



Connecticut Department of
 Energy & Environmental Protection
 Bureau of Water Protection & Land Reuse
 Inland Water Resources Division



DAM SAFETY PROGRAM DAM INSPECTION REPORT FORM – FOR REGULATORY INSPECTION

Please complete this form in accordance with the instructions (DEEP-DAM-INST-002).

Part I: Summary of Dam Inspection

Dam Name:	Crystal Pond Dam	Inspection Date(s):	August 27, 2018 (Follow-up on September 13, 2018)
Alternate Dam Name(s):	None	CT Dam ID #:	3908
Location (Municipality):	Eastford	Temperature / Weather:	8/27/18: 85 deg F, no precip. in the 7 days prior to inspection 9/13/18: Heavy rain on the previous day
Registered?: Yes or No If yes, provide the 9 digit registration number found on the notification letter.	Yes (Reg. No. not available)	Pool Level: See Instructions	Approx. 4" below the auxiliary spillway invert/normal pool level.
Emergency Action Plan?: Yes or No If Yes, see instructions	No	Impoundment Use: use options listed in instructions	Recreation
Hydraulic and Hydrologic Analysis?: Yes or No If Yes, see instructions	No	Stability Analysis?: Yes or No If Yes, see instructions	No
Overall Condition: (refer to Appendix A located at the end of this form) Poor			

Persons present at the inspection		
Name	Title/Position	Representing
Andrea Judge, P.E.	Senior Project Engineer	Fuss & O'Neill, Inc.
Scott Hernberg	President (8/27 and 9/13)	Crystal Pond Association, Inc.
Tom Hawkins	Treasurer (9/13)	Crystal Pond Association, Inc.
Bruce Lindemann	Dam Committee Member (9/13)	Crystal Pond Association, Inc.

Owners and Operators: If there is more than one owner or operator, copy the empty table below for each owner or operator and paste right below the previous table, then complete the information for each

*By providing this e-mail address you are agreeing to receive official correspondence from DEEP, at this electronic address, concerning the subject report. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify DEEP if your e-mail address changes by email via deep.damsafety@ct.gov.

Indicate if Owner or Operator: Owner

Name: **Crystal Pond Association (Point of Contact: Scott Hernberg)**

Mailing Address: **146 Crystal Pond Road**

City/Town: **Eastford**

State: **CT**

Zip Code: **06242**

Phone: **860-428-3154**

ext.: **N/A**

Emergency Phone: **212-551-5602**

*E-mail: **shernberg@royalalliance.com**

Part II: General Dam Information

General Description: The dam consists of a 270-foot long earthen embankment with 12-foot± wide crest. The upstream side consists of an earthen embankment at approx. 3H:1V slope protected by rip rap. The downstream face is retained by a 6-foot high (average) unmortared stone masonry wall. The primary spillway consists of a sluice gate controlled low level outlet pipe located near the center of the dam, based on visual inspection, the outlet is estimated to be an approximately 24 inch diameter cast iron pipe. The outlet conveys flow from the intake to a natural stream channel at the downstream side of the dam. The auxiliary spillway consists of a 10-foot wide broad crested weir with provisions for stop logs located at the right abutment of the dam. The auxiliary spillway and training walls are constructed of concrete.			
Hazard Classification:	BB (Moderate)	Dam Height (ft):	8
Dam Length (ft):	270	Spillway Length (ft):	10
Spillway Type:	Sluice gate controlled conduit	Normal Freeboard (ft):	2.5
Drainage Area (square miles):	1.09	Impoundment Area (at principal spillway crest, in acres):	140
Watercourse(s): Crystal Pond Brook			

OTHER INFORMATION:

