INSPECTION REPORT

FINAL DRAFT

LAKE HAYWARD DAM
CT DEEP #04105

HAYWARDVILLE ROAD
HAYWARD BROOK
EAST HADDAM, CONNECTICUT

PREPARED FOR:

PROPERTY OWNERS ASSOCIATION OF LAKE HAYWARD

DECEMBER 2019

Prepared by:

KARL F. ACIMOVIC, P.E.
588 Stonehouse Road
Coventry, CT 06238

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:	**Lake Hayward Dam**	Inspection Date(s):	**August 1, 2019** **August 29, 2019**
Alternate Dam Name(s):	**Shaw Lake Dam** **Shaw's Lake Dam** **(From historical records)**	CT Dam ID #:	**04105**
Location (Municipality):	**East Haddam**	Temperature / Weather:	**Mixed Suns & Clouds, 80ºF (08-01-19)** **Sunny, Clear Low 70sºF (08-29-19)**
Registered?: Yes or No If yes, provide the 9 digit registration number found on the notification letter.	**Registered 02-06-1989, No Number Assigned**	Pool Level: See Instructions	**~1" Above Rt. Spillway Crest / Dry Left Spillway (08-01-19)** **~1.5" Above Rt. Spw. Crest / Dribble Left Spillway (08-29-19)**
Emergency Action Plan?: Yes or No If Yes, see instructions	**No, See Other Information**	Impoundment Use: use options listed in instructions	**Conservation & Recreation**
Hydraulic and Hydrologic Analysis?: Yes or No If Yes, see instructions	**Yes, See Other Information**	Stability Analysis?: Yes or No If Yes, see instructions	**No, See Other Information**
Overall Condition:	**Fair to Satisfactory**		

Persons present at the inspection		
Name	**Title/Position**	**Representing**
Karl F. Acimovic, P.E.	**Consulting Engineer**	**Inspector**
Edward Bader	**Owner's Representative**	**POALH**
Gary Petersen	**Owner's Representative**	**POALH**

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 & Operator

Name: **Property Owners Association of Lake Hayward**

Bonnie Sudell, President

Mailing Address: **P.O. Box 230**

City/Town: **Colchester** State: **CT** Zip Code: **06415**

Phone: **(860) 678-1392** ext.:

Emergency Phone: **(860) 836-5245 (Cell)**

*E-mail: **bonnies@lakehaywardct.com**

Part II: General Dam Information

General Description: Lake Hayward Dam is an earth embankment dam with two sloped chute type spillways, one being a primary spillway flowing on a regular basis and the second acting as an auxiliary spillway with near the same elevation as the primary. The earth embankment section lies directly adjacent to Haywardville Road, but is separated therefrom by two culverts, carrying outflow from each of the two spillways. The top of the dam is characterized by a maintained grass area. The spillway approaches are natural pond bottom with very shallow slopes of gravel and small cobbles, while the spillway chutes (discharge channels) are constructed with a concrete base and shallow stone masonry training walls for the primary (right side) spillway, and a concrete base with vegetated side slopes and some inlaid stone for the auxiliary (left side) spillway discharge. There are no low level outlets or other water level controls at this site.

Hazard Classification:	**BB**	**Dam Height (ft):**	**5 - 8 ft. (8' Max.)**
Dam Length (ft):	**130 ft.**	**Spillway Length (ft):**	**10 ft. (Right Side) 12.5 ft. (Left Side)**
Spillway Type:	**Two broad crested concrete weirs**	**Normal Freeboard (ft):**	**2.8 ft. (Average from the two spillways to the top of the dam)**
Drainage Area (square miles):	**2.59 sq. mi.**	**Impoundment Area (at principal spillway crest, in acres):**	**172.4 acres**
Watercourse(s):	**Hayward Brook**		

OTHER INFORMATION:

History – Lake Hayward Dam has been mapped since at least 1868, at which time it was known as Shaw's Lake and shown in near its present form on the Petersen Map of East Haddam (see map section below). Prior to that, according to the Association's history, it was "…… once known as Long Pond (by the Indian tribes who inhabited its shores) ……." On the 1868 map, two downstream mills area shown, a grist mill and a saw mill, remnants of which are still evident on the downstream side of the road and culvert crossings.

Phase I Report – No Phase I Corps of Engineers Report was found in the records of the DEEP Dam Safety Section. Because of its low hazard rating, it is uncertain whether or not one was produced.

