LAKE LANSING LEVEL CONTROL STRUCTURE ALTERNATIVE ANALYSIS

Ingham County, Michigan



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Prepared By:

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INTRODUCTION

LOCATION AND DESCRIPTION OF STRUCTURE

Lake Lansing is located in the northern portion of Meridian Charter Township in Ingham County, Michigan. The lake level is maintained by a concrete spillway structure with stop logs and through a lift gate installed in line with a 24-inch drawdown pipe. The lake level control structure is under the jurisdiction of the Ingham County Drain Commissioner, Patrick E. Lindemann (ICDC). The original structure was constructed in the 1920s and the spillway was reconstructed to its current configuration as part of an improvement project completed in the fall of 1976. The design plans for the improvement project dated October 1975 are attached in Appendix A. Historic photos from 1974 and 1980 are included in Appendix A, showing the control structure before and after the 1975 reconstruction project.

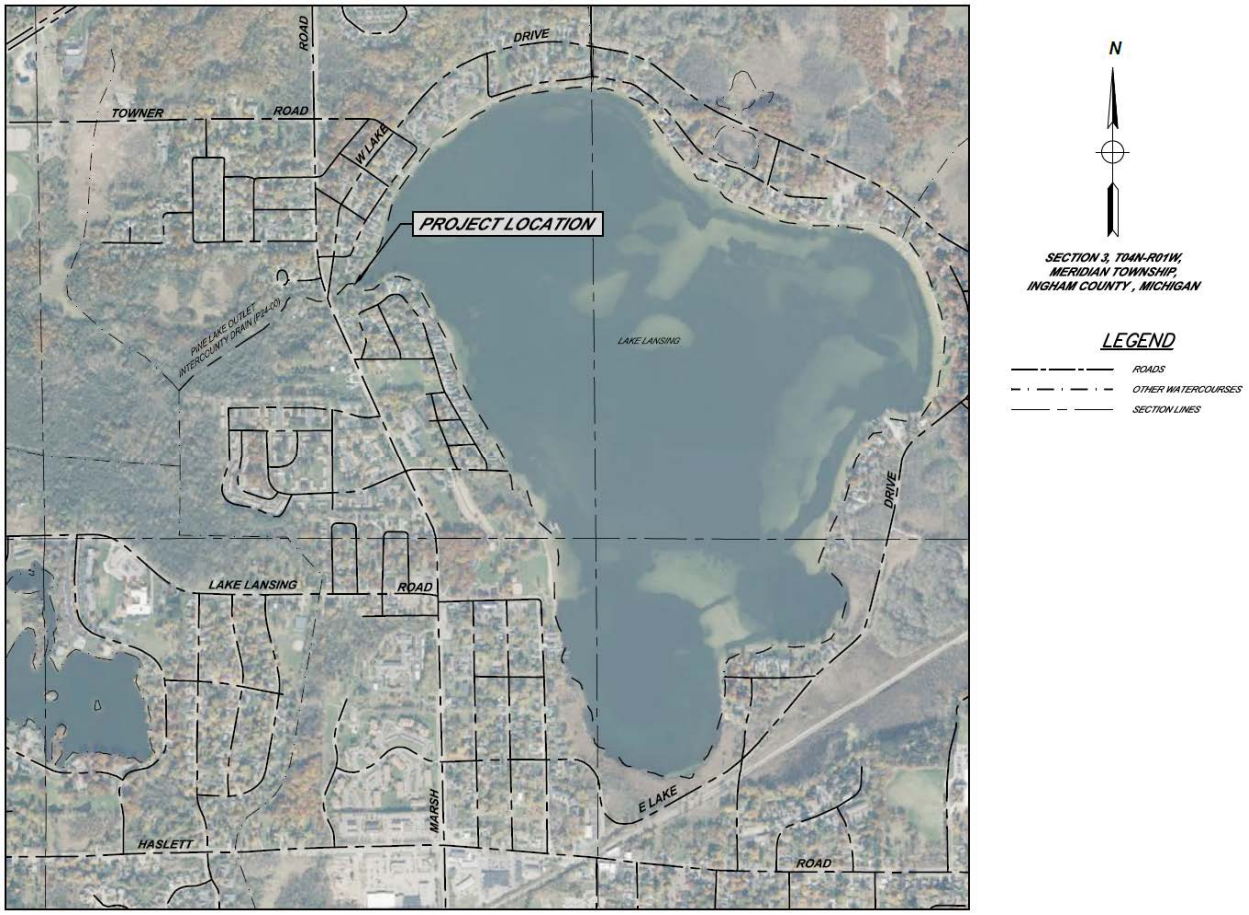


Figure 1. Lake Lansing Level Control Structure Location Map

PROJECT BACKGROUND AND HISTORY

Lake Lansing is a 453-acre lake that provides recreational opportunities for residential properties around the lake as well as the surrounding community. Lake Lansing Park South is a county owned park that offers park amenities and beach access for the community with over 180,000 visitors in 2020, according to the county parks master plan. Public access for boating and ice fishing is provided through a County owned public boat launch on the north side of the lake which saw over 150,000 users in 2020. Michigan State University's sailing center as well as the privately held Lansing Sailing Club are located around the lake.

The drainage area served by the lake level control structure is approximately 3.6 square miles in size, draining lands from Ingham and Clinton Counties. Flow from the lake discharges through the Pine Lake Outlet Intercounty Drain and Mud Lake Outlet Drain before reaching the Red Cedar River.

During regular inspections by ICDC staff in 2022 and as noted in the "Lake Lansing Dam Inspection Report" dated 12/29/2022, the lift gate installed in line with the 24-inch drawdown pipe had become inoperable. The 2022 inspection report recommended replacement of the control structure, pipe, slide gate, and related support structures. In June of 2023, Ingham County published a request for proposals seeking professional engineering services for a Lake Lansing Dam Improvement Project. The 2022 dam inspection report and the 2020 dam inspection report, which noted the gate was operable but had seepage, can be found in Appendix A.

The excerpt below from the 1986 Triennial Inspection provides a summary of the history of the current lake level control structure completed by SEG Engineers & Consultants, Inc.:

> *SEG is not cognizant of all the historical information regarding the events of the dam prior to 1970, except to state that the initial dam was constructed to maintain an unspecified lake level. In the late 1960's SEG (formally John R. Snell Engineers, Inc.) inspected the dam with specific intentions to review the dam's spillway condition as part of a study to establish a legal lake level and dredge the lake. The inspection revealed that the spillway was severely cracked and that a hole had developed in the spillway. In 1975 SEG was authorized to prepare construction plans and specifications to correct the spillway problems by rebuilding the spillway, complete with stilling basin. The spillway reconstruction also included the construction of a valved drawdown pipe, steel sheet piling and legal lake level control boards. Construction of the modifications was completed in the fall of 1976.*

Additionally, as documented in the 1986 inspection report, the intake pipe constructed in 1976 had broken free of its anchor points and floated upward. A recommended plan to correct the failure was provided showing what is believed to be the current day concrete structure under the dock section. This is the same location where the staff gauge is affixed to read the current lake level. The entirety of the 1986 inspection report can be found in Appendix A.

PROJECT PURPOSE AND SCOPE

The purpose of this study and report is to provide an alternatives analysis for improvements to the Lake Lansing level control structure following the recommendations provided in the 2022 Lake Lansing Dam Inspection Report. The goal is to address the noted draw down pipe and slide gate condition, review and recommend work related to other condition related deficiencies found during our inspection, model and provide discussion on the available capacity of the lake level control structure and make overall recommendation to provide a reliable and safe operation of the control structure. This study and report include research of existing documentation, topographic site survey, site inspection, existing condition

drawings, a hydrologic and hydraulic analysis, and an alternatives analysis for improvements to the lake level control structure.

METHOD OF ANALYSIS

DATA COLLECTION / DOCUMENT REVIEW

Spicer Group requested all available plans, reports, and other documents of significance pertaining to the Lake Lansing level control structure from the Ingham County Drain Commissioner's (ICDC) Office and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) through Dam Safety Unit of the Water Resources Division. Information collected from the ICDC and EGLE were in the form of both electronic records and paper files. Paper files from both organizations were scanned into electronic file formats for review.

Construction records and historic photographs were obtained through the document review process showing the control structure before and after improvements made to the structure in the 1970s. This allowed for a better understanding of the history, design, function, and operation of the structure. Previous regular inspection reports performed under the Inland Lake Levels part (Part 307) of the Natural Resource and Environmental Protection Act (NREPA), and under previous state statutes, were located and date back to 1986.

The slide gate on the drawdown pipe was noted as inoperable in the 2022 inspection report. Inspection reports prior to 2022 note that the slide gate operated without issue but allows for some seepage when sediments are lodged in the seat of the gate. It was noted that this was due to a lack of screening at the upstream end of the drawdown pipe since the 2010 inspection report. The drawdown pipe condition has been reported as poor since the 2007 inspection report, noting corroded holes in the intake pipe. Report recommendations for a more accessible drawdown control chamber were made since the 2013 inspection report due to the residential deck encroachment and large manhole cover over the structure that requires two people to remove. Further recommendations for remote lake level reading equipment have been made since the 2013 inspection report.

The Federal Emergency Management Agency (FEMA) performed a flood insurance study in 2011. Results of this study were used during the hydrologic and hydraulic modeling phase of this report.

Geographic information system (GIS) data was provided by the ICDC and the State of Michigan GIS Open Data portal including existing parcel outline and ownership data, street centerlines, aerial imagery, and topographic data derived from aerial flown LiDAR data collection.

Several meetings were conducted with project stakeholders and community members which provided substantial information relevant to the development of this report and the subsequent recommendations. The Lake Lansing Advisory Committee of Meridian Township and the Lake Lansing Property Owners Association were two groups that were met with regularly to provide status and receive feedback regarding the study. Additionally, Michigan State Representative, Penelope Tsernoglou held a town hall meeting with residents throughout the community to hear updates and provide feedback regarding the study.

FIELD DATA AND EXISTING CONDITIONS

A dam safety engineer from Spicer Group performed an inspection of the Lake Lansing Dam and the immediate downstream reach of the Pine Lake Outlet Intercounty Drain. Photographs were taken as part of this investigation and can be found in Appendix B. Subsequently, a topographical survey was completed for the project area. The survey provided existing centerline/flow line elevations, open channel cross-sections, a detailed survey of the existing dam, and a survey of relevant portions of the Marsh Road culvert

downstream. Crews surveyed these locations and collected data on the North American Datum of 1983 (NAD ’83) and the North American Vertical Datum of 1988 (NAVD '88).

Results of Field Work

The inspection of the lake level control structure was performed by Spicer Group staff according to the guidelines of Part 307 of NREPA on September 9, 2023. The following inspection elements were notable at the time of the inspection.

Stop logs are placed within the spillway structure and sealed with expanding foam and sheets of rubber to provide a seal around the boards. The ICDC maintenance staff provided the comment that this is required to keep the boards in place and provide a reasonable seal to hold the lake level.

The 24-inch diameter corrugated metal pipe is filled with sediment at the upstream end and is visibly corroded. The slide gate along the drawdown pipe remains inoperable as observed in the 2022 inspection report. The structure and slide gate are beneath a private deck, covered over with the storage of miscellaneous items. The slide gate is difficult to access through the residential deck and heavy structure lid. Consistent with the 2022 inspection report, minor cracking and spauling in the concrete structure was observed; however, the structure is in good condition. The private dock from the shore on the north side to the end of the drawdown pipe has failed, broken free of its connection to the shore, and is unsafe for use.

Active erosion downstream of the water level control structure was not observed. The absence of soil on the south side of the stilling basin is a concern. The south side of the spillway does not have a sheet pile or concrete wall consistent with the north side of the structure. However, through historic record research, a concrete cutoff is shown to exist to the south of the dam, though is not visible at ground level. Riprap on south side of stilling basin is recommended. Excessive vegetation and trees were found growing along the south side of the spillway and should be removed as a maintenance measure.

Surveying Methods

The two-man field crew utilizing GPS collection equipment spent two days on site, surveying the lake level control structure and Pine Lake Outlet Intercounty Drain downstream of the lake.

The topographic survey results are detailed in an existing condition drawing that can be found in Appendix A. This drawing includes plan, profile and cross section sheets of the control structure and the Pine Lake Outlet Intercounty Drain from the downstream side of the spillway, through the Marsh Road crossing to a point 1,000 feet downstream of Marsh Road. GIS basemap information was added to the existing condition drawings to provide existing contextual data.

Elevation Summary

The following is a summary and analysis of the current lake level structure elevations compared to the 2003 court ordered lake levels.

Court ordered summer level (Mar-Nov 14):	852.29 feet above sea level*
Court ordered winter level (Nov 15-Feb):	851.72 feet above sea level*
Date of Survey-September 29, 2023	
Surveyed water surface elevation:	851.76 feet NAVD88
Surveyed top of stop log elevation (summer level):	851.70 feet NAVD88
Surveyed weir elevation (winter level):	850.93 feet NAVD88
Staff gauge reading at time of survey:	852.38 feet above sea level*

*The vertical datum in the lake level court order references 'feet above sea level' which does not directly convert to the North American Vertical Datum of 1988 (NAVD88) used by the ICDC. The lake levels ordered in 2003 modify the lake levels ordered in 1975. The 2003 order set two separate lake levels to be maintained throughout the year, as opposed to the three lake levels set in the 1975 order. The elevation of the lake level set in 2003 matched two of the lake levels set in the 1975 order. The difference between surveyed board/weir elevations (NAVD88) and the court ordered levels for summer and winter is 0.59 feet and 0.79 feet respectively.

CONCEPTUAL DESIGN ALTERNATIVES

Design alternatives were developed based on comments from the community leaders, survey data, field verification, modeling results, previous dam improvement projects, comments from community stakeholders, and other recommendations. SGI reviewed previous reports and available research documents for Lake Lansing to assist with alternative design.

Many previous dam inspection reports recommend the replacement of the drawdown pipe, and the 2022 inspection found the slide gate on the drawdown pipe inoperable. Several options exist to address the improvement to the lake drawdown pipe. Additionally, other maintenance and recommended improvements are outlined to take advantage of the economies of scale of performing multiple work items as part of a larger project.

HYDROLOGIC AND HYDRAULIC ANALYSIS

A steady state hydraulic model was created in HEC-RAS to understand the existing hydraulic capacity of the lake level control structure. This model was prepared using surveyed cross sections collected as part of this study amended with 2010 LiDAR data, field observations, aerial photography, and flow rates obtained from the Michigan Department of Environment, Great Lakes and Energy (EGLE). A model was created to simulate existing conditions on the lake based on collected survey data, field observations, and the outputs from the most recent FEMA flood insurance study for Lake Lansing.

PRELIMINARY ESTIMATES OF COST

A Preliminary Estimate of Cost (PEC) was developed for each of the design alternatives to provide planning guidance and relative cost magnitude difference for each alternative. To develop the PEC, a list of general project scope items was generated for each design alternative. After identifying high-level proposed scopes, quantities were estimated based on the existing site conditions. Lump sum prices were developed for each task based on experience with similar projects.

IDENTIFY PROPOSED SOLUTION

The method for determining our recommended solution was based on the results of the previously described analyses and from discussions with various project stakeholders. The basis for our design includes the following considerations:

1. Condition of the drawdown pipe and slide gate.
2. Ability to increase the flow through the lake level control structure during times of high water to promptly maintain the legally established lake levels.
3. Operational efficiency and safety.
4. Risk and liability.
5. Environmental permitting.
6. Project cost.

HYDRAULIC ANALYSIS AND RESULTS

NARRATIVE

Hydrologic flows to Lake Lansing were provided by EGLE Hydrologic Studies and Floodplain Management Unit through request record 20230530. The flowrates provided are illustrated below and were calculated for runoff from 3.6 square miles of contributing drainage area. These flow rates mirrored the FEMA 2011 Flood Insurance Study for the Pine Lake Outlet and Lake Lansing.

Table 1 - EGLE Discharges for the Pine Lake Outlet at Lake Lansing Dam, Dam ID 1957

Discharge Frequency	Design Storm	Discharge (cfs)
50%	2 Year	20
20%	5 Year	35
10%	10 Year	55
4%	25 Year	90
2%	50 Year	130
1%	100 Year	135
0.5%	200 Year	140
0.2%	500 Year	145

These discharge rates are flows after being routed through the Lake Lansing impoundment and control structure. These discharge rates were input into a HEC-RAS one dimensional hydraulic model to evaluate structure hydraulics and overall capacity.

ASSUMPTIONS, VARIABLES, AND COEFFICIENTS

Boundary Conditions

The downstream boundary condition of the Lake Lansing Dam hydraulic model was determined utilizing the 100-year 24-hour floodplain surface water elevation at cross section E for the Pine Lake Outlet Drain, which aligns with Sta. 0+00 of the hydraulic model. The regulated elevation established in the flood insurance study is 849.2 ft. Elevations are constant until Lake Lansing Road.

The upstream boundary condition of the model was set with a starting water surface elevation of 851.70 ft which represents the top of the lake level control board installed in the overflow weir during the summer lake level. A second scenario was run without stoplogs with a starting water surface elevation of 850.93 ft, representing the concrete weir crest.

Manning's Roughness Coefficients

Manning's Roughness Coefficients were developed by Spicer Group, Inc. based on field observations. These estimates considered that roughness varies with flood stages, depending on such factors as the width-to-depth ratio of the stream, vegetation in the channel and overbanks, and the materials of the channel bed. Following is a general description of the channel and overbank characteristics as found on the project source along with their respective Manning's Roughness Coefficients:

Main Channels

Clean, straight, full, no rifts or deep pools 0.032

Floodplains

Brush

Light brush and trees 0.040 - 0.080

Trees

Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches 0.100 – 0.160

Expansion Coefficients
The expansion coefficients used in this model follow the basic recommendations made by the United States Army Corp of Engineers (USACE), Hydrologic Engineering Center and EGLE. They are as follows:

Natural stream/river	0.3
Bridge Sections	0.5

Contraction Coefficients
The contraction coefficients used in this model follow the basic recommendations made by the United States Army Corp of Engineers (USACE), Hydrologic Engineering Center and EGLE. They are as follows:

Natural stream/river	0.1
Bridge Sections	0.3

Weir Discharge Coefficients
A coefficient of 3.0 was used in the weir equation for calculating overtopping of the bridge and the bridge approaches.

HYDROLOGIC AND HYDRAULIC RESULTS
The 100-year 24-hour design storm estimated the lake level to be 853.2 feet with the 24-inch diameter gate closed flowing over the concrete weir crest. The Letter of Map Revision (Case No. 12-05-0030)) to flood insurance study 26065CV000A reports the 1% percent annual chance elevation to be 852.7 feet, therefore the model meets FEMA letter of map revision requirements and validates as a duplicate effective model. FEMA requirements are to be within 0.5 feet of the existing regulated floodplain elevation. Note that FEMA regulates floodplain elevations to the tenth of a foot.

The existing maximum capacity of the lake level control structure without overtopping was determined to be between the 10-year 24-hour and 25-year 24-hour storm events. This is a configuration of winter level (without boards) with the low-flow gate open. The definition of overtopping in the context of this analysis is any water surface elevation where flow from the lake occurs outside of the spillway itself. Please note that this analysis is limited to the vicinity of the lake level control structure site. The concrete cutoff wall north of the water level control structure is the first overtopping point at elevation 852.30 feet.

This overtopping point is 0.98 feet below the modeled 100-year 24-hour surface water elevation during the summer level (with boards) with the low-flow gate closed and is 0.51 feet below water surface for the same storm event at the winter level (without boards) with the low-flow gate open. To summarize, the 100-year 24-hour storm was modeled to overtop the dam between 6-12 inches. The FEMA reported 100-year floodplain elevation is 0.40 feet over this overtopping point.

During the winter level (without boards), the existing capacity of the structure is approximately 50-80 cfs before overtopping depending on low-flow gate position. During the summer level (with boards), the capacity of the structure is 15-40 cfs before overtopping depending on low-flow gate position. According to the EGLE provided flow rates and based on the results of our hydraulic model of the lake level control structure, a maximum of a 10-year 24-hour duration storm event can be conveyed during the winter level and a maximum of a 5-year 24-hour duration storm event can be managed during the summer level.

The following items should be noted regarding the results of the hydraulics analysis:

1. The flowrates utilized were based on FEMA FIS model and provided by EGLE through the flood flow discharge request.
2. The model results show that the structure cannot pass a 25-year 24-hour storm event without overtopping.

3. The ICDC staff have not indicated that there has been historic overtopping of the lake level control structure.
4. Testimony from residents around the dam in the community has not expressed that the dam overtops regularly.

HEC-RAS modeling results are compiled in Appendix D for four scenarios depicting the two court ordered lake levels with and without the low-flow gate opened.

CAPACITY ELEVATION SUMMARY ANALYSIS

The following tables summarize the water surface elevations modeled for the various given scenarios. There is a reference made to the "Depth of flow overtopping structure" which is a reporting of how high the water surface elevation was modeled over the lowest structural element of the dam where the flow can no longer be contained within the spillway itself, which is the northern concrete cutoff wall. Please note that this analysis is limited to the vicinity of the lake level control structure site.

Existing Conditions

Elevations during winter levels - no boards in spillway				
24-hour Design Storm Bulletin 71 Rainfall Depths	High Water Elevation with Gate Closed (ft NAVD 88)	Depth of flow overtopping structure (ft)	High Water Elevation with Gate Open (ft NAVD 88)	Depth of flow overtopping structure (ft)
50-year Storm	853.21	0.91	852.73	0.43
100-year Storm	853.22	0.92	852.81	0.51
200-year Storm	853.23	0.93	852.91	0.61
500-year Storm	853.25	0.95	852.96	0.66

Elevations during summer levels - with boards in spillway				
24-hour Design Storm Bulletin 71 Rainfall Depths	High Water Elevation with Gate Closed (ft NAVD 88)	Depth of flow overtopping structure (ft)	High Water Elevation with Gate Open (ft NAVD 88)	Depth of flow overtopping structure (ft)
50-year Storm	853.27	0.97	853.21	0.91
100-year Storm	853.28	0.98	853.22	0.92
200-year Storm	853.28	0.98	853.23	0.93
500-year Storm	853.29	0.99	853.25	0.95

STRUCTURE ELEVATIONS

Elevations adjacent to the lake level control structure

Weir crest elevation: 850.93 feet NAVD88
Lake level control board elevation: 851.70 feet NAVD88
Top of lake level control structure: 853.17 feet NAVD88
Concrete cutoff wall elevation (north): 852.30 feet NAVD88
Timber seawall elevation (south): 852.80 feet NAVD88

ALTERNATIVE ANALYSIS

EXISTING CONDITIONS AND MODEL VERIFICATION

After the existing document review, field investigation, preliminary modeling, preparation of preliminary plan, profile and cross section drawings, alternatives were analyzed. This analysis included studying the benefits and detriments related to the existing draw down pipe and slide gate, safety and operations, hydraulic capacity, cost, and current condition of different level control structure elements. The detailed alternative analysis can be found below.

CONCEPTUAL DESIGN ALTERNATIVES ANALYSIS

The current project proposes several different design alternatives that have been considered and evaluated in the process of determining the best design to cost effectively address the existing draw down pipe and slide gate, allow safe and reliable operation of the lake level control structure, and address any condition related concerns. The following is a list of alternatives considered. These alternatives have been analyzed on an individual basis for comparative purposes.

Alternative I: Do nothing
Alternative II: Abandon existing drawdown pipe and slide gate control structure in-place
Alternative III: Remove and replace drawdown pipe and slide gate control structure
Alternative IV: Remove and replace drawdown pipe and slide gate control structure, replace primary stoplogs
Alternative V: Modify spillway to provide low flow gate, abandon existing drawdown pipe in-place
Alternative VI: Increase spillway capacity

A brief description of each design alternative, its positive and negative effects, and estimated cost is provided below. Note, the costs presented below are preliminary planning level estimates of probable construction and project soft costs, excluding costs for environmental permitting and floodplain study. These estimates are developed without preliminary engineering design within the limited scope of this study and report. Inflation of 10% has been added to these costs to reflect a construction cost approximately 18 months beyond the conclusion of this study, to June of 2025. Overall plan view drawings showing the improvements of each alternative can be found in Appendix C.

Alternative I
Do nothing

Currently, the inoperable drawdown slide gate is secured in the closed position. If the slide gate were to fail in an open state, the lake would drawdown to an elevation of 847.94 feet, approximately 3.8 feet lower than the surveyed lake level. A drawdown of this amount would require emergency response to close the failed slide gate. There would likely be regulatory implications from EGLE due to impacts to riparian habitat and due to transport of sediments downstream from the unpermitted drawdown. Additionally, restoring the lake back afterward becomes a complex permitting project. This would also be a clear violation of the current lake level order.

This alternative would leave the existing drawdown pipe and inoperable slide gate structure in place. The only option for controlling lake level would be to add or remove the primary boards manually within the spillway, which can be an unsafe practice during times of high water. This alternative would not address the noted concerns with the lake level control structure's condition, operations, or safety. This scenario has a lesser hydraulic capacity than the structure would have at full operation. There is a risk of flooding and harmful impact to properties around the lake without the ability to open the drawdown gate.

The presentation of this alternative is to provide context for the risks and liabilities of moving forward without a project. We do not recommend this alternative.

Alternative II
Abandon existing drawdown pipe and slide gate control structure in-place
This alternative would bulkhead the existing ends of the drawdown pipe, both at the lake side and stilling basin side and fill the existing drawdown pipe and slide gate structure will flowable fill concrete. This would allow the drawdown pipe to be abandoned in-place. Repairs to the existing stone-cobble wall and steel sheet piling would need to be performed in the locations of the current drawdown pipe penetrations.

This alternative would mitigate one concern outlined in Alternative I regarding an unplanned drawdown of the lake due to a failed slide gate; however, it would provide a diminished capacity at the outlet structure (similar to Alternative I) because the only option for controlling lake level would be to add or remove boards manually within the spillway. In a scenario where the lake level was too high, the only option for the ICDC would be to allow the water to flow over the weir without the drawdown pipe and slide gate to assist. There is a risk of flooding and harmful impact to properties around the lake with the removal of the low-flow pipe and slide gate. This alternative would not address matters of operational safety of the lake level control structure as manual operation of boards would be required.

This alternative would reduce the overall structure capacity which will have a negative impact on the ICDC's ability to maintain the court ordered lake level. Please note, a floodplain study has not been performed as part of this report and removal of available capacity within the lake level control structure would negatively impact the mapped floodplain and flood insurance requirements around the lake. It should be noted that regulatory agencies would likely not permit a construction project only to abandon the low-flow drawdown pipe. We included this alternative as a response to questions and feedback from community stakeholders regarding removal of the drawdown pipe alone. We do not recommend this alternative.

Total Estimated Project Cost: $300,000

Alternative III
Remove and replace drawdown pipe and slide gate control structure
This alternative would remove the existing drawdown pipe and slide gate control structure and replace it with a new reinforced concrete drawdown pipe and bypass control structure. The bypass control structure would be fitted with a device that could allow for incremental drawdown of the lake level, as needed to maintain the court ordered lake level. The spillway and weir configuration, including the main primary boards to control winter and summer levels, would be un-modified in this alternative.

At the time of construction of improvements to the structure in the late 1970s, the stone-cobble wall was existing and left in place. Due to the age and condition of the stone-cobble wall on the north side of the spillway, a replacement of that wall is proposed in this alternative. Additionally, miscellaneous crack repair, and cleaning and recoating of exposed steel sheet pile is included in this alternative to extend the longevity of the spillway structure that was constructed in 1976. The residential deck over the slide gate control structure and dock over the intake pipe would be removed during construction.

This alternative would address the condition concerns related to the drawdown pipe and slide gate, as well as condition issues related to the stone and cobble wall and 1976 improvements. Operational safety is improved with new controls within a replaced drawdown pipe and bypass control structure; however, manual operation of the primary boards in the spillway would be necessary to set the winter and summer levels.

There is an opportunity to increase overall capacity in the structure with this alternative by increasing the size of the low-flow pipe. This would not provide increased passive capacity in the spillway, but it would

provide additional capacity through operation of the control structure if needed. Increasing the 24-inch low flow pipe to a 48-inch pipe would provide a capacity between a 50- and 100-year storm. The construction of a larger low-flow drawdown pipe could pose harmful impacts to property owners downstream and increased peak flows downstream of the lake should be evaluated with this alternative. Increasing the capacity of the structure will likely necessitate a flood study to receive regulatory approval for construction.

Total Estimated Project Cost: $900,000 - $950,000*
*Does not include cost for permitting and flood study.

Alternative IV
Remove and replace drawdown pipe and slide gate control structure, replace primary stoplogs
This alternative would be similar in scope to Alternative III but would include additional modifications to the spillway to retrofit a system of primary boards that could be installed and removed from the embankment beside the lake level control structure. A crank style system would raise and lower the boards within a frame over the spillway providing more reliability and safety in the operation and maintenance of the court ordered lake level. Replacement of the stone-cobble wall, crack and corrosion work, and removal of the deck and dock structures is also included in this alternative.

This alternative would address the condition concerns as noted in Alternative III. Operational safety would be fully addressed as both the drawdown and primary board operations could be performed from outside of the spillway of the level control structure.

There is an opportunity to increase overall capacity in the structure with this alternative by increasing the size of the low-flow pipe. This would not provide increased passive capacity in the spillway, but it would provide additional capacity through operation of the control structure if needed. Increasing the 24-inch low flow pipe to a 48-inch pipe would provide a capacity between a 50- and 100-year storm. The construction of a larger low-flow drawdown pipe could pose harmful impacts to property owners downstream and increased peak flows downstream of the lake should be evaluated with this alternative. Increasing the capacity of the structure will likely necessitate a flood study to receive regulatory approval for construction.

Total Estimated Project Cost: $1,060,000 - $1,110,000*
*Does not include cost for permitting and flood study.

Alternative V
Modify spillway to provide low flow gate, abandon existing drawdown pipe in-place
This alternative would remove the use of a drawdown pipe and gate structure and modify the spillway to provide a low flow gate to retain the ability and function to draw down the lake. The additional capacity and ability to lower the lake level with the 1976 addition of the drawdown pipe allowed for lake level control without pulling the primary boards. This alternative would consolidate the controls and operation of the structure to one location. The spillway would be modified to include a low flow gate across its length at a lower elevation with removable boards to set lake level, and the drawdown pipe would be abandoned in-place. The spillway would require modification to be made 1 to 2 feet lower than it is today, in order to install new control gates. In this configuration, operators would be located safely away from the spillway to operate the structure. The primary boards could be operated separately from the low flow gate, depending on the need to release water from the lake. This alternative would likely require dredging of lake bottom material in order to maintain a clear opening to the low flow gate.

