MAINE DEPARTMENT OF

INLAND FISHERIES AND WILDLIFE

ADDENDUM NO. 3

24-AUG-23

TO THE SPECIFICATIONS, PROPOSAL, CONTRACT AND BOND

FOR THE CONSTRUCTION OF

IMPROVEMENTS AT GRAND LAKE STREAM STATE FISH HATCHERY
GRAND LAKE STREAM, MAINE

WASHINGTON COUNTY

BGS PROJECT NO.: 3289-14

BID DATE: 07 SEPTEMBER 2023

SUBJECT:	**ADDENDUM NO. 3**
PROJECT:	Improvements at Grand Lake Stream State Fish Hatchery
DATE:	Wednesday, August 23, 2023
TO:	Richard Parker - DIFW
FROM:	Andrew Gurski – HDR

This Addendum is issued to known individuals, firms or corporations holding Bidding Documents and Contract Documents for above listed project.

This Addendum is hereby made a portion of Bidding Documents and Contract Documents. Bidders are required to acknowledge receipt of Addendum in appropriate space on Bid Form.

QUESTIONS AND ANSWERS

1. **QUESTION:** Typical notes has a detail on pressure relief valves, says as shown on the plans. I can not find any shown on the plans. I assume they are meant to go in the round tanks? You have a spec on a pressure relief valve, but not certain about what Harvest Kettles means.

   > Wheatley.
   >
   > 2.8 **PRESSURE RELIEF VALVES AT POND HARVEST KETTLES**: Flanged iron flap check valve such as Waterman PRB-14 or equal by Penn Troy or Neenah.

   ANSWER: Plans 02D-102 and 03D-102 have Section cuts referring to next sheets where Section 3 shows valves. We do not have any pond harvest kettles in this job. References will be removed in the specs.
   SOURCE: *Mark McPheters mark@tbuckconstruction.net Wednesday, August 16, 2023 4:54 PM*

2. **QUESTION:** Attachment B to section 01 45 33 pages 141 through 146 are blank in the bidding documents.
   ANSWER: Attachment B shall be removed in its entirety.
   SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 8:07 AM*

3. **QUESTION:** Sheet 03s-101 has a section through what I believe is a storage room labeled E/03S-301. Page 03s-301 does not exist, not in the plans or legend.
   ANSWER: The reference to 03S-301 is incorrect and should be 3/00S-103.
   SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 10:02 AM*

4. **QUESTION:** There are several specification sections for masonry. I am struggling to find where it is located, possibly the storage room in the Lower Pavilion?
   ANSWER: The Division 4 specifications are not required and will be removed.
   SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 10:02 AM*

5. **QUESTION:** I see a specification for water testing of the aquaculture tanks to be water tested. I do not see a specification for the poured in place concrete tanks to be water tested. Will poured in place tanks need to be water tested?

ANSWER: Yes. Specification 01 45 25 – Testing Concrete Structures for Watertightness has been added.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 10:28 AM*

6. **QUESTION:** Where is section 07 27 26 fluid applied vapor barrier to be used? Typically, it is used in the cavity of a block wall. I have searched the plans and cannot find where it is to be applied.
ANSWER: This is not required and this spec section will be deleted.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 3:27 PM*

7. **QUESTION:** I am confused by section 13 34 00 post framed building system. Is that section for the Storage building? Details on the plans seem to indicate at conventionally framed building with wood trusses and concrete foundation.
ANSWER: This specification section is not required and will be deleted.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 4:24 PM*

8. **QUESTION:** Page 06C-101 points the oxygen slab and says future. There is a specification for the oxygen system so I assume we are constructing the slab and oxygen system and building over the system would be future? Please confirm.
ANSWER: The callout for 'FUTURE STRUCTURE' will be modified to state 'NEW OXYGEN PAD.'
SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 4:24 PM*

9. **QUESTION:** Comment from my overhead door installer: "Spec has full view aluminum doors And plans have 2" solid panel doors". Please clarify.
ANSWER: Overhead garage doors shall be per the specifications.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Thu 8/17/2023 15:34*

10. **QUESTION:** I assume these dates are a typo.

> **ARTICLE 2 COMMENCEMENT AND COMPLETION DATES**
>
> **2.1** The Work of this Contract shall commence no sooner than the date this document is executed by the approval authority, or a subsequent date designated in the contract documents.
>
> **2.2** The Substantial Completion Date shall be ***15 December 2023***.
>
> **2.3** The Work of this Contract shall be completed on or before the Contract Final Completion Date of ***31 December 2023***.
>
> **2.4** The Contract Expiration Date shall be ***29 February 2024***. (This date is the Owner's deadline for internal management of contract accounts. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.)

ANSWER: *From DIFW* - This is a sample of what the contract format will be (water mark saying sample). Dates in this sample are not applicable to any project. At this stage you can find these dates in the Notice to Contractor section 00 11 13
SOURCE: *Richard Wentworth richard@tbuckconstruction.net Wednesday, August 9, 2023 11:14 AM*

11. **QUESTION:** Can you tell me who did the installation and services the existing Oxygen System at the hatchery? Also who fills the tanks.

ANSWER: *From DIFW* - Air Gas is the supplier of these tanks as well as our smaller high pressure oxygen tanks which are provided/leased/refilled by them via state contract. I believe more relevant would our bulk oxygen suppler by way of state contract which is Maine Oxy who serves all our facilities (excluding Grand Lake and New Gloucester which have yet to receive Department owned bulk tanks & LHO systems). Maine Oxy has also serviced our bulk delivery tanks/systems as needed. Dale Gamage 207-740-6643
SOURCE: *Mark McPheters mark@tbuckconstruction.net Friday, August 18, 2023 10:00 AM*

12. **QUESTION:** I believe soil borings were done on this project. Can we get a copy of the soils report?
ANSWER: The Geotechnical Report has been added to the Appendix of the construction manual.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Fri 8/18/2023 12:33*

13. **QUESTION:** Sheet 04D-402 references sheet 00D-602 for the back wash pump BWSP-1&2 information. I do not find the backwash pump information on the sheet. Also don't see the pump conditions in the specification.
ANSWER: The pumps on Sheet 04D-402 should be tagged CP0401 and CP0402. The pump conditions can be found in the submersible pump schedule on sheet 00D-602.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Fri 8/18/2023 12:33*

14. **QUESTION**: Please provide the required Collateral Load for the PEMBs. Collateral Loads will be supporting MEPs which typically run from 3-5 PSF.
ANSWER: Use 5 PSF for the collateral loads for the PEMBs.
SOURCE: *Mark McPheters mark@tbuckconstruction.net Monday, August 21, 2023 06:43*

15. **QUESTION:** The basic wind speed of 108mph? Note that IBC 2015 requires Ultimate Wind Speed which we believe to be 115mph. Please confirm.
ANSWER: Correct. Please use 115mph for the ultimate wind speed.
SOURCE: *Mark McPheters <mark@tbuckconstruction.net Monday, August 21, 2023 06:43*

16. **QUESTION:** Are wall or ceiling liner panels required in either the pavilions or the effluent treatment building? If so, please specify ceiling and wall locations for each building.
ANSWER: Liner panels are not required for walls. If the roof insulation will be batt insulation instead of rigid insulation, a liner panel shall be required with a vapor retarder, similar to the ThermaLiner Insulation System by Butler.
SOURCE: *Mark McPheters <mark@tbuckconstruction.net Monday, August 21, 2023 06:43*

17. **QUESTION:** Please clarify rigid insulation requirements for the building roofs. The VSR roof system is not designed for rigid insulation and would have to be custom designed.
ANSWER: If rigid insulation is not standard with the roof panels, batt insulation with a liner panel and vapor retarder may be used, similar to the ThermaLiner Insulation System by Butler.
SOURCE: *Mark McPheters <mark@tbuckconstruction.net Monday, August 21, 2023 06:43*

18. **QUESTION:** Please provide plan holders list.
ANSWER: Pre-Bid Sign in Sheet is attached to this addendum.

SPECIFICATION UPDATES

19. **SECTION 01 45 25 – TESTING CONCRETE STRUCTURES FOR WATERTIGHTNESS**
    ADDED: Added specification 01 45 25 to project manual. See attached.

20. **SECTION 01 75 00 – FACILITY STARTUP**
    UPDATE: Part 3.2, B., 4.: Replace a through i with "Piping, valves, gates, manholes, meters, 20-ft round tanks, existing raceways, low head oxygenators, weirs, drumfilters, pumps, clarifier and sludge storage tanks."

21. **SECTION 40 05 52 – MISCELLANEOUS VALVES**
    UPDATE: Part 2.8: Delete "at pond harvest kettles.**"**

22. **SECTION 40 60 05 - SLUICE & SLIDE GATES AND METAL STOPLOGS**
    UPDATE: Part 2.1, A.: Delete "Structural Sheets and" and Delete 2nd sentence of paragraph.

23. **SECTION 40 60 05 – SLUICE & SLIDE GATES AND METAL STOPLOGS:**
    UPDATE: Delete Parts 2.2 through 2.6 regarding mud valves in this Section since Section 40 05 52 better addresses mud valves.

DRAWING UPDATES

24. **SHEET 00D-502, DETAIL 2:**
    UPDATE: Change "Not applicable under structure" To "The bedding up to the spring-line of Type B pipe shall be Compacted Granular Bedding. Under structures all fill above the Compacted Granular Bedding shall be Structural Fill."

25. **SHEET 04D-401, GENERAL NOTES:**
    UPDATE: Add "3. Each mud valve shall have a 30-inch stem extension supported to the nearest concrete sump wall. Provide 3-inch diameter hole in decking/grating above and slit in floor mat above for passage of operating wrench socket."

26. **SHEET 04D-402**
    UPDATE: Plan 1: Change "BSWP-1" and "BSWP-2" To "CP0401" and "CP-0402."

27. **SHEET 00S-103**
    ADD: Attached detail 3/00S-103 "THICKENED SLAB DETAIL". See updated plan sheet in this addendum.

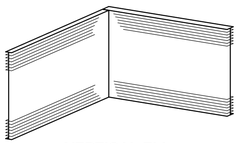
JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

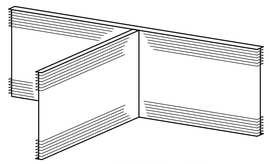
JUDITH CAMUSO
COMMISSIONER

Grand Lake Stream BREM 3289-14 Pre-Bid Meeting August 1, 2023

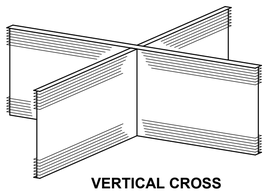
COMPANY NAME	CONTRACTOR NAME	PHONE NUMBER	EMAIL ADDRESS
T-Buck Construction, Inc	Richard Wentworth	207-595-0702	richard@tbuckconstruction.net
Wilcox Electric	Brian Wilcox	207-827-6432	brian@wilcoxelectricinc.com
Border Electric	Stephen Smith	207 454 8619	Beinc@gwi.net



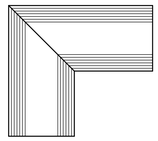
VERTICAL ELL



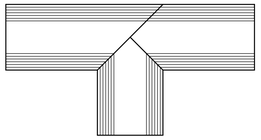
VERTICAL TEE



VERTICAL CROSS



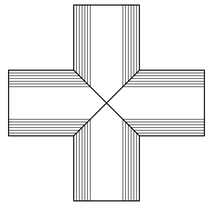
FLAT ELL



FLAT TEE

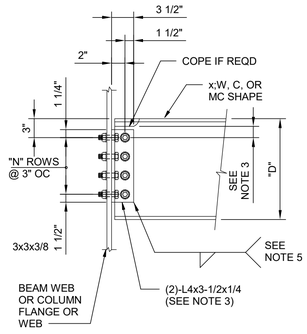
NOTES:

1. BULB TYPE WATERSTOPS SHALL BE HANDLED SIMILAR TO AS SHOWN WITH BULB JOINTS MITERED FOR FULL CONTINUITY OF HOLLOW BULB.
2. ONLY STRAIGHT BUTT JOINT WELDS ARE ALLOWED IN THE FIELD.