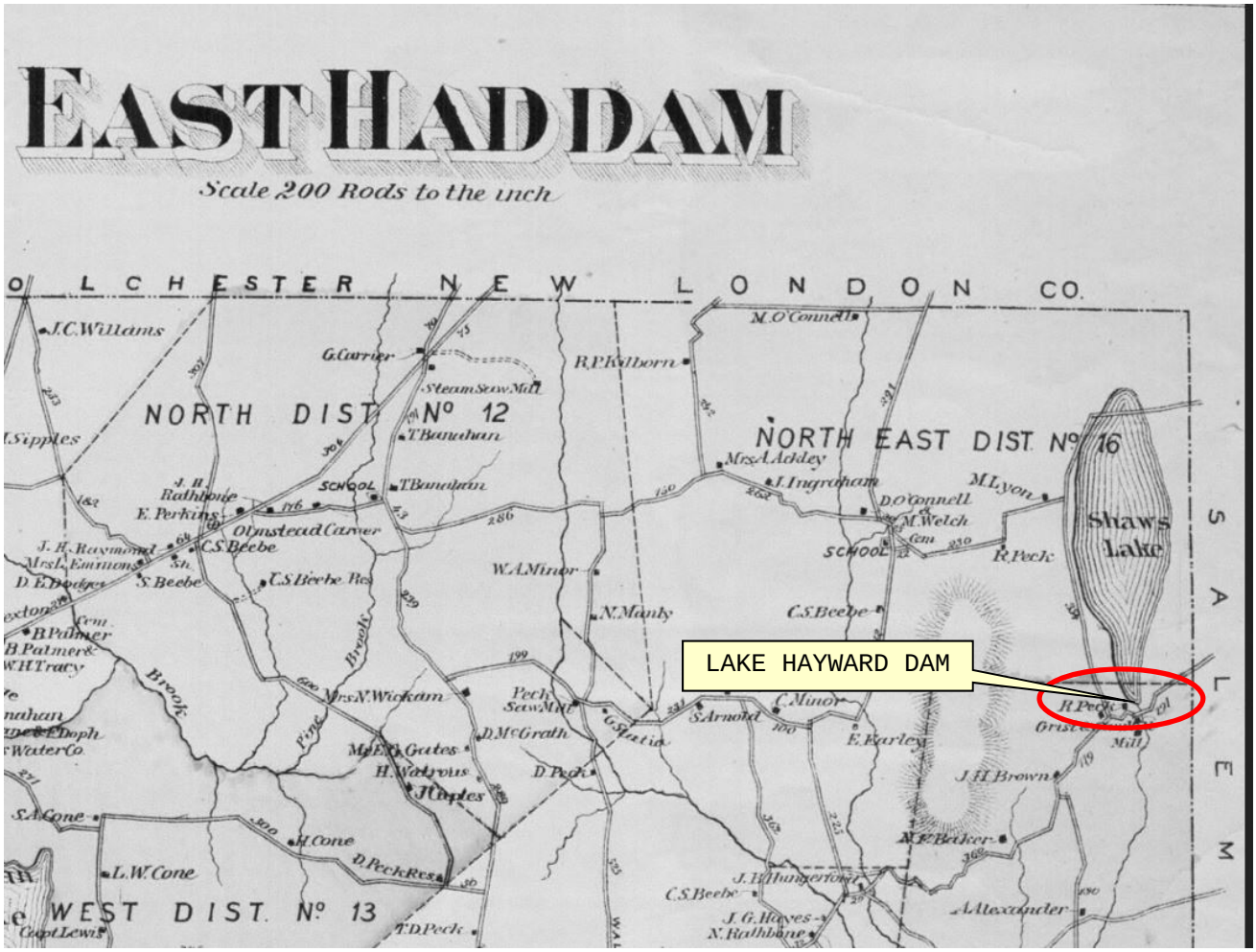
Other Reports & File Information – While no analytical reports were found on record, DEEP files were found to contain (1) an inspection report dated August 1988, (2) a letter from the director of the Water Resources Unit, Charles E. Berger, Jr., from January of 1989, and (3) an inspection report dated December 2012. Note that both inspections were conducted by DEEP Dam Safety Staff and recommendations included removal of trees and woody vegetation, repair of spillway training walls, maintaining the spillways and discharge channels free of debris, and monitoring seepage along the downstream toe of the masonry walls downstream of the road and road culverts.

Hydrologic and Hydraulic Analysis – There were no records of any hydrologic and hydraulic analyses found on record with either the DEEP's Dam Safety Section or the Association. As such, an analysis was performed to assess the dam's capacity to pass severe storm flows. Outflows from this site can be assessed under several flow regimes, notably the capacity of the weirs, the downstream channels between the weirs and the road, and lastly the capacity of the two road culvert crossings (consisting of two 36-inch concrete pipes for the right side primary spillway and one 36-inch concrete pipe for the left secondary or auxiliary spillway). It was found that the spillway weirs were the controlling factor and that taken together, they can safely pass both the 100-year and 200-year storms without overtopping. There would be a slight amount of overtopping for the 500-year storm, but its impact would be attenuated at the road due to the significantly higher flow capacities of both the spillway channels and the road culverts.

Stability Analysis – No stability analysis was found on record. Based on the size and slope of the embankments and the buttressing effect of the downstream road, both of which are stable structures, none was found to be necessary at this time.

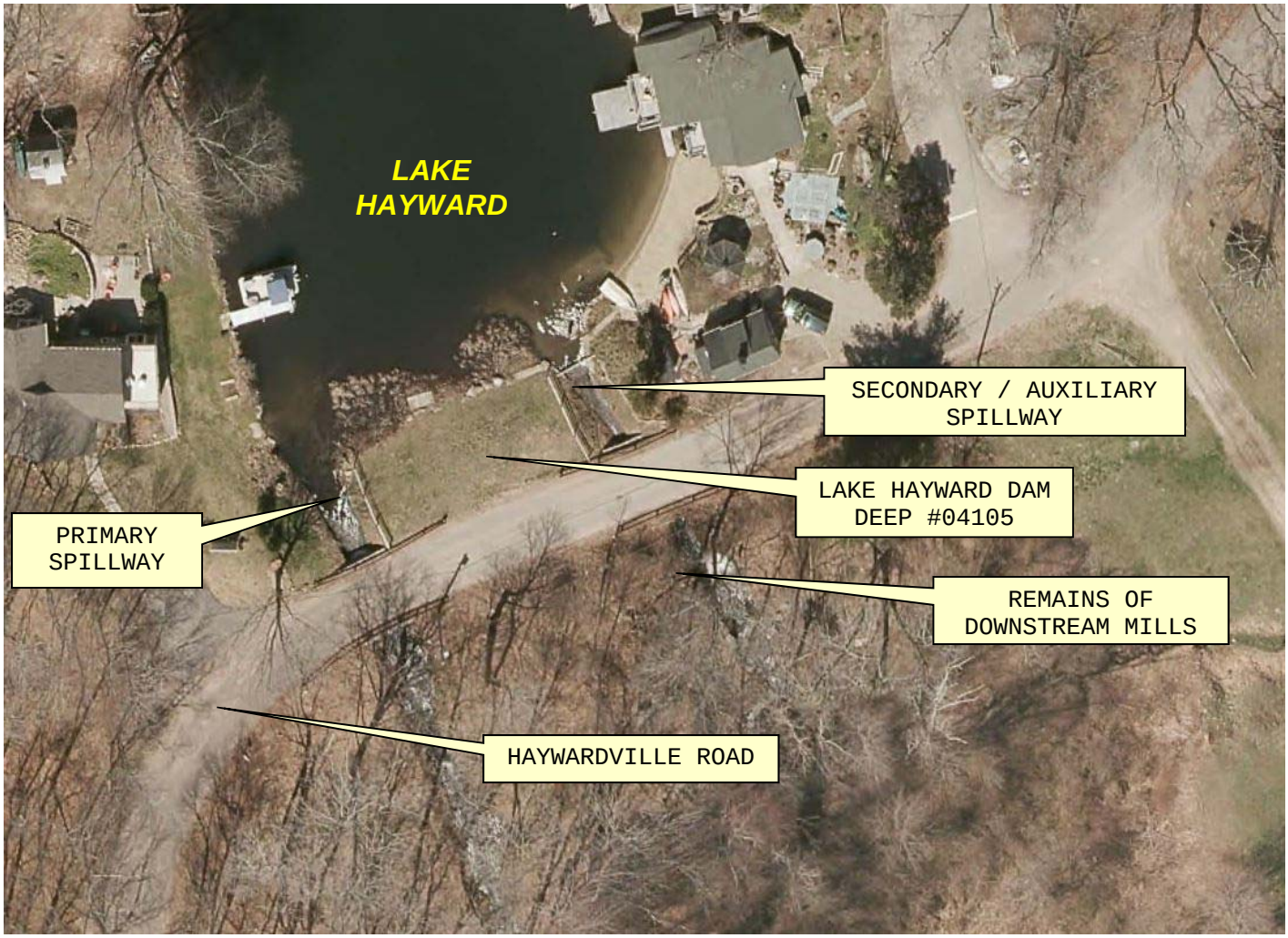
Emergency Plan – No record of an emergency plan was found on file for this dam. Based on its hazard rating, there is no regulatory requirement for one to be prepared at this time.

