COLBURN STREET DAM

FOLLOW-UP
INSPECTION / EVALUATION REPORT

Dam Name:	**Colburn Street Dam**
State Dam ID#:	**6-11-73-2**
NID ID#:	**MA02571**
Owner:	**Town of Dedham**
Owner Type:	**Commonwealth of Massachusetts**
Town:	**Dedham, MA**
Consultant:	**GZA GeoEnvironmental, Inc.**
Date of Inspection:	**July 15, 2013**

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

July 29, 2013
File No. 01.18802.38

Mr. William Salomaa
Department of Conservation and Recreation
Office of Dam Safety
251 Causeway Street, Suite 600
Boston, MA 02114-2104

249 Vanderbilt Avenue
Norwood
Massachusetts
02062
781-278-3700
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http://www.gza.com

Re: Follow-up Inspection/Evaluation Report
Colburn Street Dam, Dedham, MA
NID# MA02571

Dear Mr. Salomaa

GZA GeoEnvironmental, Inc. (GZA) is pleased to present the Department of Conservation and Recreation (DCR) Office of Dam Safety the attached Follow-Up Inspection/Evaluation Report for the Colburn Street Dam in Dedham, Massachusetts. This report has been developed under GZA's current task order agreement with DCR from RFR No. DCR395 and the Notice to Proceed from DCR (Assignment No. 2 FY14) dated July 11, 2013. The results and recommendations contained herein are subject to the Limitation attached as **Appendix A**. This follow-up inspection report is intended to corroborate the observations made during previous inspections and to document changes since the last inspections.

The follow-up inspection was completed by GZA on July 15, 2013. Flow conditions at the Colburn Street Dam allowed better observation than during the May 2006 Phase I Inspection, when high flows hindered the ability to see the overflow portions of the dam. On the basis of more extensive observations, the condition of the dam is now considered to be **FAIR**, in GZA's opinion. This is a downgrade in the previously reported condition of the dam. The noted deficiencies at Colburn Street Dam include scour downstream of the sluiceway area as well as scour approximately three to four feet downstream of the face of the dam, along the entire length of the dam. Seepage was noticed through the unmortared masonry face of the dam approximately six feet from the top of the dam near the sluiceway area. Large voids were observed between the stones comprising the downstream face of the dam. Leakage through the installed stop logs at the sluiceway was also observed. The concrete cap is also scoured along the upstream face the length of the dam.

In addition to permitting better observation of conditions, the low-flow conditions also permitted a better assessment of the size of the dam. Based on measurements taken during the follow-up inspection, it is GZA's opinion that the Size of the dam meets the definition of a "Small" structure as per 302 CMR 10.06. In addition, observations made by GZA during flooding in 2010, combined with current downstream reconnaissance, suggest that the appropriate Hazard classification for the dam, as per 302 CMR 10.06, is "Significant," in GZA's opinion. If accepted by the Commissioner, both of these recommendations would require modifications to the current data contained in the dam safety inventory.

It is our understanding that the DCR assigned GZA to perform this inspection as a courtesy to the dam owner, the Town of Dedham, to take advantage of DCR water control efforts which were on-going in Mother Brook during the inspection. A representative of the Town of Dedham Engineering Department was present during the inspection. As per our instructions from you, GZA has provided a copy of this report directly to the Town of Dedham.

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We are happy to have been able to assist you with this inspection and appreciate the opportunity to continue to provide the DCR with dam engineering consulting services. Please contact the undersigned if you have any questions or comments regarding the content of this Inspection/Evaluation Report.

Sincerely,

GZA GEOENVIRONMENTAL, INC.