The previously outlined work items in Alternative IV addressing the stone-cobble wall replacement, crack and corrosion work, and removal of the residential deck and dock would be included in this alternative.

This alternative would address all the condition related concerns as noted in previous alternatives. Operational safety would be fully addressed as both the drawdown and primary board operations could be performed from outside of the spillway of the level control structure.

Capacity would increase relative to the existing condition capacity of the lake level control structure. The low flow weir could be designed 1 to 2 feet lower to increase the capacity of the structure to a desired level of service. The construction of spillway with an increased capacity could pose harmful impacts to property owners downstream and increased peak flows downstream of the lake should be evaluated with this alternative. Increasing the capacity of the structure will likely necessitate a flood study to receive regulatory approval for construction.

Total Estimated Project Cost: $1,500,000*
*Does not include cost for permitting and flood study.

Alternative VI
Increase spillway capacity
This alternative would triple the spillway length from 10.3 feet to 30 feet to provide 100-year storm capacity in the spillway alone. The improvement of capacity at the spillway could pose harmful impacts to property owners downstream and increased peak flows downstream of the lake should be evaluated with this alternative. Increasing the capacity of the structure will likely necessitate a flood study to receive regulatory approval for construction.

The hydraulic modeling analysis results show that a 10-year 24-hour duration storm event can be managed without boards (winter level) and less than the 5-year 24-hour duration storm event can be managed with boards (summer level). This lake level control structure is not regulated as a dam by EGLE under Dam Safety regulations and therefore does not have a mandated capacity enforced by EGLE. The cost of this alternative would be significant.

Total Estimated Project Cost: $4,000,000+*
*Does not include cost for permitting and flood study.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

In choosing a final design alternative for the Lake Lansing level control structure environmental, economic, constructability, legal, and social issues were considered.

At this time, we recommend replacement of the drawdown pipe and gate system as well as a replacement of the primary stoplog configuration at the lake level control structure as outlined above in Alternative IV. This would include a solution to address major deficiencies noted in past inspection reports regarding the inoperable slide gate, provide improvements to reduce operational cost and improve operational safety, replace ageing elements of the structure constructed prior to the 1976 project, and address condition related work items to extend the overall usable life of the remaining structural elements through vegetation management, corrosion removal, and concrete crack repair.

EGLE Permitting

Construction within the lake on the lake level control structure will likely require permitting through EGLE for impacts to lakes, streams, wetlands, and floodplains. The most notable permitting impact will come through a review of the floodplain and permitting of any capacity changes to the structure. A flood study will likely be required according to FEMA letter of map change standards to update floodplain boundaries as part of a project to change the capacity at the lake level control structure. In a scenario where capacity increases, floodplain elevations on the lake could potentially go down and floodplain elevations downstream of the lake could potentially go up. The reverse would also be true and a study of these floodplain elevations would be required to justify the project to regulators.

Court Ordered Lake Level

The ultimate configuration of the dam will dictate how quickly the ICDC can respond to and operate the structure to maintain the lake level. Though operational functions of the structure have been recommended in this report, the current court order remains in place to govern the lake level. There is no datum referenced in the 2003 order that can be translated to NAVD88 which can cause confusion on the current lake level and whether the lake level is being maintained. A revised Circuit Court Order could address the elevations to provide for a modern datum. Lastly, the Circuit Court Order should be updated to allow for seasonal variation. In most instances, it is not possible to maintain a static level therefore the Order should include language to address seasonal variation such as during period of drought and during high flow events, i.e., large storm events or spring runoff.

Remote Monitoring

An element of the operational cost of the lake level control structure is the periodic documentation of the lake level elevation. Typically, this is performed following a property owner's concern or request, or as part of the regular operation and inspection of the lake level control structure. Remote read water level sensors with data logging capabilities are commonly installed in dam and lake level control structures applications. This would allow observation and documentation of the lake level to be performed quickly within an application or webpage as opposed to necessitating a visit to the site by ICDC staff members. A typical cost to purchase a water level sensor complete with solar power and cellular data capabilities is $2,000. A recuring cost of approximately $300 per year should be expected to maintain a connection and access to live data. Other subscription-based options for approximately $2,000 per year include the sensor, cellular connection, data storage, live web access to data, data alerts, maintenance, upgrades and equipment replacement.

Monitoring the water level at the control structure would be the primary location for a level sensor. Following discussions with ICDC maintenance staff, we would recommend a second water level sensor be

installed downstream of the lake just south of Lake Lansing Road east of the dead end of Sherbrook Way on the Pine River Outlet Intercounty Drain, at a location that is commonly monitored during times of lake drawdown to avoid inadvertent flooding.

Operations and Maintenance

If the design of improvements to the Lake Lansing lake level control structure are pursued, we recommend that a comprehensive operations and maintenance manual be included in the scope and requirements of the consultant performing the design. Any manufactured items/products installed on the structure will likely include a maintenance approach that is recommended by the manufacturer, that can inform the maintenance needs for that given item/portion of the structure.

APPENDIX A

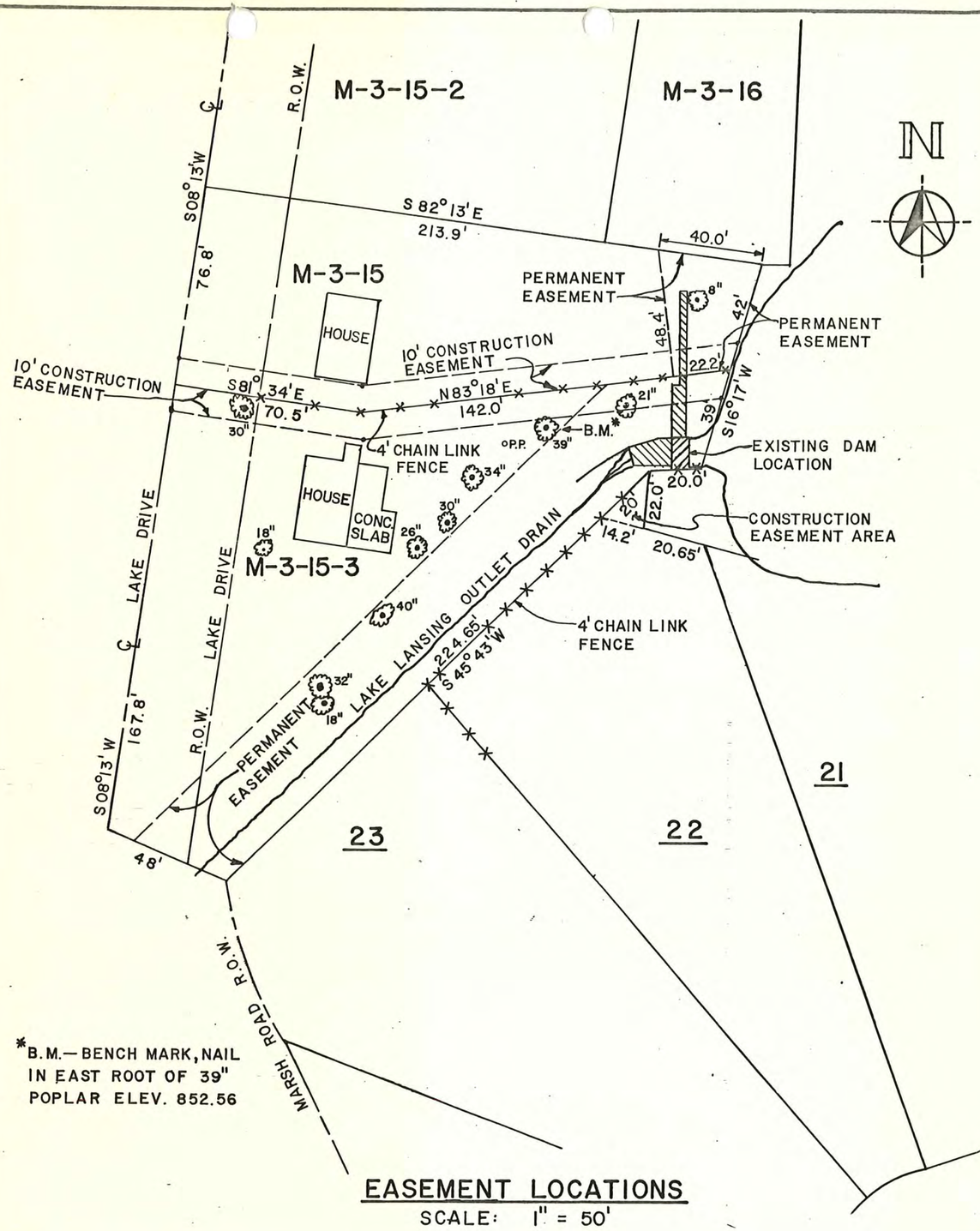
Historic and Background Information
Existing Condition Plan, Profile and Cross Section Drawings



1974 – Looking west from lake downstream over spillway.

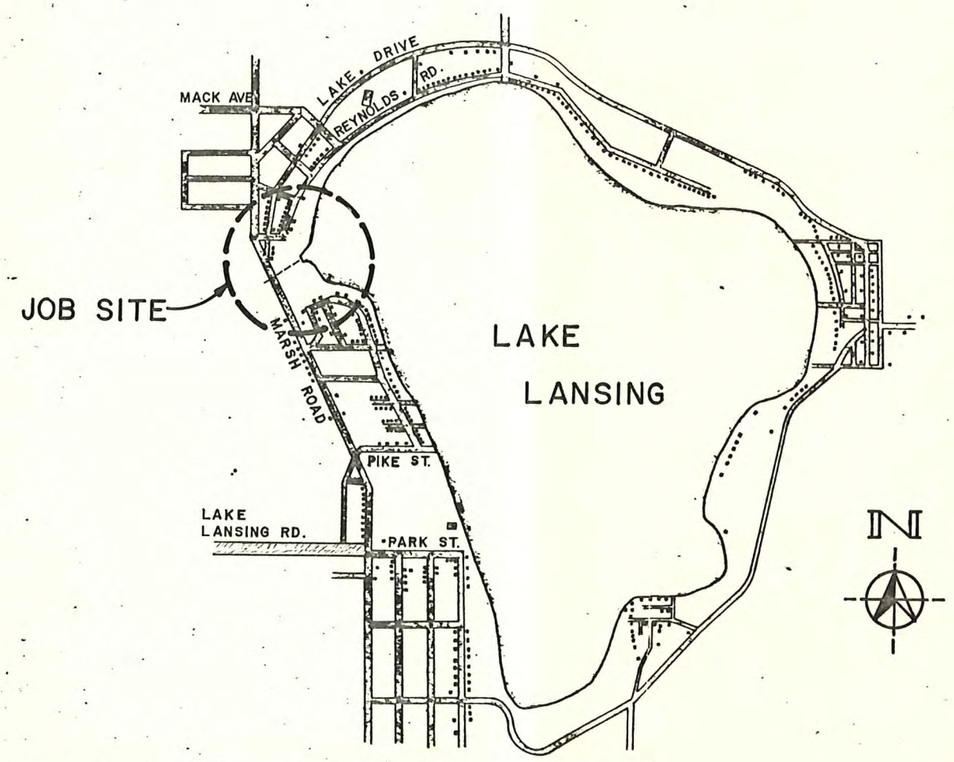


1974 – Looking east from base of spillway into lake.



*B.M.— BENCH MARK, NAIL IN EAST ROOT OF 39" POPLAR ELEV. 852.56

EASEMENT LOCATIONS
SCALE: 1" = 50'



JOB SITE LOCATION
NOT TO SCALE

DR'N. BY:	G.L.D.	10-30-75
CK'D. BY:	R.G.N.	10-30-75
APP'D. BY:	D.W.	10-30-75
DSGN. BY:	R.G.N.	10-30-75

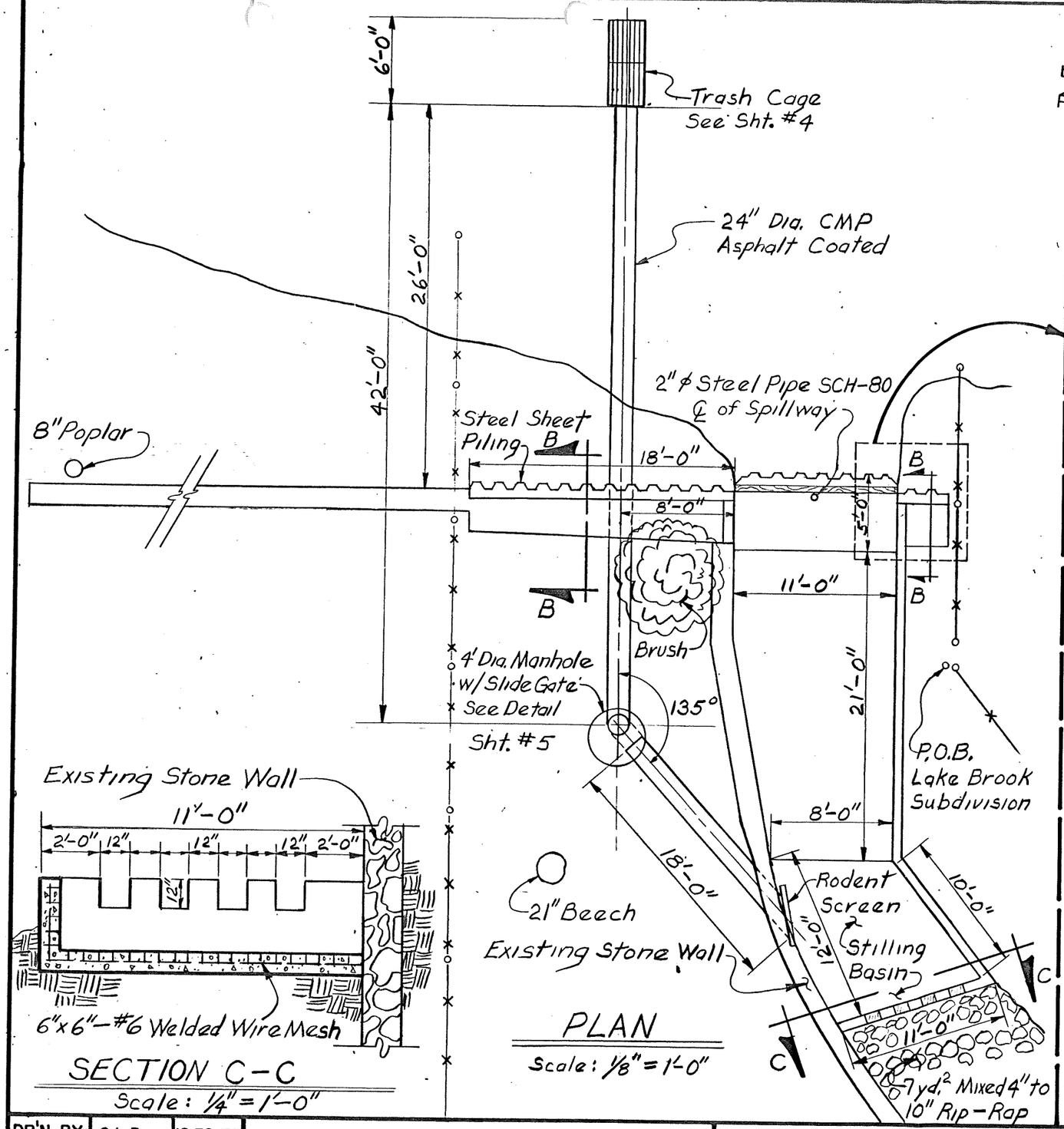
DAM ALTERATIONS & LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.

SNELL ENVIRONMENTAL GROUP
LANSING, MICHIGAN

JOB SITE AND EASEMENTS

SCALE: AS SHOWN

DRN. NO: 75168-1



DR'N. BY:	G.L.D.	10-30-75
CK'D. BY:	R.G.N.	10-30-75
APP'D. BY:	D.W.	10-30-75
DSGN. BY:	R.G.N.	10-30-75

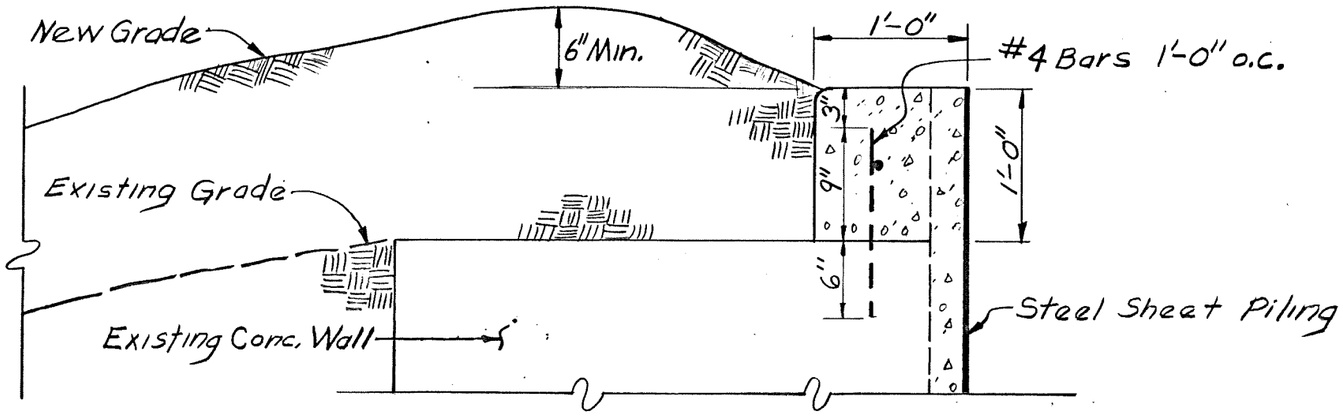
DAM ALTERATIONS &
LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.

SNELL ENVIRONMENTAL GROUP
LANSING, MICHIGAN

SPILLWAY PLAN AND DETAILS

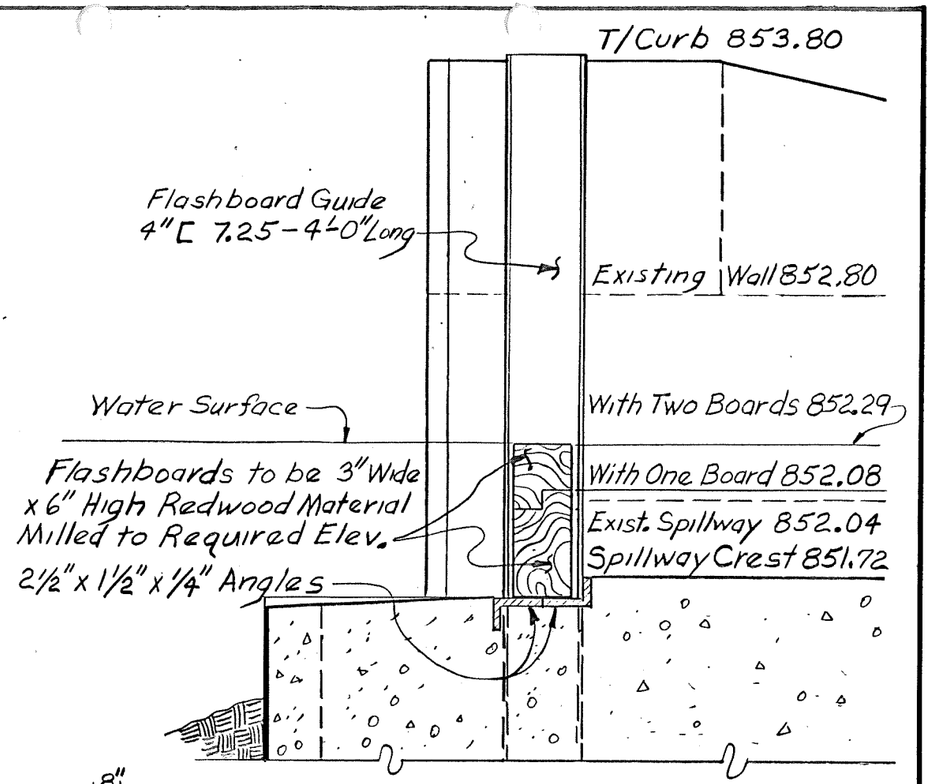
SCALE: AS SHOWN

DRN. NO: 75168-2



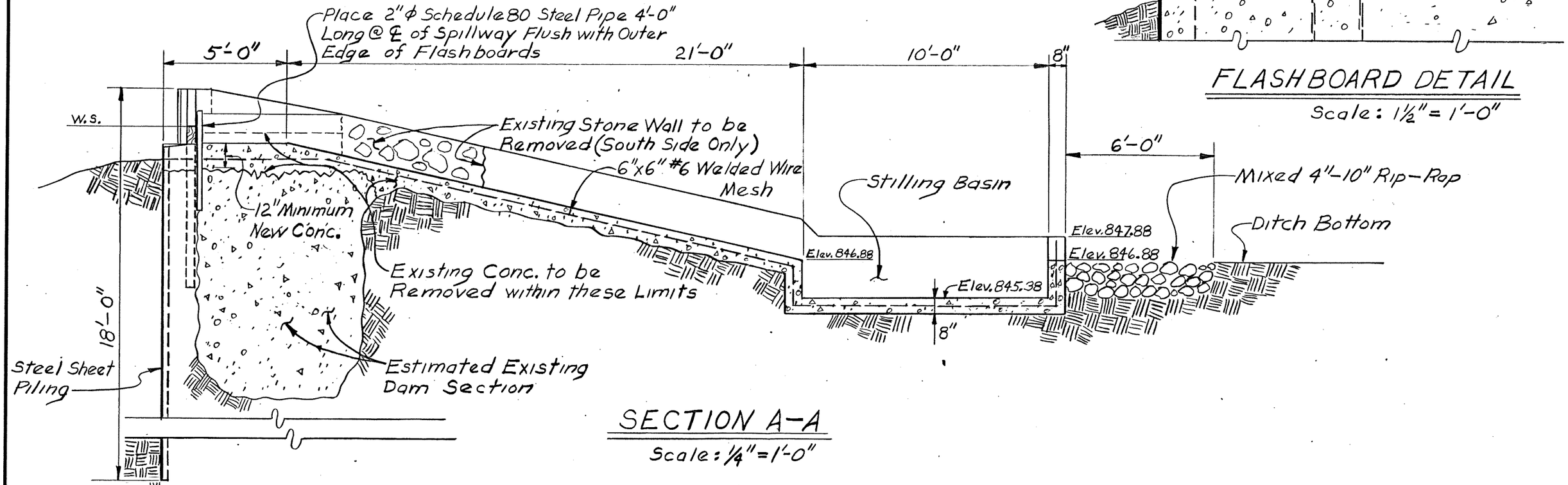
SECTION B-B

Scale: 1"=1'-0"



FLASHBOARD DETAIL

Scale: 1½"= 1'-0"



SECTION A-A

Scale: ¼"=1'-0"

DR'N. BY:	G.L.D.	10-30-75
CK'D. BY:	R.G.N.	10-30-75
APP'D. BY:	D. W.	10-30-75
DSGN. BY:	R.G.N.	10-30-75

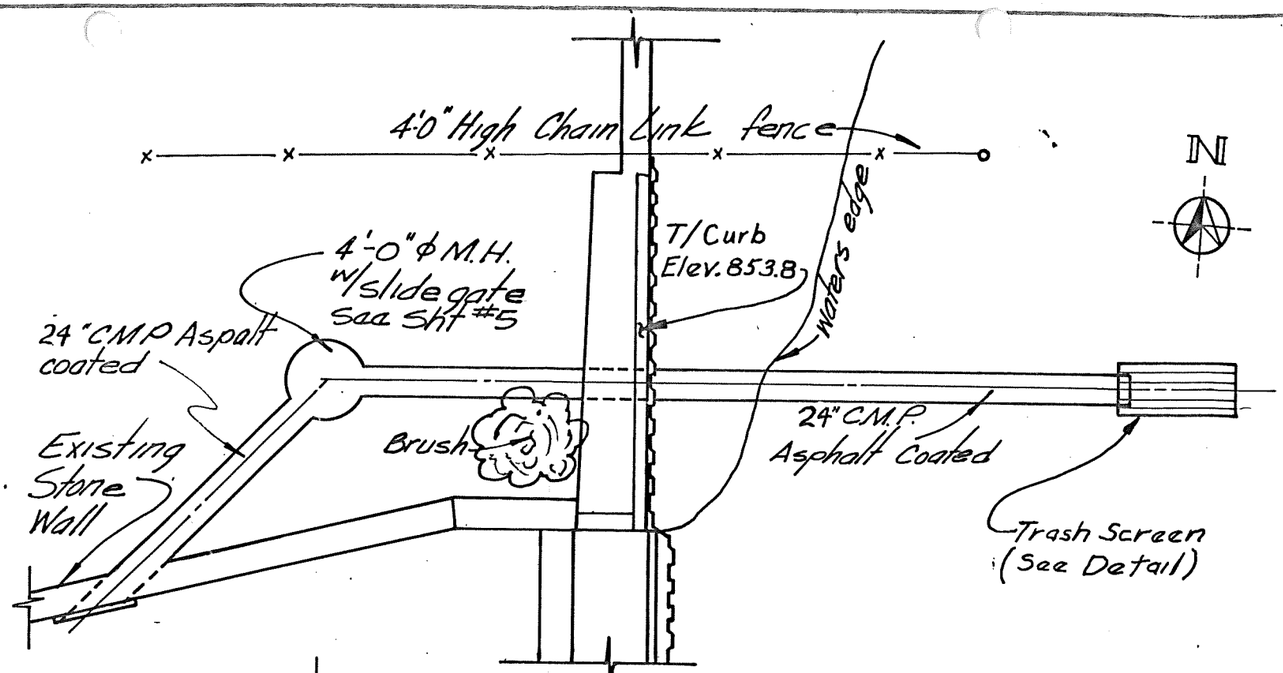
DAM ALTERATIONS & LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.

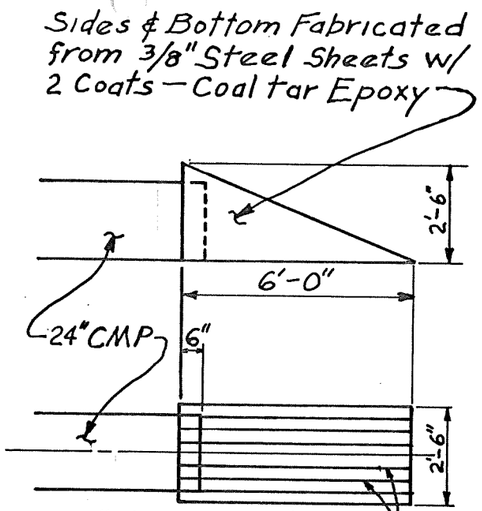
SNELL ENVIRONMENTAL GROUP
LANSING, MICHIGAN

SPILLWAY SECTION AND DETAILS

SCALE: AS SHOWN

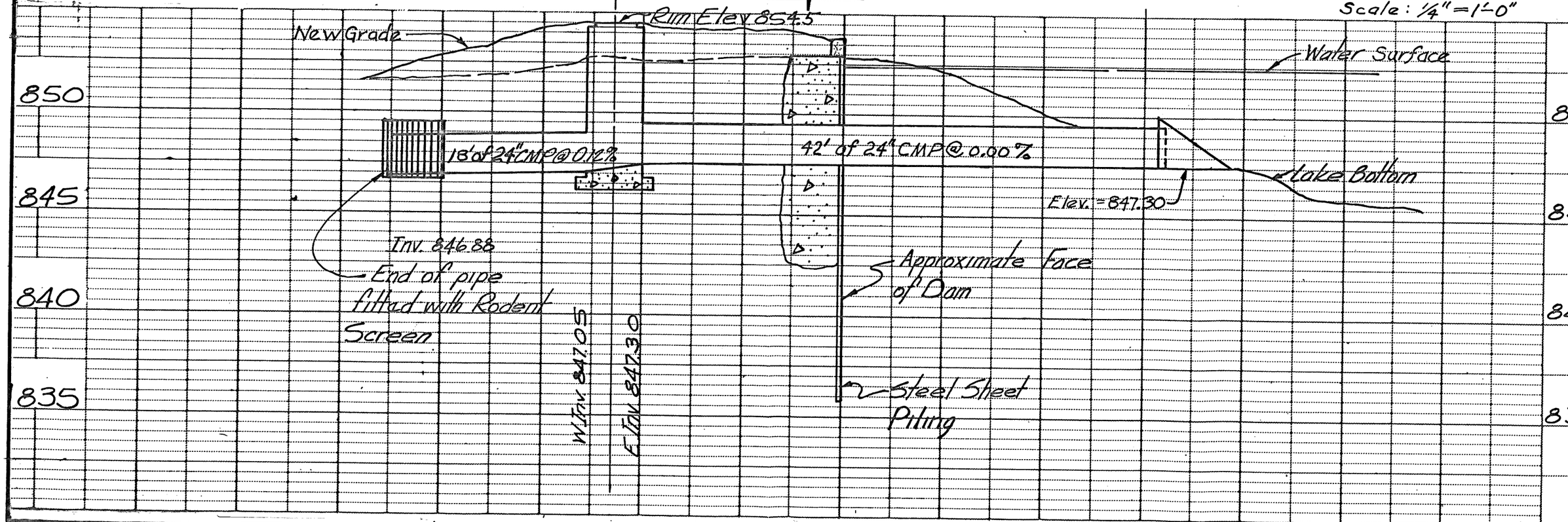
DRN. NO: 75168-3





TRASH SCREEN

Scale: 1/4" = 1'-0"



DR'N. BY:	TB	10-30-75
CK'D. BY:	R.G.N.	10-30-75
APP'D. BY:	D.W.	10-30-75
DSGN. BY:	R.G.N.	10-30-75

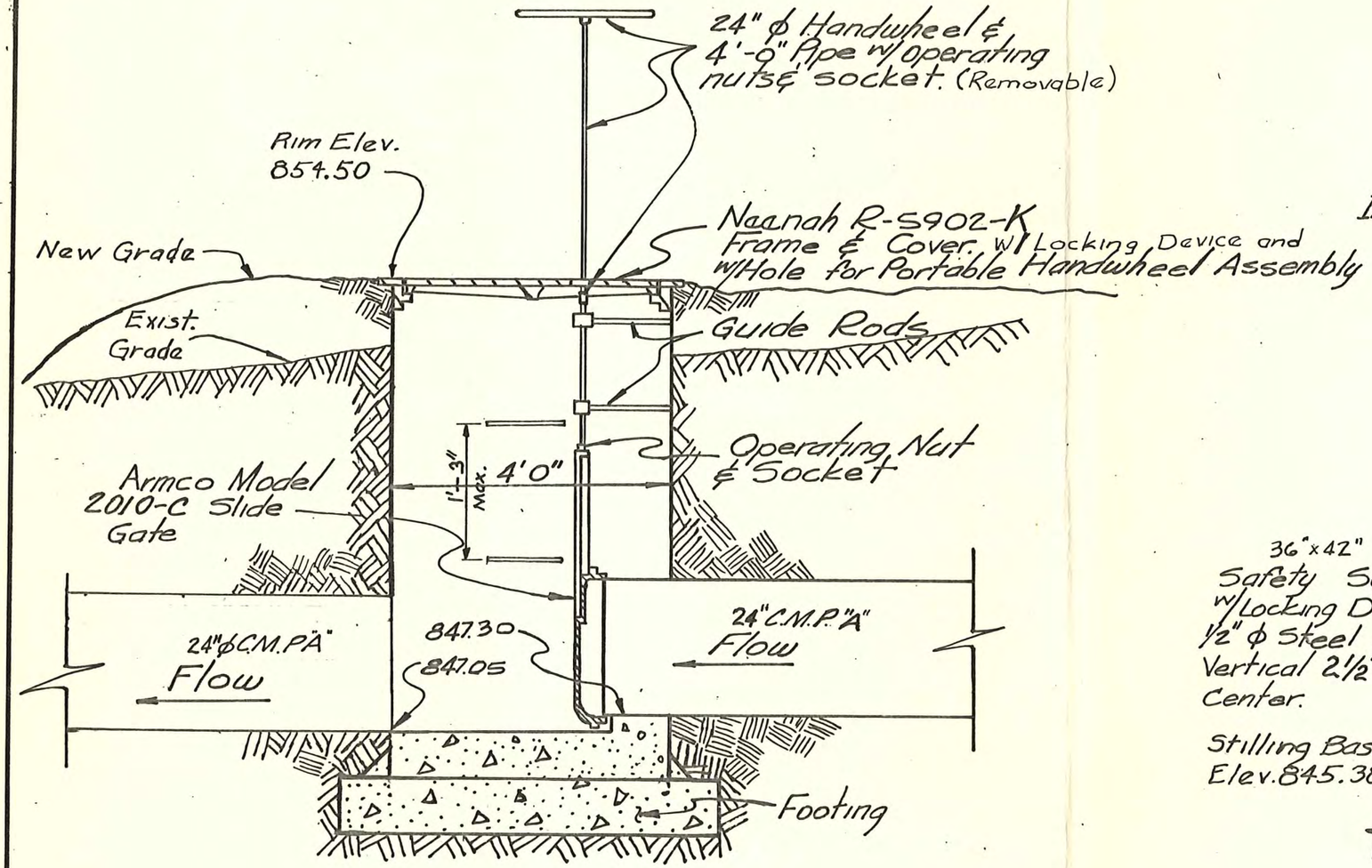
DAM ALTERATIONS & LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.

