INSPECTION REPORT

CEDAR LAKE DAM
CT DEEP #16603

NORTH STREET
MAD RIVER
WOLCOTT, CONNECTICUT

PREPARED FOR:

CEDAR LAKE OWNERS ASSOCIATION

DECEMBER 2019

Prepared by:

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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:	**Cedar Lake Dam**	Inspection Date(s):	**April 22, 2019 November 25, 2019**
Alternate Dam Name(s):	**Cedar Swamp Pond Dam**	CT Dam ID #:	**16603**
Location (Municipality):	**Wolcott**	Temperature / Weather:	**Cloudy, Windy, 64ºF (04-22-2019) Partly Cloudy, 50ºF (11-25-2019)**
Registered?: Yes or No If yes, provide the 9 digit registration number found on the notification letter.	**Yes, Registered 07-27-2015 (No Registration Number)**	Pool Level: See Instructions	**2" Above Conc. Weir & 3½" - 4" Above Weir Boards in Slot (04-22-2019) ~3' – 4' Below Spillway Crest Elev. (11-25-19)**
Emergency Action Plan?: Yes or No If Yes, see instructions	**No (See Other Information)**	Impoundment Use: use options listed in instructions	**Conservation, Recreation, Aesthetics**
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: **Satisfactory**			

Persons present at the inspection *(select the tab button in the last cell to the right to create another row)*		
Name	**Title/Position**	**Representing**
Karl F. Acimovic, P.E.	**Consulting Engineer**	**Inspector**

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: **Cedar Lake Owners Association**

Contact: **Matthew Smith**

Mailing Address: **63 Avery Avenue**

City/Town: **Wolcott** State: **CT** Zip Code: **06716**

Phone: (**860) 919-9554** ext.:

Emergency Phone: **(860) 919-9554**

*E-mail: **Matthew.Smith@yarde.com**

Part II: General Dam Information

General Description: Cedar Lake Dam consists of an earth embankment approximately 300 feet long with a stone masonry and concrete drop inlet spillway near its left side. The spillway has a steel trash rack covering its top opening, and a weir board slot at its inlet. Flow passing over the spillway inlet is carried downstream by a 4' wide x 3.5' high stone masonry discharge tunnel with a cementitious coating through the embankment and exits near the left end of the downstream toe. The crest of the dam carries North Road along its full length; there is a concrete retaining wall running along the road on the upstream side. The downstream embankment slope is largely faced with intermediate-sized ungrouted riprap. There is a brick gatehouse in the approximate center of the upstream embankment, through which passes a 16" low level outlet pipe, controlled by a gate valve. The downstream end of this pipe exits (as a PVC pipe) near the center of the downstream embankment through a stone masonry discharge chamber with a concrete top and stone masonry endwall.

Hazard Classification:	B	**Dam Height (ft):**	15 ft.
Dam Length (ft):	300 ft.	**Spillway Length (ft):**	14 ft.
Spillway Type:	Drop Inlet Semi-Circular Concrete Weir	**Normal Freeboard (ft):**	2.0 ft.
Drainage Area (square miles):	0.90 sq. mi.	**Impoundment Area (at principal spillway crest, in acres):**	136 ac.
Watercourse(s):	Mad River		

OTHER INFORMATION:

History – Historical mapping indicates that Cedar Lake Dam was originally constructed at some time between 1874 and 1893 for use in downstream manufacturing operations, impounding the area where Cedar Swamp had previously existed. The dam was purchased in the early 1900s by the Mad River Company for use in their mill operations downstream along the Mad River in Waterbury. In 1907 the dam was raised and improvements made to the outlet structure and embankment. The dam and lake were purchased by the Cedar Lake Owners Association in 1986. The lake – and since its purchase, the dam – have been maintained by this organization (and its predecessor organization by agreement with the Mad River Co.) since the 1960s for conservation and the recreational use of its members living along the lake's shore. Improvements to the dam were performed in 1988 by D&V Morin (general contractor) per a design by Heynen Engineers, which included repairs to concrete portions of the structure and improvements to the downstream riprap slope. Further work was performed in 1993 by D'Amato Construction, under design by this office, to install a cutoff wall on the upstream side of the spillway, repair the floor of the outlet box culvert and perform other miscellaneous repairs along the upstream side of the dam.

Phase I Report – No Phase I Report was found in the records of the DEEP Dam Safety Section.

Other Reports & File Information – Inspection Reports were prepared for this dam in May 2006 and January 2012 by Karl Acimovic, P.E. and subsequently submitted to DEEP. Earlier items include plans prepared by this office for a proposed underdrain installation in 1996 and an as-built drawing showing the repairs made in 1988. Plans are also on file from 2011 and 2013 showing proposed improvements to the road and dam, prepared on behalf of the Town of Wolcott (which owns and maintains North Street, running across the crest of the dam). To date, these proposals have not come to fruition.

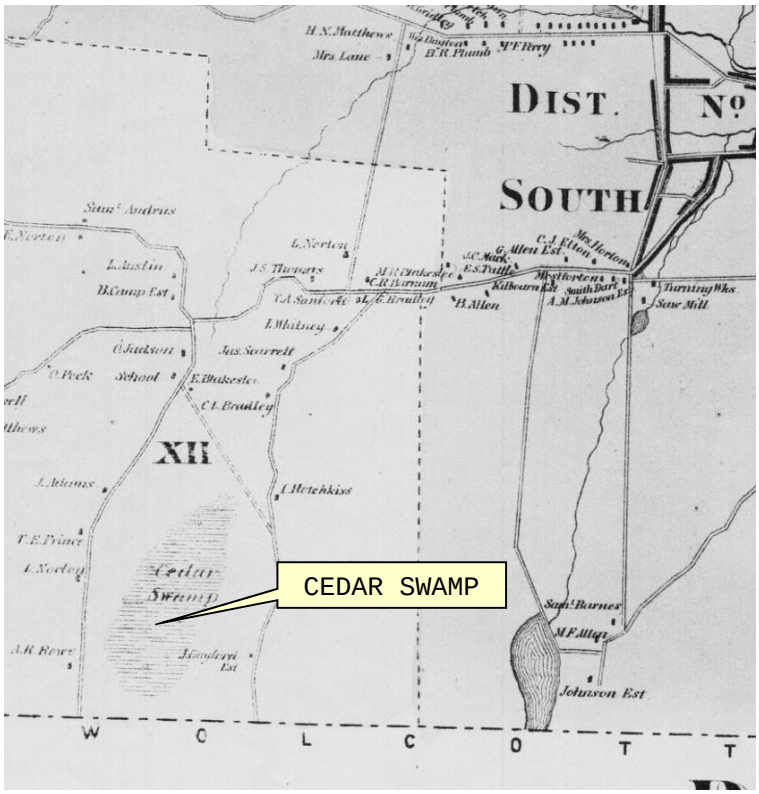
Hydrologic and Hydraulic Analysis – An analysis prepared by HRP Associates in 2014 for the Town of Wolcott indicated that the 100-year storm would produce a runoff of 751 cfs, passing through the spillway with approximately 0.3 feet of freeboard. During the 500-year storm event, it noted that the dam and roadway would be overtopped, noting a flow figure of 1,080 cfs, but providing no specific depth of overtopping.

Stability Analysis – No stability analysis was found on record for this dam and, based on its current and past condition, one does not appear to be necessary at this time. If, however, plans by the Town of Wolcott move forward to reconstruct the roadway, extend the downstream slope and outlet conduits, and redirect both surface and subsurface drainage, then we would recommend a new analysis for any reconstructive work. Note that there

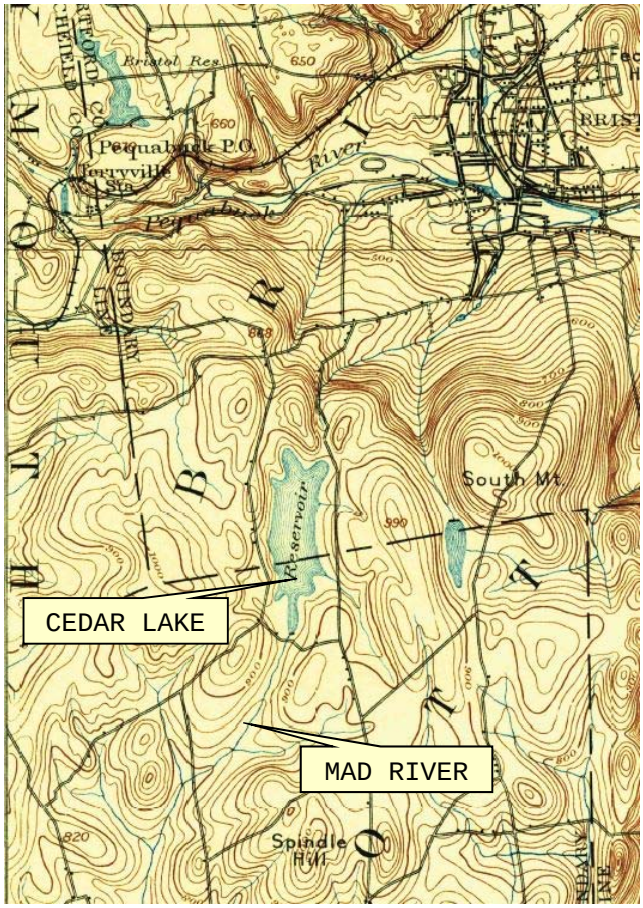
are no known records related to the original construction and makeup of the interior of the dam embankment.

