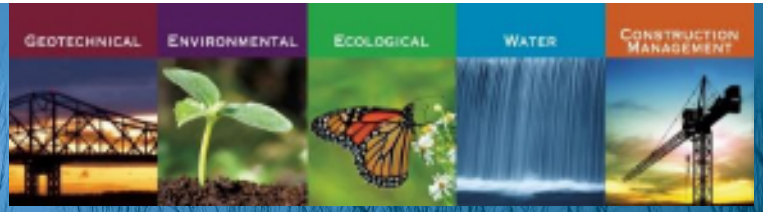
GZA GeoEnvironmental, Inc.



Final Design and Engineering Services Related to the Rehabilitation of the Macallen Dam

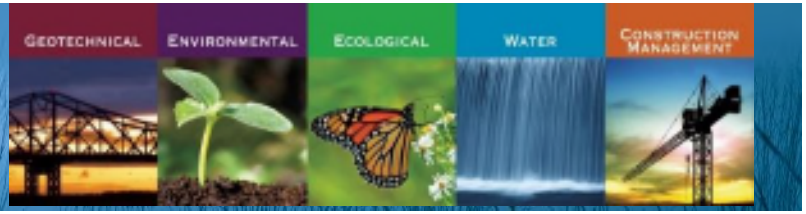
Proactive By Design.
Our Company Commitment

Newmarket Town Council

Wednesday, May 16, 2018

7:00 PM

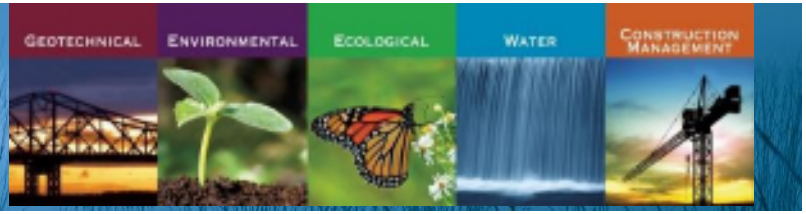
AGENDA



1. Background and Project History
2. Preferred Rehabilitation Alternative
3. Alternatives Analysis
4. Moving Forward (Next Steps)

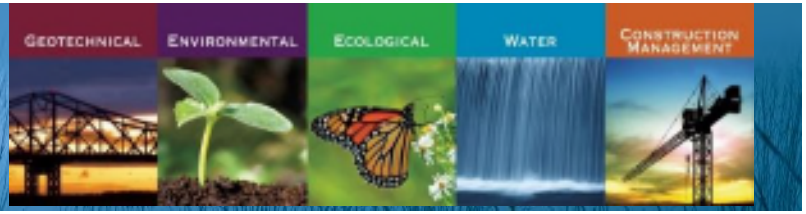
Project Partners: Dam Study Committee, Town of Newmarket, NHDES, NHF&G, Abutters, Town of Newmarket

RESOLUTION



- 09/2010 - NHDES Issued a Letter of Deficiency (LOD)
- 08/2014 - Macallen Dam Study Committee was formed
- 04/2017 - Town issued a RFQ for Design of Repairs to Dam
- 06/2017 - Committee interviewed firms related to RFQ
- 07/2017 - GZA was hired by Town to provide design services
- 11/2017 - Committee selected the preferred alternative
- 02/2018 - NHDES approved all presented alternatives
- 04/2018 - GZA submitted a Proposal for Final Design

BACKGROUND: PREVIOUS STUDIES



2010
Town Passes Warrant Article for Removal Feasibility Study

2011
Overall Assessment Wright-Pierce

2012

2013
Shift in Town policy to Repair Structure & Increase Spillway Capacity

Additional H&H, Breach Study, & Incremental Damage Assessment Wright-Pierce

2014
Final Feasibility Study Completed Gomez & Sullivan

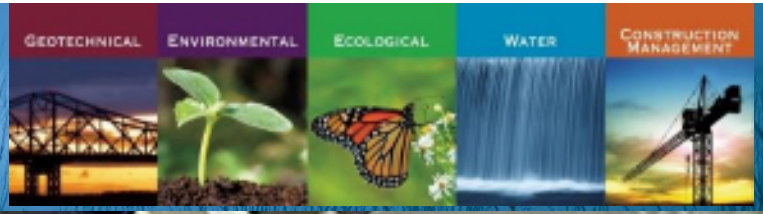
2015

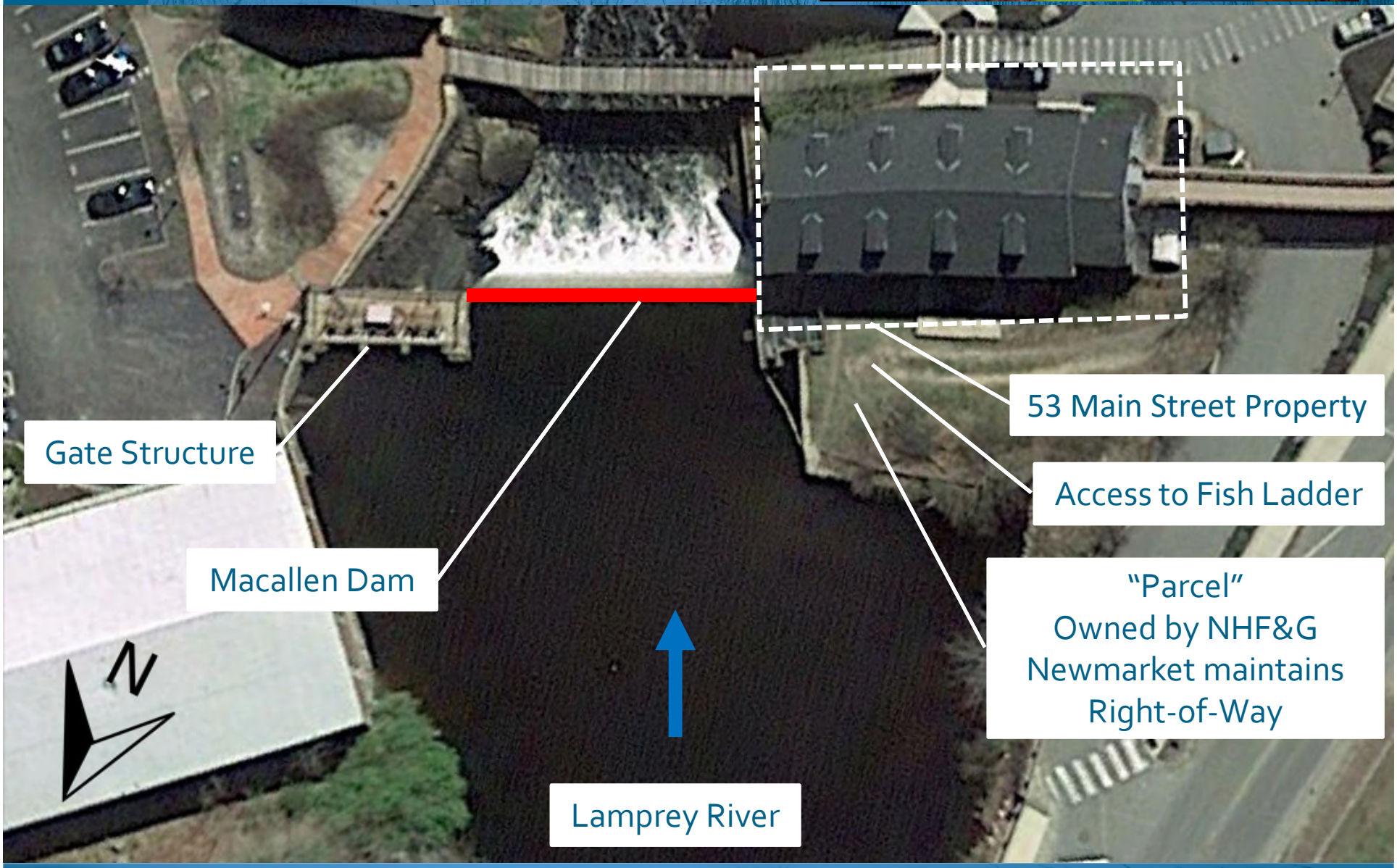
2016
Refined H&H Analysis Gomez & Sullivan