SNELL ENVIRONMENTAL GROUP
LANSING, MICHIGAN

BY-PASS PIPE
PLAN
PROFILE
INLET DETAIL

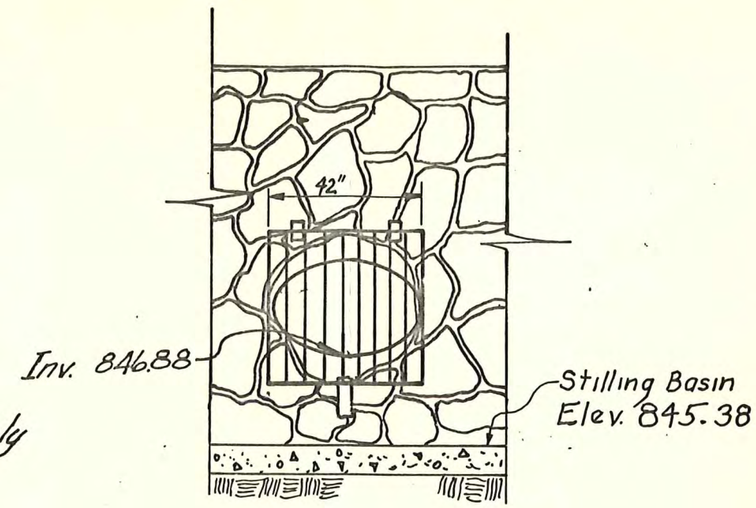
SCALE: HORZ. 1" = 8'
VERT. 1" = 5'

DRN. NO: 75168-4

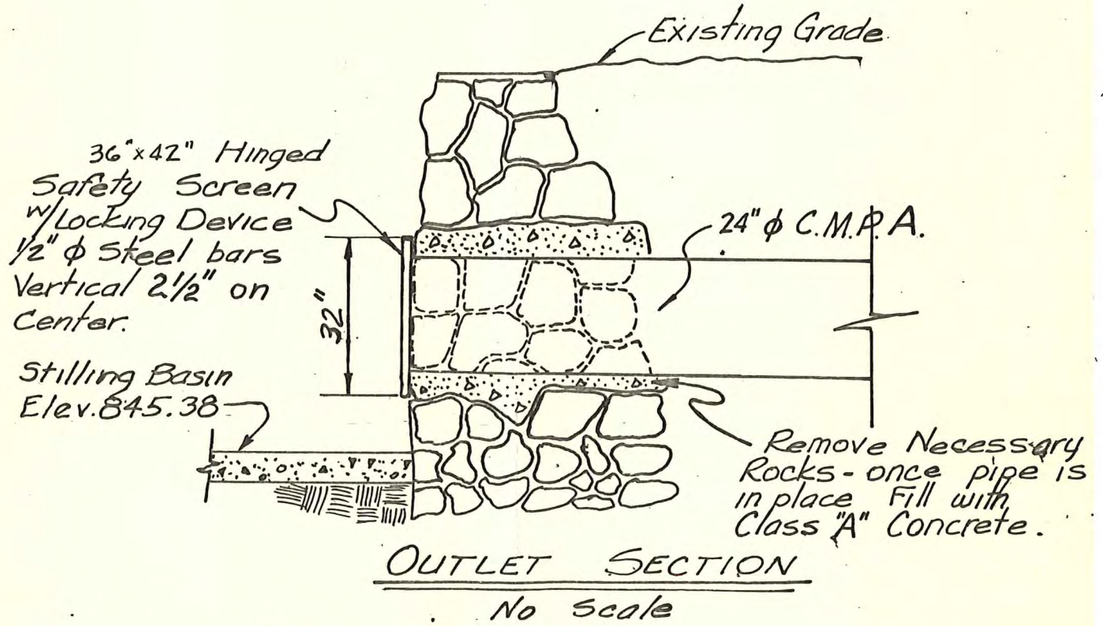


SECTION MANHOLE

No Scale



NORTH ELEVATION



OUTLET SECTION

No Scale

DR'N. BY:	M. B.	10-30-75	DAM ALTERATIONS & LAKE LEVEL CONTROL LAKE LANSING, INGHAM CO., MICH.	SNELL ENVIRONMENTAL GROUP LANSING, MICHIGAN	BY-PASS PIPE DETAILS	SCALE: AS SHOWN
CK'D. BY:	R.G.N.	10-30-75				
APP'D. BY:	D.W.	10-30-75				DRN. NO: 75168-5
DSGN. BY:	R.G.N.	10-30-75				



1980 – Looking west from lake downstream over spillway.



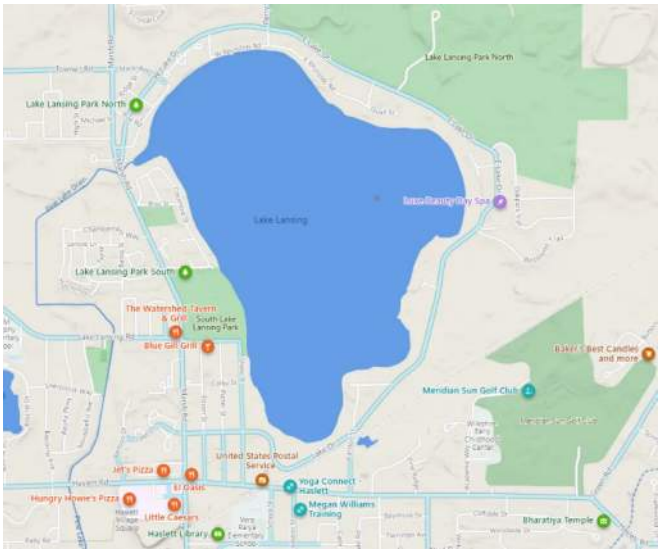
1980 – Looking east from base of spillway into lake.

LAKE LANSING DAM INSPECTION REPORT

Dam Identification No. 1957
Meridian Township, Ingham County, Michigan



12/29/2022







Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
3681 Okemos Road, Suite 600
Okemos, MI 48864

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- Lake Level as Set per Court Order

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
WATER RESOURCES DIVISION
DAM INSPECTION REPORT

This form is to be used for inspection reports required by Part 307, Inland Lake Levels, for those dams that do not meet the size criteria as defined by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Dams six (6) feet or more in height, as defined by Part 315, and impounding five (5) acres or more at the design flood elevation, must meet the inspection report format as outlined in Section 31518 of Part 315.

A person failing to comply, or falsely representing dam conditions, is guilty of misconduct in office.

Dam Name: Lake Lansing Dam County: Ingham

Dam ID: 1957 Name of Waterbody: Lake Lansing

Date of Inspection: 12/14/2022 Level this date: 851.10

Section: 3 Town: 4N Range: 1W

Date elevation set by Court: February 26, 2003 Legal level: 851.77 Nov 15 - Feb 852.29 Mar – Nov 14

Drawdown level: 848.25 High water make elevation: Unknown

EARTH EMBANKMENTS (LOOKING DOWNSTREAM)

Left Embankment: 53 ft. Right Embankment: 30 ft. Total Length: 83 ft.

	UPSTREAM	CROWN	DOWNSTREAM
VEGETATIVE COVER	None	Grasses	Heavy vegetation in channel
EROSION	None	None	None
SEEPAGE			None
SLIDES, SLUMPS, & CRACKS	None	None	None
ANIMAL BURROWS	None	None	None
WAVE ACTION PROTECTION	Stone Riprap, Concrete & Wood Seawall, Steel Sheet Piling		N/A
REMARKS*	See Attached Report		

CONTROL STRUCTURE

TYPE Horizontal CMP intake with valve control	YEARS CONSTRUCTED 1975	STRUCTURAL HEIGHT (top of dam elevation minus stream invert) 6.6 ft.
LENGTH OF SPILLWAY 38 ft. with stilling basin	FREEBOARD 1.4 ft.	HYDRAULIC HEIGHT (design flood elevation minus stream invert) 5.3 ft.
VERTICAL PIPE SIZE N/A	HORIZONTAL PIPE SIZE 24" Diameter	HEAD (normal headwater minus normal tailwater) 4.5 ft.

DESCRIBE CONDITION OF THE FOLLOWING ITEMS

STOPLOG VALVES AND GATES (open and close to check condition): Check location of top stoplog in relation to top of riser pipe intake box or fixed crest, for leakage, and condition of stoplogs, valves and gates.

No stop logs were in place at the time of inspection. Water was low with no flowing water over the weir at the time of inspection. Stop log channel could use some upgrades but Maintenance personal report that the logs maintain the summer lake level satisfactorily.

OUTLET PIPE: Check for damage from ice, logs, vandalism; inside discharge pipe for settlement and/or joint separation; condition of pipe coating.

CMP pipe is in poor condition. Evidence of holes in the pipe. Pipe end seems to be surrounded with sediments which some of it made it downstream when the valve was opened, end treatment is recommended. The gate and valve for the outlet pipe are damaged and not operable. Staff has propped the gate closed to prevent water from flowing out. **NEEDS IMMEDIATE ATTENTION**.

CONCRETE STRUCTURE: Check for erosion; location of cracking or spalling. If old or new; settlement; need for crack repairs.

Minor cracking and spalling in structure. Overall sound condition. No need for immediate action

WALKWAY & RAILING: Check if in place or removed, condition, and if adequate protection provided.

There are no walkways or railings. Deck and dock over drawdown pipe and valve are in poor condition. The dock is falling apart and unsafe to walk on. The valve is inoperable, and the deck need some attention before the next inspection. **Recommend replacement of control structure, pipe, valve and related support structures ASAP.**

TRASHRACK OR LOG BOOM: Check if operable.

N/A

EMERGENCY SPILLWAY: Size, type, and condition.

N/A

INLET & OUTLET CHANNELS

	INLET	OUTLET
SIZE	N/A	5' average bottom width, less than 5' bank height
EXISTING CONDITION	N/A	Fair
EROSION	N/A	Minimal erosion
DEBRIS & OBSTRUCTIONS	N/A	Medium vegetation growth, Leaves and brush may cause backup in the still basin.
RIPRAP PROTECTION	N/A	Continued maintenance is recommended
REMARKS*	N/A	Fallen trees and branches in ditch, east and west of Marsh Road, need clearing. The east and west ends of the culvert under Marsh road are clear.

RECOMMENDATIONS:
List work needed, how to be done, by whom, estimated cost, source of funds, recommended completion date. If emergency, to what extent. ADDITIONAL COMMENTS.

See attached report.

Inspection Ordered By: Mr. Paul C. Pratt County Delegated Agent

Inspector's Name Samir Matta Signature Deputy Drain Commissioner Samir F. Matta

P.E. Registration No. MI 41005 Phone: 517.819.2367

Address: 3681 Okemos Road, Suite 600

City, State, Zip Code: Okemos, MI, 48864

Please submit this completed report and photographs of the dam, downstream channel, and deficiencies cited in the report to:

DAM SAFETY PROGRAM
LAND AND WATER MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
PO BOX 30458
LANSING MI 48909-7958

*NOTE: If space is inadequate for remarks, attach additional sheets as needed.

If you need this information in an alternate format, contact EGLE-Accessibility@Michigan.gov or call 800-662-9278.

EGLE does not discriminate on the basis of race, sex, religion, age, national origin, color, marital status, disability, political beliefs, height, weight, genetic information, or sexual orientation in the administration of any of its programs or activities, and prohibits intimidation and retaliation, as required by applicable laws and regulations. Questions or concerns should be directed to the Nondiscrimination Compliance Coordinator at EGLE-NondiscriminationCC@Michigan.gov or 517-249-0906.

This form and its contents are subject to the Freedom of Information Act and may be released to the public.

LAKE HISTORY

Lake Lansing, originally known as Pine Lake, served as a hunting and fishing ground for Indian tribes for centuries. Burial mounds have been found around the lake that pre-date the Chippewa Indians and Chief Okemos. The lake provided abundant fishing, and the surrounding woods were a source of wild game.

The lake was described by early writers as being clear, and well stocked with various kinds of fish. The shores were timbered on the north and east by yellow pine, the only sizeable tract in Ingham County. Hickory and oaks wooded the north and west shores.

During the next several decades, the land around, but not immediately on, the lake was settled and farmed. The lake became a popular recreation site in the late 19th century.

The Lake Lansing Dam (Dam ID# 1957) helps control the lake elevation according to the court order of February 26, 2003. The dam was inspected by Lockwood, Andrews, and Newnam, Inc. (LAN), at the request of the Ingham County Drain Commissioner's Office, as part of a regular scheduled inspection program.

The report Inspection form and some of the photographs highlighting the current condition of the Dam are attached for your review and use. LAN is also working closely with the Drain office to develop design improvements to address some of the issues noted in the inspection report.

The highlighted pictures, taken on December 14, 2022, in Appendix A depict the following:

Figure 1: Shows the concrete stilling basin looking towards the lake.

Figure 2: Shows the slide gate within the intake structure that controls the level of the lake outside the weirs/spillway control. Some leakage can be seen from the valve.

Figure 3: Show the condition of the wooden dock.

Figure 4: Indicates the water level of the lake at the time of inspection.

Figure 5: Shows the Sea Wall and Approach to Spillway from the Dock location.

Figure 6: Shows the riprap shoreline right of the spillway.

Figure 7: Shows the spillway.

Figure 8: Shows the sheet piling under the wooden deck.

Figure 9: Shows the intake pipe underneath the dock.

Figure 10: Shows the Spillway looking towards the Lake.

Figure 11: Shows the Bypass Pipe into Still Basin.

Figure 12: Shows the open channel looking downstream toward the Marsh Rd. outlet structure.

Figure 13: Shows the Marsh Rd. outlet structure on the east side of Marsh Rd.

Figure 14: Shows the Marsh Rd. outlet structure on the west side of Marsh Rd.

Figure 15: Shows the Stop Log Channel.

Figure 16: Shows the Spillway edge where vines are growing through cracks.

Figure 17: Indicates the Dock Condition over the inlet structure.

Figure 18: Shows the Seawall right of Spillway.

DAM CONDITION ASSESSMENT

LAN performed one site visit to inspect the dam. The visit was performed on December 14, 2022. Based on the inspection, the condition of the dam seems to be in a stable working state. However, some repairs are needed and one in particular requires immediate attention (Slide Gate and Valve). There is visible deterioration to both the concrete and steel structures that needs to be addressed as well as the wooden dock that is unsafe to use. There is no immediate failure potential to the dam, but repairs and improvements should be considered and incorporated in the near future.

Sheet Piling:

The sheet piling has shown some signs of corrosion and needs to be mitigated. Replacement may be an option, but other means could be considered such as restoration and painting of the steel while installing an outside concrete barrier for further protection.

Concrete Structures:

The concrete spillway and manhole seem to be in fairly good shape with minor cracking that need to be addressed. However, the concrete structure supporting the intake pipe is in deteriorated state and needs to be replaced when the fix is approved for the inlet pipe replacement/repair.

Intake Pipe:

The intake pipe which is located immediately underneath the wooden dock has rusted out and is pitted in many locations along its length. The condition could be observed, during previous inspections, when the valve is operational as bubbles are seen where holes are present. Furthermore, the intake pipe lacks any screens as to prevent fish or debris from washing into the drain.

Wooden Dock:

The wooden dock is in very poor condition. The dock is unstable and unsafe to walk on. It needs to be repaired or replaced.

Riprap Walls:

No significant erosion was observed at the time of inspection. It is recommended regular upkeep be done to prevent possible erosion.

Still Basin:

The still basin at the bottom of the spillway is usually full throughout the year and it is a cause for a foul smell from stagnant water and decomposed fish during the summer months.

Slide Gate (Valve):

The slide gate is not operational and is currently propped up by a chain and wedged with a 4x4 to maintain it in a closed position.

Spillway:

The spillway and water level control structure are in satisfactory condition with some minor cracks and spalling. Vines seems to be growing through some of the cracks along the spillway edge. The spillway, however, does not allow for fish to pass from Lake Lansing into the Pine Lake Outlet Drain. Modifications could be made to the spillway to allow for fish passage.

Open Channel Drain:

The outlet drain is in good condition. Regular clearing and grubbing of vegetation are recommended within the open channel to remove obstructions.

Marsh Road Outlet Culvert:

The outlet culvert is in good condition. Regular clearing and grubbing of vegetation around the outlet culvert are recommended especially along the downstream end of the culvert west of Marsh Road.

Water Level Monitoring:

The water level measuring device located along the concrete slab at the end of the dock has shifted and needs to be releveled to its original location. This will allow for a more accurate reading of the lake level as the water level is currently monitored on a monthly basis by maintenance staff. The installation of a remote sensor that reports water level information accessible via internet could also be installed to reduce the number of visits needed for water level monitoring.

RECOMMENDATIONS

LAN recommends that the Drain Commissioner's Office perform the following:

1. Perform rehabilitation of the corroded upper portion of the sheet piling along the span of the dam. (sandblasting, painting and encasement with concrete)
2. Replace or perform lining to the existing intake piping while replacing the valve control structure for lowering the lake level; Establish new uplift control for new/rehabilitated pipe with appropriate screening to prevent fish and other debris from washing downstream when the valve is open.
3. Repair damaged concrete structures.
4. Relevel water level measuring device on the concrete structure for a more accurate lake level reading.
5. Replace the wooden dock and maybe eliminate the deck over the valve control structure when performing the upgrade.
6. Evaluate the need to replace the still basin with other means of energy dissipaters.
7. Perform regular clearing and grubbing within the open drain and around culvert.
8. Perform regular upkeep on areas that experience erosion.

APPENDIX A:

FIGURES



Figure 1 – Still Basin



Figure 2 – Slide Gate (Valve)



Figure 3 – Wooden Dock



Figure 4 – Water Level



Figure 5 – Sea Wall and Approach to Spillway from the Dock location



Figure 6 – Riprap Shoreline Right of Spillway from the Dock location



Figure 7 – Spillway



Figure 8 – Sheet Piling Right of Spillway



Figure 9 – Intake Pipe under the Dock



Figure 10 – Spillway looking towards the Lake



Figure 11 – Bypass Pipe into Still Basin



Figure 12 – Open Channel Looking downstream



Figure 13 - Marsh Rd. Outlet Structure: East End



Figure 14 – Marsh Rd. Outlet Structure: West End



Figure 15 – Stop Log Channel



Figure 16 – Spillway edge where vines are growing through cracks



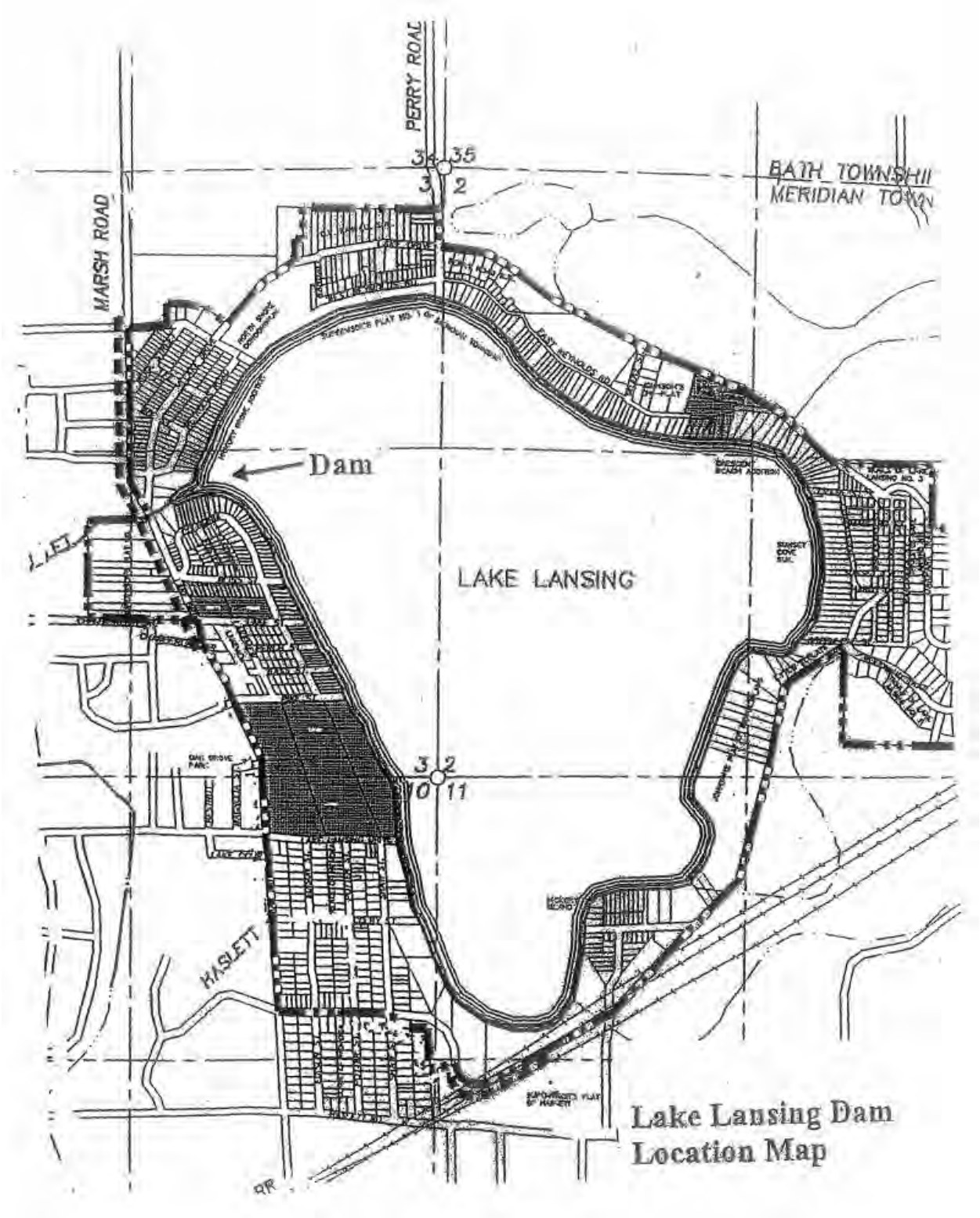
Figure 17 – Dock Condition over the inlet structure

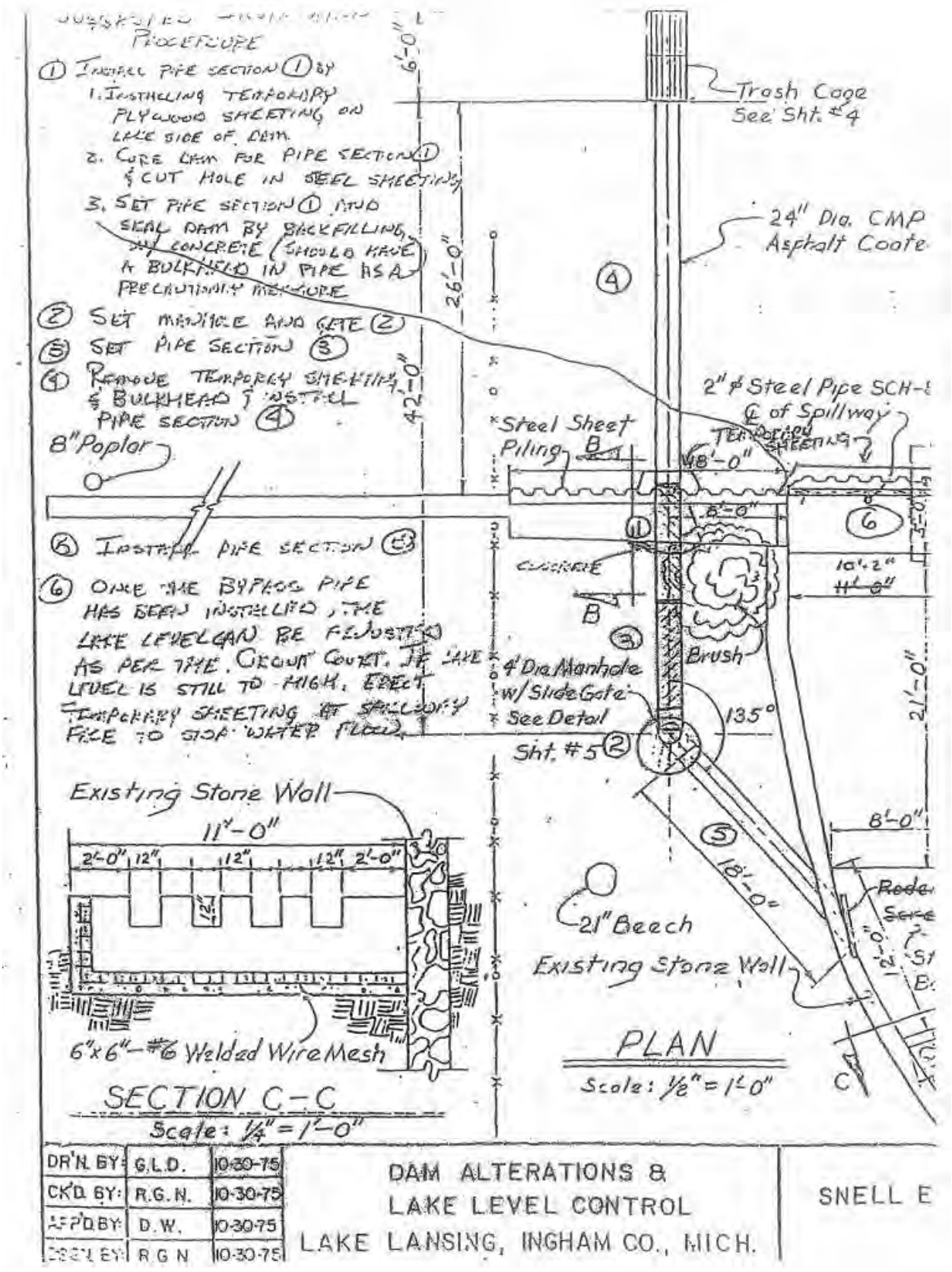


Figure 18 – Seawall right of Spillway

APPENDIX B:

DAM DETAILS


PERRY ROAD
MARSH ROAD
BATH TOWNSHIP
MERIDIAN TOWN
Dam
LAKE LANSING
KASLETT
Lake Lansing Dam
Location Map


PROCEDURE
(1) INSTALL PIPE SECTION (1) BY
1. INSTALLING TEMPORARY PLYWOOD SHEETING ON LAKE SIDE OF DAM.
2. CORE DAM FOR PIPE SECTION (1) & CUT HOLE IN STEEL SHEETING
3. SET PIPE SECTION (1) AND SEAL DAM BY BACKFILLING W/ CONCRETE (SHOULD HAVE A BULKHEAD IN PIPE AS A PRECAUTIONARY MEASURE
(2) SET MANIFOLD AND GATE (2)
(3) SET PIPE SECTION (3)
(4) REMOVE TEMPORARY SHEETING & BULKHEAD & INSTALL PIPE SECTION (4)
(5) INSTALL PIPE SECTION (5)
(6) ONCE THE BYPASS PIPE HAS BEEN INSTALLED, THE LAKE LEVEL CAN BE ADJUSTED AS PER THE CIRCUIT COURT. IF LAKE LEVEL IS STILL TO HIGH, ERECT TEMPORARY SHEETING AT SPILLWAY FACE TO STOP WATER FLOW.
6'-0"
26'-0"
42'-0"
8" Poplar
Trash Cage See Sht. #4
24" Dia. CMP Asphalt Coate
2" ϕ Steel Pipe SCH-
℄ of Spillway
Steel Sheet Piling
TEMPORARY SHEETING
48'-0"
8'-0"
3'-0"
CLOSURE
10'-2"
11'-0"
B
Brush
4' Dia Manhole w/ Slide Gate See Detail Sht. #5
135°
21'-0"
8'-0"
18'-0"
21" Beech
Existing Stone Wall
Existing Stone Wall
11'-0"
2'-0" 12" 12" 12" 2'-0"
12"
6"x6"-#6 Welded Wire Mesh
SECTION C-C
Scale: 1/4" = 1'-0"
PLAN
Scale: 1/8" = 1'-0"
C
DR'N. BY: G.L.D. 10-30-75
CK'D. BY: R.G.N. 10-30-75
APP'D BY: D.W. 10-30-75
DSGN BY: R.G.N. 10-30-75
DAM ALTERATIONS & LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.
SNELL E

APPENDIX C:

LAKE LEVEL COURT ORDER

COPY

RECEIVED
FEB 2 8 2003
INGHAM CTY. DRAIN COMMISSIONER

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.
ATTORNEYS AND COUNSELORS
601 NORTH CAPITOL
LANSING, MICHIGAN 48933

PETER A. COHL
DAVID G. STOKER
ROBERT D. TOWNSEND
BONNIE G. TOSKEY
JOHN R. McGLINCHEY
RUTH E. MASON
RICHARD D McNULTY
NAOMI A. GAYNOR
TIMOTHY M. PERRONE

(517) 372-9000
FAX (517) 372-1026

February 26, 2003

Patrick Lindemann, Drain Commissioner
Ingham County
707 Buhl Avenue
P.O. Box 220
Mason, MI 48854

Re: In the Matter of the Petition of Ingham County Board of Commissioners, a Municipal Corporation, and Patrick E. Lindemann, Ingham County Drain Commissioner, for modifications of the normal lake level for Lake Lansing, County of Ingham, State of Michigan
Ingham County Circuit Court File No. 03-4-CE

Dear Commissioner Lindemann:

Enclosed please find a copy of an Order signed by the Honorable William Collette regarding the above referenced matter. The Court agreed to the modifications as requested in the Petition. As such, the boards will not need to be removed in June, in accordance with the new Order and the removal of the boards in December is moved to mid-November. We appreciate the effort and concern put forth by your office in this matter.