Emergency Plan – There is no emergency plan currently in place for Cedar Lake Dam. An Emergency Action Plan is currently under preparation by this office, to be completed in accordance with the latest DEEP Dam Safety requirements and guidelines issued in 2016.

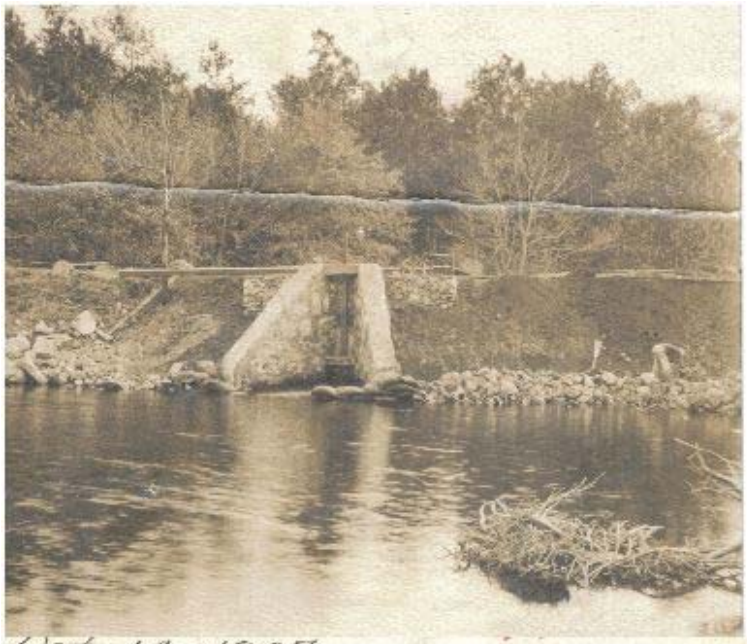
Diving Inspection – There was no indication that any recent diving inspection had been carried out for this dam. As detailed below in Part XII, one is recommended to check the condition of the submerged upstream intake.

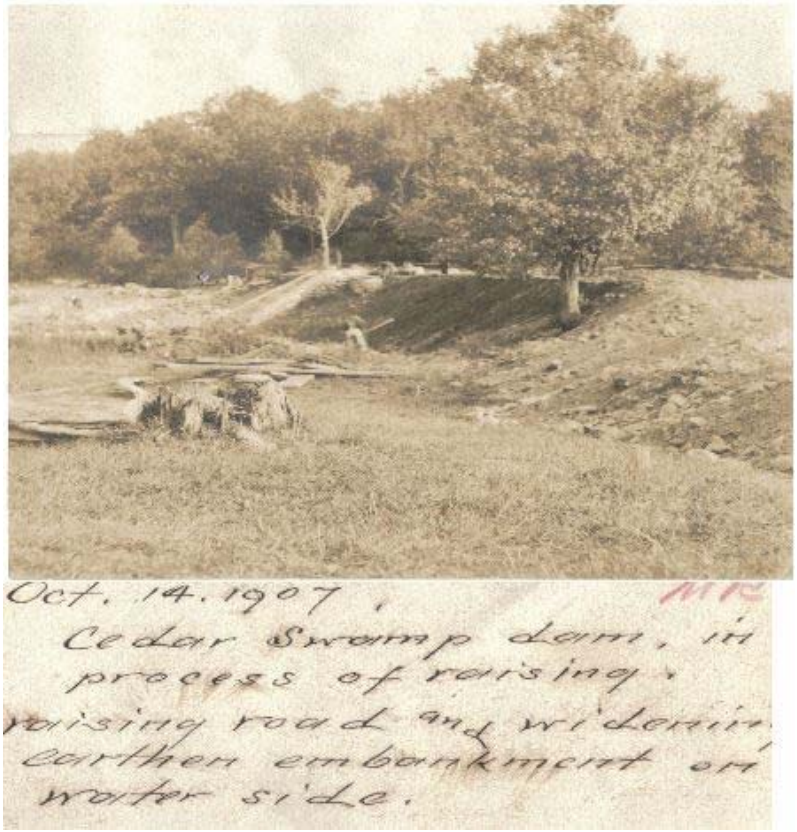


A portion of the 1874 Petersen map for Bristol, showing Cedar Swamp prior to the construction of the dam



USGS topographic map (Meriden quadrangle) from 1893, showing Cedar Lake present in near its current form.



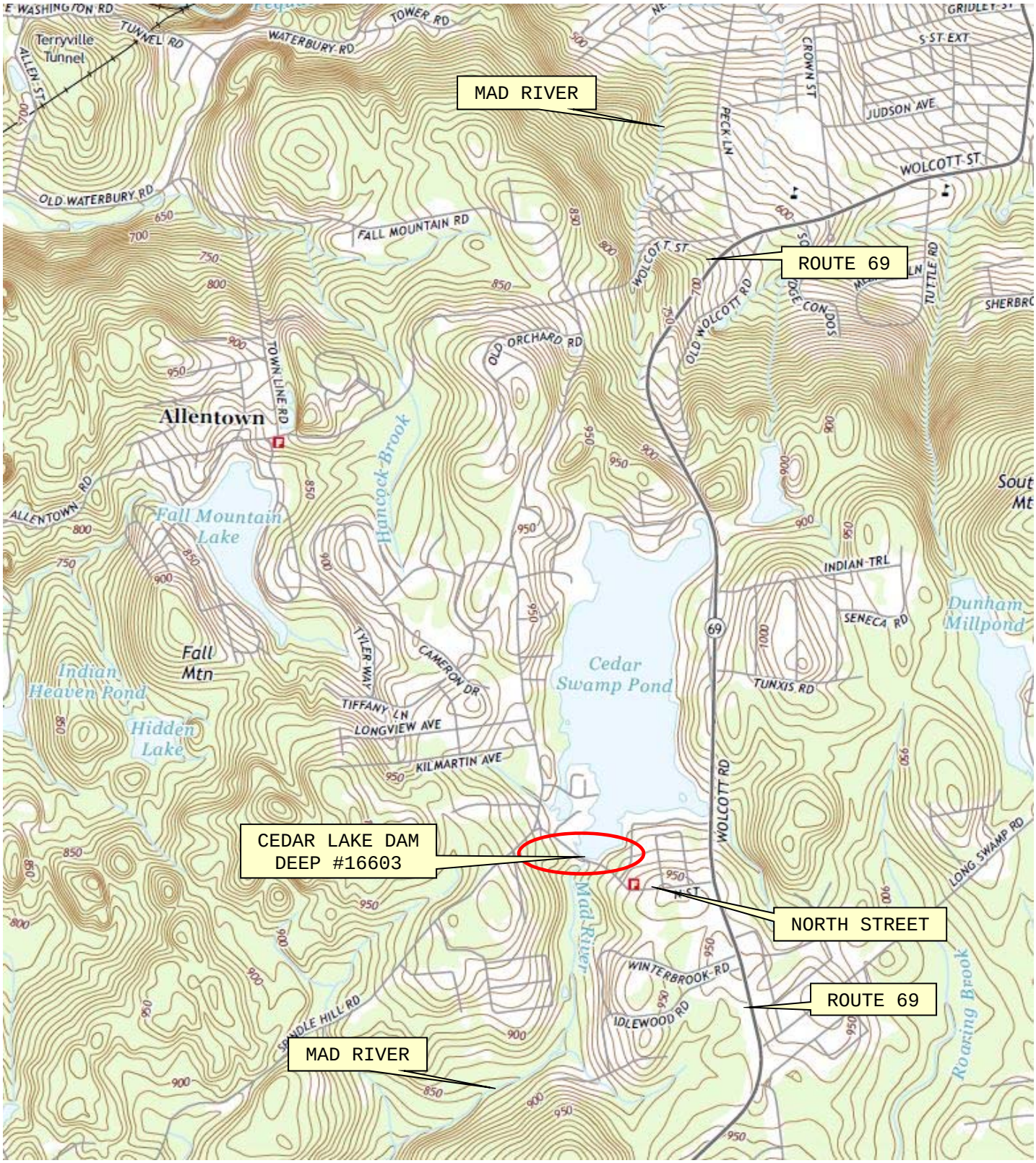


Photos taken by Robert A. Cairns, C.E., during the reconstruction of Cedar Lake Dam in 1907.

Part III: Aerial Photo/Location Map

An aerial view looking southward over Cedar Lake Dam. *(Source: Bing Maps)*

Another aerial view of Cedar Lake Dam, looking eastward from the right side of the dam. *(Source: Bing Maps)*



CEDAR LAKE DAM / LOCATION MAP

Part IV: Dam / Embankment Information

Number of Dam / Embankments: 1

Dam / Embankment / Dike Name: Cedar Lake Dam

General Description: Cedar Lake Dam consists of an earth embankment approximately 300 feet long with a stone masonry and concrete drop inlet spillway near its left side. The spillway has a steel trash rack covering its top opening, and a weir board slot at its inlet. Flow passing over the spillway inlet is carried downstream by a 4' wide x 3.5' high stone masonry discharge tunnel with a cementitious coating through the embankment and exits near the left end of the downstream toe. The crest of the dam carries North Road along its full length; there is a concrete retaining wall running along the road on the upstream side. The downstream embankment slope is largely faced with intermediate-sized ungrouted riprap. There is a brick gatehouse in the approximate center of the upstream embankment, through which passes the 16" low level outlet pipe, controlled by a gate valve. The downstream end of this pipe exits (as a PVC pipe) near the center of the downstream embankment through a stone masonry discharge chamber with a concrete top and stone masonry endwall.

General Condition: The embankment is in generally good condition.