Diving Inspection – No record of a recent diving inspection was found for this dam. Because of the shallow nature of the upstream approach slopes and the lack of a low level outlet, one does not appear to be necessary for this structure.

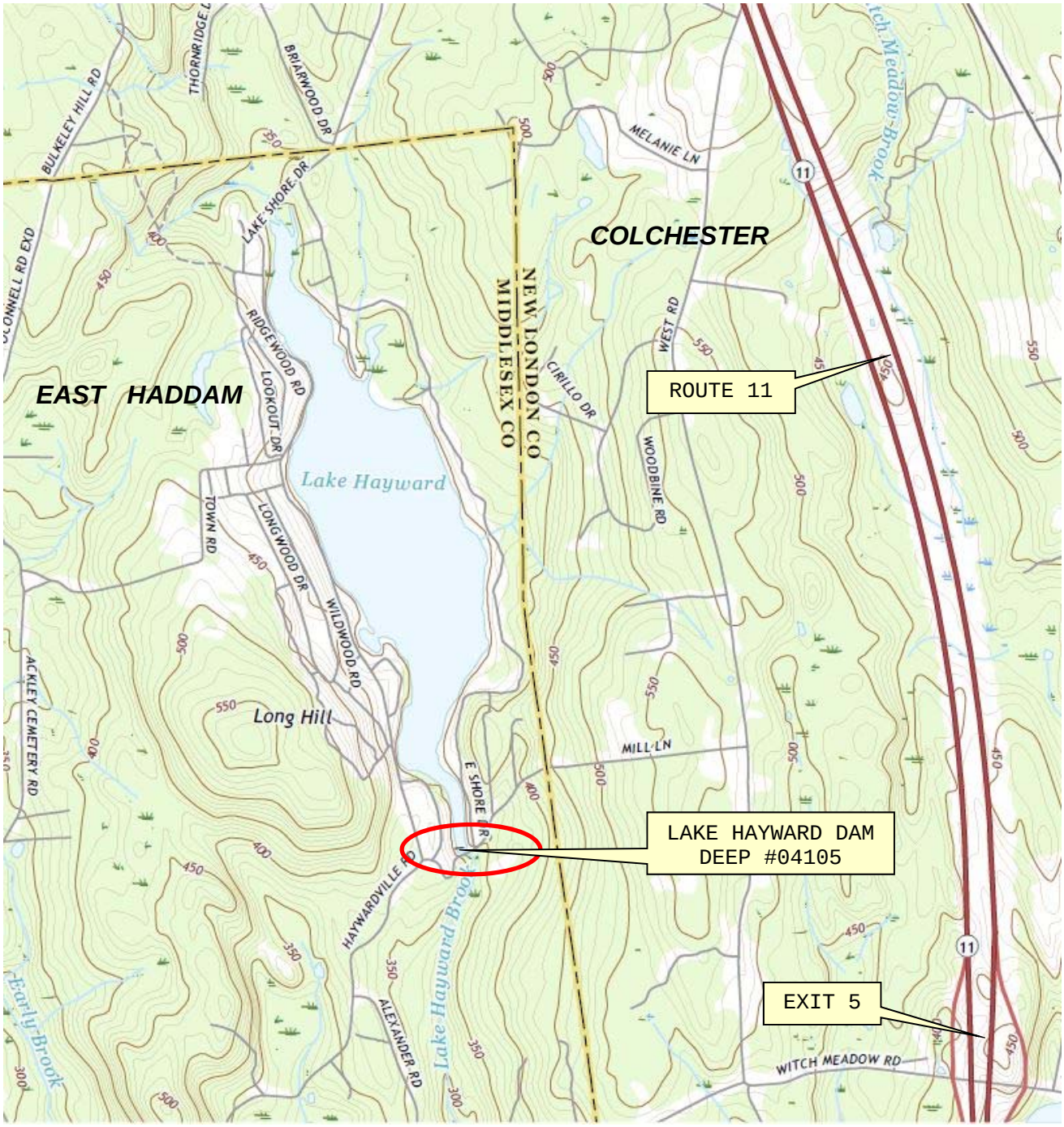


Lake Hayward, then called Shaw's Lake, as depicted on the 1868 Petersen Map of East Haddam.

Part III: Aerial Photo/Location Map



An aerial overview of Lake Hayward Dam and its vicinity. *(Source: CT ECO – 2016 Aerial Photos)*



LAKE HAYWARD DAM / USGS LOCATION MAP

Part IV: Dam/Embankment/Dike Information

Number of Dam/Embankments/Dikes: 1

Dam/Embankment/Dike Name: Lake Hayward Dam

General Description: Lake Hayward Dam is an earth embankment dam with two sloped chute type spillways, one being a primary spillway flowing on a regular basis and the second acting as an auxiliary spillway with near the same elevation as the primary. The earth embankment section lies directly adjacent to Haywardville Road, but is separated therefrom by two culverts, carrying outflow from each of the two spillways. The top of the dam is characterized by a maintained grass area. The spillway approaches are natural pond bottom with very shallow slopes of gravel and small cobbles, while the spillway chutes (discharge channels) are constructed with a concrete base and shallow stone masonry training walls for the primary (right side) spillway, and a concrete base with vegetated side slopes and some inlaid stone for the auxiliary (left side) spillway discharge. There are no low level outlets or other water level controls at this site.

General Condition: Fair to Satisfactory. Other than areas where vegetation was recently removed (see below), the embankments have a sound grass cover and are in good condition.

Concrete Condition: Not applicable.

Stone Masonry: There is a row of randomly set large flat stones situated along the upstream face of the central embankment section. The top of the stones is level with the surrounding ground, and they are in stable condition.

Settlement/Alignment/Movement: None observed.

