discharge point is located at the left abutment approximately 200 ft downstream of the dam face. A walkway across the river at the dam was under construction when the dam was inspected, so some of the signs and lights were removed to facilitate construction. The facility otherwise generally appeared to be well fenced, gated, and lighted, and included signage. Signage at the dam should be in accordance with FERC guidelines; however, it was beyond the scope of this study to verify that the signage met the FERC guidelines.

Dam modification that would lower the upstream or raise the downstream water surface elevations may negatively impact the hydropower operations. The gate operation could be adversely affected, limiting the ability of the facility to generate electricity

4.7.2.2 Options Assessment

4.7.2.2.1 Temporary Rock Fill

The Sinnissippi Dam already has a rock fill in place; however, the rock fill is at a 16% slope, which may not produce sub-critical flow. Using the standard layout methodology for the rock fill, the proposed rock fill would begin at elevation 627.40 ft NGVD, 0.10 ft below the existing fill. Therefore, the elevation of the existing fill may be adequate, but the slope could be decreased to 6%. If the existing slope has proven to reduce the roller during the 1 – 5 year storm events, then reduction of the slope may not be necessary. There were no FIS profiles available; therefore, the upstream 100 year water surface was computed using the broad crested weir equation and all downstream water surface elevations were computed using normal depth and extrapolated upstream using the downstream water surface slope. Impacts to the hydraulic operations of the gates due to decreasing the rock fill slope and extending it further downstream should be addressed prior to any construction. It should also be noted that the Sinnissippi Dam uses a grouted A5 riprap, which allows for a smaller stone size. This alternative method would result in different costs.

4.7.2.2.2 Dam Removal

A dam removal option was not considered for this reach due to the significant hydropower operations at this dam

4.7.2.2.3 Full Bypass Channel

A full bypass channel option was not considered for this reach due to the significant hydropower operations at this dam.

4.7.2.2.4 Riffle Pool

A riffle pool dam option was not considered for this reach due to the significant hydropower operations at this dam. A riffle pool would only be possible at the emergency spillway, since it would interfere with the existing gates.

4.7.2.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was not considered for this reach due to the significant hydropower operations at this dam.

4.7.2.2.6 Dam Face Modification

A dam face modification option was not considered for this reach because it would only be possible for the emergency spillway, since it would interfere with the existing gates. The existing grouted rock fill will likely serve the same purpose as a stepped face.

4.7.2.2.7 Summary of Cost

The only option that was determined to possibly be feasible was a temporary rock fill, with an opinion of cost of $4,510,000.

Evaluation of Public Safety at Run-of-River Dams

4.7 *Rock River Dams*

4.7.3 Lower Sterling Dam

CTE | AECOM

4.7.3 Lower Sterling Dam

The following section includes a description of the existing conditions of and proposed structural options for Lower Sterling Dam.

4.7.3.1 Existing Conditions Overview

Lower Rock Falls Sterling Dam was visited on January 29, 2007, and March 21, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

Lower Rock Falls Sterling Dam is a low concrete spillway with an integral sloping downstream face. The spillway and training walls comprise the entire dam. The spillway length was measured at 945 ft, with a gentle arch shape. The smooth flow over the crest and down the face suggests lack of irregularities. The spillway water line is approximately five ft below the left wall and has a breadth of approximately 20 ft. The left and right abutments consist of vertical reinforced concrete retaining walls; the left is approximately five ft high and the right is approximately 12 ft high above the crest.

Approximately 510 ft upstream of the dam is the Route 40 Bridge across the Rock River. This 12 span bridge has 11 concrete piers in the river supporting concrete beams and deck. There are no intentional non-overflow embankments, although the boat ramp parking lot could potentially overtop during high flow conditions.

The left upstream riverbank has stone riprap and should be checked for stability during design. The left bank hosts the Coloma Township Park (public) upstream of the dam, a boat launch at the left abutment, and its gravel parking lot extending downstream. Local shoreline users interviewed stated that the boat launch does receive considerable use in the summer.

The right bank has a continuous concrete wall, with active multi-story industrial plants upstream and downstream of the dam. Beginning 300 ft downstream and beyond, older industrial buildings are being demolished.

A narrow flight of slippery concrete stairs leads from the downstream left retaining wall to a frail metal catwalk along the edge of water, presumably installed as a fishing access point. A second stone staircase further downstream could be used as a canoe launch, but only with great difficulty due to its alignment. The left downstream walls are in poor condition with cracks, voids, and concrete spalling. The far downstream left river bank is reinforced with timber landscape ties, but has severe erosion and sloughing. The toe of slope should be checked for scour during low flow conditions.

A flat-topped, grass island with numerous canopy trees is located mid-channel downstream of the dam. Its banks are vegetated and stable.

In terms of public boating safety, this appears to be one of the most dangerous of all of the dams investigated. The left bank boat ramp is only about 20 ft away from the

spillway crest and waters sweep across the ramp laterally to the spillway. It would be very easy to be washed over the crest.

Channel Type/Flow Regime

Several rows of standing waves extend downstream, while the heaviest waves are across the center and right side of the spillway. Survey data shows a nine-ft head differential between upstream and downstream water levels. The water in the downstream channel is only two to three ft deep, with a fairly flat river bed. Survey also shows that river bed elevations are similar on both sides of the dams, indicating little or no sediment. The height of the dam crest above the river bed is approximately 11 ft.

The USGS has a stream flow station on the Rock River at Como, Illinois, very close to the dam. The reported watershed area is 8,753 square miles with a mean September flow of 3,790 cfs. All months have high mean flows, making cofferdams necessary. Annual peak flows have an unusually wide variation, from 10,000 to 50,000 cfs.

The gentle slope of the dam face slows overflowing waters to enter the tailwater at a flat angle, creating a fierce elongated hydraulic jump with little or no plunging flow.

Surrounding Land Uses

The right bank is a large industrial plant, both upstream and downstream. The left bank is a public park.

General Dam & River Bank Condition

Dam condition, no obvious visual deficiencies were noted. Abutments: left bank old mill race incorporated into concrete vertical structure, access for fishing platform, Onshore left bank is dilapidated factory possibly being demolished or failing.

Evidence of Rollers

A 5’ to 15’ roller was observed at the downstream toe of the dam.

Portages

Urban environment, large riprap shore structure upstream on right bank. Right bank is accessible only via private property with gated parking lot. Township boat launch is located immediately upstream of dam on left bank. No visible easy put in location downstream of dam on left bank.

Warning/Information Signage

None observed.

Construction Access

There is direct vehicle access to the left abutment and left bank though the public park, which would have to be partially closed during construction. The park entry is on West First Street and 2nd Avenue. Right bank access is physically possible, but is on private active industrial property.

4.7.3.2 Options Assessment

4.7.3.2.1 Temporary Rock Fill

The Lower Rock Falls Sterling Dam maintains a significantly sloped face. If the face adequately reduces the roller during the 1 – 5 year events, then rock fill may not be necessary. However, it appears from the inspection that a hydraulic jump with a possible roller length of 15 ft may occur. A rock fill design has been provided for cost purposes; however, a more detailed hydraulic analysis is needed to determine whether it is necessary. There were no FIS profiles available; therefore, the upstream 100 year water surface was computed using the broad crested weir equation and all downstream water surface elevations were computed using normal depth at survey point 4 and extrapolated upstream using the downstream water surface slope. The rock fill has been assumed to be placed flush with the original crest starting at elevation 625.13 ft NGVD and extending downstream at a slope of 5.5%. The rock fill will experience sub-critical flow and the hydraulic jump at the dam crest will not be submerged during the 1-year to 5-year and 10-year flow events.

4.7.3.2.2 Dam Removal

Removal Feasibility

The Lower Rock Falls Sterling Dam is a long structure on a large river, and will be hard to remove due to high flow rates and its large concrete volume. It has public access from the left bank with limited staging area. It is also accessible from the right bank, through the private property of National Manufacturing Company. The dam was constructed in 1958 and plans may be available to show how it was made, and to identify the location of construction joints. The design stage inspection and survey should investigate the back side of the dam and verify if any of the construction cofferdam remains.

Based on the preliminary assessment, perhaps the best way to remove the Lower Rock Falls Sterling Dam would be to work from both ends, one at a time. A cofferdam and accessway could be built approximately one third of the way across the river, then breach and remove that portion of the dam. This method will draw down water levels, and allow use of a lower cofferdam for the remaining demolition.