FLAT CROSS

1 / - SHOP FABRICATED WATERSTOP
NOT TO SCALE

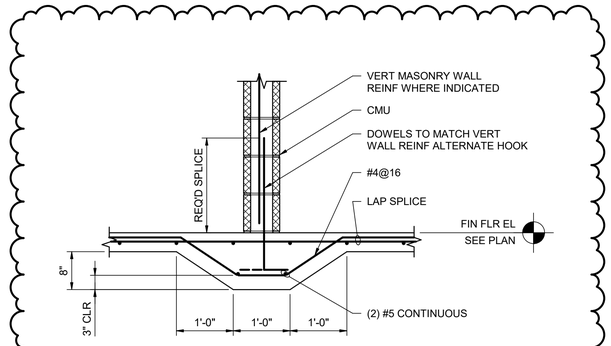


STANDARD BOLTED CONNECTION SCHEDULE		
NOMINAL BEAM SIZE "D"	NUMBER OF BOLT ROWS "N"	WELD SIZE
W8	2	3/16
W10	2	3/16
W12	3	3/16
W14	3	3/16
W16	3	1/4
W18	4	1/4
W21	4	1/4
W24	4	1/4
W27	5	1/4
W30	5	5/16
W33	6	5/16
W36	6	5/16

NOTES:

1. ALL BOLTS SHALL BE 3/4"∅ A325-N FOR STEEL CONSTRUCTION. ALL BOLTS SHALL BE 3/4"∅ SST FOR ALL OTHER CONSTRUCTION.
2. PROVIDE MINIMUM NUMBER OF BOLT ROWS "N" SHOWN AS THE TYPICAL CONN. INCREASE NUMBER OF ROWS AND / OR BOLT DIA. IF INDICATED ON PLANS.
3. MIN. DISTANCE FROM ℄ OF TOP BOLT TO A COPE SHALL BE 1-1/2". WHERE DEEP COPES ARE REQD., INCREASE DISTANCE FROM TOP OF BEAM TO ℄ OF TOP BOLT.
4. USE STANDARD OR SHORT HORIZONTAL SLOTTED HOLES AS REQUIRED.
5. WELD DOUBLE ANGLES TO BEAM WEB IN LIEU OF BOLTING AT CONTRACTORS OPTION.

2 / - TYPICAL BEAM CONNECTION
NOTES: NOT TO SCALE



3 / - THICKENED SLAB DETAIL
NOTES: NOT TO SCALE

A3

D

C

B

A

Autodesk Docs://10357686_MaineDIF_GrandLake Stream Exp_2022/10357686-00-G.rvt
8/23/2023 4:09:04 PM

ISSUE	DATE	DESCRIPTION
A3	08/23/2023	ADDENDUM 3
	07/14/2023	ISSUED FOR BID

PROJECT MANAGER	ANDREW GURSKI
CIVIL	J. GAGNON
STRUCTURAL	B. BRADLEY
ARCHITECTURAL	M. BASKIN
PROCESS	J. CHANDLER
MECHANICAL	J. CHANDLER
ELECTRICAL	A. KANER
PROJECT NUMBER	10357686

IMPROVEMENTS AT GRAND LAKE STREAM STATE FISH HATCHERY

GENERAL STRUCTURAL DETAILS 3

0 1" 2"

FILENAME 103537686-00-G.rvt
SCALE As indicated

SHEET **00S-103**

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SECTION 01 45 25
TESTING CONCRETE STRUCTURES FOR WATERTIGHTNESS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for furnishing all labor, materials, tools, equipment, and services, for all testing of concrete structures for watertightness, in accord with provisions of the Contract Documents.
   2. Completely coordinate with work of all other trades.
   3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete leak test.

B. Related Sections include but are not necessarily limited to, DIV 03:

C. Payment:
   1. Contractor to pay all costs required for testing, test water, retesting, patching, repair and work required to provide access for repair as required to meet watertightness requirements specified or indicated.

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. American Concrete Institute (ACI):
      a. 350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures and Commentary.
   2. NSF International (NSF).
   3. Underwriters Laboratories, Inc. (UL).
   4. United States Department of Agriculture (USDA).
   5. Water Quality Association (WQA).

1.3 SUBMITTALS

A. Shop Drawings:
   1. Watertightness testing plan:
      a. Plan shall include:
         1) Schedule for testing.
         2) Description of testing apparatus for measuring water level in structure and evaporation pan.
            a) Include Drawings (plans, sections, and details), sketch, or photos as appropriate to fully describe apparatus.
         3) Location plan showing measurement location and evaporation pan location.
         4) Procedures for isolation of tank or compartments to assure a constant volume during testing.
         5) Narrative describing testing procedure.
         6) Calculations showing:
            a) Total structure volume at water elevation for commencement of test period.
            b) Maximum water leakage allowed.
            c) Test period: See ACI 350.1.
         7) Plan shall be in accordance with ACI 350.1, Chapters 1 and 2.
   2. If structure has running water leaks or otherwise fails watertightness test, submit repair and patching plan. Include with plan:
      a. Location and areas of leaks.
      b. Repair material and procedures proposed for repair.

c. Photographs of all visible leaks and damp areas.
   1) Include distant photos and close-ups to document conditions.

B. Informational Submittals:
   1. Results of watertightness testing indicating the following:
      a. Level of water in structure and in evaporation pan and water temperature at commencement of test period.
      b. Level of water in structure and in evaporation pan and water temperature at end of test period.
      c. Net leakage in percent of total volume during test period (gross leakage minus that due to evaporation).
      d. Results of retesting required due to leakage exceeding specified percentages allowed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Non-shrink grout: See DIV 03.
   2. Epoxy grout: See DIV 03
   3. Instant setting waterstop:
      a. Sikaset Plug by Sika Corporation.
      b. Sikafix HH LV by Sika Corporation.
      c. MasterSeal 590 by BASF.
   4. Injectable polyurethane sealant:
      a. De Neef by GCP Applied Technologies, Inc.
      b. SikaFix HH+ by Sika Corporation.
      c. Mountain Grout by Green Mountain International.
   5. Epoxy adhesive:
      a. Sikadur-35 Hi-Mod LV by Sika Corporation.

B. Reference Division 03 specifications for patching and repair materials.

2.2 MATERIALS

A. Water for Testing:
   1. See ACI 350.1.
   2. Wastewater plant: Raw or treated effluent water.
   3. Water treatment: Potable water.
   4. Coordinate delivery of water for testing with Owner.

A. Reference DIV 03 for patching and repair materials.

B. Any patching or repair materials that may come into contact with potable water in tanks shall be approved for drinking water per NSF, UL, USDA, or WQA.

PART 3 - EXECUTION

3.1 PREPARATION BEFORE TESTING

A. General:
   1. Verify the specified 28-day concrete strength has been achieved prior to testing.
   2. Testing to be performed prior to placement of exterior backfill soil.
      a. Contractor is responsible for phasing construction to minimize the impact of and to leak testing.
   3. Contractor to furnish all necessary materials (such as gaskets and flange cover plates).
   4. Testing to be performed prior to application of any specified coatings or insulation or backfilling, unless otherwise noted.

5. Test the following tanks prior to backfilling:
    a. Clarifier, sludge storage tank, pump station wet well and sumps for drumfilters.

A. Source of water:
    1. Coordinate use and delivery of test water test with Owner.
    2. The source of water will be hatchery effluent water].
    3. Contractor shall provide the means of transporting the water to the structure being tested.

B. Cleaning:
    1. Thoroughly clean interior of structure to be tested of all debris and dirt and hose down surfaces of all walls and slabs.
    2. Cleaning may be required after satisfactory test completion.

C. Patching and Finishing:
    1. Prepare concrete surfaces in accordance with ACI 350.1 and DIV 03.
        a. Fill all holes, voids, and honeycombed areas per DIV 03. Cracks suspected to cause leakage to be filled and sealed.
        b. Review tank for areas of potential leakage before filling.

3.2 WATERTIGHTNESS TESTING

Commence testing with water 12” from structure rim unless specified otherwise in the Drawings or other Sections.

A. Perform a watertightness test as required by Engineer on any additional structure when in the opinion of the Engineer the structure contains sufficient concrete defects that could impair the watertightness of the structure.
    1. Testing to conform to requirements of this Section with allowable leakage and other criteria as established by Engineer.

B. Test for leakage in accordance with ACI 350.1, latest edition, Chapters 1 and 2, and this Section.
    1. Isolate sections of structures that can be isolated during operation.
        a. Test each section separately.
    2. Allow Owner’s Representative to witness testing for watertightness and review accompanying results.

C. Place evaporation pan in an easily accessible location.

D. Record level of water in structure and evaporation pan and water temperature at commencement of the test period.

E. During testing period, inspect structure for areas indicating leakage.
    1. Any areas evidencing running water to be repaired and patched.
    2. Patching or repair of leaks as defined above shall be completed independent of the watertightness test.
        a. Passing watertightness test does not relieve Contractor from repairing running water leaks.

F. Record level of water surface in the structure and evaporation pan and temperature every 24 HRS until end of test period.
    1. Test periods defined per ACI 350.1.

G. If leakage is greater than that allowed, repair and patch areas suspected of causing the leakage.
    1. Re-test structure using the same procedure until leakage is equal to or less than that allowed.
    2. Provide repair plan to Engineer for approval prior to repair of tank.
    3. Cracks suspected to cause leakage to be filled and sealed to prevent leakage.
        a. Patching to be performed after defective concrete area is cleaned of all loose material to surface of sound concrete.
    4. Prior to patching activities, Contractor to submit patching materials and procedures for review and approval by Engineer.

H. Dispose of water used for testing.

1. Dispose of water used for testing to an area which will not damage new or existing construction and will not interfere with construction operations or plant operations.
2. Provide hoses, temporary connections, temporary fittings and other conduits as necessary to dispose of test water without damage to structure or terrain.
3. Point of disposal to be approved by Owner.

END OF SECTION

APPENDIX A

GEOTECHNICAL REPORT, GRAND LAKE STREAM FISH HATCHERY IMPROVEMENTS,

05MAY2023

The key to success starts with a solid foundation.
ENGINEERING | EXPLORATION | EXPERIENCE

Geotechnical Report

Grand Lake Stream State Fish Hatchery Improvements
Grand Lake Stream, Maine

Client

HDR, Inc.
5201 South Sixth Street Road
Springfield, IL 62703

Project #: 22430
Date: 5/5/2023

SUMMIT
GEOENGINEERING SERVICES

Mailing: PO Box 515, Gardiner, ME 04345
Office: 210 Maine Avenue, Farmingdale, ME 04344
www.summitgeoeng.com

May 5, 2023
Summit #22430

Attn: Andrew Gurski
HDR, Inc.
5201 South Sixth Street Road
Springfield, IL 62703

Reference: Geotechnical Engineering Services
Fish Hatchery Improvements – Hatchery Lane, Grand Lake Stream, ME

Dear Mr. Gurski;

Summit Geoengineering Services, Inc. (SGS) has completed the geotechnical investigation for the improvements proposed at Grand Lake Stream State Fish Hatchery (SFH) located on Hatchery Lane in Grand Lake Stream, Maine. The scope of services included performing test borings at the site and preparing this report summarizing our findings and geotechnical recommendations for new hatchery structures.

The subsurface soils consist of topsoil overlying fill overlying glacial stream deposit explored to a depth range of 18.1 to 20.7 feet below ground surface (BGS). Refusal on probable bedrock was encountered at a depth of 18.1 feet BGS in boring B-1. The static groundwater table was observed at a depth range of 3.5 to 6.5 feet BGS. Artesian groundwater conditions were observed with water rising up to 2 feet BGS. Geotechnical considerations for site improvements include foundations bearing on silt and sand with potential for isolated organic soils and/or buried debris, and the stability of excavations below groundwater. Temporary bracing may be required for these excavations. New structures can be supported with conventional shallow foundation systems given the limitations provided within this report are followed.