NHDES Approved Design Flow

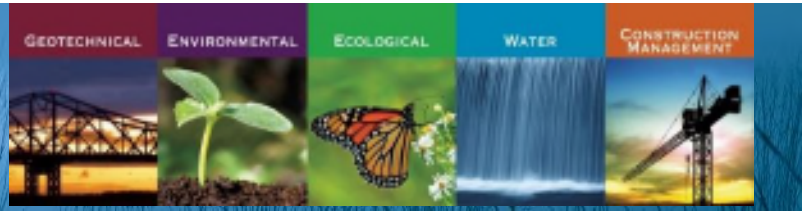
2017
GZA hired to perform conceptual design and stability analysis for dam remedial alternatives

PROPERTY / SITE ACCESS





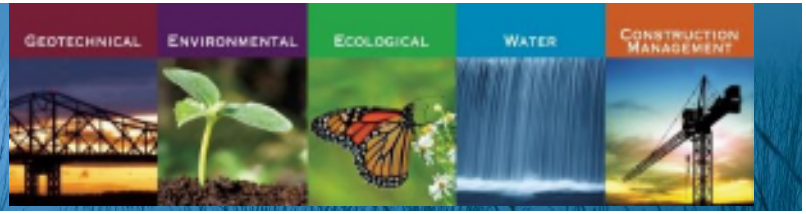
BACKGROUND: LETTER OF DEFICIENCY (LOD)



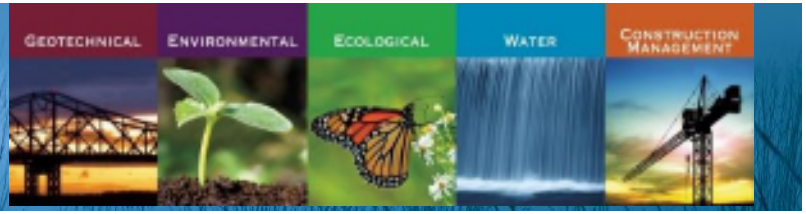
- Fill, seed, mulch right side embankment
- Remove & Structurally patch concrete:
  - Left abutment gate structure / piers
  - Left side upstream training wall
- Investigate and repair right side training wall
- Submit permit, plans, and specifications for Rehabilitation of Dam
- Compete reconstruction/repair of Dam

Multiple LODs in past decade

EXISTING GATE STRUCTURE CONDITIONS



- Three (3) Wooden Slide Gates
- Gate Approaching 100-year Lifespan
- Deteriorated Condition
  - Won't Seal Properly
  - Leakage
  - Hole in Wooden Gate



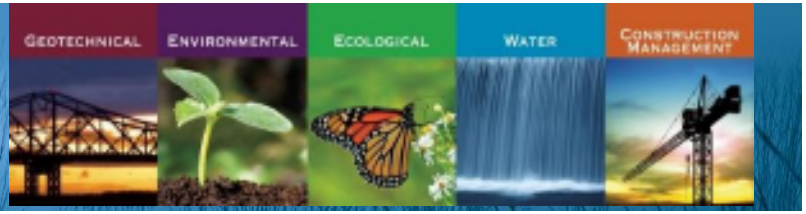
Preferred Alternative

- Replace Gate Structure; Install Automated Crest Gate; 3’ Fill within “Parcel” to raise grades and provide additional capacity

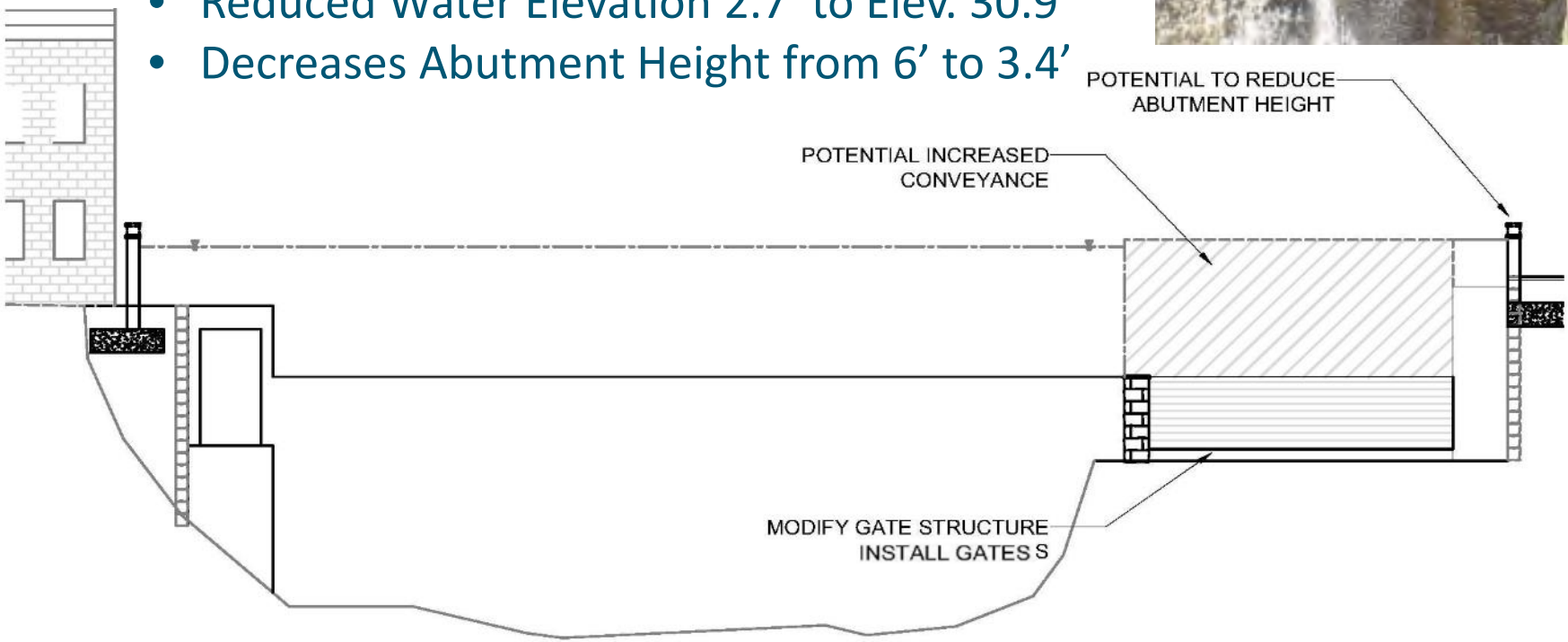
Other Alternatives – Raising /Constructing Abutment Walls

- Option 1: 4’ Left Abutment Wall; 6’ Right Abutment Wall; No Fill
- Option 2: 4’ Left Abutment Wall; 4’ Right Abutment Wall; 2’ Fill
- Option 3: 4’ Left Abutment Wall; 2’ Right Abutment Wall; 4’ Fill
- Evaluated multiple alignments within the Parcel

