Courtyard and Holding Basin Areas ahead of the 2024 construction season at the Nuclear Metals, Inc. (NMI) Site. This work is proposed to be completed starting 15 April 2024 before remedial activities within the Courtyard Area and before in-situ sequestration (ISS) drilling within the Holding Basin area. The attached table lists the 28 wells that are proposed to be decommissioned, including the well ID, current well uses, and the reason for decommissioning the well. Locations of wells proposed for decommissioning, previously decommissioned wells, and wells remaining on site are shown on the attached plan. Monitoring well installation reports for the 28 wells proposed for decommissioning are also included as Attachment A.

Attachments:

Table 1 – Summary of Wells Proposed for Decommissioning
Figure 1 – Groundwater Exploration Location Plan
Attachment A – Monitoring Well Installation Reports

c: *de maximis, inc.*; Attn: Todd Majer, Jessie McCusker, and Christine Taddonio

https://haleyaldrich.sharepoint.com/sites/demaximisinc983/Shared Documents/0131884.Nuclear Metals/Deliverables/Well Decom 2024-04/2024-0410-HAI-Rev-WellDecomMemo-F.docx

TABLE

TABLE 1
SUMMARY OF WELLS PROPOSED FOR DECOMMISSIONING
NUCLEAR METALS, INC.
CONCORD, MASSACHUSETTS

Well ID	Well Location	Current Use	Reason for Abandonment	Proposed Future Plan for Well Location
MW-S62A	Courtyard	semiannual, annual, comprehensive sampling	Within courtyard excavation area	Future well locations to be determined post remedial action on a phase by phase basis
MW-SD62	Courtyard	none		
MW-S62	Courtyard	none		
MW-S05	Courtyard	none		
MW-S60	Courtyard	semiannual, annual, comprehensive sampling		
MW-SD60	Courtyard	semiannual, annual, comprehensive sampling		
GZW-7-2	Courtyard	semiannual sampling		
MW-S24	Courtyard	semiannual, annual, comprehensive sampling		
MW-SD24	Courtyard	semiannual, annual, comprehensive sampling		
MW-T24	Courtyard	semiannual, annual, comprehensive sampling		
IP-1-1	Courtyard	ISS Pilot study injection point		
IP-2-3	Courtyard	ISS Pilot study injection point		
GZW-7S	Courtyard	semiannual, comprehensive sampling		
PZ-7	Courtyard	none	Unable to locate/destroyed	
HBPZ-2R	Holding Basin	semiannual, annual, comprehensive sampling	Within holding basin (HB) ISS injection area	
HA20-CMT-3B(OW)	Holding Basin	semiannual, annual, comprehensive sampling		
HA20-CMT-3T(OW)	Holding Basin	semiannual, annual, comprehensive sampling		
HA20-CMT-3	Holding Basin	annual sampling		
HB-12	Holding Basin	semiannual, annual, comprehensive sampling		
HB-07	Holding Basin	none		
HB-08	Holding Basin	none		
HA20-CMT-2	Holding Basin	comprehensive Groundwater Sampling		
HA20-CMT-1	Holding Basin	comprehensive Groundwater Sampling		
HA20-CMT-6	Holding Basin	comprehensive Groundwater Sampling		
HA20-CMT-6(OW)	Holding Basin	semiannual, annual, comprehensive sampling		
HA20-CMT-5	Holding Basin	comprehensive Groundwater Sampling		
HA20-CMT-5(OW)	Holding Basin	semiannual, annual, comprehensive sampling		
HA20-CMT-4	Holding Basin	comprehensive Groundwater Sampling		
MW-S16	Courtyard	semiannual, Comprehensive sampling	To be Maintained (Monitoring of the plume)	
MW-8A	Courtyard	semiannual, annual, comprehensive sampling		
MW-SD61	Courtyard	semiannual, annual, comprehensive sampling		
MW-SD62A	Courtyard	semiannual, annual, comprehensive sampling		
MW-BS7-2	Courtyard	comprehensive sampling		
MS-SD10	Building E	semiannual, comprehensive sampling		
MW-BS10	Building E	semiannual, annual, comprehensive sampling		
MW-T10	Building E	semiannual, comprehensive sampling		
SW-2A	Building E	semiannual, comprehensive sampling		

FIGURE

COURTYARD AREA MAP INSET

Cooling Water Pond

Pilot Test Area 2

Pilot Test Area 1

Legend
- DPT Jet Injection Location with 15 ft Design ROI
- Monitoring Well
- Piezometer
- Pilot Test Groundwater Monitoring Location
- Min-Trap Sample Monitoring Well
- Uranium Contour in Overburden Groundwater, April 2022 (µg/L)
- Holding Basin
- Wetlands
- Surface Water
- Former Building Footprint
- Fence
- Site Features

Notes:
1. Monitoring wells MW-S62 and MW-SD62 had unusually low recharge rates and were replaced with monitoring wells MW-S62A and MW-SD62A. MW-S62 and MW-SD62 were not sampled.
2. Monitoring wells MW-S63 and MW-SD63 were compromised during injections in Pilot Test Area 2 and were removed from the sample plan in April 2022 and for subsequent groundwater monitoring events

Overburden ISS Pilot Test Injection and Min-Trap Sampling Locations

Nuclear Metals Superfund Site
Concord, Massachusetts

Feet: 0, 15, 30, 60

Geosyntec consultants | de maximis, inc. | Acton, Massachusetts | April 2023 | Figure 4

HOLDING BASIN AREA MAP INSET

WALL_CORNER-PNT-1 N: 2985975.43 E: 677684.05
WALL_CORNER-PNT-2 N: 2985931.78 E: 677790.19
WALL_CORNER-PNT-3 N: 2985825.99 E: 677822.14
WALL_CORNER-PNT-4 N: 2985717.56 E: 677777.55
WALL_CORNER-PNT-5 N: 2985768.41 E: 677653.92
WALL_CORNER-PNT-6 N: 2985834.82 E: 677626.22

HA-23-B1B(OW) E: 677705.4300 N: 2985977.0900 ELEV: 178.10
HA-23-B2T(OW) E: 677795.2100 N: 2985914.0600 ELEV: 173.80
HA-23-B3S(OW) E: 677820.1200 N: 2985832.9700 ELEV: 176.30
HA-23-B4 E: 677795.8700 N: 2985764.2300 ELEV: 177.30
HA-23-B5 E: 677751.4800 N: 2985730.9200 ELEV: 183.40
HA-23-B6T(OW) E: 677645.8700 N: 2985800.7200 ELEV: 184.30
HA-23-B7 E: 677637.6700 N: 2985829.5600 ELEV: 183.70
HA-23-B8 E: 677661.6100 N: 2985911.8900 ELEV: 184.50
HA-23-B9 E: 677693.9800 N: 2985757.0500 ELEV: 183.40

HA20-CMT-1, HA20-CMT-2, HA20-CMT-3, HA20-CMT-3B(OW), HA20-CMT-3T(OW), HA20-CMT-4, HA20-CMT-5, HA20-CMT-5(OW), HA20-CMT-6, HA20-CMT-6(OW)

HB-07, HB-08, HB-12, HB-13, HB-14, HB-15, HB-16, HB-17, HB-18, HB-19, HB-20, HB-21, HB-22, HB-23, HB-24, HB-25, HB-26

MW-S18, MW-T24, MW-BS7-2

UNK

Legend
- Public Water Supply Well
- Monitoring Well
- Piezometer
- Staff Gauge
- Soil Boring
- Wetlands
- Surface Water
- River
- Site Boundary
- Septic Fields
- Parcel
- MW-S02 Overburden Monitoring Well
- MW-BS02 Bedrock Monitoring Well
- MW-10 Non-functional Monitoring Well
- USORB-2 Soil Boring location

Notes:
- 2008 Ortho Imagery provided by MassGIS
- Base map data and environmental data layers obtained from MassGIS

Q:\GISProjects\BR0090-NMISite\Projects\NMI_Exploration_Location_Master.mxd

MASTER LEGEND

~~HBPZ-2R~~ STRIKE-THROUGH INDICATES PREVIOUSLY ABANDONED

HBPZ-2R ORANGE CIRCLE INDICATES PROPOSED ABANDONMENT

HBPZ-2R GREEN CIRCLE INDICATES WELL MAINTENANCE

N

H&A UNABLE TO FIELD LOCATE

Route 62 | Cooling Pond | Sphagnum Bog | BLDG A | BLDG B | BLDG C | BLDG D | BLDG E | Holding Basin | AST-1 | AST-2

FIGURE 1

Feet: 60, 120, 240, 360, 480

Groundwater Exploration Location Plan

Nuclear Metals Superfund Site
Concord, Massachusetts

Geosyntec consultants | de maximis, inc. | Acton, Massachusetts | AUG 2011 | Figure E-4

ATTACHMENT 1
Monitoring Well Installation Reports

Boring and Monitoring Well Construction Log

Client: NMT | Project No. BRoo10C | Location: Concord, Mass | Sheet 1 of 2

Geosyntec consultants (engineers | scientists | innovators)

Geosyntec Inspector: Andrew Kelley | Date: 9/23/2020

Weather: 60s Sunny | Borehole Diameter: 6" | Drilling Method: Sonic

Drilling Co. Cascade | Rig Type: Terrasonic 150C | Driller Rob Maillet

Depth to water: 60 | Depth to Refusal: | Total Depth: 85'

Log of Boring: SISD-62A

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		0			5.3/10	(0-10) (0-2.2) DK brown, Lt moisture, loose, organics, fine SAND (TOPSOIL) no odors or stains. (2.2-2.95) Brown, Lt moisture, loose, poorly sorted SAND med grained - pebble, no odor or stains. (2.95-3.7) Lt brown, soft, loose, fine SAND w/ little silt, iron oxide stain @ 3.3. (3.7-4.6) Lt brown, tight, stiff SILT w/ some clay, iron oxide staining throughout, Lt moisture. (4.6-5.3) Brown, Lt moisture, loose, fine-med SAND, no odor or stains.
WL in SI62: 60.60 SD62: 60.60		10				
		15			5/10	(10-20) (0-0.7) SAA (3.7-4.6). (0.7-1.8) Reddish-DK brown, fine-coarse SAND w/ trace silt, small-med concretions, loose, Lt moisture. (1.8-2.5) Lt brown, med-coarse SAND w/ some pebbles, loose, Lt moisture. (2.5-3.0) Lt grayish-brown, loose, fine SAND, well sorted, Lt moisture. (3.0-5.0) Lt grayish-brown, loose, med grained SAND w/ pebbles, v. Lt iron oxide staining.
		20				
		25				
60sel used between 20-40 ft bgs		30			8.9/10	(20-30) (0-1.8) Lt grayish-Brown, Lt moisture, loose, fine SAND & SILT w/ some iron oxide staining. (1.8-3.2) Lt grayish-Brown, tight, SILT, Lt moisture, heavy iron oxide staining. (3.2-5.6) Grayish brown, well sorted med-grained SAND, loose, Lt moisture, trace coarse grained sand, no staining. (5.6-6.4) DK gray, clayey SILT, w/ little pebbles, Lt moisture, no stains. (6.4-8.9) Bry, Lt gray, fine-med SAND w/ some gravels, loose, no ~~staining~~ staining.
		35				
WL @ SI62: 60.60 SD62: 60.60		40			8.1/10	(30-40) (0-3.6) Grayish brown, moist loose loose coarse grained SAND, well sorted, no stains. (3.6-5.4) Lt grayish-brown, Lt moisture, poorly sorted fine SAND to pebble, no stains, loose. (5.4-6.4) Lt grayish-brown, silty SAND w/ some pebbles, loose, some small concretions Lt moisture no stains. (6.4-7.8) Lt grayish-brown, clayey SILT, Lt moisture, moderate iron oxide staining, stiff. (7.8-8.1) Brown, moist, loose, fine-med SAND, Lt staining.
		45				
		50				

Notes:

Boring and Monitoring Well Construction Log

Sheet 2 of 2

Client: NMT Project No. BROOOC Location: Concord, Mass

Geosyntec consultants

Geosyntec Inspector: Andrew Kelley Date: 9/23/2020

Weather: 60s Sunny Borehole Diameter: 6" Drilling Method: Sonic

Drilling Co. Cascade Rig Type: Terrasonic 150 Driller Rob Maillet

Depth to water: 60 Depth to Refusal: Total Depth: 85'

Log of Boring SD-62A

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		40			7.6/10	(40-50) (0-2.8) (AK) Grayish-brown, moist, loose, med grained SAND - pebble, no stains. (2.8-4.8) Lt grayish brown, Lt moisture, loose, fine-med grained SAND, with little pebble, V minor iron oxide & DK gray stains (2.8-3.0) (4.8-7.6) Lt gray, dry, fine SAND to cobble, small concretions, no staining, loose.
		45				
		50			6.4/10	(50-60) (0-1.1) Gray, moist, loose, med-coarse SAND w/ some pebbles, little clay & silt, moderate concretions, no stains. (1.1-2.9) Brown, loose, moist, fine-med SAND, small concretions, little silt, & no stains. (2.9-6.4) Lt gray, Lt moisture, loose, fine-coarse SAND w/pebbles, no stains.
		55				
		60			9/10	(60-70) (0-9) Lt grayish-brown, moist, loose well sorted fine-med SAND w/ trace silt, heavy iron oxide staining @ 3.2.
		65				
		70			9.3/10	70-80 (0-9.3) Lt grayish-brown, moist, loose, well sorted fine SAND w/ silt, no staining.
		75				
		80			5/5	(80-85) (0-2.1) Brown, moist, fine-medium SAND, trace silt, no stains (2.1-5.0) Grayish-brown, moist, tight/stiff, Clayey SILT, little to no staining.
		85				
		90				
		95				
		100				

