

**CONDITION ASSESSMENT
AND REPAIR EVALUATIONS**

CEDAR LAKE DAM / DEP #16603

NORTH STREET
WOLCOTT, CONNECTICUT



**PREPARED FOR:
CEDAR LAKE OWNERS ASSOCIATION**

MAY 8, 2006

Prepared by:

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May 8, 2006

Mike Guerrero
Cedar Lake Owners Association
63 Avery Avenue
Wolcott, Connecticut 06716

Re: Inspection Report
Cedar Lake Dam
Wolcott, Connecticut

Dear Mr. Guerrero:

Cedar Lake, situated north and east of North Street in Wolcott, Connecticut, is currently used for recreational purposes and the private use of adjacent owners. It is impounded by a dam which encompasses the roadway and the embankment limits of North Street itself and continues to serve the purpose of retaining water and allowing its overflow to pass to downstream locations. The recent inspection of the dam found it to be in an overall good condition, but requiring some basic maintenance and repairs. These issues are specifically addressed in the attached inspection report, in a form that follows the format used by the Dam Safety Section of the State of Connecticut DEP Inland Water Resources Division.

CONDITION OF THE DAM:

The overall condition of the dam was assessed as good. The maintenance items pointed out and discussed in the report and shown in the accompanying photos are not severe and do not appear to have any detrimental impact upon the current structural integrity of the dam. As with many other situations, however, items not addressed in a timely fashion can lead to more severe problems in the future; such are the current recommendations. Issues addressed include repositioning of riprap at the downstream end of the spillway discharge tunnel and channel, repair of tunnel wall areas, repair of minor erosion on the embankment, repair of concrete surfaces and concrete wall joints on the upstream side, removal of brush and trees from embankments and continued monitoring of seepage at various points of the dam.

Page 2
Mr. Mike Guerrero
May 8, 2006

RECOMMENDATIONS:

In order to maintain the integrity of the site and preserve the recreational and aesthetic value of the pond, continued maintenance of the dam, as recommended in this report, must be carried out. Clearing of trees, brush and debris from the embankments must be completed; subsequently, such clearing should be done on a continuous basis. Joints in the upstream concrete wall need to be cleaned of weathered materials and resealed to avoid infiltration into the embankment. Concrete repairs will also include a small section of the wall adjacent to the gatehouse and one at the spillway near the left side. Repositioning of riprap at the spillway outlet channel and repair of erosion along the downstream crest from pedestrian traffic must also be completed. Because the Town is one of the owners at this site, they are responsible for upkeep of drainage facilities, such as the discharge pipe on the right downstream side of the embankment which must be cleaned of built-up sediment. The gatehouse, although in overall good condition, has some minor problems such as open brick joints which should be addressed to avoid continued deterioration.

One of the long term options which may alleviate safety problems for pedestrians along the roadway, is to widen the embankment to accommodate a sidewalk. In so doing, the factor of safety for the structural integrity of the dam could be improved at the same time. As pointed out in the report, State financing from several sources may be available for this purpose, particularly with the participation of the Town of Wolcott.

Should you have any questions regarding this report or require additional information, please contact me at your convenience.

Respectfully yours,



Karl F. Acimovic, P.E. & L.S.

Encl.
Inspection Report

INSPECTION REPORT

DEP / INLAND WATER RESOURCES DIVISION

INSPECTION CHECK LIST

DAM NAME & NUMBER: Cedar Lake Dam / DEP #16603
INSPECTION DATE: March 28, 2006 & April 22, 2006
IMPOUNDMENT AREA: Cedar Lake
POOL LEVEL: 1.3' Below Spillway Crest
WEATHER CONDITIONS: Sunny, Low to Mid-50's
INSPECTOR(S): Karl F. Acimovic
ACTION TAKEN: Field Inspection / Report Preparation

DAM / EMBANKMENTS

GENERAL CONDITION: Good, both upstream and downstream.

VEGETATIVE COVER: Upstream Embankment - Brush, debris and trees need to be removed from the left¹ end of the dam; some of this material appears to have been dumped from nearby construction.

Downstream Embankment - Brush, small, trees and ivy need to be removed from the embankment section to the right of the low level outlet; minor brush growth on the left side should be monitored and removed when feasible.

EROSION / BURROWS: None Apparent

SETTLEMENT / ALIGNMENT / MOVEMENT:

None Apparent

¹ References made to left and right are in the direction of flow; i.e., downstream direction.

SEEPAGE / FOUNDATION DRAINAGE:

No new or significant seepage areas, except for the same right downstream toe area as noted in previous inspections. In a letter dated 1995, the following observation was made (still pertinent today): *"The water levels at the downstream toe of the dam have always been fairly high, as evidenced by the soft and saturated condition of the soil and the several outflow points of groundwater. Some of this has emanated from beneath the dam and some from the groundwater adjacent to the dam's embankments."* Although not a structural problem to the dam itself, a proposal had been made to install toe drains to ease routine maintenance. Bids were sought in 1996 to perform this work but, due to cost, the work was apparently not completed.