GATE AUTOMATION: INCREASE GATE CAPACITY

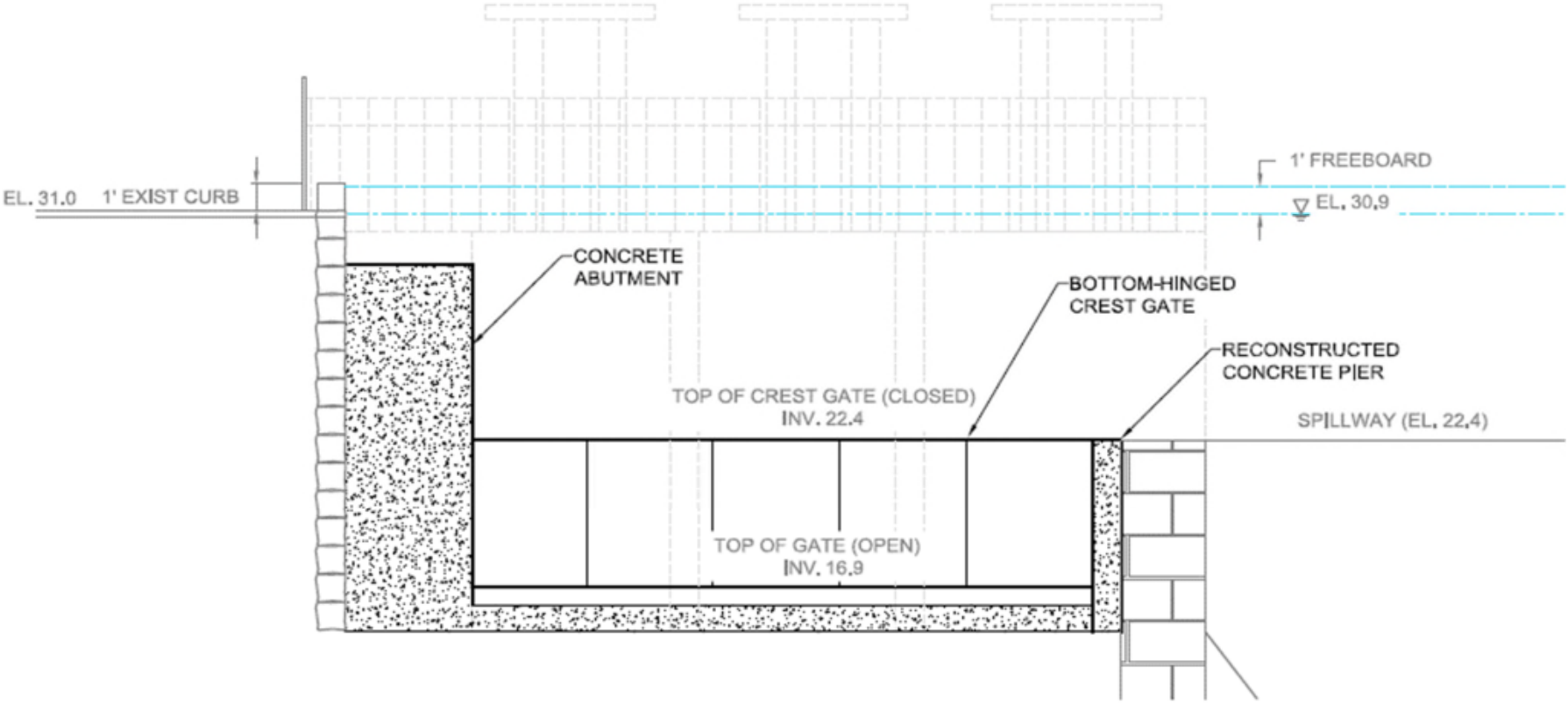


- 22’ wide, 5.5’ tall Crest Gate
- “Fail Safe” Operation / Automation
- Increase Capacity of Dam
  - Existing Conveyance Area = 147 ft^2
  - Proposed Conveyance Area = 381 ft^2
  - Reduced Water Elevation 2.7’ to Elev. 30.9
  - Decreases Abutment Height from 6’ to 3.4’