Special Issues

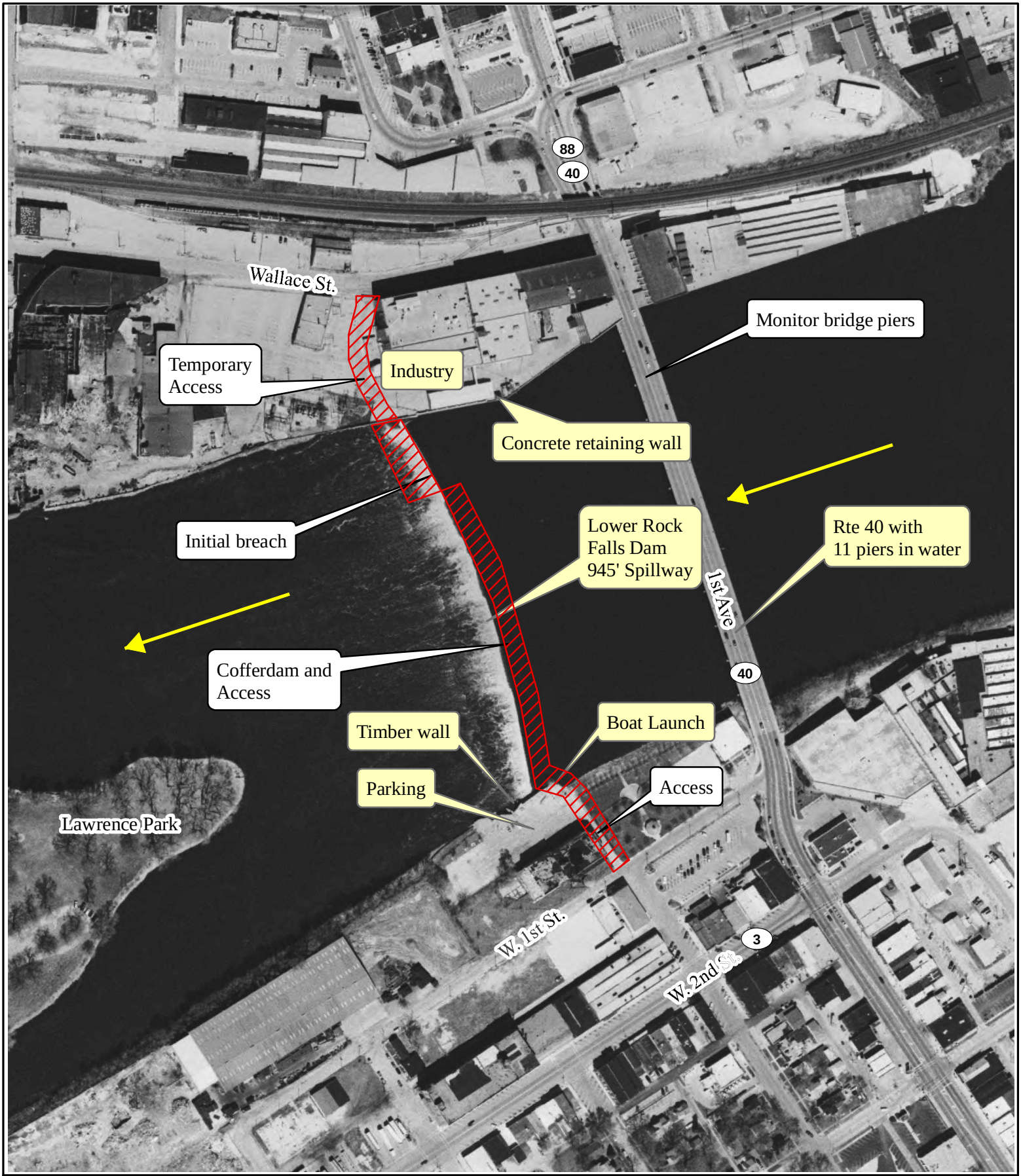
a) The Route 40 bridge piers are well within the dam backwater pool and would be exposed to higher velocities if the dam is removed. During design of the

removal, bridge foundations plans need to be evaluate. Hopefully this major bridge is founded on bedrock.

b) The upstream riverbank riprap should be checked for its below water coverage and post dam stability.

c) The right bank, upstream walls need to be checked.

d) Numerous active industries are present in close proximity to the dam. It is not known if they use the impoundment water for industrial or fire fighting purposes.



Engineering, Landscape Architecture and Environmental Science

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IL Dam Removal Project
Lower Rock Falls Dam - Rock River

LOCATION: Rock Falls, IL

MMI#: 3131-01
MXD: H:LowerRockFalls.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":300'

SHEET: Figure 4.7.3.2.2

4.7.3.2.3 Full Bypass Channel

A full bypass channel option was not considered due to the apparent lack of public land on either bank.

4.7.3.2.4 Riffle Pool

A riffle pool option was not considered for this reach due to the large width of the channel (960 ft) and the availability of less costly alternatives.

4.7.3.2.5 In-Stream Bypass Channel

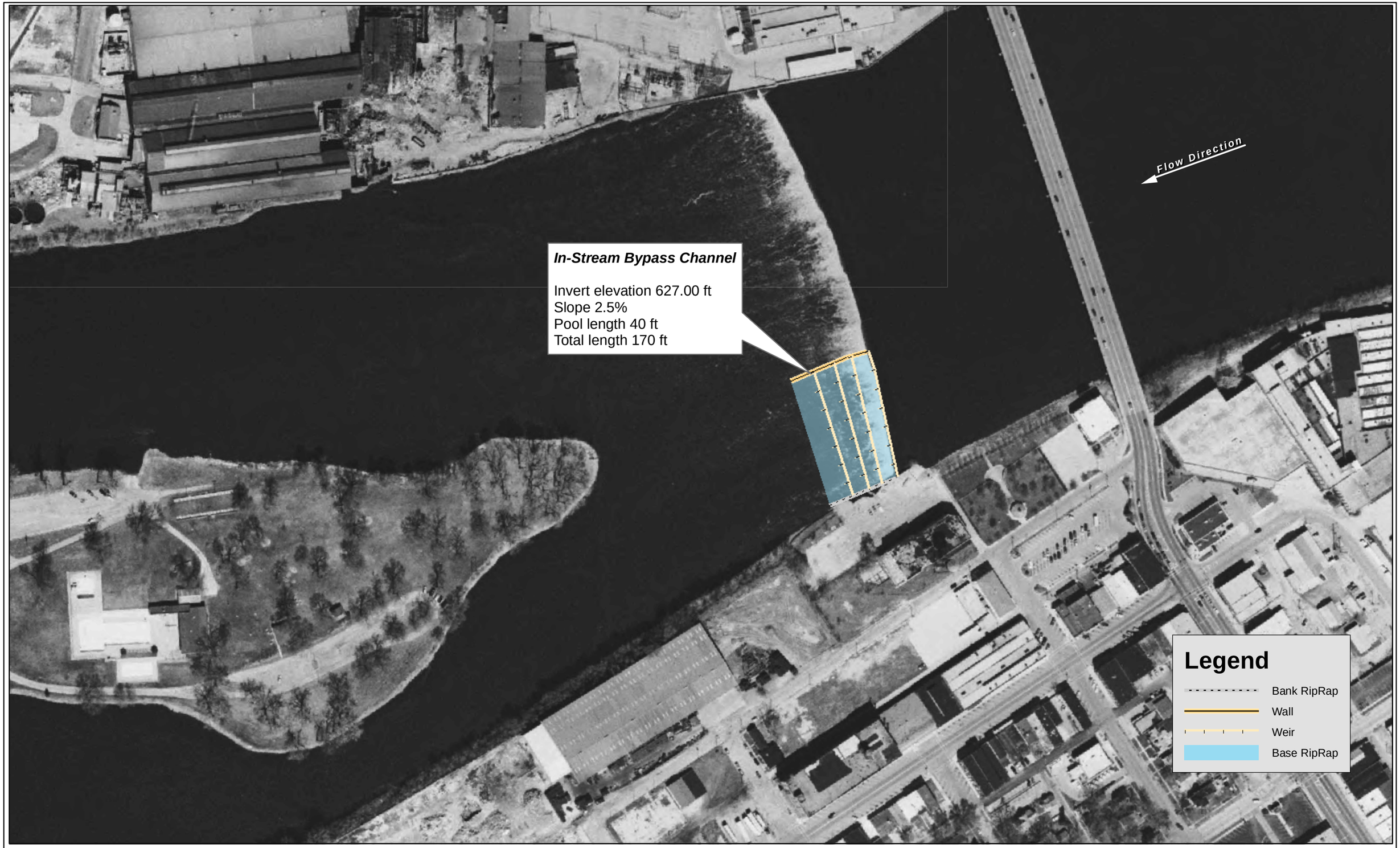
An in-stream bypass channel concept was developed for this reach (See Figure 4.7.3.2.5). A single 300-ft wide bypass, with a 2.5% slope could be most easily constructed on the left bank. This would involve notching approximately 300 ft of the dam. This bypass would prevent overtopping of the dam up to the 5-year FIS flow as well as allow for boat passage through the cut. Detailed survey would be required to further determine the feasibility of this solution.