Concrete Condition: The upstream embankment wall was in good condition above the water line on the first date of inspection. Recommendations for maintenance made in the last inspection report, namely to repair small cracks and weathered joints near the spillway and to monitor the same in other areas, remain pertinent. The wall was again checked during the fall drawdown period to inspect lower portions of the upstream concrete. It was noted at that time that, in addition to minor cracking (particularly near curb cut leak-offs to the right and left of the gatehouse), most all of the vertical expansion joints showed signs of deteriorated joint filler and joint sealant. These joints and any cracks in the concrete surface should be repaired as soon as possible, weather conditions permitting, and then monitored during regular inspections.

Stone Masonry: Although there are currently no visible sections of stone masonry along the upstream face of the embankment (except at the spillway and gatehouse) old photos indicate that there is a possibility that some of the concrete sections may have been set over underlying stone masonry walls, particularly near the spillway and gatehouse. Should these be encountered during repairs on the concrete wall sections, the Engineer should be notified to document such occurrences.

Settlement / Alignment/Movement: There were surficial signs of minor sloughing of surface stone along the downstream embankment just to the left of the low level outlet, some of which appears to have been caused by use of the area just behind the guardrails as a footpath. The area is stable at this time and only monitoring is required at present.

Seepage / Foundation Drainage: The situation has not changed significantly since the last inspection in 2012. While there are no new issues, the right downstream embankment toe area remains regularly saturated during both drawdown and high water level periods. The area beyond the toe is characterized by wetland conditions in some areas near the downstream channel. The installation of footing drains in this area (first proposed in 1993, but not constructed) continues to be recommended (see further below, Part XII). There was minor seepage noted emanating from the riprap adjacent to the spillway tunnel end.

Riprap: Generally in good condition on the downstream side. There is some growth of phragmite in the low level outlet discharge channel, which should be removed.

Erosion / Burrows: None observed.

Vegetative Cover: The grass areas along the downstream slope and toe are in good condition, with the exception of vegetative growth previously noted. The situation of the two far ends of the upstream embankment is similar, except that the growth of dense weeds at the right upstream (west) end of the dam should be cleared.

Other: The gabions along the base of the downstream embankment are in good condition, with no signs of significant corrosion along the wire cages.

North Street, which forms the crest of the dam embankment is an asphalt paved road. The surface was in good condition on the date of inspection.

Photos / Graphics / Sketches: See Photo Report in Section XIII.

Part V: Principal Spillway, Training Walls, Apron

Number of Principal Spillways: 1

Spillway Type: Broad crested stone masonry and concrete weir.

General Description: The spillway is constructed of mortared stone masonry capped with concrete, and the training and abutment walls are constructed of mortared stone masonry. The weir is a half-moon shaped broad crested section 14 feet in circumferential length, which includes a 2-foot slot for weir boards to a 2-foot depth below the main crest. Note that an upstream cutoff wall was constructed on the upstream side of this spillway in 1993 to address seepage issues through the downstream masonry wall.

General Condition: Generally good, but there are some minor issues with the concrete and stone masonry (see below). Water was overflowing the spillway on the date of inspection. Some issues were noted during a 2016 inspection.

Concrete Condition: Weathered but stable. As with the upstream wall, this section was re-checked during a low flow period. At that time, some cracked areas were noted, particularly toward the two ends, where the spillway surface slab connects to the upstream embankment wall.

Stone Masonry: Currently stable along the downstream face of the spillway, but there are some minor voids that should be chinked and mortared to prevent future deterioration. This was noted during a low flow period in 2016 at a time when no water was spilling across the weir.

Settlement / Alignment / Movement: None observed.

Cracks: No significant cracks, other than those mentioned above, were observed.

Scouring / Undermining: No issues noted (see also Stone Masonry, above).

Seepage / Foundation Drainage: None observed at the spillway during the current inspection. Inspections during low flow in 2016 and again in the fall of 2019 found minor seepage at the base of the downstream wall, which needed only to be monitored at that time. See Part VII, below for the spillway discharge tunnel.

Other: There is a substantial amount of fencing and trash racks enclosing this structure. It is currently in good structural condition, but does show signs of surface corrosion which should be monitored for weak areas in the future. During the low water level inspection during the fall of 2019 it was also noted that some of the support posts were severely corroded at their base junction to the concrete surfaces.

Photos / Graphics / Sketches: See Photo Report in Section XIII.

Part VI: Auxiliary Spillway, Training Walls, Apron

Number of Auxiliary Spillways: 0

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

Part VII: Downstream Channel

Number of Downstream Channels: 2

Channel Name / Watercourse Name: Mad River

General Description: Flow over the spillway drops onto a concrete splash pad at its base, then flows through the embankment via the 4' W x 3.5' H stone masonry tunnel lined with cementitious coating on its sides and along parts of the concrete roof. Flow then proceeds onto a concrete splash pad (with ungrouted riprap along the channel side slopes), before turning rightward and running downstream parallel to the dam via a natural ground channel.

General Condition: The channel downstream of the dam is in good condition. The tunnel is in stable condition, but issues noted in previous reports continue to persist, including voids between large stones spanning the roof of the structure near its upper end and cracks and bulging in the cementitious lining along the roof nearer its downstream end.

Scouring: None observed. (Note that the interior base floor of the tunnel section had been repaired in 1993.)

Debris: None observed.

Riprap: The riprap subsequent to the discharge tunnel outlet is currently in good condition.

Other: The tunnel section of the downstream channel passes beneath a heavily travelled roadway carrying both cars and heavy trucks.

Photos / Graphics / Sketches: See Photo Report in Section XIII.

Channel Name / Watercourse Name: The discharge channel from the low level outlet in the approximate center of the downstream embankment represents the beginning of the Mad River.

General Description: There is a brick gatehouse in the approximate center of the upstream embankment, through which passes a 16" low level outlet pipe, controlled by a gate valve. The downstream end of this pipe exits (as a PVC pipe) near the center of the downstream embankment through a stone masonry discharge chamber with a concrete top and stone masonry endwall. Flow discharges onto a concrete splash pad, then proceeds downstream via a natural ground channel, lined on its sides with ungrouted intermediate riprap, approximately 45 feet before merging with the spillway discharge channel. The pipe is encased in concrete and surrounded by a stone masonry endwall with a concrete top. There are stone gabions on either side of the endwall for downstream embankment support.

General Condition: Good.

Scouring: No significant scouring was noted.

Debris: None observed

Riprap: Currently in stable condition on both sides of the channel.

Other:

Photos / Graphics/Sketches: See Photo Report in Section XIII.

Part VIII: Intake Structure

Number of Intake Structures: 1

Intake Structure Type: Gate house with water control valve (see below).

General Description: The intake structure at Cedar Lake Dam consists of a brick gate house, an upstream intake channel constructed of stone masonry and concrete, and a control valve / gate with an operating wheel hoisting mechanism situated within the gatehouse. Based on its top configuration, the control valve appears to be made for a gate valve mechanism, although its exact configuration and type has not been confirmed.

General Condition: The exterior of the gate house is in good condition. The interior was clean and in good condition, including walls, roof, and floor. During a second inspection at this site, the door to the gatehouse opened, but with difficulty. Similarly, when operating the valve, the wheel was extremely difficult to turn; it was only opened three full turns during this second inspection. Association members subsequently lubricated the valve stem and were able to fully operate the valve for the fall drawdown. It is currently in operable and useable condition.

Concrete Condition: The gatehouse floor is composed of concrete, which was slightly weathered and littered with small detritus, but in good condition overall during inspections. The upstream approach channel walls were viewed during the second inspection and found to be in satisfactory condition.

Stone Masonry: The brick walls are in good condition on both the exterior and interior sides, with only small chips of brick littering the interior of the building (see photo).

Settlement / Alignment/Movement: None observed.

Other: There is a steel trash rack set in the concrete walls at the inlet to the low level discharge (along the upstream side of the gatehouse foundation). Visible portions of the trash rack were in satisfactory condition during the first inspection. The follow-up fall inspection showed that the full rack was in good condition.

Photos / Graphics / Sketches: See Photo Report in Section XIII.

Part IX: Outlet Structure

Number of Outlet Structures: 1

Outlet Structure Type: PVC outlet pipe & stone masonry and concrete endwall chamber.

General Description: The low level outlet consists of a 16” pipe passing through a stone masonry wall set back inside the earth embankment of the dam and discharging its flow through a short PVC pipe section. Flow discharge through the pipe is controlled by the gate mechanism situated at the intake structure.

General Condition: Good, with only minor leakage apparent around the perimeter of the pipe directly at the wall junction. The rate and clarity of this flow has not changed appreciably since the 2006 inspection. The visible portion of the pipe remains in very good condition.

Concrete Condition: The only concrete part of the outlet structure is the roof slab, which appears to be in good condition.

Stone Masonry: The stone masonry walls surrounding the pipe outlet and the grout fill in the spaces between stones are in good condition.

Settlement / Alignment / Movement: None apparent.

Scouring / Undermining: None apparent.

Other: Minor seepage noted at the right downstream end wall and discharge point adjacent to the riprap and gabions, which has been noted in inspection reports going back to 2006, continues to be present. It was running clean, but should continue to be monitored.

The gate operator was inspected inside the gatehouse. The operator itself (a large wheel) was in good condition, but the brackets at its base exhibited surficial corrosion, and should be cleaned and coated.

Photos/Graphics/Sketches: See Photo Report in Section XIII.

Part X: Miscellaneous Features

Access – North Street crossing the dam is a paved road, with side curbing on the upstream (north) side and no curbing on the downstream side, and guardrails on both sides. This road provides access to all portions of the dam, and there is room at the end of the guardrails to access areas of the embankment that require maintenance.

