Memorandum

Project Name: Montgomery Dam Removal & Fish Passage Design

Task:	Project Management
Memo Title:	Project Scope - Grant Closeout Report
To:	Audra Caler, Town Manager Town of Camden Maine
From:	Michael Burke
Date:	04/12/22

A summary of the outcomes of each project task is detailed below. Please contact me at 207.315.7014 if you have questions or comments regarding this project summary. Thank you.

- Task 1- Meetings & Coordination:
    - Synopsis: Meetings and coordination occurred on an as-needed ad-hoc basis from initiation of project work through December 2021. Due to extended project timeframe and ongoing coordination needs, accentuated by the COVID-19 pandemic occurring within the middle of the project timeline, meeting and coordination needs exceeded assumptions contained within the assumed level of effort represented in the scope of work (general project coordination and 2 two-hour meetings).
- Task 2 – Stakeholder Engagement Support:
    - Synopsis: Stakeholder Engagement support occurred on an as-needed ad-hoc basis from initiation of project work through December 2021. Due to extended project timeframe and ongoing coordination needs, accentuated by the COVID-19 pandemic occurring within the middle of the project timeline, stakeholder engagement support needs exceeded assumptions contained within the assumed level of effort represented in the scope of work (preparation for and participation in 2 two-hour meetings). In addition to ad-hoc consultations, activities included preparation for and participation in one community workshop, and preparation of supporting materials for between 5 and 10 focus meetings conducted by Town of Camden representatives.
- Task 3.1: Field Data Collection
    - Synopsis: Field data collection task activities resulted in four separate field data collection campaigns, listed below.

- Bathymetric survey of the Camden Inner Harbor – This survey was conducted by Inter-Fluve staff using a remote unmanned aquatic vessel deployed with a single beam echosounder. The survey covered the area of the harbor immediately adjacent to the outlet of the Megunticook River. The distribution of bathymetric data points is shown in Figure 1. This data was integrated into the project existing terrain surface elevation model shown in Figure 16.

- Subsurface exploration in the Harbor Park area – This exploration was conducted by Summit Geoengineering Services in late February, 2020. The summary report from the exploration is included in Appendix A.

- Supplemental Survey in the Project Area - This one-half day survey was conducted by Inter-Fluve staff on March 17, 2020 using real time kinematic differential GPS equipment. This survey collected the locations and ground elevations of the subsurface boring locations, near shore areas that were too shallow for bathymetric survey, and exposed bedrock locations downstream of the dam, adjacent to the gate outflow and sea wall. The distribution of terrain data points is shown in Figure 1. This data was integrated into the project existing terrain surface elevation model shown in Figure 16.

- Tidal water level data collection – While not initially included in the project scope, tidal water level at one location adjacent to the public landing was monitored from October 8 to November 24, 2020. This data was collected to establish tidal water level boundary conditions for the harbor modeling discussed later in this summary. The collected tidal data is shown in Figure 2, and the associated calculated tidal datums over the data collection period are summarized in Table 1.

Table 1. Tidal datums calculated for the data collection period October 8 to November 24, 2020 at Camden Harbor.

Datum	Elevation (ft, NAVD88)
MHHW	5.384
MHW	5.007
DTL	0.067
MTL	0.067
MSL	0.085
MLW	-4.873
MLLW	-5.214

- Task 3.2: Hydraulic Modeling

  - Synopsis: Preliminary work on the extension of the Megunticook River one-dimensional HEC-RAS was completed in 2020 in conjunction with the feasibility study for the upstream river. This primary involved the existing conditions model. Work on the proposed conditions model was halted when debate was raised over the project option assumed for scope of work and budget.

Figure 1. Distribution of bathymetric and supplemental terrain survey points.

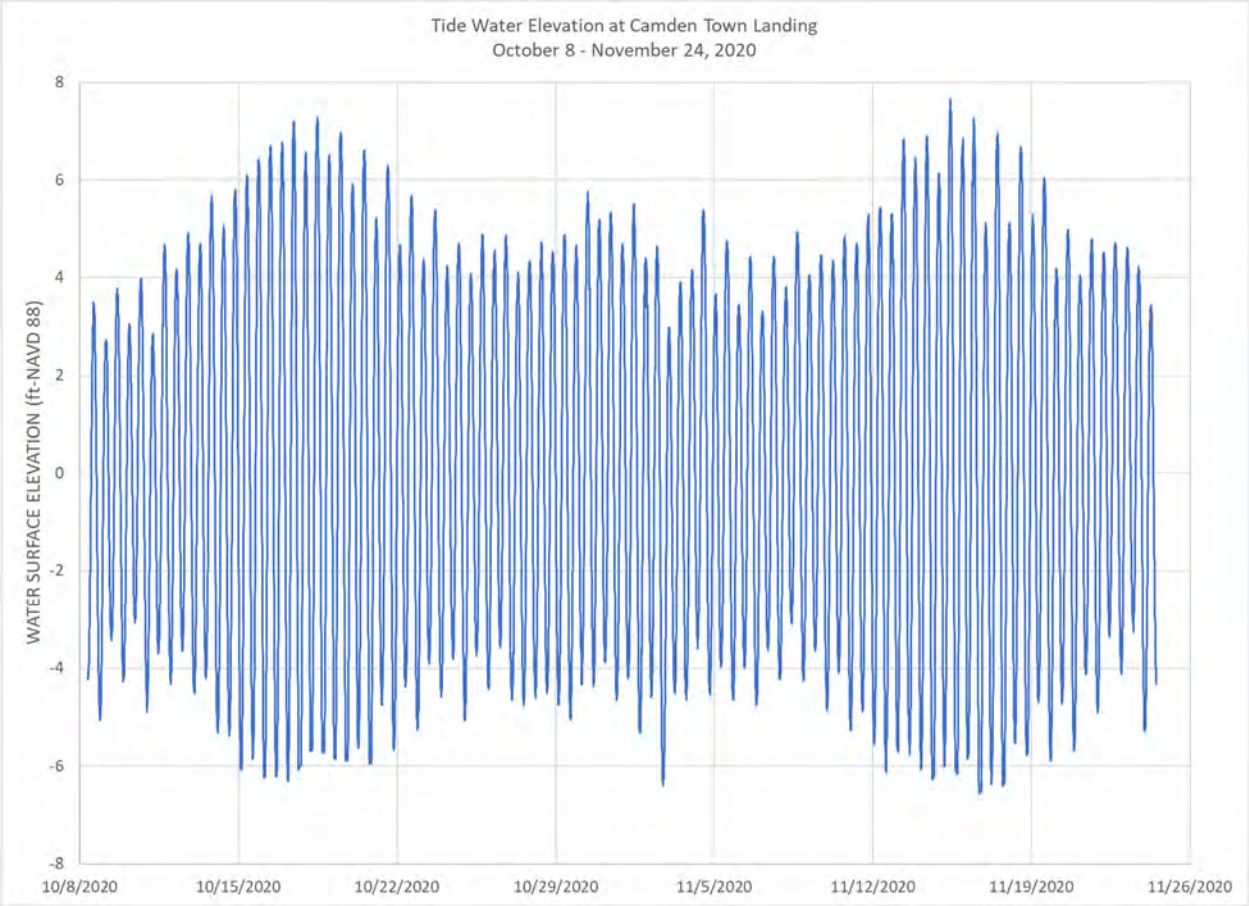

Figure 2. Tidal water surface elevation October 8 to November 26, 2000 in Camden Harbor near the Town landing.

- Task 3.3: Conceptual Design Layout

  - Synopsis: Work was completed in 2020 for the project option suggested by Town (dam removal with river restoration). This work primarily entailed engineering development of a conceptual schematic design layout that advanced the preliminary schematic included in the Montgomery Dam feasibility study, in order to support development of conceptual renderings. The conceptual design development integrated the results of the subsurface exploration and exposed bedrock surveys. Schematic layout drawings are included in Appendix B.

- Task 3.4: Landscape Renderings

  - Synopsis: Based on the suggested project alternative identified by the Town, in addition to a basic dam removal alternative, a series of illustrative renderings were prepared. Working sketches were also produced Illustrative drawings are shown in Figure 3 to Figure 8.

Figure 3. Conceptual rendering of the basic Montgomery Dam dam removal case at high river flow and mean tide level.

Figure 4. Conceptual rendering of the Montgomery Dam dam removal case with restored channel alignment at high river flow and mean tide level.

Figure 5. Conceptual rendering of the Montgomery Dam dam removal case with restored channel alignment at low river flow and mean tide level.

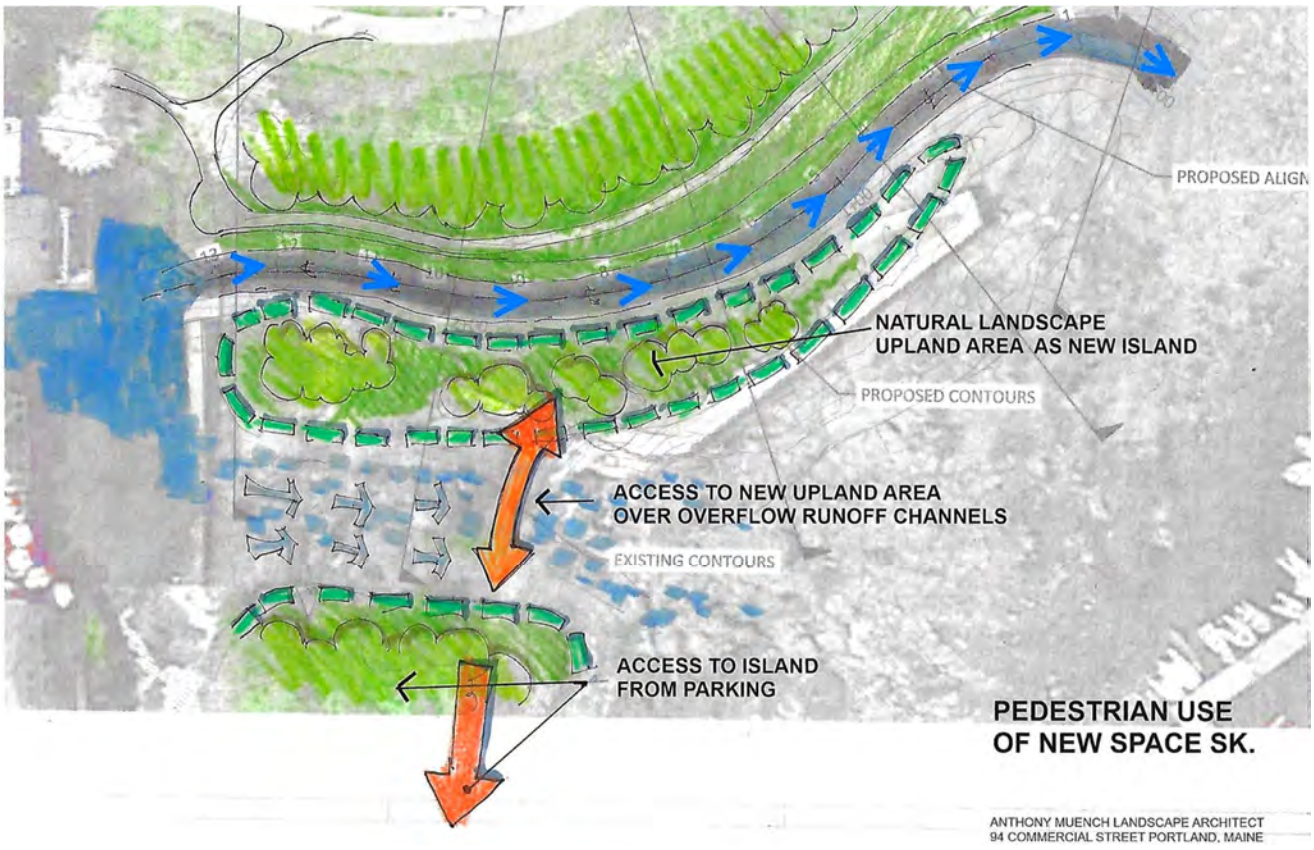

Figure 6. Conceptual working sketch of pedestrian circulation options for the Montgomery Dam dam removal case with restored channel alignment.

Figure 7. Conceptual perspective view of the Montgomery Dam dam removal case with restored channel alignment.

Figure 8. Conceptual section view of the Montgomery Dam dam removal case with restored channel alignment.

- Task 3.5: Structural Consultation & Design

    - Synopsis: The primary activity under this sub-task was an evaluation of options to provide screening behind the buildings that hover over the Montgomery Dam impoundment, which included boardwalk, screening, building extension, and structural element improvements. The summary report for this task order is found in Appendix C. Illustrative sketches for these options were also created, shown in Figure 9 to Figure 12.

      A second Task 3.5 sub-task order was scoped to fill data gaps and perform supplemental evaluations related to project effects on adjacent building structures. This was scoped as a follow-up to items identified for future in the original Montgomery Dam Feasibility Study in 2019. This sub-task has been deferred at present, and may be completed at a future date following resolution of stakeholder outreach and confirmation of future project direction.

Figure 9. Conceptual perspective sketch of a boardwalk option behind Main Street buildings.

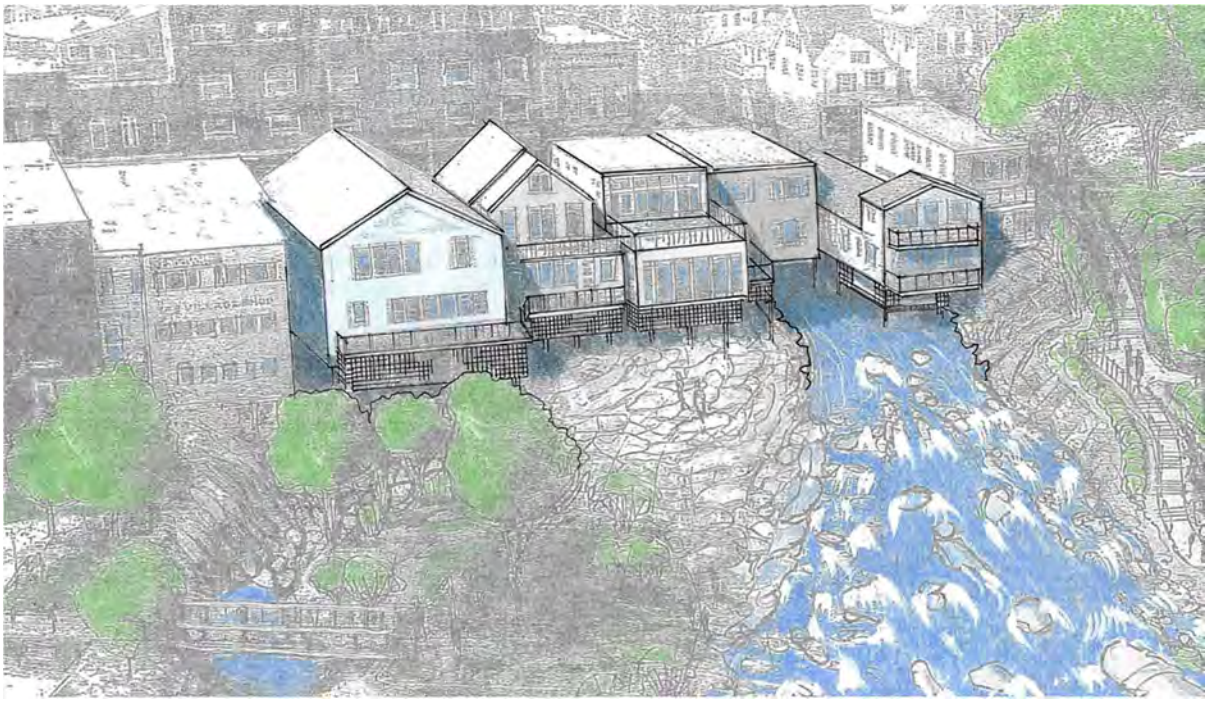

Figure 10. Conceptual perspective sketch of a structure screening option behind Main Street buildings.