Seepage/Foundation Drainage: None observed on the main embankment. Note that prior DEEP inspections pointed out minor seepage south and downstream of the road, in the vicinity of the old mill site retaining walls. Although these are not considered a part of the dam embankment, signs of seepage in these areas may indicate either groundwater flows through the embankment and road area or from side slope approaches on both sides of the downstream valley. In either case, it is prudent to check on any changes in this area when inspecting the dam.

Riprap: Not applicable.

Erosion/Burrows: None observed.

Vegetative Cover: The central section between the two spillways had a firm and stable grass cover. Brush and marshy vegetation was present along the upstream embankment face at the edge of the impoundment, and along the short right and left embankment sections outside of the two spillways during the first inspection, and was subsequently removed. These areas should henceforth have a grass cover established and regularly maintained.

Other: Note that the end of the downstream embankment slope blends in directly to the edge of Haywardville Road, which then serves to buttress the dam embankment. Flow from the two spillway discharge channels passes through two road culverts and south / downstream of the road are the remains of old mill sites, portions of which are stone masonry retaining walls running parallel to the road. The road is a Town-owned public thoroughfare and the old mill sites are on property other than that owned by the Association.

Photos/Graphics/Sketches: See Part XIII

Part V: Principal Spillway, Training Walls, Apron

Number of Principal Spillways: 2

Spillway Type: Broad crested concrete weir.

General Description: ***RIGHT SIDE PRIMARY SPILLWAY***.

General Condition: Stable; satisfactory.

Concrete Condition: Concrete is present along the base of the channel; it is weathered with minor cracking.

Stone Masonry: Both training walls are built of stone masonry. They are both low in height, after which they continue upward with earth embankment slopes on each side. The stone masonry is a mixture of mortared, unmortared and loosely laid random stonework. Although stable at the time of inspection, some areas appear susceptible to erosion in the event of significant storm flows.

Settlement / Alignment / Movement: None observed at the time of inspection, but the nature of the randomly laid stone areas indicates potential movement or misalignment due to high flows in the past.

Cracks: None observed.

Scouring / Undermining: Small open areas were observed along the base of the right side mortared training wall near the entrance to the right side pipe culvert. Along the left training wall junction with the left side of the downstream culvert headwall, heavy erosion had occurred along the drainage path emanating from the roadside to the entrance to the culvert.

Seepage / Foundation Drainage: None observed.

Other: This spillway leads to a double 36-inch reinforced concrete pipe culvert which is integrally tied in to the discharge channel, the base concrete of which is directly connected to the headwall.

Photos/Graphics/Sketches: See Part XIII

Spillway Type: Broad crested concrete weir.

General Description: ***LEFT SIDE SECONDARY SPILLWAY***.

General Condition: Stable; fair.

Concrete Condition: Fair. Although stable, the concrete is weathered, and several cracks are present (see below) along the apron face. The beginning of the left and right side training walls and the wing walls adjacent to the weir are short in length, and the height is not sufficient to prevent wall overtopping during severe storm events.

Stone Masonry: Although a few stones are visible within the side slopes of the channel, there is no evidence of any formal stone work indicating a wall or otherwise protected slope.

Settlement/Alignment/Movement: None observed.

Cracks: Several noted, including at the center of the upstream end of the weir, along the right training wall, and along the downstream portion of the discharge chute.

Scouring/Undermining: None observed.

Seepage/Foundation Drainage: None observed.

Other:

Photos/Graphics/Sketches: See Part XIII

Part VI: Auxiliary Spillway, Training Walls, Apron

Number of Auxiliary Spillways: 0

Auxiliary Spillway Type: Not applicable. There is no auxiliary or emergency spillway at this site.

Part VII: Downstream Channel

Number of Downstream Channels: 2

Channel Name / Watercourse Name: Hayward Brook (Right Side Channel)

General Description: From the crest of the primary (right side) spillway, the concrete lined channel continues downstream uninterrupted to the stone masonry headwall for the two outlet pipe culvert openings. Downstream of the culvert outlet, this becomes the primary channel since it's weir crest is set at a slightly lower elevation than that at the left side. This channel after converging with the outflow from the left side spillway discharge, forms a single channel as Hayward Brook approximately 250 feet downstream of the dam.

General Condition: Good.

Scouring: None observed.

Debris: None observed.

Riprap: Not applicable.

Other: The endwalls on both the upstream and downstream sides of the culvert carrying the flow under Haywardville Road are in satisfactory to good condition. The two pipes at this location are both 36" RCP; the interior of each is in good condition**.**

Photos/Graphics/Sketches: See Part XIII

Channel Name / Watercourse Name: Unnamed secondary channel (Left Side)

General Description: The channel from the crest of the spillway to the upstream end of the culvert is composed of concrete, narrower from the approximate midpoint of the downward slope, with earth side slopes. On the downstream side of the road, there is a short concrete apron at the downstream end of the pipe, followed by an approximate 6 – 9 ft. drop to a natural channel with a gravel and cobbles bottom. The drop over a stone masonry retaining wall appears to be part of the old mill which was once powered by flow from the lake. As noted

previously, the channel then flows through a heavily wooded area to join the main channel of Hayward Brook.

General Condition: Satisfactory.

Scouring: None observed.

Debris: None observed.

Riprap: Not applicable.

Other: The endwalls on both the upstream and downstream sides of the culvert pipe carrying flow under Haywardville Road are in satisfactory condition, requiring only minor maintenance with respect to cleaning and mortaring of joints. The pipe itself is a 36" RCP; the interior of which is in good condition**.**

Photos/Graphics/Sketches: See Part XIII

Part VIII: Intake Structure(s)

Number of Intake Structures: 0

Intake Structure Type: Not applicable. There is no intake structure at this site.

Part IX: Outlet Structure(s)

Number of Outlet Structures: 0

Outlet Structure Type: Not applicable. There is no outlet structure at this site.

Part X: Miscellaneous Features

Access – The dam is located immediately adjacent to Haywardville Road, and clear access is available therefrom.

Bridges – Not applicable. There are no bridges present at this site.

Safety – There is wooden rail fencing present on the interior side of each of the spillways, and metal beam guard rail running parallel to the road above the two discharge channels. These features are in stable condition.

Other – Property was briefly discussed in the prior portion of this report. As noted, the Property Owners' Association of Lake Hayward (POALH) owns the spillways, discharge channels and main embankment between the two. The side embankments butt directly against two lake side properties. The road and culverts are owned by the Town of East Haddam, and the old mill sites on the downstream or south side of the road are again an owner other than the (POALH).