If you have any questions regarding the enclosed, please do not hesitate to contact this office.

Very Truly Yours,

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.

Naomi Gaynor

NG/jm
Enclosure

N:\Client\Ingham\Drain\Litigation\Lake Lansing\lindemann.order.wpd

STATE OF MICHIGAN

IN THE CIRCUIT COURT FOR THE COUNTY OF INGHAM

IN THE MATTER OF THE PETITION OF INGHAM COUNTY BOARD OF COMMISSIONERS, A MUNICIPAL CORPORATION AND PATRICK E. LINDEMANN, INGHAM COUNTY DRAIN COMMISSIONER, for modifications of the normal lake level for Lake Lansing, County of Ingham, State of Michigan.

Petitioners.

Case No. 03-4-CE

Hon. William Collette

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.
Peter A. Cohl (P12029)
Naomi Gaynor (P48594)
Attorneys for Petitioners
601 N. Capitol Avenue
Lansing, Michigan 48933
(517) 372-9000

ORDER MODIFYING THE LAKE LEVELS FOR LAKE LANSING

At a session of said Court, held in the Circuit Courtrooms in Mason Michigan, County of Ingham, State of Michigan, this 26th day of February, 2003.

WHEREAS, Pursuant to a petition by Ingham County under the authority of the Inland Lake Levels Act, pursuant to MCL 281.61 et seq; MSA 11.30 (1) et seq., and now governed by MCL 324.30701 et seq.; MSA 13a.30701 et seq., a petition was filed in 1975 to establish a lake level for Lake Lansing.

WHEREAS, On July 24, 1975, the Ingham County Circuit Court entered an Order establishing the lake level (Exhibit A) which established the lake level for Lake Lansing as follows:

COHL, STOKER & TOSKEY, P.C.
ATTORNEYS AND COUNSELORS
601 NORTH CAPITOL
LANSING, MICHIGAN 48933
(517) 372-9000

Level Period	Level
a) June - November	852.08 ft.
b) December - February	851.72 ft.
c) March - May	852.29 ft.

WHEREAS, MCL 324.30707(5); MSA 13a.30707, grants this Court continuing jurisdiction to modify the normal level as necessary to accomplish the purposes of the Inland Lake Levels Act.

WHEREAS, Ingham County and the Ingham County Drain Commissioner filed a Petition for Modification of the Lake Level for Lake Lansing on January 1, 2003 (the "Petition").

WHEREAS, By Order dated January 6, 2003 this Court set the date for the hearing of the Petition, and ordered that Petitioners to provide notice of the hearing both by publication and by first-class mail to each person whose name appears within the current special assessment roll as owning land at the address shown on the roll; to the governing body of each political subdivision of the state in which Lake Lansing is located; to the governing body of each affected political subdivision of the state; and by serving notice on the Michigan Department of Environmental Quality.

WHEREAS, Petitioner has satisfied the notice requirements of the January 6, 2003 Order, and this Court having held a hearing on this matter on February 26, 2003.

NOW THEREFORE, The Court having considered the Petition for Modification of the Lake Levels for Lake Lansing, the exhibits and the testimony heard it open court, and being otherwise fully advised in the premises and for good cause shown:

IT IS HEREBY ORDERED that Petitioner's Petition for Modification of the Lak Levels for Lake Lansing is GRANTED, and the normal lake level to be established for th waters of Lake Lansing, County of Ingham, State of Michigan be and is hereby establishe at:

Level Period	Level
a) November 15 - February	851.72 feet above sea level.
b) March - November 14	852.29 feet above sea level.

These levels shall be maintained as nearly as possible to do at said levels.

IT IS FURTHER ORDERED that this Court shall have continuing jurisdiction an may provide for the departure from the normal lake level and the above stated deviation therefrom as may be necessary to accomplish the purposes of the Act.

IT IS FURTHER ORDERED that there shall be no pumping of waters into Lak Lansing, County of Ingham, State of Michigan, if same extracts water from below th ground level to meet or fulfill the normal lake level and the deviations therefrom excep upon Order of this Court.

Dated:_____

WILLIAM E. COLLETTE
Hon. William Collette
Circuit Court Judge

Prepared by:
Naomi Gaynor (P48594)
COHL, STOKER TOSKEY & MCGLINCHEY, P.C.
Attorneys for Petitioners
601 N. Capitol Avenue
Lansing, Michigan 48933
517/372-9000

N:\Client\Ingham\Drain\Litigation\Lake Lansing\order for modification.wpd

3

A TRUE COPY
CLERK OF THE COURT
30th JUDICIAL CIRCUIT COURT

STATE OF MICHIGAN

IN THE CIRCUIT COURT FOR THE COUNTY OF INGHAM

- -

IN Re:

PETITION FOR THE ESTABLISHMENT OF A NORMAL LAKE LEVEL FOR LAKE LANSING, COUNTY OF INGHAM, STATE OF MICHIGAN.

Case No. 75-17402

- -

ORDER

At a session of said Court held in the Circuit Courtrooms in the City Hall in the City of Lansing, County of Ingham, State of Michigan, on the 24th day of July, 1975.

PRESENT: The Honorable Jack W. Warren, Circuit Judge

This cause came on to be heard by this Court for a determination of a normal lake level for Lake Lansing, County of Ingham, State of Michigan, on Petition by the Ingham County Board of Commissioners, County of Ingham, State of Michigan, pursuant to 1961 P.A. 146, as amended.

It appearing to this Court from the pleadings, exhibits and testimony heard in open court that Petitioner's request in the above-entitled cause should be granted.

IT IS HEREBY ORDERED AND ADJUDGED that the normal lake level to be established for the waters of Lake Lansing, County of Ingham, State of Michigan be and is hereby determined and established at 852.08 feet above sea level and shall be maintained as nearly as it is possible to do so at said level for the months June through November; provided, however,

that a deviation from said normal lake level be permitted and shall be at as near as possible to be 851.72 feet above sea level for the months of December through February; provided further, that a further deviation from the normal level be permitted and shall as near as possible be at 852.29 feet above sea level for the months March through May.

IT IS FURTHER ORDERED AND ADJUDGED that this Court shall have continuing jurisdiction and may provide for the departure from the normal lake level and the above stated deviations therefrom as may be necessary to accomplish the purposes of the Act.

IT IS FURTHER ORDERED AND ADJUDGED that there shall be no pumping of waters into Lake Lansing, County of Ingham, State of Michigan, if the same extracts water from below the ground level to meet or fulfill the normal level and the deviations therefrom except upon Order of this Court.

IT IS FURTHER ORDERED AND ADJUDGED that this Court confirms the special assessment district boundaries as specified in this Court on the 16th day of July, 1975.

JACK W. WARREN

JACK W. WARREN

A TRUE COPY
JOHN I. WHITMYER
INGHAM COUNTY CLERK



Headquarters

2925 Briarpark Drive
Suite 400
Houston, TX 77042
713.266.6900

Info@lan-inc.com

Texas
Austin
College Station
Corpus Christi
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San Antonio
San Marcos
Waco

Arizona
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Florida
Miami
Tampa Bay

Illinois
Chicago

Michigan
Flint
Lansing

www.lan-inc.com

LAKE LANSING DAM INSPECTION REPORT

Dam Identification No. 1957
Meridian Township, Ingham County, Michigan



1/7/2020







Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

2121 University Parkway Drive, Suite 100
Okemos, MI 48864

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- Slide Gate (Valve) 5
- Spillway 6
- Open Channel Drain 6
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APPENDIX A

- Figures

APPENDIX B

- Dam Details

APPENDIX C

- Lake Level as Set per Court Order

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND AND WATER MANAGEMENT DIVISION
DAM INSPECTION REPORT

This form is to be used for inspection reports required by Part 307, Inland Lake Levels, for those dams that do not meet the size criteria as defined by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Dams six (6) feet or more in height, as defined by Part 315, and impounding five (5) acres or more at the design flood elevation, must meet the inspection report format as outlined in Section 31518 of Part 315.

A person failing to comply, or falsely representing dam conditions, is guilty of misconduct in office.

DAM NAME		DAM ID	COUNTY
Lake Lansing Dam		1957	Ingham
DATE OF INSPECTION 08/07/2019 01/03/2020	NAME OF WATERBODY Lake Lansing	SECTION, TOWN, RANGE Sec. 1 T 4N R 1W	LEVEL THIS DATE 851.85
DATE ELEVATION SET BY COURT February 26, 2003	LEGAL LEVEL 851.77 Nov 16 - Feb 852.29 Mar – Nov 14	DRAWDOWN LEVEL 848.25	HIGH WATER MARK ELEVATION Unknown

EARTH EMBANKMENTS (LOOKING DOWNSTREAM) LEFT EMBANKMENT 53 FT RIGHT EMBANKMENT 30 FT. TOTAL LENGTH 83 FT.

	UPSTREAM	CROWN	DOWNSTREAM
VEGETATIVE COVER	None	Grasses	Heavy vegetation in channel
EROSION	None	None	None
SEEPAGE			None
SLIDES, SLUMPS & CRACKS	None	None	None
ANIMAL BURROWS	None	None	None
WAVE ACTION PROTECTION	Stone Riprap, Concrete & Wood Seawall, Steel Sheet Piling		N/A
REMARKS*	See Attached Report		

CONTROL STRUCTURE

TYPE	YEAR CONSTRUCTED	STRUCTURAL HEIGHT (top of dam elevation minus stream invert) 6.6 ft
Horizontal CMP intake with valve contro	1975	
LENGTH OF SPILLWAY 38 ft. with stilling basin	FREEBOARD 1.4 ft.	HYDRAULIC HEIGHT (design flood elevation minus stream invert) 5.3 ft
VERTICAL PIPE SIZE N/A	HORIZONTAL PIPE SIZE 24" Diameter	HEAD (normal headwater minus normal tailwater) 4.6 ft

DESCRIBE CONDITION OF THE FOLLOWING ITEMS.

STOPLOG VALVES AND GATES (open and close to check condition) Check location of top stoplog in relation to top of riser pipe intake box or fixed crest, for leakage, and condition of stoplogs, valves and gates.
No stop logs were in place at the time of inspection. Water was still flowing over the weir at the time of inspection (2"-3" high). Stop log channel could use some upgrades but Maintenance personal report that the logs maintain the summer lake level satisfactorily.

OUTLET PIPE: Check for damage from ice, logs, vandalism, inside discharge pipe for settlement and/or joint separation, condition of pipe coating

CMP pipe is in poor condition. Evidence of holes in the pipe. Pipe end seems to be surrounded with sediments which some of it made it downstream when the valve was opened, and treatment is recommended.

CONTROL STRUCTURE (continued)

CONCRETE STRUCTURE: Check for erosion, location of cracking or spalling, if old or new settlement, need for crack repairs.	
Minor cracking and spalling in structure. Overall sound condition. No need for immediate action	
WALKWAY & RAILING: Check if in place or removed, condition, and if adequate protection provided.	TRASHRACK OR LOG BOOM: Check if operable.
There are no walkways or railings. Landowner's deck and dock over drawdown pipe and valve are in fair to good condition. The deck seems to be in more disrepair than in the past and will need some attention before the next inspection.	N/A
EMERGENCY SPILLWAY: Size, type, and condition.	
N/A	

INLET & OUTLET CHANNELS

	INLET	OUTLET
SIZE	N/A	5' average bottom width, less than 5' bank height
EXISTING CONDITION	N/A	Fair
EROSION	N/A	Minimal erosion
DEBRIS & OBSTRUCTIONS	N/A	Medium vegetation growth. Leaves and brush seems to cause backup in the still basin.
RIPRAP PROTECTION	N/A	Continued maintenance is recommended.
REMARKS*	N/A	Fallen trees and branches in ditch, west of Marsh road, need clearing. Evidence of recent clearing along the bank by the still basin and the east end of the culvert under Marsh road

RECOMMENDATIONS

List work needed, how to be done, by whom, estimated cost, source of funds, recommended completion date. If emergency, to what extent. ADDITIONAL COMMENTS.

See attached report.

Inspection Ordered By: Paul C. Pratt

Mr. Paul C. Pratt, County Delegated Agent
Deputy Drain Commissioner

Samir Matta
INSPECTOR'S NAME (PRINTED)

ADDRESS 2121
University Park Dr. Suite 100

SIGNATURE

CITY, STATE, ZIP CODE
Okemos, MI, 48864

MI 41005
P.E. REGISTRATION NO.

TELEPHONE NUMBER
(517) 657-6176

Please submit this completed report and photographs of the dam, downstream channel, and deficiencies cited in the report to:

DAM SAFETY PROGRAM
LAND AND WATER MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
PO BOX 30458
LANSING MI 48909-7958

*NOTE: If space is inadequate for remarks, attach additional sheets as needed.

EQP 4526 (Rev. 9/2004)

LAKE HISTORY

Lake Lansing, originally known as Pine Lake, served as a hunting and fishing ground for Indian tribes for centuries. Burial mounds have been found around the lake that pre-date the Chippewa Indians and Chief Okemos. The lake provided abundant fishing, and the surrounding woods were a source of wild game.

The lake was described by early writers as being clear, and well stocked with various kinds of fish. The shores were timbered on the north and east by yellow pine, the only sizeable tract in Ingham County. Hickory and oaks wooded the north and west shores.

During the next several decades, the land around, but not immediately on, the lake was settled and farmed. The lake became a popular recreation site in the late 19th century.

The Lake Lansing Dam (Dam ID# 1957) helps control the lake elevation according to the court order of February 26, 2003. The dam was inspected by Lockwood, Andrews, and Newnam, Inc. (LAN), at the request of the Ingham County Drain Commissioner's Office, as part of a regular scheduled inspection program.

The report Inspection form and some of the photographs highlighting the current condition of the Dam are attached for your review and use. LAN is also working closely with the Drain office to develop design improvements to address some of the issues noted in the inspection report.

The highlighted pictures in Appendix A are as follows:

Figure 1: Shows the concrete stilling basin looking towards the lake. (June 7th, 2019)

Figure 2: Shows the slide gate within the intake structure that controls the level of the lake outside the weirs/spillway control. Some leakage can be seen from the valve. (June 7th, 2019)

Figure 3: Show the condition of the wooden dock. (June 7th, 2019)

Figure 4: Indicates the water level of the lake at the time of inspection and shows that the measuring device has shifted over time. (June 7th, 2019)

Figure 5: Shows the approach of the spillway from the landowners' dock. (June 7th, 2019)

Figure 6: Shows the riprap shoreline right of the spillway. (June 7th, 2019)

Figure 7: Shows the spillway. (June 7th, 2019)

Figure 8: Shows the sheet piling under the wooden deck. (June 7th, 2019)

Figure 9: Shows the end of the intake pipe. (June 7th, 2019)

Figure 10: Shows some bubbling form the intake pipe underneath the dock. (June 7th, 2019)

Figure 11: Shows the bypass pipe from the intake structure to the spillway while the valve is open. (June 7th, 2019)

Figure 12: Shows the open channel looking downstream toward the Marsh Rd. outlet structure. (June 7th, 2019)

Figure 13: Shows the Marsh Rd. outlet structure on the east side of Marsh Rd. (June 7th, 2019)

Figure 14: Shows the Marsh Rd. outlet structure on the west side of Marsh Rd. (June 7th, 2019)

Figure 15: Shows the concrete stilling basin looking towards the lake. (January 3rd, 2020)

Figure 16: Shows the corrosion of the sheet piling under the wooden deck. (January 3rd, 2020)

Figure 17: Indicates the water level at the time of the January 3rd inspection.

Figure 18: Shows the condition of the wooden dock. (January 3rd, 2020)

Figure 19: Shows the spillway. (January 3rd, 2020)

Figure 20: Shows the seawall left of the spillway from the dock. (January 3rd, 2020)

Figure 21: Shows the riprap shoreline right of the spillway. (January 3rd, 2020)

Figure 22: Shows a panoramic view of the dam from the dock. (January 3rd, 2020)

Figure 23: Shows the Marsh Rd. outlet structure on the east side of Marsh Rd. (January 3rd, 2020)

Figure 24: Shows the Marsh Rd. outlet structure on the west side of Marsh Rd. (January 3rd, 2020)

Figure 25: Shows the open channel facing downstream from the still basin. (January 3rd, 2020)

DAM CONDITION ASSESSMENT

LAN performed two site visits to inspect the dam. The two visits were performed on June 6th, 2019 and January 3rd, 2020. From the conclusion of these inspections, the condition of the dam seems to be in a stable working state. However, some repairs are needed. There is visible deterioration to both the concrete and steel structures as well as the wooden dock that needs to be addressed. There is no immediate failure potential to the dam, but repairs and improvements should be considered and incorporated.

Sheet Piling:

The sheet piling has shown some signs of corrosion and needs to be mitigated. Replacement may be an option, but other means could be considered such as restoration and painting of the steel while installing an outside concrete barrier for further protection.

Concrete Structures:

The concrete spillway and manhole seem to be in fairly good shape with minor cracking that need to be addressed. However, the concrete structure supporting the intake pipe is in deteriorated state and needs to be replaced when the fix is approved for the inlet pipe replacement/repair.

Intake Pipe:

The intake pipe which is located immediately underneath the wooden dock has rusted out and is pitted in many locations along its length. The condition could be observed readily when the valve is operational as bubbles are seen where holes are present. Furthermore, the intake pipe lacks any screens as to prevent fish or debris from washing into the drain.

Wooden Dock:

The wooden dock is in very poor condition. The dock is unstable and unsafe to walk on. It needs to be repaired or replaced.

Riprap Walls:

No significant erosion was observed at the time of inspection. It is recommended regular upkeep be done to prevent possible erosion.

Still Basin:

The still basin at the bottom of the spillway is usually full throughout the year and it is a cause for a foul smell from stagnant water and decomposed fish during the summer months.

Slide Gate (Valve):

The slide gate is still operational but does allow for some limited water seepage.

Spillway:

The spillway and water level control structure are in satisfactory condition with some minor cracks and spalling. The spillway, however, does not allow for fish to pass from the Pine Lake Outlet Drain into Lake Lansing. Modifications could be made to the spillway to allow for fish passage.

Open Channel Drain:

The outlet drain is in good condition. Regular clearing and grubbing of vegetation are recommended within the open channel.

Marsh Road Outlet Culvert:

The outlet culvert is in good condition. Regular clearing and grubbing of vegetation around the outlet culvert are recommended especially along the downstream end of the culvert west of Marsh Road.

Water Level Monitoring:

The water level measuring device located along the concrete slab at the end of the dock has shifted and needs to be releveled to its original location. This will allow for a more accurate reading of the lake level as the water level is currently monitored on a monthly basis by maintenance staff. The installation of a remote sensor that reports water level information accessible via internet could also be installed to reduce the number of visits needed for water level monitoring.

RECOMMENDATIONS

LAN recommends that the Drain Commissioner's Office perform the following:

1. Perform rehabilitation of the corroded upper portion of the sheet piling along the span of the dam. (sandblasting, painting and encasement with concrete)
2. Replace or perform lining to the existing intake piping while revising potential valve control for lowering the lake level; Establish new uplift control for new/rehabilitated pipe with appropriate screening to prevent fish and other debris from washing downstream when the valve is open.
3. Repair damaged concrete structures.
4. Relevel water level measuring device on the concrete structure for a more accurate lake level reading.
5. Repair or replace wooden dock.
6. Evaluate the need to replace the still basin with other means of energy dissipaters.
7. Perform regular clearing and grubbing within the open drain and around culvert.
8. Perform regular upkeep on areas that experience erosion.

APPENDIX A:

FIGURES



Figure 1 – Still Basin



Figure 2 – Slide Gate (Valve)