275 gal used today up to 60'

WL @ S62: 60.60
SD62: 60.60

400 gal used from total today

425 gal used, SD Set to 85'

WL @ S62: 60.55
SD62: 60.55

Notes:

Boring and Monitoring Well Construction Log

Sheet 1 of 2

Client: NMT | Project No. BROOROC | Location: Concord, MASS

Geosyntec consultants

Geosyntec Inspector: Andrew Kelley | Date: 8/25/2020

Weather: | Borehole Diameter: 6"&8" | Drilling Method: SONIC

Drilling Co. Cascade | Rig Type: BL Mini Sonic 100C | Driller Dennis Lee

Depth to water: | Depth to Refusal: | Total Depth: 90'

Log of Boring: MW-562/SD62

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		0			4.2/10	(0-10') @ (1.6'). 5x background level radiation 12,000 counts per min. (0-0.7) DK brown, top soil, silty SAND, roots & trace pebbles. (0.7-2.0) Brown, moist, fine-med SAND. (2.0-2.9) Orangish-brown med-grained SAND, Lt moisture, little gravel. (2.9-4.2) Beige, Lt moisture, silty-fine SAND. with minor iron oxide staining.
		10			5.3/10	(10-20'). (0-0.6) Wet brown, Sandy SILT. (0.6-3.0') Yellowish-Brown, moist, loose, med-coarse grained SAND with trace pebbles. (3.0-4.0') Yellowish-brown, moist, fine SAND with some silt, no odors or staining. (4.0-5.3) Beige, dry, silty SAND, fine grained sand, with med-large concretions.
		20			9/10	(20-30'). Brown, loose, fine SAND, well-sorted (0-1.3) Lt moisture, no odor or stains. (1.3-3.8') Orangish-Brown, Lt moisture, Sandy SILT, with heavy iron oxide staining. (3.8-5.5') orangish brown, med-coarse SAND, Lt moisture, med iron oxide stains. (5.5-5.8) SAA (1.3-3.8'). (5.8-6.8) SAA (3.8-5.5'). (6.8-9.0') Beige, Lt moisture, med grained SAND with some iron oxide staining.
75 gal used so far		30				
		35			8.1/10	(30-40'). (0-3') Tan/Brown, Lt moisture, coarse SAND w/ little gravel, no odor or stains. (3-8.1') Grayish-brown, SILT w/ some fine sand, Lt moisture, mod iron oxide staining throughout, heaviest @ 8'.
250 gal used so far		40			6/10	(40-50') (0-3.4) Brown, moist coarse sand w/ little gravel, loose, no stains. (3.4-6.0) Dry, beige, gravelly SAND; fine sand-pebbles, ~~coarse~~ small concretions, no odor or stains.
350 gal used so far		45				
		50				

Notes:

Boring and Monitoring Well Construction Log

Sheet 2 of 2

Client: NMS	Project No. BRoogoc	Location: Concord, MASS	Geosyntec consultants
Geosyntec Inspector: Andrew Kelley		Date: 8/25/2020	
Weather:	Borehole Diameter: 6&8"	Drilling Method: Sonic	
Drilling Co. Cascade	Rig Type:	Driller Denis Lee	
Depth to water:	Depth to Refusal:	Total Depth: 90'	Log of Boring MW-SG2/SDG2

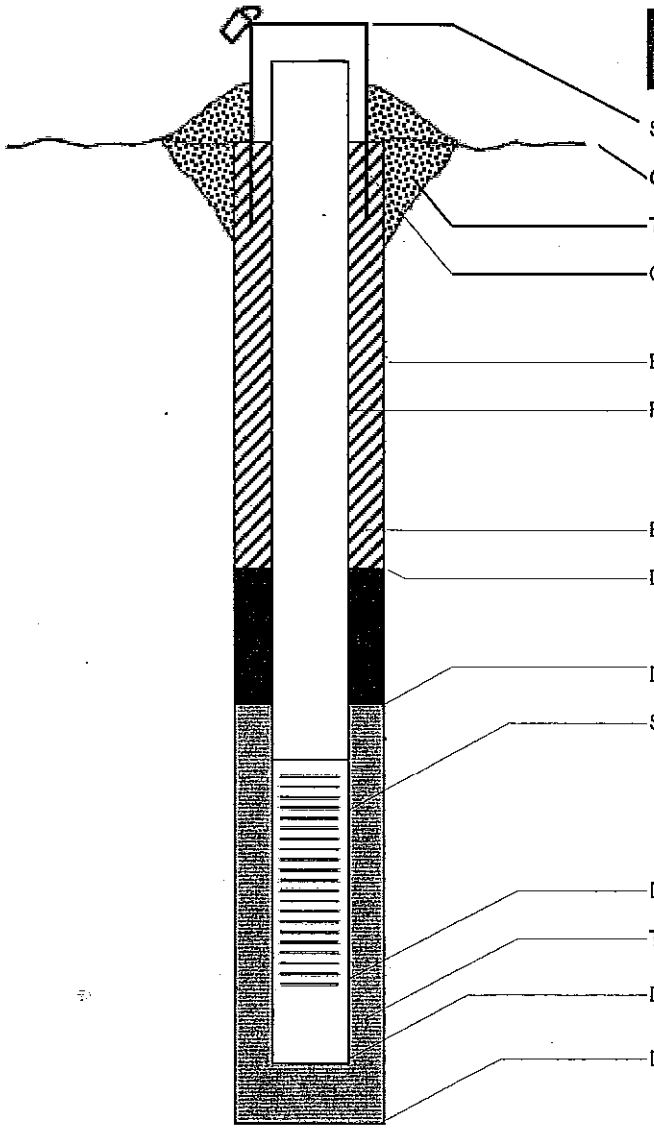
Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		50			5.4/10	(50-60'). (0-1.2) Brown, moist, med-coarse SAND w/ some gravel, no odor or stains (1.2-2.2) Dry, beige, fine SAND w/ gravels & small concretions, no odors or stains. (2.2-5.4') Yellowish-brown, moist, med grained SAND w/ trace gravels, no odor or stains
500 gal used so far. 125 gal recovered		60			9.2/10	(60-70'). (0-6.5') Grayish-brown, moist, well sorted, med-grained SAND, loose, no odors or staining. (6.5-9.2) Grayish Brown, moist, tight, silty SAND, no odors or staining.
625 gal used so far.		70			8/10	(70-80'). (0-1.2) Grayish-brown, moist, well-sorted, med grained SAND, tight, no odors or stains. (1.2-2.7) SAA (0-1.2') but loose. (2.7-8.0) Grayish-Brown, moist, tight, silty SAND, med iron oxide staining @ (7-7.6').
125 gal recovered		80			6.3/10	(80-90') SAA (2.7-8.0) for (0-4.2') with staining heavier @ (3-4.2'). (4.2-6.3') DK gray, gravelly CLAY (TILL), cobbles up to 3.5" in diameter, minor iron oxide staining @ 4.4. (Slough in the first 1-2').
675 gal used today. 125 gal recovered		90				
		45				
		50				

Notes:

Monitoring Well Construction Diagram

GeoSyntec Consultants | MACTEC

Client:	de maximis	AOI:	16-Groundwater	Date Installed:	12/8/2004
Project No:	3617037023	Boring No:	3022	Installation Contractor:	Dragin
Field Technician:	C. Ross	Well ID:	MW-S05	Development method:	



UNITS OF MEASURE

Depth: ft | Diameter: in | Length: ft

Stick-up of Casing above ground surface:	0	ft
Ground Surface (GS) elevation:		ft
Type of surface protection:	Concrete / Roadbox	
Casing material	steel	
Casing ID:	8	in
Borehole diameter	8.25	in
Riser material	PVC	
Riser ID:	2	in
Riser lenght:	62.3	ft
Backfill material:	bentonite cement grout	
Depth of top of seal (below GS):	57	ft
Seal material:	1/4" Bentonite Pellets	
Depth of bottom of seal (below GS)	60.2	ft
Screen material:	PVC	
Screen ID:	2	in
Screen slot size:	0.01	in
Screen lenght:	10	ft
Depth of bottom of screen (below GS):	72.3	ft
Type of sandpack:	No.1 FilterPro Sand	
Depth of sediment sump with plug	72.5	ft
Depth of bottom of borehole (below GS)	73	ft

Comments:

Boring and Monitoring Well Construction Log

Client: NMI	Project No. BROOK10C	Location: CONCORD, MA	Sheet 1 of 2	Geosyntec consultants
Geosyntec Inspector: G. Marjiw		Date: 09/01/20		engineers | scientists | innovators
Weather: 60s-70, clear	Borehole Diameter: 6"	Drilling Method: SONIC		
Drilling Co. Cascade	Rig Type: Terra Sonic	Driller Robert Mailler		
Depth to water:	Depth to Refusal:	Total Depth:	Log of Boring MW-560	

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		0			4.8/10	0-0.35 Asphalt. 0.35-1.4 Yellowish brown, moist, loose, fine to coarse SAND, little rounded fine gravel. 1.4-1.9 Dark brown, moist, loose, fine to coarse sand, some rounded fine to medium gravel. 1.9-2.5 Brownish gray, moist, loose, fine SAND, some rounded fine gravel, trace silt. 2.5-3.7 Brownish gray, moist, loose, medium SAND, some fine and coarse sand, trace subangular fine gravel. 3.7-4.00 SAA, Brown 4.0-4.8 Brownish gray, moist, soft, SILT, some fine sand.
		5				
		10				
		15			7.5/10	0-1.6 Gray, moist, loose, fine SAND, some silt and rounded fine gravel, trace medium and coarse sand. 1.6-2.2 Gray, moist, soft, SILT and fine SAND, 2.2-3.4 Brown, moist, loose, fine SAND, some silt, 3.4-4.5 Gray, moist, soft, SILT, some fine sand. 4.5-7.5 Brownish gray, moist, loose, medium SAND, some rounded fine gravel, little fine and coarse sand, trace coarse rounded gravel.
		20				
		25			7/10	0-1.1, Gray, dry, pulverized ROCK, some silt and fine sand. 1.1-3.6, Orangish brown, dry, loose, medium SAND, some fine and coarse sand, trace subangular medium gravel. 3.6-7.0 Grey, dry, loose, fine to coarse sand, some GREEN rock fragments, little rounded fine to medium gravel, micaceous
		30				
		35			9.5/10	0-6 Light grey, dry, loose, fine to coarse SAND, some silt and pulverized rock flour, trace angular fine gravel. 6-9.5 Greyish brown, moist, loose, fine SAND, some medium sand and rounded fine gravel, trace silt.
		40				
		45			6/10	0-2.5 Grey, dry-to moist, loose, medium-to fine SAND, some coarse sand, little rounded medium gravel and pulverized rock flour. 2.5-4.5 Brownish gray, moist, loose, fine SAND, some medium sand and rounded fine gravel. 4.5-5.6 SAA, grey. 5.6-6.0 SAA (2.5-4.5) wet.
		50				

Notes:

Boring and Monitoring Well Construction Log

Sheet 2 of 2

Client :	Project No.	Location:	Geosyntec consultants
Geosyntec Inspector:		Date : 1	engineers | scientists | innovators
Weather:	Borehole Diameter: AS PAGE 1	Drilling Method:	
Drilling Co.	Rig Type: SAME	Driller	
Depth to water :	Depth to Refusal:	Total Depth :	Log of Boring MW-560

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes (0-5.7)
		50			8.6/10	Brownish gray, wet, loose, medium to fine SAND, little silt, micaceous
						5.7-8.6 SAA, gray
		60			4.3/5	0-1.9 Grayish brown, wet, loose, fine SAND, little silt. Dark gray staining; micaceous
		65				1.9-4.3 Grayish brown, wet, loose, fine SAND, little silt, micaceous
		15				
		20				
		25				
		30				
		35				
		40				
		45				
		50				

Notes:

Project Name: NMI	**Project No.**	BR0090C	Sheet 1 of 1
Geosyntec Inspector: D. Jensen	**Drilling Method:**	Sonic	Geosyntec consultants
Weather: Overcast/sunny 50s	**Date :**	10/28/20	
Drilling Co. Cascade	**Driller:**	Kevin Smith	
Date/Time Started: 10/28/20 0830	**Date/Time Completed:**	10/28/20 1700	
Total Depth : 85 ft bgs	**Delay/Standby:**	NA	
Depth to water : ~50 ft bgs	**Depth to Refusal:**	NA	Log of Boring: TS+SB-02/MW-SD60