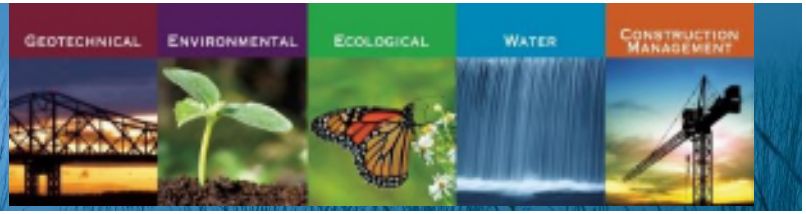


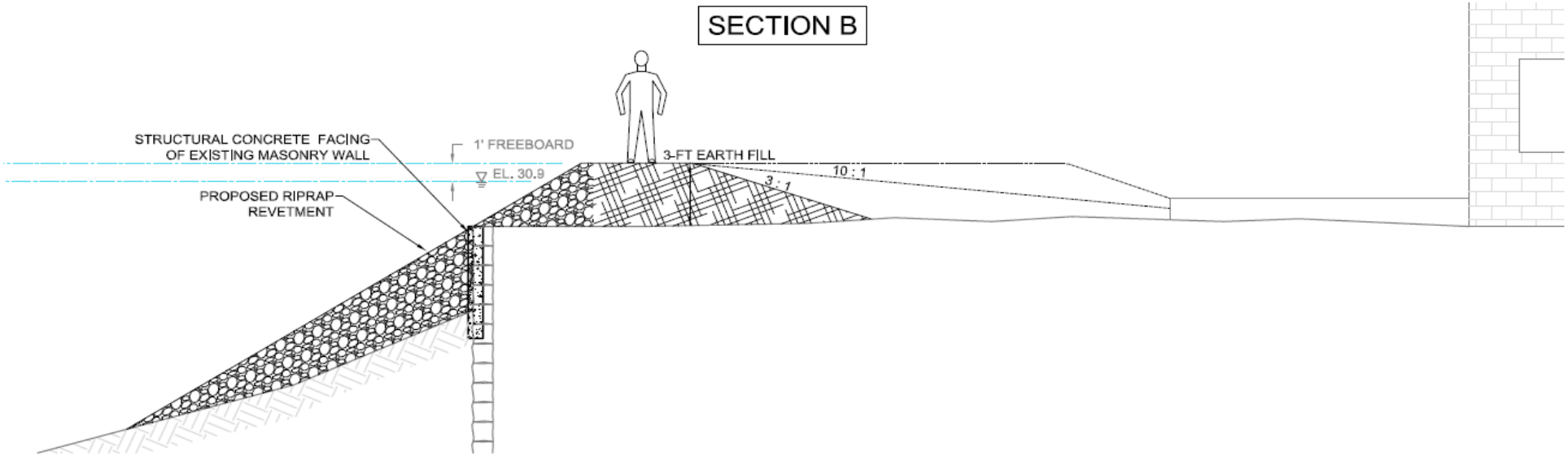
LOOKING UPSTREAM

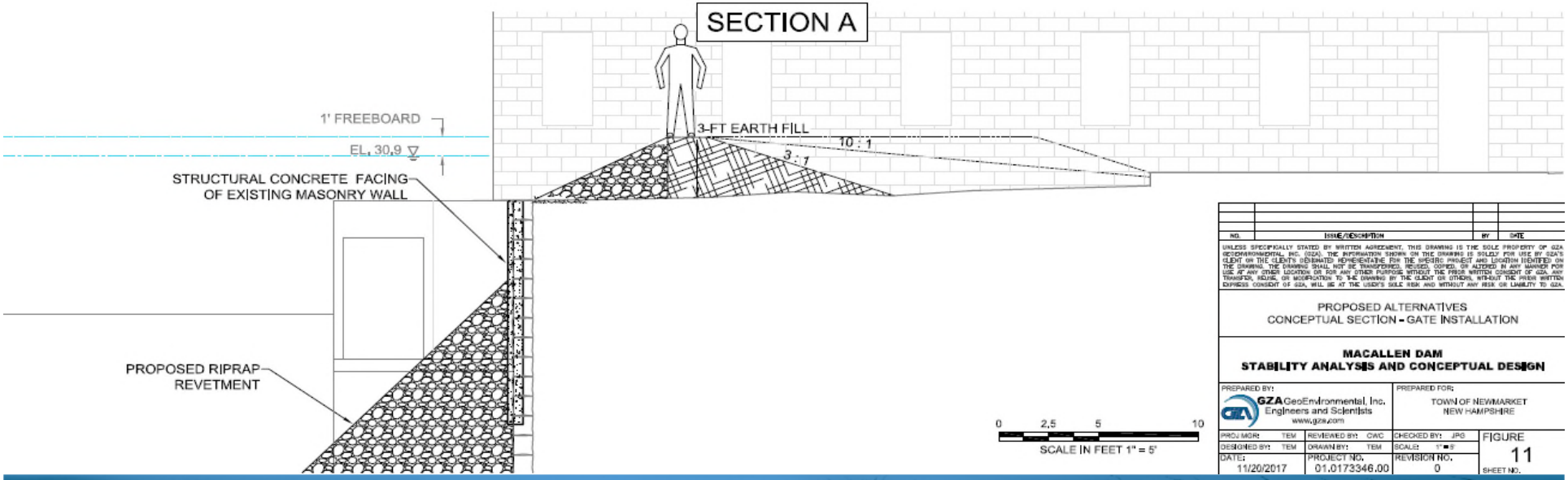
CREST GATE INSTALLATION: LEFT ABUTMENT



CREST GATE INSTALLATION: RIGHT ABUTMENT







NO. | ISSUE/DESCRIPTION | BY | DATE

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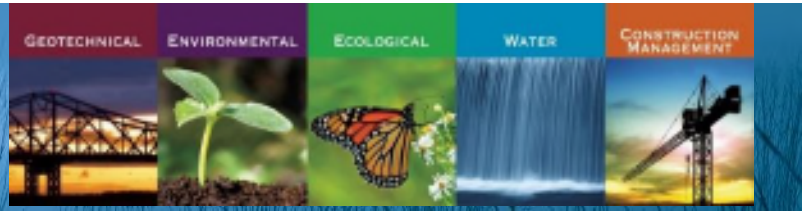
PROPOSED ALTERNATIVES
CONCEPTUAL SECTION - GATE INSTALLATION

MACALLEN DAM
STABILITY ANALYSIS AND CONCEPTUAL DESIGN

PREPARED BY:	PREPARED FOR:
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	TOWN OF NEWMARKET NEW HAMPSHIRE

PROJ MGR: TEM	REVIEWED BY: CWC	CHECKED BY: JPG	FIGURE
DESIGNED BY: TEM	DRAWN BY: TBM	SCALE: 1" = 5'	11
DATE: 11/20/2017	PROJECT NO. 01.0173346.00	REVISION NO. 0	SHEET NO.

CREST GATE INSTALLATION:



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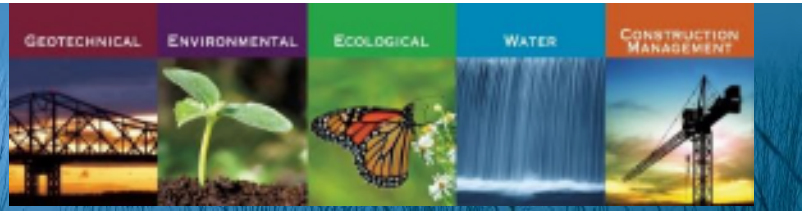

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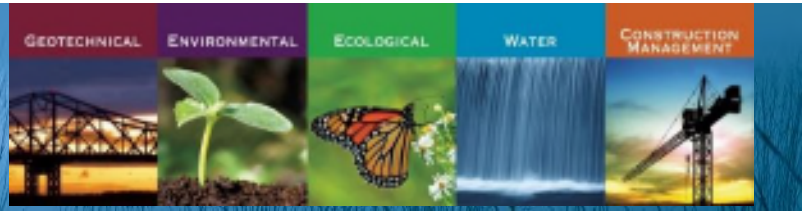

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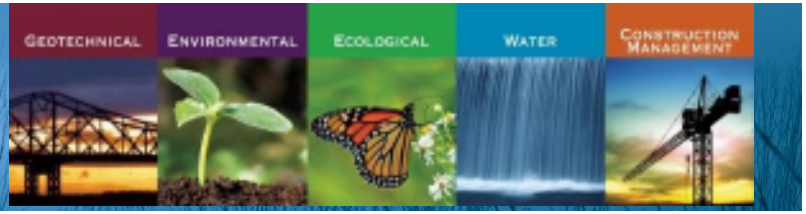
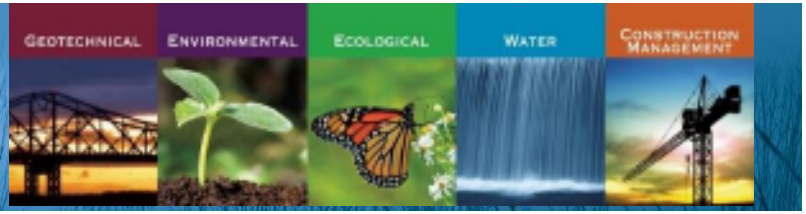


CREST GATE ALTERNATIVES
PNUEMATIC GATE



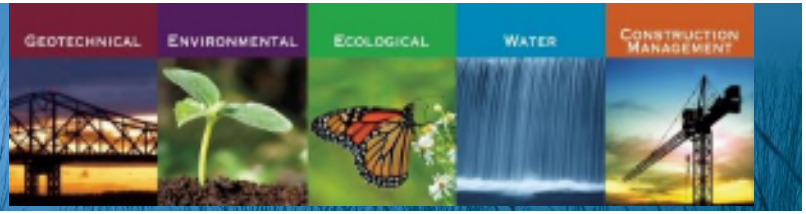
Obermeyer Spillway Gate system.
Image Source: Obermeyer hydro, Inc. website.

- Bottom-hinged crest gate
- Air-Filled Rubber Bladder supports entire crest gate width
- Accurate automatic pond level control even under power failure conditions
- “Fail-Safe” operation
- Steel plates on upstream edge
- Success in cold climates
- Requires control house
- 30+ years Life Expectancy