Photos/Graphics/Sketches: See Part XIII

Part XI: Downstream Hazard Classification Reassessment

Downstream Hazard Classification:

Based on downstream conditions, there is no recommendation with regard to changing the current hazard rating of **"BB"**. No dwelling, commercial or industrial structure changes have been noted in close proximity to the downstream channel, which was inspected both through recent aerial photography and an actual onsite inspection of the area.

Part XII: Recommendations

1. **Removal of Vegetation** – Sections of the dam were recently cleared of brush and vegetative growth, including the left and right side embankment areas, the upstream shoreline area of the embankment between the two spillways, and other isolated areas. These should be maintained clear of such growth on a regular and consistent basis. A strong grass cover should be established and maintained in such areas. In general, all features of the dam and areas within 25 ft. thereof must be kept clear of the growth of trees and brush. Reasons for this include the ability to see and inspect embankment surfaces and to avoid the establishments of roots that could impact the stability of spillway and channel training walls.

Several small to medium size tree stumps were noted along embankment sections, from clearing as had been requested through previous DEEP inspections and correspondence. While none of these stumps present any current issues or problems, they should be monitored for any changes, particularly for signs of subsidence. Should such changes occur, an engineer should be consulted as to the proper disposition, fill materials and compaction, depending upon location on the embankments.

2. **Spillways & Training Walls** – Based on the hydrologic and hydraulic analysis, significant flows passing through both spillways will overtop the side training wall and shallow slope areas adjacent to the weir and channel sections. As previously pointed out, the weirs and adjacent slope areas are currently stable, but show signs of previous displacement of training wall masonry in close proximity to the weir sections. And, because this situation could lead to potential erosion of the side slopes and create debris blockage along the channels and culvert entrances, we would recommend that the weirs, the training walls and side channel slopes be reconstructed with concrete wall sections or a combination of walls and concrete filled riprap along the side slopes. This would prevent potential erosion of slopes, displacement of stones currently lining the areas adjacent to the weirs, and buildup of debris from the erosion at the culvert entrances. Temporary remedial measures would include filling in the cracks in the spillway channels and repairing displaced and undermined or eroded stone masonry.

3. **Culvert Headwalls** – Headwalls at the two road culverts, both upstream and downstream, are in satisfactory condition, but require cleaning and minor repairs of open joints and / or loose mortar. Vegetative growth emerging in some joints should be removed wherever found.

4. **Roadside Erosion at the Right Upstream Headwall** – The erosion shown in the photographs at this location was recently (i.e., subsequent to the inspection of the dam) repaired with the placement of asphalt in the eroded flow channel. While this is a temporary fix, it is not considered a long term solution. We would encourage the Town to install a catch basin near the low point area of the erosion problem just west of the headwall and then divert flow through a piping system to the downstream channel. This will avoid flow at the headwall altogether and avoid additional flow on the inlet side of the culvert. Long term repairs can then be combined with the recommended improvements to the discharge channel training walls noted in No. 2, above.

5. **Lake Dredging** – Because of the shallow nature of the lake directly upstream of the main embankment between the two spillways, there is a substantial amount of growth due to sunlight penetration to the shallow soils beneath the submerged water surface. To avoid this growth, which hampers the inspection of the embankment and may produce woody vegetation and root expansion into the embankment itself, it is recommended that the rooted plant growth be excavated to a depth of at least three feet upstream of the dam. This may be accomplished on a regular basis through the general permit process of the DEEP Dam Safety Section which allows maintenance dredging for such situations.

Due to the presence of a shallow upstream embankment wall and the nature of underlying soils, caution must be exercised during the dredging of this area. Little is known of the depth of this wall, which should not be undermined due to the excavation of the vegetative material. For this reason, any dredging should be completed under the auspices of an engineer.

Part XIII: Photographs/Graphics

Note: Several photos within this report are duplicates. This is made necessary by the general requirement of the current DEEP / Dam Safety inspection format which requires specific numbered views for certain portions of the dam. Hence, photos which depict more than one required feature will sometimes be shown more than once to satisfy these requirements. In addition, some of the views were not attainable due to the layout and current physical conditions at the dam site. The numbering sequence of the photos follows that of the DEEP form.

Photo 1a – An overview of Lake Hayward Dam from the left upstream side, with the left side spillway in the foreground.

Photo 1b – An overview of Lake Hayward Dam from the right upstream side.

Photo 2 – An overview of the dam as seen from the road, to the right and downstream of the structure.

Photo 3a – The right upstream embankment face, prior to removal of vegetation completed between the two inspection dates.

Photo 3b – Looking eastward over the upstream embankment from the right side, during the first inspection.

Photo 3c – Looking eastward over the upstream embankment from the right side, with vegetation removed, during the second inspection.

Photo 3d – The junction of the upstream embankment with the right side spillway.

Photo 4a – The upstream embankment as seen from the left side, prior to clearing of vegetation.

Photo 4b – The short upstream embankment section to the left of the left side spillway. Care must be taken to establish a good grass cover here.

Photo 4c – The left side upstream embankment section, adjacent to the left side spillway.

Photo 4d – An overview of the upstream embankment as seen from the left side.

Photo 5a – The embankment crest as seen from the right side spillway area.

Photo 5b – The right end of the embankment crest.

Photo 6a – The crest of the embankment as seen from the left side.

Photo 6b – Looking through the fence for an overview of the embankment crest as seen from the left abutment.

Photo 7a – The downstream embankment face, as seen from the right side discharge culvert.

Photo 7b – Another view of the downstream side of the embankment, showing the transition to the adjacent road.

Photo 8a – An overview of the downstream embankment face, as seen from the left side along Haywardville Road.

Photo 8b – The left side downstream embankment face (to the left of the left side spillway), prior to the removal of brush and vegetation.

Photo 8c – Another view of the downstream embankment taken from the left side, with the transition to the left side discharge channel in the foreground and with tall vegetation removed.

Photo 9a – A side-on view of the left side spillway and its vicinity.

Photo 9b – An overview of the left side spillway and adjacent training walls.

Photo 9c – Looking downstream at the left side spillway and its environs.

Photo 9d – The right side spillway as seen from the upstream side (partially obscured by flow).

Photo 10a – An overview of the left side spillway and its discharge chute.

Photo 10b – The left side spillway, as seen from its discharge channel.

Photo 10c – The right side spillway as seen from the downstream side.

Photo 11a – The right side channel training wall along the discharge channel emanating from the right side spillway.