Well Construction	Depth (feet)	Soil Sample	Rad. Screening	Recovery	Sample Description and Boring Notes
	0			5.0/10	0-0.5 ft orangish brown dry silty SAND fine-coarse, trace fine gravel & cobble 0.5-5 ft light brown dry SAND fine-med, w/ silt
	10			9.5/10	0-1.0 ft light grey dry silty SAND fine-coarse, trace fine gravel 1.0-3.0 ft light grey dry SILT, trace fine sand orange stainings 3.0-4.2 ft orangish brown dry SAND fine-coarse 4.2-5.8 ft grey dry SILT firm 5.8-8.2 ft orangish brown dry SAND fine-coarse, w/ fine gravel, trace coarse gravel and cobble 8.2-9.5 ft light grey dry silty SAND fine-med, trace coarse sand & fine-coarse gravel
	20			9.0/10	0-1.0 ft grey wet (drilling water) silty SAND fine-med, with coarse sand, trace fine-coarse gravel 1.0-1.8 ft SAA except Dry 1.8-5.5 ft light brown SAND fine-med, trace coarse sand, fine-coarse gravel orange stains at 4.0-4.5 ft 5.5-5.9 ft grey dry silty SAND fine-coarse, with fine-coarse gravel 5.9-7.0 ft light grey dry sandy SILT with fine-coarse gravel and cobble 7.0-8.3 ft grey dry SILT firm 8.3-9.0 ft light grey silty SAND fine-med, trace coarse sand, fine-med gravel
	30			9.0/10	0-2.0 ft grey wet (drilling water) Sandy SILT fine-coarse sand, trace fine gravel 2.0-9.0 light brown dry silty SAND fine, trace coarse gravel gravel/sand layer at 6.6-6.8 ft orange staining
	40			9.3/10	0-2.0 ft light brown SAND fine-med, with coarse sand trace fine gravel, wet to moist (drilling water) 2.0-2.4 ft grey & light brown dry silty SAND fine, with cobbles 2.4-9.3 ft SAA except no cobble
	50			7.5/10	0-0.7 ft brown wet (drilling water) SAND fine, micaceous 0.7-2.4 ft SAA except moist 2.4-5.7 ft SAA except with silt 5.7-7.5 ft Grey moist sandy SILT fine sand
	59 60			9.6/10	0-9.6 ft light brown wet SAND, fine, with SILT, trace med sand micaceous, orange stainings
	64 70			10.5/10	0-1.2 ft ~~brown wet SAND, with SILT~~, SAA (DJ 11/20/20) 1.2-6.7 ft brown wet SAND fine-coarse, with fine-coarse gravel and cobbles, trace silt 6.7-8.0 ft grey wet SILT firm 8.0-10.5 grey wet SAND fine-med, with silt micaceous and orange stainings
	79 80			2.5/5	0-0.7 ft brown wet Sandy Gravel with cobbles 0.7-2.5 ft Grey ~~silty~~ moist silty SAND with cobbles, dense (Till)
	81 85				End Boring

GZA GeoEnvironmental, Inc.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164
(617) 969-0050

Nuclear Metals

Concord, Massachusetts

Boring No. GZW-7
Page 1 of 4
File No. 7875.20
Chkd. By:

Bor Co. GZA Drilling, Inc.
Foreman Rich Jones
GZA Rep. David Adilman:lr
Date Start 3/12/92 End 3/20/92
Location See Exploration Location Plan
GS.Elev. Datum

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D.	4.0"/4.5"	2.0"/2.5"
Hammer Wt.	300 lb.	140 lb.
Hammer Fall	30 in.	30 in.
Other	HSA = 4.5" ID	

Groundwater Readings

Date	Time	Depth	Casing	Stab. Time
3/16/92	0800	54.1'	76'	16 Hours

DEPTH	CASING	BLOWS	Sample Information No.	Pen./Rec.	Depth (Ft.)	Blows/6"	OVM/GEIG Field Test Data	Sample Description & Classification	Stratum Description	RMKS	Equipment Installed
			S-1	24/13	0-2	3-4	ND/<.05	Loose, light brown, medium to coarse SAND, trace Silt, black Cinders, rounded Gravel (dry).	Medium-Coarse SAND	1. 2.	
						5-6					
5			S-2	24/24	5-7	5-6	ND/<.05	Top 15": Medium dense, light brown, fine SAND-SILT (laminated). Bottom 9": Medium dense, light brown-gray, fine to medium SAND (sl. moist).	5' ± Fine SAND-SILT 6.3' ±		1.5" PVC Riser 0-68'
						9-10					
10			S-3	24/14	10-12	5-5	ND/<.05	Medium dense, light brown, medium to coarse SAND, trace Gravel, (rounded) (dry).	Medium-Coarse SAND		
						6-7					
5			S-4	24/22	15-17	7-6	ND/<.05	Medium dense, light brown-yellow brown, medium SAND, little coarse SAND (in lenses), trace Gravel (dry).	15' ±		Grout 3-63'
						6-7					
0			S-5	24/14	20-22	8-9	ND/<.05	Medium dense, light brown-yellow brown, medium SAND, little(+) coarse Sand-rounded Gravel (dry).	Medium SAND		
						10-10					
5			S-6	24/18	25-27	9-9	ND/<.05	Top 5": Medium dense, light brown-olive gray, medium SAND, some coarse Sand-Gravel. Bottom 13": Same - no coarse SAND-GRAVEL.			1/2" Barcad Casing 0-111.5'
						13-20					

1. Refer to note 1 on boring log GZW-6.
2. Four-inch protective casing cemented in place with 3-foot stickup.

at: ation lines represent approximate boundaries between soil types, transitions may be gradual. ater
dings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors
er than those present at the time measurements were made.

Boring No. GZW-7

GZA GEOENVIRONMENTAL, INC.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164
(617) 969-0050

Nuclear Metals

Concord, Massachusetts

Boring No. GZW-7
Page 2 of 4
File No. 7875.20
Chkd. By:

DEPTH	NGS WS	Sample Information: No.	Pen./Rec.	Depth (Ft.)	Blows/6"	OVM/GEIG Field Test Data	Sample Description & Classification	Stratum Description	RMKS	Equipment Installed
		S-7	24/24	30-32	13-18	ND/<.05	Dense, very light-light brown, fine SAND-SILT (Silty Sand) (some laminated) 4" brown-gray SILT (dry).	SILTY SAND 31.6' SILT		
					20-32					
35		S-8	24/24	35-37	25-25	ND/<.05	Top 6": Very dense, olive, gray SILT (sl. moist) very dense, light brown, fine to medium SAND (dry) (*some iron staining in Silt).	35.6'		1/2" Barcad Casing 0-111.5'
					30-32					
40		S-9	24/20	40-42	12-16	ND/<.05	Dense, gray-light brown-rust, (laminated) fine to medium SAND (dry).	Fine-Medium SAND		1.5" PVC Riser 0-69'
					19-23					
45		S-10	24/20	45-47	9-16	ND/<.05	45-46': Dense, olive SILT-fine SAND (Silty Sand). 46-47': Very dense, light brown-rust (mottled-laminated) fine to medium SAND (dry).	45' Silt-fine SAND 46'		
					21-29					
50		S-11	24/20	50-52	14-19	ND/<.05	Dense, light brown-rust (mottled and laminated) medium SAND (dry).		3.	Grout 3-63'
					21-22					
55		S-12	24/9	54-56	40-32	ND/<.05	Very dense, light brown, fine to medium SAND, little(-) Silt (wet).	Fine-Medium SAND		
					34-39					
60		S-13	24/13	59-61	30-25	ND/<.05	Very dense, light brown, fine to medium SAND (wet).			Bentonite Seal 63-66'
					23-29					

3. Run out of augers at 50'. Pull augers, run 4" (HW) casing to 35'. Drive and wash down to 50' (15' blow in). Using 300 lb. hammer. Wash water from NMI spicket. Recirculating drill H_2O. Pounded casing to 54' (not 55' due to tub height). Continue sampling.

ati tion lines represent approximate boundaries between soil types, transitions may be gra
din ave been made at times and under conditions stated. Fluctuations of groundwat
er than those present at the time measurements were made.

GZA GEOENVIRONMENTAL, INC.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164
(617) 969-0050

Nuclear Metals

Concord, Massachusetts

Boring No. GZW-7
Page 3 of 4
File No. 7875.20
Chkd. By:

DEPTH	CASING BLOWS	Sample Info: No.	Pen./Rec.	Depth (Ft.)	Blows/6"	OVM/GEIG Field Test Data	Sample Description & Classification	Stratum Description	RMKS	Equipment Installed
		S-14	24/12	64-66	20-21	ND/<.05	Dense, brown, fine to medium SAND, little(-) coarse Sand, trace Silt (rust stained lenses).	Fine-Medium SAND		
					40-40					
70		S-15	24/12	69-71	18-19	ND/<.05	Dense, yellow-brown, medium to coarse SAND, some(+) Gravel (schist and quartz) (wet).	70' ±		1.5" PVC Wellscreen 68-78' (GZW-7-1)
					21-23					
75		S-16	24/15	74-76	19-23	ND/<.05	Dense, light brown-brown, medium to coarse SAND and(-) fine GRAVEL, trace Silt.	Medium-Coarse SAND	4.	Filter Sand 66-80'
					25-28					
80		S-17	24/12	79-81	29-32	ND/<.05	Very dense, brown, fine to medium SAND, trace Silt, trace Gravel (wet) mica present (80-81') = medium SAND.	80' ±		
					52-52			Fine-Medium SAND		
								82.5' ±	5.	
85		S-18	24/16	85-87	47-47	ND/<.05	Very dense, olive-olive gray, SILT, some fine to coarse Sand-Gravel, trace(+) Clayey Silt (TILL).			Alternating Layers of Sand/ Bentonite 80-97'
					73-41					
90		S-19	24/13	90-92	30-32	ND/<.05	Very dense, olive-olive gray, Clayey SILT-fine SAND, little(-) coarse Sand-Gravel (moist) (TILL).	GLACIAL TILL		1/2" Barcad Casing 0-111.5'
					43-138					
95		S-20	10/10	95-95.7	100-100/4"	ND/<.05	Very dense, olive-olive gray SILT-fine SAND, some medium to coarse Sand, trace Gravel.			
					RATE MIN/FT			98'	6.	Bentonite Seal 97-101.5'
		C-1	60/36	98-99	2.3		GNEISS: Black/white - light = granodiorite - dark = biotite rich, tonalite	99' BEDROCK		
				99-100	1			TILL		

4. With casing at 74' and stabilized for 3 days, water level in casing at 54'. Assumed level of water table because still in sand.
5. At 82.5', refusal of 4" casing. Drill ahead with 3-13/16" roller bit and drill water. Drilling and sampling, boring staying open. Drive 4" to 84, then drill ahead and sampling again.
6. Very hard at 98' -- little penetration with roller bit. Pull roller bit. Telescope 3" (NW) casing through HW to 91'. Spin casing with spin shoe to 98.6', (0.6' into rock), clean out borehole (last ~75 gallons H_2O).

...atification lines represent approximate boundaries between soil types, transitions may be gradual. Water level ...dings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors ...ier ... than those present at the time measurements were made.

GZA GEOENVIRONMENTAL, INC.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164
(617) 969-0050

Nuclear Metals

Concord, Massachusetts

Boring No. GZW-7
Page 4 of 4
File No. 7875.20
Chkd. By:

DEPTH	GRAPHICS	Sample Info: No.	Pen./Rec.	Depth (Ft.)	Blows/6"	OVM/GEIG Field Test Data	Sample Description & Classification	Stratum Description	RMKS	Equipment Installed
				100-101	2		Dark sections show schistosity. 99-100': Olive, Clayey SILT-Silty CLAY, some Gravel (TILL). RQD = 26/36 = 72% Only 3 fractures, 2 at 45° 1 at 60° Slight-heavy iron staining in fractures. C-2: GNEISS, black-white wide bands. (2) horizontal, (1) 60° fractures. RQD = 50.3/54 = 93%		7.	Bentonite Seal 97-101.5'
				101-102	2.1					
				102-103	3.5				8.	
		C-2	60/54	103-104	9.8					
				104-105	4.9					1/2" Barcad Casing 0-111.5'
05				105-106	4.2					
				106-107	6.5					
				107-108	5.0				9.	
		C-3	60/51	108-109	3.5		GNEISS, black-white banded pegmatite zones. (2) fractures at 109'-60° at 110'-60°. 1" thick zone heavily weathered. RQD = 50/51 = 98%.			Filter Sand 101.5 - 122'
				109-110	4.1					
10				110-111	3.5			GNEISS (BEDROCK) w/pegmatite		
				111-112	3.0					
				112-113	3.1				10	
		C-4	48/65	113-114	5.4		GNEISS, black-white banded black sections - schistosic fractures = 1" zone at 116.2 60° at 114.6. RQD = 63.5/65 = 98%			Barcad 111.5-113' (GZW-7-2)
				114-115	3.3					
15				115-116	3.2					
				116-117	2.9					
				117-118	3.3					
		C-5	60/54	118-119	3.7		GNEISS, black-white banded with pegmatite zones. Fratures between color bands, lighter material = finer grained. RQD = 53/54 = 98%			
20				119-120	4.3					
				120-121	3.7					
				121-122	4.2				11	
							Bottom of Boring at 122 feet			
25										
30										

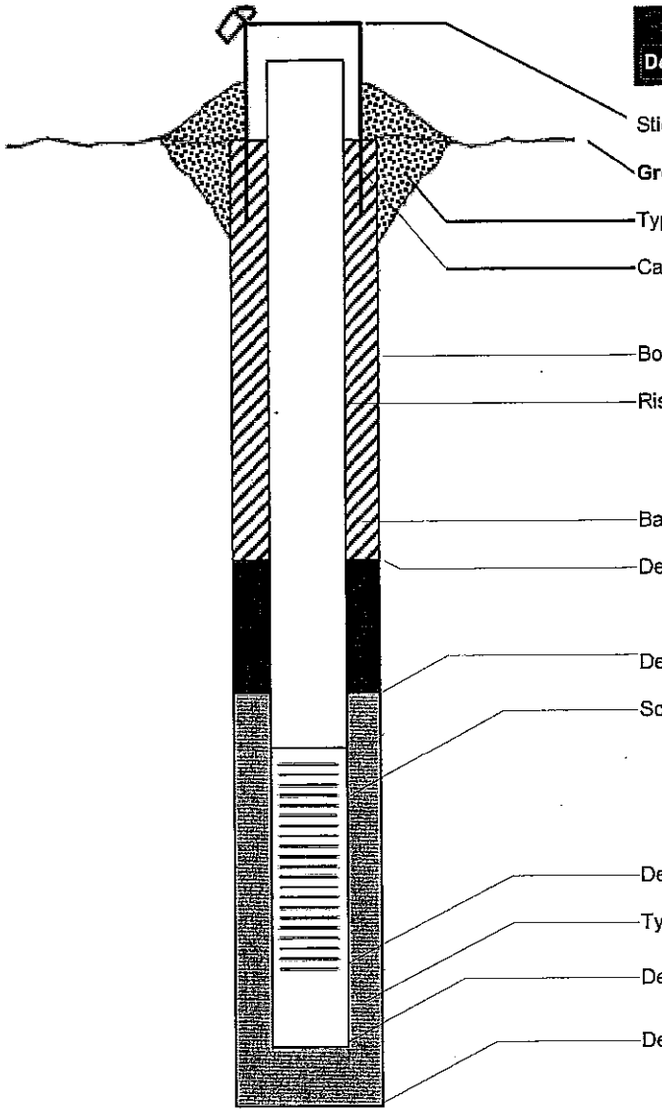
7. Begin coring at 98'.
8. 12" piece stuck in bottom of C-2 core barrel, had to break.
9. Start of C-3 -- not coring; had to remove core barrel and replace worn bit with new bit.
10. C-4 penetrated only 4' -- upon retrieval, more core in barrel than run, picked up material from last run C-3.
11. Perform packer test on rock. Install Barcad 111.5-113', sand rock socket, seal top of rock and install well as illustrated.

rat[illegible]cation lines represent approximate boundaries between soil types, transitions may be gradual. Water level ad[illegible] have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors her[illegible]an those present at the time measurements were made.