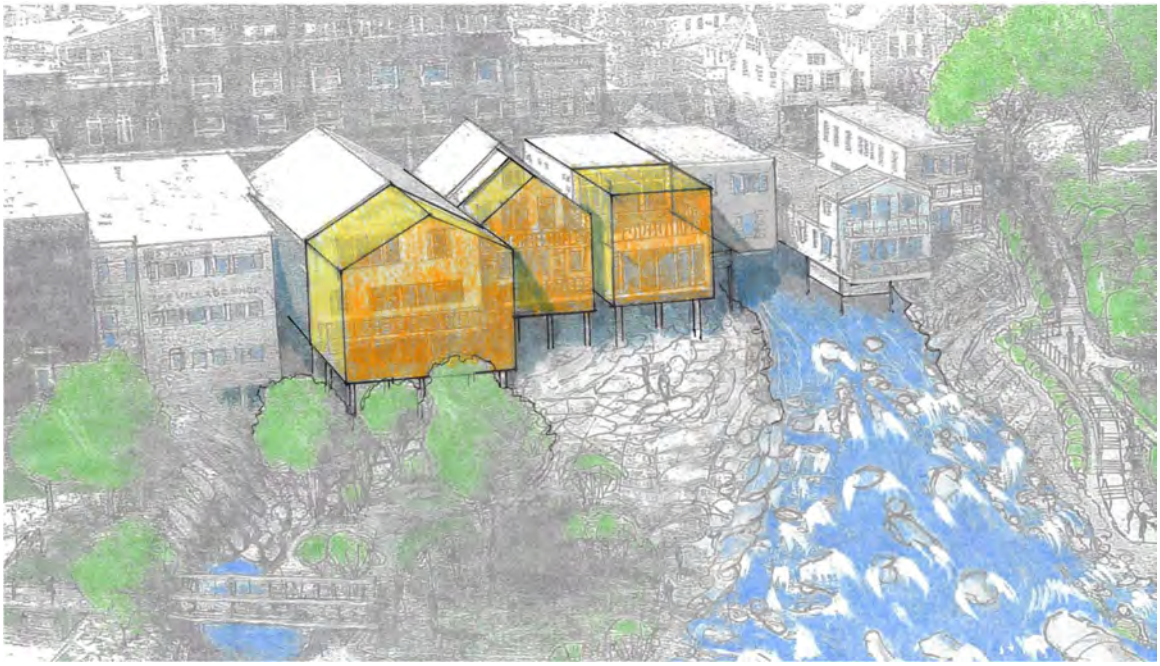

Figure 11. Conceptual perspective sketch of a building extension option behind Main Street buildings.

Figure 12. Conceptual perspective sketch of a structural element consistency upgrade option behind Main Street buildings.

- Task 3.6: Landscape Design & Consultation
    - Synopsis: One Task 3.6 sub-task order was authorized and completed. This sub-task entailed the project landscape designer/illustrator working collaboratively with the Town to develop an alternative project concept that retains a portion of the dam structure (existing masonry portion) in place, and offsets the presence of the dam with supplemental ledge removal in the impoundment area. The work included a collaborative site visit and development of the sketches shown in Figure 13 to Figure 15 below.

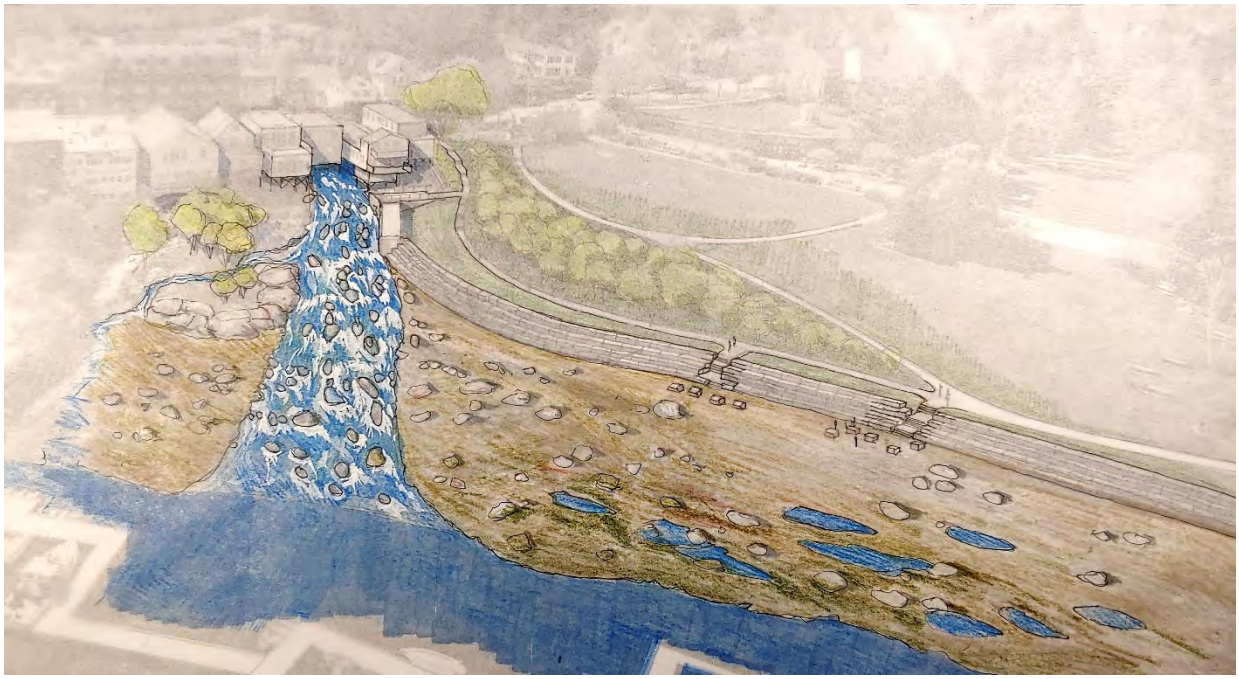

Figure 13. Conceptual perspective sketch of an alternative which retains the masonry portion of the dam and replaces the sea wall, at low tide.

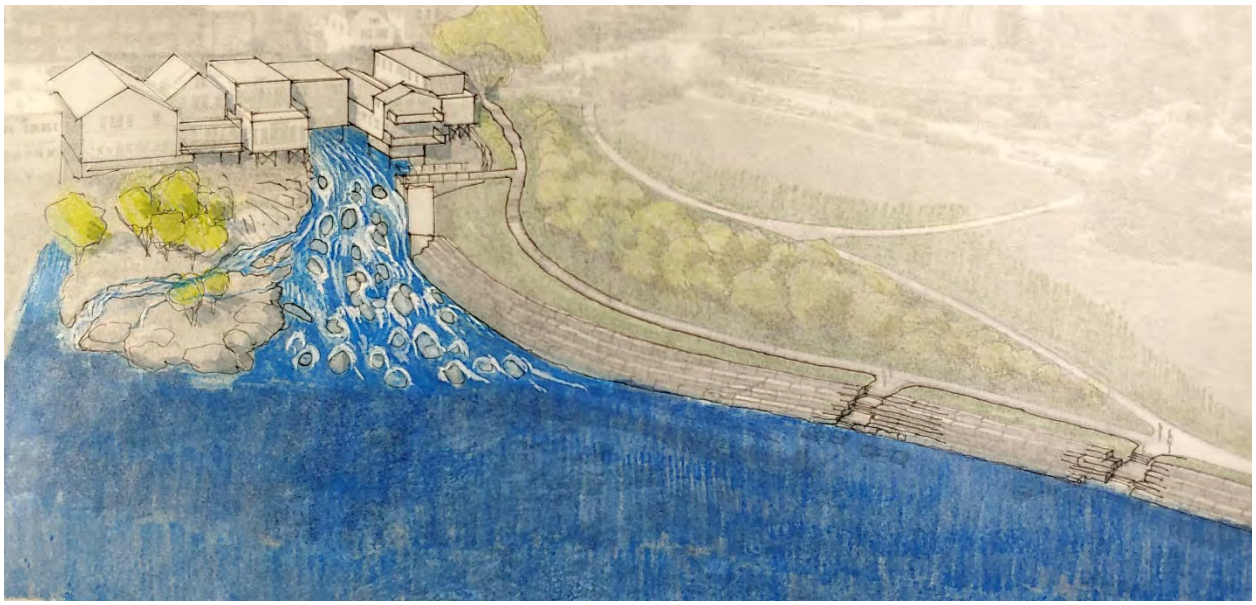

Figure 14. Conceptual perspective sketch of an alternative which retains the masonry portion of the dam and replaces the sea wall, at high tide.

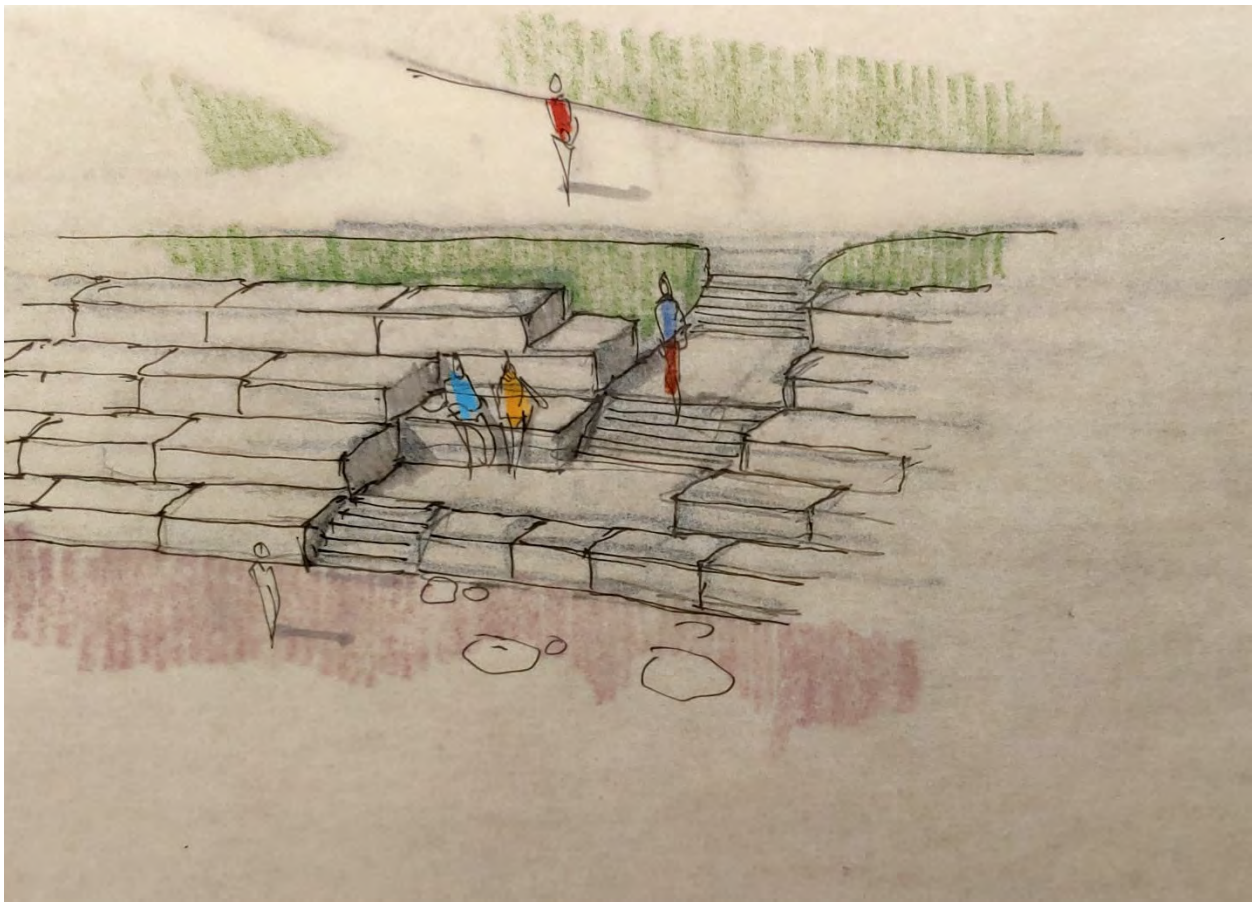

Figure 15. Conceptual perspective detail sketch of a pedestrian access feature in conjunction with a replaced stepped sea wall.

- Task 3.7: Final Design Plans & Report
    - Synopsis: Preliminary work was completed in 2020-21 but was halted when debate was raised over project option assumed for scope of work and budget. Work completed entailed background project setup, establishment of project CAD files and associated data management, post-processing of survey data and integration into project terrain models, and generating terrain surfaces for use in project hydraulic modeling.
- Task 3.8: Harbor Modeling
    - Synopsis: Work was ongoing in 2020-21 but was halted when debate was raised over project option assumed for scope of work and budget. Work to date has included processing of existing conditions and proposed conditions (dam removal alternative) terrains and computational meshes (Figure 16 to Figure 19). Modeling progress was in the process of QA/QC of existing conditions simulations, and preliminary development of proposed conditions simulations when work was halted. Figure 20 to Figure 23 show examples of model results for the initial existing conditions simulations.
- Task 4: Construction Cost Estimates
    - Synopsis: No contract work done under this task as the project development was delayed due to COVID-19 and ongoing project stakeholder deliberations.
- Task 5: Permitting Support
    - Synopsis: No contract work done under this task as the project development was delayed due to COVID-19 and ongoing project stakeholder deliberations.