Derek J. Schipper, P.E
Senior Project Manager

Peter H. Baril, P.E.
Consultant/Reviewer

Chad W. Cox. P.E
Principal-In-Charge

Cc: William A. Gode-von Aesch– DCR Flood Control Director
Jason Mammone – Town of Dedham Engineering Department

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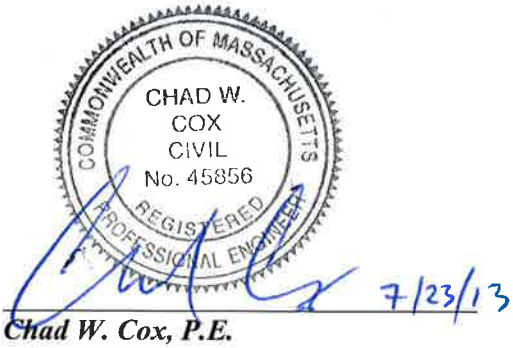
PREFACE

The assessment of the general condition of the dam is based upon available data and visual inspections. This follow-up inspection report is intended to corroborate the observations made during previous inspections and document changes since the last inspection. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, along with data available to the inspection team. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.

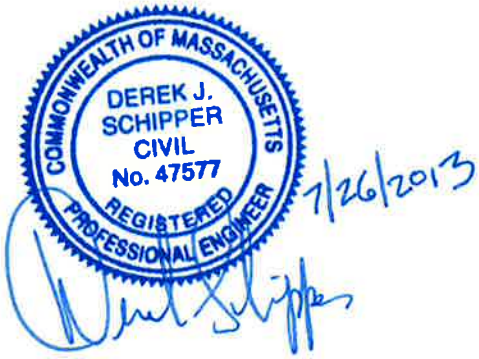
It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Prepared by:
GZA GeoEnvironmental, Inc.



Chad W. Cox, P.E.

Massachusetts License No.: 45856
Principal
GZA GeoEnvironmental, Inc.



Derek J. Schipper, P.E.

Massachusetts License No.: 47577
Project Manager
GZA GeoEnvironmental, Inc.

Commonwealth of Massachusetts
Department of Conservation and Recreation
Office of Dam Safety Poor and Unsafe Condition Dam Follow-up Inspection Form

Dam Name: Colburn Street Dam
Dam Owner: Town of Dedham, Massachusetts
Nat. ID Number: MA 02571
Hazard Potential: N/A (Current); Significant (Recommended)
Size Classification: Non-Jurisdictional (Current); Small (Recommended)
Location of Dam (town): Dedham, MA
Coordinate location (lat, long): 42.2490°N, -71.1598°W
Date of Inspection: July 15, 2013
Weather: Sunny, 85 degrees Fahrenheit
State of Impoundment: ~2 feet below top of dam (about Elev. 74 feet – NGVD-1929 Datum)

Consultant Inspector(s): GZA GeoEnvironmental, Inc. – Chad W. Cox, P.E.
Derek J. Schipper, P.E.

Others in Attendance at Field Inspection: Jason Mammone, Town of Dedham
William A. Gode-von Aesch, DCR
Ed Hughes, DCR

Attachments:

Figure 1:	Locus Map
Appendix A:	Limitations
Appendix B:	Updated Photographs
Appendix C:	Updated Site Sketch

I. Previous Inspection date/Overall Condition:

- Date of most recent formal Phase I Inspection Report: May 23, 2006 (By Weston and Sampson)
- Date of most recent formal Follow-Up Inspection Form: N/A
- List the overall condition reported in most recent Phase I Inspection Report: SATISFACTORY

II. Previous Inspection Deficiencies:

- List identified deficiencies in the most recent Phase I Inspection Report:

1. Woody vegetation on the abutments;
2. Heavy brush on the left embankment;

Note that previous Phase I stated that observations of the overflow portion of the dam were obscured by flow.

III. Overall Condition of Dam at the Time of the Current Follow-up Inspection:

- **State the current condition:** FAIR
- **Have conditions changed since the previous inspection?** Dam was inspected during low water levels in July 2013.