Monitoring Well Construction Diagram

GeoSyntec Consultants | MACTEC

Client: de maximis	AOI: 16-Groundwater	Date Installed: 11/22/2004	
Project No: 3617037023	Boring No: 0	Installation contractor: Dragin	
Field Technician: C. Ross	Well ID: MW-S24	Development method:	



UNITS OF MEASURE

Depth: ft | Diameter: in | Length: ft

Stick-up of Casing above ground surface:	0	ft
Ground Surface (GS) elevation:	185.7	ft
Type of surface protection:	Concrete / Roadbox	
Casing material	steel	
Casing ID:	8	in
Borehole diameter	8.25	in
Riser material	PVC	
Riser ID:	2	in
Riser lenght:	53.8	ft
Backfill material:	bentonite cement grout	
Depth of top of seal (below GS):	49.7	ft
Seal material:	1/4" Bentonite Pellets	
Depth of bottom of seal (below GS)	51.7	ft
Screen material:	PVC	
Screen ID:	2	in
Screen slot size:	0.01	in
Screen lenght:	10	ft
Depth of bottom of screen (below GS):	63.8	ft
Type of sandpack:	No.1 FilterPro Sand	
Depth of sediment sump with plug	64	ft
Depth of bottom of borehole (below GS)	65	ft

Comments:

Boring and Monitoring Well Construction Log

Sheet 1 of 2

Client: NMI | Project No. BR0090C | Location: CONCORD, MA

Geosyntec consultants
engineers | scientists | innovators

Geosyntec Inspector: A. Kelley, G-Hanjiru | Date: 08/31/20

Weather: 70s, clear | Borehole Diameter: 6" | Drilling Method: Sonic

Drilling Co. CASCADE | Rig Type: Terrel Sonic | Driller Robert Maillet

Depth to water: ~41' | Depth to Refusal: N.A | Total Depth: 80'

Log of Boring MW-SD24

Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		0			5.3/10	0-0.7 Asphalt fragments 0.7-1.95 Grayish brown, moist, loose, fine SAND, some medium sand and rounded fine gravel. 1.95-2.8 Grayish brown, moist, loose, medium to coarse SAND, little fine sand, 2.8-3.65 SAA 0.7-1.95 2.65-3.9 SAA 0.7-1.95 Dark brown 3.9-5.3 Grayish brown, moist, loose, fine SAND, some silt, little coarse sand and rounded fine gravel
		5				
		10				
		15			5.1/10	0-2 Brown, moist, loose, ~~fine~~ medium to coarse SAND, little fine sand, little organic plant matter 2-3.6 Yellowish brown, moist, loose, fine SAND 3.6-4.45 Reddish brown, moist, loose, fine to medium SAND ~~trace~~ some silt, trace cobble 4.45-5.1 Light (GRAY) gray, loose, moist, fine to medium sand, some angular fine gravel, trace silt.
		20				
		25			7.3/10	0-1.4 Dark brown, moist, SILT, some fine sand, trace rounded fine gravel 1.4-3 Light gray, moist, loose, medium to fine SAND, some rounded fine gravel. 3-4.9 Light gray, moist, soft, SILT, little fine sand, 4.9-6.9 Light gray, moist, loose, fine SAND, some silt. 6.9-7.3 Brownish gray, moist, loose, fine to medium SAND, little silt and rounded fine gravel.
		~~30~~				
		~~35~~				
		40			3.3/10	~~0-1.3~~ 0-0.9 Dark brown, moist, soft, SILT, some fine sand, 0.9-2.6 Gray, moist, loose, fine to medium SAND, some rounded medium Gravel, trace cobble 2.6-3.3 Orangish gray, moist, loose, fine to medium ~~SAND~~, some silt, medium concretions, little iron oxide staining.
		45			5.7/11	0-1.75 Dark gray to black, moist, loose, fine SAND, some silt. 1.75-2.4 Greyish orange, moist, loose, fine SAND, some silt. 2.4-4.9 Light gray, moist, loose, fine SAND, some silt, trace cobble (~4.5") 4.9-5.7 Gray, moist, loose, fine SAND, some silt, little rounded fine gravel
		50				

Notes:

Boring and Monitoring Well Construction Log

Sheet 2 of 2

Client :	Project No.	Location:	Geosyntec consultants
Geosyntec Inspector:		Page 1	engineers | scientists | innovators
Weather:	Borehole Diameter: AS	Drilling Method:	
Drilling Co.	Rig Type: SAME	Driller	
Depth to water :	Depth to Refusal:	Total Depth :	Log of Boring MW-3D24

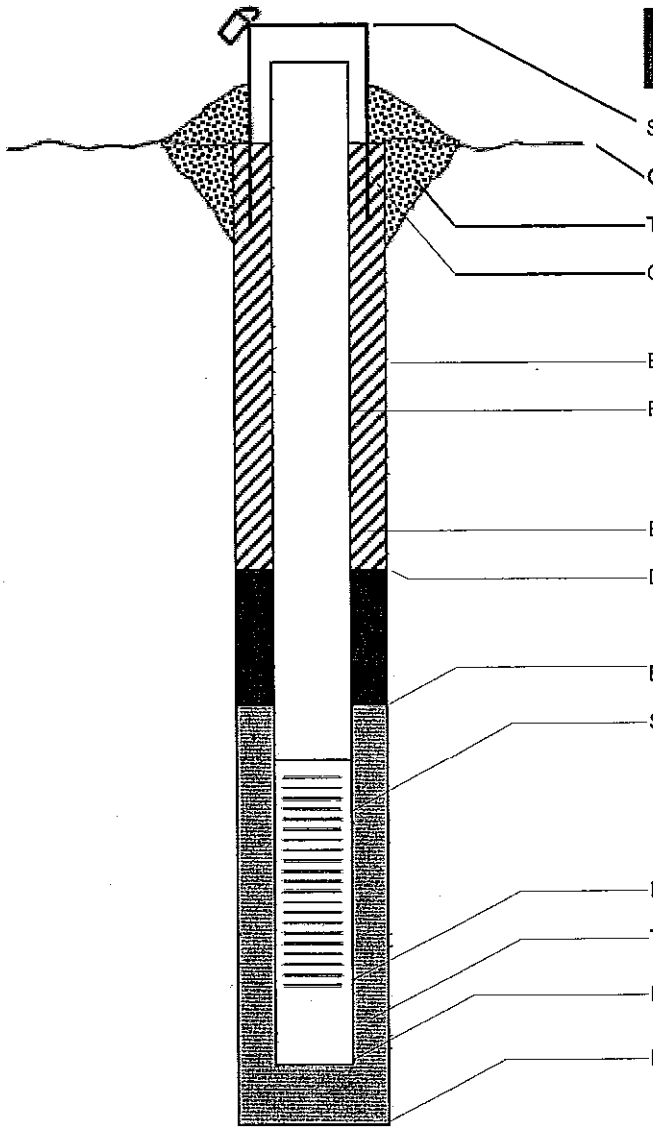
Well Construction	WL	Depth (feet)	Soil Samples	PID	recovery	Sample Description and Boring Notes
		50			1.3/9	0-1.3, Gray, ~~moist~~ wet, loose, fine to medium SAND, little silt (silty)
		60				NO recovery 60-70'. Driller reports
		70			0/10	
		80			10/10	0-5 Brownish gray, wet, loose, fine SAND, some medium sand, micaceous, light iron oxide staining 5-6.6 Brownish gray, wet, loose, fine SAND, some rounded fine gravel, some silt, 6.6-7.5 Brownish grey, wet, soft, SILT, some fine sand, Iron oxide staining at 6.9 7.5-9.0 Reddish brown, wet, loose, medium to coarse SAND, Little fine sand. 9.0-10 Greenish gray, wet, firm, SILT, some rounded and angular fine to medium gravel, little fine sand (Till?)

Notes:

Monitoring Well Construction Diagram

GeoSyntec Consultants | MACTEC

Client: de maximis	AOI: 16-Groundwater	Date Installed: 11/19/2004
Project No: 3617037023	Boring No: 4011	Installation contractor: Dragin
Field Technician: C. Ross	Well no: MW-T24	Development method:



UNITS OF MEASURE

Depth: ft | Diameter: in | Length: ft

- Stick-up of Casing above ground surface: 0 ft
- **Ground Surface (GS) elevation:** 185.5 ft
- Type of surface protection: Concrete / Roadbox
- Casing material: steel
  - Casing ID: 8 in
- Borehole diameter: 8.25 in
- Riser material: PVC
  - Riser ID: 2 in
  - Riser lenght: 79.5 ft
- Backfill material: bentonite cement grout
- Depth of top of seal (below GS): 81 ft
  - Seal material: 1/4" Bentonite Pellets
- Depth of bottom of seal (below GS): 84.3 ft
- Screen material: PVC
  - Screen ID: 2 in
  - Screen slot size: 0.01 in
  - Screen lenght: 4 ft
- Depth of bottom of screen (below GS): 89.5 ft
- Type of sandpack: No.1 FilterPro Sand
- Depth of sediment sump with plug: 90 ft
- Depth of bottom of borehole (below GS): 91 ft

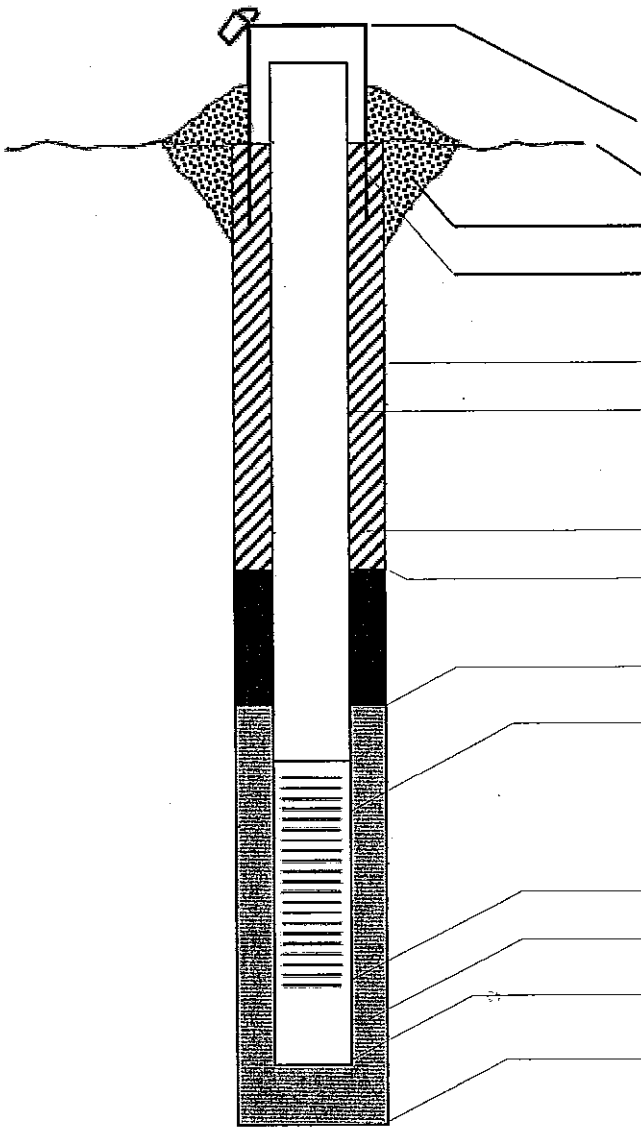
Comments:

Refusal on bedrock at 91 ft bgs; bentonite pellet seal constructed on rock from 91 to 90 ft bgs, then sandpack. Wellscreen is 4 feet long.