4.7.3.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.7.3.2.6). Although this dam is quite wide (960 ft), a stepped face might be desirable if other options are deemed infeasible. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.7.3.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, in-stream bypass channel, and dam face modification options are $18,030,000, $1,960,000, and $14,980,000, respectively. The high cost for the temporary rock fill is due to the total volume of stone required based on the length of the dam, height of the fill compared to the bed elevation, and the scour hole. The opinion of cost of dam removal is $8,290,000.



0 100 200 Feet

INSTREAM BYPASS

Lower Sterling / Lower Rock Falls Dam - Rock River

Rock Falls, Illinois

CTE | AECOM

Figure 4.7.3.2.5

Lower Sterling

DAM FACE MODIFICATION

Lower Sterling / Lower Rock Falls Dam - Rock River

Rock Falls, Illinois

CTE | AECOM

Figure 4.7.3.2.6

Lower Sterling

Evaluation of Public Safety at Run-of-River Dams

4.7 *Rock River Dams*

4.7.4 Sears Dam

CTE | AECOM

4.7.4 Sears Dam

The following section includes a description of the existing conditions of and proposed structural options for Sears Dam.

4.7.4.1 Existing Conditions Overview

Sears Dam was visited on January 30, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

General Dam & River Bank Condition

Dam is in serviceable condition with some minor structural degradation in evidence. Abutments appear sound with some minor weathering. Upstream along the left bank is silt/sand deposit are evident. Upstream right bank is sloping private property with some access and boat docks. Downstream left bank is gravel/sand deposited downstream of the bridge pier/abutment. Downstream on the left bank there is 100 year old, operating hydroelectric plant in good condition.

Evidence of Roller

10-15' reverse roller was noted downstream of toe - A floating automobile tire stayed within five ft of toe of dam for several hours.

Portages

There was no evidence of a portage on the right upstream bank. There is a portage along the downstream right bank; however, it is unsigned. Portaging requires crossing an active railway. No portages were noted along the left bank. Portaging on the left bank would require climbing an embankment and crossing private property and a four lane state highway.

Warning/Information Signage

FERC required warnings were noted on the left and right banks, upstream and downstream of the dam and at forebay and discharge of hydroelectric plant. Signage drawings were provided by hydroelectric plant operator. Two (2) seasonal buoys are present upstream of the dam between May and September.

Hydropower Assessment

The Sears dam is operated as a hydroelectric generating facility by White Hydropower Company. The plant is authorized to produce 600KW and sells it power to MidAmerican Energy Company, per the City of Rock Island, who is investigating acquiring the hydroelectric facility. The hydropower operations include a fixed dam that diverts water to a side channel on the right bank, upstream of 11th Street (US Rt. 67) in Rock Island. The side channel crosses under 11th Street and enters a small pond at the upstream

side of the power plant intake facility. The approximately 400 ft long power house is built along the river bank and discharges at a 90 degree angle to the river. The power house and pond are fenced off, though there was evidence that fisherman climb down onto the power house property from the 11th Street Bridge on to the peninsula created by the side channel adjacent to the river. The power house discharge point is located on the right bank and is accessible to river users. The discharge point is located on approximately 400 to 500 ft downstream of the dam face. The power house facility is well fenced, gated, and lighted, and includes signage. The current owner who met us at the site indicated that the signage at the dam and upstream of the dam was in accordance with FERC guidelines, subject to occasional vandalism; however, it was beyond the scope of this study to verify that it met FERC guidelines. Access is not limited to the intake and discharge by boaters although there is signage warning boaters of bad currents.

The facility did not appear to be automated and consists of a power house built at the beginning of the previous century. The height of the dam spillway crest was obtained as part of the survey work.

Dam modification that would lower the upstream water surface elevations or raise the downstream water surface elevations may negatively impact the hydropower operations. The Steel dam, which is upstream of the Sears dam on an adjacent channel, assists in diverting water into the Sears dam channel which also assists in the hydroelectric operation of the Sears dam.

4.7.4.2 Options Assessment

Option selection should be made with consideration of Steel Dam options, since these act as one system to provide a pool for hydro electric power generation. Section 4.7.5.2.3 (for Steel Dam) presents a modified Full Bypass option which allows avoidance of both Steel and Sears Dams.

4.7.4.2.1 Temporary Rock Fill

A rock fill concept has been developed for Sears Dam that provides sub-critical flow for the 1-year, 5-year and 10- year flow events. The hydraulic jump at the dam crest is not sub-merged during these flow events either. However, limited FIS data was available for Sears Dam and the downstream water surfaces were computed using normal depth. The upstream 100 year water surface was computed using the broad crested weir equation. The downstream bridge may be impacted by a rock fill and requires a detailed hydraulic analysis prior to implementation

4.7.4.2.2 Dam Removal

Dam removal was not considered since it would negatively impact existing hydropower operations at this dam.

4.7.4.2.3 Full Bypass Channel

A full bypass channel option was not considered since it would negatively impact existing hydropower operations at this dam by significantly lowering the existing pool. The presence of the downstream bridge would also make such a bypass very costly. However, an alternate bypass for boaters (i.e., canoe chute) option upstream near the Steel Dam is proposed since it allows river users to avoid both the Sears and Steel Dams. See Section 4.7.5.2.3.

4.7.4.2.4 Riffle Pool

A riffle pool option was not considered for this dam due to the down stream bridge just below the dam. A riffle pool would impact bridge hydraulics and lead to increased scour.

4.7.4.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was not considered since it would negatively impact existing hydropower operations at this dam by significantly lowering the existing pool.

4.7.4.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.7.4.2.6). Since this dam is quite dangerous and lacks other available options, a stepped face may be a desirable safety feature. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.7.4.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill and dam face modification options are $3,790,000 and $5,690,000, respectively.

0 50 100 Feet

DAM FACE MODIFICATION

Sears Dam - Rock River

Milan, Illinois

CTE | AECOM

Figure 4.7.4.2.6

Sears

Evaluation of Public Safety at Run-of-River Dams

4.7 *Rock River Dams*

4.7.5 Steel Dam

CTE | AECOM

4.7.5 Steel Dam

The following section includes a description of the existing conditions of and proposed structural options for Steel Dam.

4.7.5.1 Existing Conditions Overview

Steel Dam was visited on January 30, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

General Dam & River Bank Condition

The Steel Dam was recently rebuilt, appears to be in good condition with horizontal and vertical alignment of dam crest and abutments good. Abutments appear sound and in good condition. Upstream along the left bank there is a silt/sand deposit in state park. Downstream along the left bank there are gravel/sand deposits. This area is accessible through park. Right bank is on Van Druff Island. It can only be accessed from the river or over private property. The upstream right bank is gravel and bedrock.

Evidence of Roller

5-15' reverse roller was observed downstream of toe. Three large tree trunks were trapped and rotating in the roller at the toe of the dam for several hours.

Portages

There is an unsigned portage located along the left bank about 300 ft. upstream of the dam crest. There is an unsigned portage about 100 ft. downstream of the dam crest along the left bank. There is no evidence of portages along the right bank either upstream or downstream.

Warning/Information Signage

There are FERC required warnings on left and right banks. These upstream facing are 4' X 8' signs with 20" tall lettering "Danger Dam" and face upstream. There are smaller diamond shaped "Thin Ice" warning signs as well. On both downstream abutments there are smaller "Danger Bad Currents, Keep Back signs. Six (6) seasonal buoys are present upstream of the dam between May and September.

4.7.5.2 Options Assessment

Option selection should be made with consideration of Sears Dam options, since these act as one system to provide a pool for hydro electric power generation. Section 4.7.5.2.3 presents a modified Full Bypass option which allows avoidance of both Steel and Sears Dams.

4.7.5.2.1 Temporary Rock Fill

A rock fill concept has been developed at steel dam with a slope of 6% and a top of fill elevation of 557.20 ft NGVD. The downstream and upstream FIS profiles and flow rates were available and the 1-year, 2-year and 5-year stages and flows were extrapolated. Upstream and downstream bed elevations appear reliable in the vicinity of the dam and information is available for the dam crest. The crest is an ogee type spillway; however, it has been assumed here that the rock fill will be placed flush against the face. Additional design should be conducted to engineer the transition between the ogee face and the rock fill.