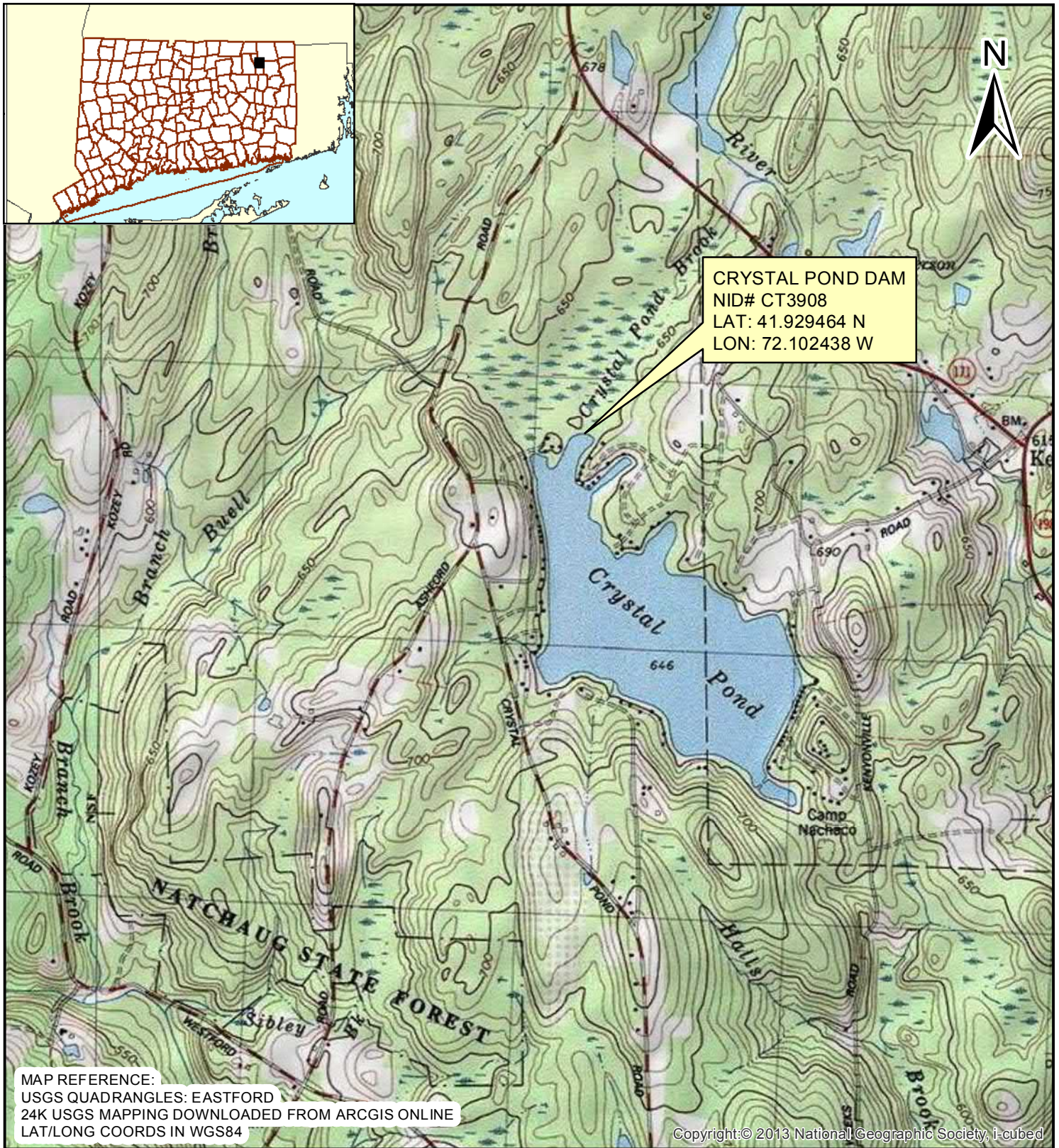
1. The Owner utilizes the gate controlled conduit as a primary outlet as well as a low level outlet.
2. The Owner has observed audible leakage that is inferred to be entering into the embankment on the upstream slope near the height of the normal pool level. At the time of the visual inspection on August 27, 2018, the Owner had drawn down the level of the impoundment 4 inches below the normal level as a precaution. The audible leakage was not detected at the time of the visual inspection. Dye was placed in the vicinity of the leakage point at the upstream side of the pond. The dye was not observed to be seeping to the downstream side of the dam during the inspection.

On September 13, 2018, the Owner requested that Fuss & O'Neill revisit the dam as they had detected the leakage sound at the upstream side of the embankment. At the time of the second field visit, the impoundment level was 3 inches below the normal level and the outlet was closed at the time that Fuss & O'Neill arrived at the site. The sound of water was detected leaking into the embankment and leakage was observed at the downstream side of the dam. In addition to the leakage noted near the middle of the embankment, leakage was observed approximately 2 to 3 feet to the left of the low level outlet. The water leaking from the downstream side of the dam at both locations was clear and there was no evidence of active particle transportation or internal erosion.

3. The directions "left" and "right" used in this report indicate the directions on the dam when looking downstream from the dam.

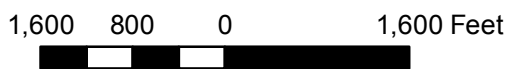
See Part IV for additional comments.