Photo 11b – The upper portion of the left side channel wall, again for the right side discharge channel.

Photo 11c – The lower section of the left side channel wall for the right side discharge channel.

Photo 12a – The left side training wall for the left side spillway.

Photo 12b – The right side training wall for the left side spillway.

Photo 13a – The left side spillway weir.

Photo 13b – The right side spillway weir.

Photo 14 – Not applicable. There are no stilling basins at this site.

Photo 15a – An overview of the left side discharge channel as seen from the upstream side.

Photo 15b – An overview of the right side discharge channel as seen from the downstream side.

Photo 15c – An overview of the right side discharge channel as seen from the upstream side, following the removal of brush from the right side embankment. Note the two barrel culvert at the downstream end of the channel.

Photo 15d – An overview of the right side downstream channel, as seen from the south side of the adjacent road.

Photo 15e – A close up view of the right side discharge channel.

Photo 15f – The left side discharge channel stretching away beyond the apron at the base of the outlet pipe. At the upper center of the photo is a retaining wall from the old mill site, with a drop to the base channel of about 8 – 9 feet.

Photos 16, 17 & 18 – Not applicable. There are no low level outlet controls, operators, or gate structures located at this dam.

Photo 19a – The upstream end of the right side outlet pipes and headwall.

Photo 19b – The upstream end of the left side outlet pipe and headwall.

Photo 19c – The downstream end of the right side outlet pipes. The endwall is in good condition.

Photo 19d – The interior of the left of the twin right side outlet pipes, in good condition and representative of both pipes.

Photo 19e – The downstream end of the left side outlet pipe. This endwall is also in good condition.

Photo 19f – A close up view of the downstream face of the left side discharge pipe.

Photo 19g – The interior of the left side outlet pipe, in similarly good condition to the two right side pipes.

Photo 19h – A close up view of the upstream face of the right side discharge pipes.

Photo 20a – Lake Hayward, as seen looking upstream from the left spillway.

Photo 20b – Looking upstream at Lake Hayward from the center of the embankment crest.

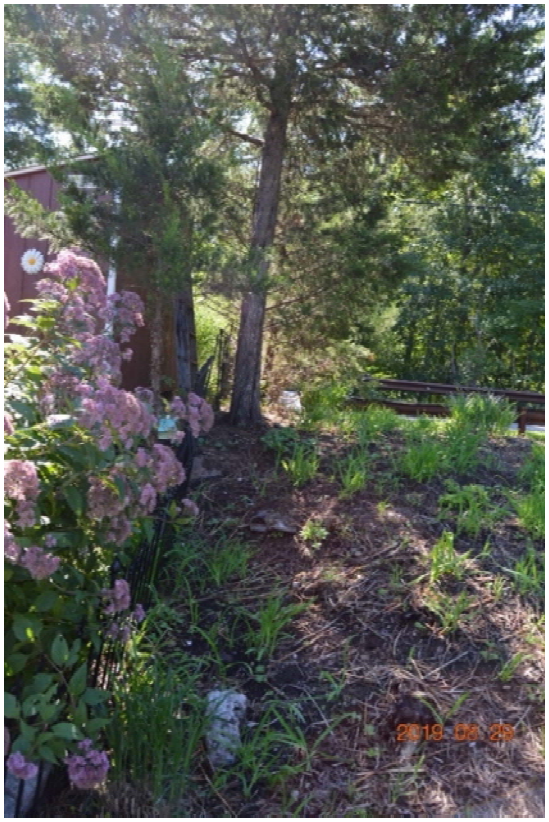


Photo 21a – The upstream side of the left embankment, most of which was cleared of vegetation along the slopes after the first inspection. Dense and woody vegetative growth should continue to be removed, and a sound grass cover established and maintained.

Photo 21b – The embankment along the right side of the right discharge channel. This area was recently cleared of brush and vegetative growth, and should have a grass cover established and maintained. The tree stump (from previous clearing) must be monitored and any depression resulting therefrom filled in as required if subsidence should occur. In the event of reconstruction of the training wall area, the stump and roots should be removed at the same time. The training walls in this area have deficiencies that require improvements and repairs.

Photo 21c – An area of washed out soil, caused by runoff from Haywardville Road, running around the right side discharge culvert endwall at the time of inspection. This area was subsequently repaired (see below).

Photo 21d – The same area as the previous photo after placement of surficial asphalt in the eroded area. See the long term recommendations in the preceding sections.

Photo 21e – Looking westward toward the source of the erosion shown in the prior two photos. There is no curb or other implement to direct drainage flowing downhill along the road away from the grassed area at the low point near the endwall.

Photo 21f – The lower portion of the left discharge channel. Side slope areas where brush growth was recently cut must be kept cleared with the reestablishment of a grass cover to prevent erosion during high flow situations. (See Section XII for additional long term recommendations.)

Part XIV: Sketches

This completed report must include a sketch of the plan view of the dam to aid in the description of its condition. Refer to the instructions for more detail and an example.

See attached site plans / sketches.

LAKE HAYWARD

HAYWARDVILLE ROAD

RIGHT SIDE SPILLWAY (CREST ELEV. = 348.65')

LEFT SIDE SPILLWAY (CREST ELEV. = 348.8')