4.7.5.2.2 Dam Removal

A dam removal option was not considered since it would negatively impact existing hydropower operations at Sears dam. The Steel Dam helps to maintain the pool for the Sears Dam.

4.7.5.2.3 Full Bypass Channel

A *modified* full bypass channel concept was developed for this reach (See Figure 4.7.5.2.3). This bypass would not convey the 5-year FIS flow, since this would negatively affect existing hydropower operations at Sears Dam by significantly lowering the pool. However, this bypass would act as a canoe / kayak chute allowing river users to bypass both the Sears and Steel Dams. It would convey minimal amounts of flow, allowing passage through the chute but having minimal impact on the pool elevation and existing hydropower operations.

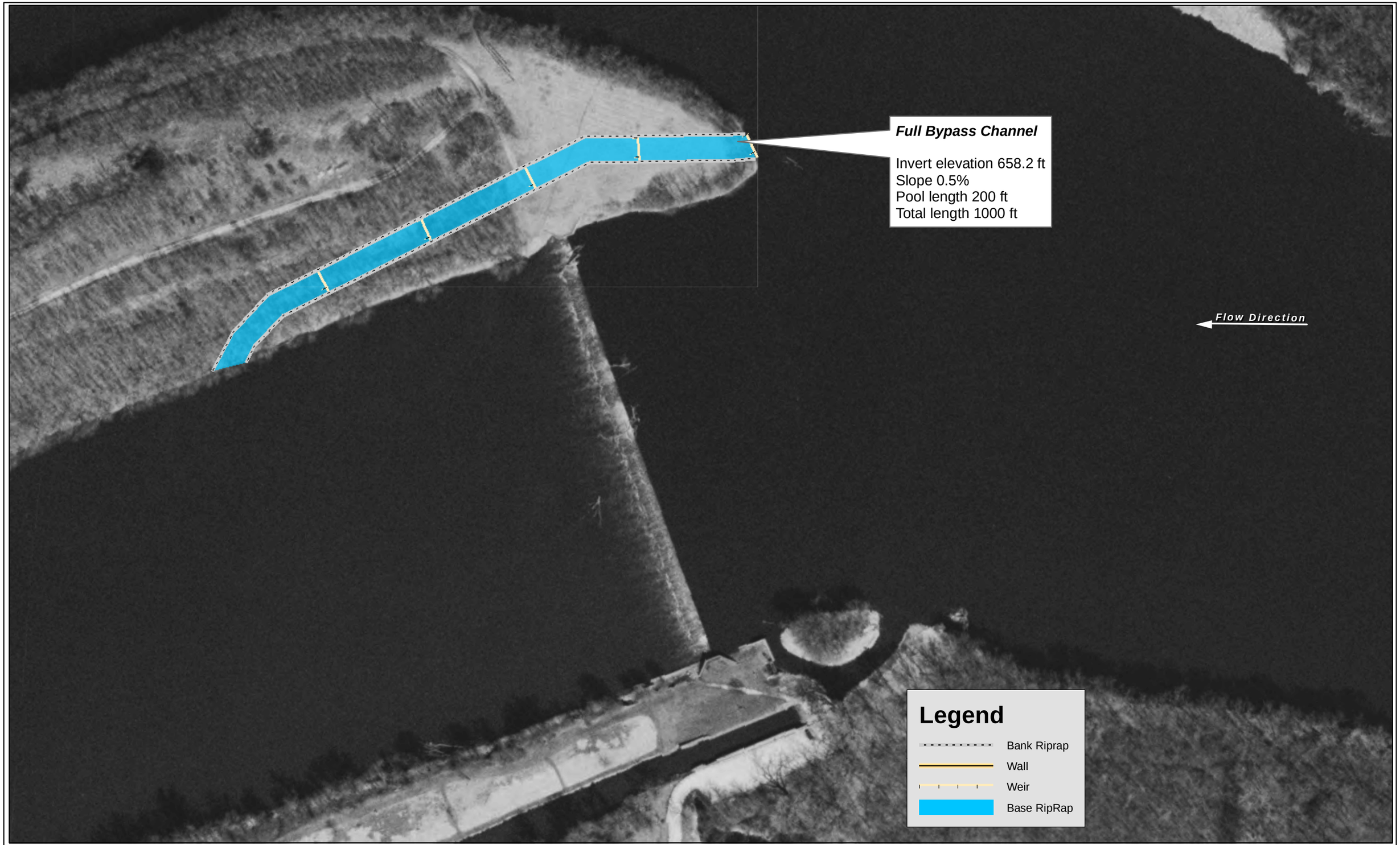
This bypass is placed at the tip of the island dividing the north and south branches and allow users to re-enter the Rock River just downstream of the Steel Dam. This option has a width of 45 ft, a 0.5 % slope and is 1000 ft long with 5 riffles. The final design of such a chute is flexible with the main goals being safe passage through the chute and minimal affect on the upstream pool. Potential options also exist for creating a white water kayaking park in this area.

4.7.5.2.4 Riffle Pool

A riffle pool concept was developed for this reach (See Figure 4.7.5.2.4). The riffle pool would be the width of the dam (781 ft) with a 1% slope with 5 riffles beginning at the dam crest. Although this dam is very wide (781 ft), a riffle pool option could serve as a desirable safety precaution. Further hydraulic studies are needed to analyze the effect of a riffle pool on downstream flooding and upstream water surface elevations.

4.7.5.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was not considered since it would negatively impact existing hydropower operations at Sears Dam by significantly lowering the existing pool.



0 50 100 Feet

FULL BYPASS

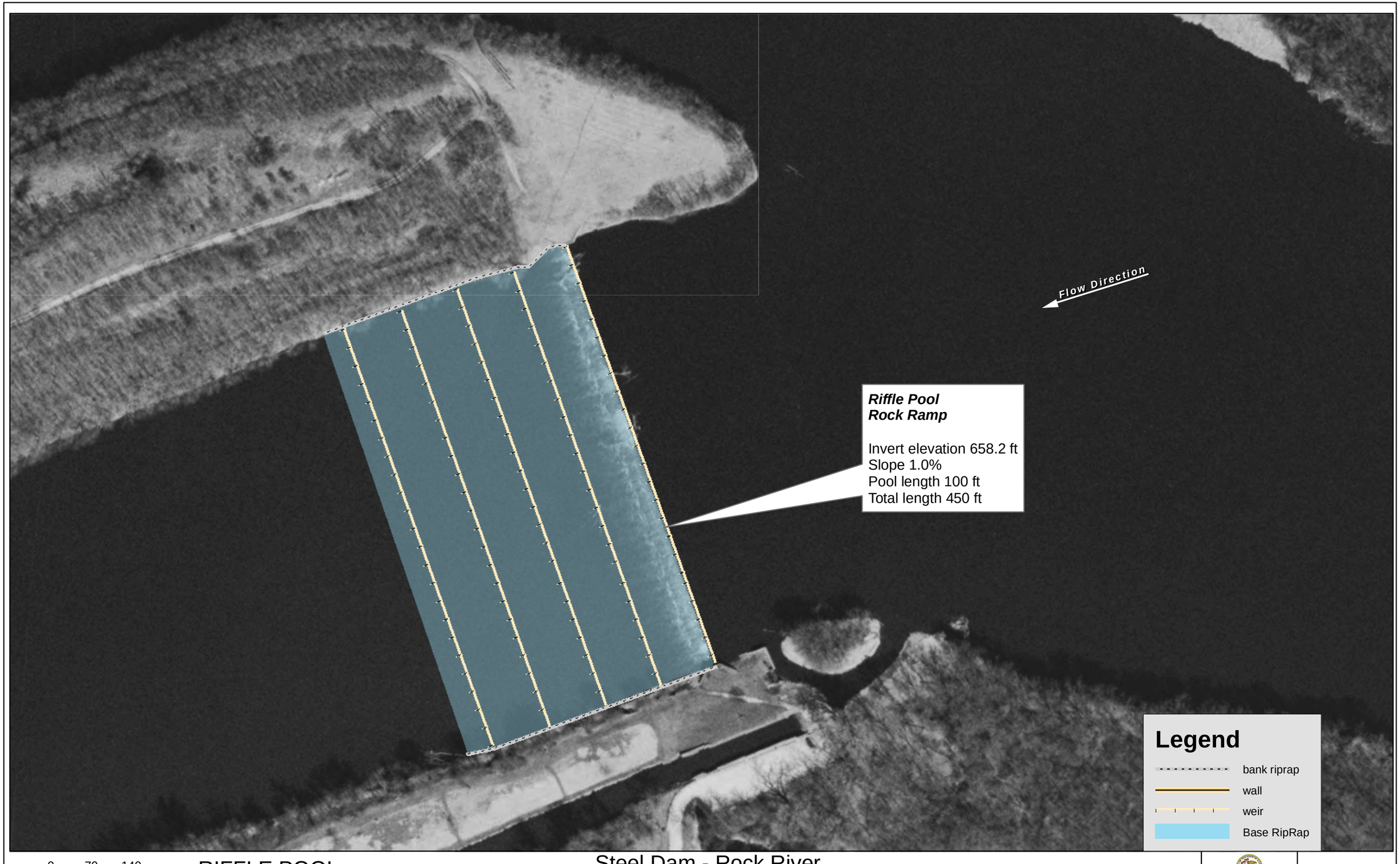
Steel Dam - Rock River

Milan, Illinois

CTE | AECOM

Figure 4.7.5.2.3

Steel



0 70 140 Feet

RIFFLE POOL
ROCK RAMP

Steel Dam - Rock River

Milan, Illinois

CTE | AECOM

Figure 4.7.5.2.4

Steel

4.7.5.2.6 Dam Face Modification

Dam face modification was not considered for this reach since a riffle pool option is available and would likely be more cost effective.