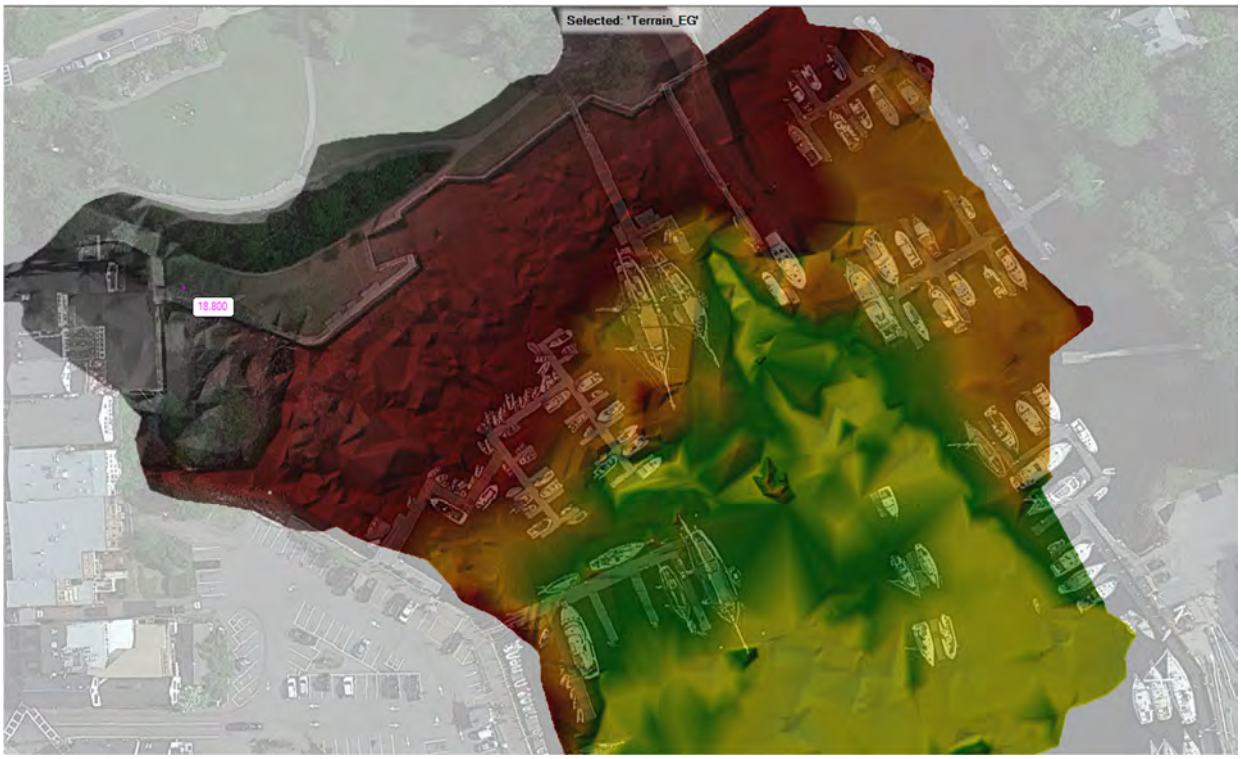

Figure 16. Existing conditions model terrain.

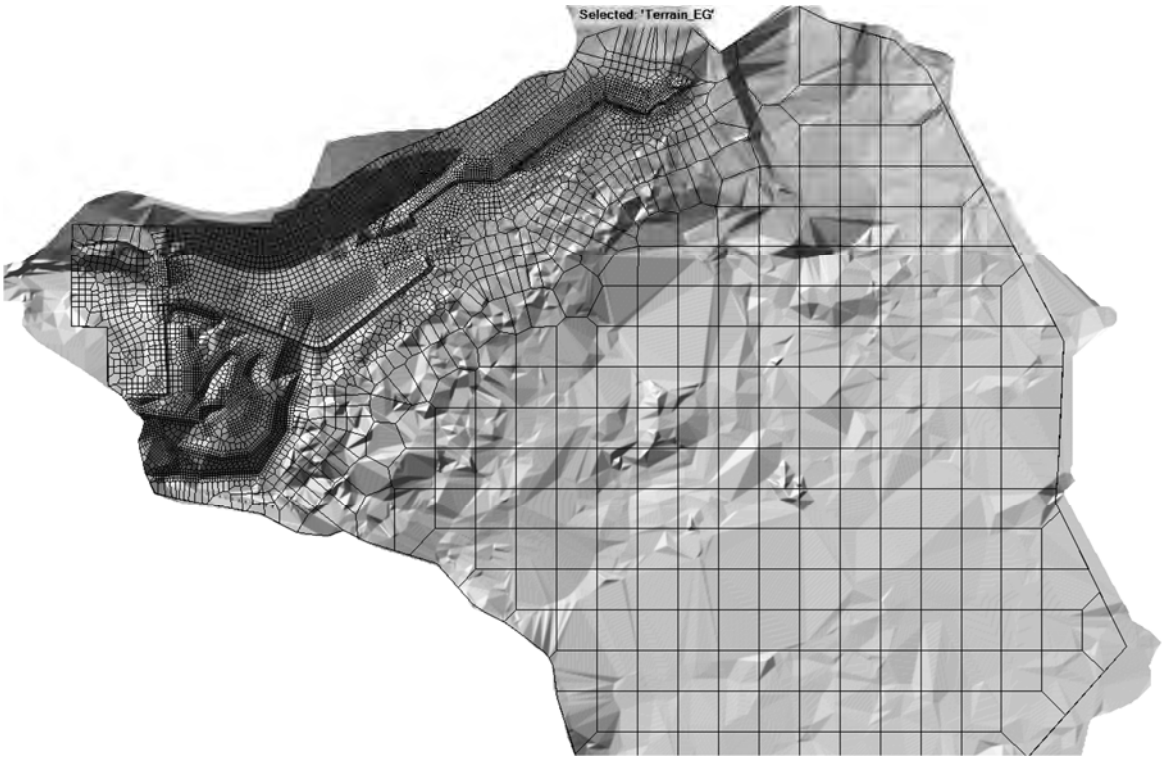

Figure 17. Existing conditions model terrain with two-dimensional model computational mesh.

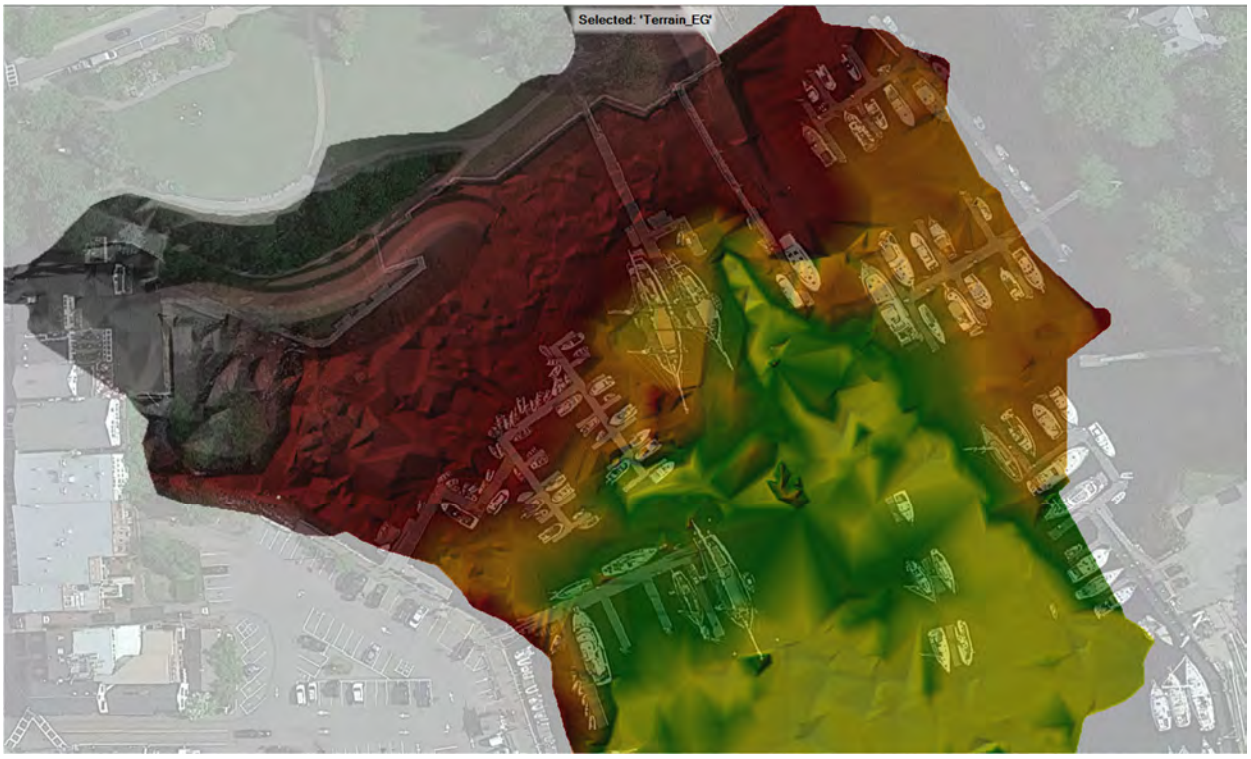

Figure 18. Preliminary proposed conditions model terrain for dam removal with restored channel alignment case.

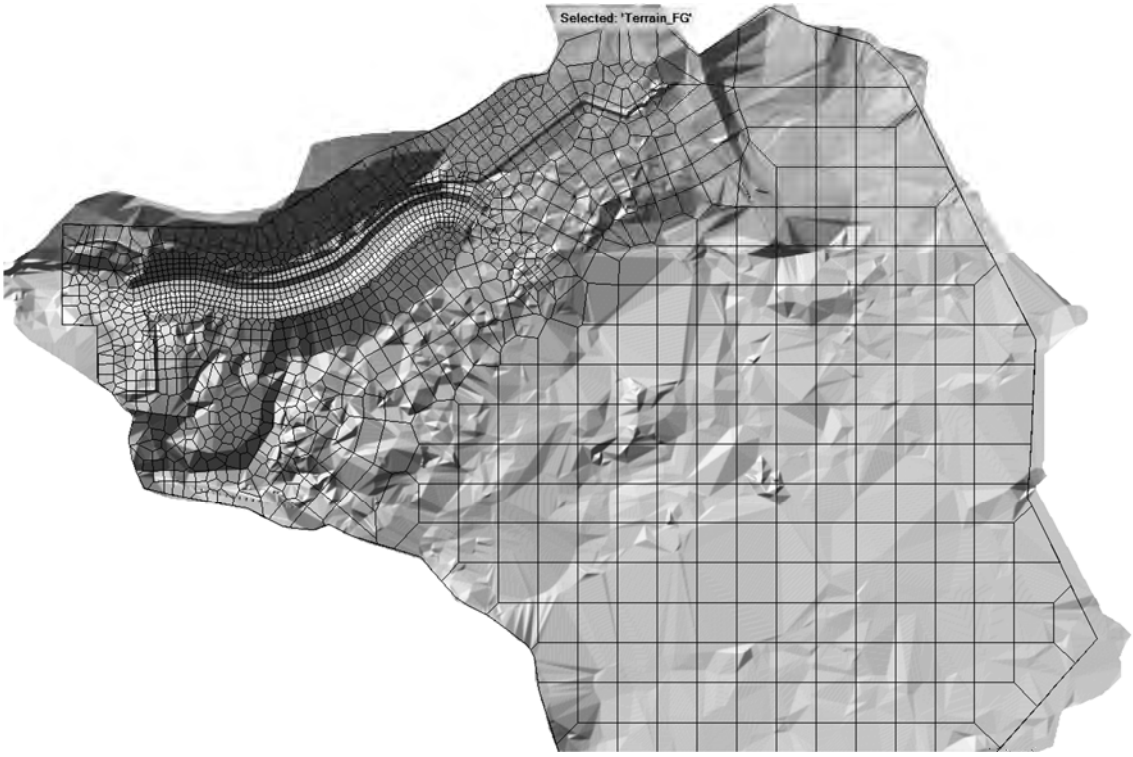

Figure 19. Preliminary proposed conditions model terrain for dam removal with restored channel alignment case, with two-dimensional model computational mesh.

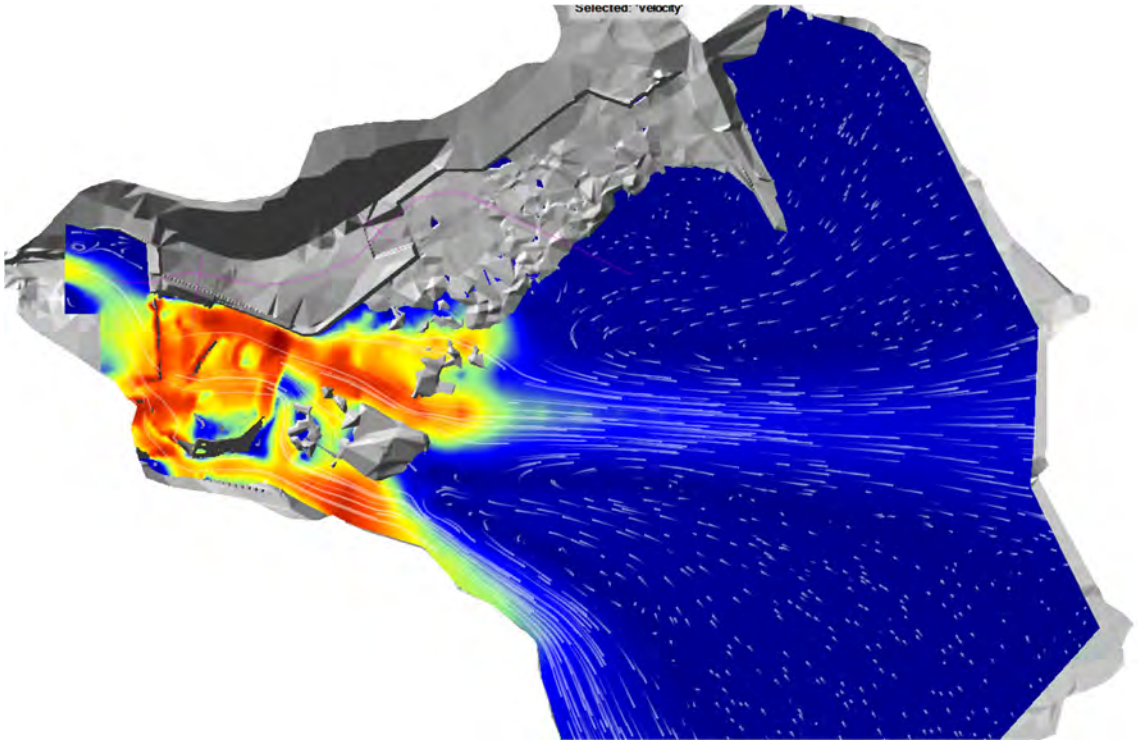

Figure 20. Example existing conditions preliminary velocity distribution results, for 1 in 10-year peak flow event and mean lower low water (MLLW) tide level.

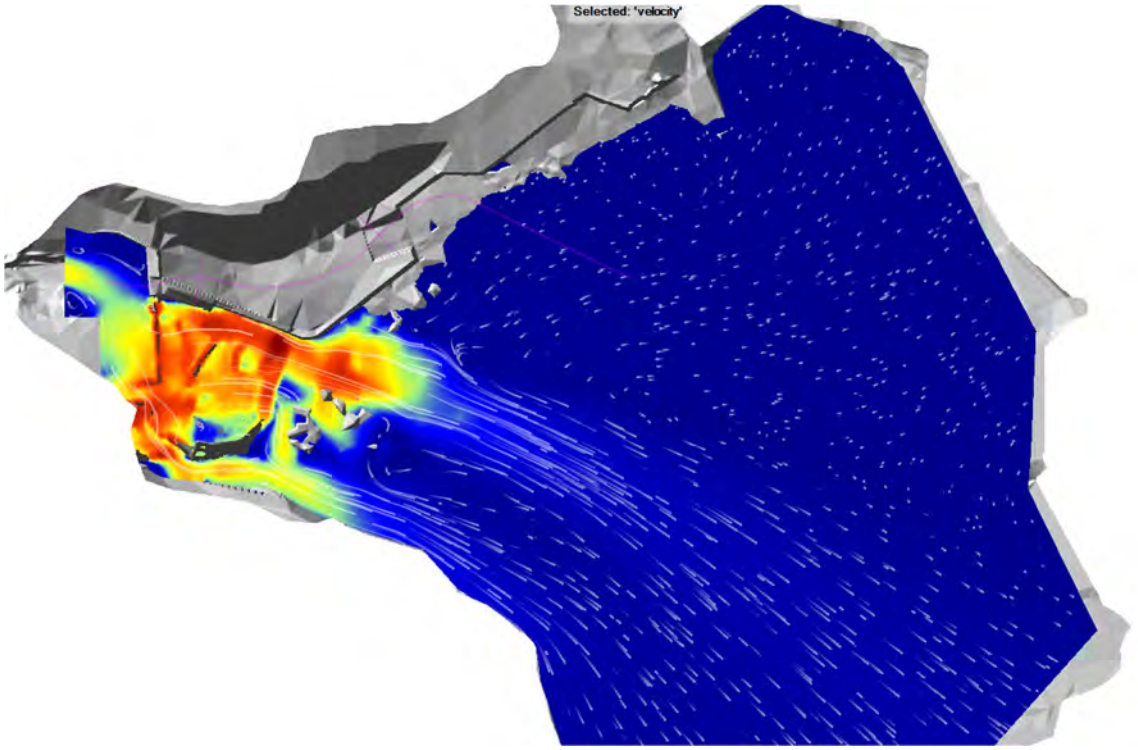

Figure 21. Example existing conditions preliminary velocity distribution results, for 1 in 10-year peak flow event and mean tide level (MTL).