This report provides discussion of the geotechnical findings and design recommendations for new hatchery structures. The geotechnical evaluation herein is based on existing site and subsurface conditions, along with planned development details from HDR, Inc. SGS appreciates the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,
Summit Geoengineering Services

Erika Stewart

Erika Stewart, P.E.
Senior Geotechnical Engineer

Mailing: PO Box 515, Gardiner, ME 04345
Office: 210 Maine Avenue, Farmingdale, ME 04344
www.summitgeoeng.com

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Mailing: PO Box 515, Gardiner, ME 04345
Office: 210 Maine Avenue, Farmingdale, ME 04344
www.summitgeoeng.com

1.0 Project & Site Description

Summit Geoengineering Services (SGS) was asked by HDR, Inc. to conduct a geotechnical investigation for hatchery improvements proposed at the Grand Lake Stream State Fish Hatchery in Grand Lake Stream, Maine. The hatchery is located along Grand Lake Stream, which flows south from West Grand Lake. Improvements will consist of constructing two new pavilion buildings east of the existing covered raceways, each with four 20-foot diameter stainless steel fish rearing tanks. New wastewater treatment facilities, including an effluent treatment (drum filter) building, a clarifier, and a sludge storage tank are proposed at the south end of the site. A new garage building and an oxygen tank are proposed north of the pavilions.

The site currently includes a series of 14 concrete covered raceways spanning a length of 700 feet, and six buildings including an office, living quarters, well house, filter house, and garages. Water for the facility is supplied by West Grand Lake through a gravity fed system. Topography throughout development areas of the site range from elevation 285 to 289 feet.

2.0 Site Geology & History

Surficial geology mapping by the Maine Geological Survey suggests the site is underlain by glacial till consisting of a heterogeneous mixture of sand, silt, clay, and gravel. Surficial materials mapping indicates bedrock outcrops are present west and north of the site. The site is not mapped within a known aquifer. Soils observed in the test boring explorations were interpreted as glacial stream deposit, commonly consisting of sand, silt, and gravel which can include reworked glacial till. Glacial stream deposits are deposited by glacial meltwater streams and are mapped nearby the site at the base of lakes.

Grand Lake Stream SFH rears landlocked salmon and brook trout, providing three quarters of the salmon used in the statewide stocking program. SGS understands the hatchery was first established in 1936 and underwent major renovations in 1962, replacing the original earthen pools with concrete raceways. Covered buildings were added to the raceways in the 1970's, along with an influent microstrainer system and ultraviolet water treatment equipment. A fish waste settling tank was installed in 2010 to improve effluent treatment. At some point, former raceways ran along the east edge of the site. Pieces of the buried concrete structures are still in place with portions visible protruding from the ground surface. The foundation remnants may overlap the footprints of the new garage, oxygen tank pad, and upper pavilion.

Historically, a tannery occupied the south end of the site prior to development as a fish hatchery. SGS understands there may be buried foundation remnants or debris associated with demolition of the structure remaining on the north side of the existing clarifier.

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3.0 Site Investigation

3.1 Subsurface Explorations

SGS explored the subsurface conditions with the drilling of 4 test borings on January 4, 2023. Explorations were performed using a track mounted AMS 9500 VTR drill rig. Explorations were field located by SGS relative to existing site features and marked for notification of Dig Safe. Locations of the explorations are shown on the Test Boring Location Plan in Appendix A. Boring logs are provided in Appendix B.

Test borings were advanced to a depth of 18.1 to 20.7 feet below ground surface (BGS) using 2¼-inch hollow stem augers. Sampling was performed at 2 to 5-foot intervals with standard penetration tests (SPT-N) using a split spoon sampler and auto-drop hammer. Sampling was not possible in boring B-4 beyond a depth of 10 feet due to sands flowing into the augers from excess hydrostatic pressure (running sands), so a solid stem probe rod was advanced with the SPT hammer from 10 to 20 feet recording blows per foot. Refusal on probable bedrock was encountered in boring B-2 at a depth of 18.1 feet BGS. Boring B-1 met split spoon refusal in dense glacial stream sands at 20.7 feet BGS. The other borings were advanced to 20 feet with no refusal.

Drilling of Test Boring B-2

3.2 Laboratory Testing

Laboratory tests were performed by SGS for select soil samples collected on site. Two samples were tested for Grain Size Analysis (ASTM D6913) and four samples were tested for Moisture Content (ASTM D2216). Reports of the laboratory tests are in Appendix C. Moisture content of soil ranged from 8.9 to 35.2 percent. Results are summarized in the table below:

LABORATORY TEST SUMMARY TABLE								
Stratum	Boring	Sample	Depth	Grain Size Distribution			Moisture Content	USCS
				Gravel	Sand	Fines		
Glacial Stream	B-3	S-4	15’ – 17’	9%	75%	16%	14.8%	SM
Fill	B-4	S-1	0.3’ – 2’	20%	71%	9%	8.9%	SW-SM

4.0 Subsurface Conditions

The subsurface conditions consist of ***topsoil*** overlying ***fill*** overlying ***glacial stream deposit***. Reworked portions of native soil were observed between the fill and glacial stream deposit in borings B-2 and B-4. Refusal on ***probable bedrock*** was encountered in test boring B-2 at depth of 18.1 feet BGS. The other test borings were terminated at depths of 20 to 20.7 feet in dense soil. A summary of the soil layers is provided below. Details of the explorations are provided on the boring logs in Appendix B.

4.1 Soil Layers

Topsoil is present at the ground surface with a thickness of 2 to 4 inches. The topsoil is described as dark brown silty sand with rootlets and is visually classified as SM in accordance with the Unified Soil Classification System (USCS). The topsoil is considered loose to compact and moist to frozen.

Fill is present beneath the topsoil extending to a depth range of 2.5 to 5.5 feet BGS. The fill consists of brown sand with some to little gravel and silt and is classified as SW-SM and SM in accordance with USCS. The grain size analysis performed on a sample of fill from B-4 indicates a fines content of 9 percent. The fill is considered loose to compact and damp to wet with depth.

Glacial stream deposit is present beneath the fill throughout the site. The stream deposit is a stratified formation consisting of light brown to olive brown sand and silt with some to little gravel. Grain size analysis results from boring B-3 indicate a fines content of 16 percent, classifying the soil as SM in accordance with USCS. Visual classification of the remainder of the deposit includes classifications of SP-SM, SM-ML, and ML. SPT-N values in the stream deposit range from 3 to 69 blows per foot (bpf) and average 28 bpf. The deposit increased in density with depth, ranging from loose /compact near the surface to dense at depths of 15 to 20 feet BGS. The stream deposit is moist to wet with moisture contents ranging from 14.3 to 35.2 percent.

4.2 Bedrock

Probable bedrock was encountered at a depth of 18.1 feet BGS in boring B-2 (elevation 268 feet) based on auger refusal. Split spoon refusal in Boring B-1 was encountered at 20.7 feet BGS in dense sands. No bedrock was encountered in the other borings, explored to a depth of 20 feet. Mapping by the Maine Geological Survey indicates bedrock at the site is part of Carboniferous to Permian period intrusive rocks consisting of white to pale pink muscovite-biotite granite.

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4.3 Groundwater

Groundwater was encountered at a depth range of 3.5 to 6.5 feet BGS in the test borings, elevation 278.5 to 282 feet. The groundwater table is present within the glacial stream deposit. Apparent artesian groundwater conditions were observed in borings B-1, B-2, and B-4 with groundwater rising to approximately 2 feet BGS (elevation 283 to 285 feet), measured in the open borehole at the end of the test. The high velocity flow of Grand Lake Stream may be a contributing factor to artesian pressure at the site. Groundwater levels may fluctuate through wet and dry periods and are likely influenced by the adjacent stream.

5.0 Geotechnical Evaluation

Development at the site will include two new pavilion buildings, a garage, oxygen tank, effluent treatment building, clarifier, and sludge storage tank. There are several geotechnical considerations for improvements at the site. These considerations are discussed below as they relate to each of the proposed structures.

Spread Footing Foundations

The pavilion buildings will be steel framed structures supported by exterior pier footings with grade beam around the building perimeter. Based on the plan set by HDR, footings for both pavilions are anticipated to be constructed near the surface of the glacial stream deposit. Subgrade will consist of sand, and silt with localized organics. Building foundations are expected to be constructed at or below groundwater. Native soils below groundwater may be susceptible to disturbance, therefore SGS recommends stabilizing foundation subgrade with 12 inches of Crushed Stone. Additional over excavation may be required where organic soils are encountered.

The garage foundation is proposed as conventional slab-on-grade with perimeter frost wall. A new oxygen tank is proposed on a reinforced exterior slab just south of the new garage. These structures were not included in the original scope of work and no test borings were performed in the footprints. Boring B-1 was performed approximately 150 feet south of the garage and 115 feet south of the oxygen tank pad. SGS anticipates similar soil conditions for the garage and oxygen tank pad as those encountered in boring B-1 (sand and silt). However, changes to subgrade conditions may occur over short distances. SGS should be retained to perform a subgrade inspection for the foundation excavations of these structures to confirm conditions are consistent with assumptions made in this report.

Mat Foundations

The effluent treatment (drum filter) building, clarifier, and sludge storage tank will be constructed adjacent to one another at the south end of the site. The effluent building will include a partial basement (elevation 278 feet) and partial slab-on-grade (elevation 285.5 feet). SGS recommends the basement portion of the building be constructed on a structural mat slab, and the slab-on-grade supported with conventional spread footings at the east end of the building. The clarifier and sludge storage will consist of submerged tanks extending 7 to 10 feet BGS (elevation 275 to 278

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feet), supported on 1-foot thick mat slabs. Subgrade conditions for all these foundations will consist of sands below groundwater, which will be susceptible to disturbance. SGS recommends all slabs below groundwater be constructed upon a stabilized base of 12 inches of Crushed Stone.

Groundwater & Excavations

Based observed conditions, groundwater should be anticipated in all foundation excavations at the site, requiring dewatering. Long term drainage will need to be considered for shallow building foundations. Submerged tanks and basements should be designed to resist buoyancy forces. Deeper excavations below groundwater for effluent structures have high potential for heaving of base soil. Running sands were encountered in the test borings near the base of new effluent structures, at elevation 275 feet. Running sands are indicative of a combination of moderate to loose density and relatively low fines content. Artesian groundwater pressure at this site may also contribute to disturbance of sands by adding uplift force. Excavations will also be relatively close to the stream (estimated at elevation 281 feet). Based on this, excavation support systems and robust dewatering will be required.

Existing Foundations & Potential Debris

Where existing structures are demolished, all foundation elements should be removed from within the footprint of new structures. This applies to the garage, which is proposed in the footprint of an existing storage building, and the new effluent treatment building which is proposed in the footprint of the existing clarifier. SGS understands the existing clarifier is approximately 12 feet deep and its removal may require import fill to construct the new treatment building foundation. Foundation remnants from former raceways may also be encountered in the upper pavilion. Voids created from removal of foundation elements can be filled with engineered material as specified in Section 6.1.

SGS understands there is potential for localized debris buried in the vicinity of new effluent structures from a historic tannery. Wood debris was observed at a depth of 5 feet in boring B-3 and a probable concrete obstruction was encountered at a depth of 3 feet in boring B-4. Planned excavations will likely facilitate removal of any debris in these areas. If encountered beneath new foundations, SGS should be notified to perform a subgrade inspection and provide supplemental recommendations for subgrade preparation.

6.0 Geotechnical Recommendations

SGS anticipates foundations for new structures will be constructed primarily on native sands and silt. Existing fill is anticipated beneath slabs on grade. Discussion and recommendations for the spread footing foundations, tank foundations, and structural mat foundations are provided in the following sections. It is recommended that SGS be made available to review final structure layout and design loads to confirm recommendations in this report are appropriate.