Monitoring Well Construction Diagram

GeoSyntec Consultants | MACTEC

Client:	de maximis	AOI:	16-Groundwater	Date Installed:	11/18/2004
Project No:	3617037023	Boring No:	0	Installation contractor:	Dragin
Field Technician:	M. Apfelbaum	Well ID:	MW-S07	Development method:	



UNITS OF MEASURE

Depth: ft | Diameter: in | Length: ft

Stick-up of Casing above ground surface:	0	ft
Ground Surface (GS) elevation:	190.800	ft
Type of surface protection:	Concrete / Roadbox	
Casing material	steel	
Casing ID:	8	in
Borehole diameter	8.25	in
Riser material	PVC	
Riser ID:	2	in
Riser lenght:	59	ft
Backfill material:	bentonite cement grout	
Depth of top of seal (below GS):	55	ft
Seal material:	1/4" Bentonite Pellets	
Depth of bottom of seal (below GS)	57.3	ft
Screen material:	PVC	
Screen ID:	2	in
Screen slot size:	0.01	in
Screen lenght:	10	ft
Depth of bottom of screen (below GS):	69	ft
Type of sandpack:	No.1 FilterPro Sand	
Depth of sediment sump with plug	69	ft
Depth of bottom of borehole (below GS)	105	ft

Comments:

GZA GeoEnvironmental, Inc.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02464

Starmet

Concord, Massachusetts

Boring No. HB-PZ-2R
Page No. 1 of 2
File No. 7875.64
Checked By:

			Casing	Sampler
Drilling Co.	GZA Drilling, Inc.	Type	HSA to 45'	Split Spoon
Foreman	Barry Wordell	I.D./O.D.	3-3/4"-7-1/8"	1-3/8"/2"
GZA Rep.	Sue Bator	Hammer Wt.	5" Coring 45'	140#
Date Start	03/09/00 End 03/10/00	Hammer Fall	52.5'	30"
Location	See Exploration Location Plan	Other	300# Hammer	
GS. Elev.	Datum			

Groundwater Readings

Date	Time	Depth	Casing	Stab. Time
03/13/00	0930	40.8'	Out (OW)	60 Hrs.

DEPTH	CASING	BLOWS	Sample Information No.	Pen./Rec.	Depth (Ft.)	Blows/6"	Field Test Data	Sample Description & Classification	Stratum Description	NOTES	Protective Stickup
								NO SAMPLES COLLECTED FROM 0-39'	FINE TO MEDIUM SAND. LITTLE FINE TO MEDIUM GRAVEL	1	Cement 0-1'
5											2" PVC Riser 0-51'±
10											
15											Backfill 1-31.5'
20											
25											

Notes:
1. Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA GeoEnvironmental, Inc.
Engineers/Scientists

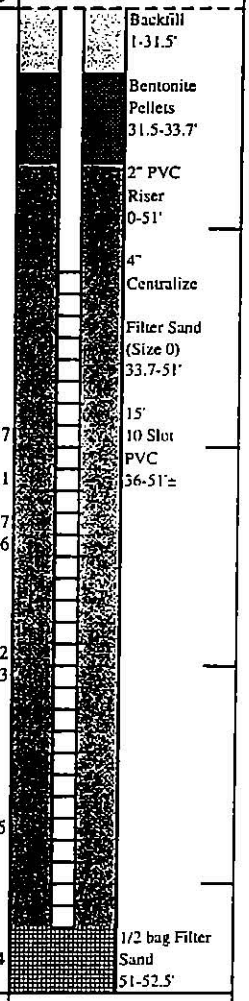
320 Needham Street
Newton Upper Falls, Massachusetts 02464

Starmet

Concord, Massachusetts

Boring No. HB-PZ-2R
Page No. 2 of 2
File No. 7875.64
Checked By:

DEPTH	CASING	BLOWS	Sample Information: No.	Pen./Rec.	Depth (Ft.)	Blows/6"	Field Test Data	Sample Description & Classification	Stratum Description	NOTES
								NO SAMPLES COLLECTED FROM 0-39'		
35										
									39'	
40			S-1	24/4	39–41	7-6		Brown, fine to coarse SAND, some fine to medium Gravel, trace(-) Silt.		7
						8-6				1
			S-2	24/3	41–43	9-6		Brown, fine to coarse SAND, some fine to medium Gravel, trace(-) Silt.		7
	218					6-7				6
									FINE TO COARSE SAND, SOME GRAVEL	
45			S-3	24/9	44–46	9-24		Brown, fine to coarse SAND, little fine to medium Gravel, trace(-) Silt.		2
	240					21-26				3
			S-4	24/3	46–48	21-26		Black, gray and white COBBLE (stuck in tip).		
						28-84				
	220		S-5	24/6	48-50	21-15		Brown, fine to coarse SAND and fine to coarse GRAVEL, trace(-) Silt.		5
50						16-10				
			S-6	18/0	51-52.5	62-65		No recovery.		4
						60				
								Bottom of Boring at 52.5'.		
55										
60										



Notes:
1. Water table encountered at approximately 41'.
2. HSA used until depth of 45', running sands necessitated casing, samples <45' may not be undisturbed.
3. Approximately 65 gallons of water lost in boring with HSA.
4. Approximately 160 gallons of water and 6 cups vanflow (drilling mud additive) lost in boring with casing.
5. 2" spoon used to sample.
6. Casing blows not recorded 0'-45' because augers had started hole.
7. Material suspected as dropped during 45' HSA.

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

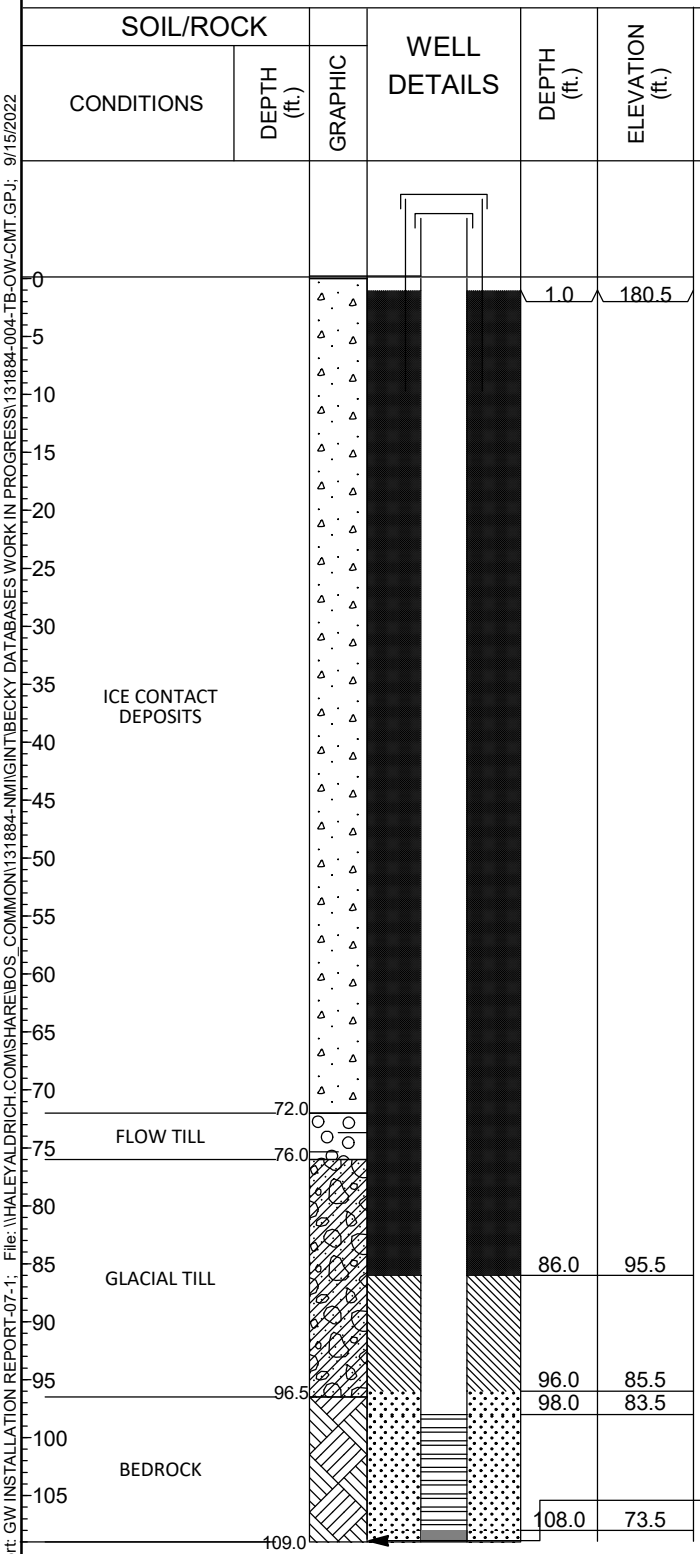
Well No. HA20-CMT-3B(OW)
Boring No. HA20-CMT-3B(OW)

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	R. Maillette
Initial Water Level (depth bgs)	ft

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	08 Jan 2021
H&A Rep.	D.M. Palleiko
Location	N 2985858.92 E 677671.6452
Ground El.	181.5
Datum	NGVD, 1929



WELL CONSTRUCTION DETAILS

Type of protective cover	Guard Pipe
Height of Guard Pipe above ground surface	3.0 ft
Height of top of riser above ground surface	2.8 ft
Type of protective casing	Guard Pipe
Length	5.0 ft
Inside diameter	4.0 in.
Depth of bottom of Guard Pipe	2.0 ft
Type of riser pipe	Sch. 40 PVC
Inside diameter of riser pipe	2.0 in.
Depth of bottom of riser pipe	98.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Grout	1.0	85.0
Bentonite	86.0	10.0
	-	-

Diameter of borehole	6.0 in.
Depth to top of well screen	98.0 ft
Type of screen	Machine slotted Sch 40 PVC
Screen gauge or size of openings	0.010/10 slot
Diameter of screen	2.0 in.
Type of Backfill around Screen	#0 Sand
Depth to bottom of well screen	108.0 ft
Bottom of silt trap	109.0 ft
Depth of bottom of borehole	109.0 ft

COMMENTS:

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

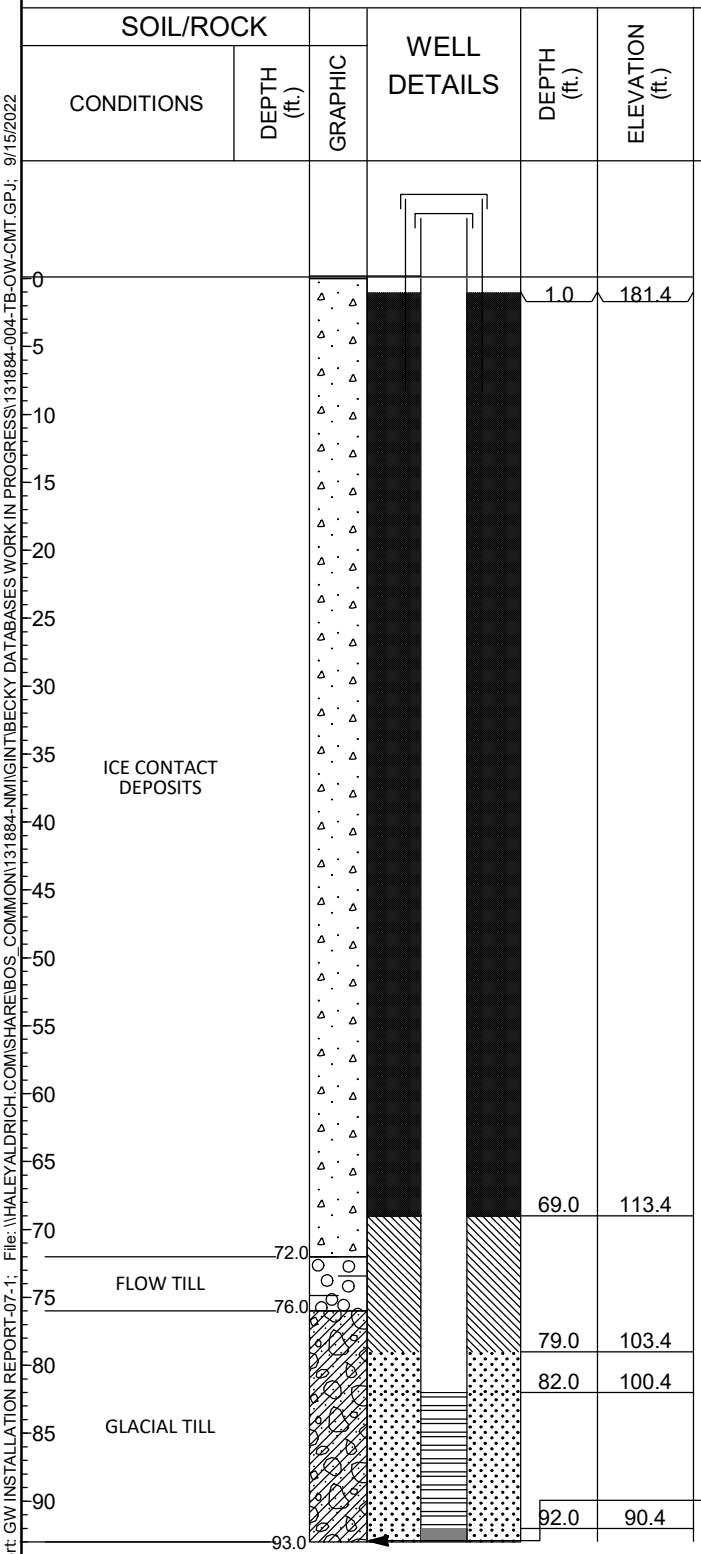
Well No. HA20-CMT-3T(OW)
Boring No. HA20-CMT-3T(OW)

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	R. Maillette
Initial Water Level (depth bgs)	ft

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	11 Jan 2021
H&A Rep.	D.M. Palleiko
Location	N 2985871.609 E 677669.132
Ground El.	182.4
Datum	NGVD, 1929



WELL CONSTRUCTION DETAILS

Type of protective cover	Guard Pipe
Height of Guard Pipe above ground surface	2.6 ft
Height of top of riser above ground surface	2.4 ft
Type of protective casing	Guard Pipe
Length	5.0 ft
Inside diameter	4.0 in.
Depth of bottom of Guard Pipe	2.4 ft
Type of riser pipe	Sch. 40 PVC
Inside diameter of riser pipe	2.0 in.
Depth of bottom of riser pipe	82.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Grout	1.0	68.0
Bentonite	79.0	10.0
	-	-