Part III: Aerial Photo/Location Map



AUGUST 2018

FIGURE 1



CRYSTAL POND ASSOCIATION

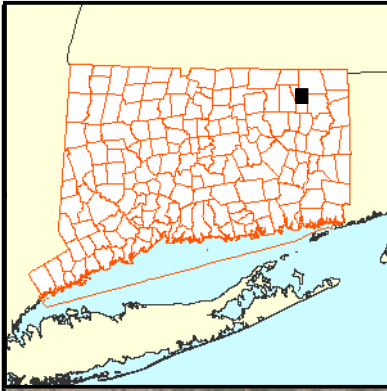
SCALE
 HORZ: 1 INCH = 1,600 FEET
 VERT:
 DATUM
 HORZ:
 VERT: NGVD29 (3-METER CONTOURS)

LOCUS MAP

CRYSTAL POND DAM (CT3908)



EASTFORD, CONNECTICUT



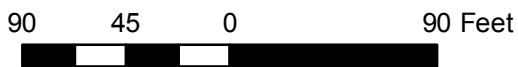
CRYSTAL POND DAM
 NID# CT3908
 LAT: 41.929464 N
 LON: 72.102438 W

MAP REFERENCE:
 USGS QUADRANGLES: EASTFORD
 LAT/LONG COORDS IN WGS84

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

AUGUST 2018

FIGURE 2



CRYSTAL POND ASSOCIATION

SCALE
 HORZ: 1 INCH = 90 FEET
 VERT:
 DATUM
 HORZ:
 VERT:



AERIAL MAP

CRYSTAL POND DAM (CT3908)

EASTFORD, CONNECTICUT

Part IV: Dam/Embankment/Dike Information

Number of Dam/Embankments/Dikes: 1

Dam/Embankment/Dike Name: Crystal Pond Dam

General Description: 270-foot long earthen embankment with 12-foot± wide crest. The upstream side consists of an earthen embankment at approx. 3H:1V slope protected by rip rap. The downstream face is retained by a 6-foot high (average) unmortared stone masonry wall.

General Condition: Poor due to the uncontrolled leakage observed at the embankment.

Concrete Condition: N/A

Stone Masonry: Poor condition, several collapsed portions, undulations and bulges in the downstream wall.

Settlement/Alignment/Movement: The center of the crest appears level with no evidence of depressions or other internal soil erosion. There are several 12" and greater diameter depressions behind the top of the stone masonry wall at the downstream side of the crest. The depressions are aligned with the areas of standing water and seepage at the toe of the dam as well as the reported leakage entry point at the upstream embankment. One depression was probed with a 1" dia rod to resistance at approximately 24 inches deep. Portions of the downstream side of the dam crest were obscured by vegetation debris that remained onsite from the Owner's clearing efforts. The downstream wall is collapsed in several areas, with several bulges and horizontal undulations. The downstream side of the crest shows some areas of prior shallow slope movement associated with the irregularities at the downstream stone masonry wall that has revegetated.

Seepage/Foundation Drainage: Several areas of standing water and soft, saturated soil were observed at the toe of the dam. No areas of active seepage were observed at the time of the inspection on August 27; however the Owner has drawn down the pond approximately 4 inches below the normal level due to concerns with an area of leakage that was previously observed by the owner during its routine informal inspection. At the time of the inspection on September 13, active leakage was observed at the downstream side of the dam near the middle of the dam as well as at the downstream retaining wall approximately 2 to 3 feet left of the outlet pipe. The depressions noted above at the top of the wall is evidence of prior embankment soil particle transportation due to leakage through the embankment. There was no evidence of active internal erosion observed at the site (ie, cloudy leakage or accumulations of washed out embankment material in the downstream area.

Riprap: The upstream slope is protected by rip rap, 4 to 10 inches in diameter. The rip rap appears to be uniform.

Erosion/Burrows: Two 4-inch diameter animal borrows were observed at the crest.

Vegetative Cover: Grass cover on the embankment. The toe of the dam is soft and vegetated with grass. Brush is routinely cleared from the toe of the dam to approximately 10 feet from the toe of the downstream retaining wall.

Other: An area of unconsolidated fill was reportedly placed by an abutter at the upstream side of the embankment on the right side of the spillway. The unconsolidated fill is vegetated with trimmed weeds.

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part V: Principal Spillway, Training Walls, Apron

Number of Principal Spillways: 1

Spillway Type: Sluice gate controlled conduit, which is also used as a low level outlet. Refer to Part VIII and IX for observations at the principle spillway.

General Description: See Part VIII and IX

General Condition: See Part VIII and IX

Concrete Condition: See Part VIII and IX

Stone Masonry: See Part VIII and IX

Settlement/Alignment/Movement: See Part VIII and IX

Cracks: See Part VIII and IX

Scouring/Undermining: None noted

Seepage/Foundation Drainage: None noted

Other: N/A

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part VI: Auxiliary Spillway, Training Walls, Apron

Number of Auxiliary Spillways: 1

Auxiliary Spillway Type: Broad crested concrete overflow weir with concrete training walls is located at the right abutment of the dam.