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The following soil parameters can be used for design of foundation systems:

PARAMETER	ENGINEERED BACKFILL [1,2]	EXISTING FILL	GLACIAL STREAM SAND & SILT
Total Natural (moist) Unit Weight (Υ_t)	130 pcf	125 pcf	125 pcf
Submerged (buoyant) Unit Weight (Υ_{sub})	68 pcf	63 pcf	63 pcf
Friction Coefficient (f_c) for Concrete	0.55	0.45	0.45
Friction Coefficient (f_s) for Steel	0.40	0.30	0.30
Passive Earth Pressure Coefficient (K_p)	3.54	3.25	3.25
Active Earth Pressure Coefficient (K_a)	0.28	0.31	0.31
At Rest Pressure Coefficient (K_o)	0.44	0.47	0.47
Effective Friction Angle (ϕ')	34^0	32^0	32^0
Undrained Shear Strength (Cohesion, c)	0 psf	0 psf	0 psf

[1] Based on 95% compaction by ASTM D1557, Modified Proctor Test Method.
[2]These parameters are applicable to Structural Fill and Granular Borrow.

6.1 Spread Footing Foundations

Spread footing foundations are anticipated to support the pavilion buildings, the garage, and a portion of the effluent treatment building. Details on these structures are as follows:

- The pavilion buildings will be steel framed structures with a width of approximately 32 feet and length of 125 feet, supported by exterior pier footings with grade beams around the building perimeter.

- The garage building is proposed as a steel framed structure with an approximate footprint of 35 feet by 35 feet. The garage foundation is proposed as a conventional slab-on-grade with perimeter frost wall.

- The effluent treatment building will consist of a partial slab-on-grade and partial basement. The footprint is proposed as 25 feet by 43 feet. The slab-on-grade portion will be constructed on conventional spread footings. The basement portion will extend 23 feet of the building length and support two drum filters on a mat slab foundation. Recommendations are provided in Section 6.4 for the basement mat slab.

Footings for the pavilions and garage are anticipated to bear on native sand and silt. Footings for the east end of the effluent building are expected to be constructed on import fill used to raise grade after removal of the existing clarifier structure. SGS recommends that the building

foundations be designed using an allowable bearing pressure of 3,000 psf. Immediate settlement associated with this bearing pressure is estimated at 1 inch or less. Differential settlement is estimated at a deflection of 1/300 (δ/L, deflection divided by span length). The structure should be evaluated by the structural engineer and architect for tolerance of this estimate for differential settlement. The bearing pressure and settlement are based on subgrade preparation as follows:

- Topsoil, vegetation, and any deleterious materials are stripped and grubbed from the ground surface within the proposed building footprint prior to proof rolling, placing fill, or constructing footings.

- Existing foundation elements are removed in entirety from the footprint of new structures. Voids created from this process should be backfilled with Structural Fill or Granular Borrow in compacted lifts up to the base of footings. Material specifications are provided in Section 6.5.

- Subgrade soils beneath footings are over excavated and stabilized using 12 inches of Crushed Stone. Where localized organic soils are encountered at the base of footing excavations, the material should be over excavated to the surface of native sand or silt and replaced with additional Crushed Stone up to the bottom of footings.

- Groundwater should be lowered to at least 2 feet below the base of excavations to prevent disturbance of subgrade soil. This may require pumps placed in Crushed Stone at the base of the excavation or well points.

- In no case shall footings be constructed on frozen soil or in standing water.

Exterior footings should be constructed at a minimum depth of 5 feet below finished grade for frost protection. This frost protection depth is based on a design air-freezing index of 1,700-degree days for the Grand Lake Stream area. SGS recommends exterior and interior portions of foundation elements be backfilled with Structural Fill, as specified in Section 6.5.

6.2 Building & Exterior Slabs

SGS recommends building slabs (above groundwater) be constructed on a minimum 12-inch layer Structural Fill overlying proof-rolled native sand or existing fill. Where below groundwater, slabs should be constructed on 12 inches of Crushed Stone.

If encountered, foundation elements and other deleterious materials should be removed from beneath slabs prior to placing fill. Voids created from this process should be filled with Structural Fill or Granular Borrow. Granular subgrade above groundwater should be proof-rolled prior to placing fill for the slab. Proof rolling should consist of a minimum of five passes in a north-south direction and then five passes in an east-west direction using a vibratory roller or plate compactor. Proof rolling of saturated or silty subgrade is not recommended due to potential for disturbance.

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SGS anticipates the oxygen tank pad will consist of a reinforced thickened edge slab. Exterior concrete aprons are proposed at pavilion overhead door entrances. Exterior slabs and unheated building slabs will require additional protection from frost. For this scenario, SGS recommends slabs be constructed on 2 inches of foam board rigid insulation with a minimum compressive strength of 40 psi, overlying a minimum 24-inch layer of Structural Fill.

The coefficient of subgrade reaction, k (per 12-inch plate) applies to the design of reinforced concrete foundations over soil. For the conditions described above, the slabs can be designed using a coefficient of subgrade reaction 150 tons/ft^3.

6.3 Rearing Tank Foundations

The two pavilion buildings will each include four 20-foot diameter stainless steel fish rearing tanks set on individual thickened edge slabs, which are anticipated to be structurally isolated from the building. Slabs will be recessed approximately 2.5 feet below top of pavilion slab sloping to 3.5 feet below slab at the center sump pit. Rearing tank slabs should be constructed on a minimum of 12 inches of Structural Fill or Crushed Stone. Existing fill and reworked native soils are anticipated to be exposed in the footprints of the rearing tanks. Unsaturated, granular soil should be proof-rolled prior to placing fill or constructing slabs. For these conditions, rearing tank slabs can be designed using a coefficient of subgrade reaction 150 tons/ft^3 and an allowable bearing pressure of 3,000 psf.

If encountered, foundation elements and other deleterious materials should be removed from beneath tank slabs prior to placing fill. Voids created from this process should be filled with Structural Fill or Granular Borrow.

6.4 Structural Mat Foundations

The three effluent treatment structures proposed at the south end of the site will be constructed on structural mat foundations below groundwater. Details on the structures are as follows:

- As described in Section 6.1, the effluent building will have a partial basement with concrete walls supported on mat slab approximately 7.5 feet below exterior grade, elevation 277 feet. The east end of the building will be supported on spread footings.

- The clarifier is proposed as a round tank with a diameter of 24 feet. Reinforced concrete walls will be supported on mat slab foundation 10 feet BGS, elevation 275 feet. The slab will have a thickened center section to facilitate piping, extending 12 feet BGS.

- The sludge storage tank is proposed as an approximate 34-foot diameter concrete tank. The tank walls will be supported by a reinforced concrete mat sloping down towards a recessed center pit (elevation 276.5). The bottom of slab at the perimeter will range from 5.5 to 7 feet BGS (elevation 278 feet) and the tank will require sub-slab piping.

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To create a stabilized base, structural mat foundations should be constructed upon a minimum of 12 inches of Crushed Stone. If subgrade becomes disturbed from groundwater or due to construction, it is recommended the subgrade be inspected by the geotechnical engineer to verify conditions or to recommend further stabilization, if necessary. Foundation walls should be backfilled with Granular Borrow (for Underwater Backfill). Granular Borrow should extend a minimum of 24 inches laterally from the walls.

The coefficient of subgrade reaction k_v (per 12-inch plate) applies to the design of reinforced concrete foundations over soil. The mat foundations can be designed using a coefficient of subgrade reaction of 150 tons/ft^3. Bearing soil for the mat slabs is anticipated as medium-compact sands with little silt and gravel. Removal of existing soil to construct the clarifier and sludge tank is expected to create an unload condition ranging from 550 to 900 psf. Total settlement is estimated at 1 inch or less for net allowable bearing pressure (to include weight of concrete) of 2,000 psf. Differential settlement is not anticipated for the mat slab foundations due to their rigidity.

SGS anticipates foundation drains will not be practical for mat foundation below groundwater. Therefore, SGS recommends that mat slabs be designed for uplift forces due to buoyancy. Uplift force of groundwater can be calculated as the unit weight of water multiplied by the depth of foundation below groundwater. Artesian pressure will result in a higher theoretical groundwater table. For design, a groundwater elevation of 283 feet should be assumed to include artesian conditions. Associated uplift forces are estimated to range from 200 to 500 psf. The mat slabs should be designed with sufficient ballast weight to provide resistance to uplift during the minimum operating weight of the structures (empty tanks, dead load). Additional uplift resistance can be provided by extending the edge of the mat slab beyond the outside foundation wall to achieve soil resistance. Alternatively, tie downs such as helical soil anchors can be considered.

6.5 Backfill Recommendations

Structural Fill is recommended for construction of building slabs and backfill of spread footing foundations. Structural Fill should be placed in maximum of 12-inch lifts and be compacted to 95 percent of its maximum dry density in accordance with ASTM D1557. Structural Fill should consist of well graded sand and gravel with a maximum particle size limited to 6 inches. The portion passing a 3-inch sieve should meet the following:

STRUCTURAL FILL	
Sieve Size	**Percent Passing**
½ inch	35 to 80
¼ inch	25 to 65
No. 40	0 to 30
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type D (2020)

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Granular borrow is recommended as backfill for foundation walls of effluent structures. Granular Borrow should be placed in maximum of 12-inch lifts and be compacted to 95 percent of its maximum dry density in accordance with ASTM D1557. Granular Borrow should consist of sand and gravel with a maximum particle size limited to 6 inches. The portion passing a 3-inch sieve should meet the following:

GRANULAR BORROW	
Sieve Size	**Percent Passing**
No. 40	0 to 70
No. 200	0 to 7

Reference: MDOT Specification 703.19, Granular Borrow (Material for Underwater Backfill) (2020)

Based on results of grain size analysis and visual classifications, neither the existing fill nor the native soils will meet specification for Granular Borrow or Structural Fill.

Crushed Stone is intended to create a stable base beneath all foundations. Crushed Stone should be tamped to lock the stone structure together and meet the following specification:

CRUSHED STONE ¾ INCH	
Sieve Size	**Percent finer**
1 inch	100
¾ inch	90 to 100
½ inch	20 to 55
⅜ inch	0 to 15
No. 4	0 to 5

Reference: MDOT Specification 703.13, Crushed Stone ¾-Inch (2020)

6.6 Groundwater Control

Groundwater was encountered at a depth range of 3.5 to 6.5 ft BGS, elevations 278.5 to 282 ft. Based on this, perimeter underdrains are recommended along the base exterior building footings. Exterior grades should also be sloped away from the building footprint to reduce runoff water from infiltrating the foundation backfill soils.

Perimeter underdrains should consist of 4-inch rigid perforated PVC surrounded by a minimum of 6 inches of Crushed Stone wrapped in filter fabric to prevent clogging from the migration of the fine soil particles in the foundation backfill soils. The underdrain should be outlet to a location where it will be free flowing. Where exposed at the ground surface, the ends of pipes should be screened or otherwise protected from entry and nesting of wildlife, which could cause clogging.

Structures constructed below groundwater should be designed for buoyant conditions and protected from groundwater with a waterproofing system. Resistance to uplift forces from groundwater is discussed in Section 6.4.

6.7 Seismic Design & Liquefaction Potential

The site is categorized as Site Class D in accordance with ASCE 7-10 based on SPT-N values for the soil profile. The following seismic site coefficients should be used:

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS – ASCE 7-10	
Seismic Coefficient	**Site Class D**
Peak Ground Acceleration (PGA)	0.130
Site Modified Peak Ground Acceleration (PGA_M)	0.201
Short period spectral response (S_S)	0.238
1 second spectral response (S_1)	0.078
Maximum short period spectral response (S_{MS})	0.380
Maximum 1 second spectral response (S_{M1})	0.186
Design short period spectral response (S_{DS})	0.254
Design 1 second spectral response (S_{D1})	0.124

The stream deposit was evaluated for liquefaction during a potential earthquake based on SPT-N values from the test borings and seismic data obtained by the American Society of Civil Engineers (ASCE) online hazards mapping tool. The maximum considered earthquake peak ground acceleration PGAM for the site is 0.201 determined by ASCE 7-10 for a site soil class D. The mean moment magnitude for the site is mapped as 5.9. Results of analysis indicate an average factor of safety above 3. The deposit is considered resistant to widespread liquefaction.