Diameter of borehole	6.0 in.
Depth to top of well screen	82.0 ft
Type of screen	Machine slotted Sch 40 PVC
Screen gauge or size of openings	0.010/10 slot
Diameter of screen	2.0 in.
Type of Backfill around Screen	#0 Sand
Depth to bottom of well screen	92.0 ft
Bottom of silt trap	93.0 ft
Depth of bottom of borehole	93.0 ft

COMMENTS:

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-3

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985853.904 E 677666.3042
Ground El. Datum	181.6

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
FILL	0			Grout to grade	
	5				
	10				
ICE CONTACT DEPOSITS	14.0				
	15				
	20				
	25				

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-3

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram: Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985853.904 E 677666.3042
Ground El. Datum	181.6

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35				
	40				
	45			Bentonite Pellets	~~bottom of grout 45.0~~ top of bentonite pellets 45.0
	50				
	55				~~bottom of bentonite pellets 55.9~~ top of sand 55.9
				Top of Screen 57.9 Channel 1 58.0-58.3 Bottom of Screen 58.4 Bentonite Pellets	

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-3

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram: Riser Pipe; Screen; Filter Sand; Cuttings; Grout; Concrete; Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985853.904 E 677666.3042
Ground El. Datum	181.6

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	60				bottom of sand 60.9 top of bentonite pellets 60.9
	65				
FLOW TILL	70	70.0			
	75				
GLACIAL TILL		76.0			
	80				bottom of bentonite pellets 82.5 top of sand 82.5
	85			Top of Screen 84.9 Channel 2 85.0-85.3 Bottom of Screen 85.4 Bentonite Pellets	bottom of sand 87.5 top of bentonite pellets 87.5

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\IGIN\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-3

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985853.904 E 677666.3042
Ground El. Datum	181.6

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
GLACIAL TILL...*continued*...	90				
TOP OF ROCK 76.5 FT	95				
BEDROCK	96.5				
	100				bottom of bentonite pellets 99.9 top of sand 99.9
				Top of Screen 101.9 Channel 3 and 6 102.0-102.3 Bottom of Screen 102.4 Bentonite Pellets	
	105				bottom of sand 104.4 top of bentonite pellets 104.4
	110				bottom of bentonite pellets 111.9 top of sand 111.9
				Top of Screen 112.9 Channel 4 113.0-113.3 Bottom of Screen 113.4 Bentonite Pellets	
	115				bottom of sand 116.4 top of bentonite pellets 116.4

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\IGINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

HALEY ALDRICH

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-3

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985853.904 E 677666.3042
Ground El. Datum	181.6

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	120				bottom of bentonite pellets 121.9 top of sand 121.9
	125			Top of Screen 123.9 Channel 5 124.0-124.3 Bottom of Screen 124.4 Bentonite Pellets	bottom of sand 126.4 top of bentonite pellets 126.4
	130				
	135				
	140				bottom of bentonite pellets 142.3 top of sand 142.3
	145			Top of Screen 145.4 Channel 7 145.5-145.7 Bottom of Screen 145.7	bottom of sand 145.7

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\IGINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

GZA GeoEnvironmental, Inc.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164

Starmet Corporation

Concord, Massachusetts

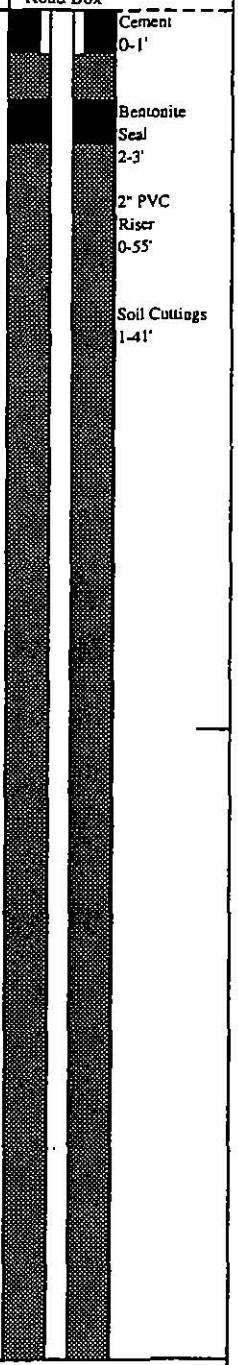
Boring No. HB-12
Page No. 1 of 2
File No. 7875.61
Checked By: SRH

			Casing	Sampler
Drilling Co.	GZA Drilling, Inc.			
Foreman	Norm Stuttard	Type	HSA	Split Spoon
GZA Rep.	Paul Lockwood	I.D./O.D.	4-3/4"/7-1/4"	1-3/8"/2"
Date Start	10/2/98 End 10/5/98	Hammer Wt.	-	140#
Location	See Exploration Location Plan	Hammer Fall	-	30"
Surf. Elev.	Datum	Other		

Groundwater Readings				
Date	Time	Depth	Casing	Stab. Time

DEPTH	CASING	BLOWS	Sample Information No.	Pen./ Rec.	Depth (Ft.)	Blows/6"	Field Test Data	Sample Description & Classification	Stratum Description	NOTES
			S-1	24/6	0-2	4-6	0.03	Medium dense, brown, fine to coarse SAND, trace(+) Gravel, Silt.		
						8-1				
5			S-2	24/13	5-7	10-10	0.05	Medium dense, brown, fine to coarse SAND, trace(+) Gravel.	FILL	
						10-9				
10			S-3	24/18	10-12	14-11	0.03	Medium dense, light brown, fine to coarse SAND, trace(+) Silt, trace(-) Gravel.		
						15-15			12' ±	
			S-4	24/23	15-17	19-27	0.05	Very dense, brown, fine SAND and SILT.	FINE SAND AND SILT	
						23-21				
20			S-5	24/23	20-22	12-24	0.08	Very dense, brown, fine SAND and SILT.		
						32-25			23.5' ±	
25			S-6	24/16	25-27	16-25	0.05	Very dense, light brown, fine to coarse SAND, trace(+) Gravel, trace(-) Silt.	FINE TO COARSE SAND	
						32-34				
			S-7	17/10	30-31.5	27-31	0.05	Very dense, light brown, fine to coarse SAND, some		

Road Box



Notes:

1. Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2. Field test data represents radiation measured by a Model 3 Ludlum Geiger Counter, units are in mREMS/hour. Background readings ranged from 0.02-0.04 mREMS/hour.

GZA GeoEnvironmental, Inc.
Engineers/Scientists

320 Needham Street
Newton Upper Falls, Massachusetts 02164

Starmet Corporation

Concord, Massachusetts

Boring No. HB-12
Page No. 2 of 2
File No. 7875.61
Checked By: SRH

DEPTH	CASING	BLOWS	Sample Information: No.	Pen./Rec.	Depth (Ft.)	Blows/6"	Field Test Data	Sample Description & Classification	Stratum Description	NOTES
	S-7	17/10	17/10	30-31.5	27-31	0.05	Very dense, light brown, fine to coarse SAND, some Gravel, trace(-) Silt.	GRAVELLY FINE TO COARSE SAND	
					100/5"			32'±	
35									
			S-8	12/6	35-36	23-100/6"	0.03	Very dense, light brown, fine to coarse SAND, trace(-) Silt.	
40									FINE TO COARSE SAND	
			S-9	24/13	40-42	32-41	0.05	Very dense, light brown, fine to coarse SAND, trace(+) Gravel.	
						35-39			
45									
			S-10	24/16	45-47	23-27	0.05	Wet, very dense, brown, fine to coarse SAND, trace(-) Gravel.	
						32-26			
									48'±
50									GRAVELLY FINE TO COARSE SAND
			S-11	24/24	50-52	17-35	0.11	Wet, very dense, brown, fine to coarse SAND, little Gravel.	
						65-85			
									53'±
55									FINE TO COARSE SAND
			S-12	18/18	55-56.5	11-24		Wet, very dense, brown, fine to coarse SAND, trace(-) Gravel.	
						100/6"			
								Bottom of Boring at 57'.	
60									

Bentonite Seal 41-43'
Filter Sand 43-57'
2" PVC Wellscreen 45-55'

Notes:

GOLDBERG-ZOINO & ASSOCIATES, INC.
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
Nuclear Metals Inc.
Concord, Massachusetts

REPORT OF BORING No. HB-7
SHEET 1 OF 2
FILE No. A-3646.2
CHKD. BY

BORING Co. D.L. Maher Co.
FOREMAN T. Pelezar
GZA ENGINEER M. Hall (slk)

BORING LOCATION See location plan
GROUND SURFACE ELEVATION _____ DATUM _____
DATE START 6-27-83 DATE END 6-29-83

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 15 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 2½" OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME

DEPTH (ft.)	CASING (bl/ft)	SAMPLE No.	SAMPLE PEN. (in) / REC.	SAMPLE DEPTH (ft)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION (1) Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
						Fine to coarse SAND, trace Silt	2	FINE TO COARSE SILTY SAND (FILL)
5	10	S-1	24/1	5-7	14-28-15-9	Bituminous concrete	3	
	15							
	12							
	12							
10	15							
	21	S-2	24/8	10-12	62-18-15-14	Dense brown fine to medium SAND, little Silt, trace fine Gravel (Fill)	4	11.0'
	16							MEDIUM TO DENSE SILT
	13							13.0'
	18					Medium dense grayish-brown SILT, trace (-) fine Sand. Conductivity 33.9		
15	20							
	8	S-3	24/6	15-17	21-18-29-34	Dense brown fine to medium SAND, little Silt, trace fine Gravel. Conductivity 15.4		DENSE BROWN FINE TO COARSE SAND
	9							
	9							
	17							
20	18							
	13	S-4	24/3	20-22	19-10-10-11	Medium dense brown fine to coarse SAND, trace Silt, trace fine Gravel. Conductivity 24.5		
	16							
	19							
	23							
25	22							
	17	S-5	18/4	25-26.5	30-34-39	Very dense brown fine to medium to coarse SAND, some fine Gravel, trace Silt. Conductivity 22.2	5	
	18							
	15							
	22							28.5'
	30							
30	10	S-6	24/18	30-32	7-15-10-11	Medium dense brown fine SAND, trace (-) Silt. Conductivity 13.9		MEDIUM DENSE FINE SAND
	16							
	17							
	24							34.0'
	48							

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT.	DENSITY	BLOWS/FT.	DENSITY
0-4	V. LOOSE	< 2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	V. DENSE	15-30	V. STIFF
		>30	HARD

REMARKS: (1) Conductivity measurements performed on equal mixture of soil and distilled water using an Extech digital conductivity meter.
(2) Description of wash sample 1-5'.
(3) No Conductivity test taken.
(4) Both samples in same jar.
(5) Piece of metal in wash at 28'±.

GZA

NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GOLDBERG-ZOINO & ASSOCIATES, INC.
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
Nuclear Metals Inc.
Concord, Massachusetts

REPORT OF BORING No. HB-7
SHEET 2 OF 2
FILE No. A-3646.2
CHKD. BY

DEPTH (ft.)	CASING (bl/ft)	SAMPLE No.	SAMPLE PEN. (in)/REC.	SAMPLE DEPTH (ft)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
	22	S-7	24/15	35-37	94-30-29-28	Very dense grayish brown fine to coarse SAND, trace fine Gravel, trace Silt. Conductivity 17.6'	6	
	20							
	20							
	22							
	28							
40	27	S-8	12/3	40-41	20-79	Very dense brown fine to coarse SAND, trace fine Gravel, trace Silt. Conductivity 9.7'		VERY DENSE FINE TO COARSE SAND
	23							
	24							
	34							
45	31							
	34	S-9	24/6	45-47	97-40-32-25	Very dense brown fine to coarse SAND and GRAVEL, trace Silt. Conductivity 103.7'		
	37							
	47							
	40							
50	41							
		S-10	4/2	50-50.3	100/4"	Very dense brown fine to coarse SAND, trace Silt. Conductivity 24.9'	7	
55	89	S-11	8/3	55-55.7	152-55/2"	Very dense brown medium to coarse SAND, little Silt, trace fine Gravel. Conductivity 12.1'		
	63							
	54							
	62							
	75							
60		S-12	6/5	60-60.2	207/6"	Very dense brown medium to coarse SAND and GRAVEL, little Silt		60.5'
		S-12A		60.3-60.5		S-12A: Very dense brown fine to medium SAND and GRAVEL, little Clayey Silt of slight plasticity. Conductivity 56.6'		VERY DENSE SAND AND GRAVEL
								64.0' (?)
65	137	S-13	6/6	65-65.6	105/6"	Very dense brown fine to medium SAND, trace (-) Silt. Conductivity 18.6'		VERY DENSE FINE TO MEDIUM SAND
	130							
	191							
	261							
	278							70.0'
70	163	S-14	6/3	70-70.6	134/6"	Very dense brown fine to medium SAND, some Clayey Silt of slight plasticity, trace fine Gravel. Conductivity 22.8'		VERY DENSE FINE TO MEDIUM SAND SOME SILT
	114							
	119							
	166							
75	359	S-15	12/8	74-75	40-86	Very dense brown fine to medium SAND, some Clayey Silt of slight plasticity. Conductivity 615		75.3'
						Bottom of boring at 75.3' (Refusal)		

REMARKS:

(6) Piece of gravel caught in spoon sampler
(7) Well installed at completion of boring, 1¼" PVC pipe.
Screen 61.0-74.0
Bentonite seals 74.0-75.3', approximately 59.0'-60.0', 0-1'

GOLDBERG-ZOINO & ASSOCIATES, INC.
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
Nuclear Metals Inc.
Concord, Massachusetts

REPORT OF BORING No. HB-8
SHEET 1 OF 3
FILE No. A-3646.2
CHKD. BY

BORING Co. D.L. Maher Co.
FOREMAN T. Pelezar
GZA ENGINEER Mary Hall (slk)

BORING LOCATION See location plan
GROUND SURFACE ELEVATION _____ DATUM _____
DATE START 6-20-83 DATE END 6-22-83

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 15 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING 300 lb. HAMMER FALLING 24 in.
CASING SIZE: 2½" OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
6-21	8a.m.	30+	30'	18 hrs. (1)
6-22	8a.m.	27.8	20'	18 hrs.
6-23	8a.m.	32.9	0'	18 hrs.