Figure 3 – Wooden Dock



Figure 4 – Water Level

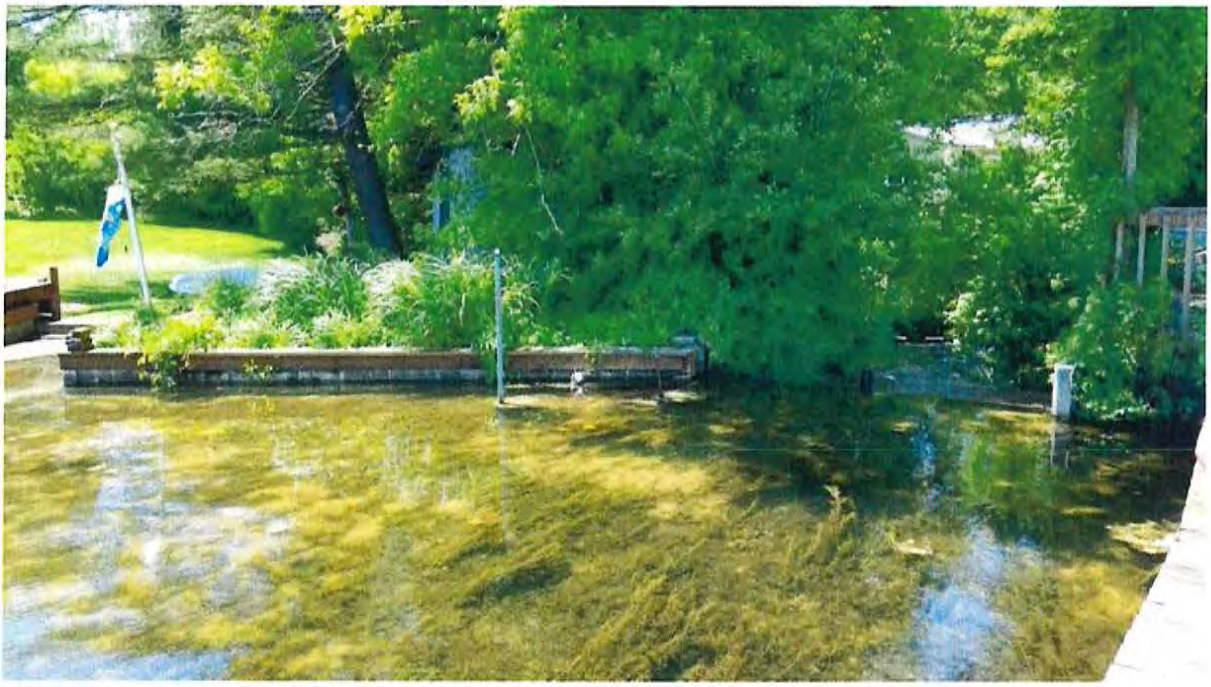


Figure 5 – Sea Wall and Approach to Spillway from Dock



Figure 6 – Riprap Shoreline Right of Spillway from Dock

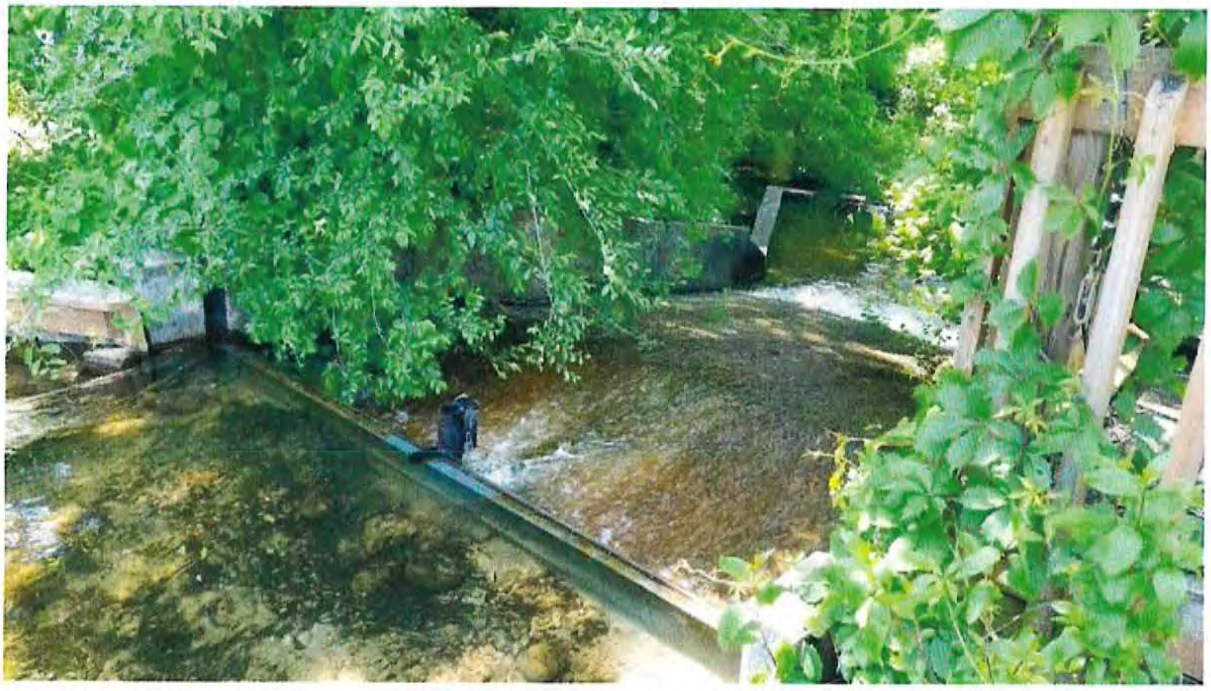


Figure 7 – Spillway



Figure 8 – Sheet Piling Right of Spillway



Figure 9 – Intake Pipe at End of Dock



Figure 10 – Intake Pipe Under Dock



Figure 11 – Bypass Pipe in Spillway

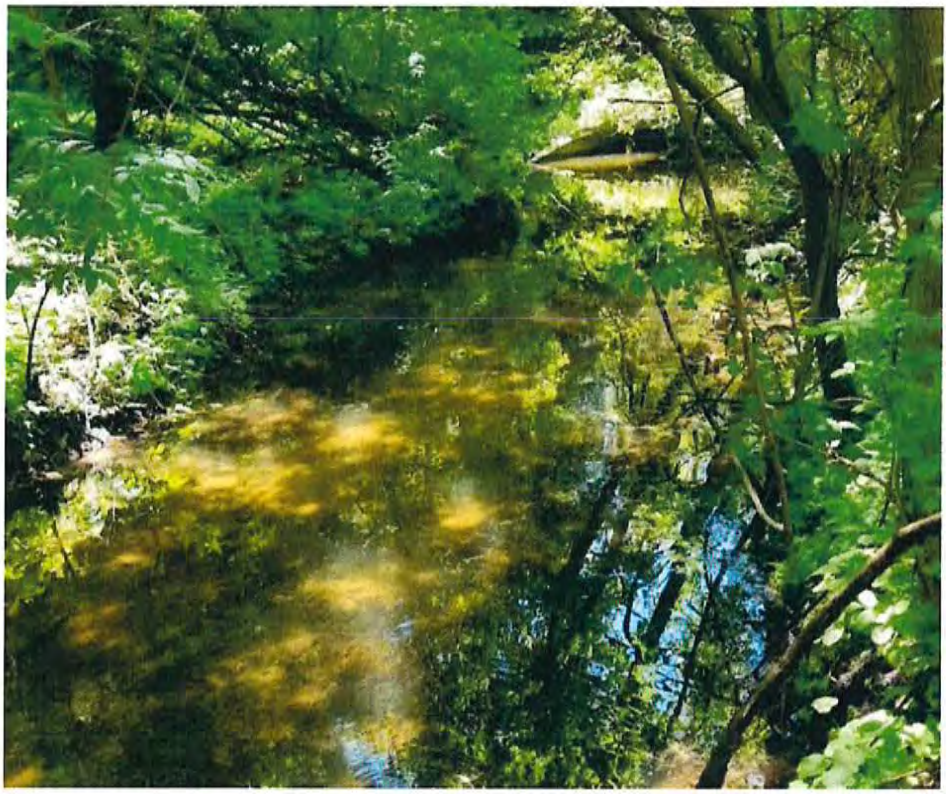


Figure 12 – Open Channel Facing downstream



Figure 13 - Marsh Rd. Outlet Structure: East End



Figure 14 – Marsh Rd. Outlet Structure: West End



Figure 15 – Still Basin



Figure 16 – Sheet Piling

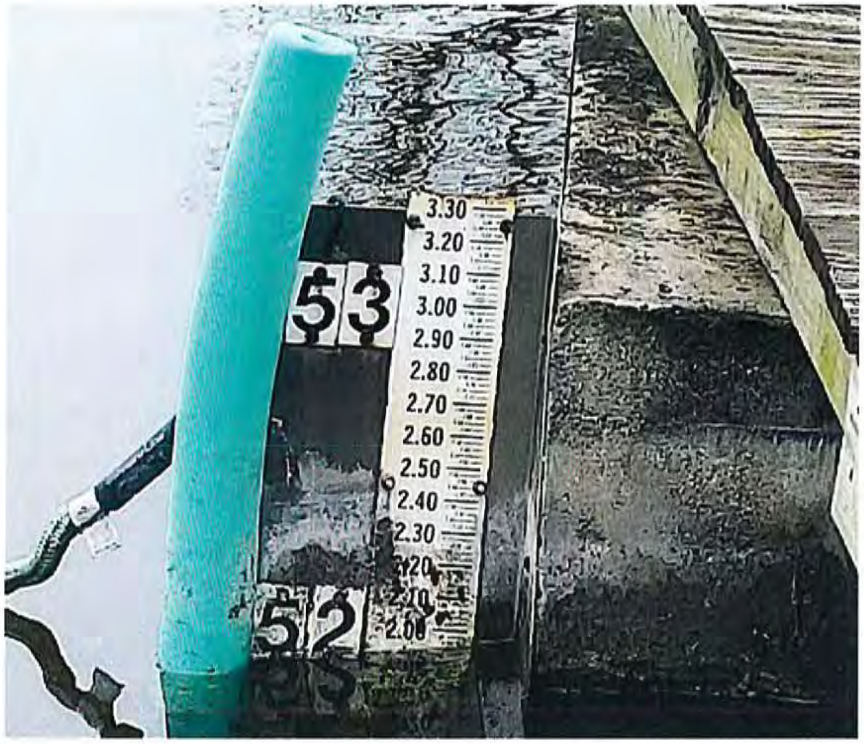


Figure 17 – Water Level



Figure 18 – Wooden Dock



Figure 19 – Spillway



Figure 20 – Seawall Left of Spillway



Figure 21 – Riprap Right of Spillway



Figure 22 – Panoramic View from Dock



Figure 23 – Marsh Rd. Outlet Structure: East End



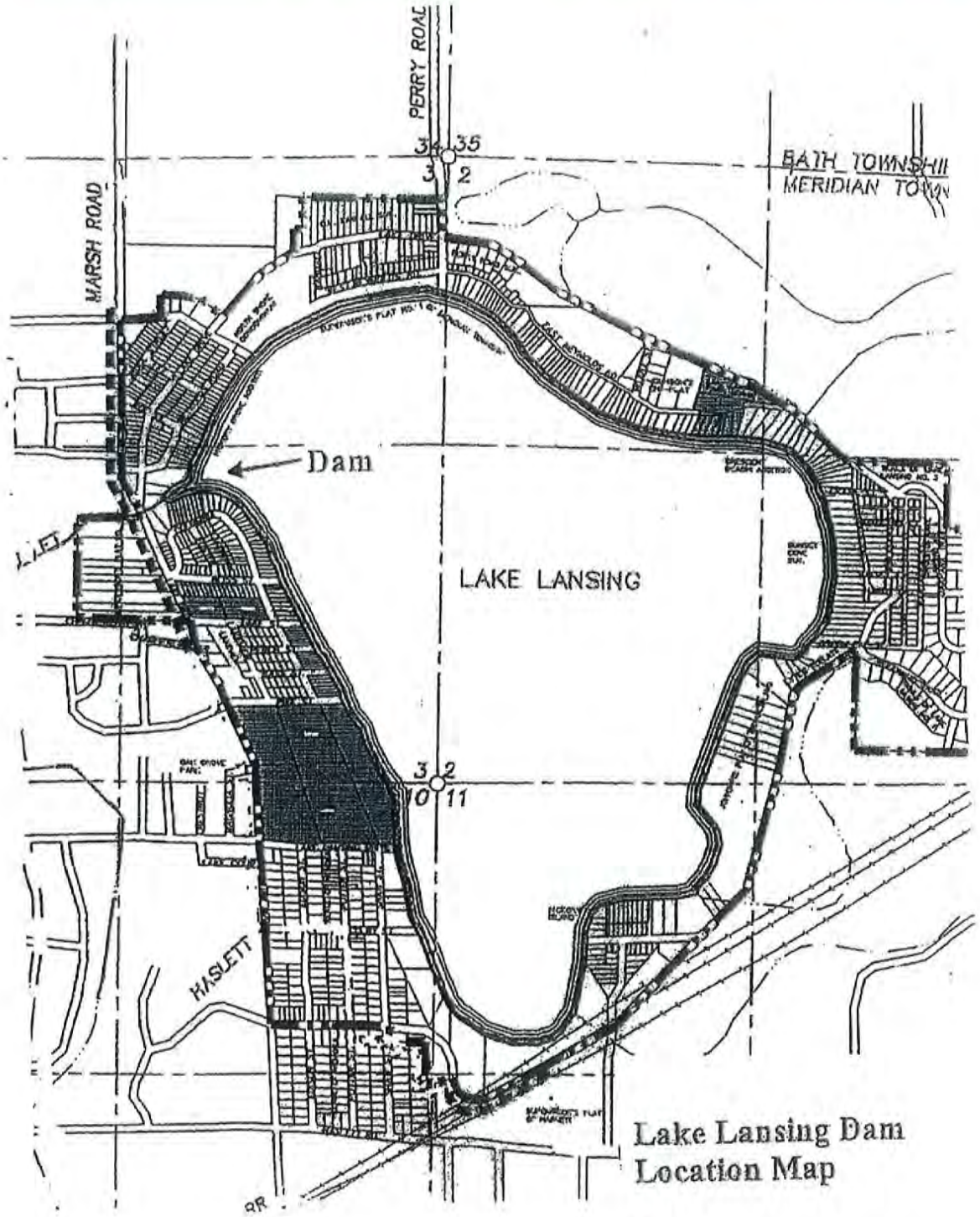
Figure 24 – Marsh Rd. Outlet Structure: West End



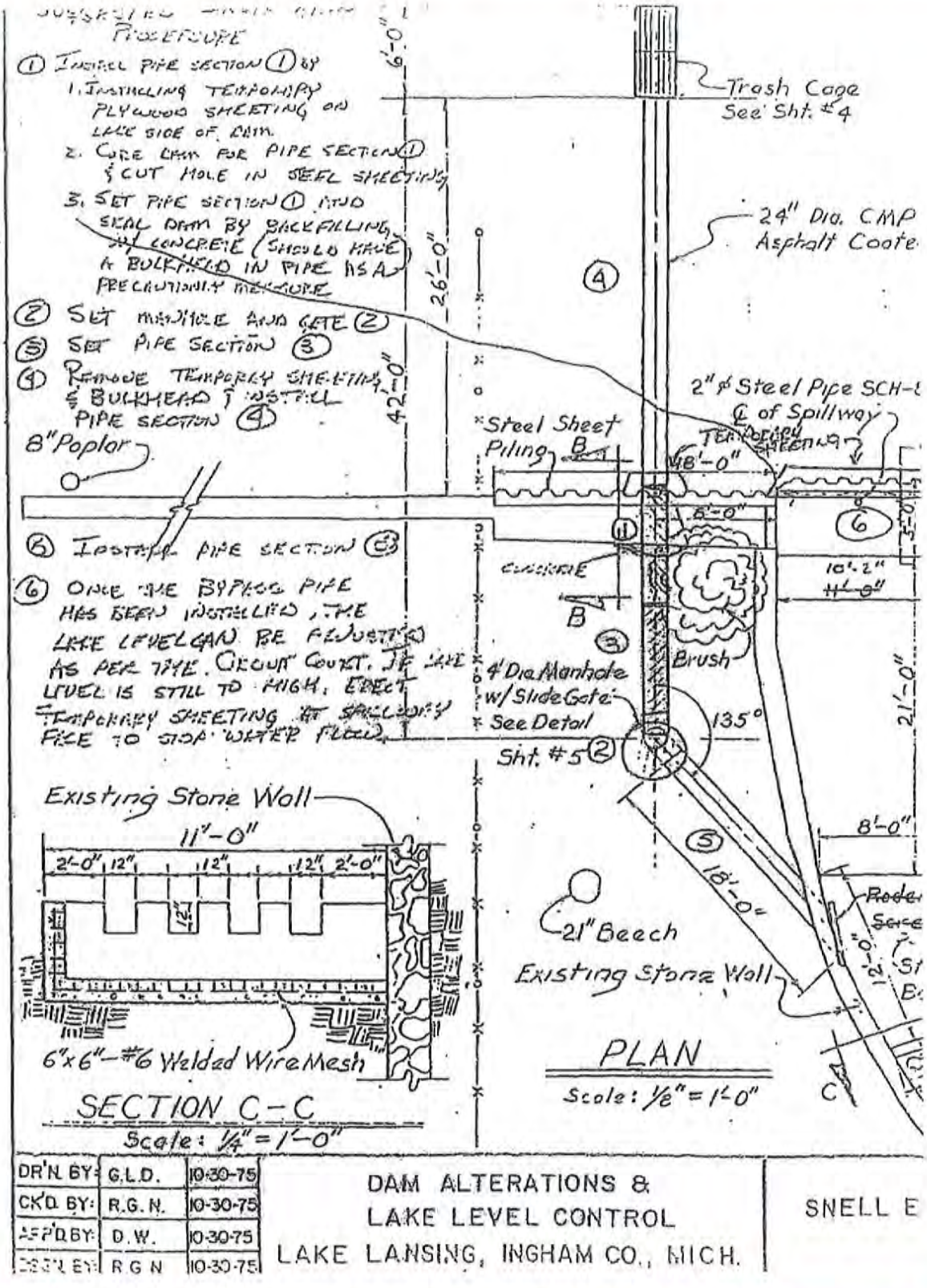
Figure 25 – Open Drain Facing Downstream from Still Basin

APPENDIX B:

DAM DETAILS



Lake Lansing Dam
Location Map


PROCEDURE
(1) Install Pipe Section (1) by
1. Installing Temporary Plywood Sheeting on Lake Side of Dam.
2. Core Dam for Pipe Section (1) & Cut Hole in Steel Sheeting
3. Set Pipe Section (1) and Seal Dam by Backfilling w/ Concrete (Should Have a Bulkhead in Pipe as a Precautionary Measure
(2) Set Manhole and Gate (2)
(3) Set Pipe Section (3)
(4) Remove Temporary Sheeting & Bulkhead & Install Pipe Section (4)
(5) Install Pipe Section (5)
(6) Once the Bypass Pipe has been Installed, the Lake Level can be Adjusted as per the Circuit Court. If the Lake Level is still to High, Erect Temporary Sheeting at Spillway Face to Stop Water Flow.
6'-0"
26'-0"
42'-0"
Trash Cage
See Sht. #4
24" Dia. CMP
Asphalt Coate
2" ϕ Steel Pipe SCH-
℄ of Spillway
Temporary Sheeting
Steel Sheet Piling B
48'-0"
8'-0"
8"Poplar
Concrete
B
4' Dia Manhole w/ Slide Gate
See Detail Sht. #5
Brush
135°
10'-2" +/- 0"
21'-0"
8'-0"
18'-0"
21" Beech
Existing Stone Wall
Existing Stone Wall
11'-0"
2'-0" 12" 12" 12" 2'-0"
6"x6"-#6 Welded Wire Mesh
SECTION C-C
Scale: 1/4" = 1'-0"
PLAN
Scale: 1/8" = 1'-0"
DR'N BY: G.L.D. 10-30-75
CK'D BY: R.G.N. 10-30-75
APP'D BY: D.W. 10-30-75
DR'N BY: R G N 10-30-75
DAM ALTERATIONS & LAKE LEVEL CONTROL
LAKE LANSING, INGHAM CO., MICH.
SNELL E

APPENDIX C:

LAKE LEVEL COURT ORDER

COPY

RECEIVED

FEB 2 8 2003

INGHAM CTY. DRAIN COMMISSIONER

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.
ATTORNEYS AND COUNSELORS
601 NORTH CAPITOL
LANSING, MICHIGAN 48933

(517) 372-9000
FAX (517) 372-1026

PETER A. COHL
DAVID G. STOKER
ROBERT D. TOWNSEND
BONNIE G. TOSKEY
JOHN R. McGLINCHEY
RUTH E. MASON
RICHARD D McNULTY
NAOMI A. GAYNOR
TIMOTHY M. PERRONE

February 26, 2003

Patrick Lindemann, Drain Commissioner
Ingham County
707 Buhl Avenue
P.O. Box 220
Mason, MI 48854

Re: ***In the Matter of the Petition of Ingham County Board of Commissioners, a Municipal Corporation, and Patrick E. Lindemann, Ingham County Drain Commissioner, for modifications of the normal lake level for Lake Lansing, County of Ingham, State of Michigan***
Ingham County Circuit Court File No. 03-4-CE

Dear Commissioner Lindemann:

Enclosed please find a copy of an Order signed by the Honorable William Collette regarding the above referenced matter. The Court agreed to the modifications as requested in the Petition. As such, the boards will not need to be removed in June, in accordance with the new Order and the removal of the boards in December is moved to mid-November. We appreciate the effort and concern put forth by your office in this matter.

If you have any questions regarding the enclosed, please do not hesitate to contact this office.

Very Truly Yours,

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.

Naomi Gaynor

NG/jm
Enclosure

N:\Client\Ingham\Drain\Litigation\Lake Lansing\lindemann.order.wpd

STATE OF MICHIGAN

IN THE CIRCUIT COURT FOR THE COUNTY OF INGHAM

IN THE MATTER OF THE PETITION OF INGHAM COUNTY BOARD OF COMMISSIONERS, A MUNICIPAL CORPORATION AND PATRICK E. LINDEMANN, INGHAM COUNTY DRAIN COMMISSIONER, for modifications of the normal lake level for Lake Lansing, County of Ingham, State of Michigan.

Petitioners.

Case No. 03-4-CE

Hon. William Collette

COHL, STOKER, TOSKEY & McGLINCHEY, P.C.
Peter A. Cohl (P12029)
Naomi Gaynor (P48594)
Attorneys for Petitioners
601 N. Capitol Avenue
Lansing, Michigan 48933
(517) 372-9000

ORDER MODIFYING THE LAKE LEVELS FOR LAKE LANSING

At a session of said Court, held in the Circuit Courtrooms in Mason Michigan, County of Ingham, State of Michigan, this 26th day of February, 2003.

WHEREAS, Pursuant to a petition by Ingham County under the authority of the Inland Lake Levels Act, pursuant to MCL 281.61 et seq; MSA 11.30 (1) et seq., and now governed by MCL 324.30701 et seq.; MSA 13a.30701 et seq., a petition was filed in 1975 to establish a lake level for Lake Lansing.

WHEREAS, On July 24, 1975, the Ingham County Circuit Court entered an Order establishing the lake level (Exhibit A) which established the lake level for Lake Lansing as follows:

COHL, STOKER & TOSKEY, P.C.
ATTORNEYS AND COUNSELORS
601 NORTH CAPITOL
LANSING, MICHIGAN 48933
(517) 372-9000

Level Period	Level
a) June - November	852.08 ft.
b) December - February	851.72 ft.
c) March - May	852.29 ft.

WHEREAS, MCL 324.30707(5); MSA 13a.30707, grants this Court continuing jurisdiction to modify the normal level as necessary to accomplish the purposes of the Inland Lake Levels Act.

WHEREAS, Ingham County and the Ingham County Drain Commissioner filed a Petition for Modification of the Lake Level for Lake Lansing on January 1, 2003 (the "Petition").

WHEREAS, By Order dated January 6. 2003 this Court set the date for the hearing of the Petition, and ordered that Petitioners to provide notice of the hearing both by publication and by first-class mail to each person whose name appears within the current special assessment roll as owning land at the address shown on the roll; to the governing body of each political subdivision of the state in which Lake Lansing is located; to the governing body of each affected political subdivision of the state; and by serving notice on the Michigan Department of Environmental Quality.

WHEREAS, Petitioner has satisfied the notice requirements of the January 6, 2003 Order, and this Court having held a hearing on this matter on February 26, 2003.

NOW THEREFORE, The Court having considered the Petition for Modification of the Lake Levels for Lake Lansing, the exhibits and the testimony heard it open court, and being otherwise fully advised in the premises and for good cause shown:

IT IS HEREBY ORDERED that Petitioner's Petition for Modification of the Lak Levels for Lake Lansing is GRANTED, and the normal lake level to be established for th waters of Lake Lansing, County of Ingham, State of Michigan be and is hereby establishe at:

Level Period	Level
a) November 15 - February	851.72 feet above sea level.
b) March - November 14	852.29 feet above sea level.

These levels shall be maintained as nearly as possible to do at said levels.

IT IS FURTHER ORDERED that this Court shall have continuing jurisdiction an may provide for the departure from the normal lake level and the above stated deviation therefrom as may be necessary to accomplish the purposes of the Act.

IT IS FURTHER ORDERED that there shall be no pumping of waters into Lak Lansing, County of Ingham, State of Michigan, if same extracts water from below th ground level to meet or fulfill the normal lake level and the deviations therefrom excep upon Order of this Court.

Dated:_____

WILLIAM E. COLLETTE
Hon. William Collette
Circuit Court Judge

Prepared by:
Naomi Gaynor (P48594)
COHL, STOKER TOSKEY & MCGLINCHEY, P.C.
Attorneys for Petitioners
601 N. Capitol Avenue
Lansing, Michigan 48933
517/372-9000

N:\Client\Ingham\Drain\Litigation\Lake Lansing\order for modification.wpd

A TRUE COPY
CLERK OF THE COURT
30th JUDICIAL CIRCUIT COURT

STATE OF MICHIGAN

IN THE CIRCUIT COURT FOR THE COUNTY OF INGHAM

- -

IN Re:

PETITION FOR THE ESTABLISHMENT OF A NORMAL LAKE LEVEL FOR LAKE LANSING, COUNTY OF INGHAM, STATE OF MICHIGAN.

Case No. 75-17402 (

- -

ORDER

At a session of said Court held in the Circuit Courtrooms in the City Hall in the City of Lansing, County of Ingham, State of Michigan, on the 24th day of July, 1975.

PRESENT: The Honorable Jack W. Warren, Circuit Judge

This cause came on to be heard by this Court for a determination of a normal lake level for Lake Lansing, County of Ingham, State of Michigan, on Petition by the Ingham County Board of Commissioners, County of Ingham, State of Michigan, pursuant to 1961 P.A. 146, as amended.

It appearing to this Court from the pleadings, exhibits and testimony heard in open court that Petitioner's request in the above-entitled cause should be granted.

IT IS HEREBY ORDERED AND ADJUDGED that the normal lake level to be established for the waters of Lake Lansing, County of Ingham, State of Michigan be and is hereby determined and established at 852.08 feet above sea level and shall be maintained as nearly as it is possible to do so at said level for the months June through November; provided, however,

that a deviation from said normal lake level be permitted and shall be at as near as possible to be 851.72 feet above sea level for the months of December through February; provided further, that a further deviation from the normal level be permitted and shall as near as possible be at 852.29 feet above sea level for the months March through May.

IT IS FURTHER ORDERED AND ADJUDGED that this Court shall have continuing jurisdiction and may provide for the departure from the normal lake level and the above stated deviations therefrom as may be necessary to accomplish the purposes of the Act.

IT IS FURTHER ORDERED AND ADJUDGED that there shall be no pumping of waters into Lake Lansing, County of Ingham, State of Michigan, if the same extracts water from below the ground level to meet or fulfill the normal level and the deviations therefrom except upon Order of this Court.

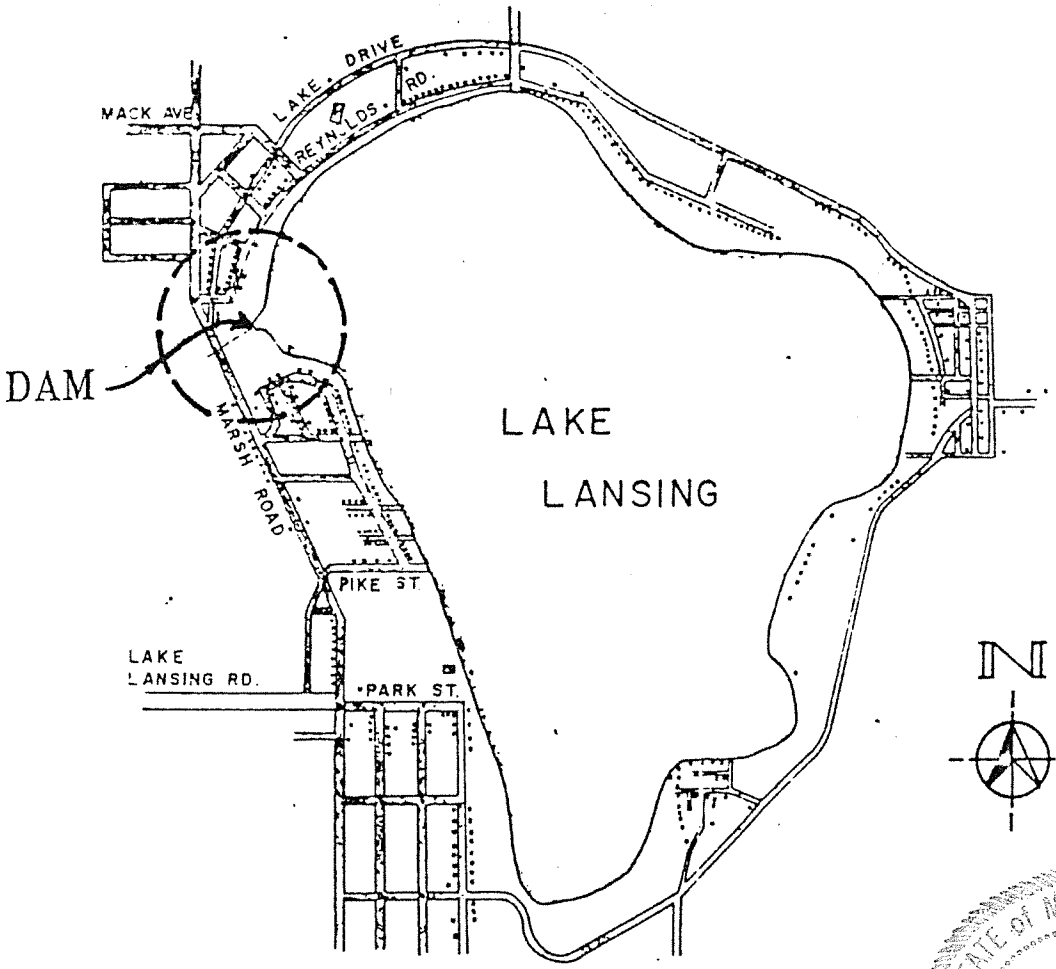
IT IS FURTHER ORDERED AND ADJUDGED that this Court confirms the special assessment district boundaries as specified in this Court on the 16th day of July, 1975.

JACK W. WARREN

JACK W. WARREN

A TRUE COPY
JOHN I. WHITMYER
INGHAM COUNTY CLERK

LAKE LANSING
LAKE LEVEL CONTROL DAM
TRIENNIAL INSPECTION
1986





GEORGE L. GRIFFITHS
INGHAM COUNTY
DRAIN COMMISSIONER

PREPARED BY
S.E.G. ENGINEERS & CONSULTANTS
1120 MAY STREET
LANSING, MICHIGAN 48906

SEG ENGINEERS & CONSULTANTS, INC.
ENGINEERS • LANDSCAPE ARCHITECTS • SURVEYORS

January 26, 1987

Mr. Leon Cook
Assistant Chief
Michigan Department of Natural Resources
Engineering/Water Management Division
P.O. Box 30028
Lansing, Michigan 48909

RE: Triennal Dam Inspection Report
Lake Lansing Dam

Dear Mr. Cook:

SEG Engineers & Consultants, Inc. is pleased to submit two (2) copies of the Triennial Dam Inspection Report to you. The inspection was authorized by Mr. George L. Griffiths, Ingham County Drain Commissioner.

Our inspection of the dam on December 5, 1986 revealed the need for some maintenance and corrective procedures, however, no major safety hazards existed. If there are any questions regarding the report, or if we may be of further assistance to you, please do not hesitate to contact our office.

Very truly yours,

David W. Starr, P.E.
Senior Associate

DWS/skv

1120 May Street, Lansing, Michigan 48906 • (517) 374-6800 • CABLE "SNELL" • TELEX 229458
A Snell Environmental Group Company

LAKE LANSING
LAKE LEVEL CONTROL DAM
MERIDIAN TOWNSHIP, INGHAM COUNTY, MICHIGAN

TRIENNIAL INSPECTION

1986

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

On October 14, 1986 the Ingham County Drain Commissioner, Mr. George L. Griffiths, authorized SEG Engineers & Consultants, Inc. (SEG) to conduct the Triennial Inspection of the Lake Level Control Dam on Lake Lansing. The inspection was ordered by the Michigan Department of Natural Resources, Water Management Division pursuant to Section 24 of the Inland Lake Level Act, Act 146, P.A. of 1961, as amended.

1.2 BACKGROUND

1.2.1 Location

The dam is located in the northwest quadrant of the lake. Specifically located on parcels designated as M-3-15 and M-3-15-3, Section 3, Meridian Township, Ingham County, Michigan. The referenced parcels were to have permanent easement acquired in 1975 for purposes of maintaining the dam.

1.2.2 History

SEG is not cognizant of all the historical information regarding the events of the dam prior to 1970, except to state that the initial dam was constructed to maintain an unspecified lake level.

In the late 1960's SEG (formally John R. Snell Engineers, Inc.) inspected the dam with specific intentions to review the dam's spillway condition as part of a study to establish a legal lake level and dredge the lake. The inspection revealed that the spillway was severly cracked and that a hole had developed in the spillway.

In 1975 SEG was authorized to prepare construction plans and specifications to correct the spillway problems by rebuilding the spillway, complete with stilling basin. The spillway reconstruction also included the construction of a valved drawdown pipe, steel sheet piling and legal lake level control boards. Construction of the modifications was completed in the fall of 1976.

The special assessment district was established 1975 to finance the spillway and lake level control devices. Appendix 1 contains an excerpt from the "Apportionment of Benefits". The complete poll can be reviewed at the Ingham County Drain Office.

Appendix 2 is a copy of the Court Order establishing the legal levels of Lake Lansing.

2.0 SITE INSPECTION

December 5, 1986, SEG inspected the structure in accordance with the DNR "Dam Safety Inspection Checklist". The check list items and inspection comments follow:

ITEM	COMMENTS
Earth Embankments	
A. Settlement	
1. Depressions	None
2. Sinkholes	None
B. Slope Stability	
1. Irregularity Alignment	None
2. Movement	
a. Sloughing	None
b. Cracks	None
c. Slides	None
d. Slumps	None
C. Slope and Crown Protection	
1. Vegetative Cover	Satisfactory (Lawns)
2. Trees and Brush	None
3. Erosion	None
4. Wave Protection	None - The dam is in a isolated cove and significant wave action is minimal.
D. Seepage, Boils, Piping	
1. At contact points with all concrete structures	None
2. Along downstream slopes	None
3. Along downstream toe	None
4. Potential seepage areas	
a. Trees	Small Trees and Brush on the South Bank
b. Animal Burrows	None

5. Drainage System(s)	
a. Toe drains	None Exist
b. Filters	None Exist
c. Ditches	None Exist

Spillways & Outlet Works

A. Control Gates & Operating Mechanisms	
1. Structural Members	Good Condition
2. Connections	Good Condition
3. Hoists	No Hoists Exist
4. Cables	No Cables Exist
5. Power Supply	No Power Supply Exist
6. Gate Seals	No Seals Exist
B. Stop Logs and Stoplog Channels	Good Condition - stop logs have been removed and stored for winter.
C. Obstruction to Flow	
1. Approach Channel	No Obstructions
2. Trash Racks	Trash rack on inlet pipe is clogged.
3. Outlet Channel	Channel is in need of cleaning to remove accumulated brush growth.
D. Drawdown Facilities	Timber ties show signs of movement.
E. Energy Dissipation	
1. Stilling Basings	Good Condition
2. Plunge Pools	Good Condition
3. Baffels	Good Condition
4. Sills and Spillway Aprons	Good Condition
F. Pipes	
1. Joint Separation	Inlet pipe for valved drawdown has become buoyant and trash rack at inlet end is elevated above the water surface.

2.	Leakage	
3.	Protective Coatings	Good
4.	Settlement	Inlet pipe has become buoyant and needs to be reset.

Concrete and Masonry Structures

A.	Surface Conditions	
1.	Spalling	None
2.	Cavitation	None
3.	Cracks	
a.	Displacement & Separation	None Evident
b.	Seepage	None Evident
B.	Joints (Monolith)	
1.	Sealant or Fillers	None Exist
2.	Movement	None Evident
3.	Seepage	None Evident

Inspection Photos on Pages 7, 8 and 9 indicates the condition of the dam and spillway on December 5, 1986.

3.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Over time debris has accumulated in the trash rack of the 24-inch diameter corrugated metal inlet pipe. At some point the trash rack had become so blocked that the normal flow of water through the pipe was interrupted and the pipe became buoyant, breaking free of the anchor at the inlet end. This can be seen from the photographs on page 7. In addition, as the pipe was uplifted a bend formed in the pipe near the waters edge.