CREST GATE ALTERNATIVES
PNUEMATIC GATE

Obermeyer Spillway Gate system. Jackson Falls Dam, Nashua, NH

Image Source: GZA Phase I Inspection



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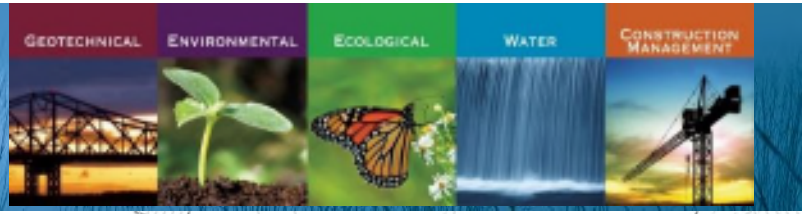
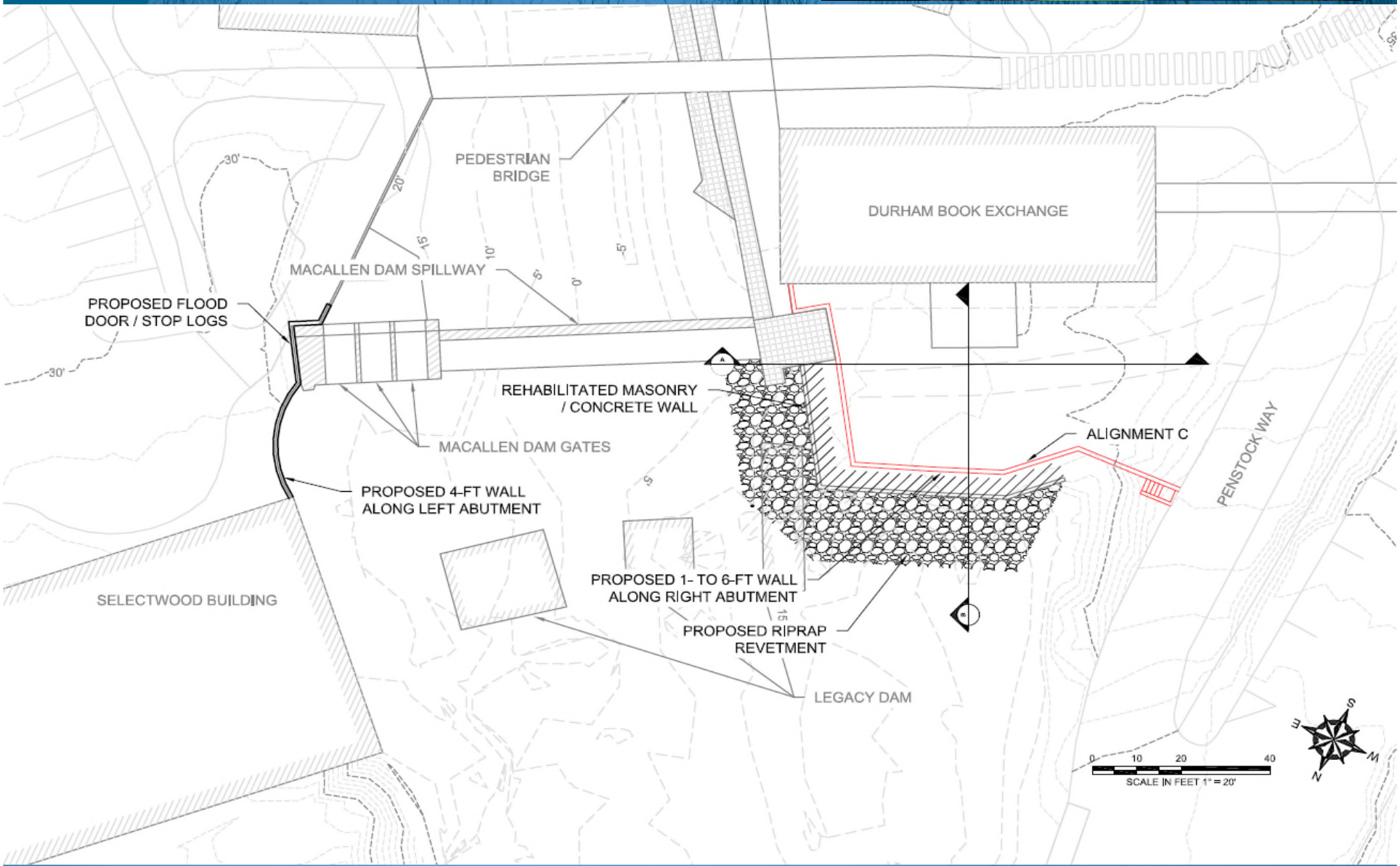
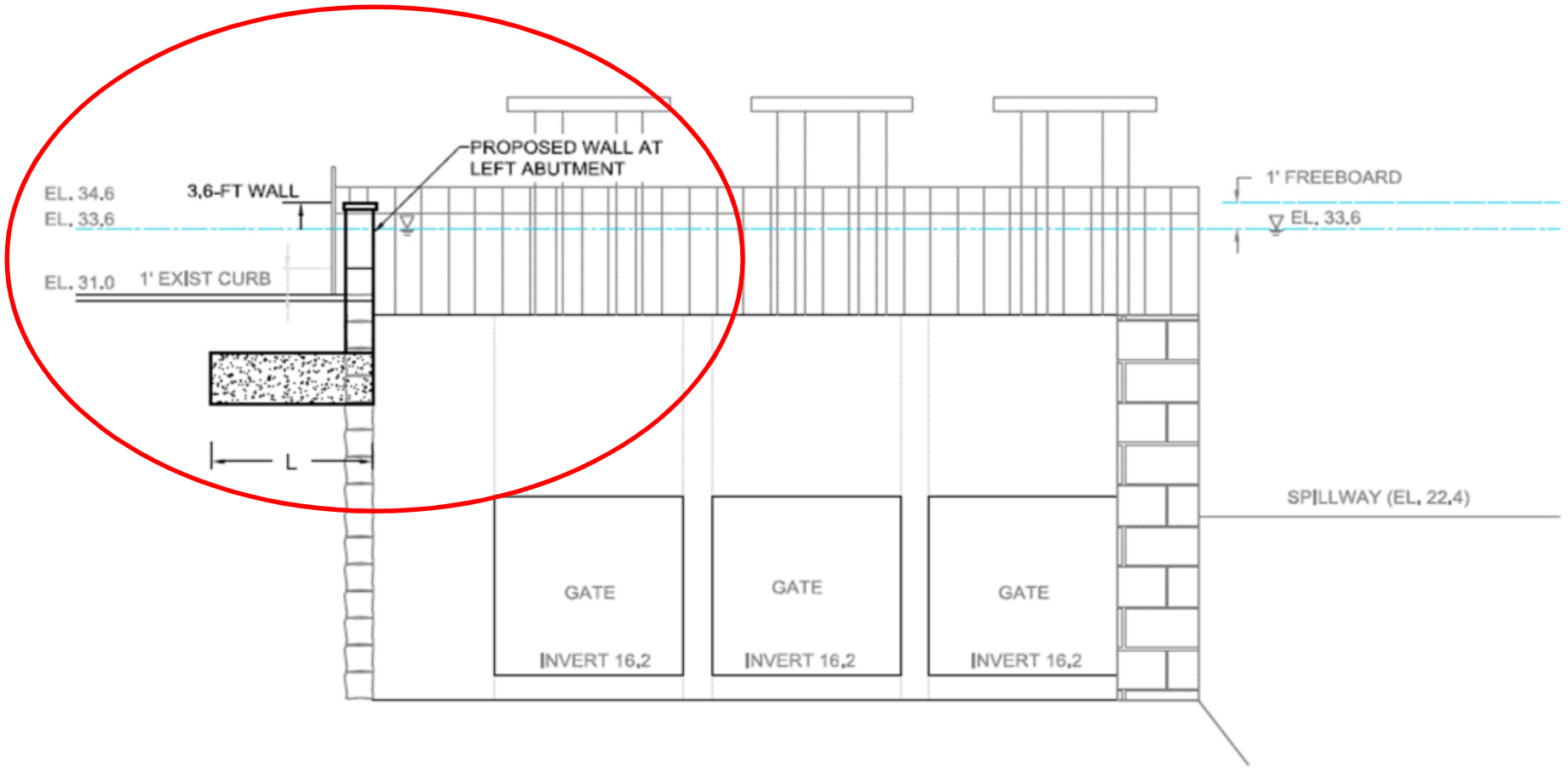
RIGHT ABUTMENT OPTIONS 1, 2, 3

