JANET T. MILLS
GOVERNOR
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DOUGLAS A.
FARNHAM
COMMISSIONER

MAINE OFFICE OF DAM SAFETY

PETER J. ROGERS
DIRECTOR

Certified Mail

Date: November 3, 2021

Bucksport Mill LLC
Attn: Dave Bryant
PO Box 1874
Bucksport, ME 04416

SUBJECT: Dam Inspection Report for MEMA #105 Silver Lake Dam

Dear Mr. Bryant:

On behalf of Commissioner Douglas Farnham, thank you for your cooperation to facilitate the required inspection of your dam by the Maine Office of Dam Safety.

Per Title 37-B MRSA, Chapter 24: Dam Safety, your dam is required to be inspected every six (6) years for condition and every twelve (12) years for hazard. Your dam was inspected on October 12, 2021 by Tony Fletcher, PE. Please find attached the condition report with recommendations.

Should you disagree with the findings and recommendations of this report you may respond in writing to this office within twenty (20) days of receipt of this letter. Further you must file the basis of your appeal within 3 months of receipt of this letter.

Should you have any queries, please do not hesitate to contact either the Dam Safety Administrator, Tara Ayotte at (207)-624-4400 or tara.ayotte@maine.gov or the Operations and Response Division Director Steven Mallory at steven.mallory@maine.gov.

Thank you again.

Sincerely,

Peter J. Rogers
Director

Enc: Distribution List
Dam Report

MAINE EMERGENCY MANAGEMENT AGENCY
72 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0072
PHONE: 207-624-4400/800-452-8735
FAX: 207-287-3178

DAM INSPECTION REPORT
ELECTRONIC DISTRIBUTION LIST

DEPARTMENT OF DEFENSE, VETERANS, AND EMERGENCY MANAGEMENT

Major General Douglas A. Farnham, Commissioner
Steven Mallory, Director of Operations and Response, MEMA
Tara Ayotte, Dam Safety Administrator, MEMA (MEMA Dam File)

OTHER
Andrew Sankey, Hancock County EMA Director
Susan Lessard, Town Manager, 50 Main Street, PO Box X, Bucksport ME 04416
Aim Recycling, Kyle Nenninger, knenn@aim-recycling.com (Electronic)

State of Maine
Department of Defense, Veterans and Emergency Management
Maine Emergency Management Agency
Office of Dam Safety

#105 Silver Lake Dam

Town of Buckport, Hancock County, ME

Hazard & Condition Report

Date of Inspection – 10/12/2021

Prepared for:
The Operations Director
MEMA

Prepared by:
Tony Fletcher PE
Acting State Dam Inspector

MEMA, 45 Commerce Drive, Suite #2, 72 State House Station, Augusta, Maine 04333-0072
Phone: 207-624-4400/800-452-8735 Fax: 207-287-3178

Contents

Attachments

Memorandum

To: The Operations Director, MEMA
Copy: MEMA Dam Safety Office
From: Acting State Dam Inspector
Date: October 24, 2021

RE: Condition Assessment of #105 Silver Lake Dam, Town of Bucksport, Hancock County, ME

Attached please find my hazard & condition report for Silver Lake Dam, a high potential hazard, complex, earth & concrete, gravity dam, located in the Town of Bucksport, Hancock County, ME. The dam is owned by Bucksport Mill LLC, represented by Mr. Dave Bryant, who, together with the dam operator, attended the inspection. The dam previously belonged to the Verso Paper Corporation which, apart from its electric generator, has been demolished. Currently Silver Lake is the water source for the Town of Bucksport.

The dam was built by St. Regis Paper Co., in 1930, to supply water to the paper mill as well as the Town of Bucksport. Records show that the dam underwent major repairs in 1984 - 37 years ago. The 1984 repairs included; dewatering, resealing the foundation, refacing exposed surfaces of the concrete spillway and channel & the construction of a new spillway bridge.

Before inspecting this dam, I reviewed the following: 1) the dam's emergency action plan (EAP), 2) the MEMA dam file. My findings were; The dams MEMA breach inundation maps are satisfactory, but must be verified by the dam owner. A breach of this dam will do two things; cause extensive downstream damage to the Town of Bucksport & interrupt the Towns water supply, therefore, per MRS 37B C24, the dam must remain a high potential hazard dam. The dams EAP is current & should be tested by the dam owner before the 2022 spring runoff.

Dam components inspected on the morning of 10/12/21; both abutments, the top of the dam, the upstream wave protection, the entire downstream of both embankments, the toe area, the concrete spillway & channel & bed. Components not inspected were; the underneath of the bridge, the steel bulkheads on the spillway crest, the stoplog gate & all underwater faces of the dam. One piezometer was found on the right embankment. Spillway overflow & gate leakage were not measured. Unusually, the right spillway was overflowing, but the left was not.

The following dam defect were found; tree roots in both embankments, uneven & settled stone wave protection, uneven embankment surfaces of sporadic settlement, seeps from both embankments, general efflorescence on most concrete surfaces & sediment and reeds in the channel. Despite the dam's unsatisfactory condition & no sign of incipient structural failure were found.

To improve the safety of Silver Lake Dam I recommend that the dam owner;

1) Authenticate the dams EAP inundation map, then test the dam's emergency action plan (EAP), before the spring runoff.
2) Root out all brush growing on both embankments, plus a 20' downstream of the toe, then topsoil & grass.
3) Develop an operation & maintenance plan for the dam & inspect it twice a year for developing flaws.
4) Find all toe drains & sumps, monitor & record their flows & lake elevation, twice a year beginning in May.
5) Locate & map all leaks & record leak flow twice a year, May & November, compare results.
6) Report results of these recommendations to the MEMA Dam Safety Office after the spring runoff each year.

If you have any questions about this report, please do not hesitate to contact me.

Sincerely,

Tony Fletcher PE
Acting State Dam Inspector
(207) 592-4315

Preface - Information for the Dam Owner & Operator.

The purpose of this report is to recommend "necessary remedial measures" to improve the safety of this dam per Title 37B MRSA c 24, "Dam Safety", a copy of which may be obtained from the Dam Safety Office, MEMA. The purpose of this law is to determine which dams are "jurisdictional" based on size dams in Maine are constructed, maintained & operated in a safe manner. The law mandates two types of dam assessment; "hazard" to estimate a dams "potential to cause damage" if it failed & a "condition" assessment to determine what "necessary remedial measures" are required to improve the safety of the dam which normally requires a field inspection. Only those dams classified a high & significant hazard dams require "condition" inspections every 6 years. Maine dam safety law does not authorize the Department to issue permits to construct or repair dams. This is the duty of the Maine Department of Environmental Protection.

The "hazard" classification of a dam is a measure of its "potential" to cause downstream damage if it failed. It is NOT a measure of its "condition". Dams classified a) "High hazard" threaten human life, b) "significant hazard" threaten downstream property damage, c) "low hazard" have a low potential to cause either loss of life or downstream property damage. The law requires "hazard" assessments every 12 years for all dams. The "hazard" of a dam may be assessed by inspection of the dam's basin and downstream watercourse, or it may be assessed using dam breach analysis. In terms of the law, dams which are classified "high hazard" (HH) or "significant hazard" (SH) require "emergency action plans" (EAP's), a plan intended to minimize the downstream impacts of dam failure. This plan must be exercised regularly by the dam owner to test its effectiveness.

The "condition" of a dam is determined by a visual inspection of components of a dam, such as the top, upstream & downstream faces, the toe & groin areas, all abutments, spillway & outlet structures & the reservoir shoreline. Other items considered are - gates, power features, mechanisms, security arrangements, dam operation & maintenance procedures, etc. A condition inspection seeks defects which would lead to failure or breach of the dam. Dam defects include - root penetration from vegetation & trees growing on or near the dam which also conceals dam surfaces, any movement observed (misalignment, settlement, cracks joint opening), leakage, seepage, piping, debris blocking gates & spillways, concrete conditions & ASR (see below) missing control features, toe scour, mis-operation & the like. During the condition assessment for this dam, its design, stability, foundation, construction, EAP, SOP's were not assessed. No surveys, material sampling or testing was done. The foundation was not investigated nor was the gate tested. Attachment A shows photograph taken during the inspection.

Note 1 - *Alkali-Silica Reaction (ASR) (also Alkali-Aggregate Reaction - AAR) is the decay of concrete that occurs under humid or wet conditions. ASR is an irreversible, internal chemical reaction in concrete, which occurs within the body of the concrete between un-hydrated sodium & potassium alkalis in Portland cement & high silica aggregates (common in the north east USA). The products of this reaction expand & physically change the properties of the concrete. Indicators that ASR is occurring in concrete are; surface cracks, crumbling, spalling & discoloration. ASR can occur, at joints, pipe/concrete interfaces & at dam/foundation joints, where it can reduce the dam's resistance to sliding. When found, the extent of ASR degradation should be recorded & monitored. The depth ASR can be determined by coring & sampling. Decayed concrete should be cut out & replaced by new concrete.*

The Office of Dam Safety, Operations Division, Maine Emergency Management Agency (MEMA), are responsible for implementing Maine Dam Safety Program (MDSP) per MRCS Tittle 37B C24 "Dam Safety". This report was prepared by an independent contractor to the department. Queries regarding this report should be addressed the Director or Planning Associate.

Table 1 Contacts

General Enquiries	**Director of Operations**	**Acting State Dam Inspector.**	**Dam Safety Emergency Planning.**
Office of Dam Safety. MEMA, 45 Commerce Drive, Suite #2, Augusta, ME 04333-0072 Tel: 207-624-4400 Fax: 207-287-3178	Steve Mallory Tel: (207) 624-4476 Fax: (207) 287-3178	Tony Fletcher Tel: (207) 624-4465	Tara Ayotte Tara.Ayotte@maine.gov Tel: (207) 624-4432 Fax: 207-287-3178

Note 2 – Right to appeal the findings of this report. Per Title 37b, C 24 "Dam Safety", if a dam owner disagrees with the findings of this condition report, the dam owner, lessee or other person in control of the dam, must notify the Commissioner, Maine Department of Defense, Veterans & Emergency Management (DVEM) within 20 days of receiving this report. The dam owner then must provide the "basis of disagreement" to the commissioner within 3 months of receipt of the inspector's report. The dam owner may apply for & be granted a further 3-months extension to this deadline for good cause, but no more.

#105 Silver Lake Dam – Hazard & Condition Report

1) Purpose & Method

The purpose of this report is to recommend necessary remedial measures (NRM's) to improve the safety of Silver Lake Dam. This report is based on; a review of the file, an assessment of the emergency action plan (EAP) & the 10/12/21 visual inspection of the dam. The inspection was based on the inspection checklist & guidelines directory attached to the safety assessment form.

2) Attachments

The following documents are attached to this report for information purposes. Please examine & read remarks.

Table 2. Attachments – 14 Pages

Refer	Pages	Description & Comments
A	5	30 Inspection photographs, with descriptions.
B1-B3	3	B1 - Location of Silver Lake Dam (Topo-Quad), B2 - Reservoir Basin, B3 - Rainfall & Runoff data from Stream Stats
C	1	Aerial Image of Dam (Google Earth). Circles denote position of pools possibly caused by dam leakage.
D1	1	Plan of Seepage Zones. - - - - - denotes seepage zones that must be investigated by dam owner.
D2	1	08/12/21 Brush Cut Inspection. This inspection was done prior to cutting the brush in preparation for the inspection.
D3	1	Cutoff Wall Section, 2 Embankment Sections & Sump Sections. Note – sump was not seen on the day.
D4	1	Bridge & Riprap & Concrete Retaining Wall Rehabilitation. This Section is likely to be typical for all concrete repairs.
D5	1	Spillway Section – Note the operating regime of the Lake. Gate currently used to alter lake level. Note sediment.
E	1	Bedrock Report by MDOT Geologist. Note that dam core is "set into bedrock". Note remarks re; faults.

Note 3 – The MEMA "Dam Safety Assessment", done during this inspection, is not attached to this report, but is on file.

3) Emergency Contacts

Table 3 - Dam Owner, Contact, Town Fire & Public Safety & County EM Director

Dam Owner	**Dam Operator**	**Bucksport Fire & Public Safety**	**Hancock County EM**
Dave Bryant Bucksport Mill, LLC PO Box 1874 Bucksport, ME 04416 Phone 920-470-1061 Cell 920-470-1061 Fax 207-469-1704 jmcglin@aimrecyclinggroup.com	Kyle Nenninger Bucksport Generation, LLC 2 River Road Bucksport, ME 04416 Phone 207-469-1311 Cell 207-852-8844 Fax 207-469-1704 richard@buckgen.com	Directpr Public Safety – Sean Geagan sgeagan@bucksportmaine.gov Deputy Fire Chief – Michael Denning mdenning@bucksportmaine.gov 89 Franklin Street, PO Box 1848 Bucksport, ME 04416 Phone: (207) 469-7951 Fax: (207) 469-3122	Director: Andrew Sankey 50 State St., Suite 4, Ellsworth, ME 04605 Office: (207) 667-8126 Cell 207-266-0743 Fax: (207) 667-1406

Note 4 – Owner please confirm these contacts are correct & on the dam's EAP. MEMA must be apprised of any changes.

4) Previous Inspections

Table 4. Previous Inspections

Rpt.	Date	By	Principal Defects
1	1977	MDOT	Trees/concrete cracks/snowmelt hid any leakage/Bedrock report/
2	1978	USACE	Hazard/high/PMF/Breach flows Condition/trees/concrete cracks & deterioration/seepage/
3	Aug 1998	MBP	Con/Sediment/bank uneven/spillway cracks/bridge decay/seepage/stoplogs/PE inspect 3 years/O&M Plan/EAP
4	Jun 2002	MEMA	Con – riprap displaced/ruts/trees/seepage/local settlement/concrete cracking
5	May 2011	MEMA	Haz-review EAP Con- brush/spillway sediment/determine seepage flow/
6	Dec 2011	MEMA	Rapid Inspection
7	May 2015	MEMA	Condition/rutting/seepage/leak L wall/embankment settlement/
8	May 2017	MEMA	No change since last inspection
9	Jul 2020	MEMA	Report Incomplete & not recommended

Note 5 – The above 9 reports are from file "#105 Silver Lake Dam". The dam owner may request copies from MEMA.

5) Description of the Dam

Silver Lake dam is a 30-foot-high, 450-foot-long, high hazard, composite mass gravity/earth dam (A1, C, D1), located on Tannery Brook, upstream of downtown Bucksport (D1,D2,D3,D4,B1,B2). The dam was designed by the New England Public Services Company for the St Regis Paper Co., to supply water to its paper mill as well as to the Town of Bucksport. It was built in 1930 & extensively rehabilitated in 1984, 54 years after construction. (A7,A8,A9,A10) The dam is 91 years old.

The dam's spillways consist of one 6' gate between two 25' high, 20.5' long, uncontrolled ogee spillways, between vertical, mass gravity channel walls. The channel walls follow the shape of the embankments (A7,A8) & connect to a large junction block & the reinforced concrete cutoff wall inside each embankment (D1,D3). The ogee spillway crests are each topped by 4' high, permanent steel bulkhead (A19, A20). Between the spillways is one, 6' wide x 5.5' high, stop-log gate. The reservoir level can be controlled by adding or removing stoplogs only. If the stoplogs were removed from the gate, discharge at NP would be 232 cfs. While the stoplog gate is closed, there is no throughflow apart from leakage & it functions as a weir. The dam has two disused cast iron pipes through the foundation of right embankment but no dewatering outlet. The 36' rising main from Alamoosook does not discharge at the dam. The dam has no other controllable outlets.

Rehabilitation work done in 1984 included an upstream cofferdam to dewater the dam, sealing of the dams foundations, a new bridge over the spillway & refacing the spillway & channel. This rehabilitation is an indicator of the condition of the dam at the time which probably showed excessive concrete decay & leakage. It is likely the dam suffered aggregate silica reaction (ASR), cracked extensively & leaked. It is not known if the dam was considered unstable before its repair. No records exist of any previous dam at the site. The dams US Army COE 1978 inspection report for Silver Lake Dam is on file.

6) Silver Lake Basin & Reservoir

The Silver lake basin is 4.8-square-miles in extent. The basin is wooded, rolling hills with little urban development. Silver Lake at NP elevation 128', has an area of 700-acres, storing 7,900-acre-feet. At TOD elevation 133', the lake area increases to 776-acres & storage to 11,600-acrefeet. 4' high steel bulkheads installed on the ogee spillways, increased storage by 2,400-acre-feet, the volume released if a bulkhead failed.

Historically, water has been pumped from Alamoosook Lake into Silver Lake to augment water supply to the Bucksport paper mill. Now that the mill is gone, water is no longer pumped into Silver Lake.

Note 6 Silver Lake operating at NP elevation 128' has an area of 700 acres & NP storage of 7,900-acre-feet.. If the water in the lake rises to elevation 133' (TOD) the lake area increases to 776 acres storing 11,607-acre-feet. The Basin Area = 4.8-square-miles.