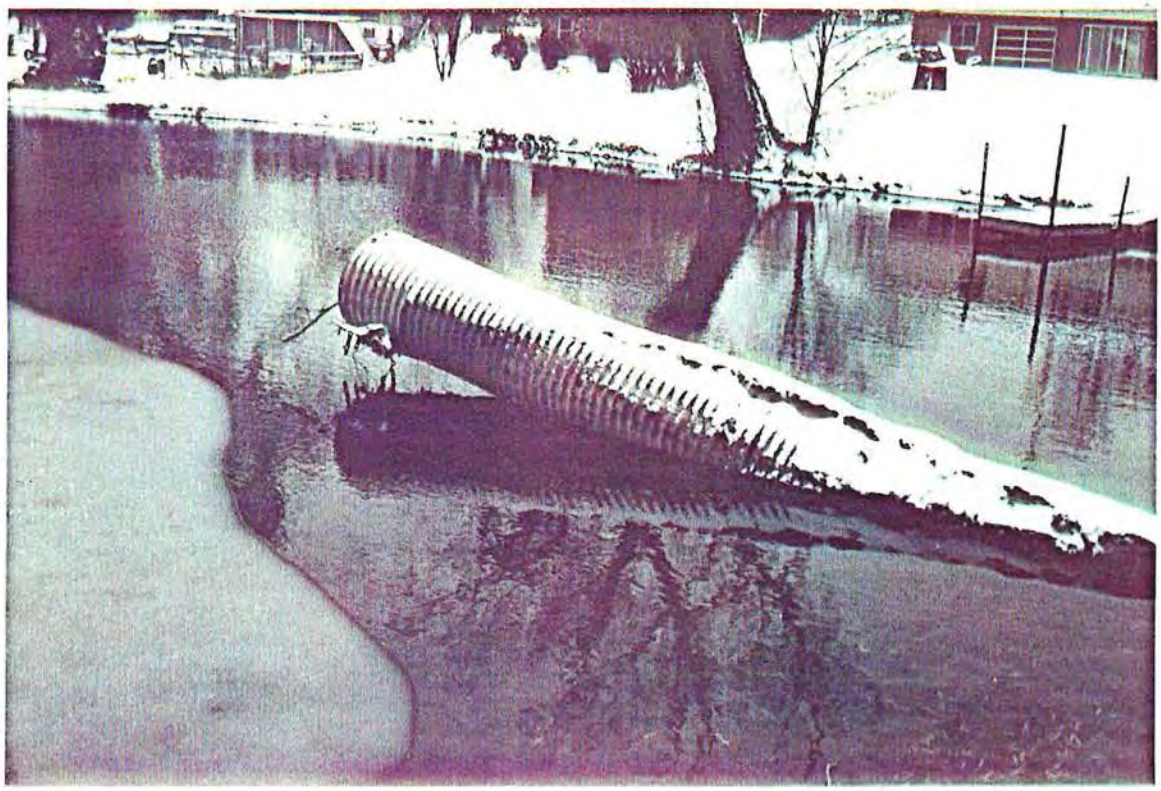
Corrective measures will involve removing the section of the pipe which is bent and reanchoring the inlet end at the desired inlet elevation. This is illustrated on the drawing on Page 10.

The timber ties along the perimeter of the inlet manhole (see page 8 photos) show signs of movement. Existing depressions should be filled and the ties should be reset. The outlet channel should be cleaned of brush and miscellaneous debris. These last two items were also addressed in the 1983 Triennial Report.

BIBLIOGRAPHY

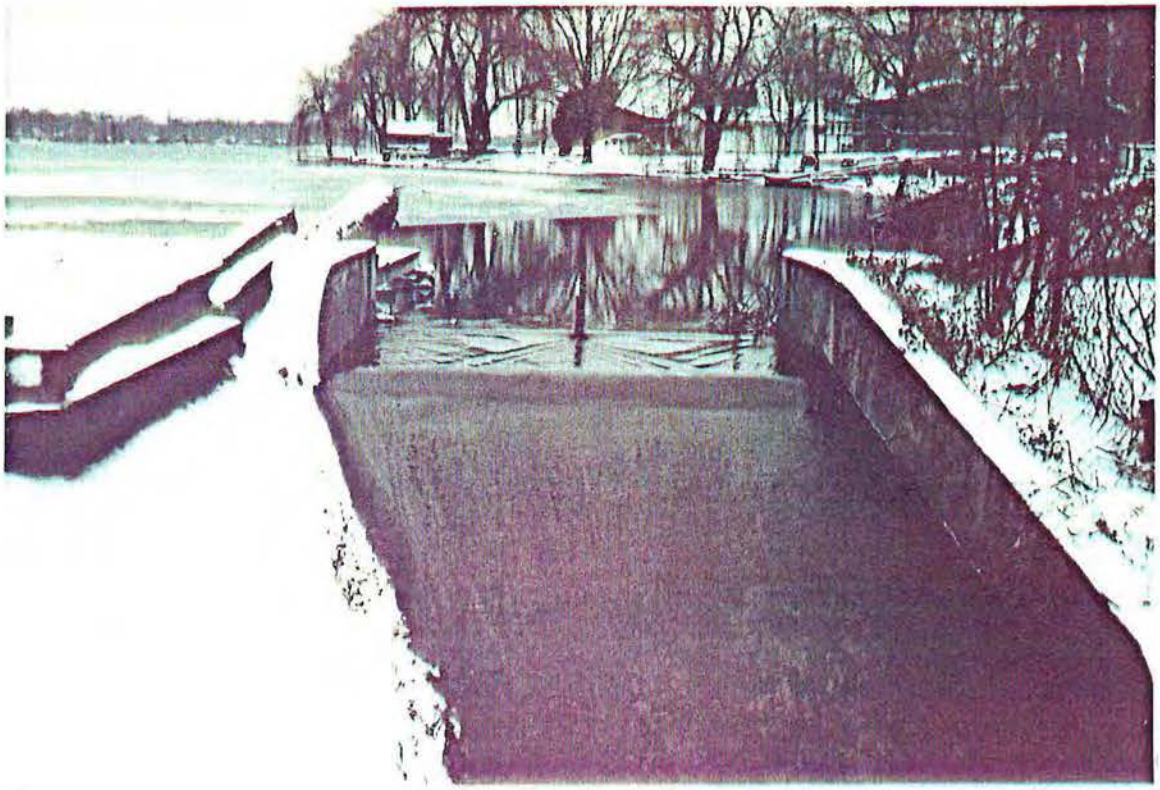
1. "Contract Documents for Lake Lansing Dam alterations and Lake level Control", Snell Environmental Group; October 31, 1975.

2. "Lake Lansing Restoration", John R. Snell Engineers, Inc.; Revised July, 1970.



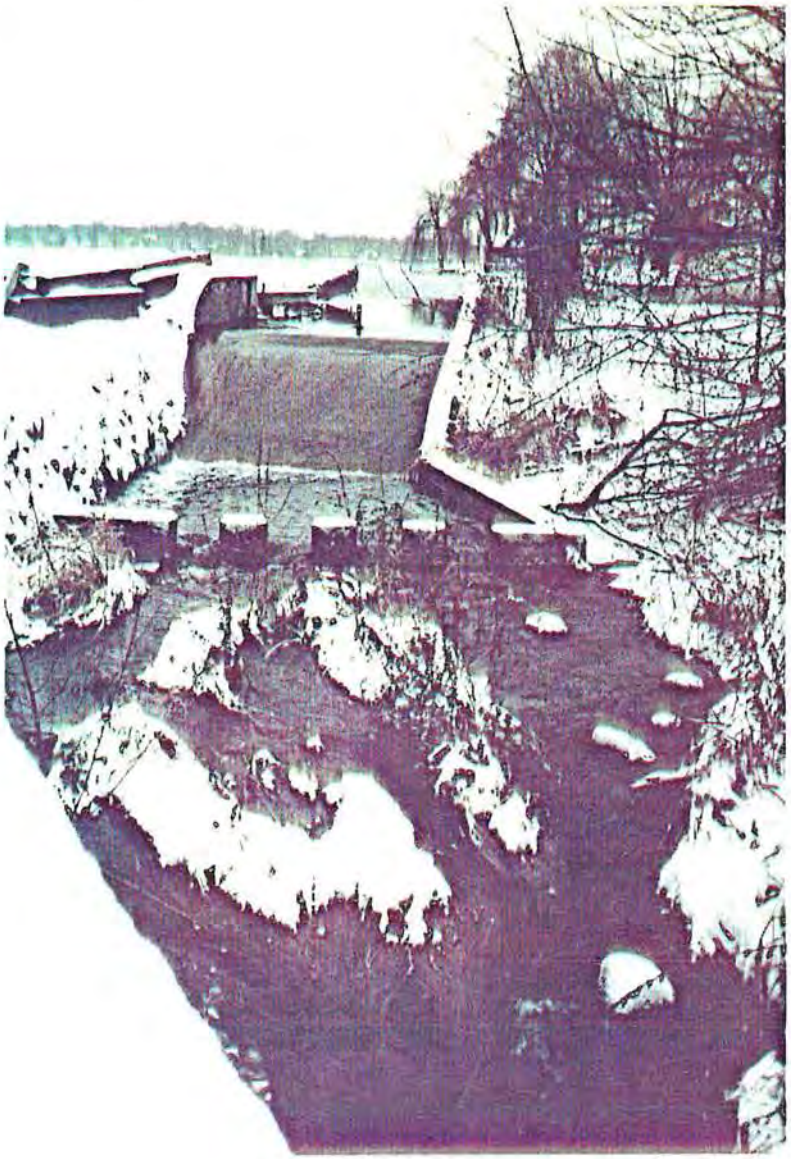
Inlet pipe has become buoyant and the restraining collar has been broken allowing the pipe to rise.



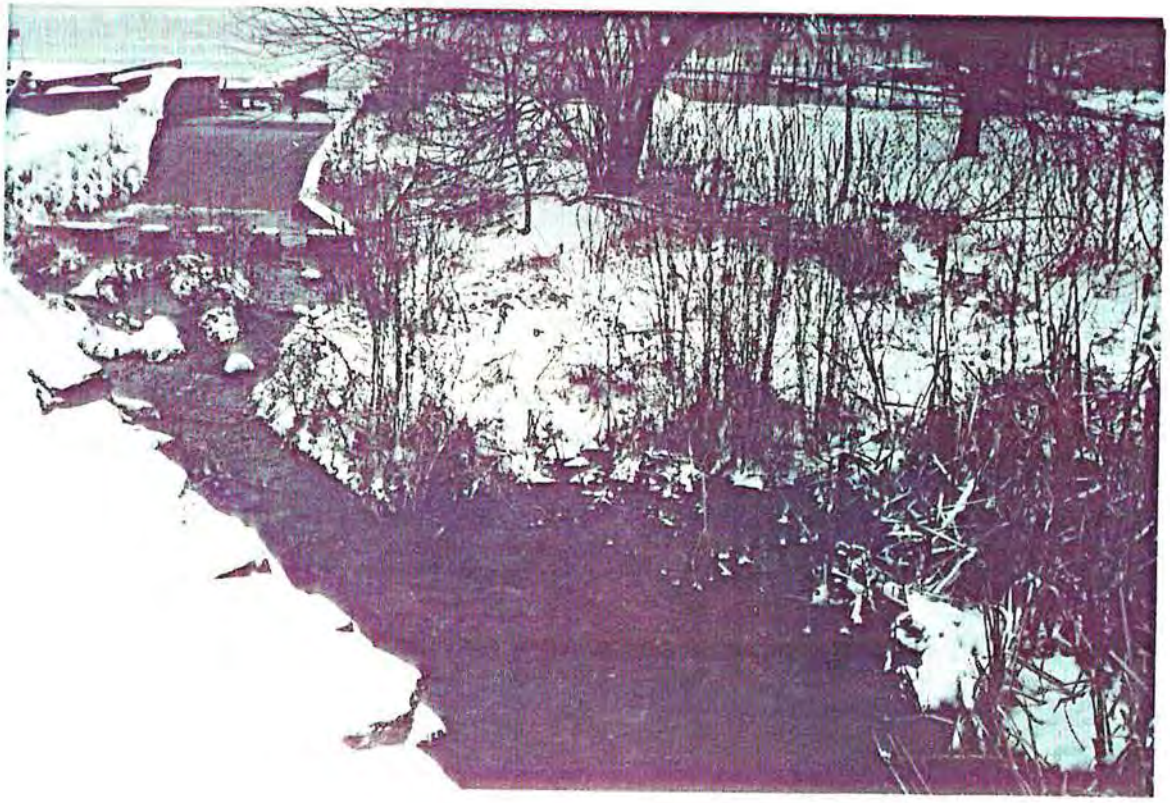


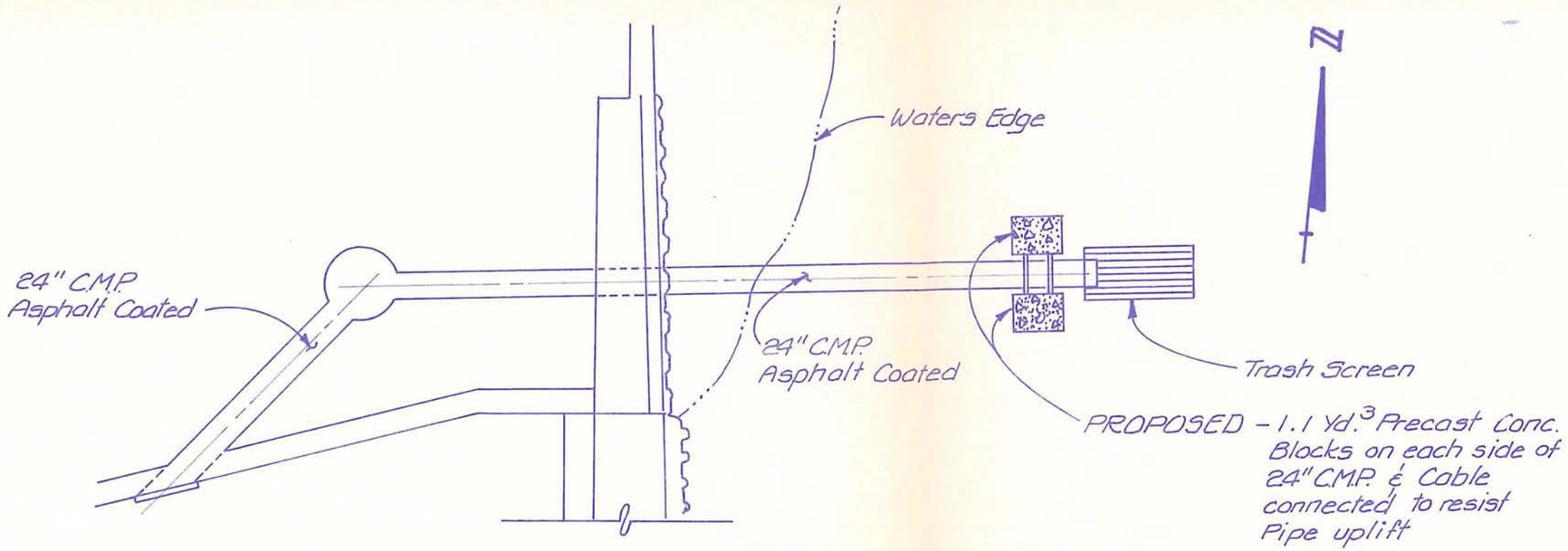
Noticeable movement of the timber ties can be seen from the photos above and below. This is especially true adjacent to the left side of the spillway.



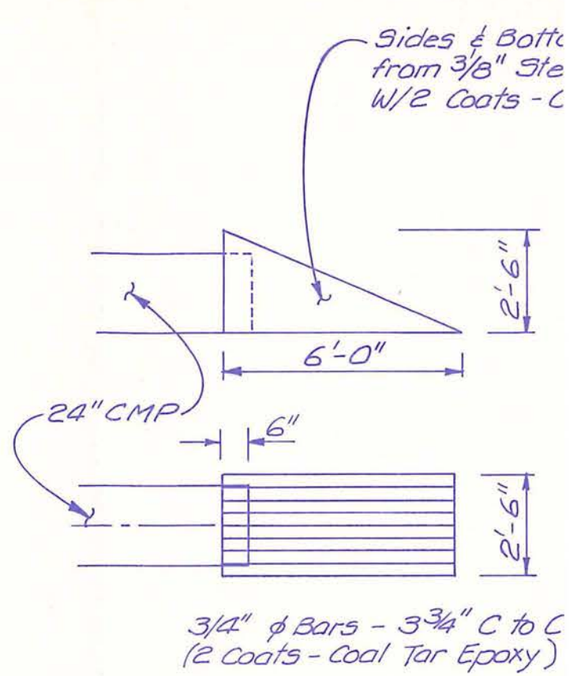


View of the lake level control structure from channel. Note brush encroachment in channel.

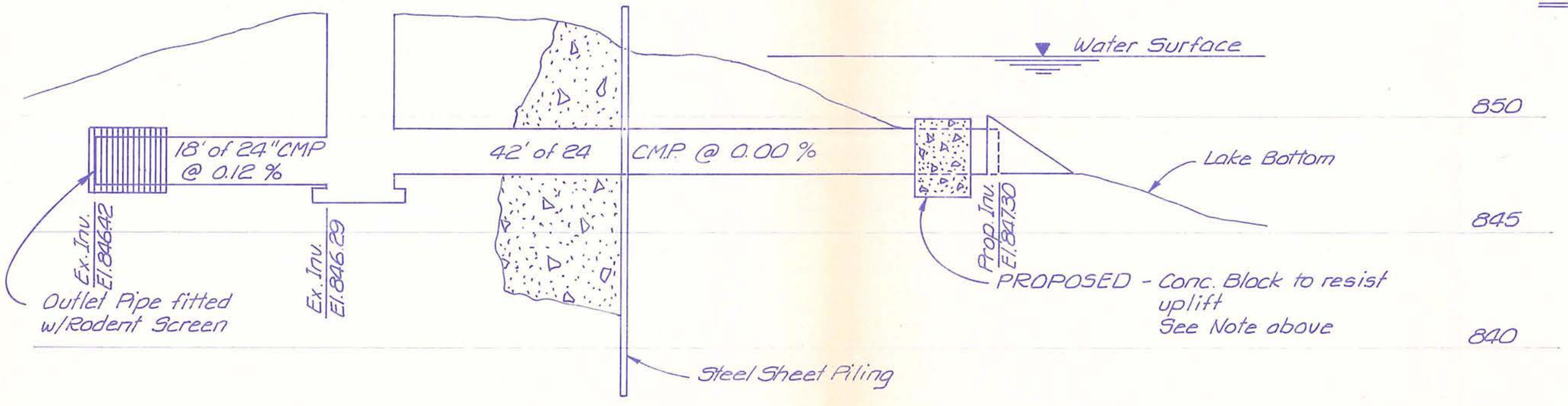




PLAN VIEW



TRASH SCREEN



PROFILE

Engineers • Planners • Consultants

LAKE LANSING LAKE CONTROL STRUCTURE

APPENDIX 1

SPECIAL ASSESSMENT DISTRICT

APPORTIONMENT OF BENEFITS BY COUNTY DRAIN COMMISSIONER—

D-60

DOUBLEDAY BROS. & CO. LAW BLANK Makers Kalamazoo, Mich.

APPORTIONMENT OF BENEFITS

Be it Known, That I, Richard L. Sode

County Drain Commissioner of the County of Ingham State of Michigan, have this day apportioned to the Township of Meridian

the Cities of ,

the Villages of

highways under the control of the County and District Road Commissioners designated as

, State Trunk Line No. ,

the respective per cent. which each shall be and hereby is made liable to pay in the construction of a certain Drain, known and designated as "Lake Lansing Outfall Dam Drain," by reason of the benefit to the public health, convenience and welfare, on account thereof and as the means of improving the highways, and that I, the said County Drain Commissioner as aforesaid, have also apportioned to the several pieces or parcels of land liable to be assessed for benefits, by reason of the construction of the said Drain, the per cent. of such benefits to accrue to each of said parcels on account thereof, and which they shall and hereby are severally made liable to pay, over and above the per cent. of costs and benefits assessed against the said Townships, Cities, Villages and Highways at large, as aforesaid, which said per cent. of benefit has been and the same is hereby apportioned upon and assessed against the several pieces or parcels of land so benefited, in accordance with such assessment of benefits as aforesaid.

Such apportionment of per cent. to the said Townships, Cities, Villages and Highways, and to the several pieces or parcels of land so benefited, has been determined by me to be as follows, to-wit:

SUB-DIVISION	SECTION	TOWN	RANGE	PER CENT APPORTIONED	
				By Board of Review	By Drain Committee
Township of Meridian at large		4N	1W	15.0000	3,571.01

The complete assessment can be reviewed at the Ingham County Drain Office.

I Hereby Certify, That all of said apportionments for benefits have been made upon the principle of benefits derived, and that public announcement of the reviewing of the above apportionment was duly made by me, as provided by law.

Given under my hand, this 13th day of February 1976

County Drain Commissioner of the

County of Ingham

NOTE

No more land should be included in each description than is actually benefited. For instance, if in forty acre tract, only the north 15 acres are actually benefited, the entire forty acre tract should not be assessed therefor. No land can be charged or sold which is not benefited.

APPENDIX 2

COURT ORDER OF LEGAL LAKE LEVEL

STATE OF MICHIGAN

IN THE CIRCUIT COURT FOR THE COUNTY OF INGHAM

IN Re:

PETITION FOR THE ESTABLISHMENT OF A NORMAL LAKE LEVEL FOR LAKE LANSING, COUNTY OF INGHAM, STATE OF MICHIGAN.

Case No. 75-17402 CE

ORDER

At a session of said Court held in the Circuit Courtrooms in the City Hall in the City of Lansing, County of Ingham, State of Michigan, on the 24th day of July, 1975.

PRESENT: The Honorable Jack W. Warren, Circuit Judge

This cause came on to be heard by this Court for a determination of a normal lake level for Lake Lansing, County of Ingham, State of Michigan, on Petition by the Ingham County Board of Commissioners, County of Ingham, State of Michigan, pursuant to 1961 P.A. 146, as amended.

It appearing to this Court from the pleadings, exhibits and testimony heard in open court that Petitioner's request in the above-entitled cause should be granted.

IT IS HEREBY ORDERED AND ADJUDGED that the normal lake level to be established for the waters of Lake Lansing, County of Ingham, State of Michigan be and is hereby determined and established at 852.08 feet above sea level and shall be maintained as nearly as it is possible to do so at said level for the months June through November; provided, however,

that a deviation from said normal lake level be permitted and shall be at as near as possible to be 851.72 feet above sea level for the months of December through February; provided further, that a further deviation from the normal level be permitted and shall as near as possible be at 852.29 feet above sea level for the months March through May.

IT IS FURTHER ORDERED AND ADJUDGED that this Court shall have continuing jurisdiction and may provide for the departure from the normal lake level and the above stated deviations therefrom as may be necessary to accomplish the purposes of the Act.

IT IS FURTHER ORDERED AND ADJUDGED that there shall be no pumping of waters into Lake Lansing, County of Ingham, State of Michigan, if the same extracts water from below the ground level to meet or fulfill the normal level and the deviations therefrom except upon Order of this Court.

IT IS FURTHER ORDERED AND ADJUDGED that this Court confirms the special assessment district boundaries as specified in this Court on the 16th day of July, 1975.

JACK W. WARREN

JACK W. WARREN

A TRUE COPY
JOHN I. WHITMYER
INGHAM COUNTY CLERK

PATRICK E. LINDEMANN
INGHAM COUNTY DRAIN COMMISSIONER
LAKE LANSING LEVEL CONTROL STRUCTURE ALTERNATIVES ANALYSIS
SECTION 3, T.4N.-R.1W. MERIDIAN CHARTER TOWNSHIP, INGHAM COUNTY

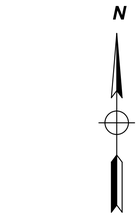


AREA MAP
NOT TO SCALE

PLAN INDEX		
FILE NO.	DESCRIPTION	NO.
DR-4636- 01	COVER SHEET	1
DR-4636- 02	EXISTING CONDITIONS	2
DR-4636- 03	PLAN AND PROFILE - STA 0+00 TO STA 12+05	3
DR-4636- 04	LAKE LANSING LEVEL CONTROL STRUCTURE PLAN	4
DR-4636- 05	CROSS SECTIONS - STA 0+03 TO STA 11+70	5
DR-4636- 06	LAKE LANSING LEVEL CONTROL STRUCTURE PLAN - ALTERNATIVE II	6
DR-4636- 07	LAKE LANSING LEVEL CONTROL STRUCTURE PLAN - ALTERNATIVE III	7
DR-4636- 08	LAKE LANSING LEVEL CONTROL STRUCTURE PLAN - ALTERNATIVE IV	8
DR-4636- 09	LAKE LANSING LEVEL CONTROL STRUCTURE PLAN - ALTERNATIVE V	9



LOCATION MAP
NOT TO SCALE



SECTION 3, T04N-R01W,
MERIDIAN TOWNSHIP,
INGHAM COUNTY , MICHIGAN

LEGEND

- ROADS
- OTHER WATERCOURSES
- SECTION LINES

NO.	BY	DATE	REVISIONS

Drawn By MWS Date 1/2/24
Approved By - Date 1/2/24

Spicer Group, Inc.
1400 Zeeb Drive
St. Johns, MI 48879
Tel. 517-774-2375

DR-4636-01

PATRICK E. LINDEMANN
INGHAM COUNTY DRAIN COMMISSIONER

LAKE LANSING LEVEL CONTROL STRUCTURE
MERIDIAN TOWNSHIP, INGHAM COUNTY, MICHIGAN
COVER SHEET

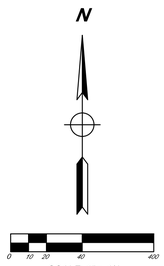
DRAIN I.D. NO.

01

INGHAM COUNTY
CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

P:\proj\2023\134\48982\2023_Lake Lansing Dam\CAD_GIS\C3D\DR-4636-CS.dwg, 1/2/2024 10:00:58 AM, matthew.starkweather





SCALE: 1" = 40'

SECTION 3, T04N-R01W,
MERIDIAN TOWNSHIP,
INGHAM COUNTY , MICHIGAN

BENCHMARKS

BM 200 - SET GEARSPIKE IN SOUTH FACE OF POWER POLE AT INTERSECTION OF MARSH ROAD, WEST LAKE OR 4' ± EAST OF BC ON MARSH ROAD 15'± WEST LAKE DRIVE.

EL 857.95

PRELIMINARY

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

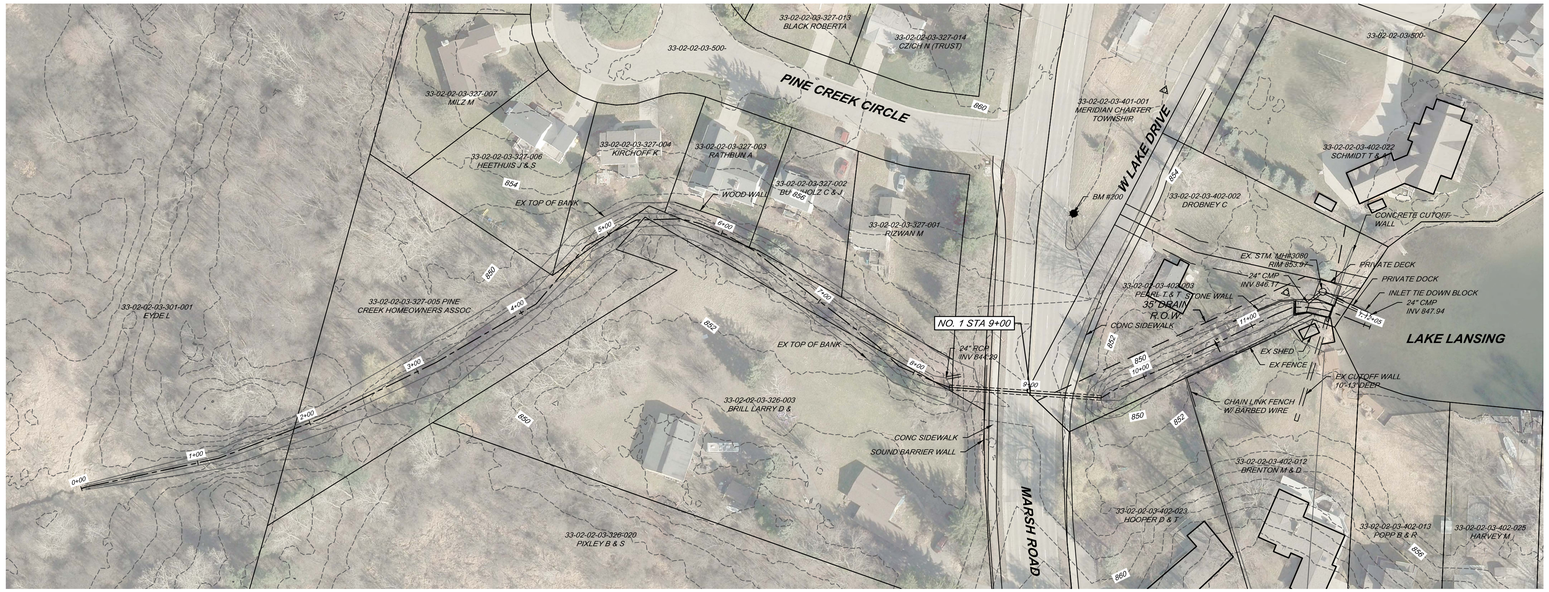
EXISTING CONDITIONS

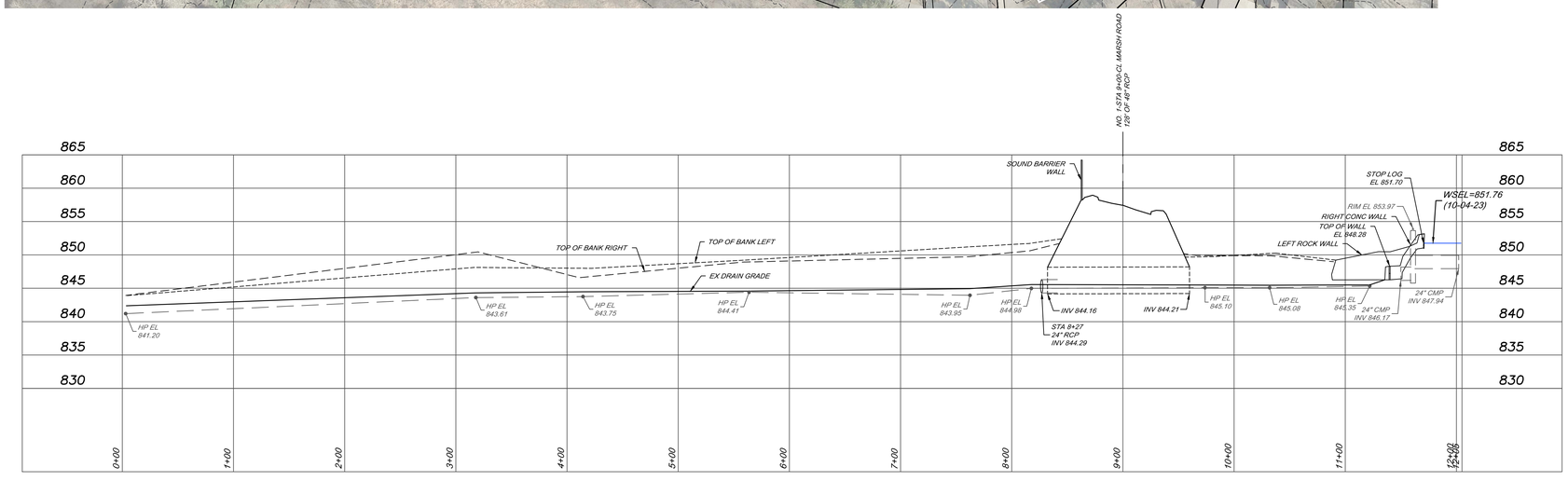
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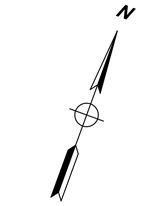
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SCALE: 1" = 60'

SECTION 3, T04N-R01W,
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LAKE LEVEL SUMMARY

PER ORDER MODIFYING THE LAKE LEVELS FOR LAKE LANSING DATED FEBRUARY 26, 2003

LEVEL PERIOD	LEVEL
NOVEMBER 15 - FEBRUARY	851.72 FEET ABOVE SEA LEVEL
MARCH - NOVEMBER	852.29 FEET ABOVE SEA LEVEL

OBSERVED LAKE LEVEL

DATE OF SURVEY - SEPTEMBER 29, 2023	
SURVEYED WATER SURFACE ELEVATION:	851.76 FEET NAVD88
SURVEYED TOP OF STOP LOG ELEVATION (SUMMER LEVEL):	851.70 FEET NAVD88
SURVEYED WEIR ELEVATION (WINTER LEVEL):	850.93 FEET NAVD88
STAFF GAUGE READING AT TIME OF SURVEY:	852.38 FEET ABOVE SEA LEVEL

NO. 1 - STA 9+00 - MARSH ROAD
NO WORK.