6.8 Basement Walls

SGS understands a partial basement is proposed for the effluent building. Cast-in-place basement foundation walls will act as retaining walls for surrounding backfill soils. At rest earth pressure should be used in the wall design for braced walls, which are restricted against horizontal deflection. Active earth pressure should be used for calculating soil load on any walls that may experience horizontal deflection; including the case of backfilling unbraced basement walls.

SGS anticipates the basement for the effluent building will be mostly submerged. Design of basement walls should include consideration of effective (submerged) unit weight of soils and the additional load from groundwater. SGS recommends basement walls be designed for the lateral earth pressures provided in the following table:

CAST-IN-PLACE WALL LATERAL LOADS		
Condition	**Equivalent Fluid Pressure (K_o*γ_{sub} + γ_w)**	**Uniform Live Load Surcharge**
Free at Top (Active)	81 psf/ft	100 psf
Fixed at Top (At Rest)	92 psf/ft	150 psf

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The above lateral loads consider that the wall is backfilled with Granular Borrow. Equivalent fluid pressures presented above are calculated using the soil properties and earth pressure coefficients provided in Section 6.0.

7.0 Earthwork Considerations

To construct the effluent building, clarifier, and sludge storage tank foundations, excavations of up to 12 feet will be required. These excavations will be in the glacial stream deposit below groundwater, which will require braced excavations such as sheet piles or similar. Prior to conducting deep excavations, SGS recommends an excavation plan be prepared by a qualified engineer in collaboration with the contractor and geotechnical engineer.

Granular subgrade above groundwater should be proof-rolled prior to placement of engineered fill. This condition generally applies beneath slabs near existing ground surface. Proof rolling should consist of a minimum of five passes in a north-south direction and then five passes in an east-west direction using a vibratory roller or large plate compactor. Proof rolling is not recommended for silty or organic soils or where below groundwater due to potential for subgrade softening.

Where below groundwater, SGS recommends all foundations be constructed on stabilized subgrade. Stabilization should consist of over-excavating the subgrade and replacing with 12 inches of Crushed Stone. Crushed Stone should be tamped to lock the stone structure together. Structural Fill and Granular Borrow should be compacted to a minimum of 95 percent of their maximum dry density, determined in accordance with ASTM D1557, Modified Proctor Density.

Dewatering will be required for excavations extending below groundwater. Footing excavations in sand are anticipated to extend near groundwater. SGS recommends that groundwater be controlled to a minimum of 2 feet below the base of excavations. Depending on excavation depths in sand, this may consist of submersible pumps. For deeper excavations, well points may be required within the sand to drawn water down. Dewatering should be performed sufficiently to prevent potential upheave at the base of deep excavations. Diversion and control of surface water should be performed to prevent water flow into the excavations. The contractor should furnish, install, operate, maintain, and remove temporary dewatering systems to control groundwater and permit construction free from standing water.

Utility trenching and general excavations below 4 feet should be sloped no greater than 1.5H to 1V (OSHA type C) for existing fill, native soils, import fill, and/or below groundwater. This slope is based on the current OSHA Excavation Guidelines.

It is recommended the geotechnical engineer be retained to conduct subgrade inspections to confirm that soil conditions and construction methods are consistent with this report. It is recommended that a qualified testing agency inspect soil materials gradation and compaction during construction for conformance to the project specifications. Soil materials testing reports should be made available to the geotechnical engineer for review.

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8.0 Closure

The recommendations provided in this report are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. No other warranty is expressed or implied. Our evaluations and recommendations are based on discrete and widely spaced data points. Some changes in subsurface conditions from those presented in this report are anticipated to occur. Should these conditions differ materially from those described in this report, SGS should be notified so that SGS can re-evaluate these recommendations.

It is recommended that this report be made available to contractors for informational purposes and be incorporated in the construction Contract Documents. SGS should be retained to review final construction documents relevant to the recommendations in this report. SGS appreciates the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

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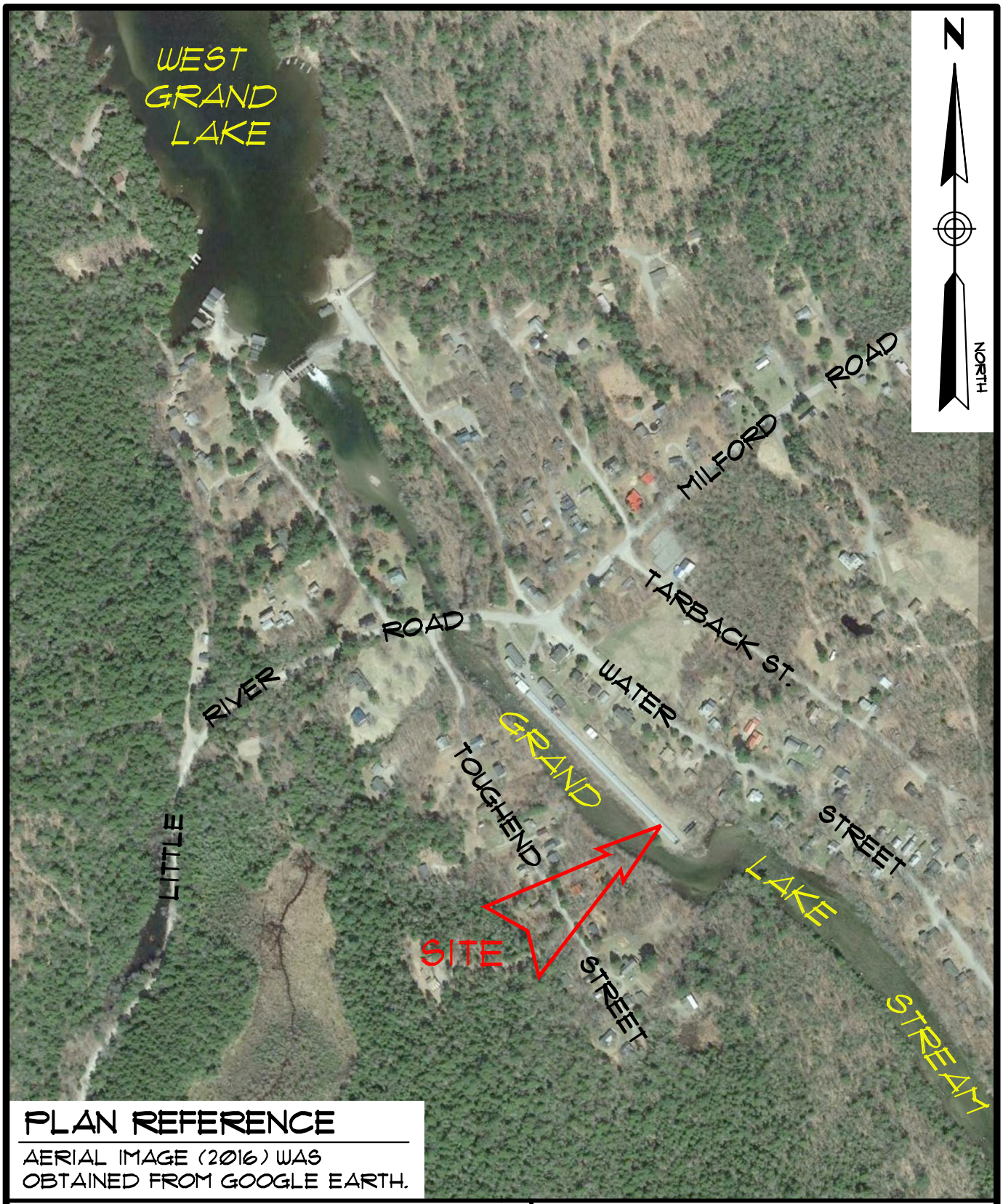
APPENDIX A

TEST BORING LOCATION PLAN

GEOLOGIC MAPS



PLAN REFERENCE

AERIAL IMAGE (2016) WAS OBTAINED FROM GOOGLE EARTH.

SITE LOCATION MAP
FISH HATCHERY IMPROVEMENTS

HATCHERY LANE - GRAND LAKE STREAM, MAINE
PREPARED FOR
HDR, INC.

DATE: 1-12-2023	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 22430	SCALE: 1" = 500'	FILE: 22430 MAPS

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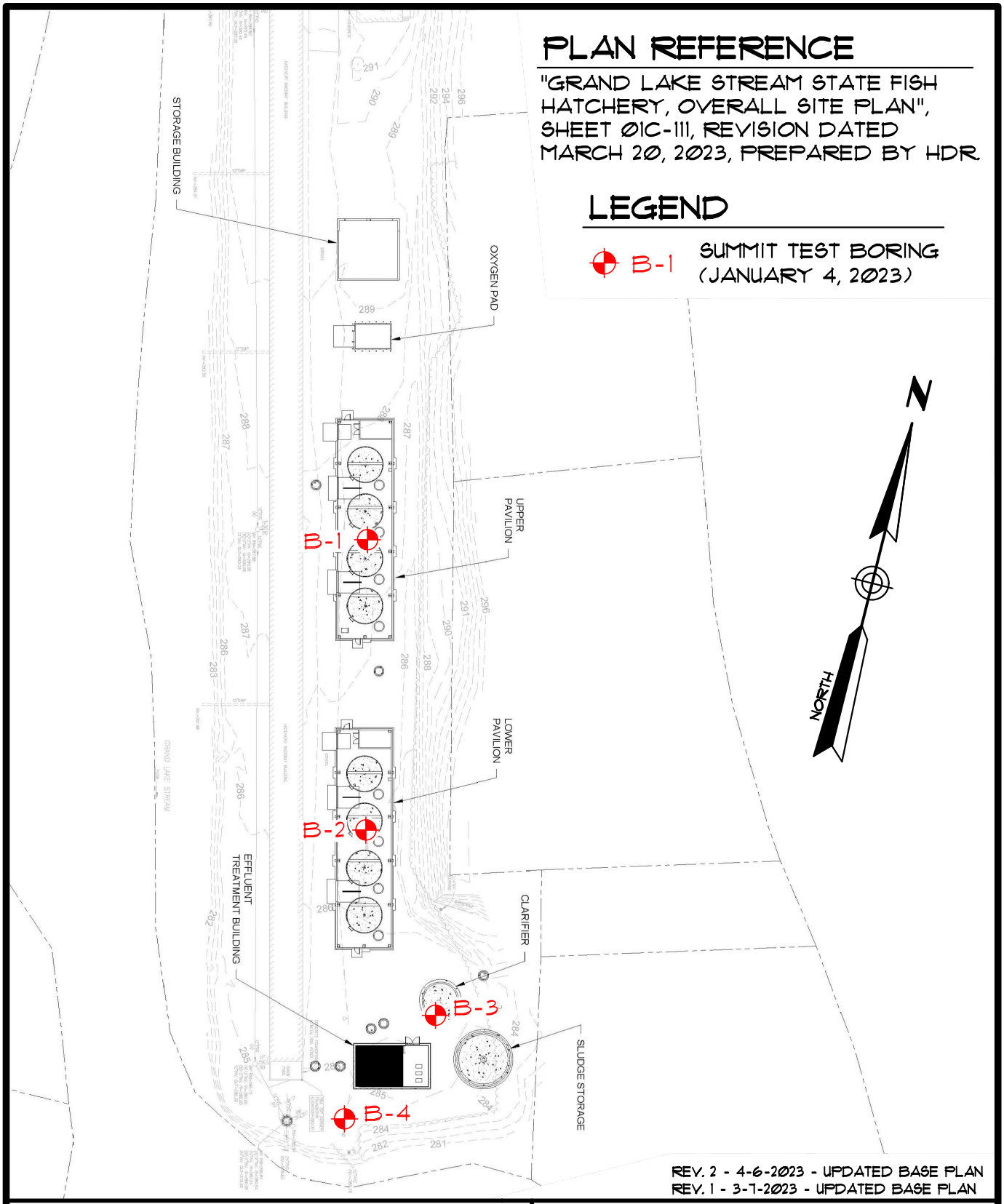

PLAN REFERENCE

"GRAND LAKE STREAM STATE FISH HATCHERY, OVERALL SITE PLAN", SHEET #1C-111, REVISION DATED MARCH 20, 2023, PREPARED BY HDR.