General Description: The auxiliary spillway is approximately 10 feet wide and 1 foot deep. Stop log slots are present at the training walls but no stop logs were in place at the time of the inspection. The auxiliary spillway discharges to a stone lined channel that discharges to Crystal Pond Brook.

General Condition: Poor

Concrete Condition: Poor, the concrete is heavily scoured and the approach apron panels show differential settlement. The apron was sounded, however no audible indication of voids beneath the panels were noted.

Stone Masonry: N/A

Settlement/Alignment/Movement: The upstream approach apron consists of two concrete slab panels. An approximately 1/4 inch space and differential settlement was noted at the joint on the panels.

Cracks: The apron at the auxiliary spillway has a longitudinal crack with differential settlement as noted above.

Scouring/Undermining: None noted.

Vegetative Cover: The downstream channel banks and the right abutment of the spillway and dam are vegetated with brush.

Riprap: The approach to the upstream side of the spillway and the downstream channel are armored with 6 to 12 inch diameter, uniform rip rap, which appeared to be in fair condition.

Seepage/Foundation Drainage: On 8/27/18 Excess red dye that remained after the assesment of the reported leak at the abutment was applied at the spillway as leakage was suspected based on visual observations. The dye applied upstream of the spillway discharged to the downstream side of the left training wall, confirming that a leak is present beneath the left side of the auxiliary spillway. At the time of the inspection, the water level was approximately 3 inches below the upstream side of the approach apron at the auxiliary spillway.

Other: N/A

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part VII: Downstream Channel

Number of Downstream Channels: 1

Watercourse Name: Crystal Pond Brook

General Description: Wooded natural stream channel at the downstream side of the primary spillway/low level outlet conduit, approximately three feet wide.

General Condition: Fair

Scouring: None noted.

Debris: None observed at the toe of the dam. The area past the toe of the dam is heavily vegetated and was obscured from view.

Riprap: Rip rap at the downstream side of the primary spillway outlet and at the downstream side of the auxilliary spillway appears to be in satisfactory condition.

Other: N/A

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part VIII: Intake Structure(s)

Number of Intake Structures: 1

Intake Structure Type: Low-level outlet

General Description: Low level outlet used as the primary spillway. The intake structure consists of an upward operating gate with a rack and pinion mechanism on the stem. The gate is enclosed by a concrete inlet structure with a steel trashrack.

General Condition: Fair, the gate is operated and maintained frequently.

Concrete Condition: The concrete is heavily abraded at the water surface; however no major cracking or spalling was noted.

Stone Masonry: N/A

Settlement/Alignment/Movement: None noted

Cracks: None noted

Other: No debris noted. The Owner indicated that the outlet was operated on a frequency ranging from several times a month to weekly to maintain a constant impoundment level.

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part IX: Outlet Structure(s)

Number of Outlet Structures: 1

Outlet Structure Type: Cast iron pipe discharging at the downstream spillway wall.

General Description: Conduit conveying flow from the intake structure to the downstream channel.

General Condition: Fair, minor corrosion of the pipe below the water level with no noted section loss.

Concrete Condition: N/A

Stone Masonry: The downstream wall in the vicinity of the outlet is in fair condition, however, several gaps were noted.

Settlement/Alignment/Movement: None noted

Scouring/Undermining: None noted. A gap in the stone masonry wall at the bottom of the wall on the left side of the pipe was probed and appears to be sand. The material was not visualized as the area was not accessible and submerged.

Other: The Owner is not aware of when the pipe was installed. During the site visit on September 13, the upward operating gate was closed to facilitate access to the downstream channel. On this occasion leakage was observed exiting the downstream wall approximately 2 to 3 feet to the left of the outlet pipe. It is not apparent if the leakage is associated with the pipe.

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part X: Miscellaneous Features

List miscellaneous features: (e.g., access roads, bridges, etc.):

Access – Roads, bridges, etc.: Vehicular access to the left abutment of the dam is via W. Cove Road. There is no street marker for W. Cove Road, but its location is marked on the mailbox at the second house on Lake Drive off of Crystal Pond Road. Locking gates are present at the left and right abutments to prevent unauthorized access.

Photos/Graphics/Sketches: All photographs are included in Part XIII and sketches are provided in Part XIV.

Part XI: Downstream Hazard Classification Reassessment

Downstream Hazard Classification:

The dam is upstream of undeveloped wooded land and a large swamp area which would presumably provide significant storage in the event of an uncontrolled dam breach. Bigelow Hollow Road (CT Route 171) is approximately 3,300 feet downstream of the dam. There appears to be two residential structures downstream of the dam in the vicinity of Bigelow Hollow Road. Therefore, it appears that current classification of Class BB (Moderate) hazard potential is appropriate.