BENCHMARKS

BM 200 - SET GEARSPIKE IN SOUTH FACE OF POWER POLE AT INTERSECTION OF MARSH ROAD, WEST LAKE OR 4' ± EAST OF BC ON MARSH ROAD 15± WEST LAKE DRIVE.

EL 857.95

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PRELIMINARY

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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

PLAN AND PROFILE
STA 0+00 TO STA 12+05

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SCALE: 1" = 10'

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**LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN**

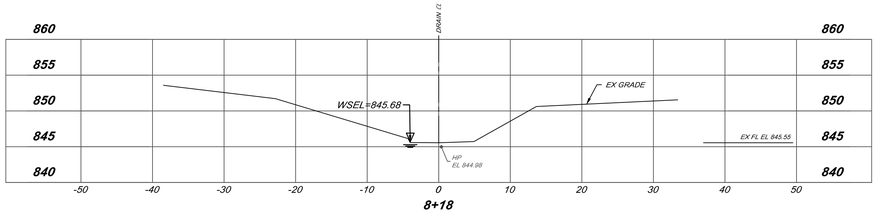
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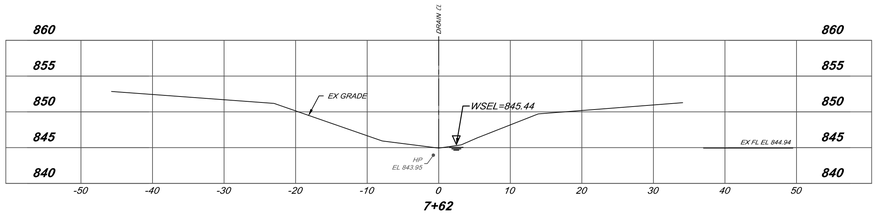
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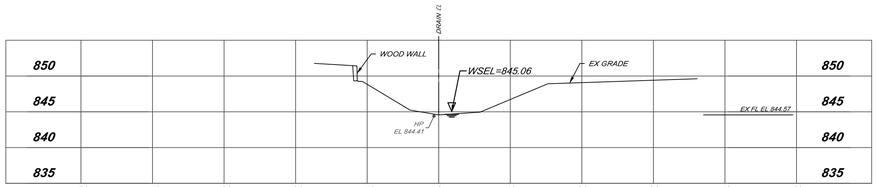
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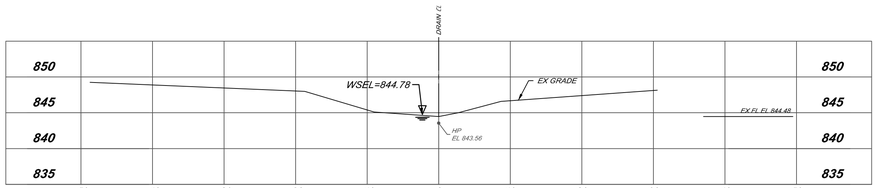
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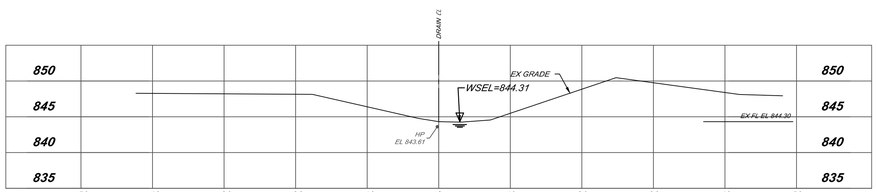
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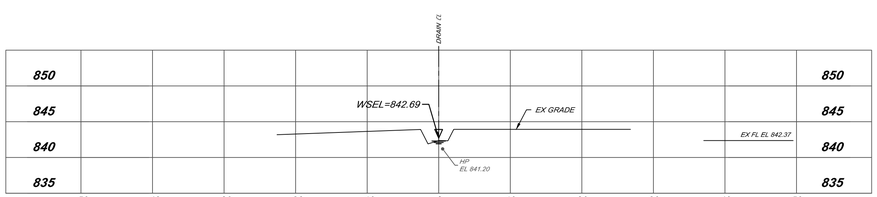
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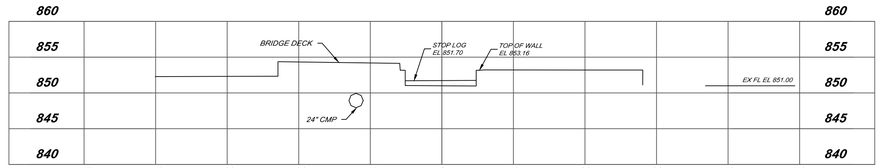
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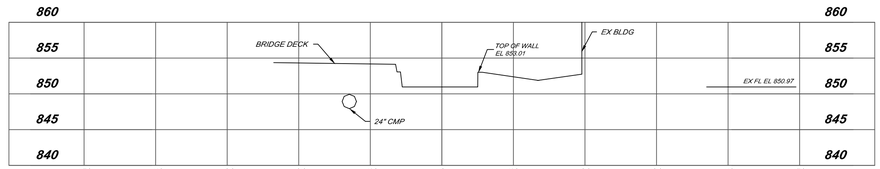
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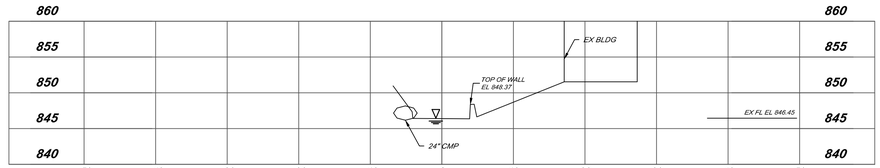
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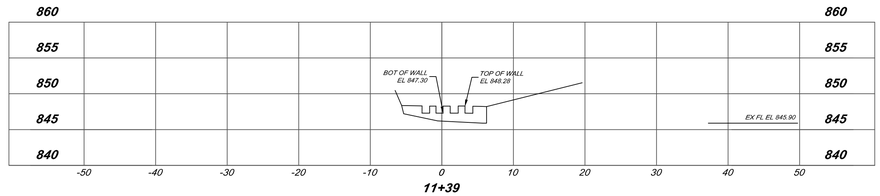
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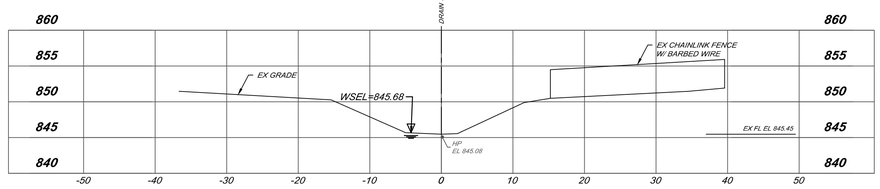
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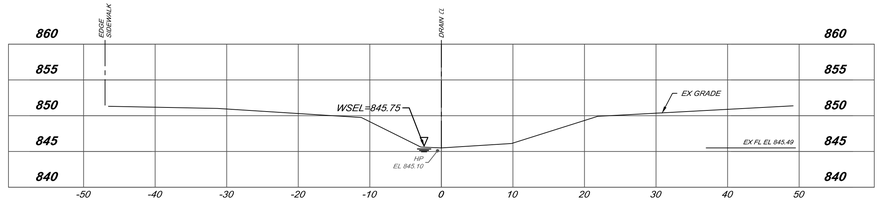
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11+39



10+32



9+75

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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

CROSS SECTIONS STA 0+03 TO STA 11+70

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CONSTRUCTION NOTES

1. COFFERDAM LAKEWARD SIDE OF INTAKE PIPE WHILE PERFORMING REMOVAL AND PATCHING OF STEEL SEAWALL.
2. BYPASS PUMP AS NEEDED.
3. PERFORM CLEARING OF SITE AS NEEDED FOR ACCESS.

N

0 5 10 20

SCALE: 1" = 10'

SECTION 3, T04N-R01W,
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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

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DRAIN COMMISSIONER
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DATE JANUARY, 2024		FILE NO.	
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PROPOSED DRAWDOWN PIPE AND STRUCTURE

PIPE	MANHOLE
24-INCH	48-INCH
36-INCH	60-INCH
48-INCH	84-INCH

CONSTRUCTION NOTES

1. COFFERDAM LAKEWARD SIDE OF STRUCTURE WHILE PERFORMING WORK ON STRUCTURE.
2. BYPASS PUMP AS NEEDED.
3. PERFORM CLEARING OF SITE AS NEEDED FOR ACCESS.

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SCALE: 1" = 10'

SECTION 3, T04N-R01W, MERIDIAN TOWNSHIP, INGHAM COUNTY , MICHIGAN

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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

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CONSTRUCTION NOTES

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2. BYPASS PUMP AS NEEDED.
3. PERFORM CLEARING OF SITE AS NEEDED FOR ACCESS.

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SCALE: 1" = 10'

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**LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN**

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SCALE: 1" = 10'

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INGHAM COUNTY, MICHIGAN

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APPENDIX B

Site Inspection Photographs



Photo 1: Upstream face of spillway



Photo 2: Wood seawall on south side of spillway



Photo 3: Failed deck over 24" dia. C.M.P. drawdown inlet

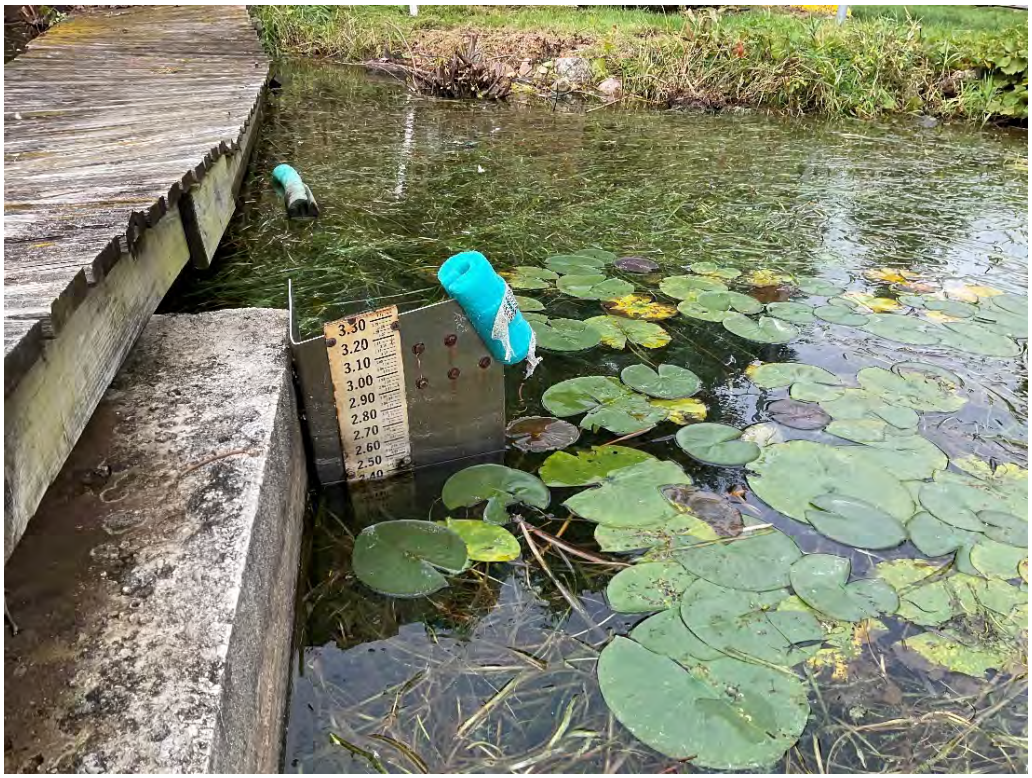


Photo 4: Staff gage on north side of failed dock



Photo 5: Disconnected post for failed dock



Photo 6: Disconnected post for failed dock



Photo 7: Failed connection of dock to deck above sheet pile seawall on north side of spillway



Photo 8: Failed dock



Photo 9: Top of 24" C.M.P. drawdown inlet projecting into lake on upstream side of lake level control structure; filled with sediment



Photo 10: Concrete cutoff wall projecting from spillway to the north



Photo 11: Concrete cutoff wall projecting from spillway to north



Photo 12: Deteriorating deck structure, table, chairs, outdoor recreational equipment, and other miscellaneous material above 24" C.M.P. drawdown structure and gate



Photo 13: Downstream face of spillway



Photo 14: Downstream stilling basin from spillway; low amount of fill material south of concrete wall



Photo 15: Baffles on downstream side of stilling basin



Photo 16: Large tree behind south side of spillway wall at southwest corner of spillway



Photo 17: Dense vegetation along south side of spillway



Photo 18: Pump discharge pipe from private parcel on south side of spillway



Photo 19: Depth from lake level at spillway crest down to concrete spillway



Photo 20: Wood seawall on south side of spillway



Photo 21: Foamed joints around stop logs



Photo 22: Foamed joints around stop logs



Photo 23: Wood seawall south of spillway



Photo 24: Shed adjacent to south side of spillway



Photo 25: Chain link fence on south side of spillway and open channel downstream of spillway



Photo 26: Dense vegetation on south side of spillway



Photo 27: 24" C.M.P. drawdown pipe outlet and spalled fieldstone



Photo 28: South spillway abutment and private pump discharge pipe to lake



Photo 29: Low amount of soil fill behind south wall of stilling basin



Photo 30: Looking downstream from spillway



Photo 31: Downstream face of spillway baffles



Photo 32: Hatch in deck to access manhole containing gate



Photo 33: Deck hatch removed to Show 3.8' dia. manhole casting



Photo 34: Manhole casting over drawdown pipe gate



Photo 35: Inoperable gate secured by ratchet strap as illustrated in 2022 inspection report



Photo 36: House adjacent to channel downstream of spillway



Photo 37: Upstream face of Marsh Road crossing for the Pine Lake Outlet Intercounty Drain (P24-00)



Photo 38: Densely vegetated banks of the Pine Lake Outlet Intercounty Drain (P24-00)



Photo 39: Noise barrier fencing on west extent of Marsh Road crossing of the Pine Lake Outlet Intercounty Drain (P24-00)



Photo 40: Sidewalk along west side of the Marsh Road crossing of the Pine Lake Intercounty Drain (P24-00)



Photo 41: Marsh Road surface over the Pine Lake Intercounty Drain (P24-00)



Photo 42: Looking downstream from Marsh Road along the Pine Lake Intercounty Drain (P24-00)

APPENDIX C

Alternative Analysis Drawings



CONSTRUCTION NOTES

1. COFFERDAM LAKEWARD SIDE OF INTAKE PIPE WHILE PERFORMING REMOVAL AND PATCHING OF STEEL SEAWALL.
2. BYPASS PUMP AS NEEDED.
3. PERFORM CLEARING OF SITE AS NEEDED FOR ACCESS.

N

0 5 10 20

SCALE: 1" = 10'

SECTION 3, T04N-R01W,
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INGHAM COUNTY , MICHIGAN

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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

LAKE LANSING LEVEL CONTROL STRUCTURE PLAN ALTERNATIVE II

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PROPOSED DRAWDOWN PIPE AND STRUCTURE

PIPE	MANHOLE
24-INCH	48-INCH
36-INCH	60-INCH
48-INCH	84-INCH

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SCALE: 1" = 10'

SECTION 3, T04N-R01W, MERIDIAN TOWNSHIP, INGHAM COUNTY , MICHIGAN

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LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

LAKE LANSING LEVEL CONTROL STRUCTURE PLAN ALTERNATIVE III

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0 5 10 20

SCALE: 1" = 10'

**SECTION 3, T04N-R01W,
MERIDIAN TOWNSHIP,
INGHAM COUNTY , MICHIGAN**

PRELIMINARY

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREIN IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

**LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN**

LAKE LANSING LEVEL CONTROL STRUCTURE PLAN ALTERNATIVE IV

INGHAM COUNTY
CLEAN WATER
DRAIN COMMISSIONER
PATRICK E. LINDEMANN

Spicer group 2024
ST. JOHNS OFFICE
1400 Zeeb Drive
St. Johns, MI 48879
Tel: 877-774-2375
www.SpicerGroup.com

DE. BY: CBM/CRS	CH. BY: CBM	PROJECT NO.	
DR. BY: MMS	APP. BY: -	134489SG2023	
STDS.	SHEET 08 OF 09	DR 08	
DATE JANUARY, 2024	FILE NO.		
SCALE 1"=10'	DR-4636-08		

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CONSTRUCTION NOTES

1. COFFERDAM LAKEWARD SIDE OF STRUCTURE WHILE PERFORMING WORK ON STRUCTURE.
2. BYPASS PUMP AS NEEDED.
3. PERFORM CLEARING OF SITE AS NEEDED FOR ACCESS.

N

0 5 10 20

SCALE: 1" = 10'

SECTION 3, T04N-R01W, MERIDIAN TOWNSHIP, INGHAM COUNTY , MICHIGAN

PRELIMINARY

BY	MARK	REVISIONS	DATE

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

LAKE LANSING LEVEL CONTROL STRUCTURE
INGHAM COUNTY, MICHIGAN

LAKE LANSING LEVEL CONTROL STRUCTURE PLAN ALTERNATIVE V

INGHAM COUNTY CLEAN WATER DRAIN COMMISSIONER PATRICK E. LINDEMANN

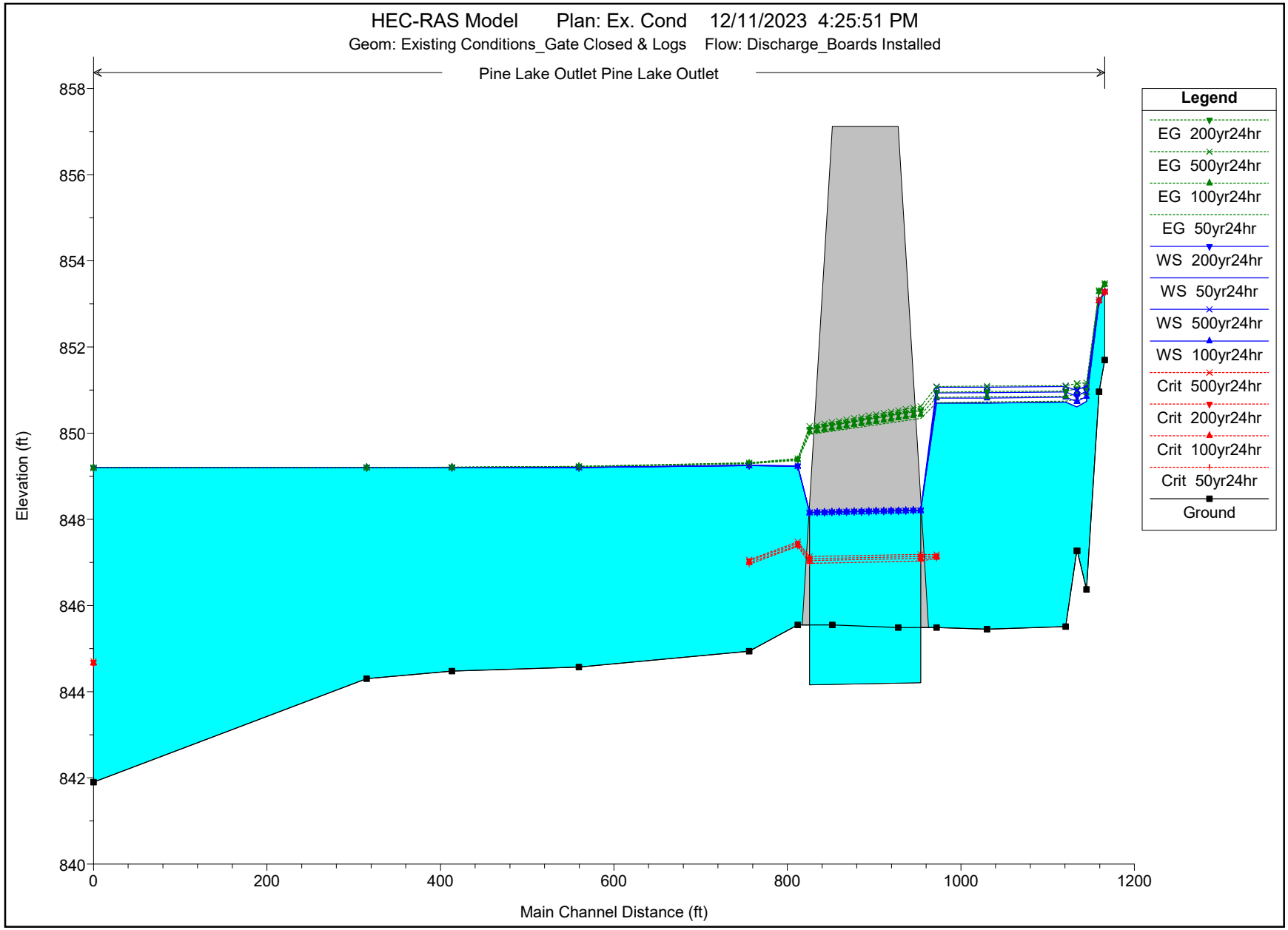
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DE. BY: CBM/CRS	CH. BY: CBM	PROJECT NO.	
DR. BY: MMS	APP. BY: -	134489SG2023	
STDS.		SHEET 09 OF 09	DR 09
DATE JANUARY, 2024		FILE NO.	
SCALE 1"=10'		DR-4636-09	

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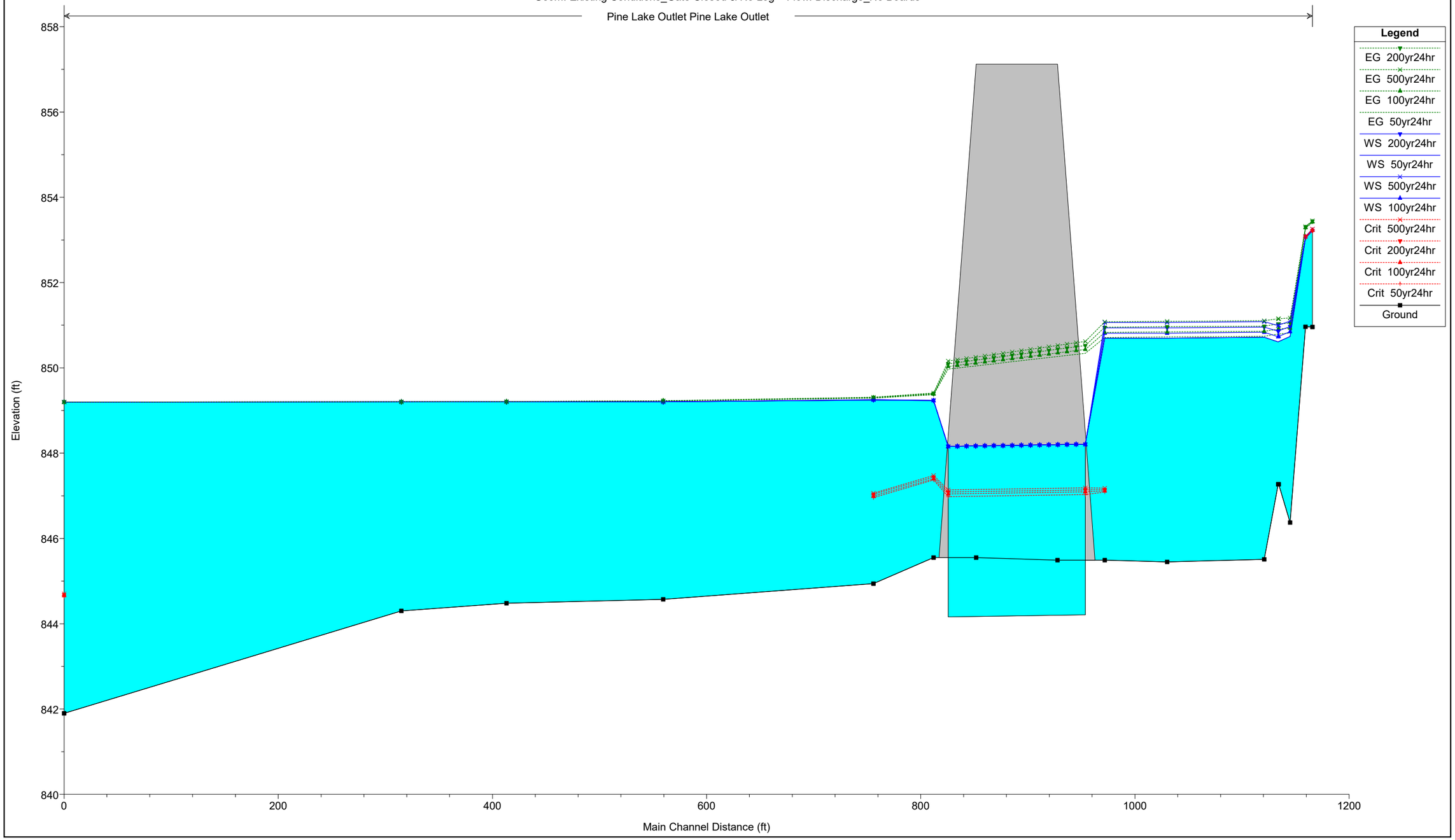
APPENDIX D

Hydrologic and Hydraulic Modeling Information


HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:25:51 PM
Geom: Existing Conditions_Gate Closed & Logs Flow: Discharge_Boards Installed
Pine Lake Outlet Pine Lake Outlet
Elevation (ft)
858
856
854
852
850
848
846
844
842
840
0
200
400
600
800
1000
1200
Main Channel Distance (ft)
Legend
EG 200yr24hr
EG 500yr24hr
EG 100yr24hr
EG 50yr24hr
WS 200yr24hr
WS 50yr24hr
WS 500yr24hr
WS 100yr24hr
Crit 500yr24hr
Crit 200yr24hr
Crit 100yr24hr
Crit 50yr24hr
Ground

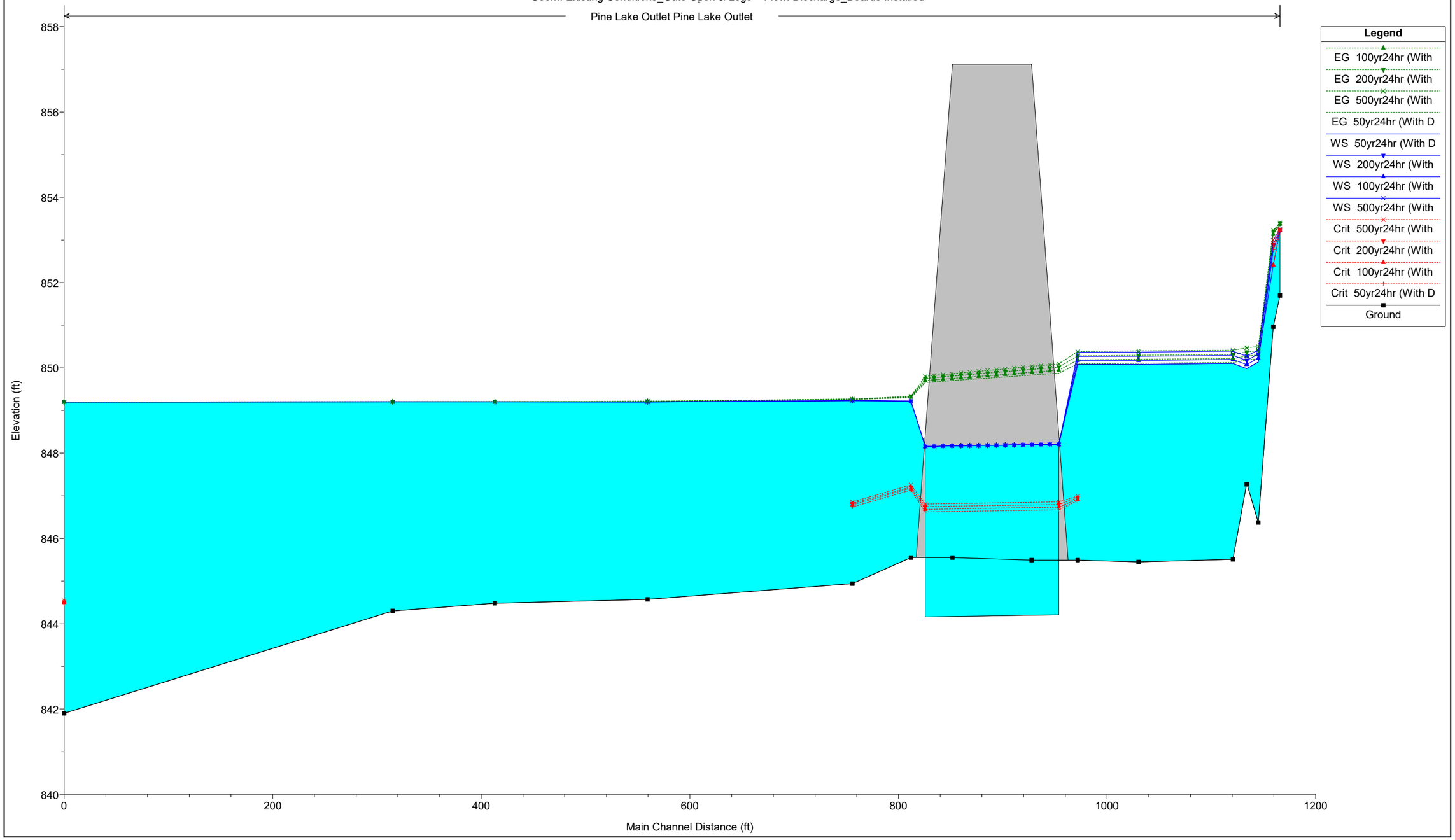
HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:23:21 PM