IV. Comparison of Current Conditions to Condition Listed in Previous Phase I Inspection Report:

- **Have any of the deficiencies listed in the previous Phase I Inspection Report worsened? If yes, list the changes.** No.
- **Are there any additional deficiencies that have been identified in the current inspection?** Yes. (The top of dam, downstream face, and stoplogs were obscured by flow during the previous inspection so it is likely that these deficiencies were present during the previous inspection but could not be observed.)
- **If yes, list the deficiencies and describe.**

  - Seepage was observed through the unmortared masonry downstream face of the dam, approximately six feet from the top of the dam.
  - Scour of up to approximately up to 5 feet was observed via probing immediately downstream of the sluiceway, as well as two to four feet downstream of the face of the dam, for the length of the dam.
  - The timber stop logs appeared to be quite old and are likely inoperable. There is no access to the stop logs under normal flow conditions.
  - Sediment was found to have accumulated to within approximately one foot of the top of the stoplogs.
  - Leakage through the installed timber stop logs was also observed.
  - Voids were found in the downstream face of the dam which suggested that large stones may have been displaced from the structure. There was not a general connection between the location of the voids and the location of seepage.
  - Any previously present mortar and most of the smaller chink stones are no longer in place along the downstream face of the structure.
  - The concrete cap on top of the overflow section of the dam was seen to exhibit shallow scour of concrete paste resulting in exposed aggregate over fundamentally the full area of the cap.

V. Dam Safety Orders:

- **List dam safety orders that have been issued to the dam owner pertaining to this dam.** None issued.

VI. Maintenance:

1. **Indicate if there exists an operation and maintenance plan for the dam.** No operation and maintenance manual exists for the dam.
2. **Indicate if it appears the dam is being maintained.** No maintenance is performed at the dam on a regularly scheduled basis, to the best of GZA's knowledge.

VII. Recommendations:

GZA recommends that the SIZE classification of the dam be amended based on measurements taken during the 2013 follow-up inspection. Height of the dam was found to be a minimum of 9 feet when measured from the crest of the overflow section to the stream invert downstream of the dam. If the height is measured from the crest of the overflow section to the deepest location immediately downstream of the stop log sluiceway, then the height is approximately 13 feet. In either case, the height of the dam is greater than 6 feet and less than 15 feet, therefore falling within the SMALL category as defined by 302 CMR 10.06 (2).

In GZA's opinion, the HAZARD classification of the dam should be amended. Based on observations of flood impacts on the residential property immediately downstream of the dam on the left bank during flooding in 2010 and observations made during the inspection of 2013, it appears that the failure of the dam has the potential to, at minimum, cause damage to that home. This meets the definition of a SIGNIFICANT Hazard structure as per 302 CMR 10.06 (3).

The 2006 Phase I Inspection Report by Weston and Sampson made the following recommendations:

1. Prepare a site topographic and bathymetric survey;
2. Perform a hydrologic / hydraulic analysis for the dam;
3. Monitor condition of the dam during low flow [Note: accomplished during this follow-up inspection];
4. Observe the condition of the dam for changes, made at least quarterly, as well as during and following rainfall events that exceed the 25-year, 24-hour storm (approximately 5 inches of rain in 24 hours);
5. Woody vegetation on the abutments should be cut to ground surface, then a healthy stand of grass should be developed on those areas and maintained in that condition;
6. The right abutment area is directly accessible from Condon Park, which is utilized by families with small children. Consideration should be given to installing and maintain fencing or other means to prevent access to the dam for purposes of public safety.

In addition, GZA recommends that consideration be given to addressing the observed leakage through the dam, missing stones on the downstream face, scour at the toe, and the condition of the stop logs.

VIII. Other Comments or Observations: According to reports by a local resident, the impoundment upstream of the dam was last dredged over 40 years ago. Bedrock was observed at both abutments.

IX. Updated Site Sketch with Photo Locations: Attached

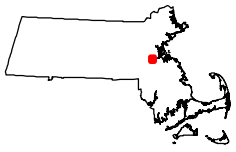
X. Updated Photos: Attached

XI. Copy of Locus Map from Phase I Report: Attached

XII. Other applicable attachment: GZA Limitations

FIGURES

DAM LOCATION



MASSACHUSETTS

FIGURE 1
DEDHAM, MA
COLBURN STREET DAM - MA02571
USGS QUAD: NEWTON

LOCUS MAP

SCALE 1:25000
SOURCE: USGS

Weston & Sampson
ENGINEERS, INC.