7) Gate & Spillway Performance

If all stoplogs were removed from the outlet gate, the discharge would be 232 cfs. Removing these stoplogs, say, in advance of a storm, or a drawdown, will be difficult, unless the logs are replaced by a mechanized gate. Assuming no stoplogs are removed & the lake rose to TOD, all 3 spillways would discharge at 1,580 cfs, before the dam overtopped. A failure of one bulkhead when the lake is at NP, would discharge at 490 cfs.

8) Dam Breach

The COE estimate of the "probable maximum flood" (PMF) at the lake of 8,000 cfs. Routed through the dam this"test flood" is 2,625 cfs. The actual dam spillway capacity when the dam is about to overtop (TOD) is 1,580 cfs. The deficit in flow is 1,045 cfs so the PMF is expected to overtop the dam by at least a foot. The spillway is therefore "inadequate" for a high hazard potential dam.

If the dam did overtop during a PMF event, the embankment is likely to erode, the toe would scour & the dam may breach by back cutting. One mitigating factor is that the dam has a reinforced concrete cutoff wall, but its condition is unknown.

The dam could also breach by overturning of the concrete spillway. Since all of the dam's spillway walls are mass-gravity & connected to the cutoff walls, which are stabilized by the embankments, this mode of dam breach is remote.

To give a sense of scale, a "full height" breach, 25' wide, lake at normal pool elevation 128', during "Fair Weather" conditions, would discharge at 9,499 cfs, which is 4 times the flow of the routed PMF.

9) Hazard Assessment

Reviewing the dams EAP breach inundation maps shows that a hypothetical "fair weather breach" of Silver Lake dam could flood up to 70 houses, endanger the lives of several hundred people & cause widespread property & infrastructure damage.

Per MRS 37B C24 the dam is a "high potential hazard dam" which requires an emergency action plan (EAP).

The next Hazard Assessment for Silver Lake Dam must be done before November 2033

10) Emergency Action Plan (EAP)

The EAP submitted for Silver Lake dam was done by a consultant & is current. The breach inundation map has been supplied by MEMA & requires authentication by the dam owner before an EAP tabletop exercise (TTX). The EAP should, if possible, be tested before the 2022 spring runoff.

Note 7 – Bucksport Emergency Services must expect upstream shorefront flooding of Silver Lake during large storms & should plan accordingly.

11) Findings of Previous Inspections

Principal common themes in the reports listed in Table 4 are; uncut brush concealing the embankments, deteriorating & cracked concrete in the concrete spillway & downstream channel & general seepage from the toe area of the embankment.

12) Field Inspection 10/12/21

Features of the dam inspected (D1); the L & R abutments, the L & R embankments on all exposed faces, the L & R upstream wave protection, the concrete spillway, the bridge deck, the L & R spillway channel walls, the spillway channel invert, the L & R embankment toe area, an area of downstream forest about 100' downstream toe groin. Several springs were found downstream of the dam. One significant wet area was found on the lower left embankment & several downstream of the right embankment in the woods. One of two piezometer tubes were found.

Not inspected; the under-surface of the bridge & its bearings, the L & R steel bulkheads (fixed to the crest of the ogee spillway), the stoplogs & gate outlet structure, all underwater faces of the dam.

I did not measure flow from any of the leaks at the toe of the dam, but it was steady & what I did see was leakage showed no sign of eroded material. How much seepage from the dam is flowing un the underdrains I could not determine.

Spillway overflow & gate leakage was also not measured. The dam has two ogee spillways separated by a stoplog gate. On the day the right spillway was overflowing but not the left.

13) Inspection Findings

The brush growing on the dam in August had been removed, facilitating the inspection.

A1 show an uneven top of dam. A2 shows upstream wave protection was displaced in places. Some riprap had slipped & some settled. The shoreline was not straight, A2, A22. Settlement of the shorefront was obvious in places especially at the concrete junction blocks near the spillway inlet A5, A6.

All embankment earth surfaces were grassed. All embankment surfaces were uneven. No significant slips or scarps were seen in the embankments except at A5, A6, A15, A16.

A muddy seep exists on the downstream face of the left embankment, A3, A4. Its flow at A7 was steady & clear, but its rate was not determined.

The downstream face of the right embankment has a bulge, A18, A24, which may indicate a developing slip.

Several springs have developed at the toe of the right embankment, A25, A26. A27 & A28 & some springs have developed in the wooded area downstream of the toe of the right embankment, C, D1 & D2.

All concrete spillway & channel surfaces have cracked & effloresced (A9, A10, A12 & A30). No misalignment was seen on concrete faces A12, A17, A18. The efflorescence seen on most concrete work is caused by minerals, dissolved by seepage passing through the concrete, being deposited by evaporation, leaving a white deposit near or on the concrete surface.

A11, A12, shows the results of a recent storm which caused the dams spillway to flow. Significantly the channel has silted, see D6 supporting thick vegetation. D6 also shows then components of the channel bed covered by silt. On the day of the inspection, Silver Lake was at NP elevation.

The steel bulkheads A19, A20, could not be accessed but appeared to be functioning satisfactorily. The gates stoplogs, A12, A13 & A20, leaked significantly & also could not be could not be accessed.

14) Conclusion

Silver Lake Dam is a high hazard dam which would have a significant impact on Bucksport & its citizens if it were to fail. Its condition is therefore critical to the safety of people & property downstream of the dam. The dams EAP & inundation map are current but untested. Based on this inspection, the dam has the following developing defects; uncontrolled & unmonitored leakage of both the right & left embankments, general efflorescence & loss of material & strength in the spillway channel walls (which retain the embankments) & by extension, possibly all concrete work in the dam, the unknown condition of the concrete cutoff wall in the embankment, an inadequate spillway, settlement of the embankments & uneven wave protection.

15) Recommendations

To improve the safety of Silver Lake Dam I recommend that the dam owner.

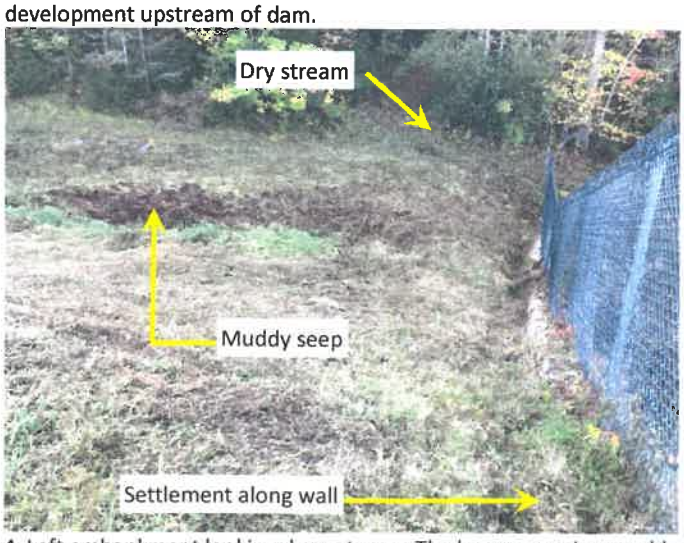
1) Authenticate the dams EAP inundation map, then test the dam's emergency action plan (EAP), before the spring runoff.
2) Root out all brush growing on both embankments, plus a 20' downstream of the toe, then topsoil & grass.
3) Develop an operation & maintenance plan for the dam & inspect it twice a year for developing flaws.
4) Find all toe drains & sumps, monitor & record their flows & lake elevation, twice a year beginning in May.
5) Locate & map all leaks & record leak flow twice a year, May & November, compare results.
6) Report results of these recommendations to the MEMA Dam Safety Office after the spring runoff each year.

Tony Fletcher PE
Acting State Dam Inspector

1. Left abutment from top of dam (TOD). Brush recently cut, bank well grassed. Some settlement along TOD. Downstrream slope has significant settlement in place.

2. Uneven TOD & stone wave protection. Waters edge not straight indicating settlement and/or riprap slippage. No new shorefront development upstream of dam.

3. Left embankment downstream recently cleared of brush. Both the inclined & level surfaces show uneveness indicating embankment or local slippage.



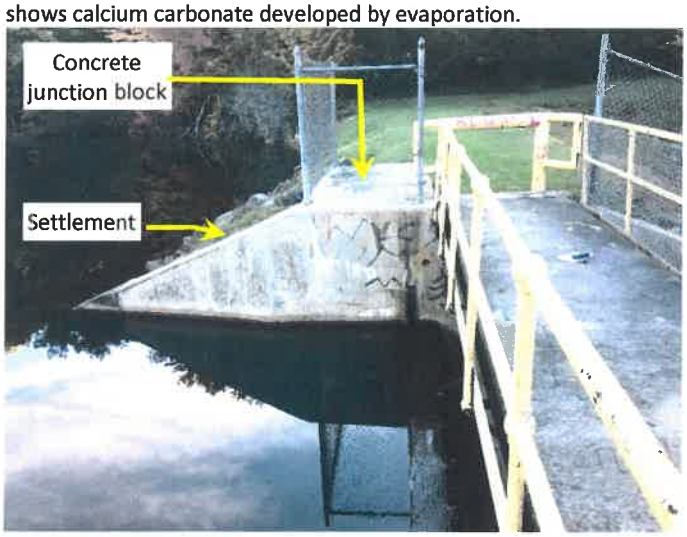
4. Left embankment looking downstream. The brown area is a muddy seep which must be inspected after spring runoff & around labor day & monitored for flow & reservoir stage.

5. Settlement, random boulders & uneven earthwork surface. Concrete cracked but surfaces are plain. This concrete block is connected to the reinforced concrete cutoff wall.

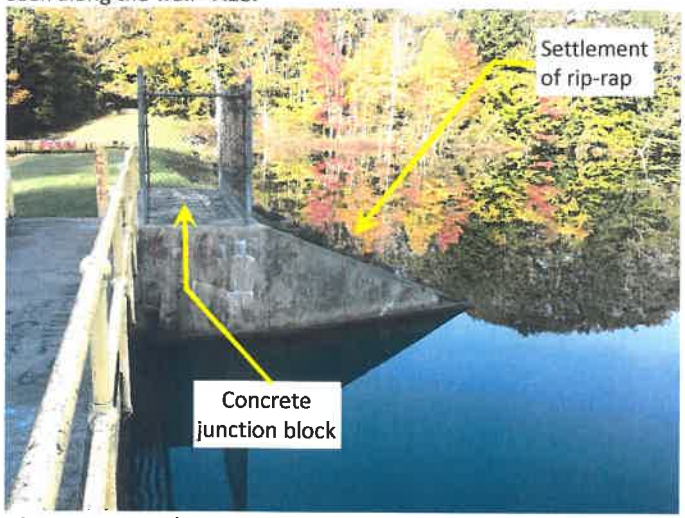
6. Stone wave protection (rip-rap) settled by up to 2 feet at the concrete connecting block - arrow. No visible distress in concrete.

7. Left downstream mass gravity channel. Built 1930, re-faced 1984, with Gunite. Photos show similar cracks & efflorescence reported by the Army Corps of Engineers (COE) in 1978, A3&A6. Efflorescence shows calcium carbonate developed by evaporation.

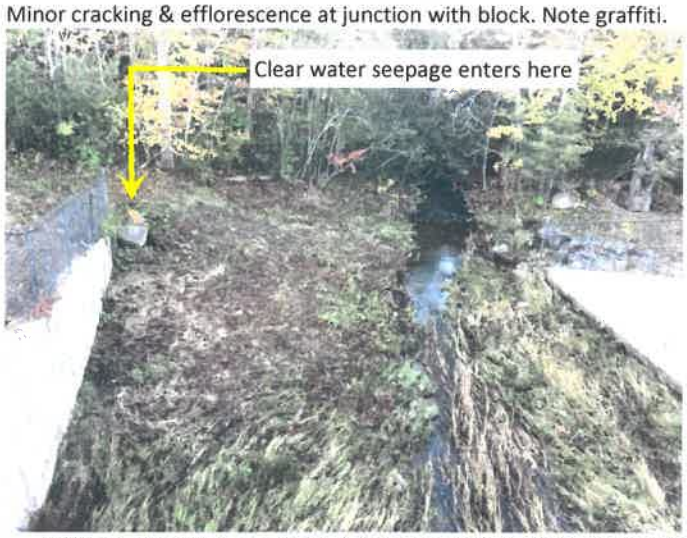
8. Same as A7. Craze cracks & a lift joint can be seen. Efflorescence caused by dissolved free lime in the leak dissolved within the mass gravity concrete wall. No inward deflection or iron oxide from rebar seen along the wall - A18.



9. Upstream, left mass-gravity retaining wing wall & footbridge. Minor cracking & efflorescence at junction with block. Note graffiti.

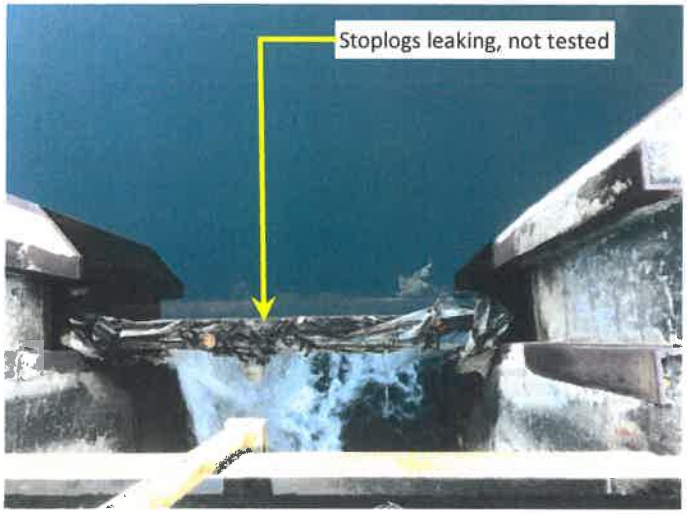


10. Upstream, right mass-gravity retaining wing wall & footbridge.



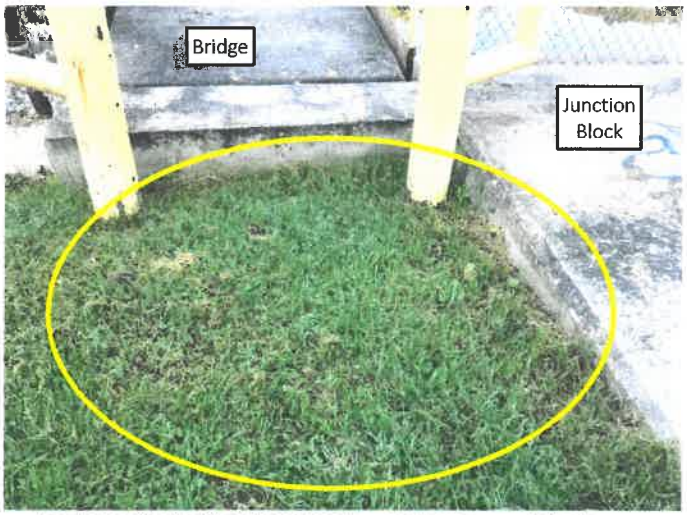
11. Spillway downstream channel between left & right wingwalls silted. Note flattened grass from recent storm.

12. Spillway & stoplog weirs. Note the right bulkhead overtopping considerably more that the left & leaking stoplogs leaking. Note difficult access to stoplogs.