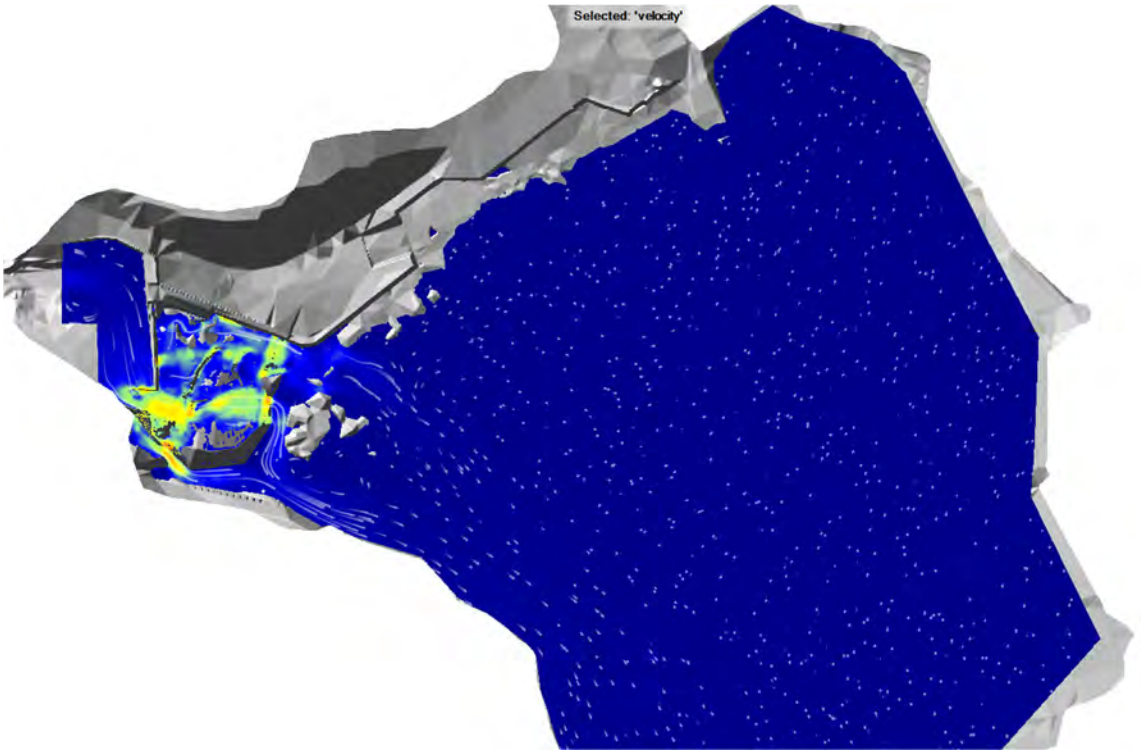

Figure 22. Example existing conditions preliminary velocity distribution results, for a median fish passage flow (110 cfs) and mean tide level (MTL).

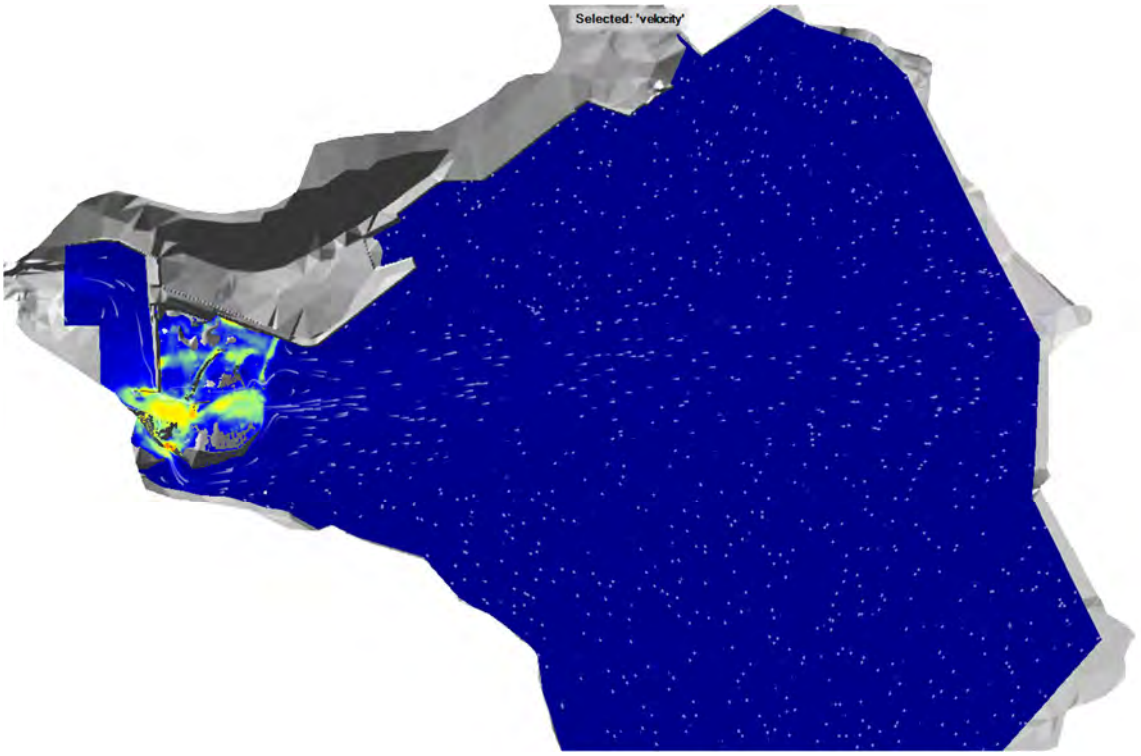

Figure 23. Example existing conditions preliminary velocity distribution results, for a median fish passage flow (110 cfs) and mean higher high (MHHW) tide level.

APPENDIX A – SUBSURFACE EXPLORATION REPORT

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

Geotechnical Report

Montgomery Dam

Camden, Maine

3/19/2020

SUMMIT GEOENGINEERING SERVICES

PIN 19394

SUMMIT
GEOENGINEERING SERVICES

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March 19, 2020
Summit #19394

Michael Burke, P.E.
Interfluve
165 Main Street, Suite 2B
PO Box 236
Damariscotta, Maine 04543

Reference: Geotechnical Engineering Services
Montgomery Dam – Harbor Park at Camden, Maine

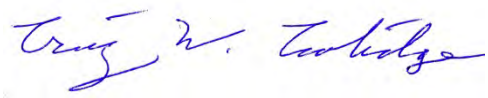
Dear Mr. Burke;

Summit Geoengineering Services, Inc. (SGS) has completed a geotechnical investigation for Montgomery Dam at Harbor Park in Camden, Maine. Scope of services included performing subsurface explorations at the site and preparing this report summarizing the findings.

The project consists of evaluating long-term planning considerations for Montgomery Dam located at lower Harbor Park in Camden, Maine. Considerations for the dam include structural upgrades or possible removal of the dam. Improvement in water connectivity are planned between the Mengunticook River watershed and Camden Harbor by implementing a new fish passage or improved channel flow by dam removal. As part of these considerations SGS is asked to investigate the subsurface conditions near the outlet of the dam structure and possible location for new channel flow.

Discussion of our geotechnical findings are included 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.

Sincerely yours,
Summit Geoengineering Services



Craig W. Coolidge, P.E.
Vice President
Principal Engineer

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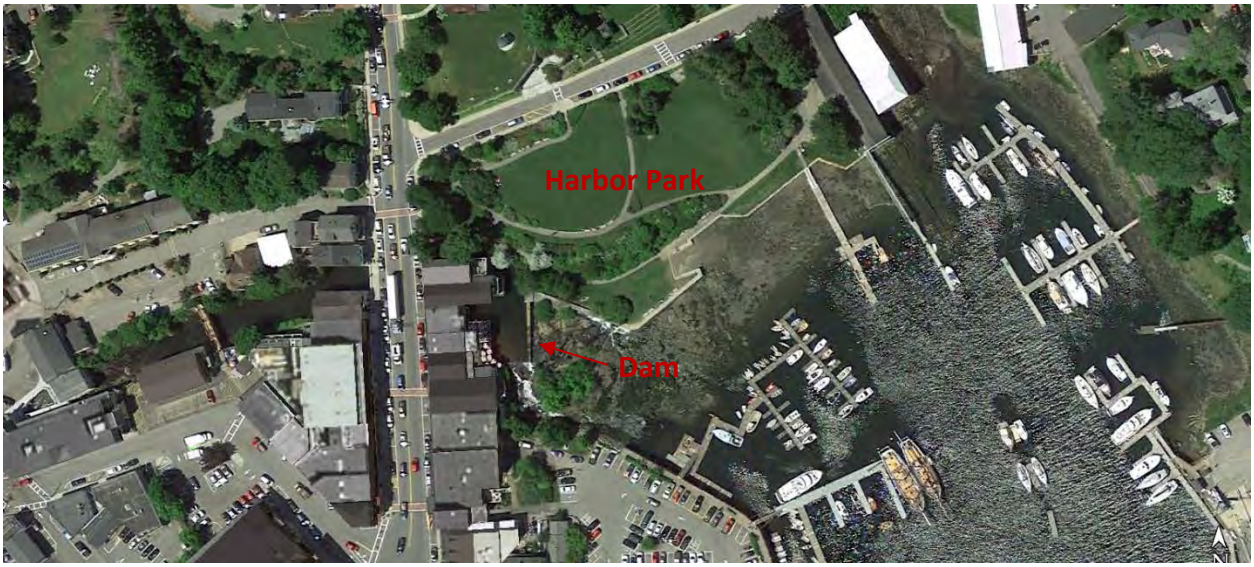
1.0 Project and Site Description

Summit Geoengineering Services, Inc. (SGS) was asked to conduct a geotechnical investigation for a site located northeast of Montgomery Dam located at Harbor Park in Camden, Maine.



Aerial Image of Site (2014)

Montgomery Dam is located at the outlet of the Megunticook River flowing to Camden Harbor. The current dam structure is constructed of quarry rock with a small upstream impoundment. The dam is 100 feet in length bearing upon bedrock with a spillway elevation of 24.4 feet.

Montgomery Dam Spillway

Outlet Below Dam (Harbor)

The dam structure has been in place for a significant period of time, estimated at over 200 years of age, with the current dam being reconstructed in 1930 with periodic modifications or repairs being conducted overtime. Outlet of the river includes a field of cobbles and boulders. Aerial imagery indicates Harbor Park underwent reconstruction as late as 2004.

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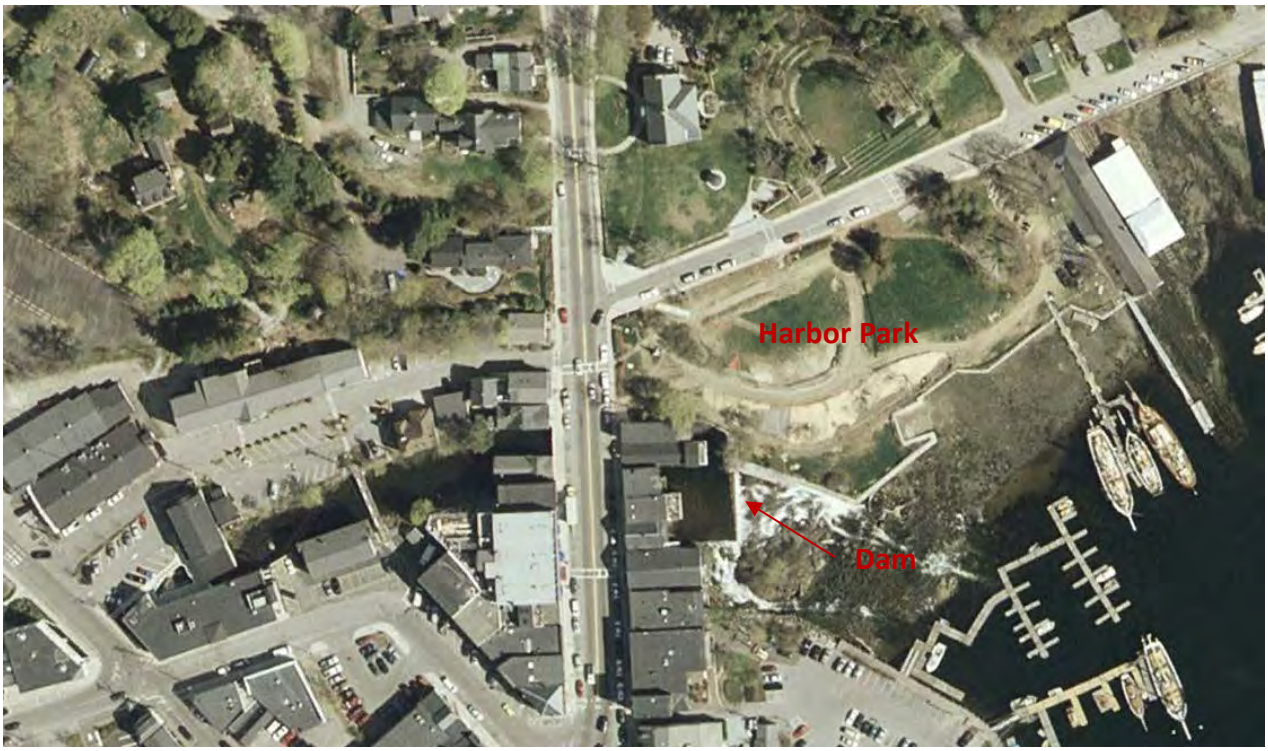

Aerial Image of Site (2004)

Presently, the dam is being evaluated for future renovation or potential removal. As part of planning, SGS conducted a subsurface investigation for the lower portion of Harbor Park located northeast of the existing dam alignment. This area of Harbor Park is being considered for possible redevelopment to include realignment of the Megunticook River.

Lower Harbor Park (Facing Slope)

Lower Harbor Park (High Tide)

At high tide, the lower portion of Harbor Park was observed as being partially submerged along the lower paved walkway. Photograph was taken on February 27, 2020 at 12:40 pm near the peak of high tide listed at 1:16 pm by US Harbors tide chart for Camden, Maine.

2.0 Subsurface Explorations

Summit Geoengineering Services, Inc. (SGS) observed the subsurface conditions with the drilling of 8 test borings on February 26 to 27, 2020. Test borings were performed using a track mounted AMS Power Probe 9500 VTR. Test borings were advanced using 3.5-inch outer diameter drill casing with rotary wash by roller cone to depths of refusal ranging from 5.0 to 24.8 feet below ground surface. Soils were investigated with split spoon sampling using the standard penetration test with an auto drop hammer. Samples were visually logged onsite by a geotechnical engineer using the Unified Soil Classification System (USCS). Test boring locations are shown on the Exploration Plan in Appendix A. Interpretive cross sections are also provided in Appendix A. Logs of the test borings are provided in Appendix B.