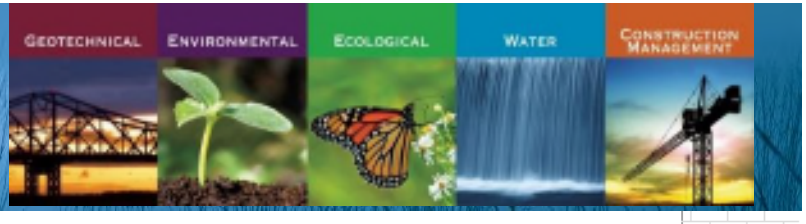


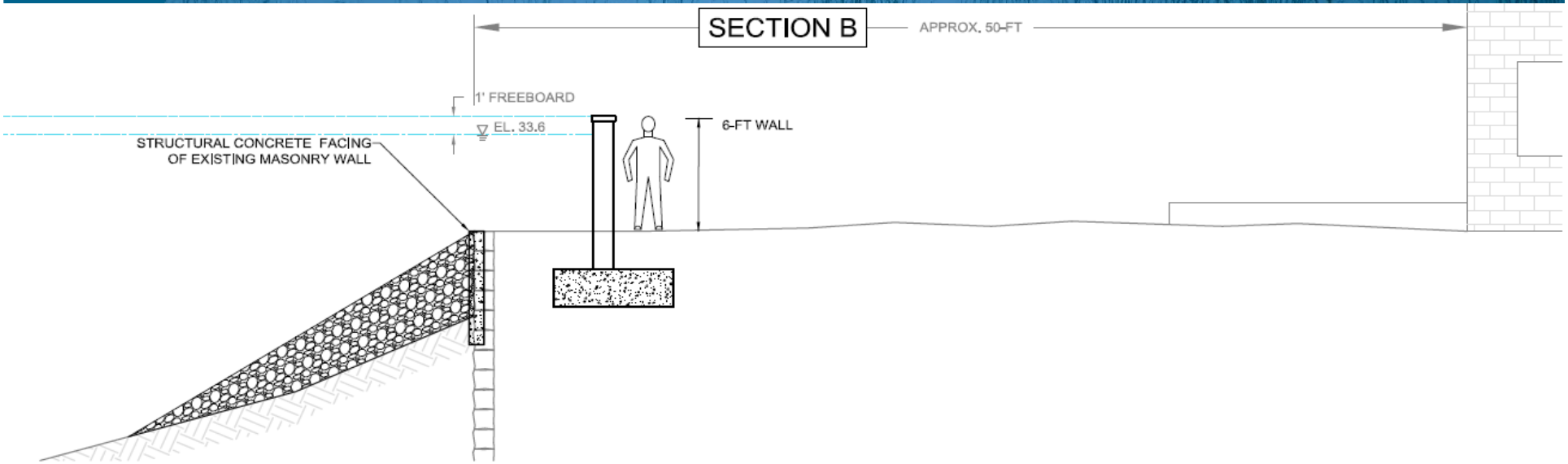


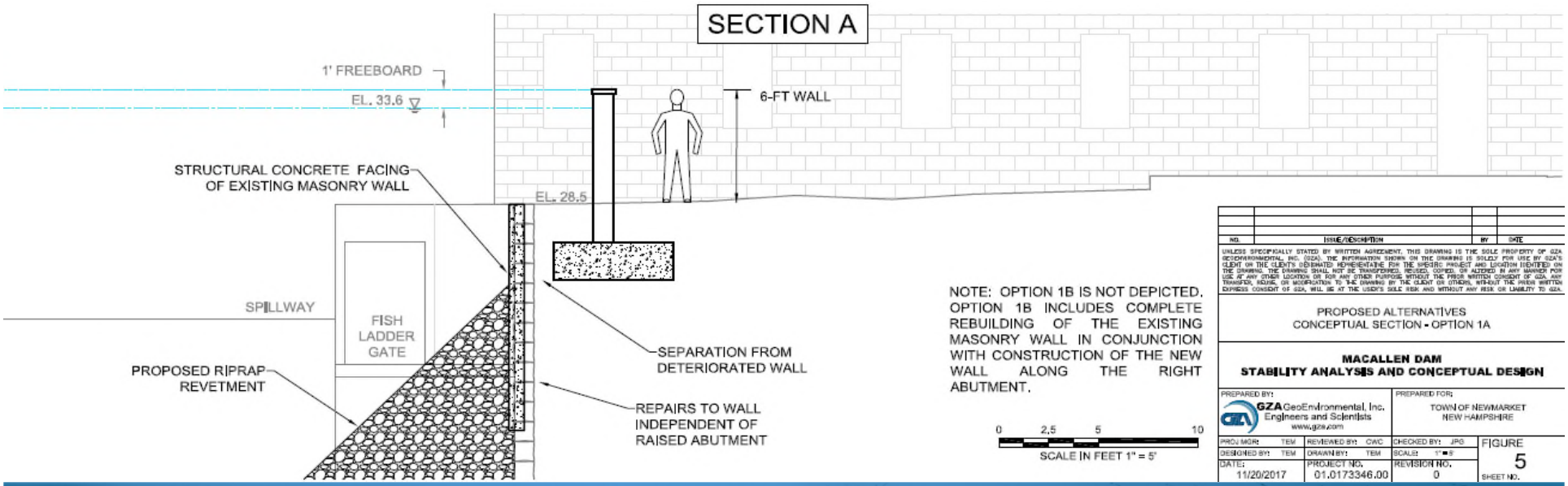
LEFT ABUTMENT
ALL OPTIONS 1, 2, 3



OPTION 1:
6’ WALL, NO FILL







NOTE: OPTION 1B IS NOT DEPICTED. OPTION 1B INCLUDES COMPLETE REBUILDING OF THE EXISTING MASONRY WALL IN CONJUNCTION WITH CONSTRUCTION OF THE NEW WALL ALONG THE RIGHT ABUTMENT.

0 2.5 5 10
SCALE IN FEET 1" = 5'

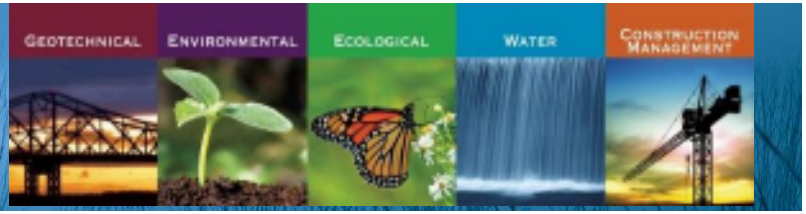
NO.	ISSUE/DESCRIPTION	BY	DATE

PROPOSED ALTERNATIVES
CONCEPTUAL SECTION - OPTION 1A

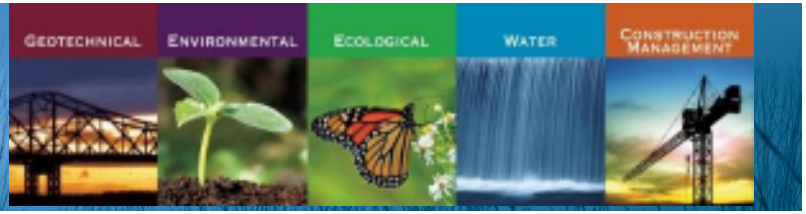
MACALLEN DAM
STABILITY ANALYSIS AND CONCEPTUAL DESIGN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: TOWN OF NEWMARKET NEW HAMPSHIRE
PROJ MGR: TEM · REVIEWED BY: CWC · CHECKED BY: JPG	FIGURE 5
DESIGNED BY: TEM · DRAWN BY: TEM · SCALE: 1" = 5'	
DATE: 11/20/2017 · PROJECT NO. 01.0173346.00 · REVISION NO. 0	SHEET NO.