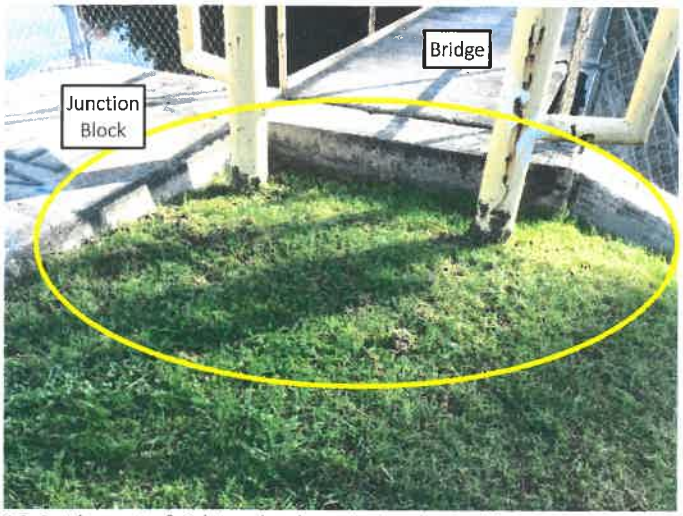


13. One 8' X 6' wide stoplog gate.

14. Stoplog gate guides.



15. Settlement of left embankment at walkway. No defects seen on the concrete junction.

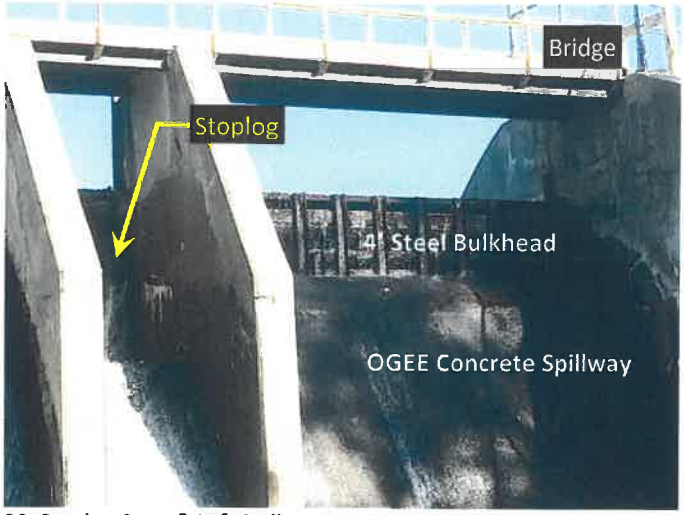


16. Settlement of right embankment at walkway. No movement seen on the concrete junction block.

17. Left embankment/wing-wall abutment. Swamp from seepage in the area where the brush has been cut.

18. Right embankment/wing-wall abutment. Note either settlement or erosion along wall

19. Right Spillway. The reason for overflow is that the top of the bulkhead is lower than the lrft bulkhead.



20. Stoplog Gate & Left Spillway.

21. Spillway Bridge from left embankment.

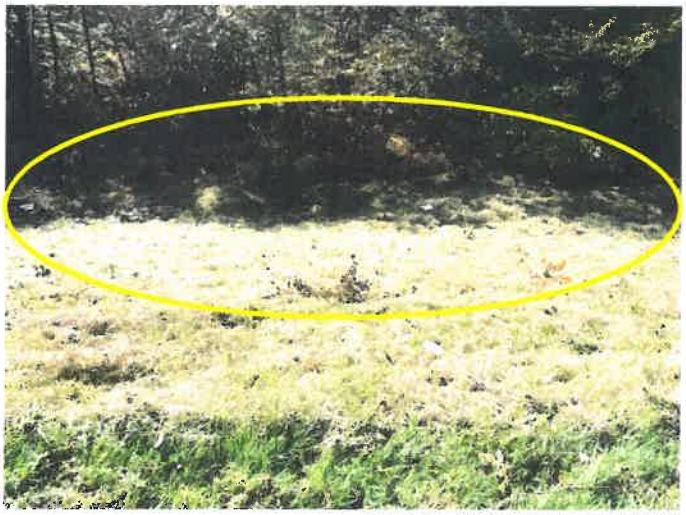
22. Right embankment stone wave protection (rip-rap). Remove brush & rearrange riprap to correct slope. Place new riprap where embakment is exposed.

23. Top of Right embankment & downstream face – mostly covered by grass. Downstream face of dam uneven due to local settlement and/or small slips.

24. Right embankment plane recently cut & uneven. Soil surface could not be seen, however, sporadic settlement, erosion & cracks seen.

25. Right embankment seepage clear, possibly a toe drain outlet.

26. View down right embankment toe. Yellow elipse is area where at least 6 seperate marches have formed. No seepage carried silt or was discoloured.

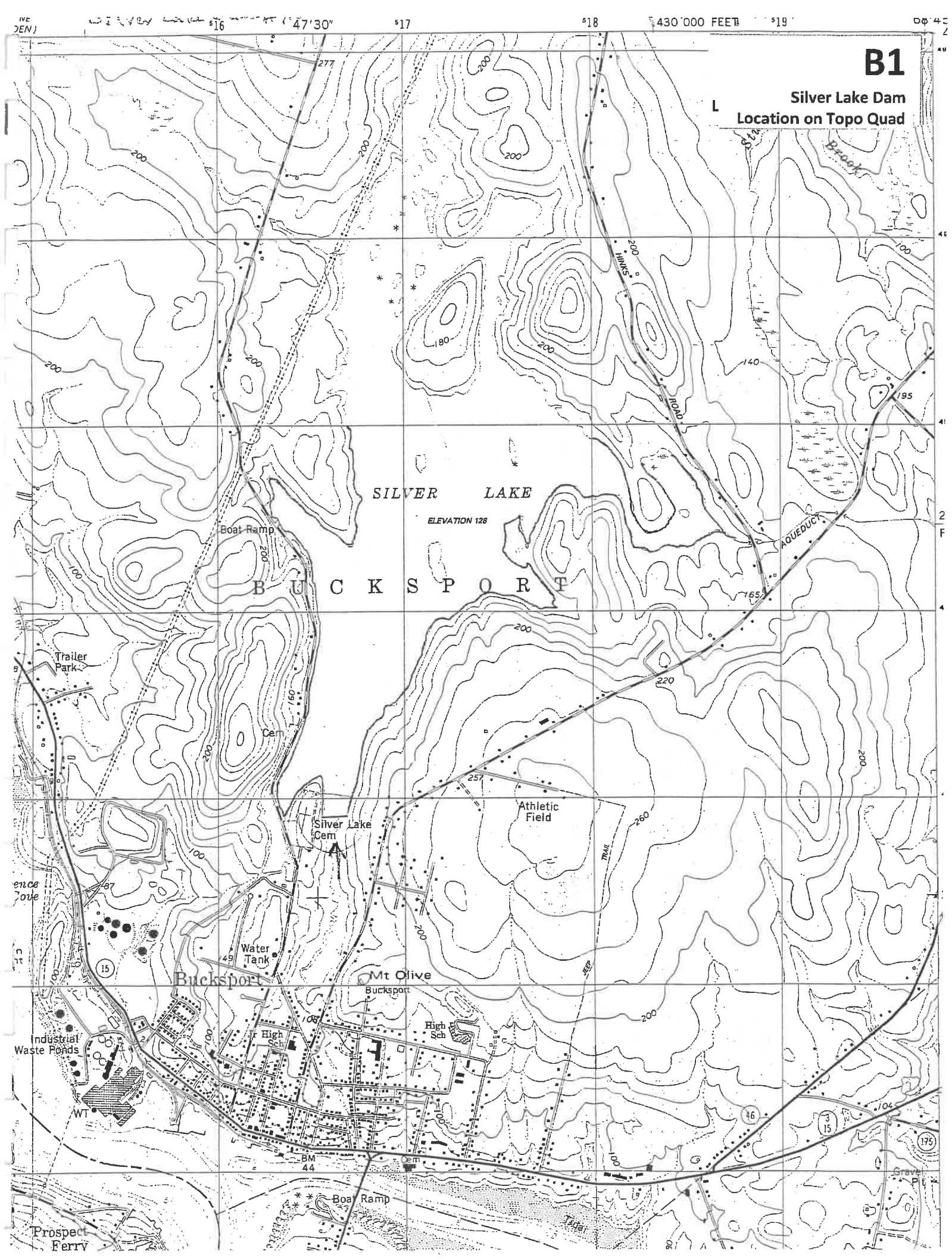


27. View down embankment toward seepage. A28 is in the middle of the photo.

28. Typical low flow marsh showing seepage. This spot is located about 150 feet from the left spillway wall.

29. Silver Lake reservoir. Rural watershed. no shoreline development.

30. Efflorescence (calcium carbonate) caused by evaporation of water seeping through cracks in the channel wall.

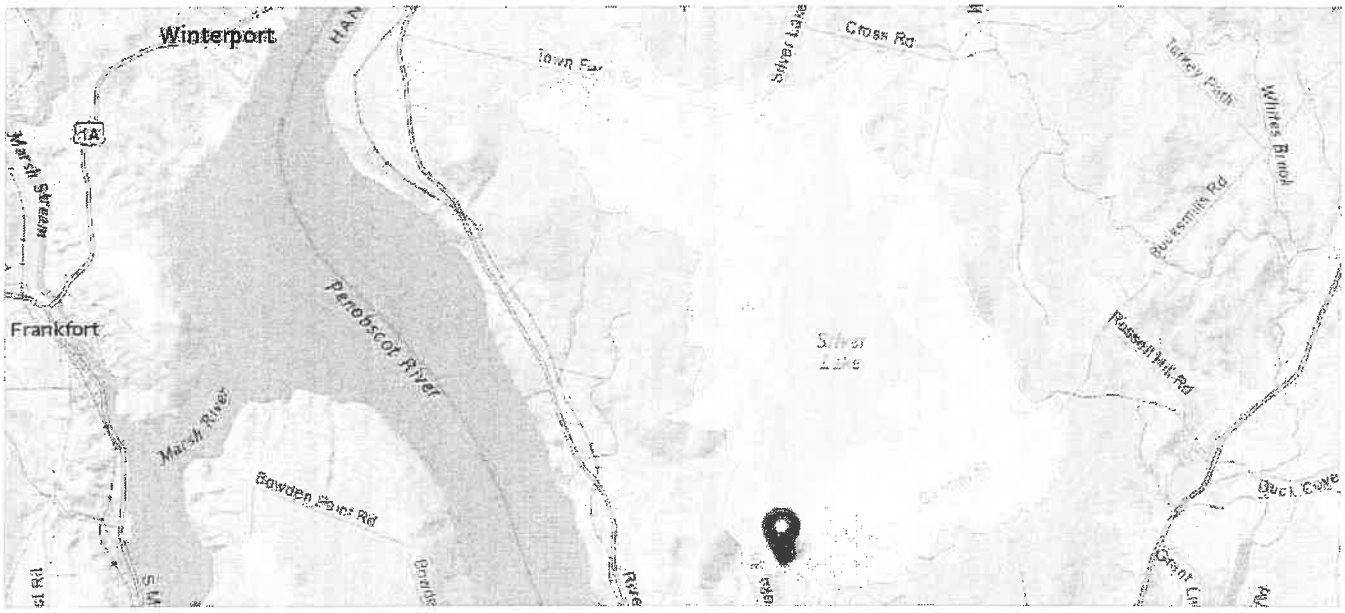

B1
Silver Lake Dam
Location on Topo Quad
L
SILVER LAKE
ELEVATION 128
BUCKSPORT
Boat Ramp
Trailer Park
Cem
Silver Lake Cem
Athletic Field
Water Tank
Bucksport
Mt Olive
Bucksport
Jr High Sch
High Sch
Industrial Waste Ponds
WT
BM 44
Cem
Boat Ramp
Prospect Ferry
HINKS ROAD
AQUEDUCT
TRAIL
JEEP
Brook
Gravel Pit
47'30"
430'000 FEET

B2

Silver Lake Dam
River Basin Map

#105 Silver Lake Dam

Region ID: ME
Workspace ID: ME20210824185046145000
Clicked Point (Latitude, Longitude): 44.58735, -68.78988
Time: 2021-08-24 14:51:09 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	4.81	square miles
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	2.94	inches
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	24.557	percent
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	3.61	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.18	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	4.96	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	5.55	inches
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	6.16	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	6.84	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	7.81	inches
BSLDEM10M	Mean basin slope computed from 10 m DEM	6.42	percent
ELEVMAX	Maximum basin elevation	364.6	feet

Peak-Flow Statistics Parameters [Statewide multiparameter peakflows SIR 2020 5092]

B3
Silver Lake Dam
Rainfall & Runoff

Parameter Code	Parameter Name	Value	Units		
DRNAREA	Drainage Area	4.81	square miles	0.26	5680
I24H2Y	24 Hour 2 Year Precipitation	2.94	inches	1.92	4.17
STORAGE	Percent Storage	24.557	percent	0	29.4
I24H5Y	24 Hour 5 Year Precipitation	3.61	inches	2.48	5.38
I24H10Y	24 Hour 10 Year Precipitation	4.18	inches	2.84	6.38
I24H25Y	24 Hour 25 Year Precipitation	4.96	inches	3.3	7.75
I24H50Y	24 Hour 50 Year Precipitation	5.55	inches	3.65	8.79
I24H100Y	24 Hour 100 Year Precipitation	6.16	inches	3.99	9.88
I24H200Y	24 Hour 200 YearPrecipitation	6.84	inches	5.26	11.1
I24H500Y	24 Hour 500 Year Precipitation	7.81	inches	5.95	13.1

Peak-Flow Statistics Flow Report [Statewide multiparameter peakflows SIR 2020 5092]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

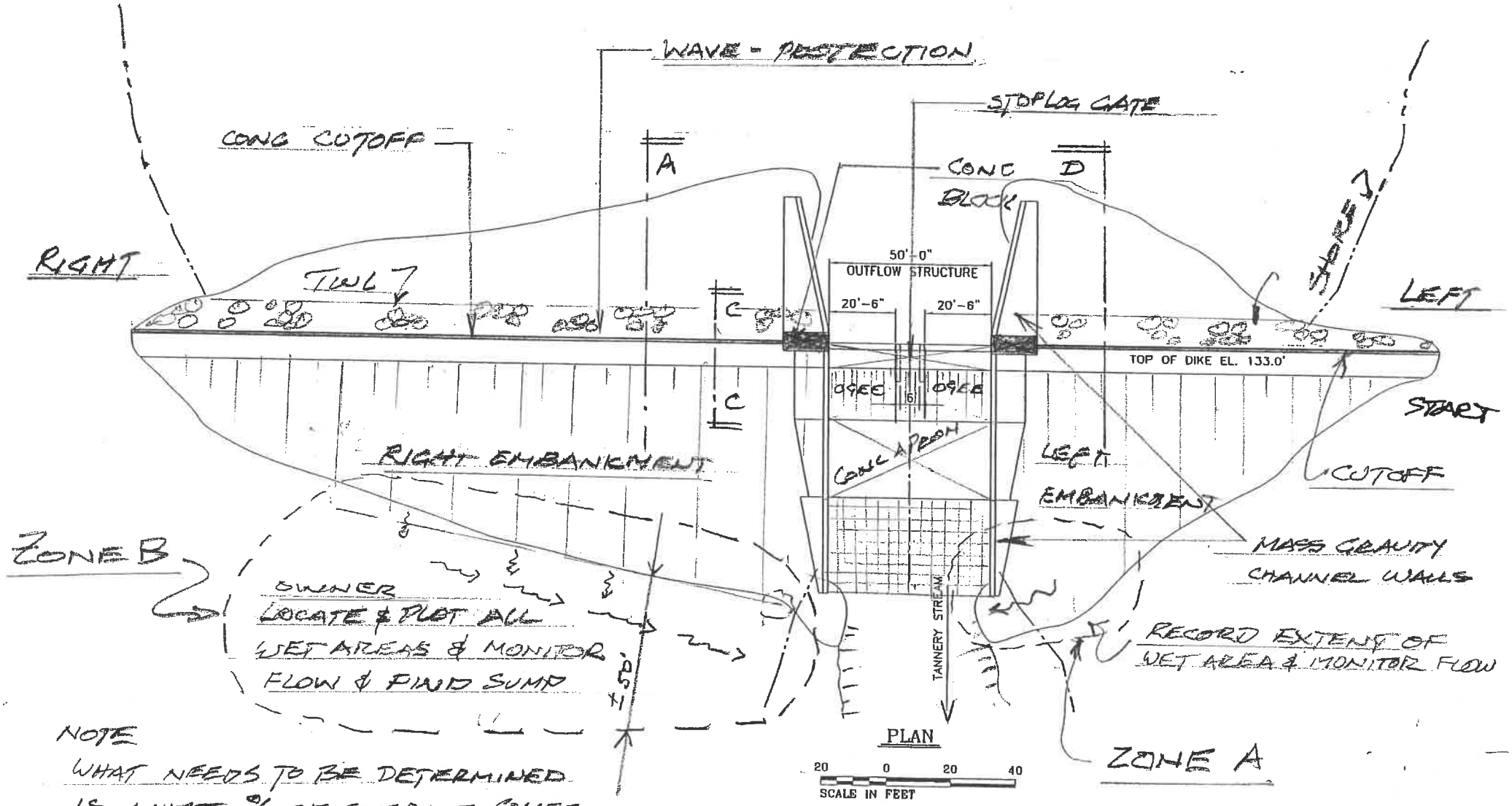
Statistic	Value	Unit	PII	Plu	ASEp
50-percent AEP flood	88.6	ft^3/s	47	167	39.1
20-percent AEP flood	130	ft^3/s	70	241	38.1
10-percent AEP flood (10 YR)	160	ft^3/s	85	301	38.9
4-percent AEP flood	200	ft^3/s	105	382	39.9
2-percent AEP flood	230	ft^3/s	118	447	39.7
1-percent AEP flood (100 YR)	262	ft^3/s	136	506	40.7
0.5-percent AEP flood	301	ft^3/s	151	602	42.8
0.2-percent AEP flood (NOTE →)	346	ft^3/s	171	702	43.8

Peak-Flow Statistics Citations

Lombard, P.J., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on gaged and ungaged streams in Maine: U.S. Geological Survey Scientific Investigations Report 2020–5092, 56 p. (https://doi.org/10.3133/sir20205092)