Bridges – There are no bridges present at this site. The box culvert or tunnel carrying flow downstream from the spillway is discussed in prior sections.

Dry Hydrant – Located along the left upstream side behind the guardrails adjacent to the road. It appears to be in good condition and has no impact on the dam itself.

Safety – The spillway is ringed by a combination of steel railing and chain link fencing. Both, including the posts and cross rails of the chain link fencing, exhibit signs of corrosion, while the fence fabric itself is still in relatively good and sound condition. There is a padlock at the gate in the fence used to access the top of the spillway. The steel beam guardrails running along the two sides of the road are in good condition. The gatehouse roof has concertina wire set around its perimeter; the door to the structure is padlocked.

Photos / Graphics / Sketches: See Photo Report in Section XIII.

Part XI: Downstream Hazard Classification Reassessment

Downstream Hazard Classification:

The dam is currently rated as a "**B**" hazard dam and, based on a visual inspection of available data with respect to downstream residential housing and infrastructure, it is recommended that the rating remain as is, pending any newly available data since the original assessment was completed.

Part XII: Recommendations

Recommendations:

1. Trees, Brush & Vegetative Cover on and near the Embankments – In general, DEEP Dam Safety guidelines require that all trees and brush be cleared and removed from all embankment and abutment areas and from within 25 feet of all toe and abutment areas. During this inspection, the embankment areas were generally clear, but dense high weeds were noted at the end of the right upstream abutment endwall. Phragmites noted in the downstream low level outlet channel, although not encompassing a large area, should be cleared before they spread further along the channel and downstream toe area. In the event that roots of trees or large bushes need to be removed in the future, voids left by such removals must be filled and properly compacted, as a general guideline, with impervious materials if on or near the upstream side of the dam embankment and with pervious materials if on the downstream side. Tree and root removal, and subsequent filling of voids, should be supervised by an engineer. Growth within the riprap and surrounding area of the downstream embankment will be a recurring maintenance issue and should be monitored on a regular basis.

2. Right Downstream Toe Area – The following recommendation, quoted from the 2006 and 2012 Inspection Reports, remains applicable: The base area of the right downstream embankment *"is currently kept in relatively good condition, but is fairly saturated along the right side. This is probably due to low level seepage beneath the embankment of the dam, from high groundwater levels along the surrounding embankments and from occasional drainage coming off the roadway. A plan was drawn up in 1995 to install toe drains along this saturated area, but no action has been taken to date. While the need is not critical, consideration should be given to placement of these drains to facilitate better maintenance. In addition, the Town's drainage pipe, partially filled with sediment, should be cleared out to restore its full capacity and to avoid the possibility of excess overflow running along the right downstream embankment. Note that there are signs that such flow may already occur."*

3. Diving Inspection – A diving inspection to examine the submerged portions of the upstream intake structure was recommended in the 2012 report; this recommendation remains applicable.

4. **Fence, Railing & Control Valve** - (From the 2012 Report, this section remains applicable): ***"Metal Corrosion*** *– Features such as fencing at the spillway, the interior valve controls at the gatehouse, and the gatehouse door frame should be cleaned of surface corrosion and recoated with appropriate steel paint products (minimum 2 coats), to stem further deterioration while they are still in structurally sound condition."* In addition, as observed during difficult operation of the control valve this year, the valve stem and packing need to be serviced to assure continued operation at critical times. The valve should be operated through a full close and open cycle on a regular schedule to clear the operating stem and interior fixtures.

The fall 2019 follow-up inspection at low water level revealed that several of the support posts for the spillway security fencing were corroded at the post bottoms. As such, it is recommended that fencing be replaced, keeping in mind to allow for unimpeded flow along the lower portions of the fencing.

5. **North Street** – Although in general good condition during this inspection, some small cracks were noted in proximity to leakoffs along the north side of the road. These should be monitored on a regular basis to avoid infiltration of runoff into the embankment. Likewise, minor erosion was noted on the south side of the road (along the downstream embankment crest) behind the guardrails, as this is an area where pedestrians walk to avoid the narrow roadway with no safety shoulder.

6. **Spillway Crest & Downstream Wall** – Several small cracks and spalls were noted along the spillway crest approach slab during the low water level period; as well, small gaps and voids were noted in the vertical downstream stone masonry of the downstream spillway wall face. Surface cracking and spalls on the approach apron should be repaired with appropriate grout and / or epoxy materials, and the voids in the downstream wall, should be chinked with small stone and mortared, as appropriate.

7. **Upstream Embankment Wall** – Although not visible for the first inspection, the upstream embankment wall was checked for cracks and open joints for normally submerged areas during the low water level fall inspection. It was noted at that time that, in addition to minor cracking (particularly near curb cut leak-offs to the right and left of the gatehouse), most all of the vertical expansion joints showed signs of deteriorated joint

filler and joint sealant. These joints and any cracks in the concrete surface should be repaired as soon as possible, weather conditions permitting, and then monitored during regular inspections. Repairs will keep the wall from deteriorating and keep infiltration of flow into the embankment to a minimum. Many of these areas were repaired during the work completed by D'Amato Construction in 1993, but may need to be addressed again.

8. **Spillway Discharge Tunnel** – Although the outlet tunnel is currently stable, we continue to recommend its replacement, based on past and current assessments (see prior reports). We are particularly concerned with the condition of the interior tunnel roof as previously pointed out.

Part XIII: Photographs/Graphics

Note: Some photos within this report may be duplicates. This is made necessary by the general requirement of the new 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. The numbering sequence of the photos follows that of the DEEP form.

Photo 1a – Cedar Lake Dam, as seen from the right upstream abutment.

Photo 1b – An overview of Cedar Lake Dam taken from the right upstream abutment area in 2016.

Photo 1c – Another overview of Cedar Lake Dam, this time looking over the dam from the left side upstream abutment.

Photo 1d – An overview of Cedar Lake Dam, again as seen from the left side upstream abutment, this time during the winter drawdown period. The riprap apron in the foreground and along the upstream slope is in satisfactory condition.

Photo 2a – An overview of Cedar Lake Dam, as seen from the left downstream abutment area.

Photo 2b – The downstream side of Cedar Lake Dam, as seen from the left downstream abutment area. The spillway discharge channel is in the foreground.

Photo 3a – The upstream side of Cedar Lake Dam, taken from the right abutment area.

Photo 3b – The upstream face of Cedar Lake Dam, as seen from the right upstream end of the dam during a low water level period in 2016.

Photo 3c – Riprap lining the upstream embankment slope on the right side of the gatehouse, during the annual winter drawdown.

Photo 3d – The right end of the upstream embankment during the winter period, again in satisfactory condition. The intake training wall at the gatehouse can be seen at the center-left of the photo.

Photo 4a – A view of the upstream face of the dam, seen from the left upstream abutment area.

Photo 4b – Panning over from the central section of the upstream side toward the right end, with the spillway and gatehouse visible.

Photo 4c – Looking eastward toward the left upstream end of the dam from the left side of the gatehouse.

Photo 4d – The right upstream side of the dam, as seen from the left looking right. The concrete retaining wall is generally in good, stable condition here and along the breadth of the upstream side.

Photo 4e – A view of the left side upstream embankment area, as taken from North Street during a low water level period in 2016.

Photo 4f – An overview of the central section of the upstream embankment; the spillway is visible in the center of the photo.

Photo 4g – The upstream embankment slope to the left of the spillway. The concrete wall here is in stable condition.

Photo 4h – Looking back along the upstream embankment toward the gatehouse during the winter drawdown.

Photo 5a – The crest of Cedar Lake Dam, as seen from the right abutment.

Photo 5b – An overall view of the dam crest, formed by North Street, as seen from the right abutment in 2016. The gatehouse on the upstream side is situated in the center of the photo.

Photo 6a – The crest of the dam as seen from the left abutment.

Photo 6b – An overall view of the crest, seen from closer to the center of the dam, looking around the bend in the road running toward the right side in the background.

Photo 7a – An overview of the downstream face and toe area, taken from the right side of the embankment. The discharge channel for the low level outlet is at the right-center of the photo.

Photo 7b – Looking westward toward the right downstream end of the dam embankment.

Photo 7c – The stone-lined face of the downstream embankment. This area has been maintained clear of vegetative growth between the stones. The discharge channel at the right-center of the photo emanates from the spillway.

Photo 7d – Looking eastward over the downstream embankment face, from the right downstream toe.

Photo 7e – The right end of the downstream embankment and toe area. The downed tree at the abutment has been removed.

Photo 7f – Looking eastward from the center of the dam for an overview of the left half of the downstream embankment. The riprap lined low level outlet discharge channel is in the left foreground of the photo.

Photo 7g – The central section of the downstream embankment. The stone cover is stable in this area (note the gabion metal mesh cages placed to prevent sloughing of embankment stones).

Photo 8a – An overview of the downstream face of the dam, as seen from the left abutment. Again, the spillway discharge channel is in the foreground.

Photo 8b – In the top left corner of the photo is visible the toe of the left-most section of the downstream embankment, east of the spillway outlet channel. Note gabion placement for slope stability at the right side outlet of the spillway discharge tunnel beneath North Street (see also next photo).

Photo 8c – A sweeping view of the downstream embankment face, taken from the discharge channel outlet.

Photo 8d – A panoramic view of the central and right side downstream embankment, in good and stable condition in 2016.

Photo 9a – An overview of the spillway and its approach area, as seen from the left side.

Photo 9b – Looking at the spillway from its right side. There was substantial flow on the date of the first inspection.