Test Boring B-1 (Rotary Wash)

Test Boring B-1 (SPT Sampling)

Test boring locations were pre-marked by SGS prior to drilling for coordination with public utilities. Due to the potential for utilities, a private utility locator (Blood Hound, LLC) was subcontracted by SGS to further identify utilities in proximity to the test borings. Test boring locations were also surveyed by SGS using an auto level to obtain surface elevations as follows:

SURVEY DATA SUMMARY TABLE (Feet)					
Exploration	**Surface EL**	**Refusal Depth**	**Refusal EL**	**GW Depth**	**GW (EL)**
B-1	36.0	24.5	11.5	6.1	29.9
B-2	33.7	24.8	8.9	6.9	26.8
B-3	28.7	6.5	22.2	5.0	23.7
B-4	19.0	10.6	8.4	8.2	10.8
B-5	12.2	5.5	6.7	5.1	7.1
B-6	8.6	5.0	3.6	2.5	6.1
B-7	8.7	7.5	1.2	2.3	6.4
B-8	11.4	19.5	-8.1	2.3	9.1

Elevations are in reference to a top of dam EL 24.4 feet (NAVD 88)

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3.0 Subsurface Conditions

The subsurface conditions beneath topsoil or bituminous pavement consist of ***fill,*** overlying ***marine deposits***, overlying ***glacial till***. Refusal on probable ***bedrock*** ranged from depths of 5.0 to 24.8 feet below ground surface. Interpretive cross sections of the subsurface conditions are provided in Appendix A. The subsurface conditions are summarized on the following table:

SUBSURFACE CONDITIONS SUMMARY TABLE (Feet)					
Exploration	**Fill**	**Glacial Marine**	**Glacial Till**	**Refusal**	**Groundwater**
B-1	--	0.3 to 14	14 to 24.5	24.5	6.1
B-2	0.2 to 1.5	1.5 to 16	16 to 24.8	24.8	6.9
B-3	0.3 to 4	--	4 to 6.5	6.5	5.0
B-4	0.3 to 3	3 to 6.5	6.5 to 10.6	10.6	8.2
B-5	0.2 to 4	--	4 to 5.5	5.5	5.1
B-6	0.2 to 3	--	3 to 5.0	5.0	2.5
B-7	0.2 to 4	--	4 to 7.5	7.5	2.3
B-8	--	0.6 to 9	9 to 19.5	19.5	2.3

Fill is described as brown sand with variable gravel and silt and classified as SP-SM or SM in accordance with the Unified Soil Classification System (USCS). The fill is compact to loose.

Marine deposit is described as olive brown and mottled silty clay with occasional sand and is classifed as ML-CL or CL in accordance with USCS. The marine deposit is stiff to firm.

Glacial till is desribed as gray silt clay mixture with variable sand and gravel and is classified as ML-CL in accordance with USCS. The glacial till is dense to hard and contains occasional to frequent cobbles and boulders.

Bedrock is estimated from roller cone refusal encountered at depths of 5.0 to 24.8 feet below ground surface. Penetration resistance by roller cone drilling indicates the bedrock surface to be hard and intact. Mapping by the Maine Geological Survey (MGS) indicates the bedrock consists of rusty schist and gneiss. Outcrops are visible along Montgomery Dam which appears consistent with the mapping by the MGS.

Groundwater was recorded within the open boreholes at a depth range of 2.3 to 8.2 feet below ground surface approximately 24 hours upon completion. Groundwater appears to flows towards Camden Harbor. Mottled soil staining indicates depths may fluctuate during wet and dry periods such as recharge from rain and snow melt. Given close proximity to the harbor, groundwater within the lower portion of the slope is likely hydraulically connected to the harbor tidal water and may fluctuate in depth during tidal ebb and flow.

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4.0 Closure

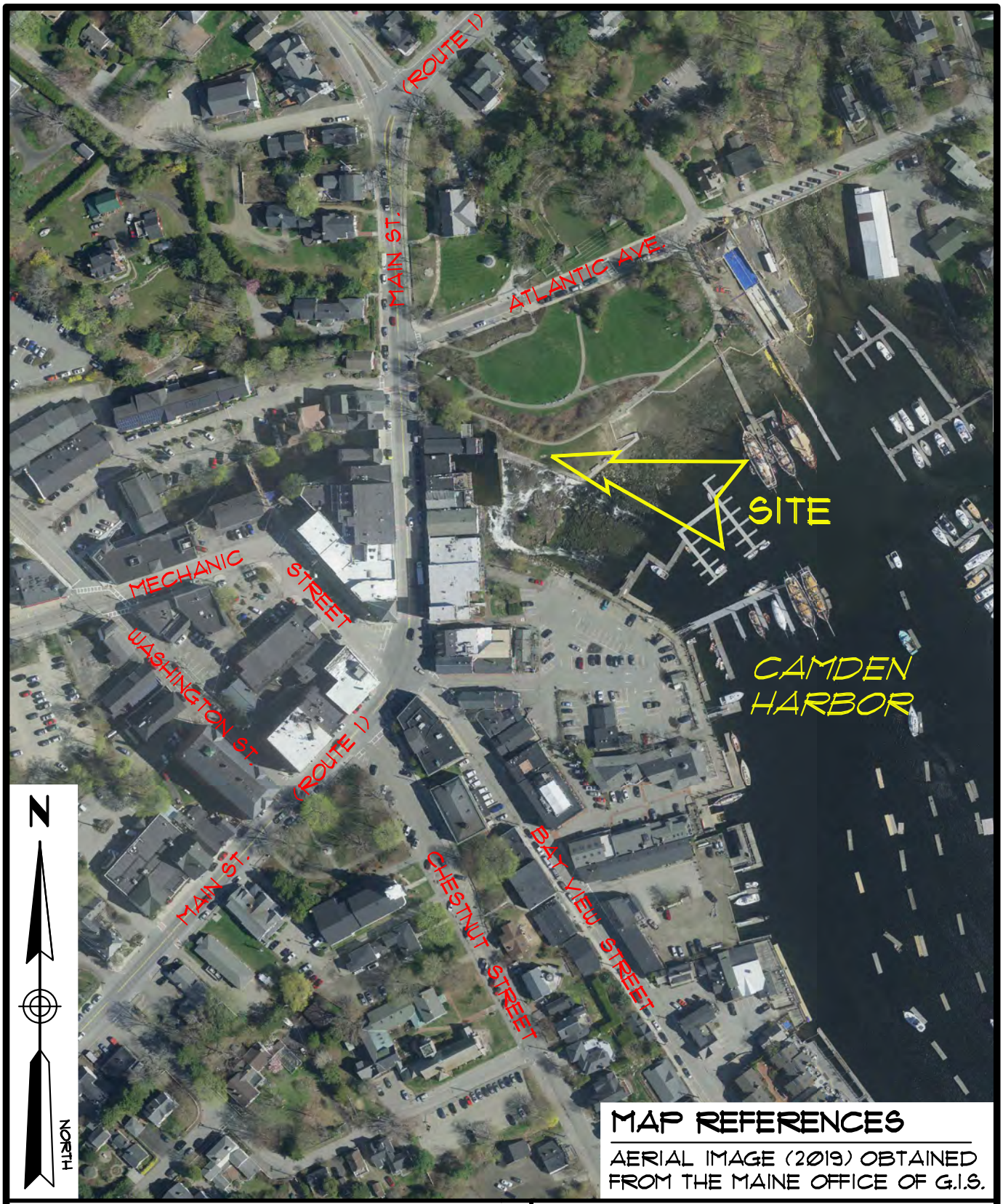
This subsurface investigation and summary of findings are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions differ materially from those described in this report, SGS should be notified so that we can re-evaluate our recommendations.

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.

APPENDIX A

EXPLORATION LOCATION PLAN

INTERPRETIVE CROSS SECTIONS



MAP REFERENCES

AERIAL IMAGE (2019) OBTAINED FROM THE MAINE OFFICE OF G.I.S.

SITE LOCATION MAP
MONTGOMERY DAM

HARBOR PARK - CAMDEN, MAINE

PREPARED FOR

INTERFLUVE

DATE: 3-4-2020	DRAWN BY: KRF	CHECKED BY: ELS
JOB: 19394	SCALE: 1"= 200'	FILE: 19394 MAPS

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SUMMIT
GEOENGINEERING SERVICES
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ATLANTIC AVE.

MAIN STREET (U.S. ROUTE 1)

B-3 (28.7)

B-1 (36.0)

B-2 (33.7)

B-4 (19.0)

B-5 (12.2)

B-6 (8.6)

B-7 (8.7)

B-8 (11.4)

SECTION 1

SECTION 2

SECTION 3

SECTION 4

SCALE: 1" = 30'

0 15 30 60 90

N NORTH

LEGEND

B-1 SUMMIT TEST BORING (FEBRUARY 26-27, 2020)

(33.7) APPROX. GROUND ELEVATION

PLAN REFERENCE

AERIAL IMAGE (2019) AND 2' LIDAR CONTOURS WERE OBTAINED FROM THE MAINE OFFICE OF G.I.S. WEBSITE.

PROJECT: MONTGOMERY DAM
HARBOR PARK - CAMDEN, MAINE

CLIENT: INTERFLUVE

TITLE: EXPLORATION LOCATION PLAN

SCALE: 1" = 30'

DRAWN BY: KRF

APPR. BY: CWC

DATE: MARCH 2020

SUMMIT GEOENGINEERING SERVICES
113 PLEASANT STREET
ROCKLAND, ME 04841
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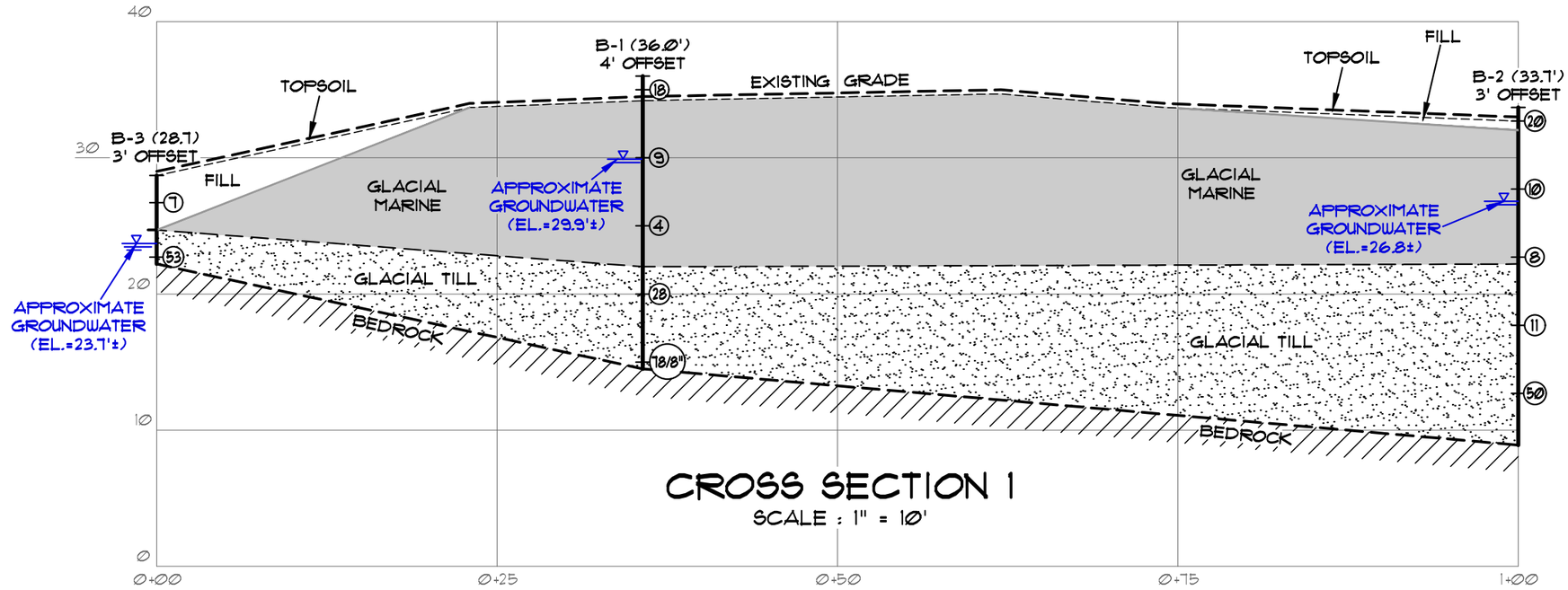
LEWISTON, ME 04240
Tel.: (207) 576-3313

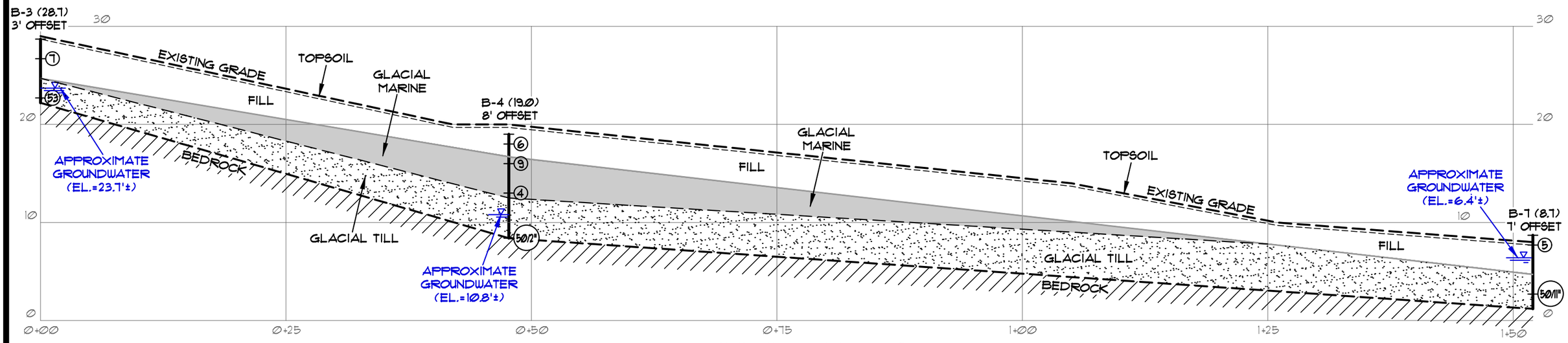
PROJ.#: 19394

FIGURE: 1



CROSS SECTION 1

SCALE : 1" = 10'



CROSS SECTION 2

SCALE : 1" = 10'

SCALE: 1" = 10'

0 5 10 20 30

145 LISBON ST. - SUITE 701
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

SUMMIT
GEOENGINEERING SERVICES

TITLE: CROSS SECTIONS 1 & 2

SCALE: 1" = 10'