RIPRAP:

Upstream Side - Riprap is in generally good condition.

Downstream Side - Most riprap here is also in generally good condition, except along the downstream embankment crest where pedestrian traffic along the south side of the road has led to a displacement of the upper portion of the riprap. There is no room for pedestrians along the road surface itself (on either the south or north side), thus for optimal protection, persons walking on foot proceed along the back of the guardrail on the south side of the dam.

STONE MASONRY:

Not Applicable.

CONCRETE CONDITION:

The upstream concrete wall is in good condition. Vertical expansion joints, however, show signs of deterioration. The sealant is currently in a weathered condition, with sealant at the base of many joints missing. These should be cleaned and resealed to avoid infiltration into the embankment of the dam.

At a point about 15' left of the gatehouse, there is a horizontal crack along a small section of concrete near the top of the wall and adjacent to both a vertical joint and one of the drainage leak-offs. If not repaired, the concrete will most likely fall off.

CRACKS:

Other than the horizontal crack noted in the concrete wall, there is only minor concrete cracking which is not significant at this time and should be monitored during future inspections.

OTHER:

The small drainage leak-offs on the north side of the dam (along the concrete wall) need to be cleaned of built up sand and sediment. Along with some longitudinal and transverse cracking within

the pavement, ponding caused by this build-up could cause infiltration into the dam.

The downstream gabions are in good condition and there is no sign of any significant corrosion on the wire cages.

SPILLWAY / TRAINING WALLS / APRON

GENERAL CONDITION: Overall good condition.

SETTLEMENT / ALIGNMENT / MOVEMENT:

None Apparent.

STONE MASONRY: There is mortared stone masonry on the downstream vertical face of the spillway which is in good condition. Minor seepage noted at its base is not a problem, but should be monitored for any future changes in quantity or quality.

CONCRETE CONDITION: The top surface is in overall good condition, except for one loose chunk of concrete near the left upstream interface between the wall and approach slab (see photos). This, along with the adjacent crack, should be repaired.

CRACKS: See above note for crack adjacent to broken concrete section.

SCOURING / UNDERMINING:

None Apparent.

OTHER: Protective safety fencing shows signs of corrosion, but is structurally sound except for one displaced horizontal joint at a vertical support post. While this fencing is good for access control and safety, it should be closely monitored during storm situations due to its inherent capacity to collect debris and thereby raise water level by blocking flow.

The slide gate and vertical slots are in good condition.

DOWNSTREAM CHANNEL

SCOURING: No significant scouring was noted.

STONE MASONRY: There is stone masonry below water level in the upstream approach channel which, from a surface inspection, appears to be in good condition.

CRACKS: There are no apparent cracks in the walls of the approach channel walls, nor on the concrete floor inside the gatehouse.

OTHER: The building exterior is in generally good condition, except for the horizontal open joint (approximate 1/2" displacement) which starts above the door lintel and runs around to the side of the building past the window lintel on the east side. In addition, there is corrosion on the door and door frame, especially at the base, and the door frame shows displacement at its base.

OUTLET STRUCTURE

The low level outlet structure consists of a pipe discharge emanating from a downstream stone masonry wall within the toe of the embankment (see photos). Flow from the pipe is controlled by the upstream gatehouse (see above under intake structures).

GENERAL CONDITION: Good, the pipe and wall look in good condition, except for minor seepage around the pipe. The pipe itself, at the discharge end, looks in very good condition; the interior is not accessible and, thus, its condition could not be assessed at this time.

CONCRETE CONDITION: The concrete roof support slab appears in good condition.

SETTLEMENT / ALIGNMENT / MOVEMENT:

None Apparent.

SCOURING / UNDERMINING:

None Apparent.

STONE MASONRY: As may be seen in the photos, the stone masonry is in good condition, as is the grout between stones. There are no significant issues at this time and, the seepage through the masonry wall (currently estimated at 0.5 to 1.0 gpm) along the sides of the pipe is minor and should only be monitored at this time (see recommendations and also the 1994 report previously referenced).

OTHER: Seepage is also apparent on the outside of the right downstream end of the outlet wall, adjacent to the gabions and riprap. The seep-

age amount is approximately the same as inside the structure (about 0.5 to 1.0 gpm), does not appear to carry any sediment from within the embankment and should only be monitored at this time.

MISCELLANEOUS FEATURES

ACCESS - ROADS, BRIDGES, ETC.:

Access to the dam in general is from the Town roadway passing along the entire crest of the dam. The roadway, while narrow, is in overall good condition. It should be noted, however, that future repair and maintenance work may require traffic control due to the location and proximity of the various dam facilities.