Part XII: Recommendations

Recommendations:

The dam is generally found to be in poor condition due to the uncontrolled leakage. The following recommendations are provided to ensure that areas of concern do not develop in serious deficiencies that are more costly to repair.

1. Continue to monitor the dam for increased signs of leakage, particularly after storm events. A repair should be designed to address the deficiency to ensure that it does not continue to deteriorate.
2. Continue completing routine mowing and brush clearing at the dam.
3. Remove all trees and woody vegetation within 15 feet of the dam and dike embankments, including along the toe of downstream stone masonry wall and the trees located at the left and right abutments of the dam. Should removal at this time be infeasible due to ownership/property boundary issues, the trees should be monitored and ultimately removed if later determined to be causing damage to the dam.
4. Monitor leaning stone masonry wall on downstream face and repair if necessary to correct stone displacement to provide plumb wall, minimizing the potential for future stone displacement.
5. Eradicate nuisance animals and repair (fill) animal holes.
6. Provide a filter berm at the downstream side of the dam. The filter berm should be designed to reduce the potential for damage to the embankment by internal soil erosion, provide support to the downstream wall, and facilitate maintenance access to the downstream side of the dam.

Part XIII: Photographs/Graphics



Photo 1: Overview of the dam from upstream



Photo 2: Overview of upstream face from right abutment.



Photo 3: Overview upstream face from left abutment.



Photo 4: Overview of dam crest from right abutment.



Photo 5: Overview dam crest from left abutment.



Photo 6: Overview of downstream face from right abutment

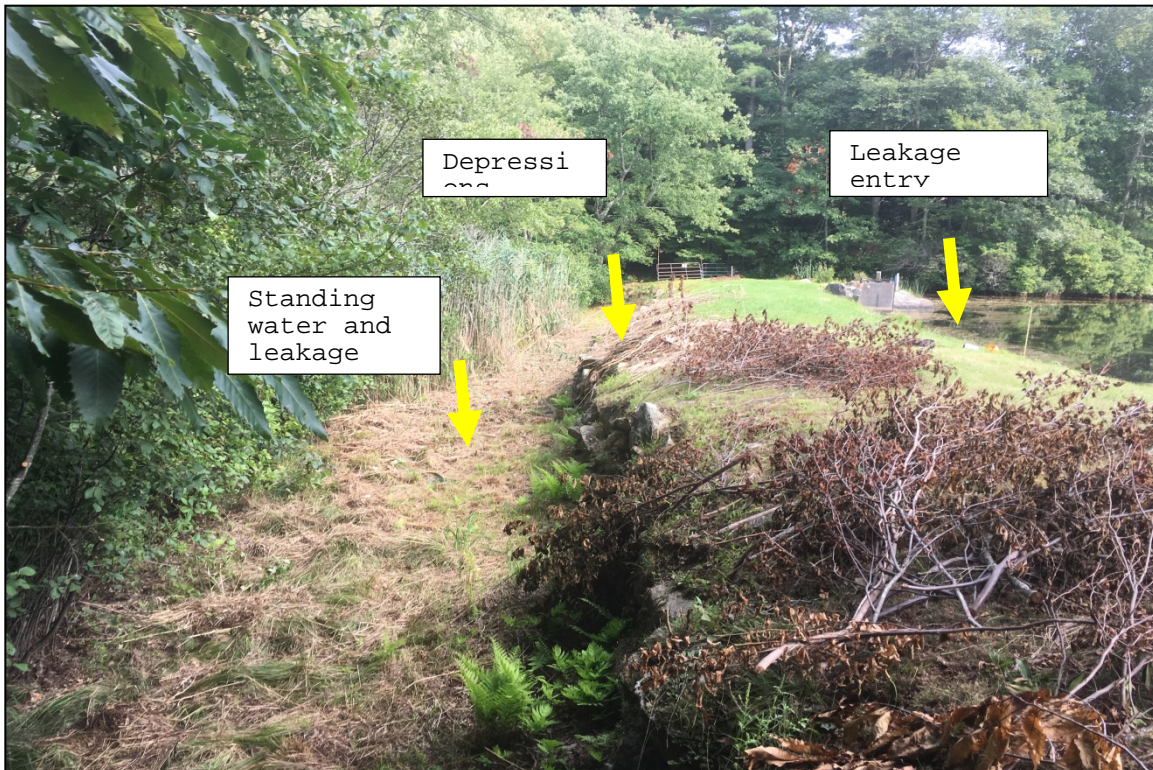


Photo 7: Overview downstream face from left abutment.



Photo 8: Overview primary spillway from the right side (Owner uses low level outlet as the primary spillway).



Photo 9: Overview of primary spillway/low level outlet interior.



Photo 10: Overview of primary spillway/low level outlet exterior.



Photo 11: Overview of operators.