4.7.5.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, *modified* full bypass channel and riffle pool options are $1,670,000, $3,470,000, and $4,770,000, respectively.

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.1 McHenry (Stratton L & D) Dam

CTE | AECOM

4.8 *Fox River Dams*

The following section includes a description of the existing conditions of and proposed structural options for dams located on the Fox River.

4.8.1 McHenry (Stratton L & D) Dam

The following section includes a description of the existing conditions of and proposed structural options for McHenry (Stratton L & D) Dam.

4.8.1.1 Existing Conditions Overview

McHenry (Stratton L & D) Dam was visited on February 1, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

General Dam & River Bank Condition

The dam appears in good condition with no visible obvious deficiencies. A new gate was installed in left spillway within the last 10 years.

Evidence of Roller

No, however water was 18" – 2' lower than normal flow because of winter draw down. There was a hydraulic jump visible at the downstream side of the west spillway.

Portages

There are no marked portages, although canoeists can exit the river at state park on left bank and portage around dam. There is a potential portage path that currently is marked as snowmobile trail.

Warning/Information Signage

Yes, there is the standard IDNR-OWR warning sign ("Warning Hazardous Currents Present DO NOT Enter Spillway Area" posted in Spanish and English) on the downstream side of dam on the right abutment. The sign is visible from 15 yards. There are also signs upstream of the dam. Seven (7) seasonal buoys seasonal buoys are present upstream of the dam between May and September. There are additional signs upstream on both banks warning "Danger Dam Ahead".

4.8.1.2 Options Assessment

4.8.1.2.1 Temporary Rock Fill

Several issues may make a rock fill unfeasible at the McHenry Stratton Lock and Dam. While a rock fill could be constructed at a 12% slope that would result in sub-critical flow along the rock fill for the 2 year and 5 year flow events, both the 2 year and 5 year hydraulic jumps at the dam crest would be submerged by the tailwater. Downstream water surfaces and flow rates were not available for the 1 year event. The dam has also been modified to include a stepped face and a hinged flood control gate at the right abutment. The impact of a rock fill on both of these features would need to be assessed prior to construction. The lock channel may also present a problem. For the purposes of this report, a 12% sloped rock fill starting at an elevation of 735.50 has been provided.

4.8.1.2.2 Dam Removal

Dam removal was not considered for this dam since it would negatively impact the upstream pool and the major recreation uses present there.

4.8.1.2.3 Full Bypass Channel

A full bypass channel was not considered for this dam since it would negatively impact the upstream pool and the major recreation uses present there and due to an apparent lack of available public land for such a bypass. A lock system currently exists west of the channel which allows for a safe bypass around the dam.

4.8.1.2.4 Riffle Pool

A riffle pool was not considered for this reach due to the presence of a gated spillway at the west end of the dam. A riffle pool would increase downstream low flow stages and negatively impact the operations of the spillway.

4.8.1.2.5 In-Stream Bypass Channel

An in-stream bypass channel was not considered for this dam since it would negatively impact the upstream pool and the major recreation uses present there.

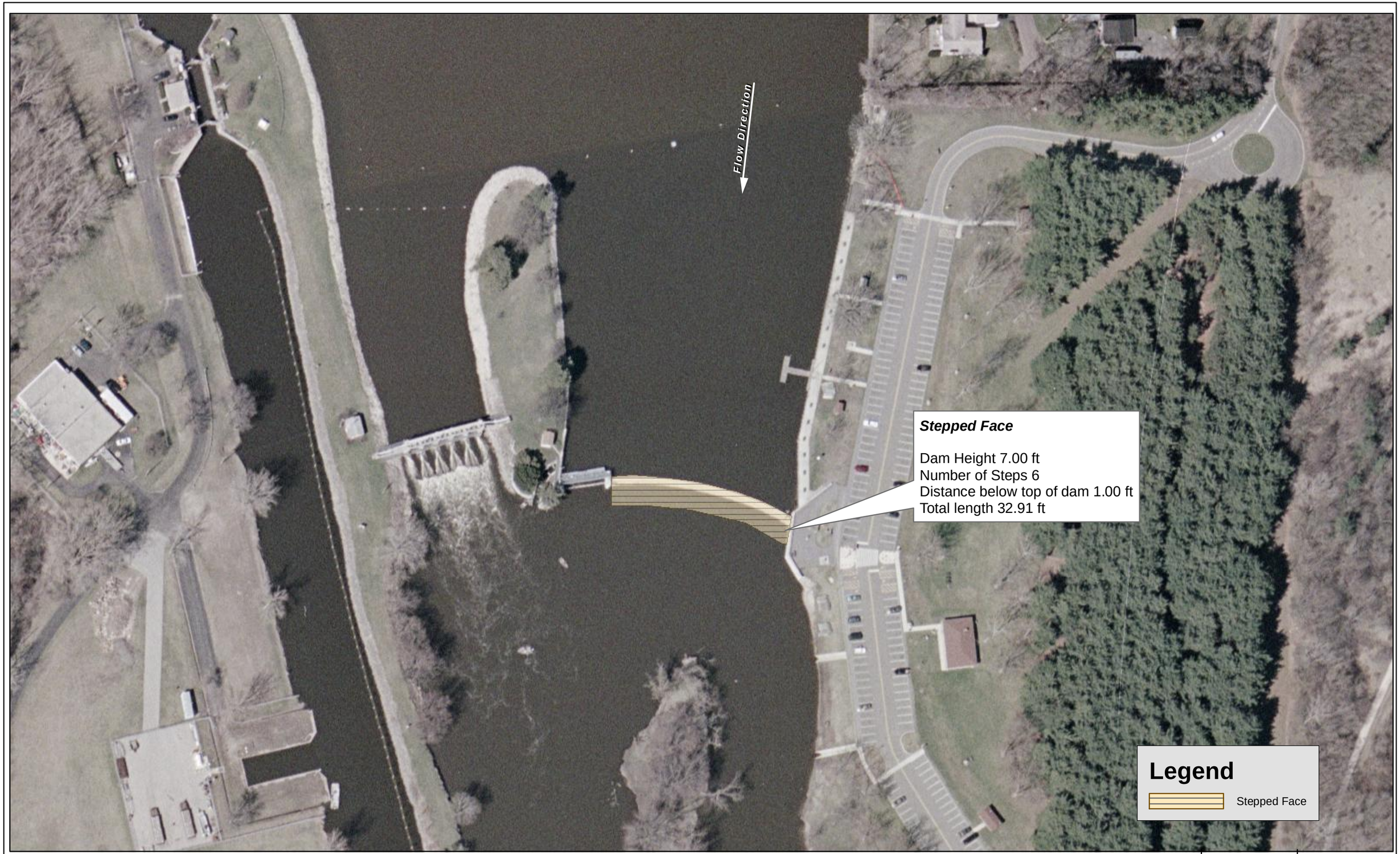
4.8.1.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.8.4.1.6). A stepped face structure with 6 steps could replace the existing steps which appear to be quite steep (approximately a 1:1 (H:V) slope). Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face. The study should also examine the impacts of the conceptual stepped face on the adjacent gated structure.

4.8.1.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The

opinions of cost for the temporary rock fill and dam face modification options are $720,000 and $1,260,000, respectively.



DAM FACE MODIFICATION

Mc Henry (Stratton L and D) Dam - Fox River

Mc Henry, Illinois

CTE | AECOM

Figure 4.8.1.2.6

McHenry/Stratton

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.2 Algonquin Dam

CTE | AECOM

4.8.2 Algonquin Dam

The following section includes a description of the existing conditions of and proposed structural options for Algonquin Dam.