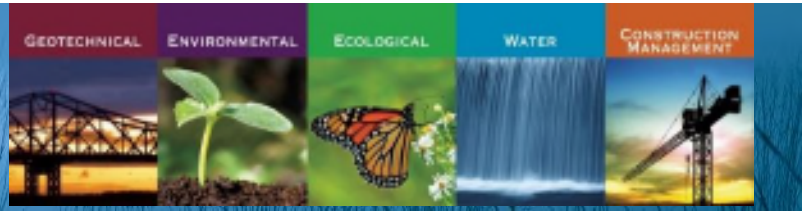
OPTION 1, ALIGNMENT C:



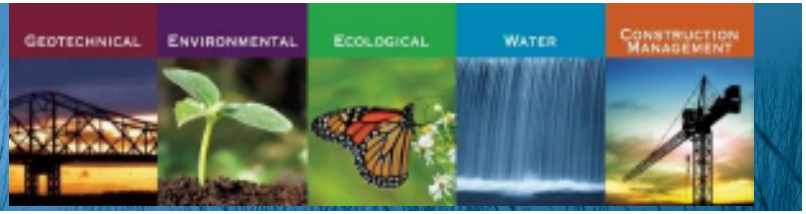
OPTION 1, ALIGNMENT C:

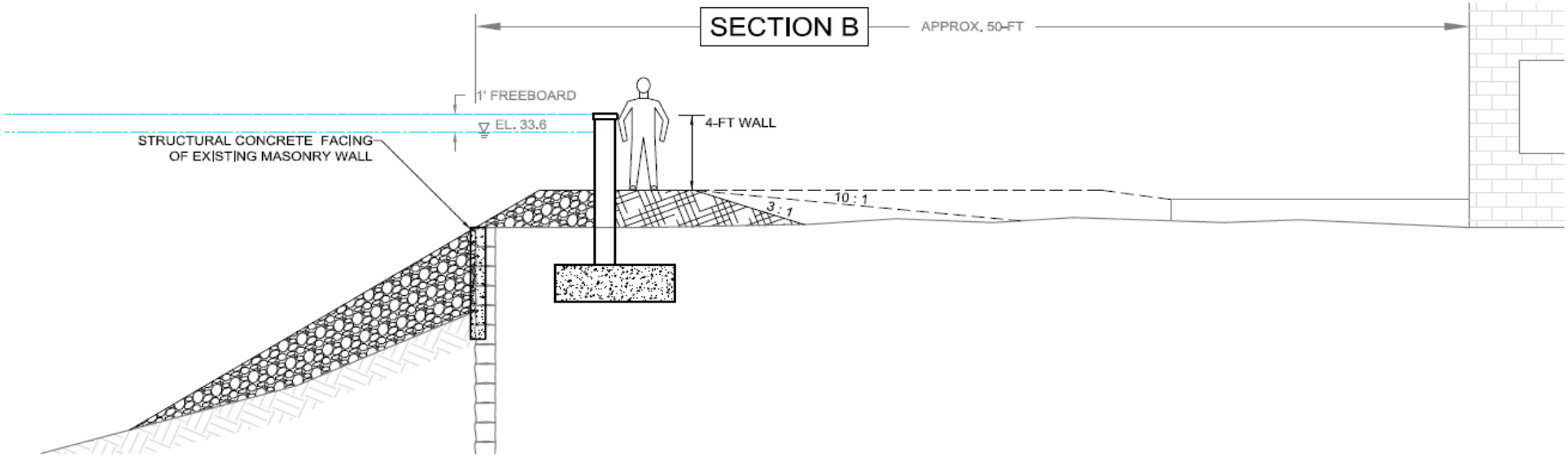


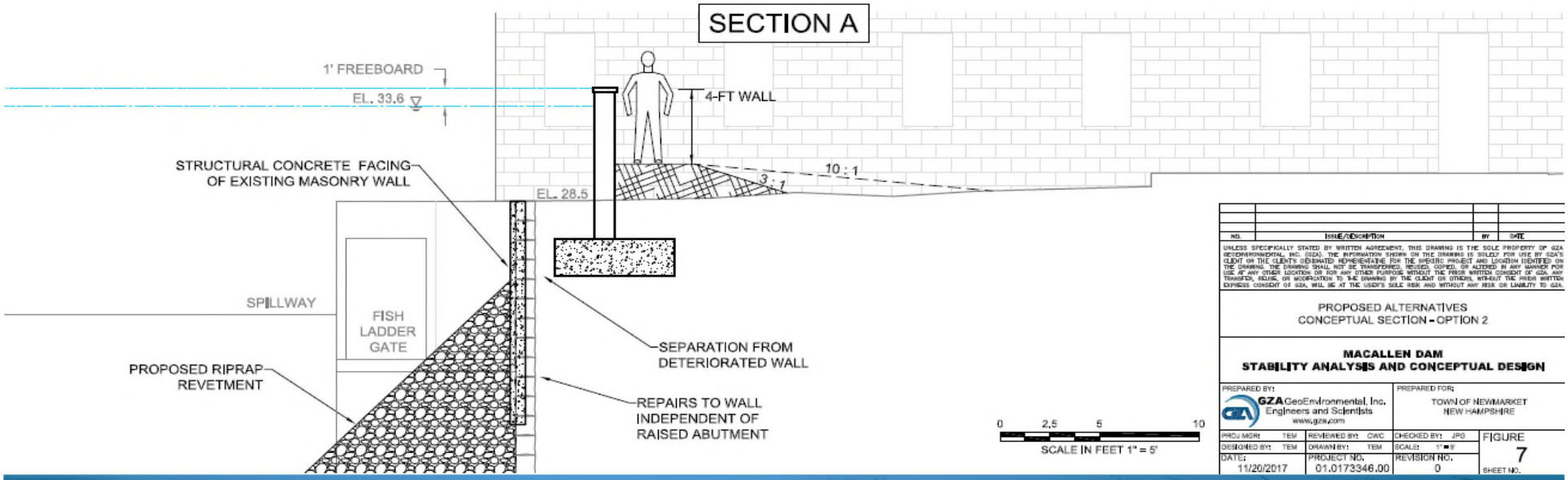
OPTION 1, ALIGNMENT C:



OPTION 2:
4’ WALL, 2’ FILL







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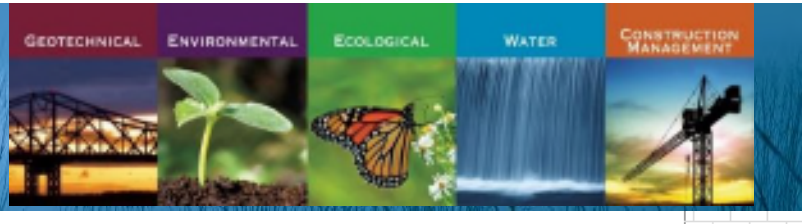
PROPOSED ALTERNATIVES
CONCEPTUAL SECTION - OPTION 2