LEGEND

B-1 SUMMIT TEST BORING (JANUARY 4, 2023)

REV. 2 - 4-6-2023 - UPDATED BASE PLAN
REV. 1 - 3-7-2023 - UPDATED BASE PLAN

TEST BORING LOCATION PLAN
FISH HATCHERY IMPROVEMENTS

HATCHERY LANE - GRAND LAKE STREAM, MAINE
PREPARED FOR
HDR, INC.

DATE: 1-12-2023	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 22430	SCALE: 1"= 80'	FILE: 22430 MAPS

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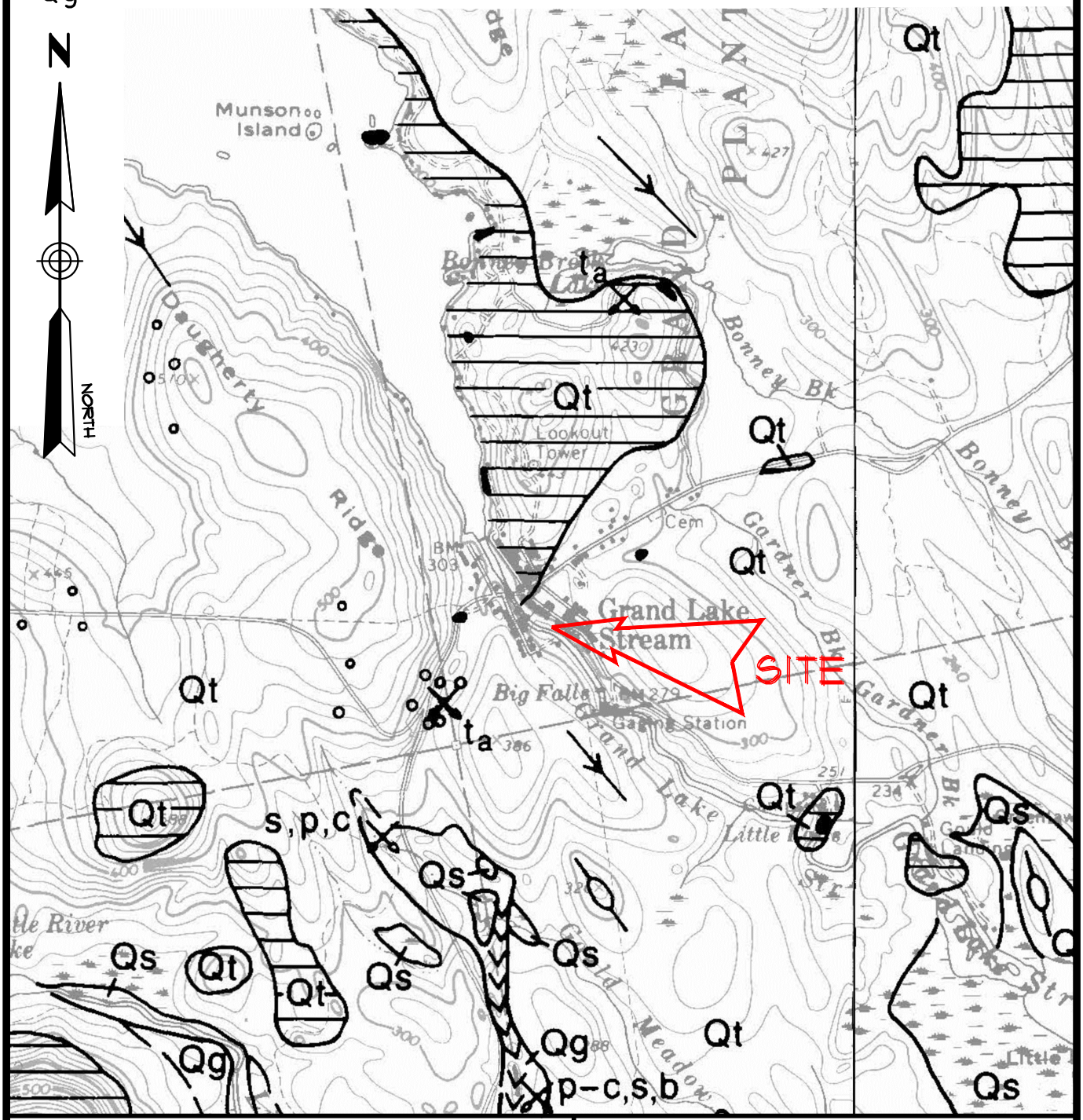
LEGEND

- Qt TILL
- Qs SWAMP & TIDAL MARSH DEPOSITS
- Qg GLACIAL STREAM DEPOSITS (SAND&GRAVEL)

MAP REFERENCE

SURFICIAL GEOLOGY, BIG LAKE AND WABASSUS LAKE QUADRANGLES, DATED 1986, PREPARED BY MAINE GEOLOGICAL SURVEY.



SURFICIAL GEOLOGY MAP
FISH HATCHERY IMPROVEMENTS

HATCHERY LANE - GRAND LAKE STREAM, MAINE
PREPARED FOR
HDR, INC.

DATE: 1-12-2023	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 22430	SCALE: 1"= 3000'	FILE: 22430 MAPS

OFFICE: 210 MAINE AVENUE
FARMINGDALE, MAINE
TEL.: (207) 588-7579

MAIL: P.O. BOX 515
GARDINER, ME 04345

SUMMIT
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www.summitgeoeng.com

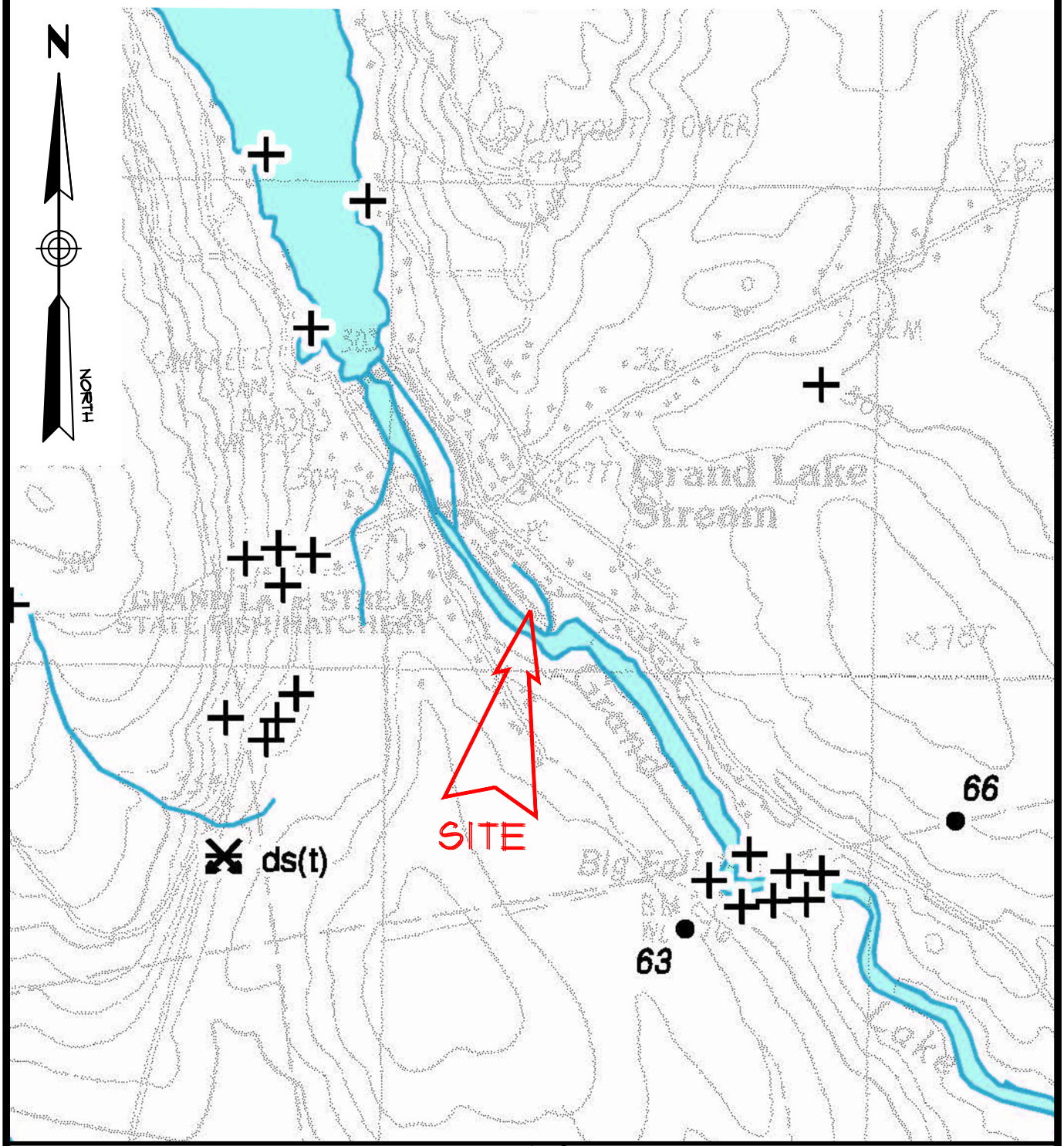
LEGEND

+ BEDROCK OUTCROP

19● BEDROCK WELL WITH DEPTH TO BEDROCK

PLAN REFERENCE

SURFICIAL MATERIALS, GRAND LAKE STREAM QUADRANGLE, DATED 2001, PREPARED BY MAINE GEOLOGICAL SURVEY.



SURFICIAL MATERIALS MAP
FISH HATCHERY IMPROVEMENTS

HATCHERY LANE - GRAND LAKE STREAM, MAINE
PREPARED FOR
HDR, INC.