SAFETY - FENCING, RAILING, ETC.:

There are guardrails along the road, fencing around the primary spillway, a lock on the gatehouse door and concertina (razor) wire along the roof of the gatehouse - both for safety and protection from vandalism or intrusion. All are in relatively good condition.

DOWNSTREAM HAZARD REASSESSMENT:

There are no apparent changes on the downstream side of the dam that would warrant a change in the current hazard assessment. It is prudent, however, to periodically reassess downstream flood plain characteristics (such as dense tree growth in areas where there had been none before) for any changes which might signal an increase in downstream flood levels during severe storm events.

RECOMMENDATIONS

1. **Downstream Embankment** - Remove vegetative growth, specifically small trees and woody vegetation, to prevent the expansion of tree growth and the spread of roots throughout the embankment and toe areas. Repair erosion areas from pedestrian traffic and stormwater drainage flows. [See long term recommendation below for roadway area.]
2. **Downstream Toe Area** - The downstream toe area 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 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 place-

ment 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. **Downstream Primary Spillway Discharge Channel** - While none of the seepage noted at the upstream end of the tunnel is currently a problem, it should be monitored on a continuous basis for any change in quantity or quality (see Item 4 below). The steel beam supporting the upstream concrete wall along the roadway edge, although not in current danger, should be cleaned and coated to avoid continued corrosion and loss of structural support for the wall and tunnel. The interior roof of the tunnel at the location of the stone masonry supports spanning its width should also be repaired due to the loss of supporting roadway fill noted between the stones. At the outlet of the tunnel, the discharge channel riprap should be regraded to form a defined swale to carry flow directly away from the dam embankment and avoid the potential for problems with the current overflow that runs along the toe area. In addition, trees and brush in close proximity to the left edge of the downstream channel should be removed to avoid blocking or diverting flow during severe storm situations.
4. **Downstream Low Level Outlet and Channel** - The channel appears to be in relatively good condition and should be maintained clear of debris. The seepage emanating from around the low level outlet pipe perimeter, while currently low in flow, should be monitored on a continuous basis for any change in quantity or quality (e.g., turbidity). If a change in flow is observed, its relation to any varying water level in the reservoir should be documented. In any case, a significant change should be brought to the attention of an engineer and / or the DEP Dam Safety Section.
5. **Top of Dam / Roadway** - Although drainage improvements were carried out in 1995, some minor problems were noted during this inspection, namely a build-up of sand along the north side leak-off areas and cracking within the road pavement. To avoid ponding and infiltration of flow into the embankment of the dam, the sand build-up should be removed and the cracks in the pavement filled.

In addition, it has been noted that pedestrian traffic along the downstream slope crest has caused erosion of the ground surface behind the guardrails. As a long term recommendation to prevent continued damage to the dam crest and for the safety of pedestrians passing across the dam's narrow roadway, it is recommended that the Town and the CLOA look into widening the road by extending out the southerly side of the dam to provide for a walkway and to reconstruct the downstream earth embankment at the same time to a 3H:1V gradient landscaped with grass. This would improve many of the current maintenance issues in addition to providing a safe traffic and pedestrian situation. There are several potential funding sources through the State which might provide financial assistance to accomplish this goal.

6. **Upstream Embankment Vegetation** - As pointed out in the inspection report, brush, debris and trees need to be removed from the left end of the dam; some of this material

appears to have been dumped from nearby construction. Once this debris is removed, removal of brush and small tree growth should be carried out on a continuous basis from all areas within 25 feet of any portion of the embankment or toe areas.

7. **Upstream Concrete Wall** - Although the wall itself is in good condition, joints should be cleaned of existing sealant, the joint filler should be checked for integrity and replaced if necessary and then, new sealant should be set into the joints to as low as possible in the wall to avoid infiltration into the embankment. The broken concrete section on the support wall to the left of the gatehouse should also be repaired.
8. **Gatehouse** - The door and door frame should be replaced with a new steel door and the open joints along the outside of the building itself should be repaired. The gate or valve should be exercised on a routine basis to make sure of its operational capability when needed and to avoid a buildup of sediment and debris on the upstream side.
9. **Primary Spillway** - The loose chunk of concrete near the left upstream interface between the wall and approach slab along with the adjacent crack should be repaired. In addition, minor seepage noted at the base of the vertical spillway wall should be monitored for any future changes in quantity or quality, but requires no further action at this time.

PHOTOS

[TAKEN MARCH 28, 2006 & APRIL 22, 2006]



Photo 1 - An overview of the downstream side of the dam embankment. Note the growth of small trees at the right center of the photo, debris and displaced riprap at the discharge opening of the spillway channel and the wet area at the right downstream side of the dam.