Geom: Existing Conditions_Gate Closed & No Log Flow: Discharge_No Boards



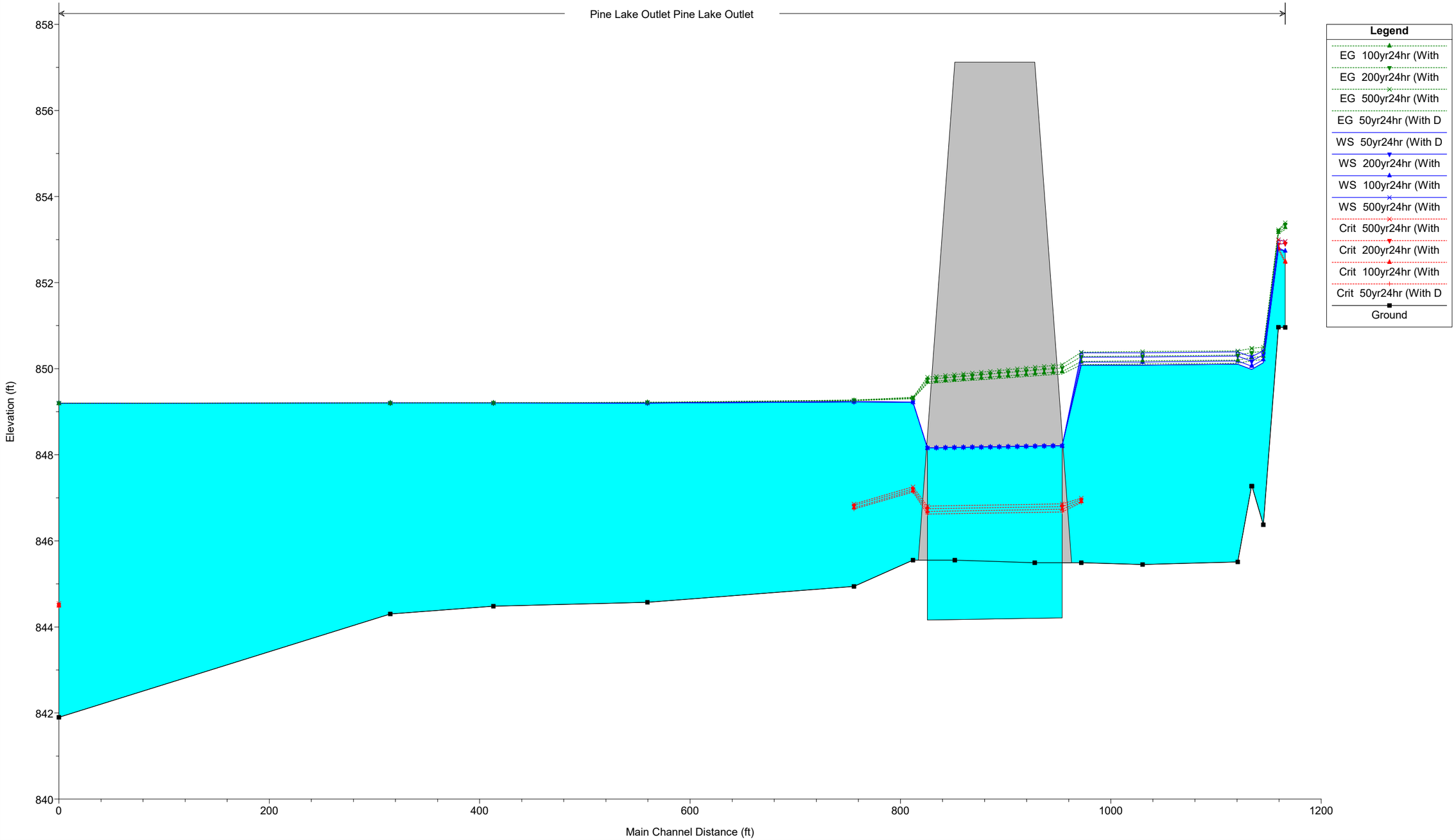
HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:42:37 PM

Geom: Existing Conditions_Gate Open & Logs Flow: Discharge_Boards Installed



HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:30:05 PM

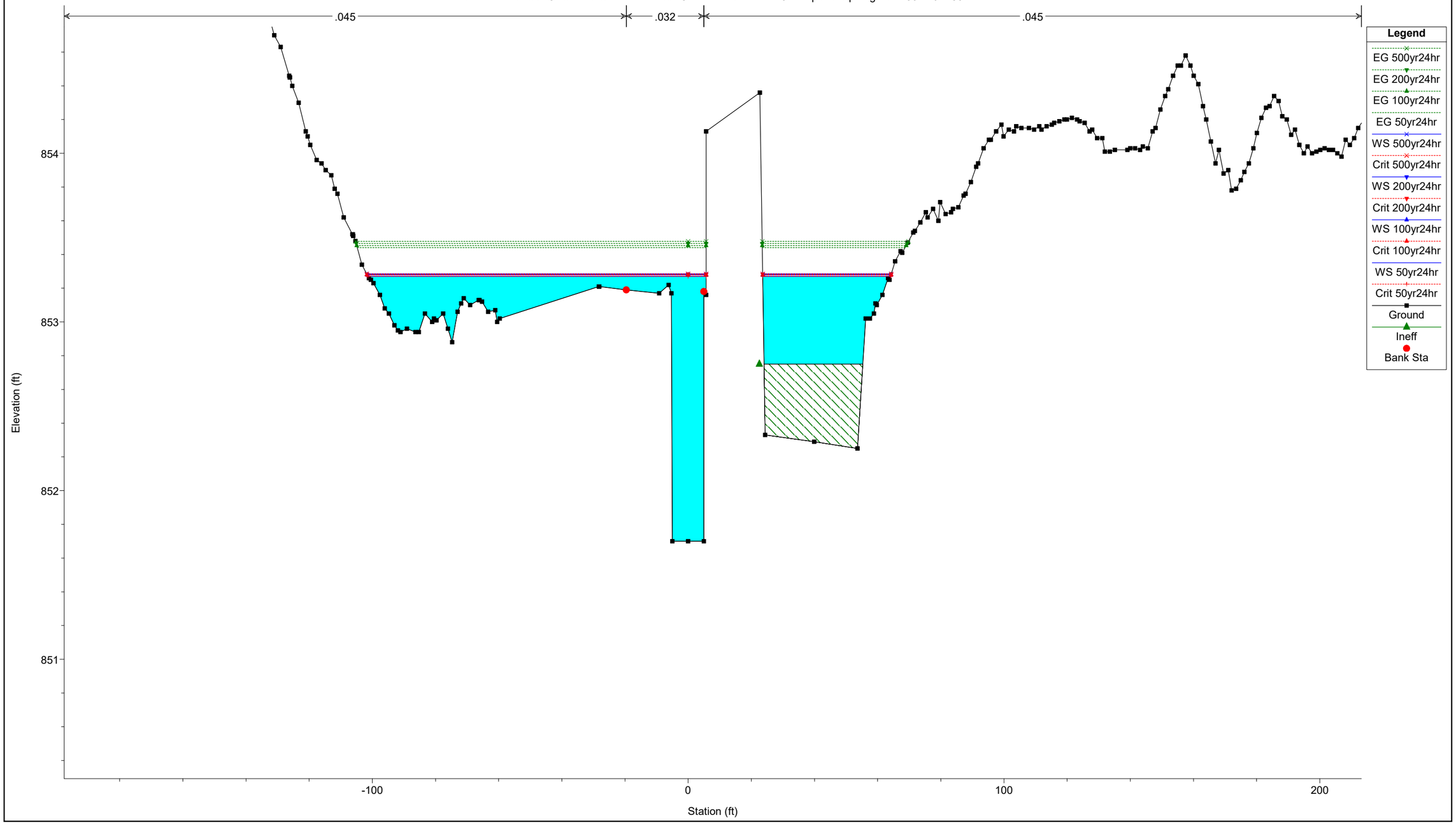
Geom: Existing Conditions_Gate Open & No Log Flow: Discharge_No Boards



HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:25:51 PM

Geom: Existing Conditions_Gate Closed & Logs Flow: Discharge_Boards Installed

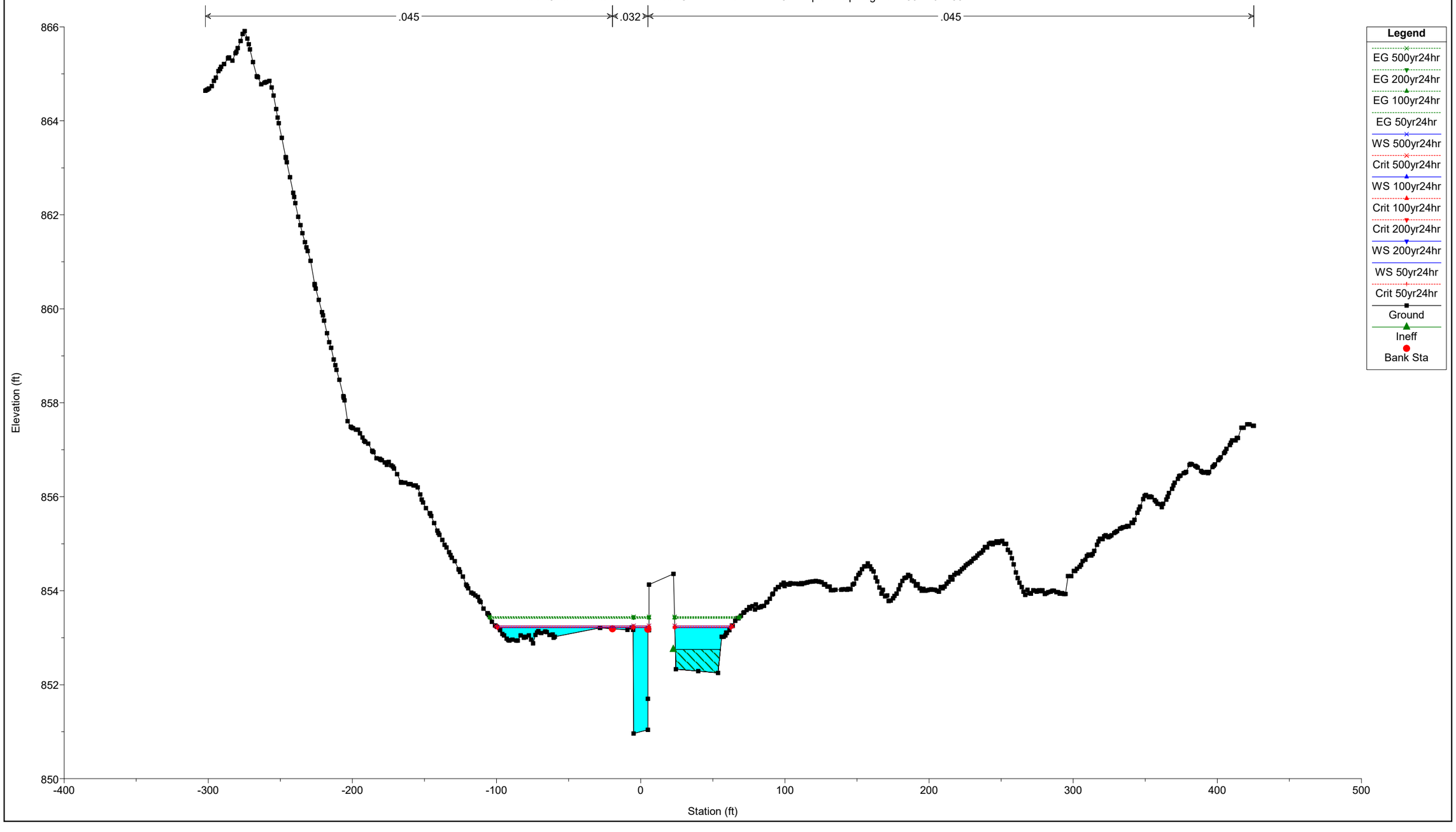
River = Pine Lake Outlet Reach = Pine Lake Outlet RS = 1171.5 Top of Stop Log Elev. 851.70 - 851.74 ft



HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:30:05 PM

Geom: Existing Conditions_Gate Closed & No Log Flow: Discharge_No Boards

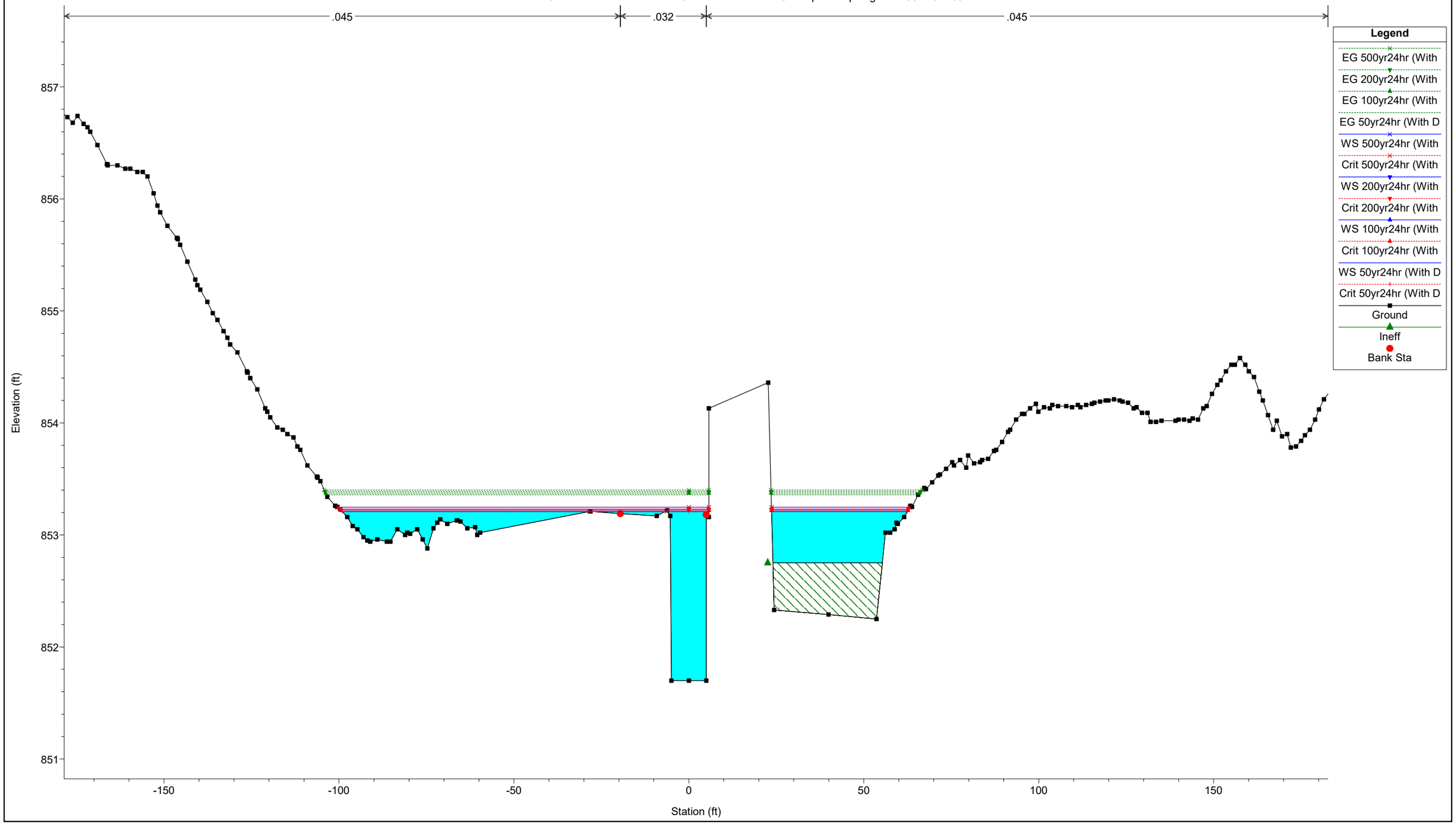
River = Pine Lake Outlet Reach = Pine Lake Outlet RS = 1171.5 Top of Stop Log Elev. 851.70 - 851.74 ft



HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:42:37 PM

Geom: Existing Conditions_Gate Open & Logs Flow: Discharge_Boards Installed

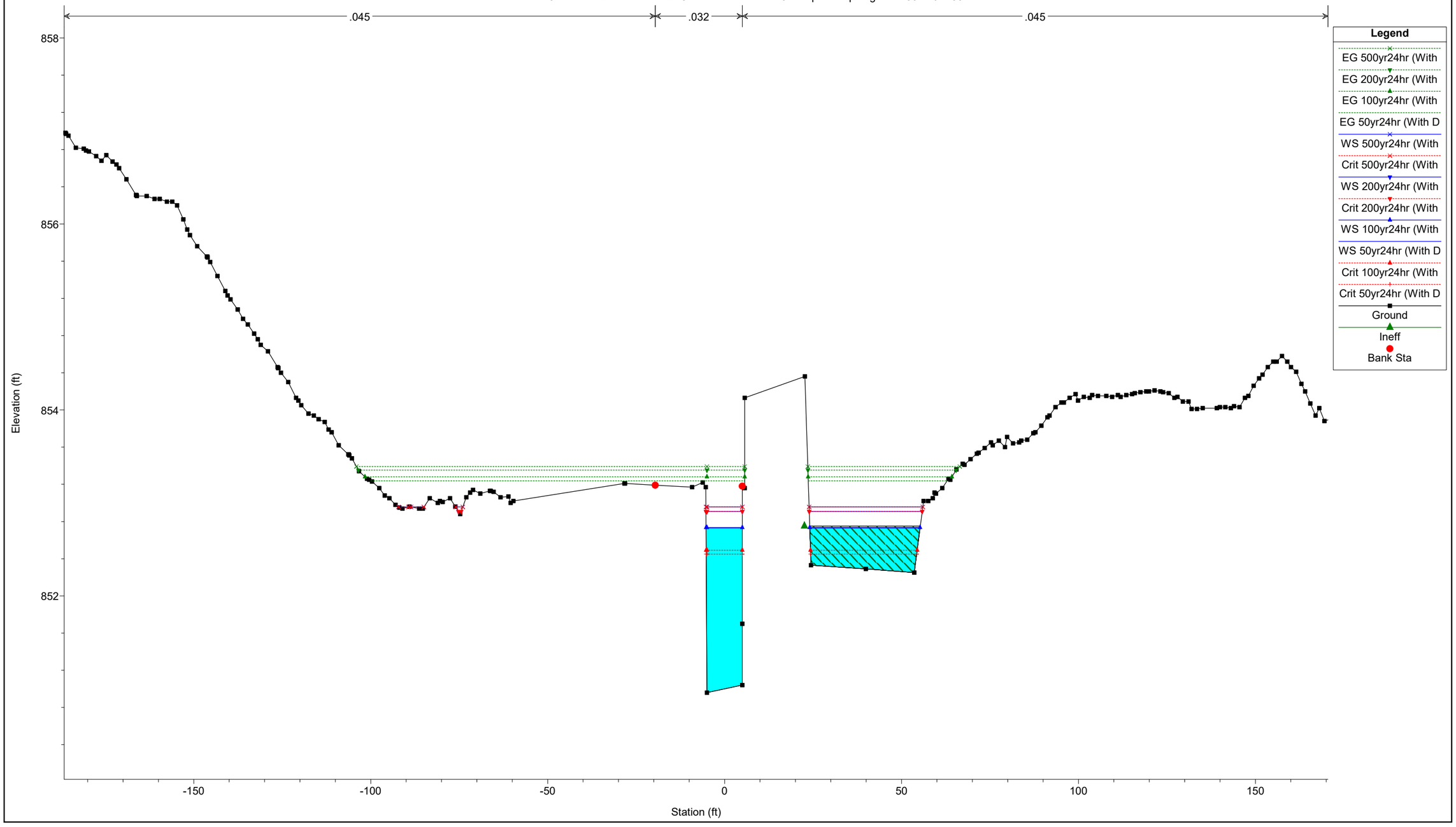
River = Pine Lake Outlet Reach = Pine Lake Outlet RS = 1171.5 Top of Stop Log Elev. 851.70 - 851.74 ft



HEC-RAS Model Plan: Ex. Cond 12/11/2023 4:30:05 PM

Geom: Existing Conditions_Gate Open & No Log Flow: Discharge_No Boards

River = Pine Lake Outlet Reach = Pine Lake Outlet RS = 1171.5 Top of Stop Log Elev. 851.70 - 851.74 ft



APPENDIX E

Preliminary Estimates of Cost

PRELIMINARY ESTIMATE OF COST
LAKE LANSING DAM
December 2023
INGHAM COUNTY, MICHIGAN

Item No.	Estimated Quantity	Unit	Description		Unit Price		Amount
ALTERNATIVE 2 - ABANDON DRAWDOWN IN PLACE							
1.	5	Cu. Yd.	Flowable Fill (48-Inch Dia. Conc. MH)	$	265.00	$	1,325.00
2.	10	Cu. Yd.	Flowable Fill (24-Inch Storm Sewer)	$	265.00	$	2,650.00
3.	30	Lin. Ft.	Remove Existing Dock	$	50.00	$	1,500.00
4.	1	Each	Staff Gauge - Remove and Replace	$	8,000.00	$	8,000.00
5.	720	Sq. Ft.	Cofferdam (10' x 16')	$	160.00	$	115,200.00
6.	1	Lump Sum	Misc. Bypass Pumping	$	30,000.00	$	30,000.00
7.	1	Lump Sum	Bulkhead - Stone Wall and Seawall		Lump Sum	$	20,000.00
8.	1	Lump Sum	Clearing		Lump Sum	$	2,000.00
ESTIMATED CONSTRUCTION ALTERNATIVE 2 COST ----------						**$**	**180,675.00**
			50% for Design, Legal, Financing, Bidding, Construction Administration, Inspection, and Contingency			$	90,337.50
			*Environmental Permitting and Flood Study Not Included			$	-
			Subtotal			$	271,012.50
			10% Inflation			$	27,101.25
ESTIMATED TOTAL ALTERNATIVE 2 COST ----------						**$**	**298,113.75**

PRELIMINARY ESTIMATE OF COST
LAKE LANSING DAM
December 2023
INGHAM COUNTY, MICHIGAN

Item No.	Estimated Quantity	Unit	Description		Unit Price		Amount
ALTERNATIVE 3 - REMOVE AND REPLACE DRAWDOWN							
1.	64	Lin. Ft.	24" R.C.P. Storm Sewer	$	500.00	$	32,000.00
2.	1	Each	48" Dia. Conc. Storm Manhole w/ Control Device	$	15,000.00	$	15,000.00
3.	1	Lump Sum	Remove Existing Dock and Deck		Lump Sum	$	17,500.00
4.	31	Lin. Ft.	Existing Stone Wall - Removal	$	1,000.00	$	31,000.00
5.	25	Cu. Yd.	CIP Conc. Wall, 12-inch	$	3,000.00	$	75,000.00
6.	1	Lump Sum	Trash Rack and Intake Filter		Lump Sum	$	10,000.00
7.	1	Each	Staff Gauge - Remove and Replace	$	8,000.00	$	8,000.00
8.	1	Lump Sum	Steel Corrosion Coating		Lump Sum	$	35,000.00
9.	200	Lin. Ft.	Conc. Crack Repair	$	100.00	$	20,000.00
10.	100	Cu. Yd.	Pressure Grouting	$	300.00	$	30,000.00
11.	1,500	Sq. Ft.	Cofferdam (20' x 35')	$	160.00	$	240,000.00
12.	1	Lump Sum	Misc. Bypass Pumping		Lump Sum	$	30,000.00
13.	1	Lump Sum	Clearing		Lump Sum	$	2,000.00
ESTIMATED CONSTRUCTION ALTERNATIVE 3 COST ----------						**$**	**545,500.00**
			50% for Design, Legal, Financing, Bidding, Construction Administration, Inspection, and Contingency			$	272,750.00
			*Environmental Permitting and Flood Study Not Included			$	-
					Subtotal	$	818,250.00
					10% Inflation	$	81,825.00
ESTIMATED TOTAL ALTERNATIVE 3 COST ----------						**$**	**900,075.00**
VARIATION ON ALTERNATIVE 3							
			Increase size of drawdown pipe to 48-inch RCP with 84-inch manhole and control device.		Additional Cost	**$**	**50,000.00**
ESTIMATED TOTAL VARIATON ALTERNATIVE 3 COST ----------						**$**	**950,075.00**

PRELIMINARY ESTIMATE OF COST
LAKE LANSING DAM
December 2023
INGHAM COUNTY, MICHIGAN

Item No.	Estimated Quantity	Unit	Description		Unit Price		Amount
ALTERNATIVE 4 - REMOVE AND REPLACE DRAWDOWN W/ LIFT SYSTEM							
	64	Lin. Ft.	24" R.C.P. Storm Sewer	$	500.00	$	32,000.00
	1	Each	48" Dia. Conc. Storm Manhole w/ Control Device	$	15,000.00	$	15,000.00
	1	Lump Sum	Remove Existing Dock and Deck		Lump Sum	$	17,500.00
	31	Lin. Ft.	Remove Existing Stone Wall	$	1,000.00	$	31,000.00
	25	Cu. Yd.	CIP Conc. Wall, 12-inch	$	3,000.00	$	75,000.00
	1	Lump Sum	Trash Rack and Intake Filter		Lump Sum	$	10,000.00
	1	Each	Staff Gauge - Remove and Replace	$	8,000.00	$	8,000.00
	1	Lump Sum	Steel Corrosion Coating		Lump Sum	$	35,000.00
	200	Lin. Ft.	Conc. Crack Repair	$	100.00	$	20,000.00
	100	Cu. Yd.	Pressure Grouting	$	300.00	$	30,000.00
	1,500	Sq. Ft.	Cofferdam (20' x 35')	$	160.00	$	240,000.00
	1	Lump Sum	Misc. Bypass Pumping		Lump Sum	$	30,000.00
	1	Lump Sum	Lake Level Boards		Lump Sum	$	100,000.00
	1	Lump Sum	Clearing		Lump Sum	$	2,000.00
ESTIMATED CONSTRUCTION ALTERNATIVE 4 COST ----------						**$**	**645,500.00**
			50% for Design, Legal, Financing, Bidding, Construction Administration, Inspection, and Contingency			$	322,750.00
			*Environmental Permitting and Flood Study Not Included			$	-
					Subtotal	$	968,250.00
					10% Inflation	$	96,825.00
ESTIMATED TOTAL ALTERNATIVE 4 COST ----------						**$**	**1,065,075.00**
VARIATION ON ALTERNATIVE 4							
			Increase size of drawdown pipe to 48-inch RCP with 84-inch manhole and control device.		Additional Cost	**$**	**50,000.00**
ESTIMATED TOTAL VARIATON ALTERNATIVE 4 COST ----------						**$**	**1,115,075.00**

PRELIMINARY ESTIMATE OF COST
LAKE LANSING DAM
December 2023
INGHAM COUNTY, MICHIGAN

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
ALTERNATIVE 5 - SPILLWAY MODIFICATION FOR DRAWDOWN GATE					
	5	Cu. Yd.	Flowable Fill (48-Inch Dia. Conc. MH)	$ 265.00	$ 1,325.00
	10	Cu. Yd.	Flowable Fill (24-Inch Storm Sewer)	$ 265.00	$ 2,650.00
	1	Lump Sum	Remove Existing Dock and Deck	Lump Sum	$ 17,500.00
	31	Lin. Ft.	Remove Existing Stone Wall	$ 1,000.00	$ 31,000.00
	25	Cu. Yd.	CIP Conc. Wall, 12-inch	$ 3,000.00	$ 75,000.00
	1	Each	Staff Gauge - Remove and Replace	$ 8,000.00	$ 8,000.00
	1	Lump Sum	Steel Corrosion Coating	Lump Sum	$ 35,000.00
	200	Lin. Ft.	Conc. Crack Repair	$ 100.00	$ 20,000.00
	100	Cu. Yd.	Pressure Grouting	$ 300.00	$ 30,000.00
	1,500	Sq. Ft.	Cofferdam (20' x 35')	$ 160.00	$ 240,000.00
	35	Cu. Yd.	Dredging and Disposal	$ 500.00	$ 17,500.00
	1	Lump Sum	Misc. Bypass Pumping	Lump Sum	$ 30,000.00
	1	Lump Sum	Lake Level Boards	Lump Sum	$ 100,000.00
	1	Lump Sum	Spillway Modification	Lump Sum	$ 300,000.00
	1	Lump Sum	Clearing	Lump Sum	$ 2,000.00
ESTIMATED CONSTRUCTION ALTERNATIVE 5 COST ----------					**$ 909,975.00**
			50% for Design, Legal, Financing, Bidding, Construction Administration, Inspection, and Contingency		$ 454,987.50
			*Environmental Permitting and Flood Study Not Included		$ -
				Subtotal	$ 1,364,962.50
				10% Inflation	$ 136,496.25
ESTIMATED TOTAL ALTERNATIVE 5 COST ----------					**$ 1,501,458.75**