4.8.2.1 Existing Conditions Overview

Algonquin Dam was visited on December 27, 2006. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

General Dam & River Bank Condition

No visible obvious deficiencies were noted. The horizontal and vertical alignment of the dam crest and abutments was good. Abutments are in good condition, with 4 ft. rails. The left downstream abutment is eroded with some large rocks and steep banks.

Evidence of Roller

Yes, a reverse roller extends for 10-12 ft beyond along the length of the run-of-river portion of the dam. Sticks and other objects were seen stuck in the roller. There is a roller downstream of the new spillway. The roller downstream of the spillway appears to extend several ft further than the run-of-river dam roller.

Portages

There are portages on the right bank. One is 1200 ft upstream and the other is 500 ft downstream. The portage is in good condition. No portage was signage observed. The downstream portage leads directly into strong current. This portage should be considered redesign.

Warning/Information Signage

Three (3) standard IDNR-OWR warning signs (“Warning Hazardous Currents DO NOT Enter Spillway Area”, posted in English and Spanish) visible from 45 ft are mounted on the downstream face of dam (1 on each end and on the wall between the gated spillway and the dam). There are "Do not enter" and “No Trespassing” signs on both downstream banks.

4.8.2.2 Options Assessment

4.8.2.2.1 Temporary Rock Fill

A rock fill concept at Algonquin Dam may not provide the desired reduction in the downstream hydraulic for the 2 and 5 year flow events. At a slope of 6.5%, the rock fill will experience sub-critical flow for the 1 through 10 year events; however, a submerged hydraulic jump will occur at the dam crest for the 2 through 10 year events. The rock fill can not be raised any higher since the current layout places it 1 ft below the crest of the dam. Decreasing the slope does not prevent the jumps from being submerged either; there is simply too high of a tailwater. In addition, the dam has a flood control structure at the right abutment that is capable of releasing additional discharge during upstream flood events. Construction of a rock fill may impact this structure; therefore, detailed hydraulic analyses should be completed before implementing this option. It also appears from the IDNR survey that the dam has a significant scour hole approximately 100 ft long and 2.5 to 5 ft deep, followed by a rise in the bed of 2.5 ft to 5 ft over 50 ft. For the purposes of this report, a cost is provided for filling in the scour hole alone. The scour hole would be filled to an elevation of 723.6 ft NGVD for 100 to 150 ft downstream.

4.8.2.2.2 Dam Removal

Dam removal was not considered for this dam since it would negatively impact both the upstream pool, which allows major recreation uses.

4.8.2.2.3 Full Bypass Channel

A full bypass channel was not considered for this dam since it would negatively impact both the upstream pool, which allows major recreation uses, and a recently installed flood control gate.

4.8.2.2.4 Riffle Pool

A riffle pool was not considered for this reach due to the presence of the flood control gate at the west end of the dam. A riffle pool would increase downstream low flow stages and negatively impact the operations of the flood control gate.

4.8.2.2.5 In-Stream Bypass Channel

An in-stream bypass channel was not considered for this dam since it would negatively impact both the upstream pool, which allows major recreation uses, and a recently installed flood control gate.

4.8.2.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.8.2.2.6). A stepped face structure with 9 steps could be constructed at the dam face Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face, as well as to examine the impacts on the adjacent gated structure.

4.8.2.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill and dam face modification options are $1,460,000 and $2,300,000, respectively.

0 50 100 Feet

DAM FACE MODIFICATION

Algonquin Dam - Fox River

Algonquin, Illinois

CTE | AECOM

Figure 4.8.2.2.6

Algonquin

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.3 Carpentersville Dam

CTE | AECOM

4.8.3 Carpentersville Dam

The following section includes a description of the existing conditions of and proposed structural options for Carpentersville Dam

4.8.3.1 Existing Conditions Overview

Carpentersville Dam was visited on January 5, 2007, and April 12, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

This publicly owned dam is located approximately one mile upstream of the Route 25 Bridge over the Fox River in Dundee. The dam consists of a left embankment and raceway, training wall, spillway, right training wall with observation deck, right embankment and raceway. At one time, the raceways provided water to several 19th century businesses, including an 1830's lumber mill, flour mill, cording and cloth shops, woolen mill, iron and bolt shop, and Star Manufacturing. An ice house was located on the pool.

The spillway has a broad crest, a two to three ft vertical wall, and then a steep ramp to an undulating hydraulic jump. The dam height is eight ft and its length is 380 ft, with two straight segments forming a shallow "V" plan shape.

The spillway's left training wall is constructed of stone masonry. The 75-ft long left embankment between the left training wall and east raceway is in poor condition and appears to have been overtopped in the past. Erosion is present behind the downstream training wall, with severe erosion of the left downstream bank due to an eddy. The fish ladder is blocked with debris. The embankment between the raceway and river is narrow and eroding, prone to failure. The right abutment appears to have some undercutting downstream of the abutment. Raceway head gates are three 12-ft high concrete bays, with a total width of 60 ft. Heavy duty timber stop logs plug the raceway, holding approximately seven ft of water. An earth berm (old cofferdam) crosses most of the east (left) raceway, just upstream of the head gates.

A headrace begins at the right abutment area and extends downstream on the right floodplain to Dundee. A paved trail from the parking lot to the gazebo crosses the headrace. Flow to the headrace appears to be controlled by a submerged valve with a damaged riser stem. The shallow raceway is filled with brush and is a wetland, but is a possible bypass route to at least partially dewater the pool during construction.

The downstream channel is broad and shallow with several low wooded islands. A short earth embankment extends from the scenic overlook, across a headrace, to the right shore.

Channel Type/Flow Regime

The vertical upper face and steep ramp leads to high velocity flow at the toe. A toe apron creates horizontal undulating jump moving downstream (Case 2). The standing wave at the toe rises two to three ft and is followed by a secondary roller approximately 20 ft out. The left and right sides of the channel downstream of the dam both have horizontal reverse eddies that could be difficult for waders or weak swimmers.

Surrounding Land Uses

The upstream pool perimeter is undeveloped; much is owned by the Fox River Shores Forest Preserve. The downstream channel has islands, raceways through low floodplains on both banks, to mills in Dundee. Cattail wetlands are present along the upstream right shoreline.

The right end of the spillway has a gazebo and cast in place concrete deck with a black light duty ornamental rail. The upstream wing wall is modern reinforced concrete. The downstream face of the structure has lean water seepage with mortar from masonry joints. A canoe launch and trail is located downstream of the dam on the right bank, with a paved parking lot.

General Dam & River Bank Condition

The right abutment has some undercutting at the downstream ft of the abutment. Log debris on the dam face near the right abutment was noted. The left abutment is in deteriorating condition with cracks and some vegetation growth in abutment. There is erosion around the left abutment. The fish ladder located at the left abutment showed some concrete deterioration and was partially clogged with log debris. Significant erosion was noted on the downstream left bank. There is a millrace left of the left dam abutment that has been bulkheaded to prevent flow. Some overflow could occur at exceptionally high river levels. There is a pedestrian walkway over the millrace that is in poor condition. This walkway is the access to the left abutment.

Evidence of Roller

The dam has a sloped face. A standard hydraulic jump exists at the downstream toe of the dam of between 5 and 10 ft. White water extends for about 20 to 30 ft.

Portages

There are unsigned portages upstream at the left and right abutments. The downstream right bank has a portage near the dam face. There is no apparent portage downstream of the left abutment, due to very steep slopes and heavy brush.

Warning/Information Signage

No warning signage was observed.

Construction Access

The best construction access to this dam is from the parking lot on the right bank, from which the downstream and upstream faces can be reached. The bikeway near Cottage Street at Carpenter Street also provides good access to the east raceway and head gate.

4.8.3.2 Options Assessment

4.8.3.2.1 Temporary Rock Fill

A rock fill concept has been developed for the Carpentersville Dam with a slope of 6.5% beginning at an elevation of 719.24 ft, approximately 1.46 ft below the dam crest. The rock fill will experience sub-critical flow and the hydraulic jump at the dam crest will not be submerged during the 1-year, 5- year and 10-year flow events. FIS data was available for the dam; however, the extrapolated 1-year stage was below the bed invert elevation. The 1-year stage was estimated using the extrapolated 1-year discharge and the bed elevation. Impacts to the right bank should be assessed prior to construction, where increases to local flooding could occur for small storm events.