DATE: 1-12-2023	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 22430	SCALE: 1"= 1000'	FILE: 22430 MAPS

OFFICE: 210 MAINE AVENUE
FARMINGDALE, MAINE
TEL.: (207) 588-7579

MAIL: P.O. BOX 515
GARDINER, ME 04345

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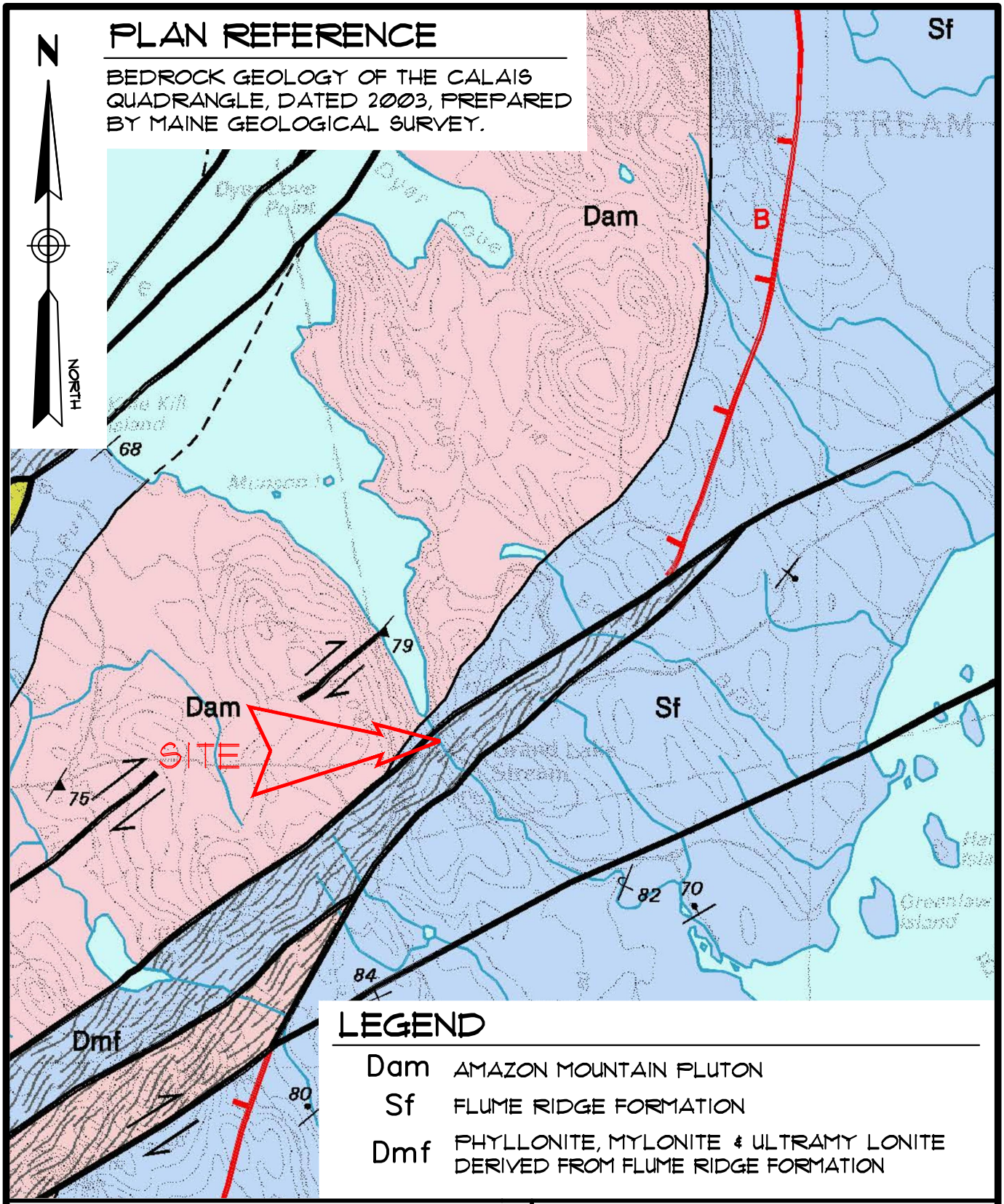
PLAN REFERENCE

BEDROCK GEOLOGY OF THE CALAIS QUADRANGLE, DATED 2003, PREPARED BY MAINE GEOLOGICAL SURVEY.



LEGEND

Dam	AMAZON MOUNTAIN PLUTON
Sf	FLUME RIDGE FORMATION
Dmf	PHYLLONITE, MYLONITE & ULTRAMY LONITE DERIVED FROM FLUME RIDGE FORMATION

BEDROCK GEOLOGY MAP
FISH HATCHERY IMPROVEMENTS

HATCHERY LANE - GRAND LAKE STREAM, MAINE
PREPARED FOR
HDR, INC.

DATE: 1-12-2023	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 22430	SCALE: 1"= 4000'	FILE: 22430 MAPS

OFFICE: 210 MAINE AVENUE
FARMINGDALE, MAINE
TEL.: (207) 588-7579

MAIL: P.O. BOX 515
GARDINER, ME 04345

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APPENDIX B

BORING LOGS

EXPLORATION COVER SHEET

The exploration logs are prepared by the geotechnical engineer from both field and laboratory data. Soil descriptions are based upon the Unified Soil Classification System (USCS) per ASTM D2487 and/or ASTM D2488 as applicable. Supplemental descriptive terms for estimated particle percentage, color, density, moisture condition, and bedrock may also be included to further describe conditions.

Drilling and Sampling Symbols:

S = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Lab Shear Vane (Torvane)
PP = Pocket Penetrometer
C = Rock Core Sample
FV = Field Vane Shear Test
SP = Concrete Punch Sample

Hyd = Hydraulic Advancement of Drilling Rods
Push = Direct Push of Drilling Rods
WOH = Weight of Hammer
WOR = Weight of Rod
PI = Plasticity Index
LL = Liquid Limit
MC = Natural Moisture Content
USCS = Unified Soil Classification System
Su = Undrained Shear Strength
Su(r) = Remolded Shear Strength

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. Groundwater monitoring wells may be required to record accurate depths and fluctuation.

Gradation Description and Terminology:

Boulders:	Over 12 inches	Trace:	Less than 5%
Cobbles:	12 inches to 3 inches	Little:	5% to 15%
Gravel:	3 inches to No.4 sieve	Some:	15% to 30%
Sand:	No.4 to No. 200 sieve	Silty, Sandy, etc.:	Greater than 30%
Silt:	No. 200 sieve to 0.005 mm		
Clay:	less than 0.005 mm		

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		DENSITY OF GRANULAR SOILS	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 4	Very Loose
2 to 4	Soft	5 to 10	Loose
5 to 8	Firm	11 to 30	Compact
9 to 15	Stiff	31 to 50	Dense
16 to 30	Very Stiff	>50	Very Dense
>30	Hard		

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-1**

Project:	Fish Hatchery Improvements	Project #:	22430
Location:	Hatchery Lane	Sheet:	1 of 1
City, State:	Grand Lake Stream, Maine	Chkd by:	CWC
Drilling Co:	Summit Geoengineering Services	Boring Elevation	287 feet
Driller:	Shawn Floyd	Reference:	Estimated from Overall Site Plan for Phase III Facility Conversion by HDR, Inc.
Summit Staff:	Erika Stewart, P.E.	Date started:	1/4/2023 Date Completed: 1/4/2023

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	2¼" HSA	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
1/4/2023	5 ft +/-	282 ft +/-	Observed moisture content
1/4/2023	2.2 ft (Artesian)	284.8 ft	Measured in open borehole after

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 - 2	5		Dark brown Silty SAND, rootlets, compact, frozen-moist, SM		TOPSOIL
1				4	286.8	(Cobble fragments in spoon at top of fill)		0.2'
				4		Brown SAND, little Gravel and Silt, loose, damp, SW-SM		FILL
2				4				
3								
4								
5								
	S-2	24/12	5 - 7	3		Olive brown SAND with Silt, little Gravel, loose, wet, SM	Water at 5'+/-	
6				15	281.8	Olive SILT, some Sand, little Gravel, v. stiff, wet, ML		5.2'
				7		Dark brown SAND, some Gravel, little Silt, compact, wet,		5.6' GLACIAL
7				4		SP-SM to SM		STREAM DEPOSIT
8								
9								
10								
	S-3	24/18	10 - 12	10		Olive to light brown SAND, some Gravel and Silt, cobbles,		
11				14		dense, wet, SM		
				19				
12				17				
13								
14								
15								
	S-4	24/24	15 - 17	6		Olive brown Sandy SILT, some to little Gravel, interlayered		
16				21		with Silty SAND, dense, wet, ML and SM		
				24				
17				34				
18								
19								
20								
	S-5	8/8	20 - 20.7	45		Olive gray Silty SAND, some Gravel, very dense, damp, SM		
21				50/2"				
					266.3	End of Exploration at 20.7', Spoon Refusal in Dense Stratum		20.7'
22								DENSE SANDS

Granular Soils		Cohesive Soils	
Blows/ft.	Density	Blows/ft.	Consistency
0-4	V. Loose	<2	V. soft
5-10	Loose	2-4	Soft
11-30	Compact	5-8	Firm
31-50	Dense	9-15	Stiff
>50	V. Dense	16-30	V. Stiff
		>30	Hard

% Composition ASTM D2487
< 5% Trace
5-15% Little
15-30% Some
> 30% With

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-2**

Project:	Fish Hatchery Improvements	Project #:	22430
Location:	Hatchery Lane	Sheet:	1 of 1
City, State:	Grand Lake Stream, Maine	Chkd by:	CWC
Drilling Co:	Summit Geoengineering Services	Boring Elevation	286 feet
Driller:	Shawn Floyd	Reference:	Estimated from Overall Site Plan for Phase III Facility Conversion by HDR, Inc.
Summit Staff:	Erika Stewart, P.E.	Date started:	1/4/2023 Date Completed: 1/4/2023

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	2¼" HSA	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
1/4/2023	5 ft +/-	281 ft +/-	Observed moisture content
1/4/2023	2.7 ft (Artesian)	283.3 ft	Measured in open borehole after

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 - 2	3		Dark brown Silty SAND, rootlets, loose, moist, SM		TOPSOIL
1				4	285.8	Brown medium to course SAND, some to little Gravel, little		0.2'
				4		Silt, loose, damp, SW-SM		FILL
2				3				
	S-2	24/12	2 - 4	4		Same as above, some Silt, loose, damp, SM		
3				8	283.5	Olive gray SILT with Sand, some Gravel, trace Clay,		2.5' +/-
				5		firm to stiff, damp, ML		REWORKED NATIVE
4				3				
5								
	S-3	24/12	5 - 7	2		Same as above, firm, wet, ML	Water at 5'+/-	
6				2	280.8	Dark brown organic SILT, some wood debris, little Sand,	MC = 35.2%	5.2'
				1		trace Gravel, soft, moist, OL		GLACIAL STREAM
7				3				DEPOSIT
	S-4	24/24	7 - 9	8		Olive gray med-course SAND, little Silt & Gravel, compact,		7' +/-
				9		wet, SP-SM to SM	MC = 20..8%	
				9		Dark brown SILT with Sand, little organics, soft/loose, wet, ML		7.3' +/-
8				17		Brown to olive gray med-coarse SAND, little Silt & organics,SM		7.9'
						Olive brown SILT, some Sand & Gravel, dense, moist, ML		8.5'
9								
10								
	S-5	24/18	10 - 12	7		Olive brown fine SAND-SILT, some Gravel, compact to		
11				8		very stiff, wet, SM-ML	MC = 16.0%	
				9		Light brown and mottled, medium to fine SAND, little Silt,		11'+/-
12				13		trace Gravel, compact, wet, SP-SM		
13								
14								
								14'+/-
15								
	S-6	8/8	15 - 15.7	54		Olive brown SILT, some Sand and Gravel, cobbles, very	MC = 14.3%	
16				50/2"		dense, damp, ML		
17								
18								
					267.9	End of Exploration at 18.1', Auger Refusal on Probable		18.1'
19						Bedrock		PROBABLE BEDROCK
20								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	Fish Hatchery Improvements	Boring #:	**B-3**
Location:	Hatchery Lane	Project #:	22430
City, State:	Grand Lake Stream, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services	Boring Elevation	285 ft
Driller:	Shawn Floyd	Reference:	Estimated from Overall Site Plan for Phase III Facility Conversion by HDR, Inc.
Summit Staff:	Erika Stewart, P.E.	Date started: 1/4/2023	Date Completed: 1/4/2023

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	2¼" HSA	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
1/4/2023	3.5 ft	281.5 ft	Measured in open borehole