DRAWN BY: KRF

DATE: MARCH 2020

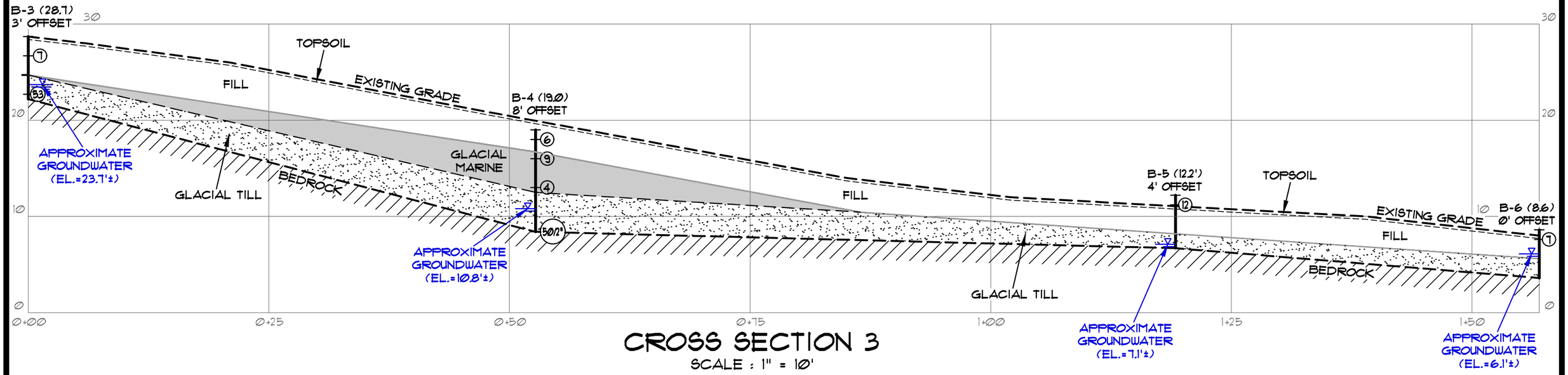
APPR BY: CWC

PROJECT: MONTGOMERY DAM
HARBOR PARK - CAMDEN, MAINE

CLIENT: INTERFLUVE

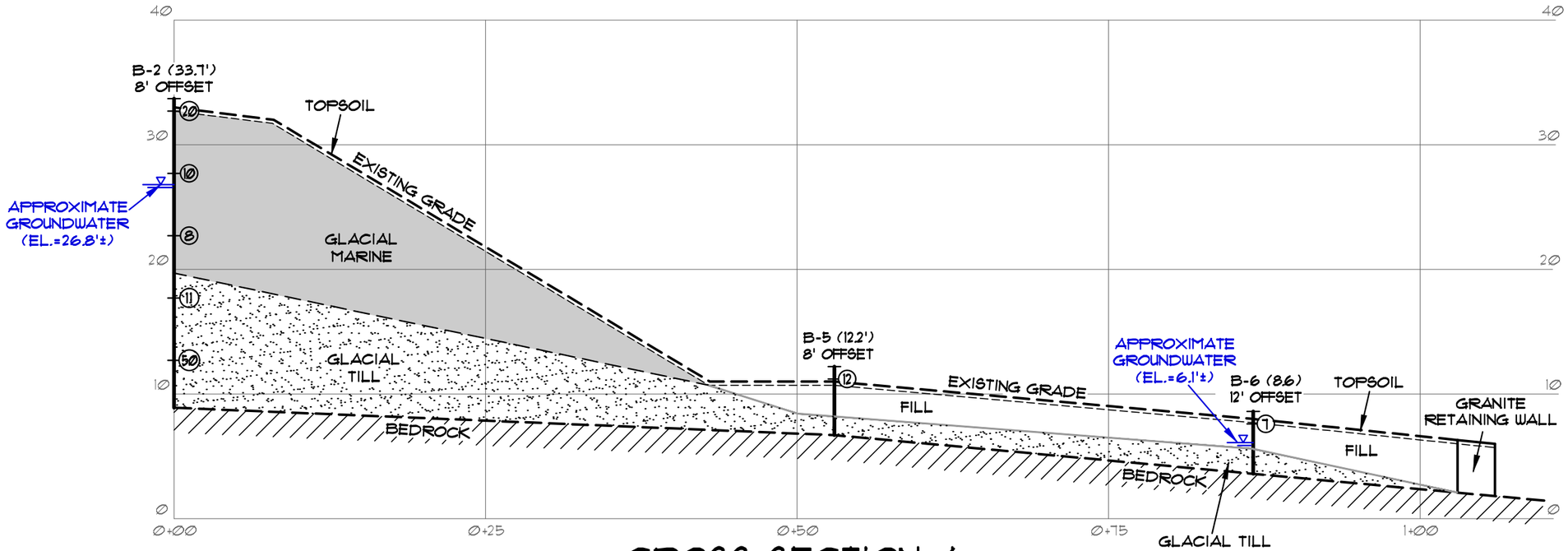
PROJ.#: 19394

FIGURE: 2



CROSS SECTION 3

SCALE : 1" = 10'



CROSS SECTION 4

SCALE : 1" = 10'

SCALE: 1" = 10'

0 5 10 20 30

145 LISBON ST. - SUITE 101
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SUMMIT
GEOENGINEERING SERVICES

TITLE:	CROSS SECTIONS 3 & 4
SCALE: 1" = 10'	DRAWN BY: KRF
DATE: MARCH 2020	APPR BY: CWC
PROJECT:	MONTGOMERY DAM HARBOR PARK - CAMDEN, MAINE
CLIENT:	INTERFLUVE
PROJ.#:	19394
FIGURE:	3

APPENDIX B

TEST 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:

SS = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Shear Vane
PP = Pocket Penetrometer
RC = Rock Core Sample
FV = Field Vane Shear Test
PS = 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
W = Natural Water 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: Montgomery Dam | Project #: 19394
Location: Harbor Park | Sheet: 1 of 1
City, State: Camden, Maine | Chkd by: CWC

Drilling Co: Summit Geoengineering, Inc.
Driller: Craig Coolidge, P.E.
Summit Staff: Erika Stewart, P.E.

Boring Elevation: 36.0 feet
Reference: Measured on site using an auto level with benchmark by Gartley & Dorsky
Date started: 2/26/2020 Date Completed: 2/26/2020

DRILLING METHOD		SAMPLER	
Vehicle	Power Probe	Length:	24" SS
Model	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/26/2020	8.0 ft	28.0 ft	Measured in open borehole, end of day
2/28/2020	6.1 ft	29.9 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	24/15	0 - 2	5		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				10	35.7	Olive gray Silty CLAY, very stiff, damp, CL	PP = 8,000 psf	0.3' GLACIAL MARINE DEPOSIT
				8				
2				7				
3								
4								
5								
	S-2	24/24	5 - 7	3		Olive brown and mottled Silty CLAY, occasional fine	PP = 5,000 to	
6				4		Sand lenses, stiff, damp to moist, CL	3,000 psf	
				5			w/ depth	
7				5			Water at 6.1'	
8								
9								
10								
	S-3	24/24	10 - 12	1		Same as above, firm, wet, CL	PP = 1,000	
11				2			to 2,000 psf	
				2				
12				2				
13								
14								
					22.0			14'+/- GLACIAL TILL
15								
	S-4	24/12	15 - 17	11		Gray SILT-CLAY, some Sand and Gravel, dense/hard,		
16				11		wet, ML-CL		
				17				
17				25				
18						Occasional to frequent cobbles		
19								
20								
	S-5	14/14	20 - 21.1	21		Gray SILT- CLAY, some Sand and Gravel, very dense/	PP ≥ 9,000 psf	
21				48		hard, wet, ML-CL		
				50/2"		Spoon refusal on cobble/boulder at 21.1'		
22								
23								
24								
					11.5	End of Exploration at 24.5', Roller cone refusal on probable bedrock		24.5' BEDROCK

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
SP = Gravel punch sample, S = Split spoon Sample

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: Montgomery Dam | Project #: 19394
Location: Harbor Park | Sheet: 1 of 1
City, State: Camden, Maine | Chkd by: CWC

Drilling Co: Summit Geoengineering, Inc.
Driller: Craig Coolidge, P.E.
Summit Staff: Erika Stewart, P.E.

Boring Elevation: 33.7 feet
Reference: Measured on site using an auto level with benchmark by Gartley & Dorsky
Date started: 2/26/2020 Date Completed: 2/26/2020

DRILLING METHOD		SAMPLER	
Vehicle	Power Probe	Length:	24" SS
Model	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/26/2020	7.6 ft	26.1 ft	Measured in open borehole, end of day
2/28/2020	6.9 ft	26.8 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	24/20	0 - 2	2		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				10	33.5	Dark brown Silty SAND, some to little Gravel, frozen,SM	Frost to 1.5'	0.2'
				10				FILL
2				9	32.2	Olive brown Silty CLAY, very stiff, damp, CL		1.5'
								GLACIAL
3								MARINE
								DEPOSIT
4								
5								
	S-2	24/24	5 - 7	3		Olive brown and mottled Silty CLAY, occasional fine	PP = 5,000 to	
6				5		Sand lenses, stiff, moist, CL	3,500 psf	
				5			w/ depth	
7				5				
							Water at 6.9'	
8								
9								
10								
	S-3	24/24	10 - 12	2		Same as above, firm, moist to wet, CL	PP = 2,000	
11				2			to 4,000 psf	
				6				
12				10		Olive brown and mottled SILT-SAND, some Gravel,		11.5'
						little Clay, very stiff/compact, wet, SM-ML		
13								
14								
15								
	S-4	24/15	15 - 17	4		Olive brown and motlted SILT-SAND, some Clay and	PP = 4,000	
16				4		Gravel, compact, wet, SM-ML to SC	to 5,000 psf	
				7	17.7	Gray SILT-CLAY, some Sand and Gravel, very stiff,		16'+/-
17				15		wet, ML-CL		GLACIAL TILL
18								
19								
20								
	S-5	24/12	20 - 22	11		Same as above, hard, wet, ML-CL	PP ≥ 9,000 psf	
21				24				
				26				
22				33				
23						Cobble at 23'		
24								
					8.9	End of Exploration at 24.8', Roller cone refusal on probable bedrock		24.8' BEDROCK

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
SP = Gravel punch sample, S = Split spoon Sample

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%

SOIL BORING LOG

SUMMIT GEOENGINEERING SERVICES

Project:	Montgomery Dam	Boring #:	B-3
Location:	Harbor Park	Project #:	19394
City, State:	Camden, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	28.7 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started: 2/26/2020	Date Completed: 2/26/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/26/2020	5 ft+/-	23.7 ft +/-	Observed moisture content
2/28/2020	Caved at 2.1', Dry		Measured in open borehole

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	SP-1	12/12	0 - 1	PUSH		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		PAVEMENT
1				PUSH	28.4	Brown Gravelly SAND, little Silt, compact, frozen, SP-SM		0.3'
	S-1	24/8	1 - 3	10		to SM		FILL
2				5				
				2				
3				4		Possible debris at 2'-4' based on spoon and roller cone		
						resistance		
4								
					24.7			4' +/-
5								GLACIAL TILL
	S-2	18/6	5 - 6.5	38		Olive brown SILT, some Sand and Gravel, little Clay,	PP = 2,500	
6				21		very stiff/dense, wet, ML	to 4,000 psf	
				32		(Rock fragment in spoon tip)		
7				50/0"	22.2	End of Exploration at 6.5', Refusal on Bedrock		6.5'
								BEDROCK
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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-4**

Project:	Montgomery Dam	Project #:	19394
Location:	Harbor Park	Sheet:	1 of 1
City, State:	Camden, Maine	Chkd by:	CWC
Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	19.0 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started:	2/26/2020 Date Completed: 2/26/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/26/2020	10 ft+/-	9.0 ft +/-	Observed moisture content
2/28/2020	8.2 ft	10.8 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	2		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				3	18.7	Dark brown to brown SAND, some Gravel, some to little		0.3'
				3		Silt, loose, frozen to damp, SP-SM to SM		FILL
2				2		Light brown med-fine SAND, little Silt, SP-SM		1.3'+/-
	S-2	24/12	2 - 4	6		Black plastic pipe ~ piece recovered in spoon		
3				4		Light brown med-fine SAND, little Silt, SP-SM		2.3'+/-
				5	16.0	Olive gray and mottled SILT-CLAY, little Sand and Gravel,	PP = 5,000	3' +/-
4				6		stiff, damp, ML-CL	to 6,000 psf	GLACIAL MARINE
								DEPOSIT
5								(Reworked)
	S-3	24/12	5 - 7	3		Gray to brown and mottled SILT-CLAY, mixed with some	PP = 2,000	
6				2		to little Sand and Gravel, rootlets, firm/loose, moist,	to 4,000 psf	
				2		ML-CL (Possible voids at 5'-6.5', losing wash water)		
7				10	12.5	Olive gray SILT-CLAY, some Sand and Gravel, very		6.5' +/-
						stiff, moist, ML-CL		GLACIAL TILL
8								
							Water at 8.2'	
9								
10								
	S-4	8/6	10 - 10.6	18		Same as above, hard/desne, wet, ML-CL		
11				50/2"		(Dark gray rock fragments in spoon tip)		
					8.4	End of Exploration at 10.6', Refusal on Bedrock		10.6'
12								BEDROCK
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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%

SOIL BORING LOG

SUMMIT GEOENGINEERING SERVICES

Project:	Montgomery Dam	Boring #:	B-5
Location:	Harbor Park	Project #:	19394
City, State:	Camden, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	12.2 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started: 2/27/2020	Date Completed: 2/27/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/28/2020	5.1 ft	7.1 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	4		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				8	12.0	Brown SILT-SAND, little Gravel, damp to frozen, SM-ML		0.2' FILL
				4				
2				6		Brown SAND, some Gravel, little Silt, loose to compact, damp, SP-SM		1.3'
3								
4								
					8.2			4' +/- GLACIAL TILL
5								
	S-2	4/2	5 - 5.3	50/4"		No soil recovered. Rock fragments in spoon tip.	Water at 5.1'	
6					6.7	End of Exploration at 5.5', Refusal on Bedrock		5.5' BEDROCK
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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-6**

Project:	Montgomery Dam	Project #:	19394
Location:	Harbor Park	Sheet:	1 of 1
City, State:	Camden, Maine	Chkd by:	CWC
Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	8.6 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started:	2/27/2020 Date Completed: 2/27/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/28/2020	Caved at 2.5', Wet	6.1 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	4		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				5	8.4	Brown to dark brown SILT, some Sand, little Gravel,		0.2'
				2		loose, frozen to damp, ML		FILL
2				2				
3							Water at 2.5'	
					5.6	Casing refusal at 3.5' on boulder, performed offset probe.		3'+/-
4						Probe refusals at 3.7', 4.7', and 5.0' within 3-ft radius		FILL OR GLACIAL TILL
						of central hole.		w/ BOULDERS
5								
					3.6	End of Exploration at 5', Refusal on Boulders or Possible		5.0'
6						Bedrock		BOULDERS OR
								POSSIBLE BEDROCK
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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-7**

Project:	Montgomery Dam	Project #:	19394
Location:	Harbor Park	Sheet:	1 of 1
City, State:	Camden, Maine	Chkd by:	CWC
Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	8.7 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started:	2/27/2020 Date Completed: 2/27/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/28/2020	Caved at 2.3', Wet	6.4 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	3		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				3	8.5	Brown Silty SAND, little Gravel, damp to frozen, SM		0.2' FILL
				2				
2				5				
3							Water at 2.3'	
4								
					4.7			4'+/- GLACIAL TILL
5								
	S-2	24/12	5 - 6.2	12		Olive brown to gray SILT-SAND, some Gravel,		
6				15		little Clay, hard/dense, SM-ML		
				50/5"		(Spoon refusal on cobble at 6.2')		
7								
8					1.2	End of Exploration at 7.5', Refusal on Boulder or Possible Bedrock		7.5' BOULDERS OR POSSIBLE BEDROCK
9						Offset probe refusal at 8.6' next to boring.		
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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-8**