Application Version: 4.6.2
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2


#105 Silver Lake
Image Date: May 2018
C
Silver Lake Dam
Aerial Image
Google Earth
N
100 ft



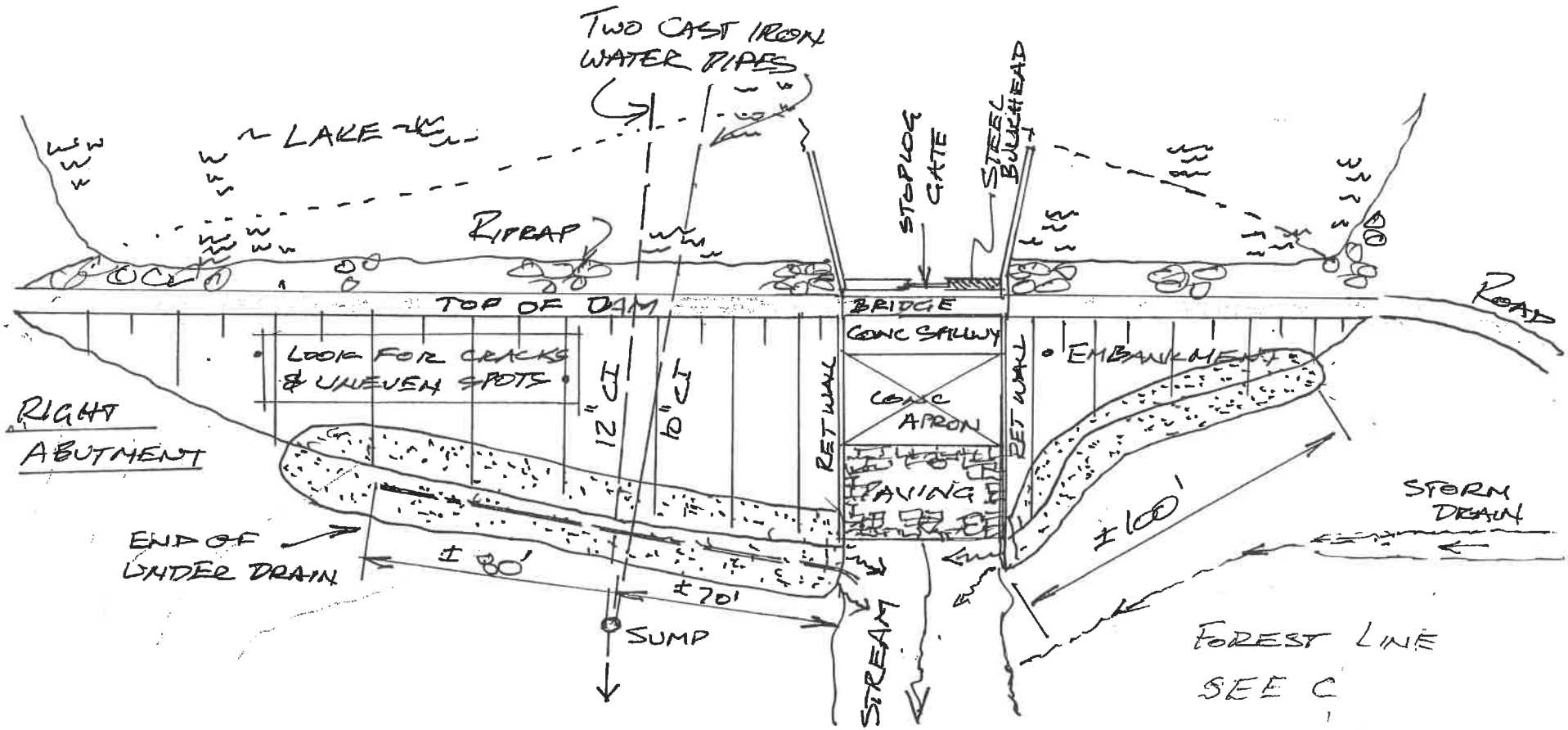
NOTE

WHAT NEEDS TO BE DETERMINED IS WHAT % OF SEEPAGE COMES THROUGH THE DAM

D1

Silver Lake Dam

Plan of Seepage Zones



KEY

— GROIN

CHECK FOR SEEPAGE

LIKELY UNDER DRAIN

(P) → PHOTO FROM - TO

CHECK DOWNSTREAM FACE OF E

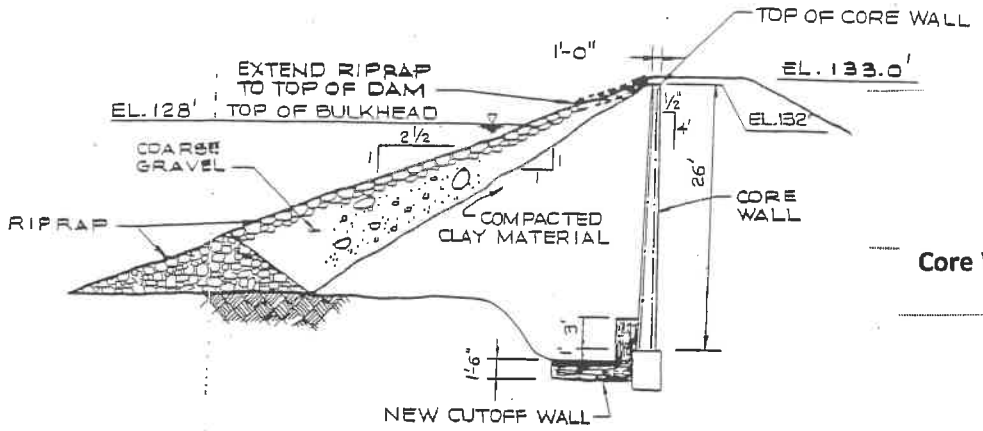
--- CI PIPES UNDER DAM

105 SILVER LAKE DAM

INSPECTION & PHOTOS

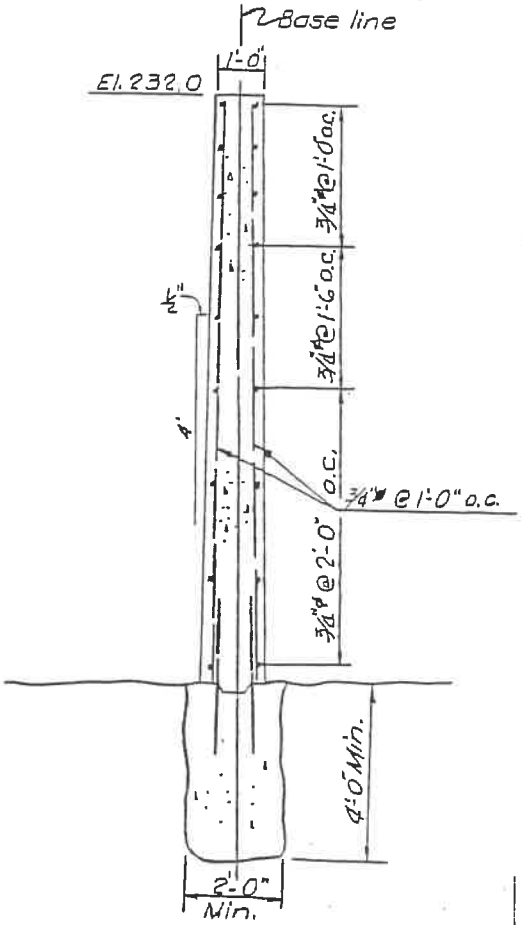
D3

Silver Lake Dam
1984 Rehab
Core Wall, Embankment & Sump Sections



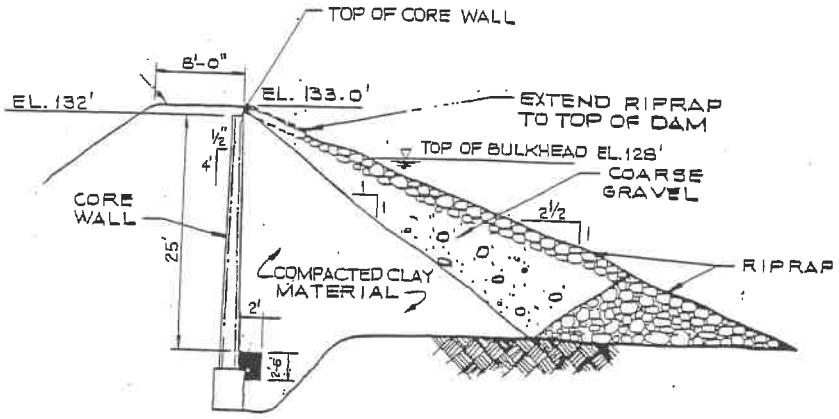
SECTION A

THROUGH EAST EMBANKMENT



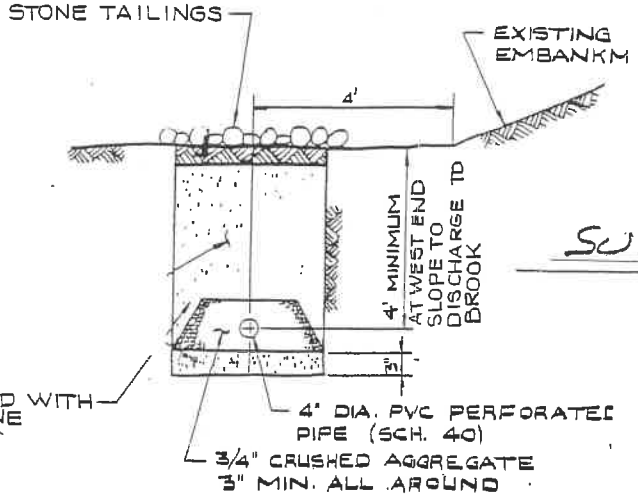
TYPICAL SECTION - CORE WALL

SCALE 1/2" = 1'-0"



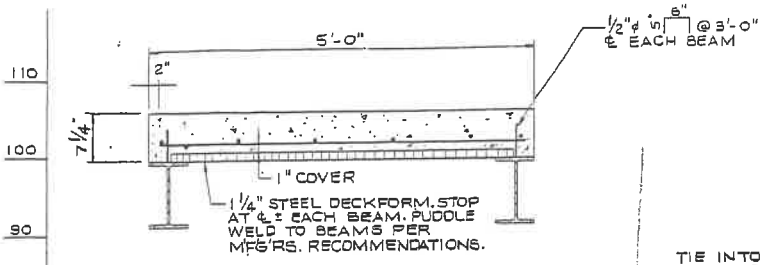
SECTION D

THROUGH WEST EMBANKMENT

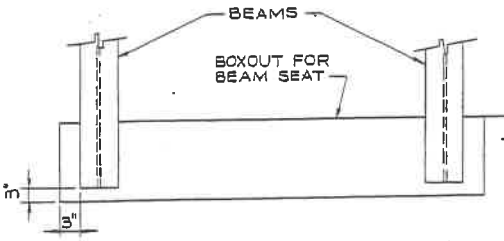


SUMP

BRIDGE

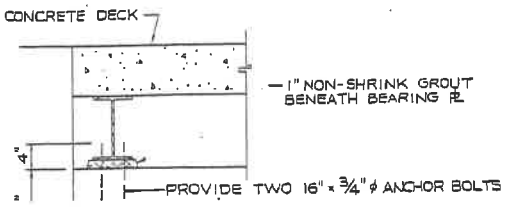


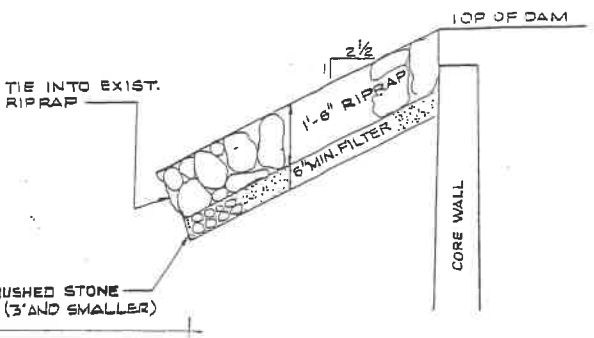
BRIDGE DECK REPLACEMENT
1" = 1'-0"



NOTE
EXIST. BEAMS SHALL BE REMOVED & BEAM SEAT REBUILT AS DETAILED. BEAM CAST-IN-PLACE FOR MIDDLE (PIER) SUPPORTS.

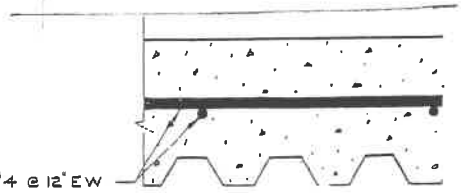
BRIDGE DECK SEAT - PLAN
1" = 1'-0"





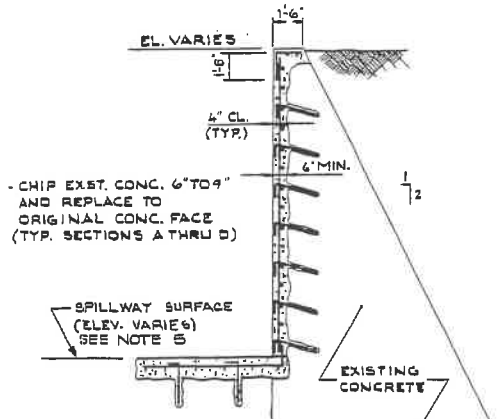
RIPRAP DETAIL

1¼" x 20 GA. COMPOSITE - FLOOR DECK (GALV.) FASTENED TO STEEL BEAMS & DETAILED PER MFGR'S RECOMMENDATION



BRIDGE DECK

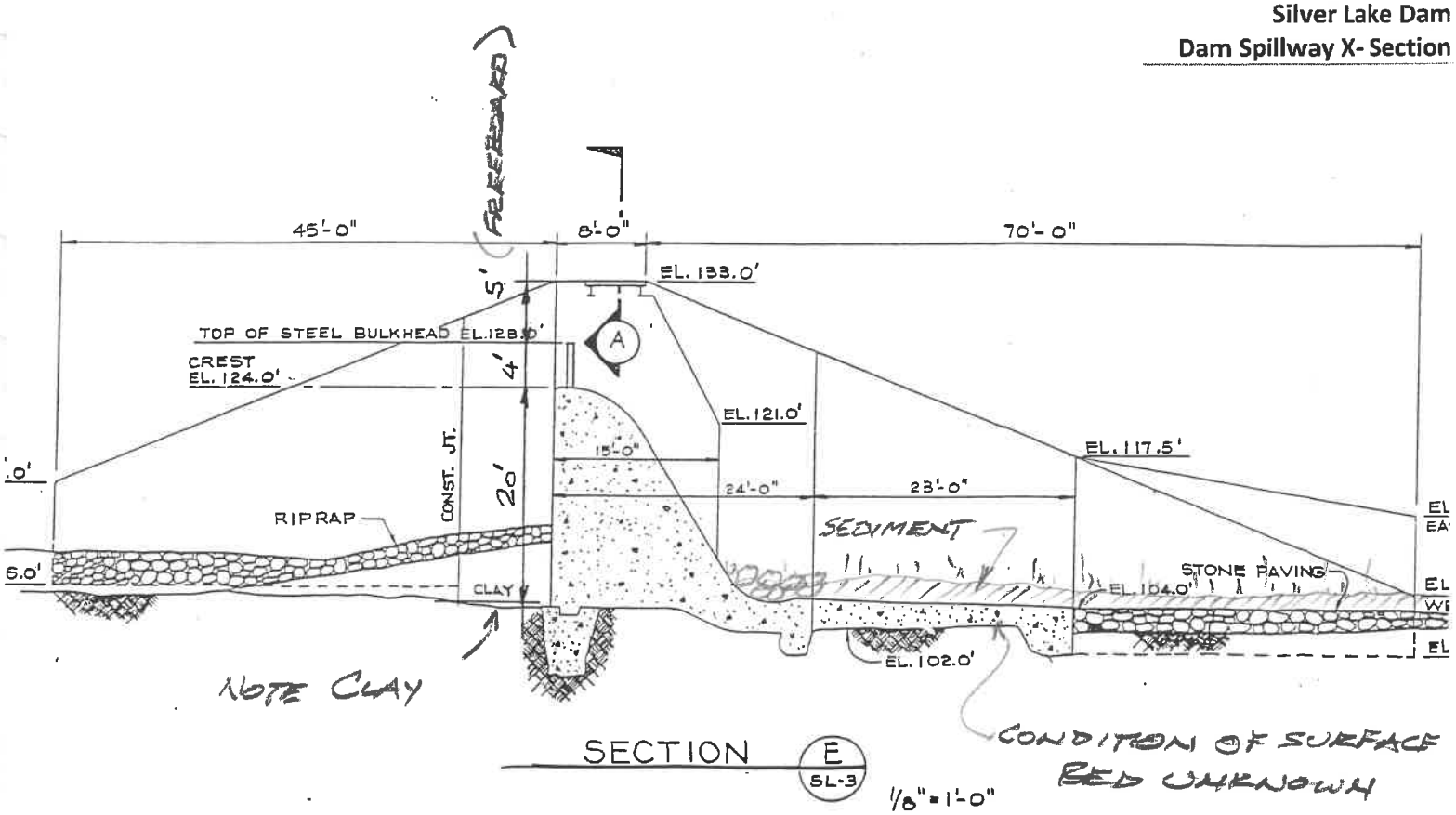
NOTE →



MASS-GRAVITY WALL SECTION REHABILITATION

D5

Silver Lake Dam
Dam Spillway X- Section



SILVER LAKE

12/15/77

E

Silver Lake Dam
Geological Bedrock Report

DAM INSPECTION #1

BEDROCK REPORT

NAME: Silver Lake Dam

TOWN: Bucksport COUNTY: Hancock

RIVER: Tannery Brook

TYPE OF DAM: Buttress Earth

PURPOSE: Water Supply

HEIGHT(FT.): 24

CAPACITY(ACRE FT.): 6428

UNDERLYING BEDROCK: Rusty weathering schist, sulfidic (General Class — Penobscot Fmn. — Undifferentiated Metasediments)

SITUATION: Dam is approximately 1600 feet south of the reported contact between the Penobscot and Bucksport Formations. This is a possible fault zone of some 5 miles in extent. No outcrops were noted in the dam vicinity. The concrete core of the dam (according to the original plans) is apparently set into bedrock. There is no historical record of movement along this fault zone. There are two larger fault zones north of the dam; Long Lake Fault, 3 miles distant, and Norumbega Fault, 7 miles distant, neither of which is known to be active in modern times.