36" RCP INV=346.24

36" RCP INV=346.11

36" RCP INV=342.98

36" RCP INV=345.64

36" RCP INV=345.81

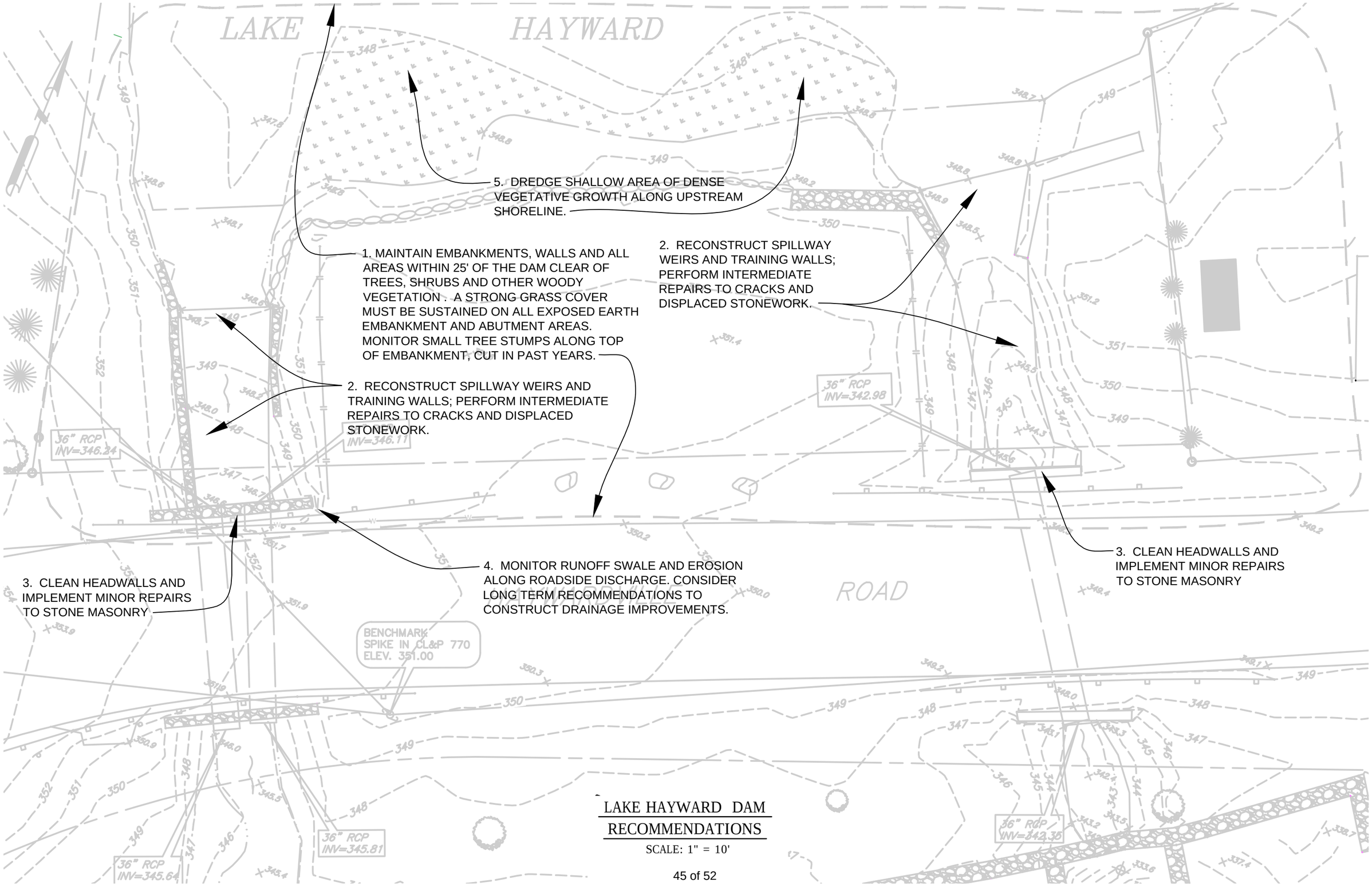
36" RCP INV=342.35

BENCHMARK SPIKE IN CL&P 770 ELEV. 351.00

NOTE: THE UNDERLYING SURVEY FOR THIS PLAN WAS PREPARED BY THE BONGIOVANNI GROUP ON A PLAN ENTITLED "MAP SHOWING A PORTION OF PROPERTY OF LAKE HAYWARD PROPERTY OWNERS ASSOCIATION, HAYWARDVILLE ROAD, EAST HADDAM, CONNECTICUT", DATED 09-04-2019.

LAKE HAYWARD DAM
EXISTING CONDITIONS

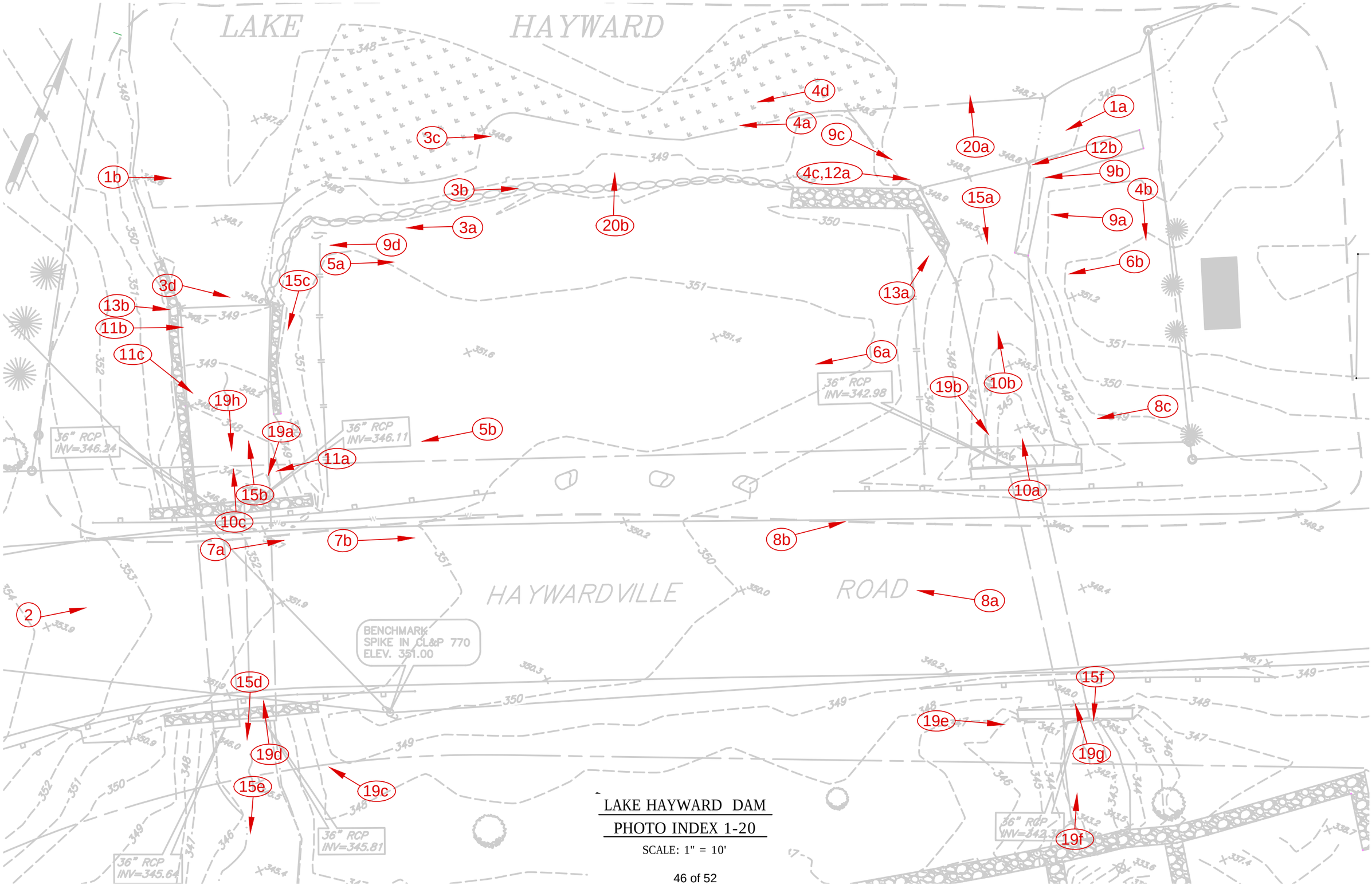
SCALE: 1" = 10'