DEPTH (ft.)	CASING (blt/ft)	SAMPLE No.	SAMPLE PEN. (in) / REC.	SAMPLE DEPTH (ft)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION — CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
5		S-1	24/0	5.0-7.0	1-2-5-6	No recovery		
		S-1A	24/3	7.0-9.0	5-5-4-3	Loose brown medium to coarse SAND, trace Silt. (Fill) Conductivity 74.1		MEDIUM TO COARSE SAND (FILL)
	5							
10	4							
	5							
	6							
	7							
	6							
	8							
15	21	S=2	24/2	14.0-16.0	7-8-10-16	Medium dense brown medium to coarse SAND, little fine Gravel, trace Silt (Fill). Conductivity 57.3		
	16							
	17							
	19							
	21							
20	10	S-3	24/3	20.0-22.0	6-7-7-8	Medium dense brown fine to medium SAND, trace fine Gravel, trace Silt (Fill). Conducitvity 20.4		23.0' (?)
	21							
	18							
	15							
	24							
25	21	S-4	24/4	25.0-27.0	18-17-19-20	Dense brown SILT, trace fine Sand. Conductivity 34.0		DENSE SILT
	26							
	21							
	24							
30	25	S-5	24/½	30.0-32.0	11-16-16-19	Dense brown SILT, trace fine Sand		
		S-5A	24/15	30.0-32.0	4-8-15-25	Dense brown SILT, trace fine Sand. Conductivity 37.5	2	32.0'

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT.	DENSITY	BLOWS/FT.	DENSITY
0-4	V. LOOSE	<2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	V. DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:
(1) No water in hole but soil at bottom was wet.
(2) Both samples in same jar.

GZA
NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GOLDBERG-ZOINO & ASSOCIATES, INC.
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
Nuclear Metals Inc.
Concord, Massachusetts

REPORT OF BORING No. HB-8
SHEET 2 OF 3
FILE No. A-3646.2
CHKD. BY

DEPTH (ft.)	CASING (bl/ft)	SAMPLE No.	SAMPLE PEN./REC. (in)	SAMPLE DEPTH (ft)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION (Burmister CLASSIFICATION)	REMARKS	STRATUM DESCRIPTION
	12	S-6	24/2	35-37	10-8-12-12	Medium dense medium to coarse SAND, little Silt, little fine Gravel. Conductivity 8.8		
	13							
	20							
	21							
	25							
40	16	S-7	24/3	40-42	22-19-15-16	Dense brown fine to coarse SAND, some fine Gravel, little Silt. Conductivity 16.9		DENSE FINE TO COARSE SAND, LITTLE GRAVEL
	18							
	20							
	36							
	30							
45	30	S-8	24/2	45-47	15-10-9-10	Medium dense brown fine to coarse SAND, little fine Gravel, trace Silt. Conductivity 23.7	3	
	26							
	27							
	26							
	37							
50	74	S-9	18/15	50-52	25-49-100	Very dense brown fine to coarse SAND, trace fine Gravel, trace Silt. Conductivity 79.0	4	
	55							
	61							
	52							
	48							
55	34	S-10	24/2	55-57	61-38-35-32	Very dense brown fine to coarse SAND, little fine Gravel, trace Silt. Conductivity 16.0	3	
	40							
	57							
	58							
60	48	S-11	15/15	59-60.2	29-70-162/3"	Very dense brown fine to medium SAND, trace fine Gravel, trace Silt. Conductivity 170.0		
	81							
	66							62.0'
	77							
	64							
	76							
65	72	S-12	24/15	65-67	24-25-29-33	Very dense brown fine SAND, trace Silt. Conductivity 81.5		VERY DENSE FINE SAND
	59							
	61							
	66							
70	58	S-13	18/15	69-70.5	57-84/12	Very dense brown fine SAND, trace Silt	4	
	131						5	
	87							
	58							73.0'
	85							
	75							

REMARKS:
(3) Piece of gravel caught in spoon.
(4) Casing moved down 6" while taking sample.
(5) No conductivity reading taken.

GZA

GOLDBERG-ZOINO & ASSOCIATES, INC.
320 NEEDHAM ST, NEWTON UPPER FALLS, MA.
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
Nuclear Metals Inc.
Concord, Massachusetts

REPORT OF BORING No. HB-8
SHEET 3 OF 3
FILE No. A-3646.2
CHKD. BY

DEPTH (ft.)	CASING (bl/ft)	SAMPLE No.	SAMPLE PEN. (in)/REC.	SAMPLE DEPTH (ft)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION Burmister CLASSIFICATION	REMARKS	STRATUM DESCRIPTION
	204	S-14	20/20	75-76.7	10-59-99-67/2"	Very dense gray SILT & CLAY of low plasticity, some fine to coarse Sand, trace fine Gravel. (Till) Conductivity 810.	6	VERY DENSE GLACIAL TILL 77'
	280					Bottom of boring at 77' (Refusal)		
80								
85								
90								

REMARKS:

(6) Well installed at bottom of boring. 1¼" PVC pipe. Screen 61.0'-76.0'. Bentonite seals 76.0'-77.0', 0-1'
PVC pipe moved up approximately 3' while removing casing.

(7) Refer to note 1 on Log HB-7 for description of conductivity testing procedure.

GZA

BORING No. HB-8

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-2

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985760.827 E 677653.9087
Ground El. Datum	187.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
FILL	0			Grout to grade	
	5				
	10				
	15				
	20				
ICE CONTACT DEPOSITS	22.0				
	25				

HALEY ALDRICH

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-2

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985760.827 E 677653.9087
Ground El. Datum	187.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35				
	40				bottom of grout 43.0
	45			Bentonite Pellets	
	50				top of bentonite pellets 53.0
	55				bottom of bentonite pellets 59.3 top of sand 59.3

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-2

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985760.827 E 677653.9087
Ground El. Datum	187.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	60			Top of Screen 61.4 Channel 4 and 1 61.5-61.8 Bottom of Screen 61.9 Bentonite Pellets	bottom of sand 63.9 top of bentonite pellets 63.9
GLACIAL TILL	65 66.0				
TOP OF ROCK 85.5 FT	70 75 80 85				bottom of bentonite pellets 83.4 top of sand 83.4 bottom of sand 85.0 top of bentonite pellets 85.0
BEDROCK	85.5			Top of Screen 85.4 Channel 5 and 2 85.5-85.8 Bottom of Screen 85.9 Bentonite Pellets	bottom of bentonite pellets 89.4 top of sand 89.4

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NM\IGINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-2

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram: Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985760.827 E 677653.9087
Ground El. Datum	187.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	90				
				Top of Screen 91.4 Channel 3 91.5-91.8 Bottom of Screen 91.9 Bentonite Pellets	bottom of sand 93.9 top of bentonite pellets 93.9
	95				
	100				
	105				
	110				
	115				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-2

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	10 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985760.827 E 677653.9087
Ground El. Datum	187.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	120				bottom of bentonite pellets 120.9 top of sand 120.9
				Top of Screen 122.9 Channel 6 123.0-123.3 Bottom of Screen 123.4 Bentonite Pellets	
	125				bottom of sand 125.4 top of bentonite pellets 125.4
	130				bottom of bentonite pellets 133.4 top of sand 133.4
	135				bottom of sand 135.6
BOTTOM OF EXPLORATION 135.6 FT	135.6			Top of Screen 135.4 Channel 7 Bottom of Screen 135.6	

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HALEY ALDRICH

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-1

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	06 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985714.75 E 677779.6621
Ground El. Datum	177.1

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS	0			Grout to grade	
	5				
	10				
	15				
	20				
	25				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-1

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	06 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985714.75 E 677779.6621
Ground El. Datum	177.1

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35				
	40				
	45			Bentonite Pellets	bottom of grout 45.0 top of bentonite pellets 45.0
	50				bottom of bentonite pellets 52.0 top of sand 52.0
	55			Top of Screen 55.9 Channel 1 56.0-56.3 Bottom of Screen 56.5 Bentonite Pellets	

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-1

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	06 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985714.75 E 677779.6621
Ground El. Datum	177.1

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
	60				bottom of sand 60.0 top of bentonite pellets 60.0
GLACIAL TILL	60.0				bottom of bentonite pellets 63.0 top of sand 63.0
	65			Top of Screen 64.9 Channel 2 65.0-65.3 Bottom of Screen 65.4 Bentonite Pellets	bottom of sand 68.0 top of bentonite pellets 68.0
	70				bottom of bentonite pellets 70.7 top of sand 70.7
BEDROCK	72.0			Top of Screen 72.9 Channel 3 and 6 73.0-73.3 Bottom of Screen 73.4 Bentonite Pellets	bottom of sand 77.0 top of bentonite pellets 77.0
	75				
	80				bottom of bentonite pellets 83.0 top of sand 83.0
	85			Top of Screen 85.9 Channel 5 86.0-86.3 Bottom of Screen 86.4 Bentonite Pellets	bottom of sand 88.0 top of bentonite pellets 88.0

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-1

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	06 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985714.75 E 677779.6621
Ground El. Datum	177.1

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	90				~~bottom of bentonite pellets 91.0~~ top of sand 91.0
	95			Top of Screen 94.3 Channel 6 94.4-94.7 Bottom of Screen 94.8	~~bottom of sand 94.8~~

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-6

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985799.469 E 677818.2195
Ground El. Datum	177.3

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
FILL	0			Grout to grade	
	5				
	10				
	15				
ICE CONTACT DEPOSITS	16.0				
	20				
	25				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-6

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985799.469 E 677818.2195
Ground El. Datum	177.3

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35				
	40				
	45				bottom of grout 48.0
				Bentonite Pellets	top of bentonite pellets 48.0
	50				
	55				

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-6

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram: Riser Pipe; Screen; Filter Sand; Cuttings; Grout; Concrete; Bentonite Seal

File No.	131884-004
Date Installed	15 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985799.469 E 677818.2195
Ground El. Datum	177.3

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	60				bottom of bentonite pellets 48.0 top of sand 63.0
	65			Top of Screen 65.0 Channel 65.1-65.4 Bottom of Screen 65.5 Bentonite Pellets	bottom of sand 67.5 top of bentonite pellets 67.5
FLOW TILL	68.0				
GLACIAL TILL	70				
TOP OF ROCK 76.5 FT	75				bottom of bentonite pellets 75.0 top of sand 75.0
BEDROCK	76.5			Top of Screen 77.0 Channel 4 and 1 77.1-77.4 Bottom of Screen 77.5 Bentonite Pellets	bottom of sand 79.5 top of bentonite pellets 79.5 bottom of bentonite pellets 81.0 top of sand 81.0
	80				
	85			Top of Screen 83.0 Channel 3 83.1-83.4 Bottom of Screen 83.5 Bentonite Pellets	bottom of sand 85.5 top of bentonite pellets 85.5

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CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-6

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985799.469 E 677818.2195
Ground El. Datum	177.3

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	90				
	95				bottom of bentonite pellets 97.5 top of sand 97.5
	100			Top of Screen 99.5 Channel 5 99.6-99.9 Bottom of Screen 100.0 Bentonite Pellets	bottom of sand 102.0 top of bentonite pellets 102.0
	105				
	110				
	115				bottom of bentonite pellets 116.0 top of sand 116.0
				Top of Screen 118.0 Channel 6 118.1-118.3 Bottom of Screen 118.5	

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-6

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez/F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Dec 2020
H&A Rep.	A. Midgley
Location	N 2985799.469 E 677818.2195
Ground El. Datum	177.3

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	120			Bentonite Pellets	bottom of sand 120.5 top of bentonite pellets 120.5
					bottom of bentonite pellets 123.3 top of sand 123.3
	125			Top of Screen 125.3 Channel 7 Bottom of Screen 126.5	bottom of sand 126.5