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 - 2	6		Dark brown Silty SAND, rootlets, frozen to moist, SM		TOPSOIL
1				8	284.7	Brown SAND, some Gravel, some to little Silt, compact,		0.3'
				7		damp, SW-SM to SM		FILL
2				7				
	S-2	24/12	2 - 4	9		Brown SAND, some Gravel, some to little Silt, cobble		
3				11		fragments, compact, damp, SW-SM to SM		
				6				
4				5		(Wet at spoon tip)	Water at 3.5'	
5						(Low recovery; very loose or possible voids. Auger griding on		
	S-3	24/6	5 - 7	1		wood debris at 5'+/-)		
6				2	279.5	Brown SAND, some to little Gravel, little Silt, very loose,		5.5'
				1		wet, SP-SM		GLACIAL STREAM
7				2				DEPOSIT
8								
9								
10								
						Attempted sample at 10', running sands filled augers.		
11						Soils likely consist of loose and/or clean stratified sands.		
						Offset boring, advanced to 15'.		
12								
13								
14								
15						(Stratified sands)		
	S-4	24/24	15 - 17	24		Brown medium-fine SAND, some Silt, little Gravel,	Gravel = 9%	
16				40		frequent mottled seams and lenses, very dense, wet, SM	Sand = 75%	
				29			Fines = 16%	
17				31			MC = 14.8%	
18								
19								
20						Attempted sample at 20', running sands filled augers		
					265	End of Exploration at 20' in Dense Stratum		20'
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	Fish Hatchery Improvements	Boring #:	**B-4**
Location:	Hatchery Lane	Project #:	22430
City, State:	Grand Lake Stream, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services	Boring Elevation	285 ft
Driller:	Shawn Floyd	Reference:	Estimated from Overall Site Plan for Phase III Facility Conversion by HDR, Inc.
Summit Staff:	Erika Stewart, P.E.	Date started: 1/4/2023	Date Completed: 1/4/2023

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	2¼" HSA	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
1/4/2023	6.5 ft	278.5 ft	Observed moisture content
1/4/2023	2.0 ft (Artesian)	283.0 ft	Measured in open borehole after

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 - 2	6		Dark brown Silty SAND, loose, moist, SM		TOPSOIL
1				6	284.9	Brown SAND, some Gravel, little Silt, compact, damp, SW-SM	Gravel = 20% Sand = 71% Fines = 9% MC = 8.9%	0.1' FILL
				6				
2				6				
3								
						Obstruction at 3'+/- on possible concrete. Offset boring,		
4						advanced to 5'.		
					281+/-			4'+/-
5								REWORKED NATIVE
	S-2	24/18	5 - 7	9		Gray to brown SAND, some Silt and Gravel, compact,		
6				12		moist, SM		
				5	279+/-	Dark brown SILT, some wood and Sand, soft, moist, ML,		6'+/-
7				12		Brown medium-coarse SAND, little Silt,	6.5'	GLACIAL STREAM
						compact, wet, SP-SM	Water at 6.5'+/-	DEPOSIT
8								
9								
						Attempted sample at 10', running sands filled augers.		
10						Advanced solid stem rod probe with SPT-N auto hammer,		
				12		recording blows per foot through stratified sands.		
11								
				20				
12								
				30				
13								
				31				
14								
				34				
15								
				39				
16								
				29				
17								
				21				
18								
				40				
19								
				95				
20								
					265	End of Exploration at 20' in Dense Stratum		20'
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

APPENDIX C

LABORATORY TEST RESULTS

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GEOENGINEERING SERVICES

GRAIN SIZE ANALYSIS - ASTM D6913

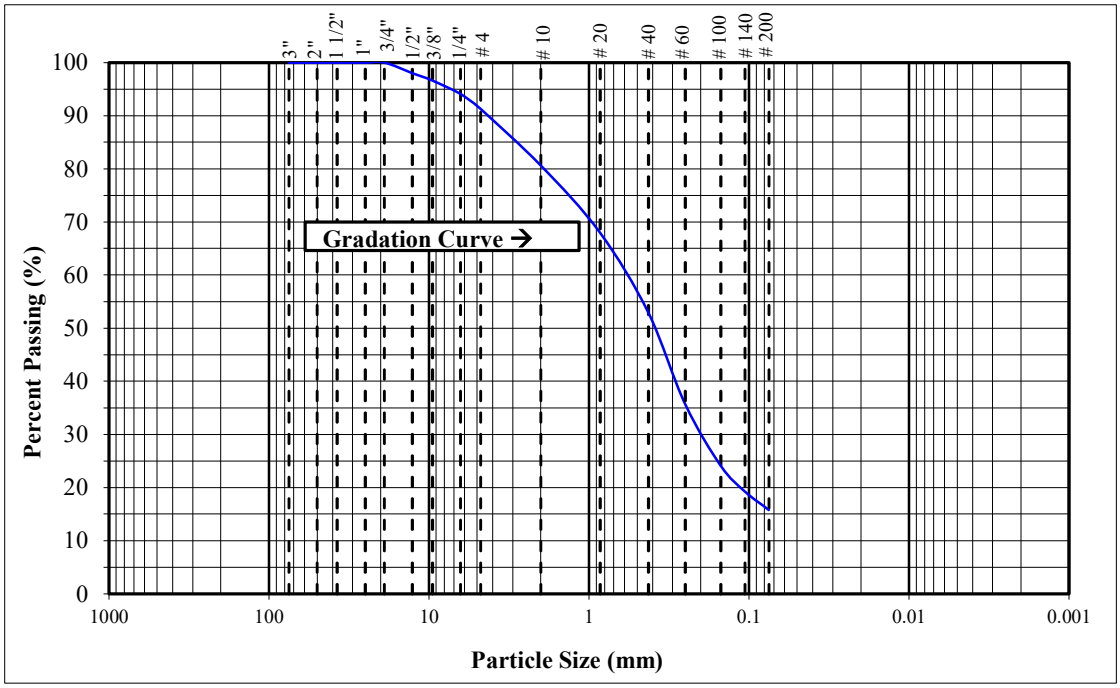
PROJECT NAME:	Fish Hatchery Improvements	PROJECT #:	22430
PROJECT LOCATION:	Hatchery Lane, Grand Lake Stream, ME	EXPLORATION #:	B-3
CLIENT:	HDR, Inc.	SAMPLE #:	S-4
TECHNICIAN:	Erika Stewart, P.E.	SAMPLE DEPTH:	15' - 17'
SOIL DESCRIPTION:	Medium-fine SAND, some Silt, little Gravel, SM	TEST DATE:	1/31/2023

TEST PROCEDURE

Sample Source: Split Spoon	**Sieve Stack:** Composite	**Specimen Procedure:** Air Dry
Test Method: Method A	**Separating Sieve(s):** 3/8 Inch	**Dispersion Type:** (NaPO3)6 Solution

DATA

STANDARD SIEVE DESIGNATION (mm)	ALTERNATIVE SIEVE DESIGNATION (in)	PERCENT PASSING (%)
75	(3 in)	100
50	(2 in)	100
37.5	(1-1/2 in)	100
25.0	(1 in)	100
19.0	(3/4 in)	100
12.7	(1/2 in)	98
9.5	(3/8 in)	97
6.35	(1/4 in)	94
4.75	(No. 4)	91
2.00	(No. 10)	81
0.850	(No. 20)	68
0.425	(No. 40)	53
0.250	(No. 60)	36
0.150	(No. 100)	24
0.106	(No. 140)	19
0.075	(No. 200)	16



REMARKS: Moisture Content = 14.8%

Reviewed By: CRS

Mailing: PO Box 515, Gardiner, ME 04345
Office: 210 Maine Avenue, Farmingdale, ME 04344

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GRAIN SIZE ANALYSIS - ASTM D6913

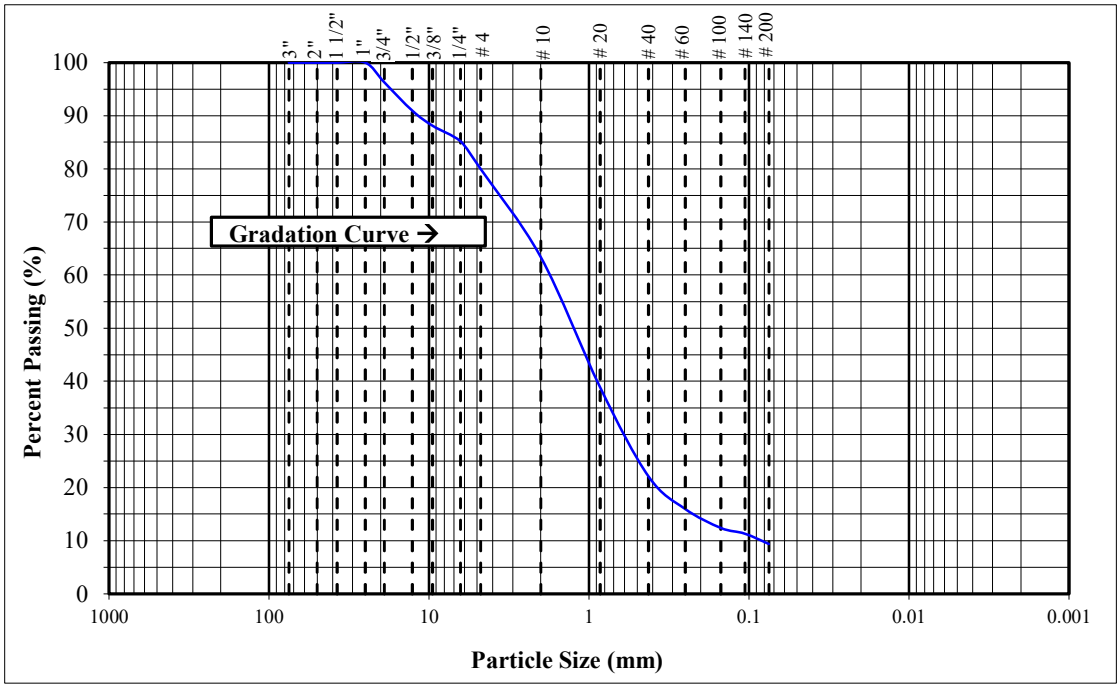
PROJECT NAME:	Fish Hatchery Improvements	PROJECT #:	22430
PROJECT LOCATION:	Hatchery Lane, Grand Lake Stream, ME	EXPLORATION #:	B-4
CLIENT:	HDR, Inc.	SAMPLE #:	S-1
TECHNICIAN:	Erika Stewart, P.E.	SAMPLE DEPTH:	0.3' - 2'
SOIL DESCRIPTION:	SAND, some Gravel, little Silt, SW-SM	TEST DATE:	1/12/2023

TEST PROCEDURE

Sample Source: Split Spoon	**Sieve Stack:** Composite	**Specimen Procedure:** Moist
Test Method: Method A	**Separating Sieve(s):** 3/8 Inch	**Dispersion Type:** Tap Water

DATA

STANDARD SIEVE DESIGNATION (mm)	ALTERNATIVE SIEVE DESIGNATION (in)	PERCENT PASSING (%)
75	(3 in)	100
50	(2 in)	100
37.5	(1-1/2 in)	100
25.0	(1 in)	100
19.0	(3/4 in)	96
12.7	(1/2 in)	91
9.5	(3/8 in)	88
6.35	(1/4 in)	85
4.75	(No. 4)	80
2.00	(No. 10)	63
0.850	(No. 20)	39
0.425	(No. 40)	22
0.250	(No. 60)	16
0.150	(No. 100)	12
0.106	(No. 140)	11
0.075	(No. 200)	9



REMARKS: Moisture Content = 8.9%

Reviewed By: CRS

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SUMMIT
GEOENGINEERING SERVICES

Laboratory Determination of Water (Moisture) Content of Soil ASTM D2216

PROJECT NAME:	Fish Hatchery Improvements	PROJECT #:	22430
PROJECT LOCATION:	Hatchery Lane, Grand Lake Stream, ME	DRYING METHOD:	Oven Dried
CLIENT:	HDR, Inc.	DESCRIPTION:	Glacial Stream Deposit
SOURCE:	Borings	TECHNICIAN:	Erika Stewart, P.E.
COLLECTION DATE:	01/04/23	TESTING DATE:	01/12/23

Location	Sample No.	Depth	Moisture Content	Remarks
B-2	S-3	5.2' - 7'	35.2%	SILT with Sand & wood pieces
B-2	S-4	7' - 9'	20.8%	SAND & SILT mix
B-2	S-5	10' - 11'	16.0%	SAND-SILT
B-2	S-6	15' - 15.7'	14.3%	SILT, some Sand & Gravel
B-3	S-4	15' - 17'	14.8%	(Grain Size Analysis)
B-4	S-1	0.3' - 2'	8.9%	(Grain Size Analysis)

REMARKS:

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