4.8.3.2.2 Dam Removal

Removal Feasibility

The right raceway could, with minor improvements, be used to divert water from the spillway. It could be temporarily reconnected to the river just below the dam. The left raceway appears to have significant flow capacity and could be the prime water control system. Removing the flashboards and bulkheads gradually would provide a controlled drawdown to minimize the extent of needed cofferdams and sediment control costs during construction. Favorable access to both ends of the dam and easy drawdown conditions would enable a relatively easy removal.

Special Issues

The upstream pool is several times wider than the spillway, so there may be some exposed bed area after removal.

Upstream sediment could be significant due to the pool's broad width and low velocity.

The pool's perimeter supports wetlands that could be impacted.

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IL Dam Removal Project
Carpentersville Dam - Fox River

LOCATION:
Carpentersville, IL

MMI#: 3131-01
MXD: Carpentersville.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET:
Figure 4.8.3.2.2

4.8.3.2.3 Full Bypass Channel

A full bypass channel concept was developed for this reach. (See Figure 4.8.3.2.3.) A full bypass channel could be constructed utilizing the existing millrace on the left side of the dam. Construction of this bypass would require demolition of the existing millrace gates and large scale regrading of the area as well as the loss of approximately an acre of existing forest. Construction access would be difficult and would likely require a construction path through the existing forested area. The bypass would be 100 ft wide, with a 1.5% slope and 5 riffles.

4.8.3.2.4 Riffle Pool

A riffle pool concept was developed for this reach. (See Figure 4.8.3.2.4.) A riffle pool spanning the width of the dam with a 1% slope could be installed downstream of the dam, beginning at the dam face. A total of 9 riffles would be required. The installation and design would be complicated by the downstream island which would necessitate a split in the riffle pool. An especially narrow and inaccessible area that is present on the left side of the island would present significant challenges. Further hydraulic studies are needed to analyze the effect of a riffle pool on downstream flooding and upstream water surface elevations.

4.8.3.2.5 In-Stream Bypass Channel

An in-stream bypass channel was not considered due to viability of a full bypass channel.

4.8.3.2.6 Dam Face Modification

Dam face modification was not considered viable due to the range of potential alternatives.

4.8.3.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, full bypass channel, and riffle pool options are $1,640,000, $5,250,000, and $6,620,000, respectively. The opinion of cost of dam removal is $940,000.

0 50 100 Feet

FULL BYPASS

Carpentersville Dam - Fox River

Carpentersville, Illinois

CTE | AECOM

Figure 4.8.3.2.3

Carpentersville

0 70 140 Feet

RIFFLE POOL
ROCK RAMP

Carpentersville Dam - Fox River

Carpentersville, Illinois

CTE | AECOM

Figure 4.8.3.2.4

Carpentersville

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.4 Elgin Kimball Street Dam

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4.8.4 Elgin Kimball Street Dam

The following section includes a description of the existing conditions of and proposed structural options for Elgin Kimball Street Dam

4.8.4.1 Existing Conditions Overview

Elgin Kimball Street Dam was visited on February 1, 2007, and April 11, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

This dam is located 150 ft downstream (south) of Kimball Street and is owned by the City of Elgin. It consists of a right training wall, spillway, left training wall, and two scenic overlooks at the left abutment. The dam appears to be in good overall condition.

The concrete spillway has a height of 13 ft and a length of 330 ft. It was constructed in 1904 for industrial headrace water supply. The spillway alignment is slightly curved, with the convex side facing downstream. It has a broad crest and steeply sloping 45 degree downstream face, leading to a flat concrete apron. The difference in water surface elevation is approximately eight ft.

The right abutment has a low concrete training wall along a steep 15-ft high earth slope with partial coverage by large riprap. Active multi-track railroad lines extend along the upper right bank, preventing all access from that side.

The left abutment has a concrete training wall and two cantilevered concrete scenic overlooks with black ornamental metal railings and limestone walls, dated 2002. It is the formal Plote Family gateway to the new Elgin Riverfront Walkway. A hardscape river trail extends downstream along the left bank towards a park, mid-channel island, and a large floating casino riverboat. A parking lot off of Kimball Street provides vehicle access to the top of bank, but high walls prevent access to the river. A plaque and sculpture state that two firemen drowned at this dam in 1974 during a rescue mission.

The Kimball Street Bridge just upstream of the dam has eleven simply supported spans of concrete beams. The two end spans are over the sloping river banks. Ten concrete piers are in the river. There is only approximately three ft of under-clearance beneath the beams, some of which is used for a large utility pipe. The bridge and pipe block access to the dam from upstream, eliminating the option of a barge or filled access road. Unlike many Fox River dams, the river reach has high solid banks on both sides and lacks an active floodplain.

Restoration of the Fox River Corridor has been a long term process with many participants, including Forest Preserves, the non-profit group Friends of the Fox River, and the Isaac Walton League of Elgin and Kane County. In Elgin, a Comprehensive Plan was prepared that addressed "Reclaiming the Fox River," addressing land use,

stream and wetland protection, soil erosion, sediment control, stormwater management, shoreland reclamation, and parks and recreation.

Channel Type/Flow Regime

The steep sloping dam face and high unit discharge rate (due to the relatively short spillway) leads to high face velocities. The horizontal concrete apron and deep tailwater lead to a severe high velocity hydraulic jump with approximately a three-ft wave front and great violent reverse rollers. This is a very dangerous site for boaters, compounded by concrete retaining walls that virtually prevent a lateral exit from the rolling water.

Low velocity flow rates between the dam and island attest to deep water depths that contribute to the hydraulic jump. The slightly curved spillway also tends to push water towards the banks, not the river's center. Raising the concrete apron or decreasing tailwater levels could provide relief from the hazardous conditions.

Surrounding Land Uses

The long upstream pool has a combination of high banks and residential areas. Part of the shoreline is owned by Forest Preserves and the large Max McGraw Wildlife Foundation. An island is located 300 ft downstream of the dam with ftbridges connecting to the linear park and trail system.

General Dam & River Bank Condition

Dam appears to be in good condition. There were no visible obvious deficiencies noted. The horizontal and vertical alignment of the dam crest and both abutments was good. Left overbank is in good condition. Downstream of the dam, left overbank has new retaining walls and a pedestrian path. Upstream the dam left overbank, consists of concrete/rubble material. The right overbank both upstream and downstream of dam consist of steep embankment with railroad tracks on top

Evidence of Roller

A significant roller present. Super-critical flow extends approximately 10 ft beyond toe of the dam face then the hydraulic jump extends 3 to 5 ft with an additional 5 ft of whitewater.

Portages

There is a boat ramp located downstream of dam on left bank.

Warning/Information Signage

Warning sign (“Danger Dam Ahead”) is located on upstream face of Kimball Street Bridge. Five (5) seasonal warning buoys are present upstream of the dam between May and September.

Construction Access

The right bank cannot be used for access due to the railroad tracks and steep bank. The left (east) side has a formal new park, trails, and overlooks with high banks. Access could be achieved from downstream on the left bank, from a canoe ramp, building a full access road from the island, but it would be an awkward position for notching and demolition. It may be necessary to use a crane to lift a barge and equipment over the Kimball Street Bridge to access and notch the right end of the dam.

4.8.4.2 Options Assessment

4.8.4.2.1 Temporary Rock Fill

A rock fill concept has been developed for the Elgin Kimball Street Dam at a 7% slope that addresses the 1 – 5 year hydraulic jumps both at the toe and dam crest. Three potential problems should be addressed in more detail, including the left abutment river walk, right abutment fish ladder and the sloped dam face. The potential for flooding the river walk should be assessed through a detailed hydraulic analysis. The rock fill impacts to the fish ladder should also be discussed before implementing the option. For the purposes of this report, it is assumed that the rock fill will be placed against the face of the dam.

4.8.4.2.2 Dam Removal

Removal Feasibility

Removing this dam will be difficult due to deep water and limited access. There is a reported upstream sediment deposit and deposition prone channel downstream. The spillway is quite massive, so extensive demolition would be required.

Special Issues

a) This dam has a dangerous hydraulic jump.

b) Construction access is very poor; it would be expensive to demolish this dam.

c) The upstream pool is much wider than the river, and is a likely sediment deposition zone.

d) A casino riverboat is anchored in the river a short distance downstream from the dam.

e) The potential and impact of sediment releases needs to be evaluated. The potential for upstream scour following dam removal will need to be carefully assessed, as will management of the reported sediment deposition in the upstream pool.

f) The Kimball Street Bridge needs to be evaluated for potential scour. Dam removal would have an immediate upstream reaction with shallower flow, higher

velocities, and increased potential for pier scour. This would need to be carefully assessed during dam removal feasibility studies.

g) This structure is massive and will require an extensive amount of demolition. Removal is likely to be expensive.