Photo 9c – A closer view of the spillway from the left side, with the trash rack visible. The rack is in good condition, but the fencing around the spillway exhibits progressive corrosion.

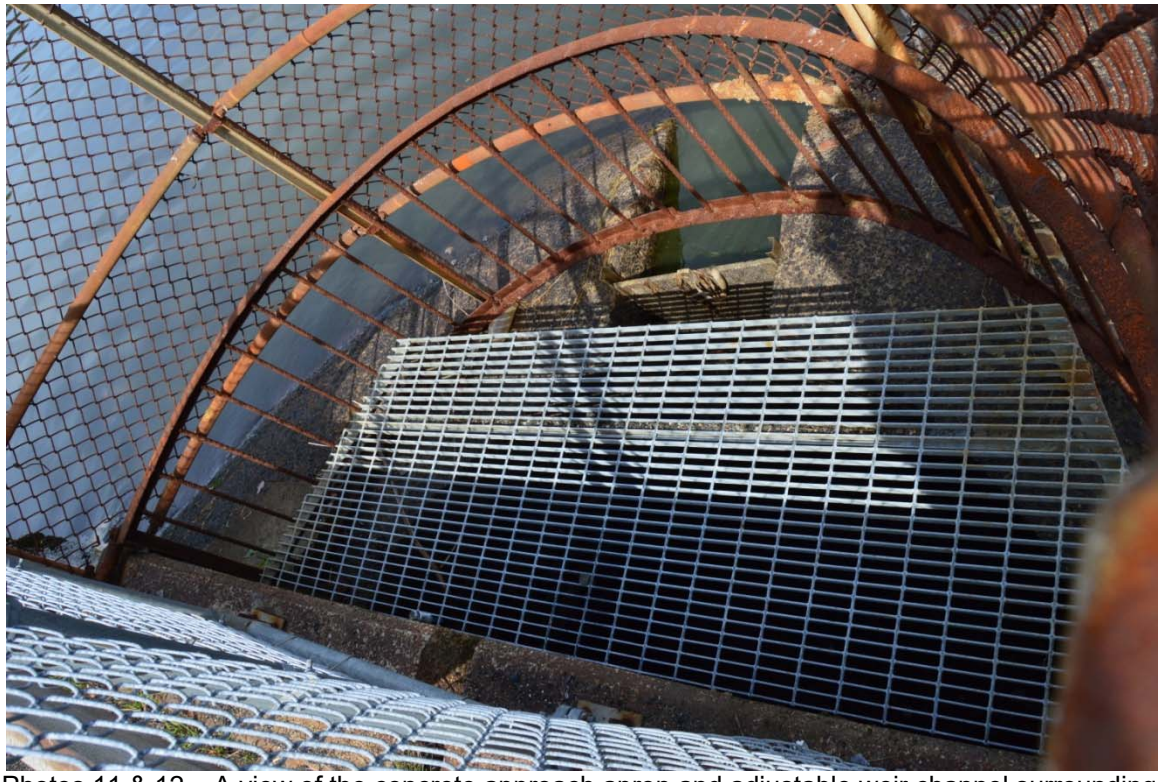
Photo 9d – A close up of the spillway approach, with conditions noted in the prior photo again visible.

Photo 9e – The spillway and appurtenances as seen from the left side looking westward at a lower flow period in 2016. Note the concrete approach pad on the left side.

Photo 9f – The spillway approach area as seen from the upstream during the winter drawdown. The concrete is in overall good condition with minor spalls and cracks near the overflow crest area.

Photo 10a – A view of the spillway as seen from the immediate downstream (looking downward from the adjacent roadway).

Photo 10b – Looking upstream from within the discharge channel to the base of the drop inlet spillway.



Photos 11 & 12 – A view of the concrete approach apron and adjustable weir channel surrounding the spillway inlet area. The concrete is a bit weathered but still in sound condition.

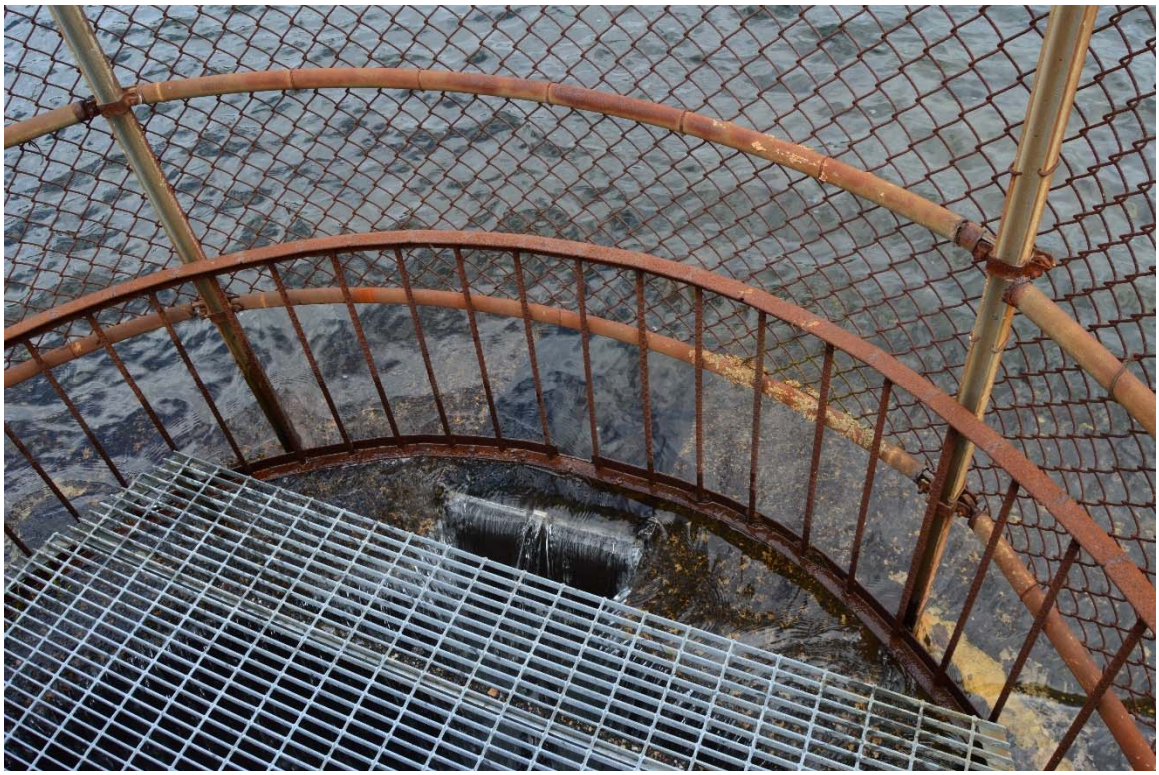


Photo 13a - Looking down at the spillway weir; the weir board slot is situated in the center.

Photo 13b – The spillway weir, with weir boards in place, as seen through the protective fencing in 2016.

Photo 14a – An overview of the stilling basin at the low level outlet discharge.

Photo 14b – The same discharge area as seen in the prior photo, taken from its left side. Although minor vegetative growth is visible in the channel, it is typically cleaned out on a seasonal basis.

Photo 14c – The concrete splash pad at the main spillway discharge outlet, with riprap lined channel and side slopes extending further downstream.

Photo 14d – The spillway chute discharge, at the exit of the tunnel area beneath North Street, with riprap side slopes.

Photo 15a – An overview of the downstream area, with the downstream spillway channel and its junction with the low level discharge channel visible in the left center of the photo.

Photo 15b – The upper section of the discharge channel, exiting the spillway tunnel outlet. The riprap along the sides of the channel is stable and generally clear of vegetative growth.

Photo 15c – The low level outlet discharge channel, from the pipe end to the junction of the channel with the main stream (Mad River) in the center background of the photo.

Photo 15d – Panning rightward from the perspective of the previous photo, this view shows the progress of the river heading further downstream.

Photo 15e – The upper channel sections, as seen from the right side dam crest.

Photo 15f – The lower reaches of the downstream channel, continuing southward as the Mad River.

Photo 15g – A view of the lower sections of the downstream channel in November of 2019, with the low level outlet valve open.

Photo 16a – Looking upstream at the gatehouse, from North Street.

Photo 16b – The exterior of the gatehouse and its environs, as seen from the right side of the building.

Photo 16c – Again taken from the right side, this close up view shows the foundation of the gatehouse sitting atop the inlet channel sidewalls. The concrete is in sound condition.

Photo 16d – The left side of the gatehouse and foundation, in a similar condition to the right side.

Photo 16e – An overview of the gatehouse as seen from the left upstream side.

Photo 17a & 18a – The interior of the gatehouse and the operator for the sluice gate at the low level outlet.

Photo 17b & 18b – Another look at the interior of the gatehouse and the operator in the fall of 2019, this time with the stem in a raised position with the sluice gate open.

Photo 19a – The downstream end of the low level outlet discharge structure.

Photo 19b – A head-on view of the low level outlet pipe discharge. The coupling or connection fitting with the remaining outlet pipe is unknown.

Photo 19c – The downstream end of the tunnel conveying the spillway discharge flow.

Photo 19d – Progressing upstream through the spillway discharge tunnel. The masonry sides of the tunnel are covered with a cementitious coating; the roof appears to have been cast rather than coated. The concrete roof extends only halfway up the tunnel from the downstream end; the rest is open stone – see Photo 19e.

Photo 19e – The upstream section of the spillway discharge channel, which runs under North Street, as seen in 2016 from the upstream end. Note the roof in this area is open stone masonry – slabs spanning its width.