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

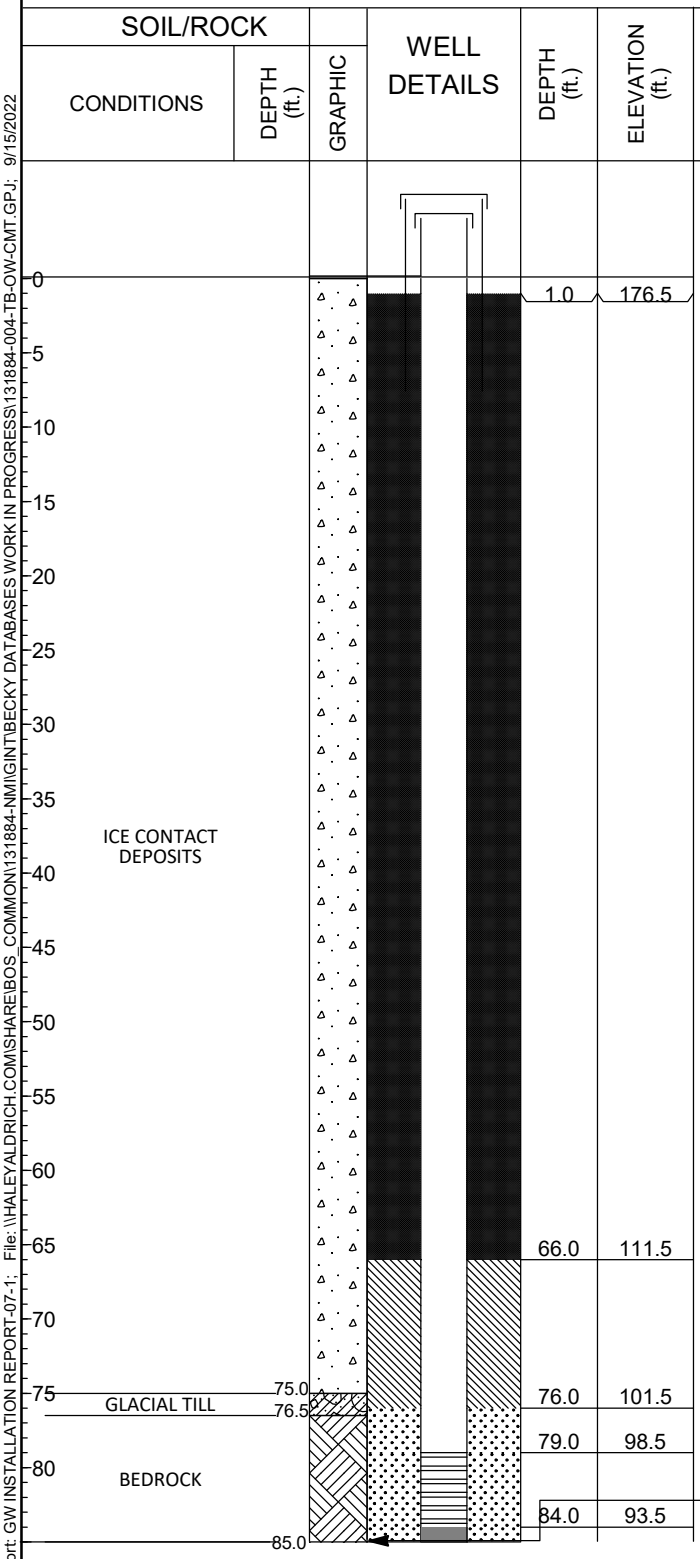
Well No. HA20-CMT-6(OW)
Boring No. HA20-CMT-6(OW)

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	R. Maillette
Initial Water Level (depth bgs)	ft

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

File No.	131884-004
Date Installed	13 Jan 2021
H&A Rep.	D.M. Palleiko
Location	N 2985790.239 E 677815.007
Ground El.	177.5
Datum	NGVD, 1929



WELL CONSTRUCTION DETAILS

Type of protective cover	Guard Pipe
Height of Guard Pipe above ground surface	2.9 ft
Height of top of riser above ground surface	2.8 ft
Type of protective casing	Guard Pipe
Length	5.0 ft
Inside diameter	4.0 in.
Depth of bottom of Guard Pipe	2.1 ft
Type of riser pipe	Sch. 40 PVC
Inside diameter of riser pipe	2.0 in.
Depth of bottom of riser pipe	79.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Grout	1.0	65.0
Bentonite	66.0	10.0
	-	-

Diameter of borehole	6.0 in.
Depth to top of well screen	79.0 ft
Type of screen	Machine slotted Sch 40 PVC
Screen gauge or size of openings	0.010/10 slot
Diameter of screen	2.0 in.
Type of Backfill around Screen	#0 Sand
Depth to bottom of well screen	84.0 ft
Bottom of silt trap	85.0 ft
Depth of bottom of borehole	85.0 ft

COMMENTS:

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-5

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985880.983 E 677820.574
Ground El. Datum	173.5

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
FILL	0			Grout to grade	
ICE CONTACT DEPOSITS	2.0				
	5				
	10				
	15				
	20				
	25				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-5

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram: Riser Pipe; Screen; Filter Sand; Cuttings; Grout; Concrete; Bentonite Seal

File No.	131884-004
Date Installed	15 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985880.983 E 677820.574
Ground El. Datum	173.5

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35			Bentonite Pellets	bottom of grout 35.0 top of bentonite pellets35.0
	40				bottom of bentonite pellets 40.0 top of sand 40.0
	45			Top of Screen 44.9 Channel 1 45.0-45.3 Bottom of Screen 45.4 Bentonite Pellets	
	50				bottom of sand 50.0 top of bentonite pellets 50.0
	55				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-5

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985880.983 E 677820.574
Ground El. Datum	173.5

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	60				bottom of bentonite pellets 60.0 top of sand 60.0
	65			Top of Screen 64.9 Channel 2 65.0-65.3 Bottom of Screen 65.4 Bentonite Pellets	bottom of sand 68.0 top of bentonite pellets 68.0
FLOW TILL	70	70.0			bottom of bentonite pellets 70.6 top of sand 70.6
				Top of Screen 72.9 Channel 3 73.0-73.3 Bottom of Screen 73.4 Bentonite Pellets	
GLACIAL TILL	75	76.0			bottom of sand 76.0 top of bentonite pellets 76.0
TOP OF ROCK 77.8 FT BEDROCK		77.8			bottom of bentonite pellets 79.0 top of sand 79.0
	80				
				Top of Screen 81.9 Channel 4 82.0-82.3 Bottom of Screen 82.5 Bentonite Pellets	
	85				bottom of sand 86.0 top of bentonite pellets 86.0
					bottom of bentonite pellets 89.0 top of sand 89.0

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-5

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985880.983 E 677820.574
Ground El. Datum	173.5

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	90			Top of Screen 91.9 Channel 5 92.0-92.3 Bottom of Screen 92.4 Bentonite Pellets	bottom of sand 97.0 top of bentonite pellets 97.0
	95				
	100				
	105				
	110				bottom of bentonite pellets 113.0 top of sand 113.0
	115			Top of Screen 116.9 Channel 6 117.0-117.3 Bottom of Screen 117.4 Bentonite Pellets	

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-5

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	O. Gonzalez

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	15 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985880.983 E 677820.574
Ground El. Datum	173.5

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	120				bottom of sand 122.0 top of bentonite pellets 122.0
	125				bottom of bentonite pellets 125.0 top of sand 125.0
	130			Top of Screen 129.4 Channel 7 129.4-129.6 Bottom of Screen 129.6	bottom of sand 129.6

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

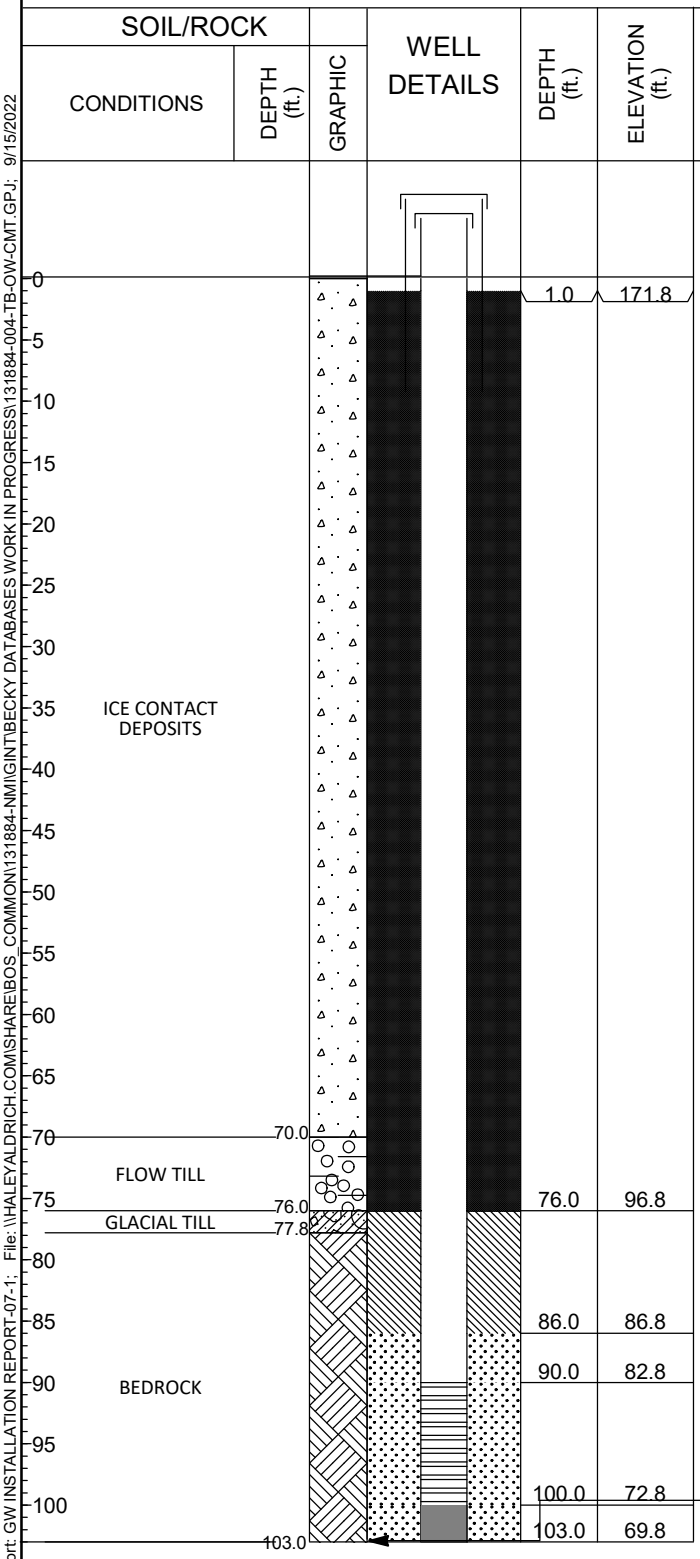
Well No. HA20-CMT-5(OW)
Boring No. HA20-CMT-5(OW)

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	R. Maillette
Initial Water Level (depth bgs)	ft

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	16 Jan 2021
H&A Rep.	D.M. Palleiko
Location	N 2985892.135 E 677817.646
Ground El.	172.8
Datum	NGVD, 1929



WELL CONSTRUCTION DETAILS

Type of protective cover	Guard Pipe
Height of Guard Pipe above ground surface	3.0 ft
Height of top of riser above ground surface	2.9 ft
Type of protective casing	Guard Pipe
Length	5.0 ft
Inside diameter	4.0 in.
Depth of bottom of Guard Pipe	2.0 ft
Type of riser pipe	Sch. 40 PVC
Inside diameter of riser pipe	2.0 in.
Depth of bottom of riser pipe	90.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Grout	1.0	75.0
Bentonite	76.0	10.0
	-	-

Diameter of borehole	6.0 in.
Depth to top of well screen	90.0 ft
Type of screen	Machine slotted Sch 40 PVC
Screen gauge or size of openings	0.010/10 slot
Diameter of screen	2.0 in.
Type of Backfill around Screen	#0 Sand
Depth to bottom of well screen	100.0 ft
Bottom of silt trap	103.0 ft
Depth of bottom of borehole	103.0 ft

COMMENTS:

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-4

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	13 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985929.262 E 677779.7947
Ground El. Datum	173.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS	0			Grout to grade	
	5				
	10				
	15				
	20				
	25				

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-4

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	13 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985929.262 E 677779.7947
Ground El. Datum	173.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	30				
	35				
	40				
	45				bottom of grout 46.0
				Bentonite Pellets	top of bentonite pellets 46.0
	50				
	55				bottom of bentonite pellets 58.0 top of sand 58.0

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

HALEY ALDRICH

Boring No. HA20-CMT-4

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	13 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985929.262 E 677779.7947
Ground El. Datum	173.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
ICE CONTACT DEPOSITS...*continued*...	60				
	65			Top of Screen 61.9 Channel 1 62.0-62.3 Bottom of Screen 62.4 Bentonite Pellets	bottom of sand 67.0 top of bentonite pellets 67.0
	70				
GLACIAL TILL	74.0				bottom of bentonite pellets 75.0 top of sand 75.0
	75				
	80			Top of Screen 78.9 Channel 2 79.0-79.3 Bottom of Screen 79.4 Bentonite Pellets	bottom of sand 84.0 top of bentonite pellets 84.0
	85				
TOP OF ROCK 88.0 FT BEDROCK	88.0				bottom of bentonite pellets 88.0 top of sand 88.0

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022

CONTINUOUS MULTICHANNEL TUBING WELL INSTALLATION REPORT

Boring No. HA20-CMT-4

Project	NUCLEAR METALS INC.
Location	CONCORD, MA
Client	DE MAXIMIS, INC.
Contractor	Cascade Drilling
Driller	F. Gardella

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No.	131884-004
Date Installed	13 Jan 2021
H&A Rep.	A. Midgley
Location	N 2985929.262 E 677779.7947
Ground El. Datum	173.9

Soil/Rock CONDITIONS	DEPTH (ft.)	GRAPHIC	Well Details	Borehole Backfill	Installation Comments
BEDROCK...*continued*...	90			Top of Screen 90.9 Channel 3 and 6 91.0-91.3 Bottom of Screen 91.4 Bentonite Pellets	
	95				bottom of sand 95.0 top of bentonite pellets 95.0
	100				bottom of bentonite pellets 100.0 top of sand0100.0
	105			Top of Screen 102.9 Channel 4 103.0-103.3 Bottom of Screen 103.4 Bentonite Pellets	bottom of sand 106.0 top of bentonite pellets0106.0
	110				bottom of bentonite pellets 109.0 top of sand
				Top of Screen 110.9 Channel 5 111.0-111.3 Bottom of Screen 111.4 Bentonite Pellets	
				Top of Screen 113.0 Channel 7 Bottom of Screen 113.2	

Report: CMT REPORT; File: \\HALEYALDRICH.COM\SHARE\BOS_COMMON\131884-NMI\GINT\BECKY DATABASES WORK IN PROGRESS\131884-004-TB-OW-CMT.GPJ; 9/12/2022