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APPENDIX A

LIMITATIONS

DAM ENGINEERING REPORT LIMITATIONS

Use of Report

1. GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of the Commonwealth of Massachusetts Department of Conservation and Recreation (Client) for the Colburn Street Dam in Dedham and the stated purpose(s) and location(s) identified in the Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

2. Our findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. Conditions other than described in this report may be found at the subject location(s).

3. Our services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Subsurface Conditions

4. If presented, the generalized soil profile(s) and description, along with the conclusions and recommendations provided in our Report, are based in part on widely-spaced subsurface explorations by GZA and/or others, with a limited number of soil and/or rock samples and groundwater /piezometers data and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

5. Water level readings have been made in test holes (as described in the Report), monitoring wells and piezometers, at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the groundwater and piezometer levels, however, occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, reservoir and tailwater levels, the presence of subsurface utilities, and/or natural or artificially induced perturbations.

General

6. The observations described in this report were made under the conditions stated therein. The conclusions presented were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by the Client.

7. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein available to GZA at the time of the evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

8. Any GZA hydrologic analysis presented herein is for the rainfall volumes and distributions stated herein. For storm conditions other than those analyzed, the response of the site's spillway, impoundment, and drainage network has not been evaluated.

9. Observations were made of the site and of structures on the site as indicated within the report. Where access to portions of the structure or site, or to structures on the site was unavailable or limited, GZA renders no opinion as to the condition of that portion of the site or structure. In particular, it is noted that water levels in the impoundment and elsewhere and/or flow over the spillway may have limited GZA's ability to make observations of underwater portions of the structure. Excessive vegetation, when present, also inhibits observations.

10. In reviewing this Report, it should be realized that the reported condition of the dam is based on observations of field conditions during the course of this study along with data made available to GZA. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued inspection and care can there be any chance that unsafe conditions be detected.

Compliance with Codes and Regulations

11. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

12. This scope of work does not include an assesment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

Cost Estimates

13. Unless otherwise stated, our cost estimates are for comparative, or general planning purposes. These estimates may involve approximate quantity evaluations and may not be sufficiently

accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over the labor and material costs required to plan and execute the anticipated work, our estimates were made using our experience and readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

Additional Services

14. It is recommended that GZA be retained to provide services during any future: site observations, explorations, evaluations, design, implementation activities, construction and/or implementation of remedial measures recommended in this Report. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

APPENDIX B

PHOTOGRAPHS

Photo 1: View of dam from downstream.

Photo 2: Downstream discharge channel from top of dam.

Photo 3: Leakage through the stop logs at the sluiceway.

Photo 4: Woody vegetation at right abutment. Note seepage through face of dam.

Photo 5: View of crest and sluiceway from right abutment.

Photo 6: View of left abutment. Note good contact between concrete and bedrock.

Photo 7: View of right abutment. Note good contact between concrete and bedrock.

Photo 8: Seepage through face of dam and leakage through stop logs. Note scour measured downstream by approximately six foot long stick.

Photo 9: Large voids between stones on face of dam (no indication of soil movement).

Photo 10: Upstream view of dam.