Photo 19f – A view of the entrance to the discharge channel, taken from the base of the spillway and looking in a downstream direction in 2016.

Photo 19g – The intake for the low level outlet pipe on the upstream side of the gatehouse. The trash rack covering the opening appears to be in good condition judging from the visible portion above water level.

Photo 19h – A curb cut on the north (upstream side) of North Street, facilitating the discharge of flow runoff from the road into the impoundment on the north side of the road.

Photo 19i – A close up view of the trash rack at the low level intake, taken during the low water level period in the fall of 2019.

Photo 19j – A curb cut facilitating the flow of road drainage into the lake, along with the drain outlet adjacent thereto, for the same purpose.

Photo 20a – The lower reaches of Cedar Lake, looking toward the right upstream side of the dam.

Photo 20b – Panning northward from the previous photo, with the upper reaches of the lake in the upper right background.

Photo 20c – Looking directly upstream at Cedar Lake.

Photo 20d – The eastern section of the lake. Note the dock on the right of the photo (also visible in Photo 20c) for reference.

Photo 21a – The interior base of the gatehouse. Note the mild corrosion on the base brackets for the valve operator, which should be cleaned and coated. In addition, the occasional difficulty in turning the valve indicates that the valve needs to be serviced on a regular basis (i.e., bonnet removed, gaskets replaced, stuffing repacked, etc.).

Photo 21b – Brush growth at the right end of the upstream embankment wall. Although not as prolific as during the peak growing season, it is clearly a nuisance, and should be removed to open the area for observation of any problems along the wall and abutment area.

Photo 21c – Saturated ground between the toe of the left downstream embankment and the downstream channel.

Photo 21d – The interior of the spillway tunnel (looking downstream from the upstream end), showing a section of roof with open voids between stone that spans the width of the tunnel.

Photo 21e – The interior roof of the spillway discharge tunnel. There are cracks in this section, downward bulging and pitting further along near the downstream end.

Photo 21f – The left side of the spillway approach area, showing the corrosion present on the fence post and rails surrounding the spillway.

Photo 21g – Another view of the right side upstream embankment area of Cedar Lake Dam, with the full extent of seasonal brush growth visible (2016 photo).

Photo 21h – The fencing surrounding the spillway inlet has begun to show wear, along with separation of some structural members. Steel should be cleaned and coated where practicable, while deteriorated portions of the chain link fence should be replaced.

Photo 21i – Concrete deterioration at the left upper end of the spillway approach slab. The concrete must be cleaned, and cracks and openings closed off and re-mortared where necessary.

Photo 21j – The right side of the spillway at the junction between the weir and right side abutment wall. Note the gap between concrete wall sections. This should be cleaned and mortared. Wear of the steel bars and the bracket for the protective outer grate is also extant.

Photo 21k – The left side of the spillway weir, showing conditions similar to those on the right side.

Photo 21l – The base of the spillway wall. The stone wall face and base area should be cleaned, chinked and re-mortared where gaps between stones are present. Seepage at the base is not severe or problematic, but should be monitored on a regular basis.

Photo 21m – A leak off for road drainage to flow into the lake. Note minor concrete deterioration just below the leak off point. This area should be patched and coated before the deterioration worsens.

Photo 21n – An area of standing water near the base of the downstream slope, indicating seepage through the embankment, although to a moderate extent. Continued monitoring is recommended.

Photo 21o – Rutting from vehicular tracks in the downstream base area, probably caused by mowing equipment being driven through a wet area. Such sections may have to be mowed with a hand-push mower or weed whacked.

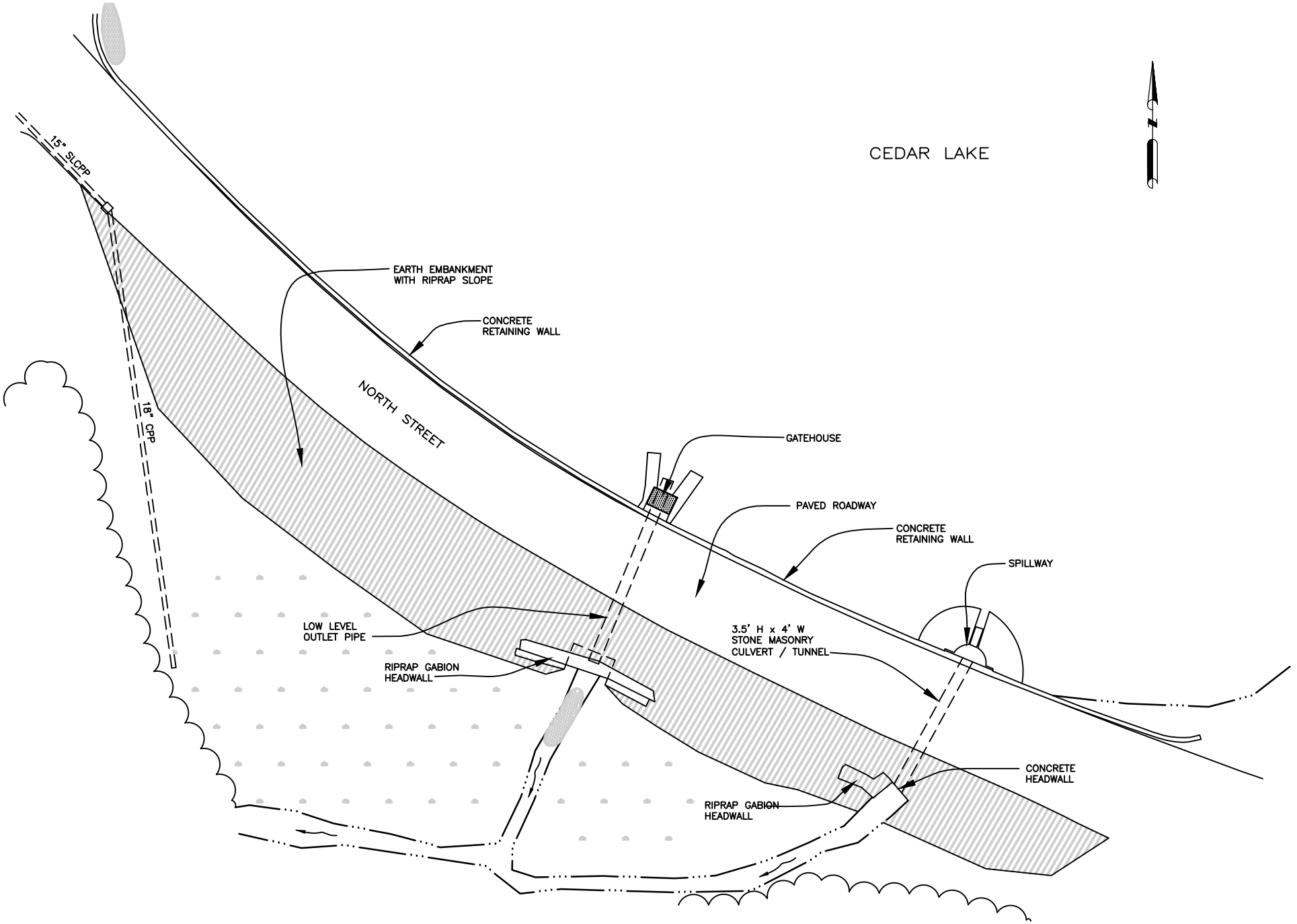
Photo 21p – The stubby right side training wall at the base of the gatehouse and low level intake area. The concrete cap over the stone masonry and concrete surfaces should be inspected during annual drawdowns for any potential defects.

Photo 21q – The base of the upstream embankment wall, to the right of the spillway. The joint filler has been displaced, and the gap at the joint is expanding, creating a void in the wall (typical of several vertical joints).

Photo 21r – The base portions of the vertical fence support posts around the upstream spillway approach area are badly deteriorated.