Photo 12: Overview of spillway outlet and stilling basin from downstream channel area. Leakage was subsequently observed on September 13 when the low level outlet was closed.



Photo 13: Overview auxiliary spillway from the left side of the spillway.



Photo 14: Overview of auxiliary spillway from downstream channel area.



Photo 15: Overview of right training wall.



Photo 16: Overview of left training wall.



Photo 17: Overview of weir, note the differential settlement on the slab.



Photo 18: Overview of downstream channel at primary spillway. The water is colored with excess dye that was used to assess leakage at the upstream side of the dam.



Photo 19: Overview of reservoir area.



Photo 20: Areas of specific deficiencies – Rodent hole on the crest (typ.).



Photo 21: Areas of specific deficiencies – tree growth at the left abutment.



Photo 22: Areas of specific deficiencies – the downstream wall is leaning and collapsed, however, the toe is otherwise clear of vegetation.



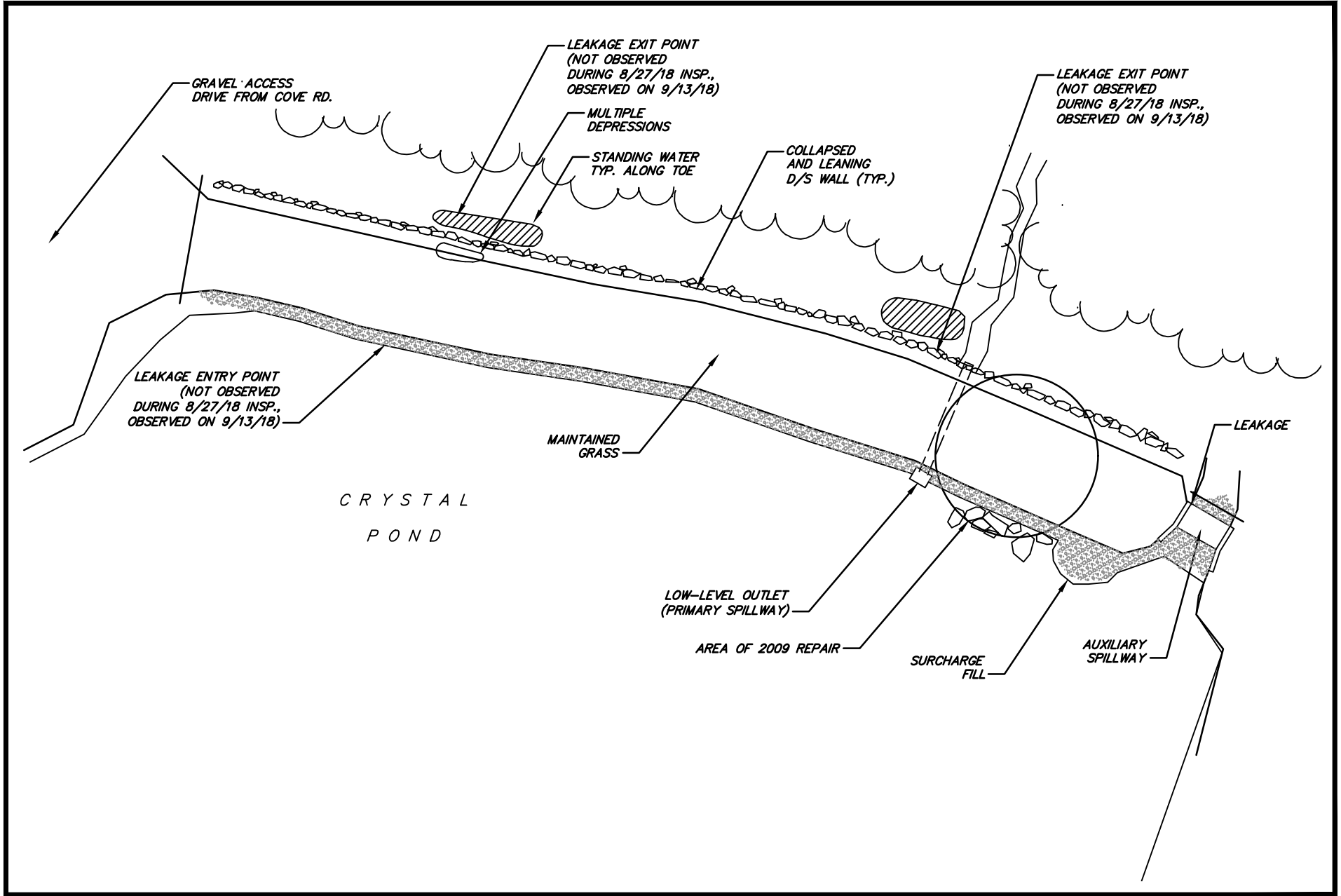
Photo 23: Areas of specific deficiencies – area of leakage entry (reported by Owner). Leakage was not detected on August 27, 2018 but was confirmed on September 13.