Project:	Montgomery Dam	Project #:	19394
Location:	Harbor Park	Sheet:	1 of 1
City, State:	Camden, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering, Inc.	Boring Elevation:	11.4 feet
Driller:	Craig Coolidge, P.E.	Reference:	Measured on site using an auto level with benchmark by Gartley & Dorsky
Summit Staff:	Erika Stewart, P.E.	Date started: 2/27/2020	Date Completed: 2/27/2020

DRILLING METHOD		SAMPLER	
Vehicle:	Power Probe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3" Casing/RW	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
2/27/2020	5 ft+/-	6.4 ft +/-	Observed moisture content
2/28/2020	2.5 ft	8.9 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	2		Dark brown SILT, little Sand, rootlets, frozen to moist,ML		TOPSOIL
1				2	11.2	Olive brown SILT-CLAY, firm, damp to frozen, ML-CL	PP = 6,000 psf	0.6' GLACIAL MARINE DEPOSIT
				2				
2				3				
3							Water at 2.5'	
4								
5								
	S-2	24/18	5 - 7	3		Olive brown to gray SILT-CLAY, some to little Sand	PP = 1,000	
6				3		and Gravel, firm, wet, ML-CL	to 4,000 psf	
				3				
7				7				
8								
9								
					2.4			9'+/- GLACIAL TILL
10								
	S-3	24/12	10 - 12	4		Gray fine SAND-SILT, some Gravel, little Clay, very stiff/	PP = 5,000 to	
11				11		compact, wet, SM-ML	7,000 psf	
				12				
12				16				
13								
14								
15								
	S-4	9/6	15 - 15.8	50		Same as above, dense/hard, wet, SM-ML		
16				50/3"		(Spoon refusal on cobble at 15.8')		
17								
18								
19								
20					-7.8	End of Exploration at 19.5', Refusal on Bedrock		19.5' BEDROCK
21								
22								
23								
24								

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
SP = Gravel punch sample, S = Split spoon Sample

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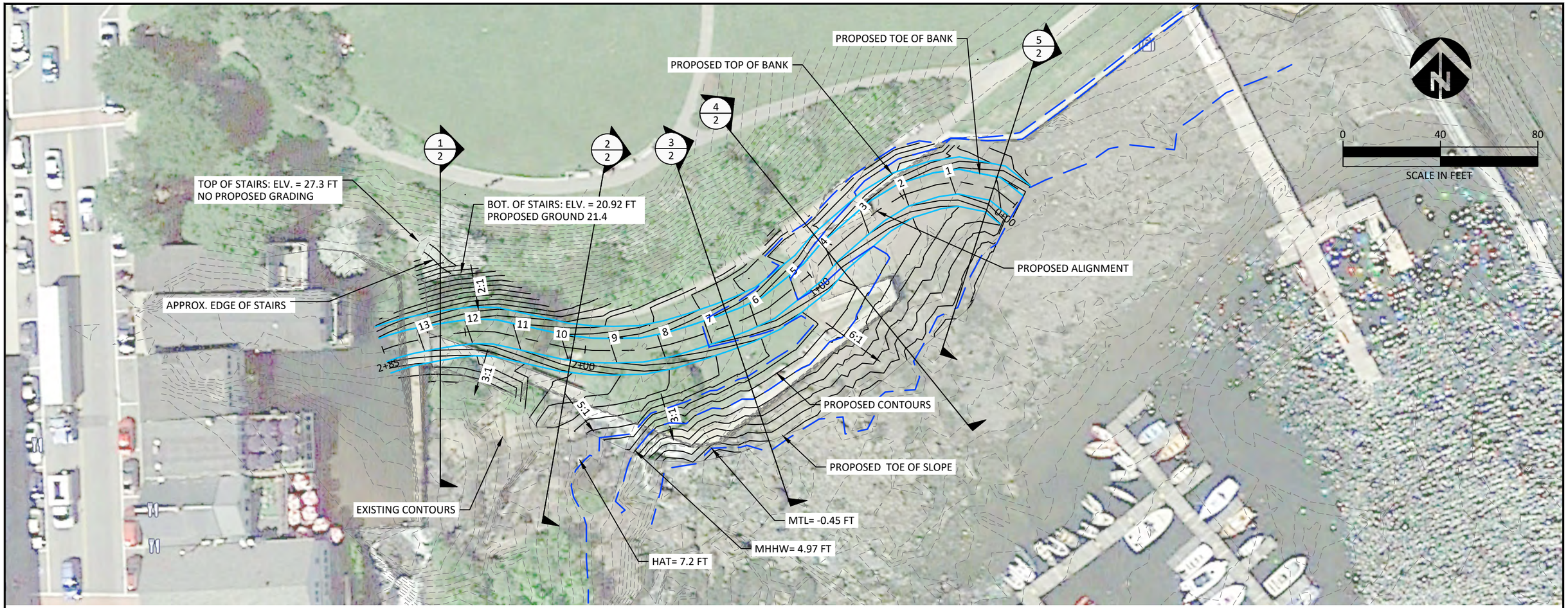
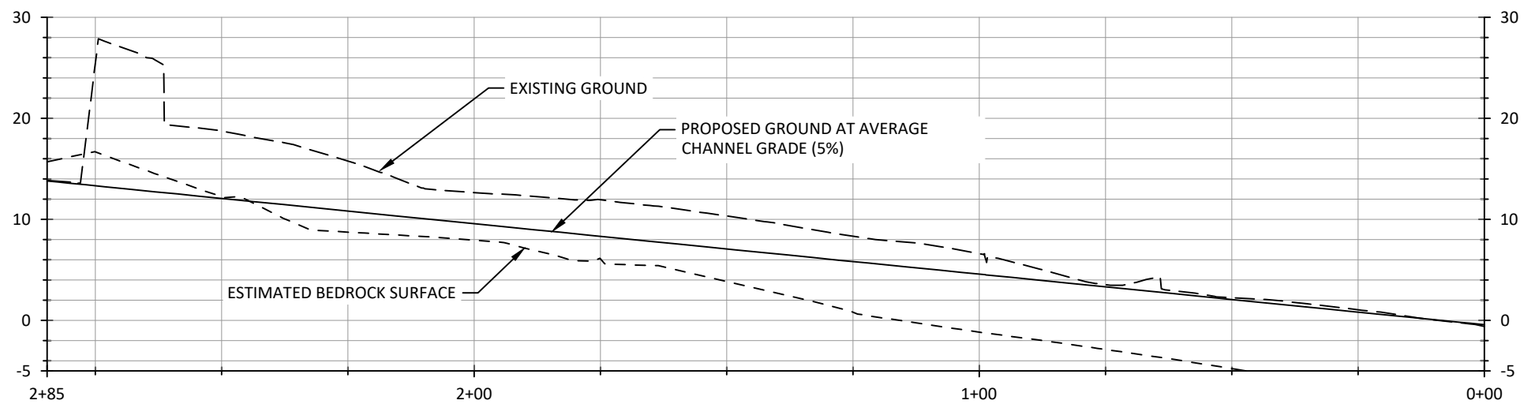
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

APPENDIX B – CONCEPTUAL DESIGN SCHEMATIC LAYOUTS





Profile

NO.	BY	DATE	REVISION DESCRIPTION

DRAWN | DESIGNED | CHECKED

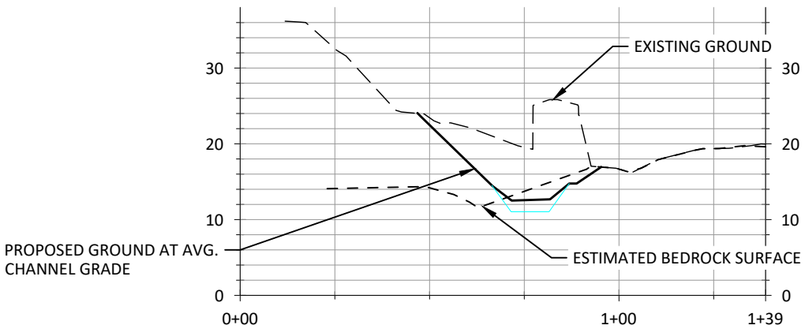
APPROVED | MAY 2020 DATE | PROJECT

MONTGOMERY DAM
CAMDEN, ME

inter·fluve
165 Main Street, Suite 2B
P.O. Box 236
Damariscotta, ME 04543
207.315.7014
www.interfluve.com

PLAN AND PROFILE

SHEET
1 OF 2



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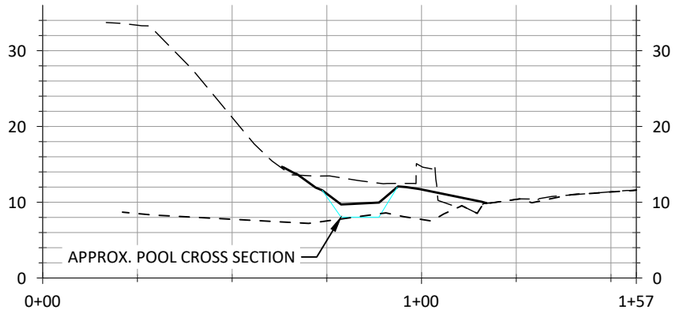

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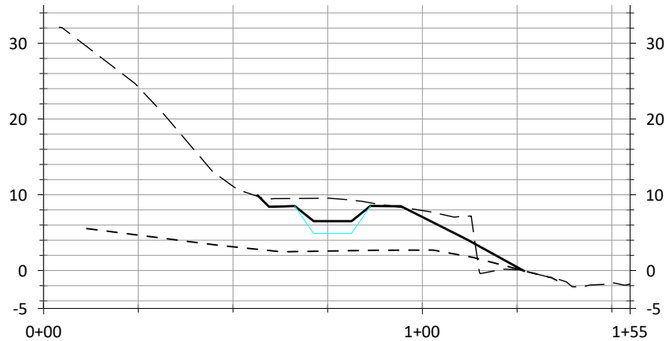

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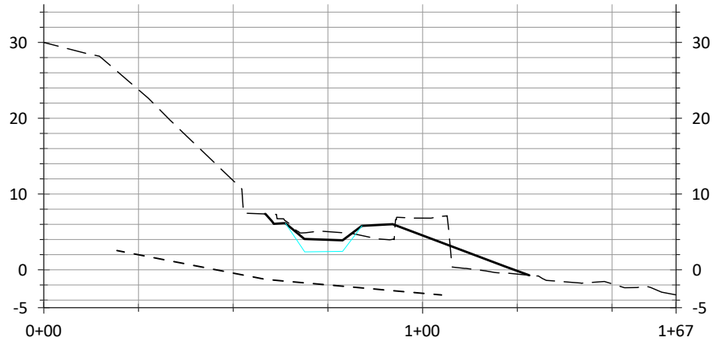

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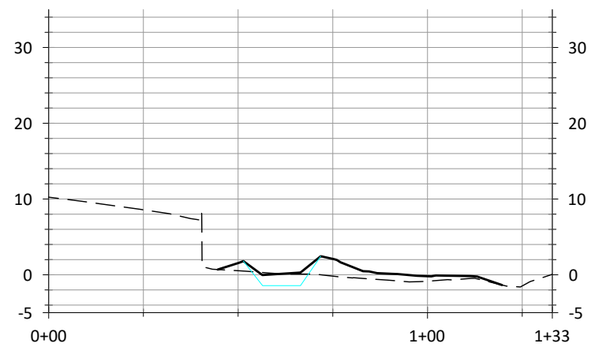

5

NO.	BY	DATE	REVISION DESCRIPTION

DRAWN | DESIGNED | CHECKED

APPROVED | MAY 2020 DATE | PROJECT

MONTGOMERY DAM
CAMDEN, ME

inter·fluve
165 Main Street, Suite 2B
P.O. Box 236
Damariscotta, ME 04543
207.315.7014
www.interfluve.com

GRADING CROSS SECTIONS

SHEET
2 OF 2

APPENDIX C – STRUCTURAL SCREENING FEASIBILITY REPORT

TOWN OF CAMDEN, MONTGOMERY DAM PROJECT
WATERSIDE BUILDING IMPROVEMENTS FEASIBILITY REPORT
MEGUNTICOOK RIVER


Conceptual Illustration by Tony Muench

Photo by Inter-Fluve

Prepared for
Inter-Fluve
Damariscotta, Maine

Prepared by

Gartley & Dorsky
ENGINEERING SURVEYING
59 Union Street Unit 1 P.O. Box 1031 Camden, ME 04843-1031
Ph (207) 236-4365 Fax (207) 236-3055 www.gartleydorsky.com

Report Issue Date: June 15, 2021 DRAFT
Project No: 18-044

Table of Contents

1. INTRODUCTION & BACKGROUND

Montgomery Dam is located in Camden, Maine at the outlet of Megunticook River in Camden Harbor. The dam is situated east of Main Street (Route 1) behind several of the Main Street shops in downtown Camden. The dam is owned by the Town of Camden, however the pool and water flow affect several privately owned properties. Removal of the dam and re-establishment of a more natural river flow with fish passage is currently being considered.

Dam removal would eliminate the impoundment and alter the water flow and aesthetics in the vicinity of the current dam. Elimination of the impoundment would result in increased visibility of the existing building foundations along the east side of the buildings. Removal of existing sediment would improve the aesthetics of the terrain but would also extend the depth of exposed foundations.

2. PURPOSE

This feasibility report is part of a larger study seeking to evaluate the physical, biological, ecological and engineering impact associated with removing or altering Montgomery Dam and promoting fish passage from Camden Harbor to Megunticook Lake. This feasibility report responds to four possible improvement options to mitigate unsightly views of the building substructures which may become more pronounced if Montgomery Dam is removed:

A. Install a pedestrian boardwalk.
B. Install foundation screening.
C. Upgrade the eastern foundation elements to achieve a more uniform and pleasing aesthetic.
D. Expand building footprint(s) toward the harbor and/or over the (would be former) impoundment.

3. SCOPE OF CONDITIONS ASSESSMENT

We have visited the site on numerous occasions and are familiar with the structures and foundations along the east side of Main Street from our previous structural assessment. We visited the site March 12, 2021 with Inter-Fluve and representatives from the Town to discuss priorities, goals, functions, constraints, and the overall vision for each of the improvement options.

This feasibility report aims to provide general feedback on the feasibility of performing each of the four improvement options. Consideration is also given to the possibility of performing a combination (e.g., upgrading the eastern foundation elements and installing screening).

The feasibility report is based on qualitative observation of the structures and surrounding features only. This assessment does not include engineering calculations to determine the structural capacity and/or structural stability of any existing or new elements. Permitting considerations are based on review of the applicable ordinance and regulations; we have not contacted any regulatory agencies for an interpretation for this project.

4. STRUCTURES & PROPERTIES LIST

The feasibility report pertains to the following buildings (or appurtenances to these buildings):

- A 35 Main Street (Marriner's Restaurant, Once a Tree)
- B 37 Main Street (Camden Deli)
- C 39 Main Street (Surroundings)
- D 41 Main Street (The Smiling Cow)
- E 43 Main Street (Psychic & Tarot)
- Z 25 Main Street (The Village Shop)

5. PERMITTING/REGULATORY CONSIDERATIONS

We reviewed applicable regulatory restrictions that may apply to any or all of the four improvement options, including local, state and federal regulations. Concept specific regulatory considerations are presented in the applicable subsections below. Permitting and regulatory considerations that apply to all improvement options include:

Applicants for all permits are required to show title, right and interest for the property that the project is on. This is typically achieved by ownership (deed to the property), a purchase and sale agreement or a lease agreement. For all the proposed options, multiple property owners are involved, meaning multiple applications or one application with multiple leases. Further discussion/negotiations and possibly legal advice may be needed to determine the best course of action. A boundary survey should be conducted for all the properties involved in order to create accurate easements (if needed), determine limits for expansion and ensure proper title, right and interest.