Part XIV: Sketches

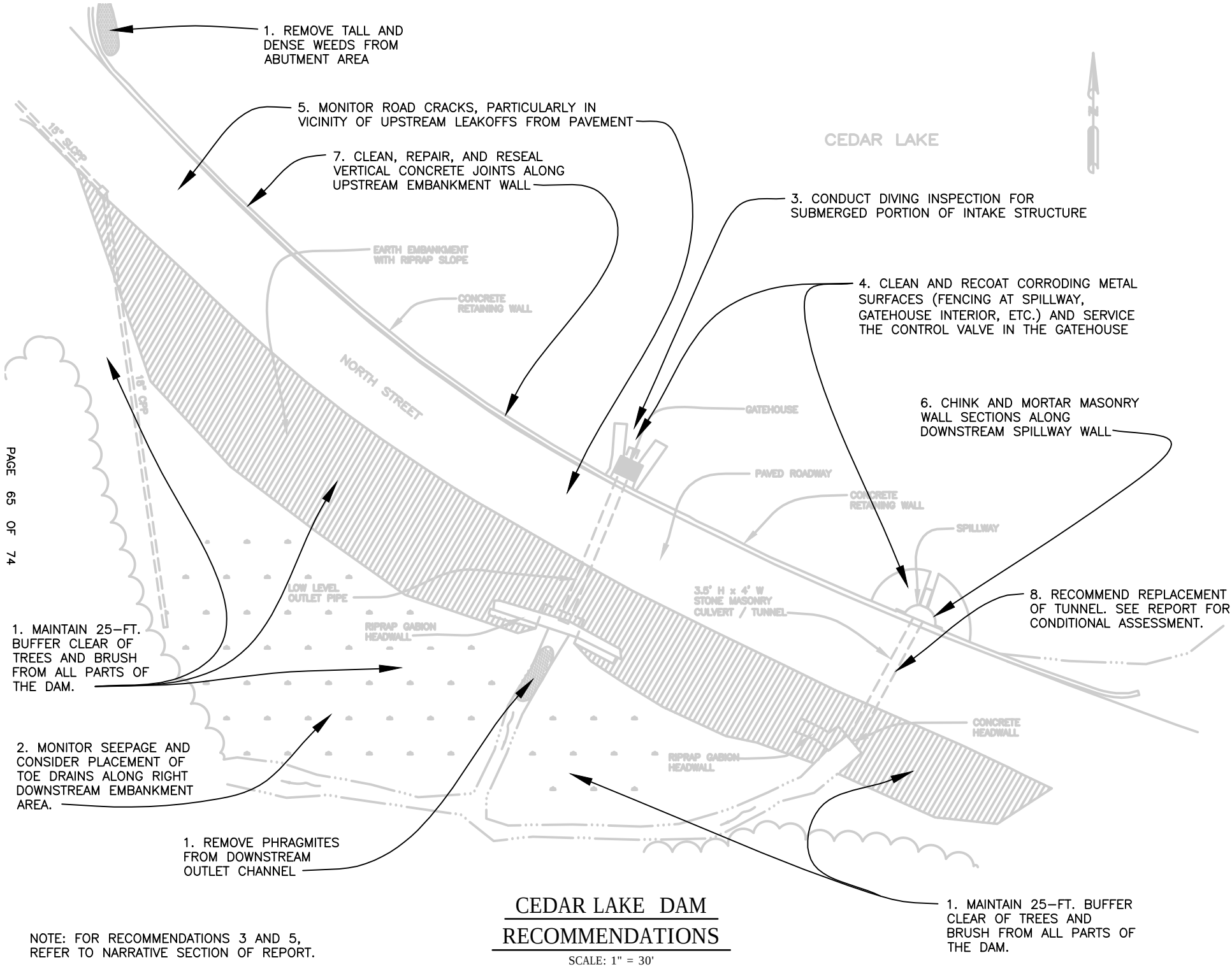
See attached site plans / sketches.



CEDAR LAKE DAM
EXISTING CONDITIONS

SCALE: 1" = 30'

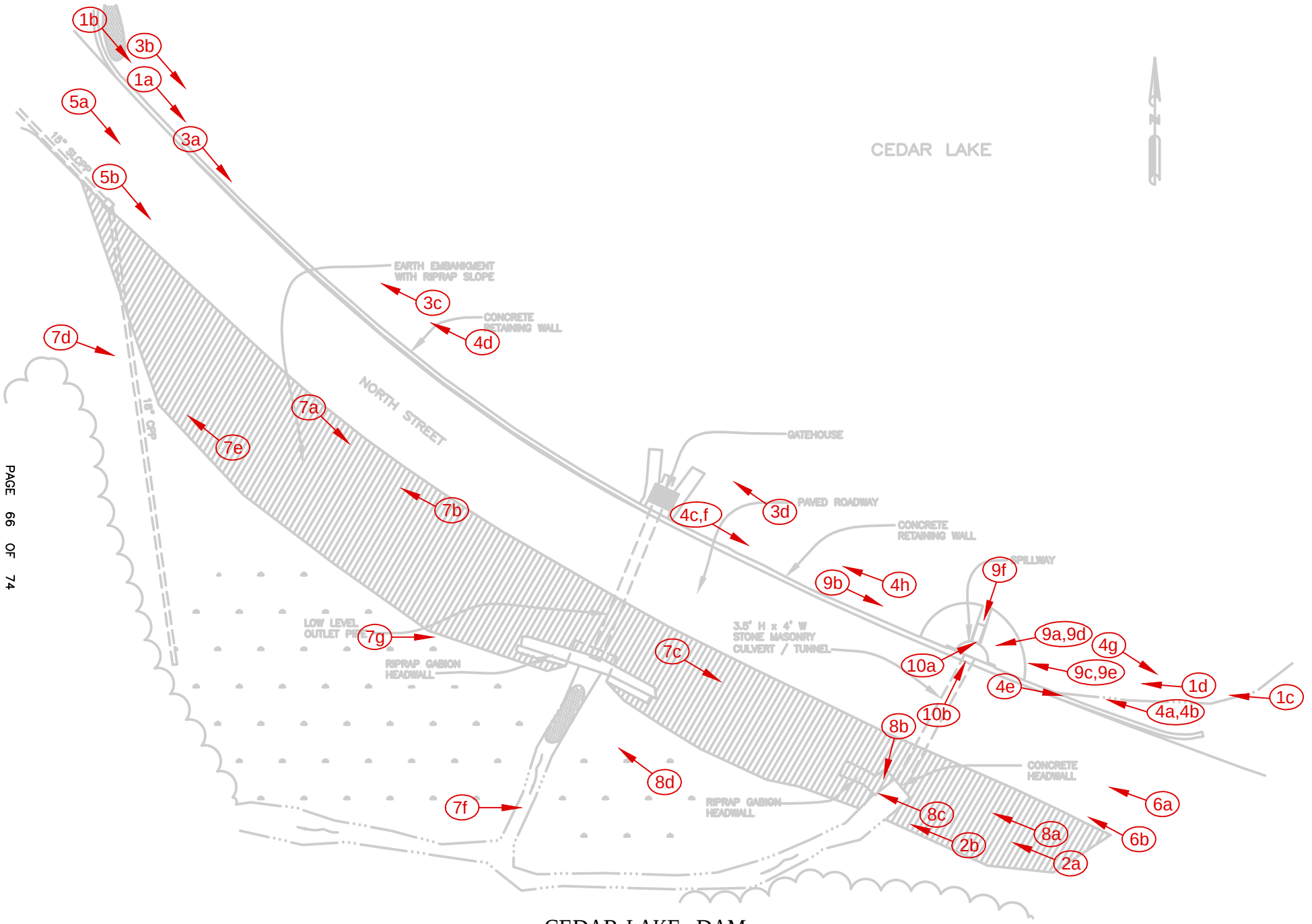
NOTE: INFORMATION FOR THE BASE PLAN IS TAKEN FROM A MAP PREPARED BY MILONE & MacBROOM FOR THE TOWN OF WOLCOTT.



CEDAR LAKE DAM
RECOMMENDATIONS

SCALE: 1" = 30'

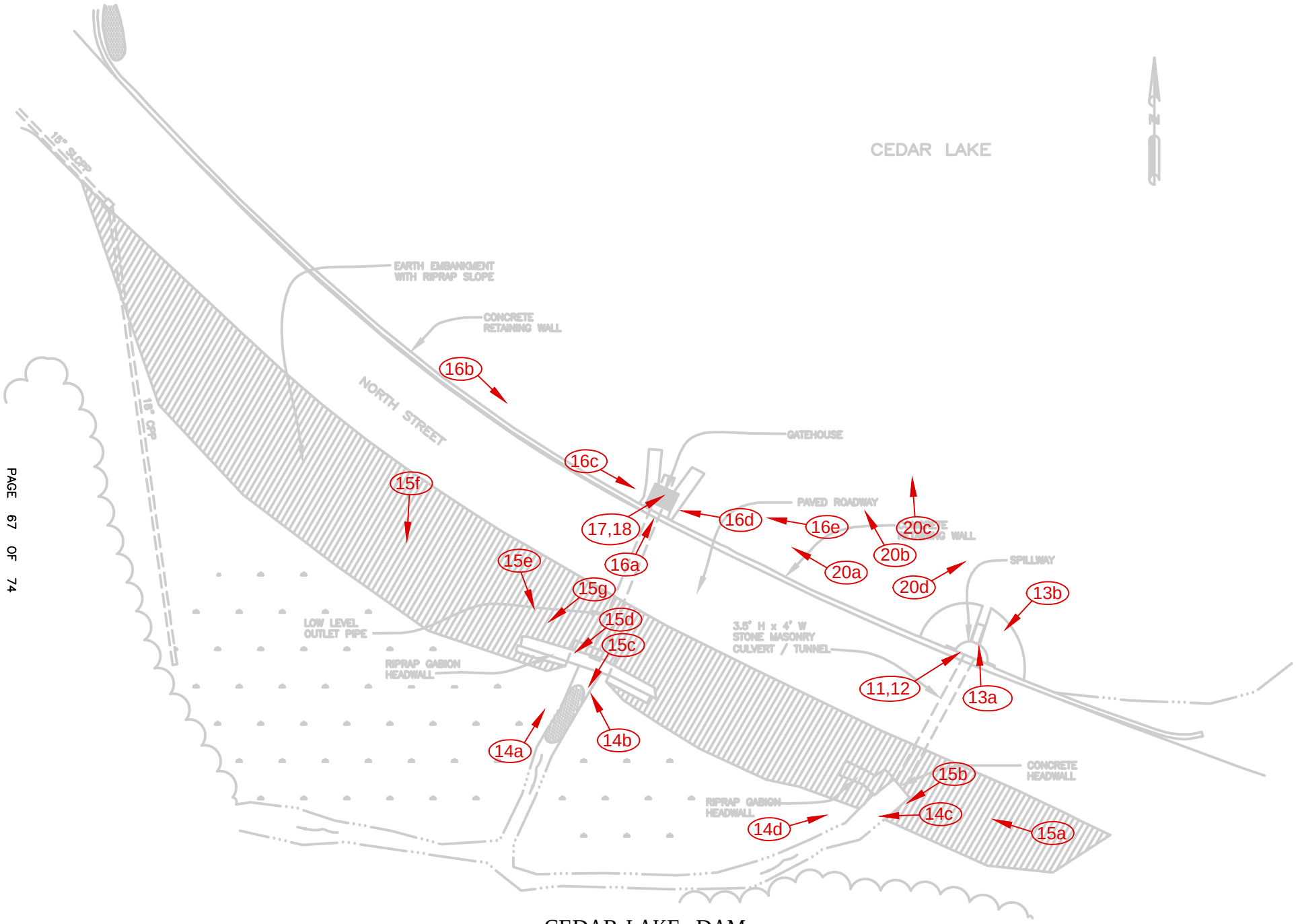
NOTE: FOR RECOMMENDATIONS 3 AND 5, REFER TO NARRATIVE SECTION OF REPORT.