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

Foresight Engineering P.C.

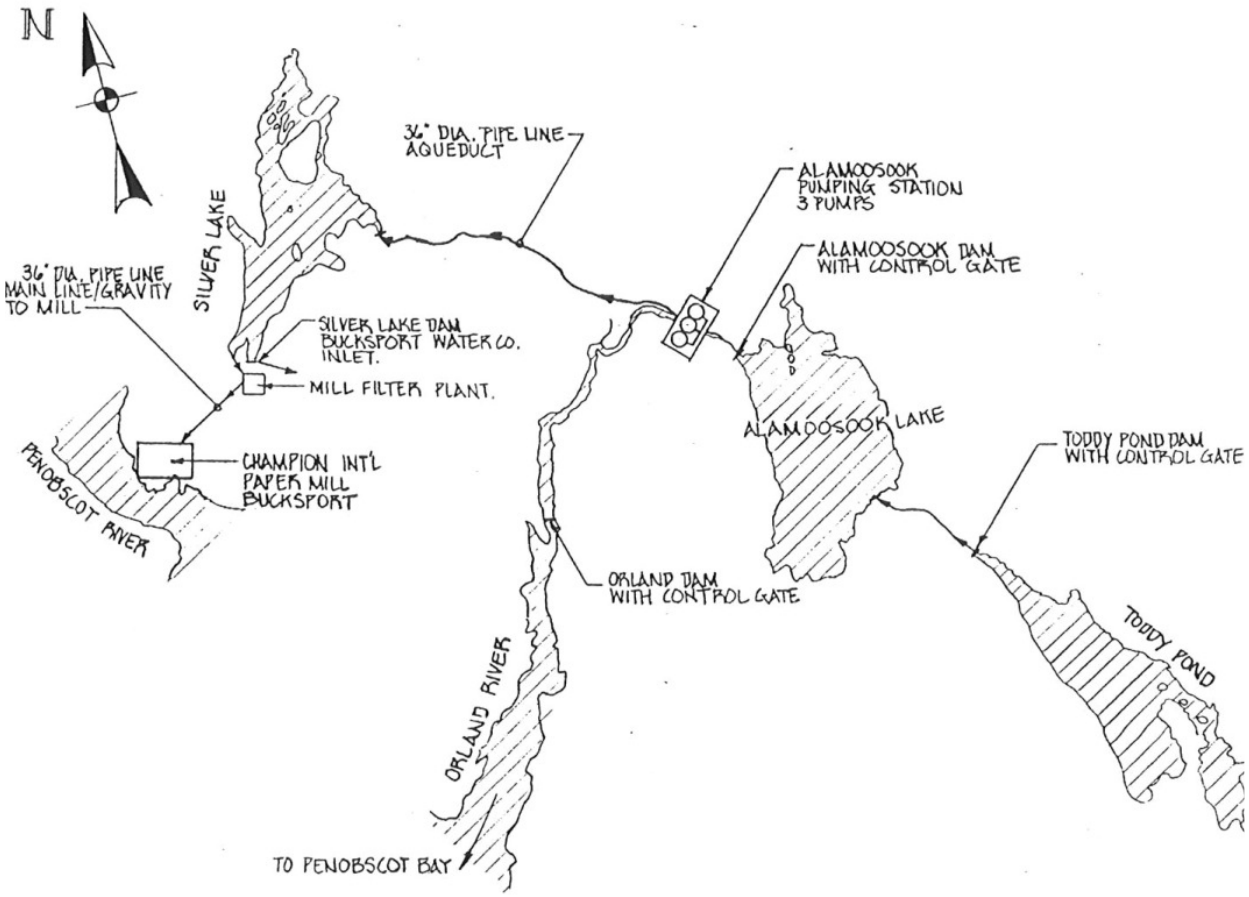
Downstream Engineering Assessment of Bucksport Mill Water System Silver Lake to Bucksport Mill

(Project # 22027R0)

10-30-2022

1.0 Purpose of Report:

1.1 The purpose of this report is to provide an engineering assessment of the general condition of the Bucksport Mill's Water System. The following maps show an overview of the entire water intake system. This report will evaluate from Silver Lake to the Bucksport Mill. The report also includes: Design capacity, life expectancy, spare parts, and operational / maintenance budgets.



2.0 Silver Lake Dam

2.1 Silver Lake Dam provides the lake water storage for the Bucksport Mill & the Town of Bucksport. The dam consists of an earthen embankment with masonry core and a concrete spillway and gate section.

2.2 The concrete and earthen dam had no spalling or earth movement and is in good condition.

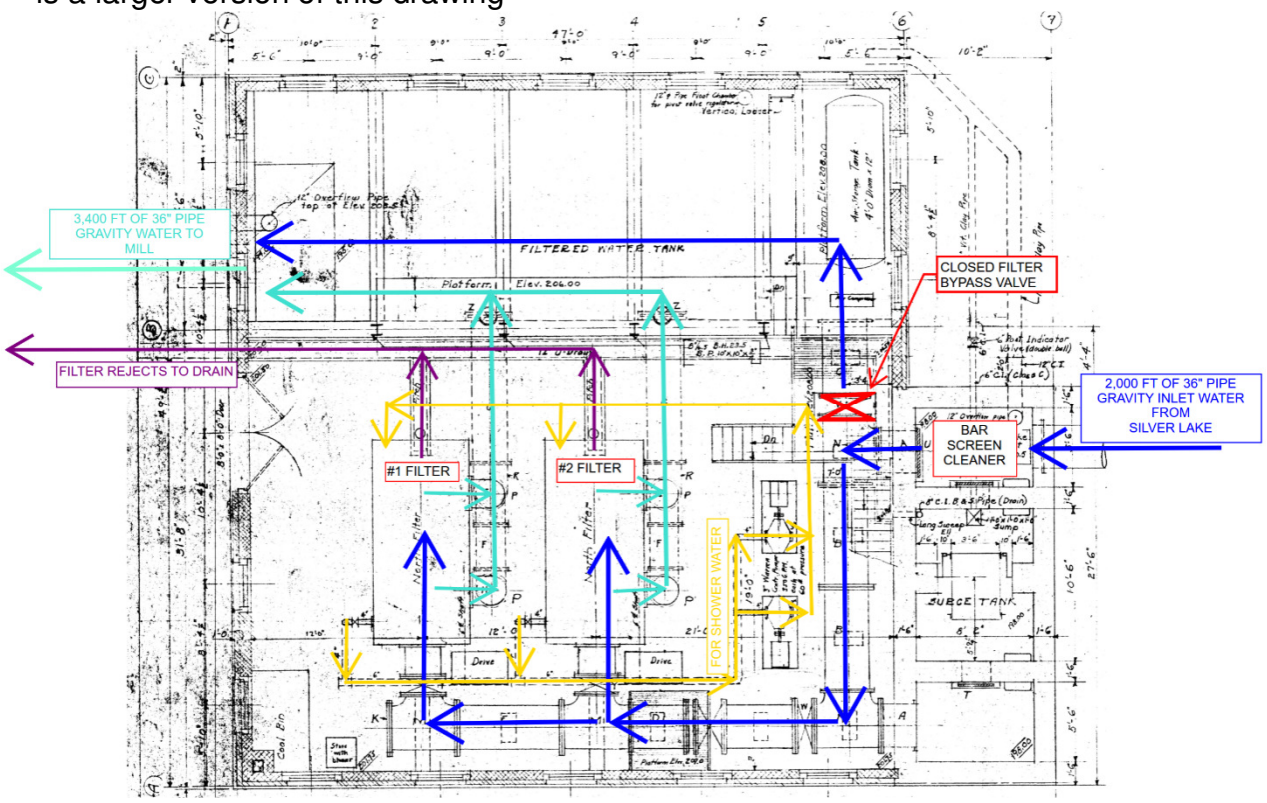
2.3The concrete wing walls shows water leaks thru the concrete cracks. To protect the rebar in the concrete, these cracks should be pressure injected if water leakage occurs.

3.0 Piping System from Silver Lake to Filter House

3.1 From the drawings, in 1930 about 2,000 ft of 36" diameter steel pipe was installed to the Mill's Water Filter Plant. The piping is mostly underground. We could not see any leaks on the day of our inspection.

4.0 Filter House

4.1 The Filter House will be reviewed using the following flow diagram. Attachment 2 is a larger version of this drawing



4.2 The 36” piping inlets to the Filter House traveling screen. This equipment is an automatic screen cleaner shown in the following pictures. If this screen is plugged, the water just outlets thru the surge tank.

4.3 The red valve shown above in the flow diagram is a 36” valve that is presently closed. This valve allows by pass of the remainder of the filter plant. The issue with by passing is at 5 MGD flow rate the velocity is only 1.14 ft/sec. Therefore, the sand and heavy material will settle in the bottom of the gravity piping to the Mill.

4.4 Each filter is design for 10 MGD. This picture is of the #2 filter. The inlet is on the left side. The clean water flows thru the screens on the front side. The spray water is on the top back side which pushes the debris to an internal outlet gutter. The debris and spray water drains on the right side.

4.5 The screen slowly rotates and is powered by a 3 HP motor. The drive rotates a gearbox and a chain which drives the shaft.

4.6 The shaft is support by bearing on both ends. The shaft turns the two small plastic pinion gears which rotates the two cast iron bull gears.

4.9 This is the #1 filter which has not run for several years.

4.10 The original 1930s brick building has a leaking roof system. Also the dark stain on the CMU wall is an area that the masonry needs to be repointed.

4.11 The addition on the left was built in 2006 for the chemical treatment of the water. This build is in good condition.

4.12 The second story shown has several cracks in the walls. This photo shows the cracks in corner. About six windows are so damaged that it is better to replace them.

4.13 The filter house has a backup generator. It is propane powered. We did not see this equipment running.

5.0 Expected Life Expectancy

5.1 The filters are 92 years old. They can be rebuilt to maintain good reliability. Since they run so slowly, the age has little impact on future expected life. The major question is can new cast iron gears be obtained. The existing bull gears still have at least 5 years of remaining life.

5.2 I can only find that the pumps were installed before 2006. They did replace the original Warren Pumps. Yearly vibration analysis will determine the life to rebuild. Power ends for Goulds 3196 are very common.

5.3 As for the 2,000 feet of carbon steel 36” diameter piping from Silver Lake and the 3,400 feet of carbon steel

36” diameter pipe to the Mill, you should expect a leak about every other year. These repairs are typical done with a stainless steel pipe repair clamp (see photo). If the leak is a small hole, this type of repair allows you to do the repair on the run. This type of underground water system are very common for Mills in the State of Maine. I personally know of raw water intake systems still in use that are over 100 years old that are still in service. The Bucksport piping system is 92 years old and no immediate issues are present.

6.0 Spare Parts

6.1 The filter has one spare screen drum that is stored outside. The screens are new on this filter.

6.2 This picture is a close up of the bull gear. Each filter has one bull gear on each end. Of the three screen drums, this one is in the worst condition. The rust flaking is typically 5 times greater than the actual corrosion. Due to the very slow turning rate, the drum still has life, but needs to be cleaned up and stored inside the 2006 addition.

6.3 Currently the Mill does not have the parts in Mill stores for the Goulds 3196 shower pumps.

6.4 Since the pipeline can have routine leaks, I would recommend that least one 36" SS repair clamp be on site. Presently none are on site.

7.0 Operational Budget:

7.1 At $120 /MWH, the cost to run 1 HP for one year is around $1,088. To run the traveling screen, one filter and one shower pump is around 25 HP. This equals $27,200 per year.

8.0 Maintenance Budget:

8.1 The following is the recommended maintenance:

- Replace the lubricants quarterly for equipment running continuously. Budget $9,000
- Measure vibration once per year. Budget $2,250
- Patch the piping once per year. Budget $15,000
- Maintenance for traveling screen. Budget $6,000
- Rebuild one filter screen. Budget $37,500 (1st two years)
- Rebuild one pump base, Budget $12,000 (1st two years)
- Repack the stem of the 30"valve. Budget $3,750 (1st year only)
- Propane usage: $6,000
- With the yearly total maintenance budget of $91,500

8.2 A motor will need to be replaced about every 10 to 15 years. The motor for the shower pumps is a 40 HP 1800 RPM 460 volt TEFC 1.15 SF. The price for this motor is around $3,750.

8.3 Another capital job is the roof repair on the brick & masonry building. The budget price for this project is $90,000. This is expected to be done within 2 years.

8.4 And another capital job is the replace the broken windows in the brick building and pointing of the masonry. The budget price for this project is $15,000. This is expected to be done within 2 years.

8.5 Another option is to put the filter plant bypass mode, and install two grit chambers in parallel to remove the sediment. This system would be gravity.

9.0 Conclusion:

9.1 The lake water system from Silver Lake to the Mill is in adequate condition but needs annual maintenance to maintain its reliability. As any mechanical system, it will need yearly maintenance to remain a reliable system.

9.2 This study is being conducted to understand if the current water supply will be adequate for the future Salmon Farm on the Bucksport Mill Site. The projected Salmon Water usage is:

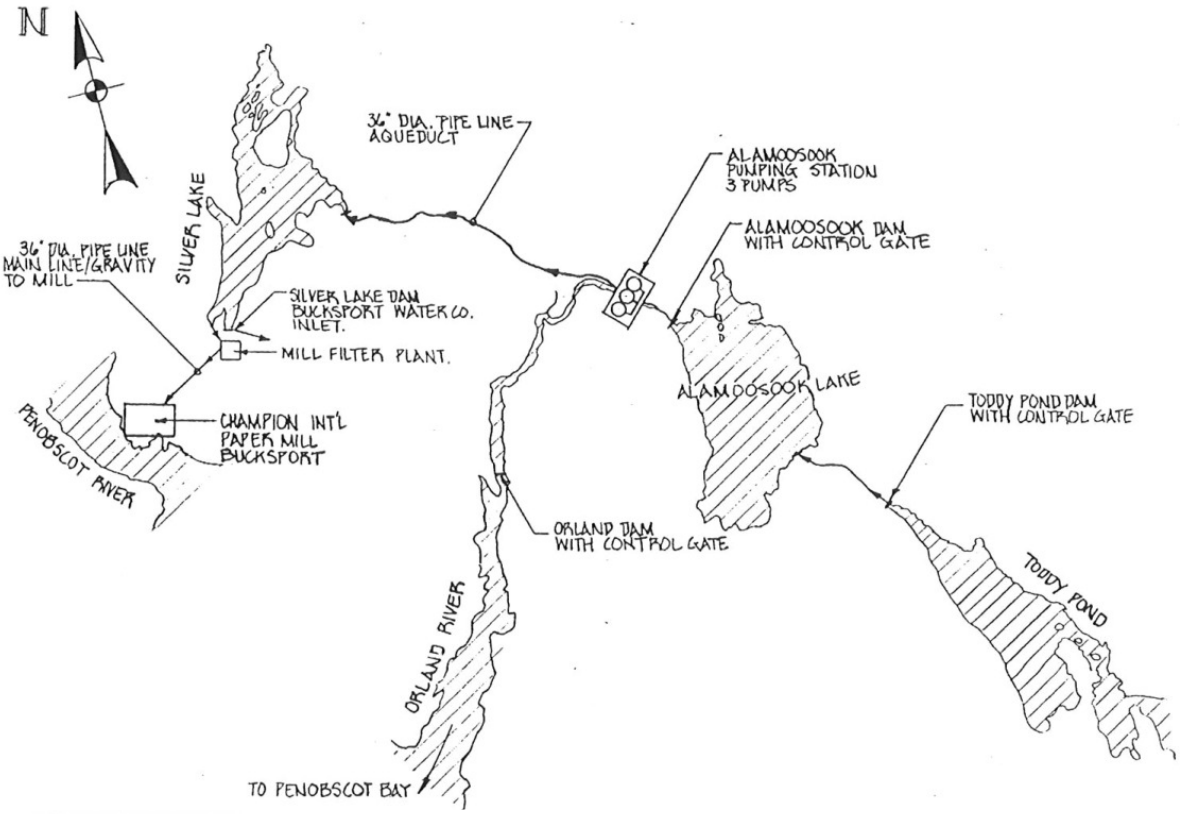
- Year 1: 1 MGD
- Year 5: 3 MGD
- Year 10: 5 MGD

9.3 The gravity water system has historically provided the Mill with 12.6 MGD.

9.4 A 1967 Process Water Study by Dr Kleinschmidt P.E. provided an estimate that Silver Lake has an estimate useful drawdown of 9.5 feet with a storage of 2,000 MG. The Town of Bucksport average usage is 0.3 MGD. At 5.3 MGD per day, water is available for 377days.