Photo 24: Areas of specific deficiencies – depressions at the downstream side of the crest.

Part XIV: Sketches

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SCALE:
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VERT.:
DATUM:
HORZ.: N/A
VERT.: N/A
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GRAPHIC SCALE

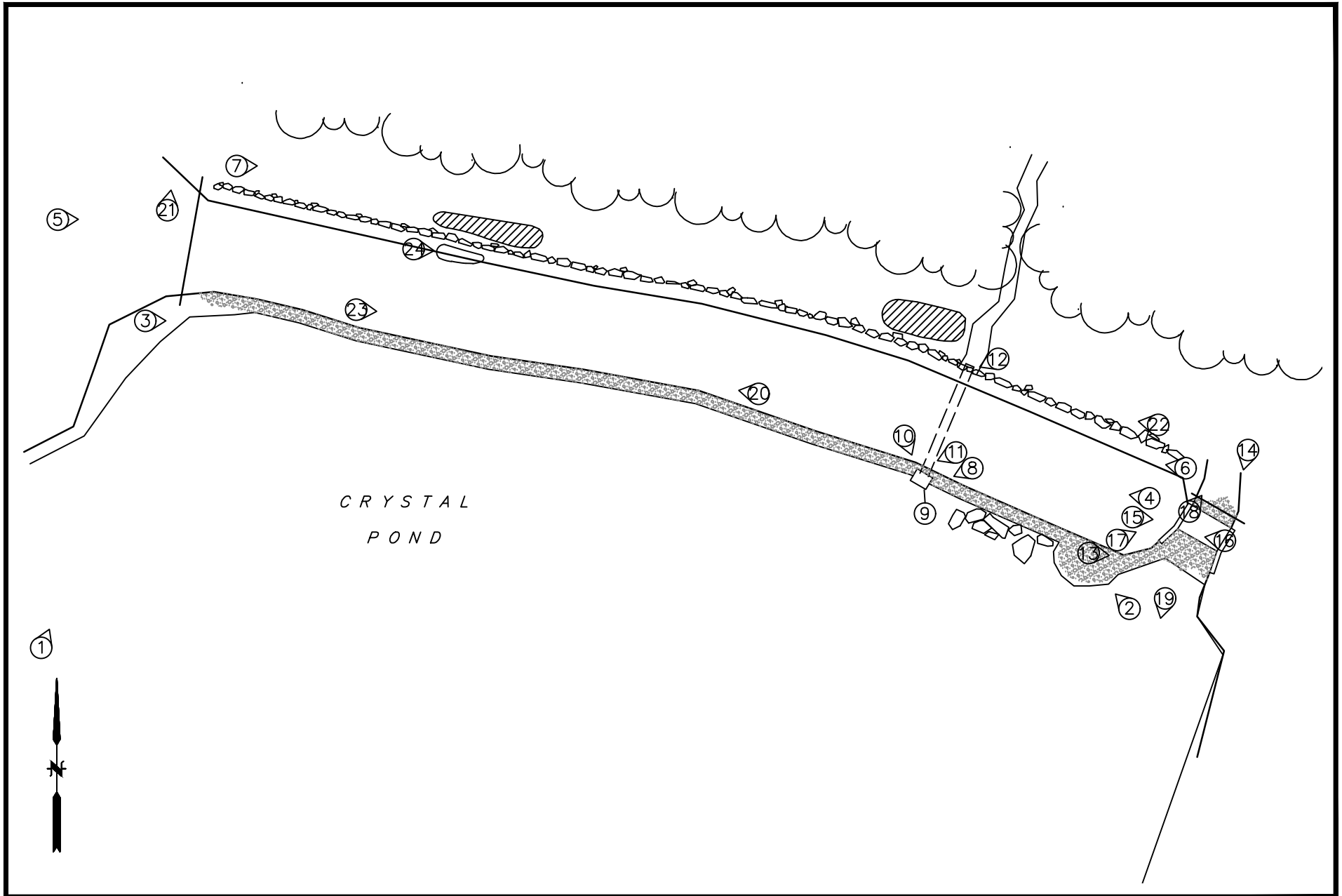


FUSS & O'NEILL
 146 HARTFORD ROAD
 MANCHESTER, CONNECTICUT 06040
 860.646.2469
 www.fando.com

CRYSTAL POND ASSOCIATION
 SITE SKETCH
 CRYSTAL POND DAM VISUAL INSPECTION
 EASTFORD CONNECTICUT

PROJ. No.: 20050682.B40
 DATE: 09/12/2018
FIG. 3

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 LAYER STATE:



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HORZ.:	1"=40'
VERT.:	
DATUM:	
HORZ.:	N/A
VERT.:	N/A
GRAPHIC SCALE	



FUSS & O'NEILL

146 HARTFORD ROAD
 MANCHESTER, CONNECTICUT 06040
 860.646.2469
 www.fando.com

CRYSTAL POND ASSOCIATION
 PHOTO LOCATION SKETCH
 CRYSTAL POND DAM VISUAL INSPECTION

EASTFORD

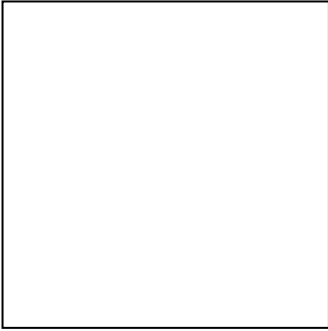
CONNECTICUT

PROJ. No.: 20050682.B40
 DATE: 09/12/2018

FIG. 4

Part XV: Professional Engineer Certification

The following certification must be signed by a Professional Engineer

<p>"I hereby certify that the information provided in this report has been examined by me and found to be true and correct in my professional judgment."</p>		
		2/08/2019
Signature of Professional Engineer		Date
Philip E. Forzley	Vice President	15817
Printed Name of Professional Engineer	Title	CT P.E. Number
<p>Fuss & O'Neill, Inc <hr/> Name of Firm</p>		
		Affix P.E. Stamp Here
		

Part XVI: Owner Signature

The following statement must be signed by the Owner(s) of the subject Dam.

"The information provided in this report has been examined by me."	
Signature of Owner	Date
Scott Hernberg on behalf of Crystal Pond Association	President
Name of Owner (print or type)	Title (if applicable)
Signature of Owner	Date
Name of Owner (print or type)	Title (if applicable)
Signature of Owner	Date
Name of Owner (print or type)	Title (if applicable)
Signature of Owner	Date
Name of Owner (print or type)	Title (if applicable)

Note: Mail the completed inspection report to:

DAM SAFETY PROGRAM
INLAND WATER RESOURCES DIVISION
CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106

In addition, please send this completed report converted to Adobe portable document format (pdf) including a scan of the signature page via email to: DEEP.DamSafety@ct.gov

Appendix A: Overall Dam Condition Selection Standards

Condition	Definition
Good	Through file research and after a thorough visual inspection it has been determined that the dam is well maintained and no existing dam safety deficiencies are recognized. Only continued routine maintenance is required.
Satisfactory	Through file research and after a thorough visual inspection it has been determined that no significant deficiencies are recognized. Only minor maintenance is required and only minor flaws are noted.
Fair	Through file research and after a thorough visual inspection it has been determined that there are no critical deficiencies with the dam that would require engineering analysis with the following exception: the engineer may recommend that a hydrologic and hydraulic analysis be conducted due to the lack of adequate freeboard and/or the lack of spillway capacity documentation. A condition exists at the dam that may require some sort of additional monitoring.
Poor	Through file research and after a thorough visual inspection it has been determined that deficiencies are recognized that require engineering analysis and/or remedial action.
Unsatisfactory	Through file research and after a thorough visual inspection it has been determined that a deficiency is recognized that requires immediate or emergency action. Administrative/Enforcement action may be required as determined by the Dam Safety Program. Reservoir level restrictions may be necessary until the problem is resolved.

Appendix B - Hazard Classification of Dams

I. A Class AA dam is a negligible hazard potential dam which, if it were to fail, would result in the following:

- (i) no measurable damage to roadways;
- (ii) no measurable damage to land and structures;
- (iii) negligible economic loss.

II. A Class A dam is a low hazard potential dam which, if it were to fail, would result in any of the following:

- (i) damage to agricultural land;
- (ii) damage to unimproved roadways (less than 100 ADT);
- (iii) minimal economic loss.

III. A Class BB dam is a moderate hazard potential dam which, if it were to fail, would result in any of the following:

- (i) damage to normally unoccupied storage structures;
- (ii) damage to low volume roadways (less than 500 ADT);
- (iii) moderate economic loss.

IV. A Class B dam is a significant hazard potential dam which, if it were to fail, would result in any of the following:

- (i) possible loss of life;
- (ii) minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc;
- (iii) damage to or interruption of the use of service of utilities;
- (iv) damage to primary roadways (less than 1500 ADT) and railroads;
- (v) significant economic loss.

V. A Class C dam is a high hazard potential dam which, if it were to fail, would result in any of the following:

- (i) probable loss of life;
- (ii) major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc;
- (iii) damage to main highways (greater than 1500 ADT);
- (iv) great economic loss.