CEDAR LAKE DAM

PHOTO INDEX 1-10

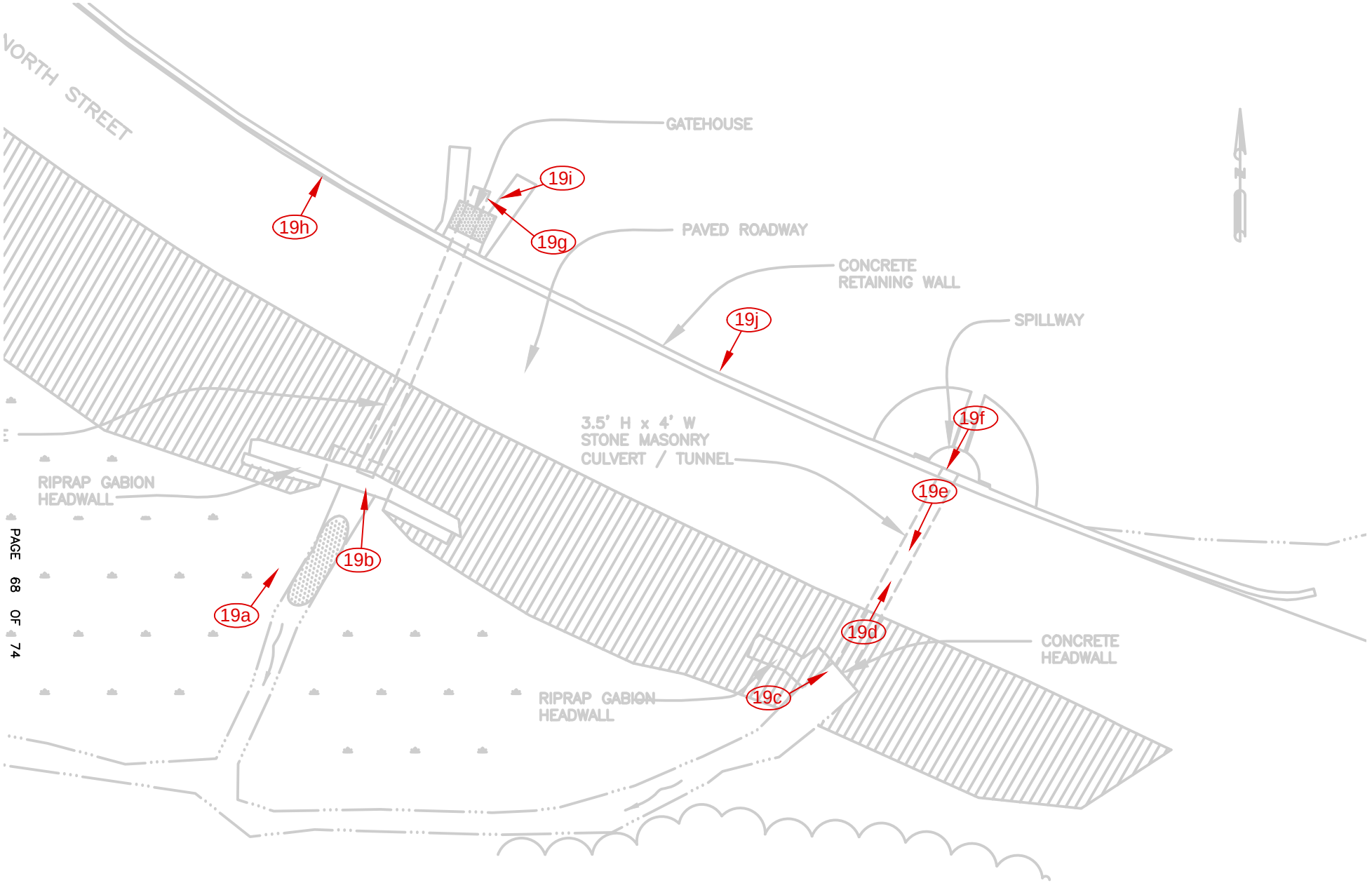
SCALE: 1" = 30'



CEDAR LAKE DAM

PHOTO INDEX 11-18, 20

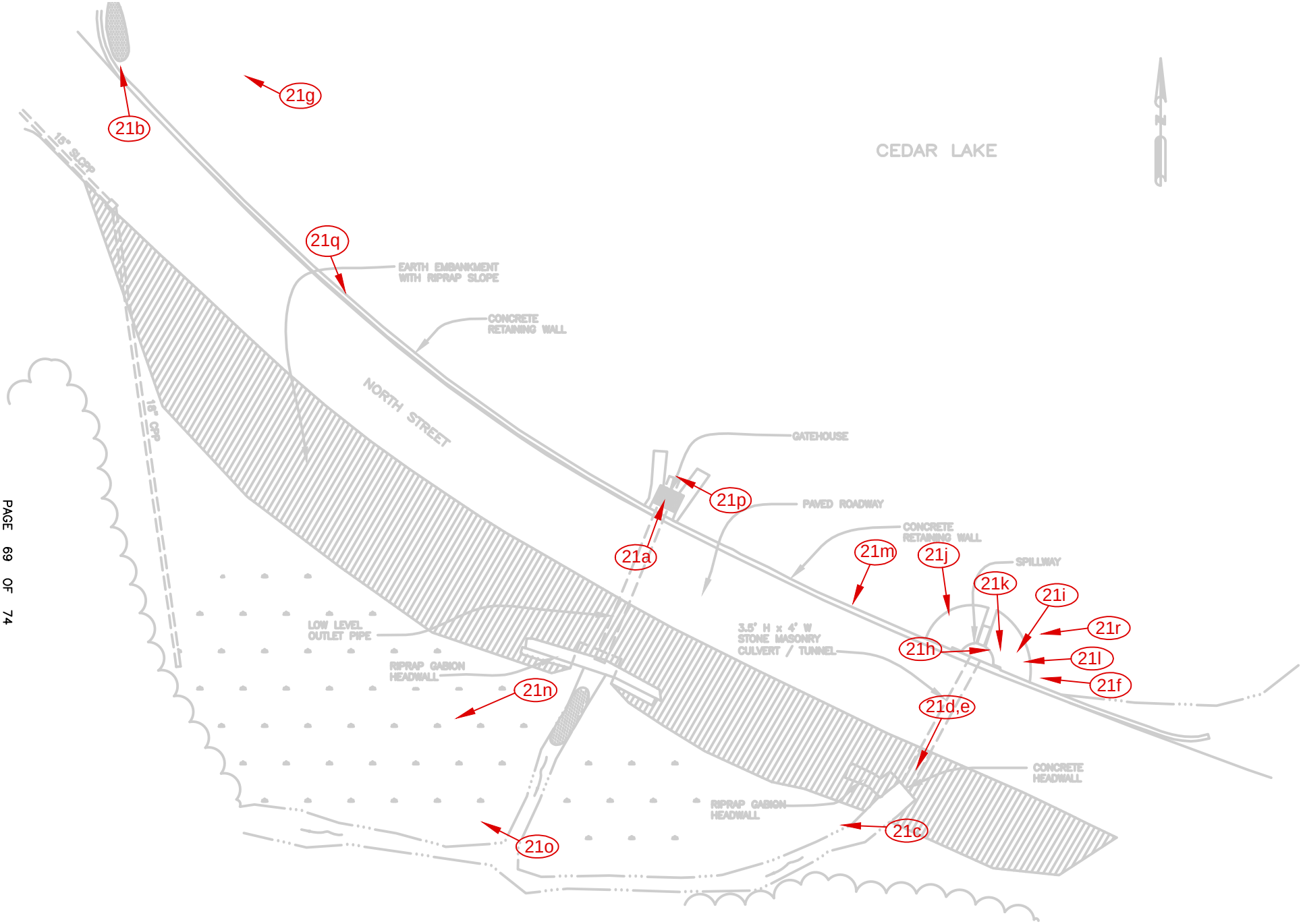
SCALE: 1" = 30'



CEDAR LAKE DAM

PHOTO INDEX 19-SERIES

SCALE: 1" = 20'



CEDAR LAKE DAM

PHOTO INDEX 21-SERIES

SCALE: 1" = 30'

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."

Karl F. Acimovic 12/10/2019

Signature of Professional Engineer Date

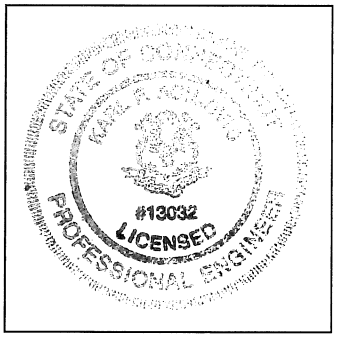
Karl F. Acimovic, P.E. **13032**

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: President	Date: 11-25-19
Name of Owner (print or type): Daniel Houlihan	Title (if applicable): President
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.)