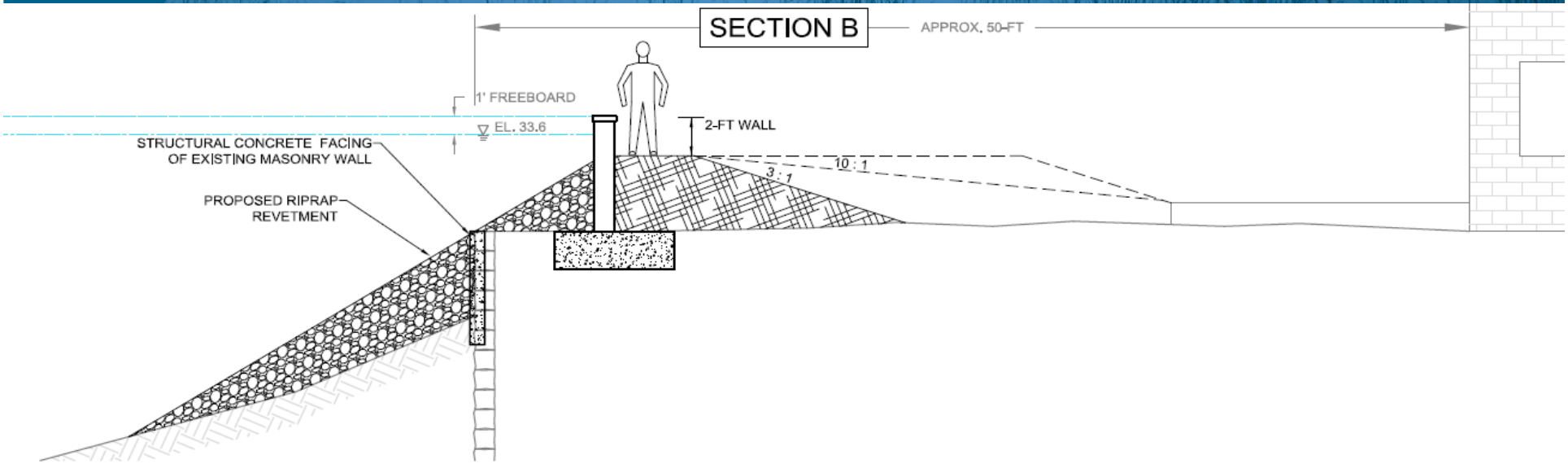
MACALLEN DAM
STABILITY ANALYSIS AND CONCEPTUAL DESIGN

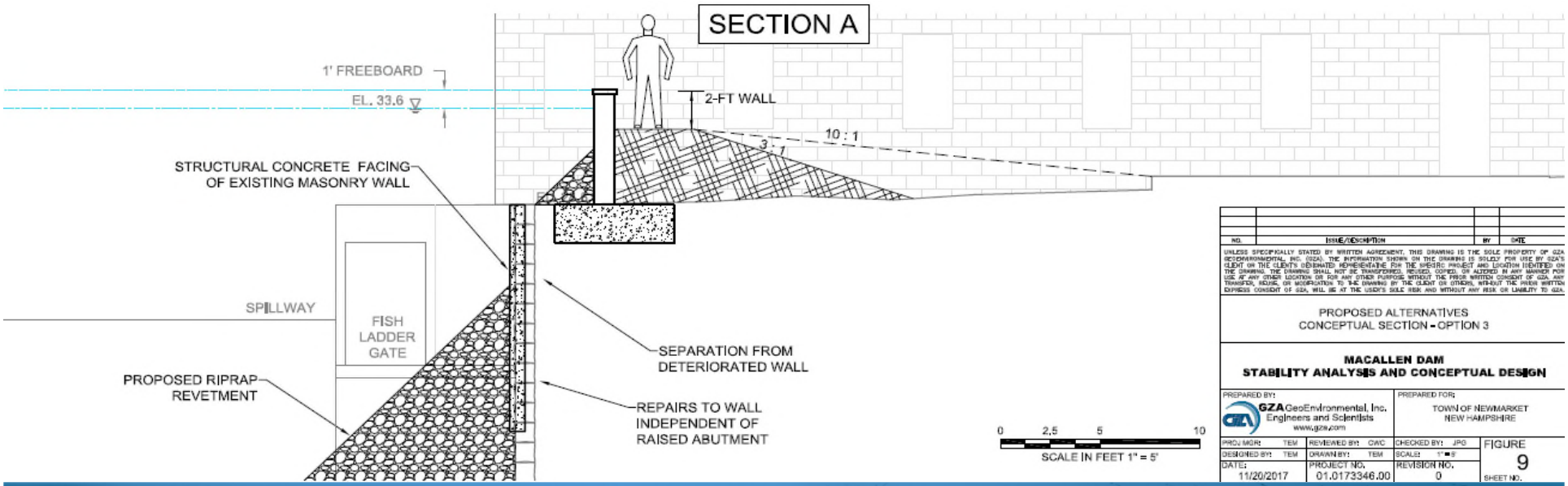
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com
PREPARED FOR: TOWN OF NEWMARKET NEW HAMPSHIRE

PROJ MGR: TEM	REVIEWED BY: CWC	CHECKED BY: JPG	FIGURE	
DESIGNED BY: TEM	DRAWN BY: TEM	SCALE: 1" = 5'		
DATE: 11/20/2017	PROJECT NO. 01.0173346.00	REVISION NO. 0	7	SHEET NO.

OPTION 3:
2’ WALL, 4’ FILL







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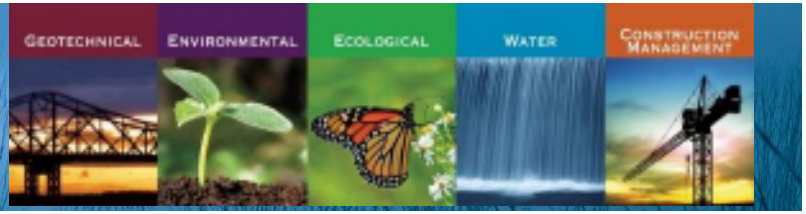
PROPOSED ALTERNATIVES
CONCEPTUAL SECTION - OPTION 3

MACALLEN DAM
STABILITY ANALYSIS AND CONCEPTUAL DESIGN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com
PREPARED FOR: TOWN OF NEWMARKET NEW HAMPSHIRE

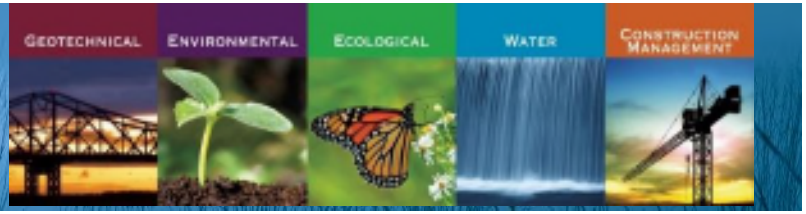
PROJ. MGR: TEM	REVIEWED BY: CWC	CHECKED BY: JPG	FIGURE
DESIGNED BY: TEM	DRAWN BY: TEM	SCALE: 1" = 5'	9
DATE: 11/20/2017	PROJECT NO. 01.0173346.00	REVISION NO. 0	SHEET NO.

MOVING FORWARD
FINAL DESIGN PROPOSAL

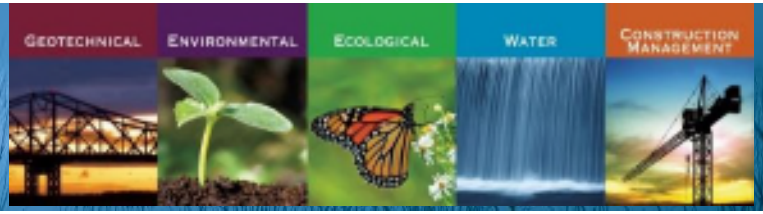


Base Line Scope (Final Design / Permitting)		$ 195,900
Task 1	Project Coordination	$ 3,200
Task 2	Project Kick-off/consultation	8,400
Task 3	Field Investigations/Data collection	12,900
Task 4	Final Design	127,700
Task 5	Permitting	34,900
Task 6	Bidding Services	8,800
Allowance for Fees	(Estimated)	$ 6,700
NHDES Wetland Permit		2,700
NHDES Dam Permit		4,000
Total Contract Amount		**$ 202,600**

MOVING FORWARD
NEXT STEPS



Spring 2018	Council Vote for Approval of Funds for Final Design/Permitting
July 2018	Begin Engineering, Final Design, & Permitting
Fall 2018	Submit Permits
Fall 2018	Start of Town's CIP and Budget Process
March 2019	Town Meeting Vote on Bond for Construction
Spring 2019	Construction Bidding Process; Order Gates*
Summer 2019	Permits Received
Summer 2019	Contract Award; Construction Begins
Fall 2019	Construction Ends (Late October*)
Winter 2020	Reporting and Project Closeout


GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

Questions?