9.5 Therefore, It is a rare opportunity that this high quality lake water system is available for high demand use with its abundant water storage. The mechanical system can be maintained with money. The Lake Water System is a gift of nature.

9.6 In conclusion, we believe this part of the Lake Water System, will easily supply a sustainable quality and quantity of water as required by the future Salmon Farm.



Ted Ocana P.E.

Theodore E. Ocana, P.E.
Registered Professional Engineer

Attachment:
1) Water System Block Diagram
2) Filter Plant Flow Diagram

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

ATTACHMENT 1

VERSO PAPER
BUCKSPORT WATER SYSTEM

TODDY POND – ORLAND

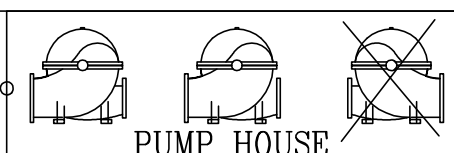
Physical Characteristics
Pond Area = 2,360 Acres.
Elevation drop of 9 feet
= 6,400 MG

Lake level is controlled by a dam and a manual gate.
Toddy Pond feeds the Alamoosook Lake through an unnamed stream.

ALAMOOSOOK LAKE – BUCKSPORT

Physical Characteristics
1,180 Acres at 120' El.
Elevation change from 120' to 114' (6 ft drop) = 1,900 MG

There are 3 pumps of which 2 are working and can run seasonally.



Lake level is controlled by a dam and a manual gate that overflows into the Narramissic river. When Silver Lake levels are low we run an electric pump through 12,200 feet of pipe that travels above/below the ground through residential areas to maintain level.

SILVER LAKE – BUCKSPORT

Physical Characteristics
610 Acres at 123' El.
734 Acres at 129.5' El. (Full Pond)
Elevation change from 129.5' to 123' (6.5 ft drop) = 2,000 MG

Lake level is controlled by a dam and a manual gate that overflows into the Mill stream. Silver Lake feeds the filter house by gravity through 2,000 feet of 36"ø gravity pipe.

FILTER HOUSE – BEHIND LAND FILL

There are 2 rotary screens rated for 10MGPD each. There is 1 traveling screen to remove debris. Shower water pumps cleans the rotary screens. The system can be bypassed.

The Filter House feeds the Bucksport Mill by gravity through 3,400 feet of 36"ø gravity pipe.

BUCKSPORT MILL

The Bucksport Mill used an average of 12.6 MGPD of fresh water in the paper making process. The effluent flow average was 11.54 MGPD in 2009 against a goal of 11 MGPD.

PREVIOUS VERSO DWG =S-19559

NOT FOR CONSTRUCTION
FOR PERMITTING ONLY
REV A

DATE: 5/13/19
SCALE: NOTED
DRAWN: TEO
JOB NO: 19023

BUCKSPORT MILL LAKE WATER SYSTEM BLOCK FLOW DIAGRAM

BUCKSPORT GENERATION
2 RIVER RD.
BUCKSPORT, ME 04416

FORESIGHT ENGINEERING P.C.
10 FLEMING STREET
LINCOLN, MAINE 04457
(207) 794-2775
(PHONE OR FAX)

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

ATTACHMENT 2

3,400 FT OF 36" PIPE GRAVITY WATER TO MILL

FILTER REJECTS TO DRAIN

CLOSED FILTER BYPASS VALVE

2,000 FT OF 36" PIPE GRAVITY INLET WATER FROM SILVER LAKE

BAR SCREEN CLEANER

#1 FILTER

#2 FILTER

FOR SHOWER WATER

FILTERED WATER TANK

Platform Elev. 206.00

Platform Elev. 208.00

Av. Storage Tank 4'-0" Diam x 12'

12" Overflow Pipe top of Elev. 208.5

12"ø Pipe Float Chamber for pivot valve regulators Vertical Lever

6" Post Indicator Valve (double bell)

12" C.I. (Class C)

6" C.I. (Class C)

8" C.I. B & S. Pipe (Drain)

Long Sweep Ell

Jump

SUBCE TANK

Drive

Cool Bin

Store with blower

Platform Elev. 209.0

North Filter

3" Warren Cent. Pump 300 G.P.M. each at 60ft pressure

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

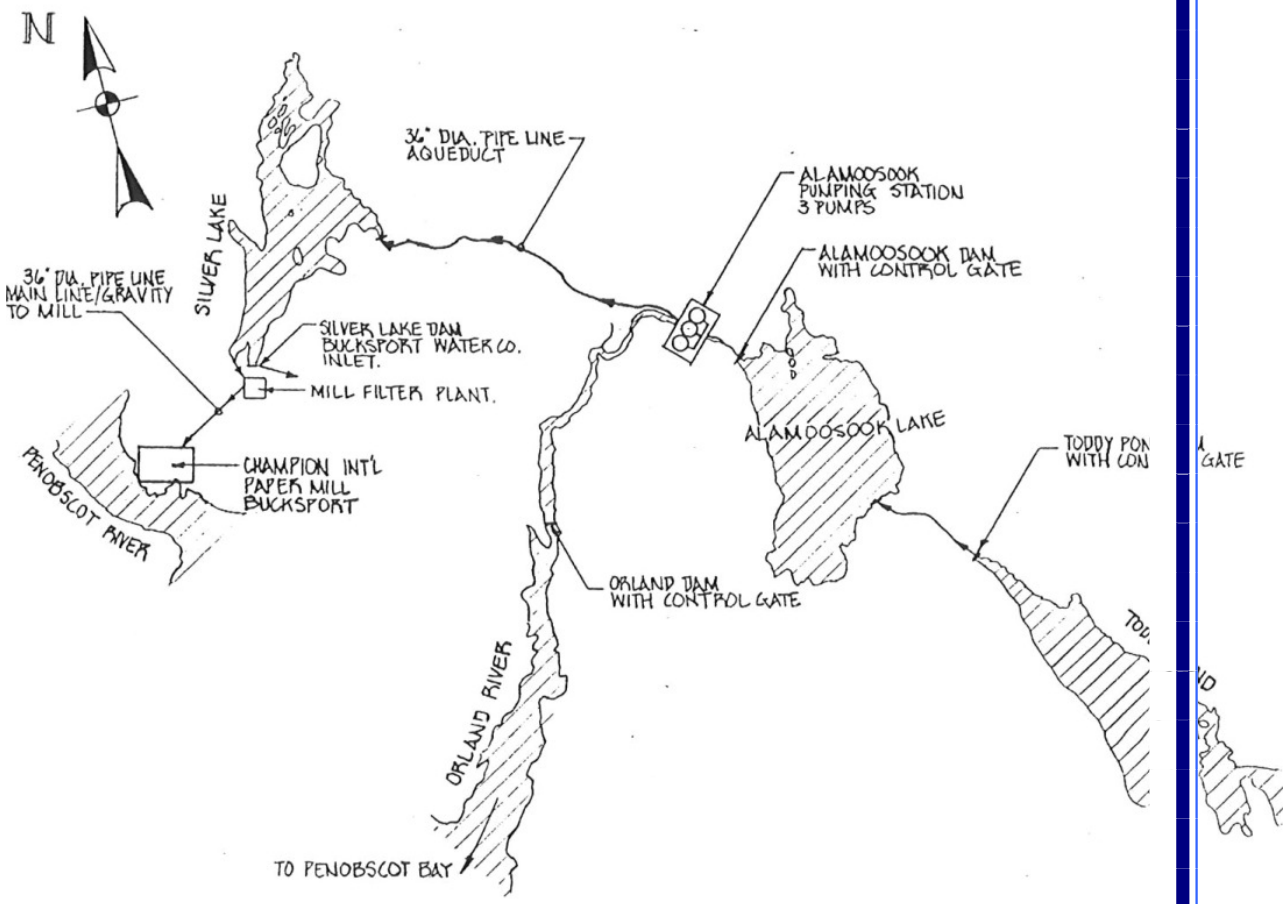
Upstream Engineering Assessment of Bucksport Mill Water System Alamoosook Pump House to Silver Lake

(Project # 22027R0)

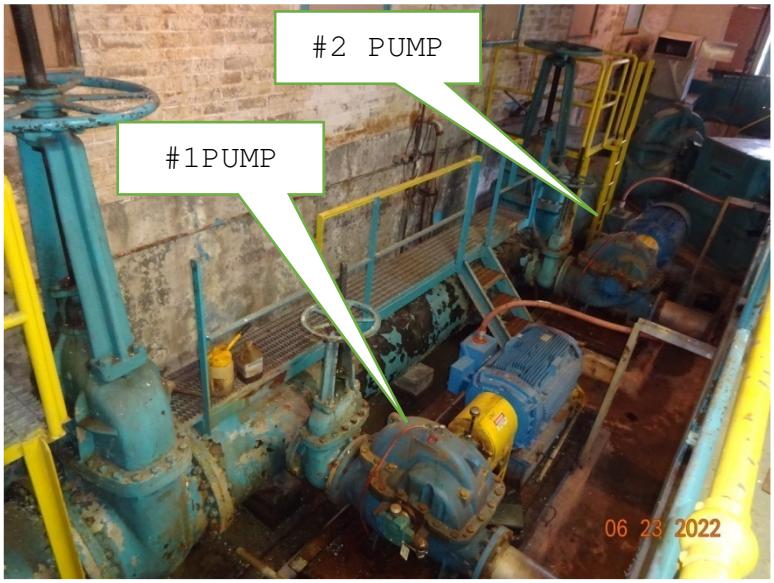
10-30-2022

1.0 Purpose of Report:

1.1 The purpose of this report is to provide an engineering assessment of the general condition of the Bucksport Mill's Water System. The following maps show an overview of the entire lake water system. This report will evaluate from the Alamoosook Pump House to Silver Lake. The report also includes: Design capacity, life expectancy, spare parts, and operational / maintenance budgets.



2.0 Pumping Capacity



2.1 The following picture shows the 3 pumps in the pump house. The #3 pump is not usable. The #1 & #2 pumps are operational.

2.2 The pumps are only run seasonally when Silver Lake level is low (See Atch 2: Water System Block Diagram).

2.3 The equipment file shows that pumps #1 & #2 are Goulds 3410 Size 10x12x17L with a 14.5" bronze impellor. The pumps are a premium brand which was installed in mid-2001.

2.4 Per the original pump curve (see atch 2), one pump could pump 4,200 gpm. Using the amp meters on the MCC, we back calculated that one existing pump is pumping around 4,300 gpm or 6.2 MGD. By using both pump #1 & #2, the flow rate will be around 8,400 gpm or 12.1 MGD. The flow rate is nearly double due to most of the head is caused by the static head component.

2.5 We did witness both pumps running. They ran with no excessive vibration and typical packing leakage.

3.0 Piping System to Silver Lake

3.1 The discharge piping is 36" diameter carbon steel piping with an exterior tar-based coating. This piping is about 12,000 feet long which travels above and below the ground.

3.2 During the pump tests, a leak was found in the pipe that go worse as time went on. The pipe was repaired and we reinspected the piping.

3.3 This next picture shows outlet which flows to Silver Lake after the leak was fixed. We measured the wall thickness of this pipe to be:

- At 12:00 0.480 Inches
- At 3:00 0.448 Inches
- At 6:00 0.269 Inches
- At 9:00 0.469 Inches

3.4 The original pipe thickness is 0.5". Therefore the pipe has lost 47 % due to corrosion. Most of the leaks are occurring that the welds which is typical and will continue. The pipe is pitted on the bottom half.

3.5 The concrete under the end of the pipe is undermining and will eventually need a repair.

<u>4.0 Pump House Structure</u>

4.1 The 1930s pump house is a typical brick mill building. The structure shows no cracked bricks. The wall does show efflorescent which means water is leaking thru the wall.

<u>5.0 Expected Life Expectancy</u>

5.1 The Gould Pumps have an average pump bearing life of 10 continuous years.

5.2 The pump were installed in 2001 and the mill closed in 2015. Using an average run time of 3 months per year, the pumps are about 35% used or 65% life remaining. This means the drive or power end will be to be rebuild in around 20 years due to the low usage with proper lubrication. Yearly vibration analysis will determine the life to rebuild. The original pump's life was 60 years.

5.3 As for the 12,200 feet of carbon steel 36" diameter piping, you should expect annual leak patching.

6.0 Spare Parts

6.1 Attachment 3 is the recommended spare parts list for the Goulds 3410L pump. The list shows startup and recommended spare parts. It is typical for the mill to have purchased the parts or have a complete power end in stores. Currently the Mill does not have the parts in Mill stores.

6.2 Since the pipeline has routine leaks, a couple sheet of A36 rolled steel plate should be on site.

7.0 Operational Budget:

7.1 At $120 /MWH, the cost to run 1 HP for one year is around $1,088. To run one pump at the Alamoosook Pump Station will cost about $657/day per pump.

8.0 Maintenance Budget:

8.1 Since this system is only expect to be used seasonally during droughts, the maintenance for this system is low. The following is the recommended maintenance:

- Beginning of the pumping season, rotate the pump shaft by hand. It should turn easily. Budget: $1,050
- Replace the lubricants annually. Budget $1,200
- Measure vibration once per year. Budget $1,500
- Patch the piping once per year. Budget $9,000
- Megger the motors during drought years Budget $2,250
- The yearly maintenance budget is $14,000

8.2 A motor will need to be replaced about every 10 to 15 years. The motor for the pumps is a 250 HP 1800 RPM 2300 volt 449T frame TEFC 1.15 SF. The price for this motor is around $27,000. During the 2001 project, they put in Reliance motors. Presently one motor is still a Reliance.

8.3 Another capital job will be repair the concrete outfall of the piping system. The budget price for this project is $45,000. This is expected within 5 years.

9.0 Conclusion:

9.1 The pumping system from Alamoosook Lake to Silver Lake is in adequate condition to provide the backup water during low levels at Silver Lake. As any mechanical system, it will need yearly maintenance to remain a reliable pumping system.