LAKE HAYWARD DAM

RECOMMENDATIONS

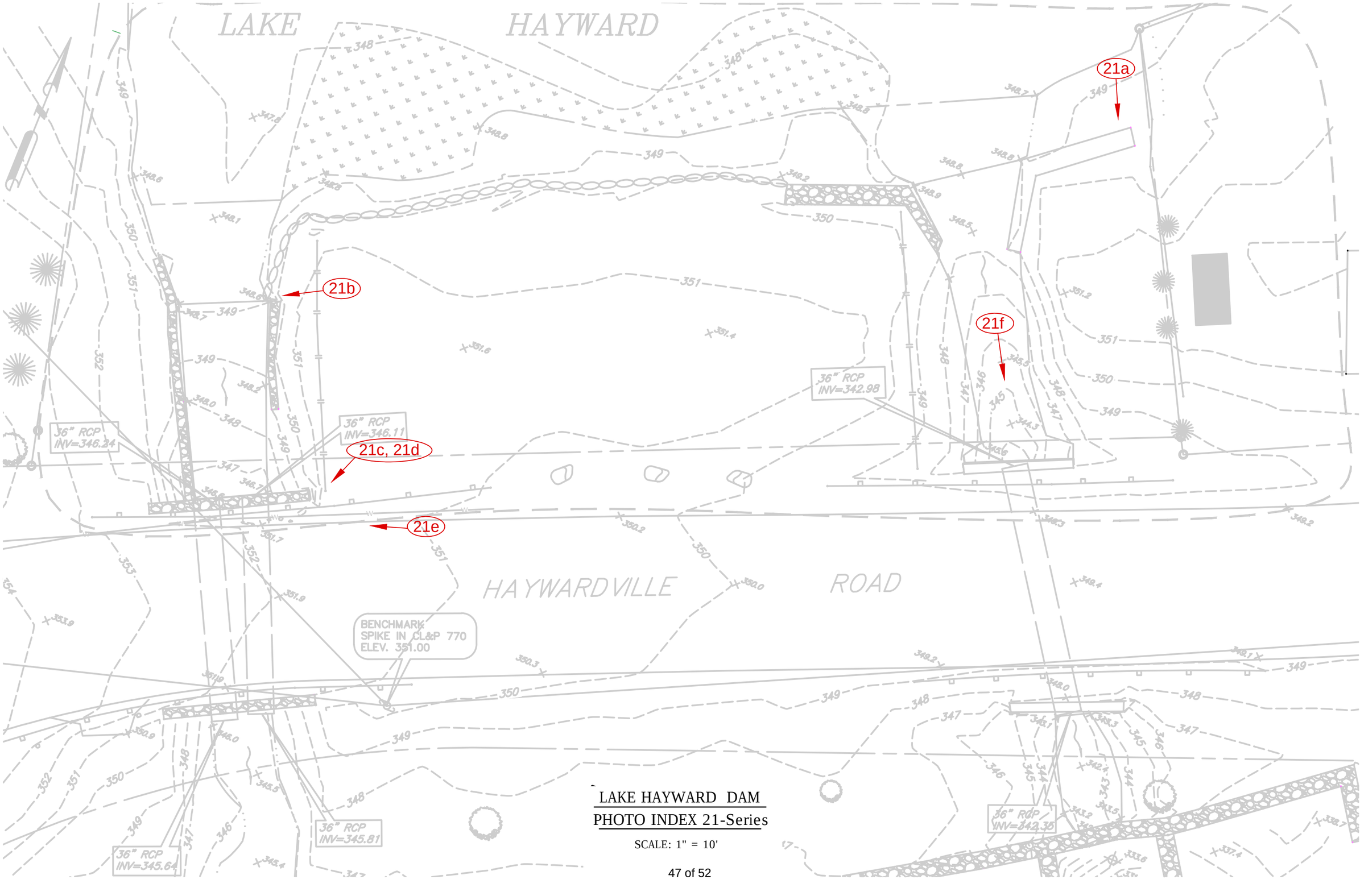
SCALE: 1" = 10'



LAKE HAYWARD DAM

PHOTO INDEX 1-20

SCALE: 1" = 10'



LAKE HAYWARD DAM

PHOTO INDEX 21-Series

SCALE: 1" = 10'

Part XV: Professional Engineer Certification

The following certification must be signed by a Professional Engineer

"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."

Signature of Professional Engineer		Date
Karl F. Acimovic, P.E.		**13032**
Printed Name of Professional Engineer	Title	CT P.E. Number

Karl F. Acimovic, P.E. & L.S., Consulting Engineer
Name of Firm

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
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.

Appendix C - PHOTOGRAPH INSTRUCTIONS

All photographs shall be color photographs. Photographs shall be clear and include scale references where applicable. Photographs shall include, but not be limited to the following:

1. Overview of dam(s)/dike(s) from upstream

2. Overview of dam(s)/dike(s) from downstream

3. Overview of upstream face from right abutment

4. Overview of upstream face from left abutment

5. Overview of dam crest from right abutment

6. Overview of dam crest from left abutment

7. Overview of downstream face from right abutment

8. Overview of downstream face from left abutment

9. Overview of spillway(s) from upstream

10. Overview of spillway(s) from downstream (tailrace or channel area)

11. Overview of right training wall(s)

12. Overview of left training wall(s)

13. Overview of weir

14. Overview of stilling basin

15. Overview of downstream channel

16. Overview of gatehouse exterior

17. Overview of gatehouse interior

18. Overview of operators

19. Outlet inlets and discharge points

20. Overview of reservoir area

21. Areas of specific deficiencies (e.g., cracks, erosion, displacement, seeps, deterioration, etc.)