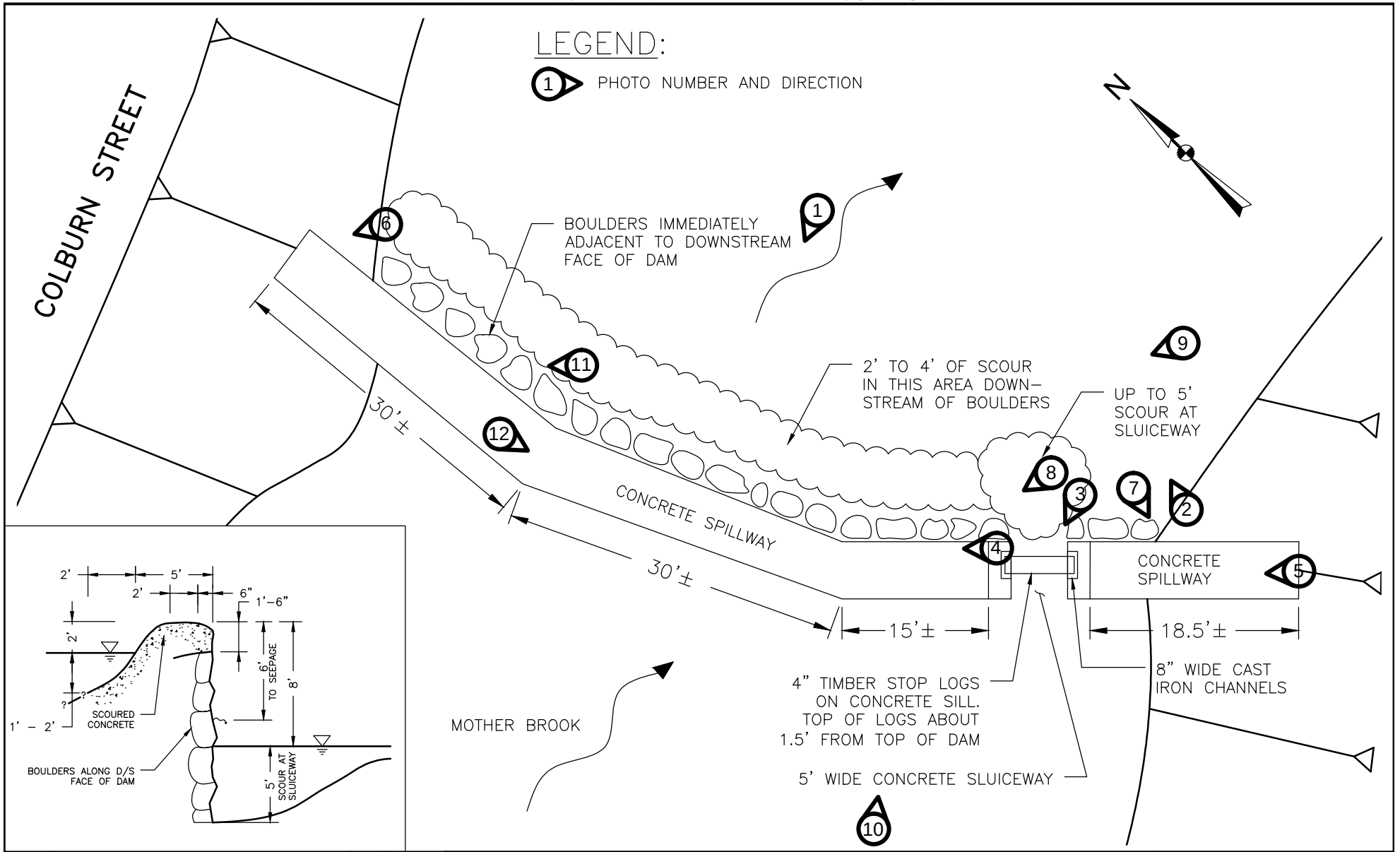
Photo 11: Large voids between stones making up downstream face of dam.

Photo 12: Scoured concrete along top of dam.

APPENDIX C

SITE SKETCH

©2013 – GZA GeoEnvironmental, Inc. GZA–J:\17,000–18,999\18802\18802–38.DJS\Figures\CADD\DAM INSPECTION SKETCH 1.dwg [Layout1] July 22, 2013 – 12:13pm connor.roman



NO.	ISSUE/DESCRIPTION	BY	DATE

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COLBURN STREET DAM
DEDHAM, MA

COLBURN STREET DAM INSPECTION
DAM SKETCH

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION

PROJ MGR: DJS	REVIEWED BY: DJS	CHECKED BY: DJS	FIG OR DWG 1
DESIGNED BY: CFR	DRAWN BY: CFR	SCALE: N.T.S	
DATE: 7/18/2013	PROJECT NO. 18802.38	REVISION NO.	SHEET NO. 1 OF 1