9.2 This study is being conducted to understand if the current water supply will be adequate for the future Salmon Farm on the Bucksport Mill Site. The projected Salmon Water usage is:

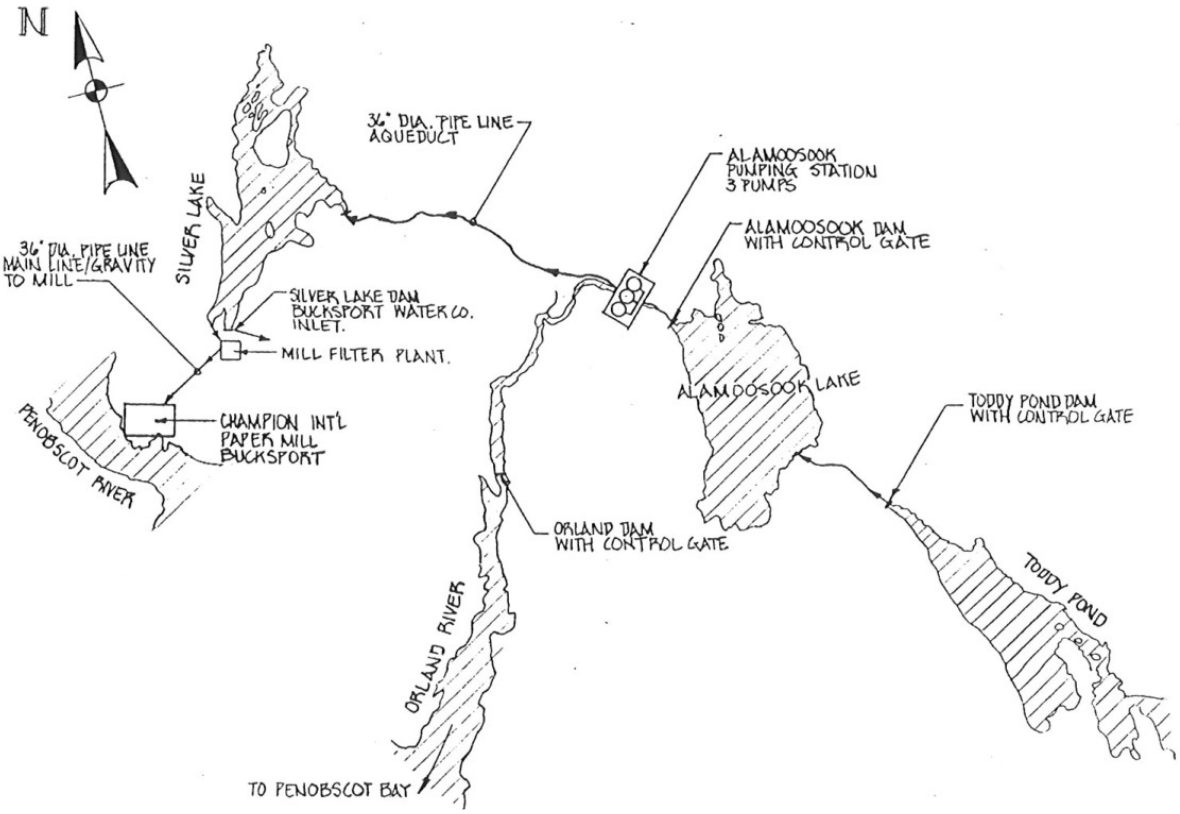
- Year 1: 1 MGD
- Year 5: 3 MGD
- Year 10: 5 MGD

9.3 The pumping system is able to provide 6.2 to 12.1 MGD.

9.4 A 1967 Process Water Study by Dr Kleinschmidt P.E. provided an estimate that Alamoosook Lake has an estimate useful drawdown of 6 feet with a storage of 1,900 MG. At 5 MGD per day plus 0.3 MDG for the Town of Bucksport, water is available for 358 days.

9.5 Therefore, It is a rare opportunity that this high quality lake water system is available for high demand use with its abundant water storage. The pumping system is just money. The Lake Water System is a gift of nature.

9.6 In conclusion, we believe this part of the Lake Water System, will easily supply a sustainable quality and quantity of water as required by the future Salmon Farm.



Jed Ocana P.E.

Theodore E. Ocana, P.E.
Registered Professional Engineer

Attachment:
1) Water System Block Diagram
2) Pump Curve / Pump Pricing in 2000
3) Pump Recommended Spare Parts

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

ATTACHMENT 1

VERSO PAPER
BUCKSPORT WATER SYSTEM

TODDY POND – ORLAND

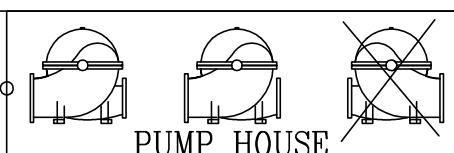
Physical Characteristics
Pond Area = 2,360 Acres.
Elevation drop of 9 feet
= 6,400 MG

Lake level is controlled by a dam and a manual gate.
Toddy Pond feeds the Alamoosook Lake through an unnamed stream.

ALAMOOSOOK LAKE – BUCKSPORT

Physical Characteristics
1,180 Acres at 120' El.
Elevation change from 120' to 114' (6 ft drop) = 1,900 MG

There are 3 pumps of which 2 are working and can run seasonally.



Lake level is controlled by a dam and a manual gate that overflows into the Narramissic river. When Silver Lake levels are low we run an electric pump through 12,200 feet of pipe that travels above/below the ground through residential areas to maintain level.

SILVER LAKE – BUCKSPORT

Physical Characteristics
610 Acres at 123' El.
734 Acres at 129.5' El. (Full Pond)
Elevation change from 129.5' to 123' (6.5 ft drop) = 2,000 MG

Lake level is controlled by a dam and a manual gate that overflows into the Mill stream. Silver Lake feeds the filter house by gravity through 2,000 feet of 36"ø gravity pipe.

FILTER HOUSE – BEHIND LAND FILL

There are 2 rotary screens rated for 10MGPD each. There is 1 traveling screen to remove debris. Shower water pumps cleans the rotary screens. The system can be bypassed.

The Filter House feeds the Bucksport Mill by gravity through 3,400 feet of 36"ø gravity pipe.

BUCKSPORT MILL

The Bucksport Mill used an average of 12.6 MGPD of fresh water in the paper making process. The effluent flow average was 11.54 MGPD in 2009 against a goal of 11 MGPD.

PREVIOUS VERSO DWG =S-19559

NOT FOR CONSTRUCTION
FOR PERMITTING ONLY
REV A

DATE: 5/13/19
SCALE: NOTED
DRAWN: TEO
JOB NO: 19023

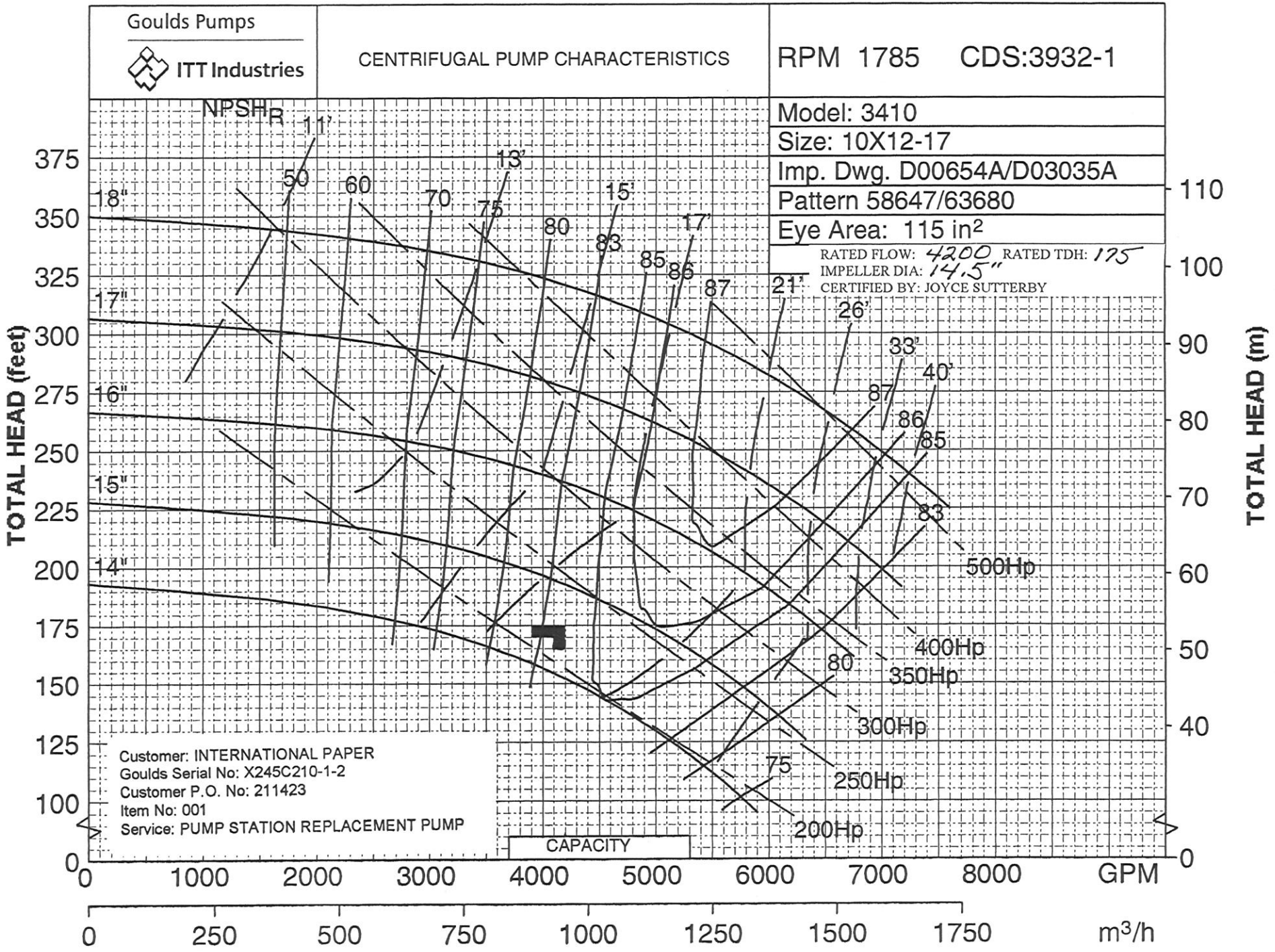
BUCKSPORT MILL LAKE WATER SYSTEM BLOCK FLOW DIAGRAM

BUCKSPORT GENERATION
2 RIVER RD.
BUCKSPORT, ME 04416

FORESIGHT ENGINEERING P.C.
10 FLEMING STREET
LINCOLN, MAINE 04457
(207) 794-2775
(PHONE OR FAX)

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

ATTACHMENT 2


Goulds Pumps
ITT Industries
CENTRIFUGAL PUMP CHARACTERISTICS
RPM 1785 CDS:3932-1
Model: 3410
Size: 10X12-17
Imp. Dwg. D00654A/D03035A
Pattern 58647/63680
Eye Area: 115 in²
RATED FLOW: 4200 RATED TDH: 175
IMPELLER DIA: 14.5"
CERTIFIED BY: JOYCE SUTTERBY
NPSHR
11'
13'
15'
17'
21'
26'
33'
40'
50
60
70
75
80
83
85
86
87
18"
17"
16"
15"
14"
500Hp
400Hp
350Hp
300Hp
250Hp
200Hp
Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP
CAPACITY
TOTAL HEAD (feet)
TOTAL HEAD (m)
0 1000 2000 3000 4000 5000 6000 7000 8000 GPM
0 250 500 750 1000 1250 1500 1750 m³/h
0 100 125 150 175 200 225 250 275 300 325 350 375
0 40 50 60 70 80 90 100 110

GOULDS PUMPS

GOULDS PUMPS
ITT INDUSTRIES
22 MADISON ROAD
FAIRFIELD, NJ 07004
MARIE DIMARCO - APPLICATION ENG
PHONE: 800-664-6312
FAX: 800-850-8883
EMAIL: MDiMarco@flulds.ittind.com

23 March 2000

Attn:GEREMY CHUBBUCK

CHAMPION INTERNATIONAL CORP.

Inquiry No:

Proposal No: BL00019 Rev.# 1

Item No : 001

MODEL: 3410 Size: 10x12-17 L QTY: 2

Operating conditions

SERVICE	*PUMP STATION REPLACEMENT PUMP*
LIQUID	*Water*
CAPACITY N/R	*4200.0 / 4200.0 GPM (60 Deg F, 1.000 SP.GR 1.12 cp Viscosity)*
HEAD	*175.0 ft*

Performance at 1800 RPM

PUBLISHED EFFY	*85.0% (CDS)*
RATED EFFY	*85.0%*
RATED HP	*218.4 ,Max at run out 234.0*
NPSHR (ft)	*18.6*
DISCH PRESSURE	*75.8 PSI (92.2 @so) (Based on 0.0 PSI Suc.press)*
PERF.CURVE	*3932 (Rotation CW viewed from coupling end)*
SHUT OFF HEAD	*213.0 ft*
MIN FLOW	*1582.0 GPM*

Prices In USD	
Pump Unit	14,164
Testing	
Driver	16,342
Box, & Frt	
Total Unit	30,506
Tot. 2 Un.	61,012

Shipment: 14 Weeks Ex-works

Materials

CASING	*CAST IRON max.casing pres.@ rated temperature 175 psi*
CASING WEAR RING	*BRONZE*
ST.BOX	*CAST IRON*
IMPELLER	*BRONZE -Enclosed-Between Bearings (14.5000 rated (Inches) max=18.0000 min=14.0000)*
SHAFT	*SAE 4140*
SHAFT SLEEVE	*BRONZE*
LUBRICATION	*FLOOD OIL*
BEARINGS	*6211 (Radial) 5309 (Coupling end)*
COUPLING	*FALK DISC PACK 1080FD06N20*
COUPLING GRD	*STEEL*
BASE PLATE	*CAST IRON D=12.5;B=27.5;A=25.5;AB=37.5 (inches) D00062A* *Current motor frame is 449T. Baseplate is sized to accommodate 449T future motor size*

Sealing Method

PACKING	*NON-ASBESTOS*

Driver MOTOR

FURNISHED BY	*GOULDS*
RATING	*250.0 HP (186.5 KW)*
PHASE/HZ/VOLTS	*3/60/2300*
INSULATION/SF	*F / 1.15*

Manufacturer: RELIANCE

MOUNTED BY	*GOULDS*
ENCLOSURE	*TEFC MILL & CHEM HIGH EFFY*
SPEED	*1800 RPM*
FRAME	*449T*

Weights and Measurements

TOTAL NET UNIT WEIGHT 4,334 Lbs

FORESIGHT ENGINEERING P.C.
10 Fleming Street
Lincoln, ME 04457 (207) 794-2775

ATTACHMENT 3

ITT Industries
Goulds Pumps

REPLACEMENT PARTS DATA SHEET

6/19/01 Page : 1

Customer PO # : 211423
Serial number : X245C210
Pump Quantity : 2.000 QUOTE IS VALID FOR 30 DAYS
Price is in : United States Dollars
Model/Group/Size. 3410/L /10X12-17
Construction..... CAST IRON/BRZ
S.B.Arrangement.. PACKMASTER 1 (STANDARD)
Imp.Diameter..... 14.5000
Lubrication..... FLOOD OIL
Service..... PUMP STATION REPLACEMT PU
Equipment Number. ITEM# 001
Salesman Rep... 295000
B. LYNCH

Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP

Comments.. EQUIP No. 18331 & 18332

	Item Number	Qty	Part Number	Part Name	Material Description	Price
	100	001	0E00349A211003	CASING,ASSY	CAST IRON	8806.194
#	101	001	245C210M	IMPELLER,6V D00654A01 1101	SILICON BRZ	5040.291
*	103	002	C01293A11 1618	RING,WEAR	FEDERALLOY III BRZ ASTM B584	231.984
*	105	002	RB01144A	RING,LANTERN ASSEMBLY		72.417
*	106	001	A01063A45	PACKING,SB PACKMASTER 2		79.587
	107	002	RC02474A 1203	GLAND,ASSEMBLY	316SS	186.420
	109	002	B02001A 1000	COVER,END BRG	CAST IRON	156.306
	109A	001	A01186A02	PLUG,SOFT THST HSG		16.491
*	112	001	8049-30900	BEARING,BALL SKF 5309 AHC3		82.399
	113A	002	72416 0300	OIL/GRS FTG		2.652
#	122	001	RD02747A012238	SHAFT,ASSEMBLY	ALLOY STL 4140	208.552
#	124	002	RB02008A 1618	NUT,SLEEVE ASSY	FEDERALLOY III BRZ ASTM B584	49.473
#	125	002	B00474A05 3211	BUSHING,THROAT	316 STN STL	35.133
*	126	002	C02450A 1618	SLEEVE,SHAFT	FEDERALLOY III BRZ ASTM B584	149.250

Note: * = Startup Spare # = Recommended Spare

ITT Industries
Goulds Pumps

REPLACEMENT PARTS DATA SHEET

Customer PO # : 211423
Serial number : X245C210
Pump Quantity : 2.000 QUOTE IS VALID FOR 30 DAYS
Price is in : United States Dollars

Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP

Model/Group/Size. 3410/L /10X12-17
Construction..... CAST IRON/BRZ
S.B.Arrangement.. PACKMASTER 1 (STANDARD)
Imp.Diameter..... 14.5000
Lubrication..... FLOOD OIL
Service..... PUMP STATION REPLACEMT PU
Equipment Number. ITEM# 001
Salesman Rep... 295000
B. LYNCH

Comments..