Determining the new limits of the stream and establishing the setbacks from the new high-water line of the stream will be a key component in determining the permitting requirements for all the proposed options.

The following is a brief summary of the municipal, state, and federal permits that may be required based on the proposed development:

Town of Camden (Municipal)

The subject properties are in the B-1 Downtown Business District. There are no front, side or rear setbacks and no lot coverage restrictions in this district. The B-1 Downtown Business District is exempt from the lot

and structures standards in the Shoreland Zoning Ordinance. The building is mapped in a FEMA special flood hazard area (SFHA) AE-zone. The following municipal permits and/or approvals may apply:

- Planning Board Review will be required for any new, non-residential building or structure having a new floor area totaling more than 1,000 square feet. The Planning Board approval process is the lengthiest (in terms of calendar days) of the municipal permits with 2 to 3 meetings, a possible public hearing and a site walk. This process typically takes 2-4 months.
- Town Building Permit will be required. New construction must comply with the Maine Uniform Building and Energy Code (MUBEC). This process typically takes a few days/weeks only, assuming the project complies with all provisions of the MUBEC.
- Flood Hazard Development Permit will be required for any development made within the SFHA (which will be different once the dam is removed, presumably smaller in area with a lower Base Flood Elevation (BFE)). The Camden Floodplain Management Ordinance requires all new construction to be located landward of mean high tide (except lobster and fishing sheds permitted as a Conditional Use). The Flood Hazard Development Permit process typically takes a few days/weeks only, assuming the project complies with all provisions of the Floodplain Management Ordinance.

<u>Maine Department of Environmental Protection (MDEP) (State)</u>

Due to the proximity of the existing and proposed structures to Camden Harbor and Megunticook River, the Natural Resources Protection Act (NRPA) may apply:

- Chapter 310: Wetlands and Waterbodies Protection – Full Permit
  - This section would apply to any project resulting in an alteration of the coastal wetland (Camden Harbor) or river (Megunticook River). Alterations include dredging, bulldozing, removing or displacing soil, sand, vegetation or other materials, draining or dewatering, filling, or any construction, repair or alteration of any permanent structure.
  - This section does not apply to work that qualifies for a Permit by Rule (PBR).
  - Chapter 310 permits have a 3- to 4-month review process.
- Chapter 305: Permit by Rule (PBR)
  - There are multiple scenarios where a PBR may be applicable, including:
    - Activities Adjacent to a Coastal Wetland (MDEP Chapter 305, Section 2), which generally applies to soil disturbance within 75' of a resource but outside of 25'.
    - Replacement of Structures (MDEP Chapter 305, Section 4), which generally applies to the replacement of an existing permanent structure in, on or over the coastal wetland (Camden Harbor) or river (Megunticook River).
  - Chapter 305 permits have a 2-week review process.

<u>The New England District of the U.S. Army Corps of Engineers (Army Corps) (Federal)</u>

Megunticook River and Camden Harbor are U.S. navigable waters according to federal regulations, so Army Corp regulations may apply:

- Section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322): Maine General Permit
  - This section will apply to construction of any structure in, over or under Megunticook River or Camden Harbor, the excavating or dredging from or depositing of material in such waters or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters.
  - Maine General Permits typically coincide with the MDEP Chapter 310 permit schedule.

6. OPTION A: INSTALL PEDESTRIAN BOARDWALK

A pedestrian boardwalk is envisioned as an elevated exterior deck/boardwalk structure along the east side of the buildings from approximately 25 Main Street to 43 Main Street. The boardwalk would be

accessed by stairs from the public landing at the south end and would continue northward along the east side of the Main Street businesses at the elevation of the main floor of the businesses (Main Street sidewalk elevation). The boardwalk would descend a ramp and/or stairs back down to Harbor Park at the north end.

STAKEHOLDER CONSIDERATIONS

Primary identified potential benefits and limitations of an elevated pedestrian boardwalk include:

- Benefit: A secondary means for pedestrians to access to businesses while traveling from the public landing to Harbor Park.
- Benefit: Secondary exit/entry for businesses.
- Benefit: Improved aesthetic on public-facing east side. New construction screens existing foundations, limiting visual impact.
- Limitation: Ownership and maintenance issues associated with a public boardwalk over privately owned land and attached to privately owned buildings.
- Limitation: Security concerns for building owners after hours.
- Limitation: Visual/functional impact of pedestrians blocking the harbor view from the existing buildings and/or decks.
- Limitation: Conflict with existing second floor deck supports (diagonal braces, etc.).
- Limitation: Significant elevation gain from the public landing to the boardwalk level would make full ADA access largely infeasible without a lift or elevator (although it may be feasible to achieve ADA access from the Harbor Park side).
- Limitation: Irregularities in the building shapes along the east side create a non-uniform boardwalk shape.
- Limitation: Relatively high cost with significant on-going maintenance required.

STRUCTURAL CONSIDERATIONS

The boardwalk concept is structurally feasible. The bearing conditions below the proposed boardwalk would be ledge in almost all locations. Ledge provides a solid bearing surface for posts. Due to the size and elevation of the structure, numerous posts and significant bracing may be required, particularly if a wood structure were used. Stairs would constitute a significant component of the boardwalk concept as well. Handrails, guardrails, etc. would be required throughout.

PERMITTING/REGULATORY CONSIDERATIONS

A public boardwalk will likely require all three municipal permits (Planning Board Review, Town Building Permit and Flood Hazard Development Permit). As a new structure that will be in, over or adjacent to the harbor and river it would require a full MDEP NRPA permit and an Army Corps General Permit. The fact the boardwalk will enhance public access will be beneficial for demonstrating a need for the project and justification for the impacts as required in the MDEP and Army Corps applications. Boardwalk ownership will be a key part of the application. If the boardwalk is to be owned by the Town of Camden, then the town will be the applicant and there will be one permit application for the project. This will require the town to secure easements with each of the property owners for any portion of the structure that is on or over private property. It is our assessment that a pedestrian boardwalk is permittable as a town project that will benefit the public, although significant permits and approvals may be required.

7. OPTION B: INSTALL FOUNDATION SCREENING

Screening is envisioned as a semi-open covering to partially block the view of the east side of the building foundations. The screening would be installed from approximately the main floor elevation of the businesses down to 1 foot above the Base Flood Elevation (BFE). Due to the substantially narrower river

bed that will exist if the dam is removed and the impoundment eliminated, much of the screening could likely extend down close to the existing ledge elevation. Where flood waters may occur the screening would be elevated to avoid conflict with water during extreme events.

STAKEHOLDER CONSIDERATIONS
Primary identified potential benefits and limitations of foundation screening include:

- Benefit: No change or obstruction to harbor views.
- Benefit: Improved aesthetic on public-facing east side.
- Benefit: Relatively easy to implement.
- Benefit: Relatively low cost with minimal on-going maintenance required.
- Limitation: Maintenance issues associated with keeping a consistent appearance.

STRUCTURAL CONSIDERATIONS
Foundation screening is structurally feasible. The support conditions under and around the buildings vary, so different support systems may be required in different locations. Where wood support posts exist, screening could be applied directly to the posts; in other locations new or additional support may be required, either bearing on ledge or suspended from the building framing above.

PERMITTING/REGULATORY CONSIDERATIONS
Foundation screening may be the simplest of the four options assuming there are no additional supports required that will be in or within 25' of the resource. If that is the case the project will only require a Town Building Permit, Flood Hazard Development Permit (minor development) and MDEP PBR; no permit would be required from the Army Corps. However, if additional supports are required in or within 25' of the resource, a full MDEP NRPA permit and an Army Corps General Permit will also be required. The impacts will likely be minimal even if new supports are required and the justification should be straight forward. We do not anticipate difficulty obtaining permits required for foundation screening.

8. OPTION C: UPGRADE FOUNDATION ELEMENTS

Upgrade of the eastern foundation elements is envisioned as replacement of dissimilar foundation elements with new foundation elements that would all match along the east line of the buildings. There may be more than one "typical" system, however the intent would be for them to create a relatively uniform and clean appearance, while maintaining equivalent structural integrity.

STAKEHOLDER CONSIDERATIONS
Primary identified potential benefits and limitations of this option include:

- Benefit: Cleaner and more uniform appearance.
- Benefit: No change or obstruction to harbor views.
- Benefit: One-time cost to Town, assuming foundations would be subsequently maintained by the building owners.
- Benefit: Partially improved building foundation.
- Limitation: At least one building (41 Main Street) has a unique foundation system which would be difficult to modify to match the surrounding foundations without significant modification to the entire foundation assembly.
- Limitation: Unforeseen conditions may be exposed during construction which could be difficult to address and/or pose challenges to the Town or property owner.
- Limitation: Relatively difficult to implement with relatively high cost.

- Limitation: Relatively high liability for the Town associated with temporarily supporting existing privately owned structures while foundation elements are replaced and ensuring long-term performance of replaced elements.

STRUCTURAL CONSIDERATIONS

Upgrade of select foundation elements is structurally feasible; however, foundation systems under buildings must work collectively as a system, so any alterations likely create some liability for the Town. It is anticipated that most, if not all, of the buildings are supported on ledge, which provides the benefit of similar bearing conditions. However, at least one building (41 Main Street) has a unique foundation system which would be difficult to modify without substantial analysis of the existing assembly. Since the existing foundations are also in varying condition and likely have varying structural capacities, any approach other than in-kind replacement would have to either be based on a full structural analysis of the existing building foundation or be clearly better than the existing. A full structural analysis of the existing building foundations is not practical. A qualitative judgment is feasible but also imparts risk to the Town.

PERMITTING/REGULATORY CONSIDERATIONS

Upgrading the foundation elements would only require a Town Building Permit, Flood Hazard Development Permit (minor development) and MDEP PBR if the elements are simply replaced or repaired. If new structural support posts are added or the size of the supports are increased in or within 25' of the resource, then a full MDEP NRPA permit is required. Additionally, if new structural support posts are added in the resource, then an Army Corps permit will be required. This work is easily justified. We do not anticipate difficulty obtaining permits for foundation upgrades.

9. OPTION D: EXPAND BUILDING FOOTPRINTS

Enabling expansion of the existing building footprints is envisioned as a business/property owner incentive in the event a property owner would like to expand their building eastward. It is presumed that building expansion(s) would be performed by the property owner at their own cost.

STAKEHOLDER CONSIDERATIONS

Primary identified potential benefits and limitations of this option include:

- Benefit: Increase building square footage and usable space.
- Benefit: New construction elements may appear more aesthetically pleasing; however, they may not be uniform and the aesthetics would presumably be customized to owner preference and not subject to Town or public approval.
- Benefit: New construction expansions screen existing foundations, limiting visual impact.
- Benefit: No cost to Town; presumable increase in property tax revenue.
- Limitation: Not all buildings could expand equally, so it is not a uniform incentive/benefit to all property owners.

STRUCTURAL CONSIDERATIONS

Expanding any or all building footprints is structurally feasible. All new construction would need to comply with the Maine Uniform Building & Energy Code (MUBEC) which is in effect in Camden, Maine. Since all properties are commercial and/or mixed-use, a Registered Design Professional would be required.

PERMITTING/REGULATORY CONSIDERATIONS

The feasibility of expanding building footprints will vary based on the proximity of each building to the different resources and will depend on the proposed expansion use, the need for the use and an alternative analysis. Properties directly over the resource will not be eligible for expansion. This includes

properties over the new river channel and any areas where tidal water may reach the building (e.g., 25 Main Street where the harbor has a small inlet that reaches westward toward the buildings).

Some amount of expansion can likely be justified and permitted for properties that are not over the resource and where the expansion would not extend beyond mean high water (tidal inlet). Where expansion is permitted, both MDEP and Army Corps expect projects to minimize impacts to and adjacent to the resources as much as possible. Individual expansions less than 1,000 square feet would require a Town Building Permit and Flood Hazard Development Permit (minor development); expansions greater than 1,000 square feet would require Site Plan Review. Properties that have been through Site Plan Review previously and have an existing approved Site Plan would need to have it amended, regardless of expansion size. All building expansions within 25' of the resource would require a full MDEP NRPA permit and an Army Corps General Permit.

The location of the individual property lines for each owner is critical for this option. A boundary survey would be important for any properties interested in expansion.

10. SUMMARY

This feasibility report responds to four possible improvement options to mitigate unsightly views of the building substructures which may become more pronounced if Montgomery Dam is removed:

A. Install a pedestrian boardwalk.
B. Install foundation screening.
C. Upgrade the eastern foundation elements to achieve a more uniform and pleasing aesthetic.
D. Expand building footprint(s) toward the harbor and/or over the (would be former) impoundment.

Several potential stakeholder benefits and limitations were identified for each option. All four options are considered structurally feasible. The permitting constraints vary for each option and property. It is generally expected that some version of options A, B and C would be permittable. Option D is more complex with building expansion being permittable for only some properties. In addition, for those that can expand, the permitting processes will vary based on proximity to the resource(s), size of expansion, previous issued permits, etc.

Although all four options are generally feasible, we recommend consideration of the potential benefits and limitations of each option prior to proceeding. In particular, we recommend careful consideration of the following:

- Option A: Installing a pedestrian boardwalk along the east side of the Main Street buildings may or may not be desirable to property owners and is a high cost, moderate liability and high maintenance option for the Town. Due to the landscapes on the Public Landing side of the boardwalk relative to the main floor elevation of the buildings, the boardwalk could not practically achieve ADA compliance from the south side without a lift or elevator. It may be feasible to achieve ADA access on and off the boardwalk from Harbor Park which has higher grades near the boardwalk than the Public Landing. ADA access to/from existing buildings may require ramps due to varying floor elevations. Given the size, elevation and use of the boardwalk, it would require substantial bracing and structural support. Further exploration into whether the boardwalk would serve primarily as a travel way between Harbor Park, the stores/restaurants and the public landing or as additional outdoor space with restaurant seating, storefront displays, etc. would be needed if this option is considered further.

- Option B: Foundation screening has the benefit of low cost, low liability and minimal maintenance. It meets the objective of mitigating perceived, potentially undesirable views under the buildings without significant secondary impacts. Coordination to achieve agreement on the construction and finishes would be required.
- Option C: Upgrading the eastern foundation elements to achieve a more uniform and pleasing aesthetic is anticipated to be a high cost, high liability project for the Town, particularly when compared to the benefit of the end product, which will still be exposed, potentially mismatched, foundation elements. At least one structure has a very different foundation system than the others making it difficult to modify. Further structural analysis and assessment of each individual building to be altered would be necessary. This option may be better suited to be an incentive program for property owners rather than an actual Town project.
- Option D: Expanding the building footprints would require substantial investment by property owners, who may choose to do a variety of things with their private property. It is not necessarily a targeted solution to mitigate unsightly views under the buildings unless it was developed with a coordinated intent to do so. Removal of the dam has the benefit of increasing/easing expansion options for some property owners; however, select properties may become more restricted.

END OF REPORT