Photo 2 - The top of the dam as seen from the left (east) side. Note the erosion of the downstream embankment crest from pedestrian traffic - due to the lack of a road shoulder with proper sidewalk.



Photo 3 - The downstream discharge from the primary spillway, showing the buildup of debris and riprap in the discharge channel. Due to the rocks blocking the channel, flow is currently directed along the base of the gabions and the left downstream toe of the dam embankment.



Photo 4 - The inside of the primary spillway discharge channel, looking in an upstream direction. Several large rocks within the "tunnel" are visible along the base of the channel. Note that the overall condition of the channel near the downstream end is good, with sidewalls and roof in relatively good condition (stone and concrete).



Photo 5 - The left downstream toe area. Note the swale (in the center of the photo) developing from redirected flow emanating from the spillway discharge channel.



Photo 6 - Looking upstream toward the low level outlet from the upstream gatehouse. Note the good condition of the gabions above the outlet, the erosion and displacement of riprap along the embankment crest and the growth of small trees along the embankment at the left of the photo.



Photo 7 - The right downstream embankment as seen from the low level outlet discharge channel, showing the tree and brush growth on the embankment.



Photo 8 - Seepage emanating from the left side of the low level outlet pipe. The seepage flow rate is currently low, but should be monitored on a frequent basis for any change.



Photo 9 - Seepage is also present along the wall on the right side of the low level outlet pipe. Again, this flow should be monitored for any changes, but no further action is required at this time.



Photo 10 - Seepage emanating from the back of the right side of the low level outlet channel wall adjacent to the gabions. This flow is most likely passing along the back of the low level outlet pipe and wall and should be monitored, as pointed out for the other seepage areas noted above.



Photo 11 - The right downstream toe area of the dam as seen from the low level outlet channel. The end discharge of the Town's drainage pipe is visible at the center of the photo, as is the saturated groundwater area in the foreground.



Photo 12 - The discharge of the drainage pipe shown in Photo 11; note that the pipe is partially filled with sediment.



Photo 13 - The right end of the downstream embankment; the drainage pipe mentioned in the previous photos runs adjacent to the pole guy wire with the discharge at the base of the embankment near the center of the photo. Note the lack of vegetation along the embankment crest and sediment near the pole from apparent surface runoff at the road.



Photo 14 - An overview of the upstream side of the dam from the right abutment. The low level gatehouse is at the center of the photo with the primary spillway just beyond and to the left. Riprap along the base of the upstream concrete wall is in overall good condition.



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Photo 15 - The top of the dam consists of the Town road, which in general appears slopes toward the upstream side of the dam. Although there are leak-offs through the concrete wall crest, the buildup of sand sediment indicates areas of ponding which may lead to infiltration into the embankment through cracks in the roadway.



Photo 16 - The gatehouse for the low level outlet at the upstream center of the dam, as seen from the right upstream abutment area.



Photo 17 - The primary spillway near the left end of the dam. Note here the growth of woody vegetation and a tree within 25 feet of the end of the dam, both of which should be removed.



Photo 18 - Typical of the joints along the upstream concrete wall. The joint sealant is weathered and in most instances has separated from the concrete; ins some cases, sealant is missing form the bottom of the joint which is close to or just below water level. This leads to infiltration of flow into the embankment.



Photo 19 - The entrance door to the gatehouse, showing signs of corrosion and some displacement of the door frame at the base, which leads to difficulty in opening the door.



Photo 20 - The inside of the gatehouse, showing the low level outlet control valve. Corrosion is minimal and the valve is reportedly in good operating condition. Note the condition of the door frame base.



Photo 21 - The left side of the gatehouse, with a crack emanating from the top of the right window corner. While not a serious problem at this time, the crack should be repaired to avoid more serious displacement with continued exposure to the elements.



Photo 22 - Another of the upstream weathered joints with deteriorating sealant. This photo also shows a piece of concrete ready to fall off due to a horizontal crack, located between a vertical joint and a cutout leak-off for road drainage.



Photo 23 - A section of broken concrete and open joint on the left side of the spillway in need of repair. This area, because of the grating and fence screen should always be closely monitored for the buildup of debris, particularly during storm situations when blockage could occur.



Photo 24 - The upstream end of the primary spillway discharge channel, showing minor cracking along the upper wall area and seepage along the base of the right wall. Of note here are two items not visible; first, there is a steel support beam which spans beneath the concrete support wall at the base of the tunnel roof and, secondly, there are open joints in two of the support stone masonry blocks just inside the upper end of the tunnel where there are voids in the soil area between the blocks.



Photo 25 - A close-up view of the seepage at the base of the spillway wall . The seepage is currently minor, but should be monitored on a continuous basis for any change in quantity or quality (turbidity) - as with that noted for the low level outlet discharge area.



Photo 26 - An overview of the upstream side of the dam as seen from the left abutment area.