	Item Number	Qty	Part Number	Part Name	Material Description	Price
	134	002	D02641A 1000	HOUSING,BRG	CAST IRON	122.607
*	168	001	8050-21160	BEARING,BALL SKF 6211		24.378
#	178	001	49568 329 2226	KEY	303SS	19.359
	183	001	E02530A 3201	BASEPLATE	CARBON STEEL	REFER FACTORY
	190A	001	49528 00846501	PIPE,NIPPLE	BLK STL SCH 40	27.963
	195E	001	49528 00506502	PIPE NIPPLE	GALV STL SCH 40	3.585
	222B	004	49514 202 2229	SCREW,SET	316SS	1.434
	232A	001	245C210CG	ORDERED COUPLING		REFER FACTORY
	251	002	072531 14 8683	OILER,SIGHT #5 8 OZ CAPACITY	OILER,SIGHT	87.474
#	332	001	D08717A17 6241	SEAL,LABY OUTBOARD	PTFE COMPOUND 10% FILLED	89.460
#	333	002	D08717A15 6241	SEAL,LABY INBOARD	PTFE COMPOUND 10% FILLED	89.460
	340A	008	B02395A08	MOTOR ADJUSTER		60.228
*	351D	001	C02471A02 5108	GASKET,DISCHARGE	NON-ASBESTOS	17.253
*	351S	001	C02471A01 5108	GASKET,SUCTION	NON-ASBESTOS	17.253

Note: * = Startup Spare # = Recommended Spare

ITT Industries
Goulds Pumps

REPLACEMENT PARTS DATA SHEET

Customer PO # : 211423
Serial number : X245C210
Pump Quantity : 2.000 QUOTE IS VALID FOR 30 DAYS
Price is in : United States Dollars

Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP

Model/Group/Size. 3410/L /10X12-17
Construction..... CAST IRON/BRZ
S.B.Arrangement.. PACKMASTER 1 (STANDARD)
Imp.Diameter..... 14.5000
Lubrication..... FLOOD OIL
Service..... PUMP STATION REPLACEMT PU
Equipment Number. ITEM# 001
Salesman Rep... 295000
B. LYNCH

Comments..

	Item Number	Qty	Part Number	Part Name	Material Description	Price
	353	004	3-46 181 2228	STUD	304SS	8.806
	355	004	49507 7 2228	NUT,HEX	304SS	2.327
*	360	002	B01143A 5130	GASKET,COVER END	VELLUMOID	1.853
#	361	001	58102 177	RING,RTNG 5102 177		2.151
	371C	008	49511 110 2210	SCREW,HHC 3/8"-16 X 3"LG	CARBON STEEL	.717
	372U	004	49511 256 2210	SCREW,HHC 5/8"-11 X 2-1/2"LG	CARBON STEEL	1.434
#	400	001	49568 307 2213	KEY,SQUARE END	CARBON STEEL	7.815
	408B	002	63122 2 2210	PLUG PIPE HEX HD .250" 18NPT	CARBON STEEL	1.434
	424A	004	91778 3	PIN,NAMEPLATE		.251
*	428	002	90282 14 5180	GASKET,SHAFT SLEEVE	NON-ASB GLK 3000	13.419
	443T	001	B02055A 2210	SPACER,BEARING	CARBON STEEL	21.510
	445A	004	80860 9	PIN,ROLL		.717
*	497	002	C02495A36 5302	O-RG AS568-36	BUNA-N	2.364
*	497F	001	C02495A1385304	O-RG AS568-138	VITON	10.863

Note: * = Startup Spare # = Recommended Spare

GOULDS PUMPS
ITT Industries

SENECA FALLS, NEW YORK 13148

HYDROSTATIC TEST REPORT

PUMP SERIAL NO. X245C210-1-2

MODEL 3410 L

SIZE 10X12-17

PART NAME Casing

Customer Data

Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP

A SATISFACTORY HYDROSTATIC TEST HAS BEEN PERFORMED AT STATED PRESSURE AND AMBIENT TEMPERATURE IN ACCORDANCE WITH THE REFERENCED QUALITY CONTROL PROCEDURE:

Quality Control Procedure Number: QCP *550* REV *17*

Pressure: *263 PSIG* / *1813 kPa*

Duration: 10 MIN

Additional Information:

GOULDS Q.A. REPRESENTATIVE: Doug Nichols — QA Auditor

CUSTOMER WITNESS: Non-Witness

CERTIFICATION DATE: June 27, 2001

GOULDS PUMPS
ITT Industries

SENECA FALLS, NEW YORK 13148

CERTIFICATE OF COMPLIANCE

PUMP SERIAL NO. X245C210-1-2

MODEL 3410 L

SIZE 10X12-17

Customer Data

Customer: INTERNATIONAL PAPER
Goulds Serial No: X245C210-1-2
Customer P.O. No: 211423
Item No: 001
Service: PUMP STATION REPLACEMENT PUMP

We certify that the customer's Purchase Order requirements have been complied with and that the materials used in the construction of the above described pump(s) and, or part(s) are in accordance with the specifications.

Applicable for repair parts: We certify that the repair parts are new and unused and that they are equivalent and, or interchangeable with the original parts supplied on the original pump order.

Additional Information:

ROTORS HAVE BEEN BALANCED PER ISO G1.0

UNIT#	PLANE#1	PLANE#2
1	.245 OZ / IN	.173 OZ / IN
2	.252 OZ / IN	.197 OZ / IN

GOULDS Q.A. REPRESENTATIVE: Doug Nichols QA Auditor

CERTIFICATION DATE: **June 27, 2001**

Commercial Divers Inc.

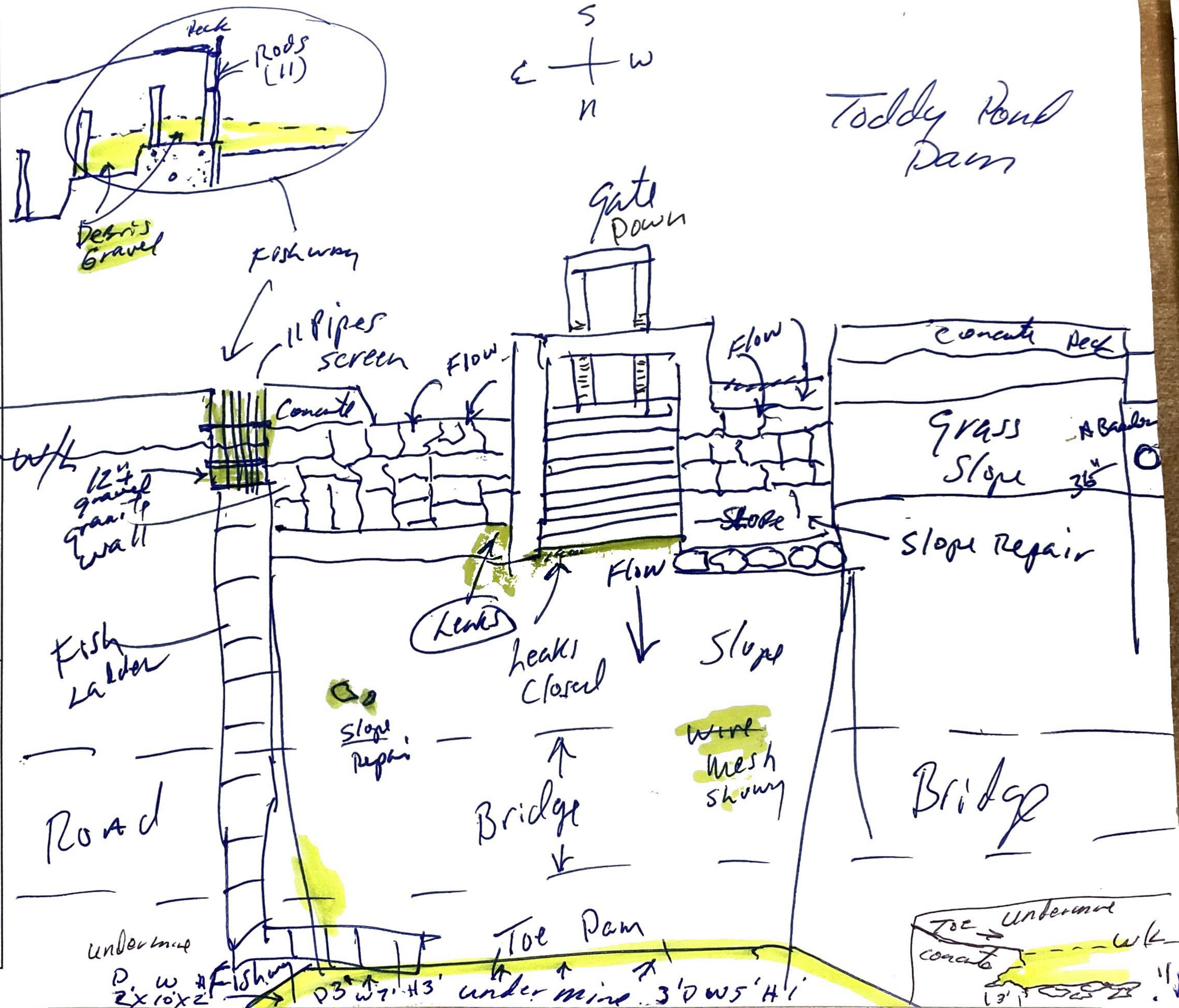
Consulting

Written by J. Kacer

Description: Toddy Pond Downstream looking upstream

Page of

Date 6/11/24



Commercial Divers Inc.
Consulting

Written by R Norris

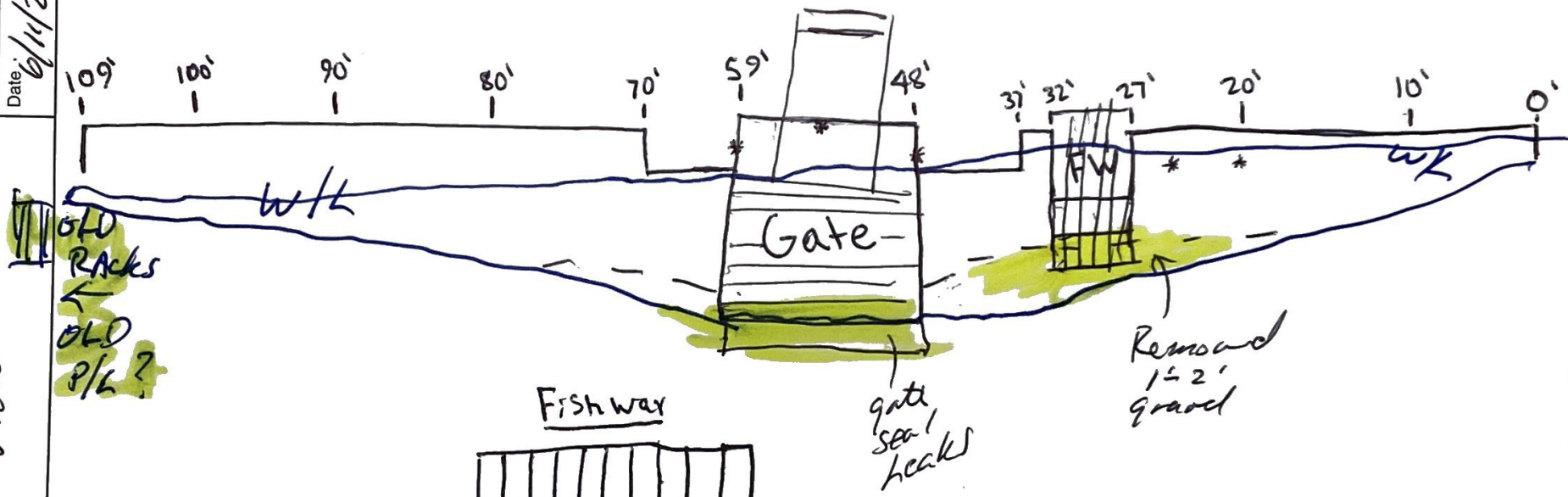
Description Toddy Dam Downstream View

Page of

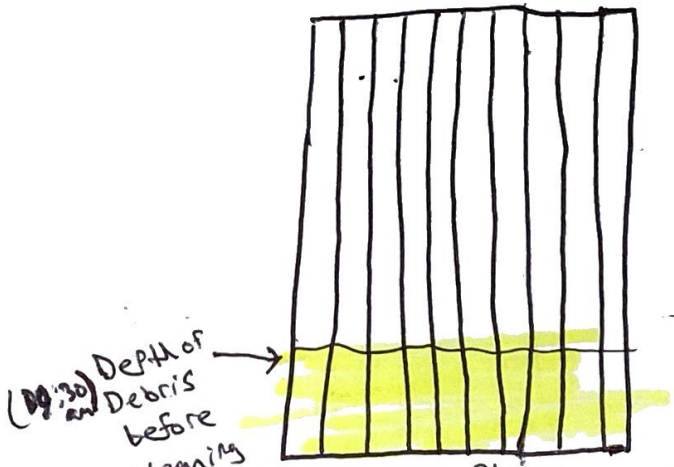
Date 6/14/24

View looking DS

8 ft of water



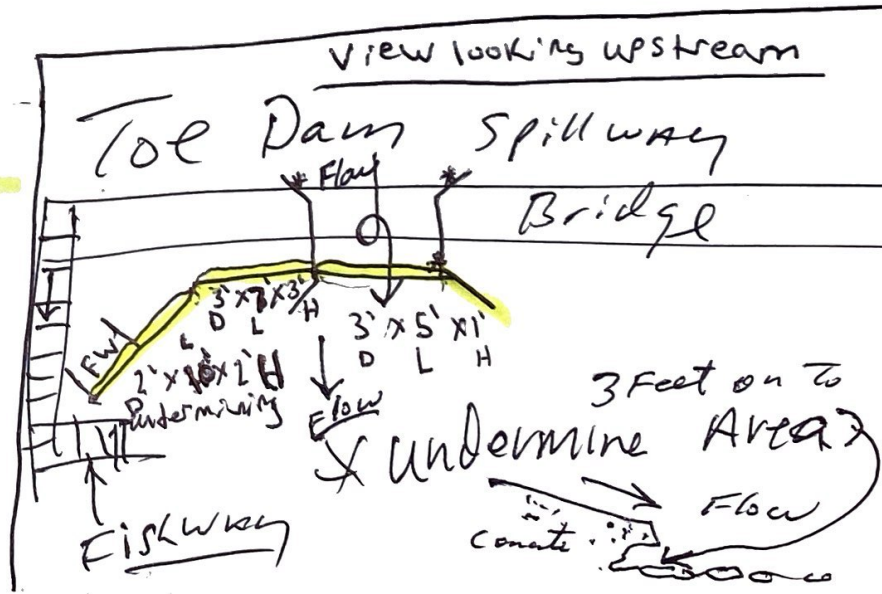
Fishway



- 9 total Bars
- Hardware in tact

* - Spalling/delaminations

View looking upstream



Commercial Divers Inc.
Consulting

Written by J. Kacer / Norris

Description Silver Lake Dam Survey Report/Sketch

Page of

Date 6/13/2024

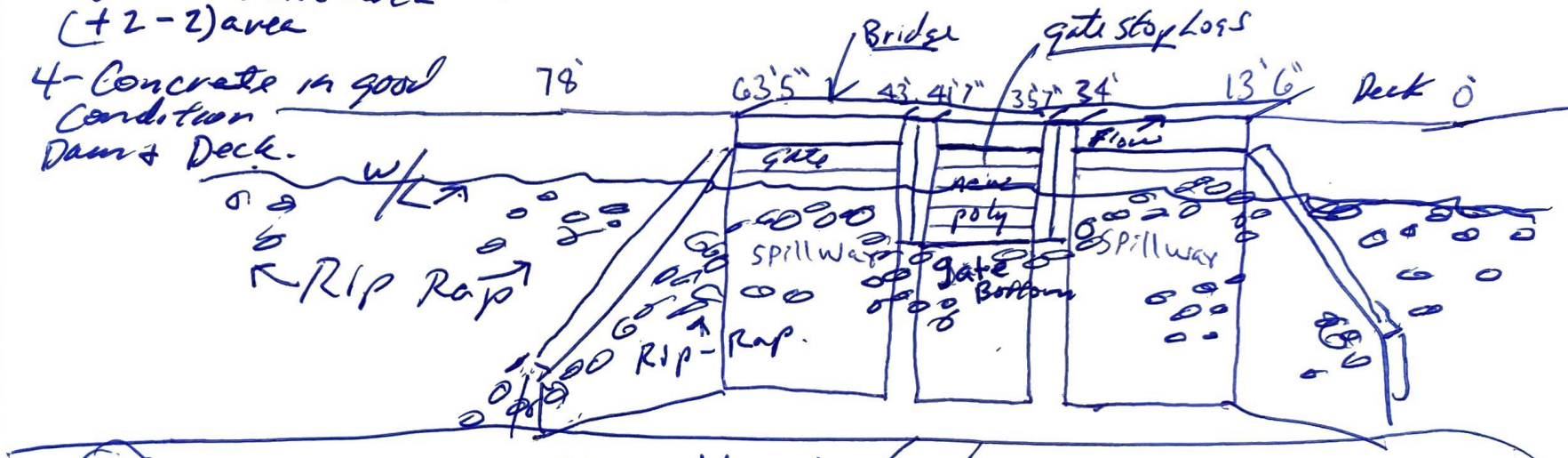
1- No Leaks on Dam noted
2- No sink Holes on Roadway
3- some Freeze Thaw Damage & water line area (+2-2) area
4- Concrete in good Condition Dam & Deck.

Looking downstream

* Old Poly Bad Leaking

Front View

8X10'



FZ

* Freeze Thaw Damage at water line

PLAN View

Stream Bed Low Flow

* No Flows