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IL Dam Removal Project
Elgin-Kimball Street Dam - Fox River

LOCATION: Elgin, IL

MMI#: 3131-01
MXD: Elgin-Kimball.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.8.4.2.2

4.8.4.2.3 Full Bypass Channel

A full bypass channel was not considered for this reach due to the apparent lack of available public land for such a bypass.

4.8.4.2.4 Riffle Pool

A riffle pool was considered for this dam but was found to be infeasible due to the proximity of upstream and downstream bridges to the dam. At the maximum 2.5% slope, the riffle pool would be less than 100 ft from either bridge. Additionally placing the riffle pool upstream would require notching the full width of the dam, which would be considered equivalent to dam removal. Flooding concerns downstream of the dam for the adjacent island and river walks would also be of significant concern.

4.8.4.2.5 In-Stream Bypass Channel

An in-stream bypass channel concept was developed for this reach (See Figure 4.8.4.2.5). A 150-ft wide bypass, with a 2.5% slope could be most easily constructed on the left bank. This would involve notching approximately 150 ft of the dam. This bypass would prevent overtopping of the dam up to the 5-year FIS flow as well as allow for boat passage. Detailed survey would be required to further determine the feasibility of this solution as well as examine downstream flooding on the left bank.

4.8.4.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.8.4.2.6). A stepped face structure with 10 steps is proposed for this dam. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.8.4.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, in-stream bypass channel, and dam face modification options are $2,860,000, $1,430,000, and $4,360,000, respectively. The opinion of cost of dam removal is $3,290,000.

0 50 100 Feet

INSTREAM BYPASS

Elgin Kimball Street Dam - Fox River

Elgin, Illinois

CTE | AECOM

Figure 4.8.4.2.5

Elgin Kimball

0 50 100 Feet

DAM FACE MODIFICATION

Elgin Kimball Street Dam - Fox River

Elgin, Illinois

CTE | AECOM

Figure 4.8.4.2.6

Elgin Kimball

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.5 South Elgin Dam

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4.8.5 South Elgin Dam

The following section includes a description of the existing conditions of and proposed structural options for South Elgin Dam.

4.8.5.1 Existing Conditions Overview

South Elgin Dam was visited on January 11, 2007, April 11, 2007, and April 13, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The South Elgin Dam over the Fox River is owned by the State of Illinois, and is located at Panton Mill Park, 700 ft upstream of the State Street Bridge. The dam is composed of its left training wall and embankment, its long slightly curved spillway, right training wall, and right embankment.

The concrete spillway has a height of approximately eight ft and a length of 360 ft with a broad crest, beveled edge, and vertical downstream face. The water surface drop is approximately eight ft. The dam has minor erosion along most of the crest. The available upstream head above the spillway crest is very limited, with some risk of overbank flows at abutments. It has a concrete training wall at the left end and an earth embankment. Abutments have surface cracks and chips. Four large outlet conduits pass through the left abutment area.

The left downstream side of the dam has two and three story brown brick mill buildings that are set back approximately 75 ft from the low grass river bank. A portion of these historic structures exhibit some deterioration and exposed rebar. The area upstream of the dam has a three to six-ft high wooded bank with minor erosion and low use parking lots. The buildings, used by Vescor Corporation are now vacant. A paved bike trail extends along the left bank, providing access to the river from a park.

The right end of the dam also has a modern concrete training wall and eight-ft high grass-covered earth embankment. The structures all appear to be in good condition. The immediate right upstream bank is composed of deteriorating riprap and brush. Panton Mill Park extends along the right bank, near the Village Hall government center. The park is on a low flat floodplain with grass lawns, canopy trees, and benches. It provides easy access to the dam. Low concrete walls line the channel edge from the dam to State Street Bridge. A gated access road approaches the dam from Route 31 to the right embankment, which is 500 ft long with stone riprap facing the pond.

The downstream State Street Bridge has five spans with four piers in the water. The nearest upstream bridge is Illinois Route 20, which is two miles away. It is unlikely to be affected.

There are numerous residential properties along the pool that would be impacted by a drawdown. The upstream pool width is typically over 1,000 ft. A float plane was observed on the pool.

A worn ftpath extends over the dam behind the right training wall, apparently used by pedestrians and probably as a canoe portage. This depressed path should be filled and paved with erosion resistant material. The right end also has a USGS gauging station.

It is noted that the low concrete walls along the downstream channel bank in the park provides good water access, but encourages waders near the toe of the dam. The cast in place walls have a "step" on their river side. The walls have minor cracks and some displacement at one joint. The concrete training walls and spillway are generally in good condition, with minor cracks and spalling.

Channel Type/Flow Regime

The spillway has a vertical face with steep plunging flow. There is a relatively small reverse roller but limited standing waves. Upwelling flow occurs 25 ft downstream of the spillway. The downstream channel has smooth uniform flow at approximately two ft per second.

Surrounding Land Uses

Land uses surrounding this structure include moderate intensity mixed commercial and governmental land uses, as well as historic mill buildings. Open space and vacant industrial lands are present, most notably along the upstream pool. Panton Mill Park extends along the right bank of the dam both upstream and downstream of the structure.

General Dam & River Bank Condition

The dam has minor erosion along most of the crest. Log debris was noted along the dam crest at both abutments. Additional log debris was noted downstream of the roller left abutment. Abutments have surface cracks and spalling. The downstream portion of the left abutment is an historic structure possibly an old millrace intake to a building that no longer exists which has some deterioration and exposed rebar. The immediate left upstream bank is composed of deteriorating riprap and brush. The immediate right upstream bank has minor erosion along the engineered berm.

Evidence of Roller

Yes, a reverse roller extending 10-15 ft. Logs observed stuck in roller.

Portages

No signer portages were observed on either the right or left upstream banks. An upstream right bank portage could be made along the engineered berm that forms the immediate upstream right bank. The left bank also has several locations which might serve as portage points.

Warning/Information Signage

Standard IDNR-OWR warning signs are present on each abutment. The standard sign reads "Warning Hazardous Currents Present DO NOT Enter Spillway Area" posted in English and Spanish. These are visible from approximately 15 yards to downstream river users. Several signs provide information to anglers concerning fishing codes. Five (5) seasonal buoys are present upstream of the dam between May and September.

Construction Access

The dam is accessible to pedestrians from the right bank from a park and to vehicles by an access road with a locked gate. It is also accessible through private industrial property along the left bank. A low bridge over the bikeway prevents heavy equipment access along that route.

4.8.5.2 Options Assessment

4.8.5.2.1 Temporary Rock Fill

A rock fill concept has been developed for the South Elgin Dam at a 7% slope starting at an elevation of 696.48 ft NGVD, 3.52 ft below the crest of the dam. FIS profiles and flow rates were available, and the 1 – 5 year stages and flows were extrapolated. The dam appears to have a vertical or slight ogee spillway, which may require additional engineering to place the rock fill against. The dam is also not aligned horizontal, it does have a slight curvature. Placement of the rock fill must account for this curvature to insure that the slope of 7% is maintained. There are also areas along the right bank that may experience increased local flooding during small storm events. Additional abutments may need to be constructed to prevent inundation in these areas.

4.8.5.2.2 Dam Removal

Removal Feasibility

The four large raceway conduits through the left abutment area could provide substantial capacity to draw down water levels during periods of low flow. The conduits are bulkheaded and no inlet was found. Panton Mill Park on the right bank and vacant industrial land on the left bank both provide easy access to this dam. A drawdown allows use of either upstream or downstream construction access.

This dam does not have a significant low level outlet to draw down water levels, unless the raceway is operational. Having access to both ends of the dam, the ideal procedure for removing this dam is to notch one end, probably the left (east) end, to progressively drawn down the pool. An access road, serving as a cofferdam as well, could then be advanced from the opposite bank enabling demolition of the dam.

Special Issues

- The left abutment gates and conduits need to be inspected to confirm their operation and flow capacity.
- Construction access through the park would require moderate restoration.
- The USGS gauging station will need to be relocated.
- The river boat casino floating in the Fox River at Elgin appears to be in the upper end of the South Elgin dam impoundment.
- There are many private properties along the pool perimeter.
- The State Street is unlikely to be impacted by dam removal, given the run-of-river operating regime of the existing dam (i.e. post-construction flows and water surface elevations will remain unchanged).
- Upstream use of the impounded water appears to be significant and would likely be impacted by dam removal.

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IL Dam Removal Project
South Elgin Dam - Fox River

LOCATION: South Elgin, IL

MMI#: 3131-01
MXD: SoElgin.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.8.5.2.2

4.8.5.2.3 Full Bypass Channel

A full bypass channel concept was developed for this reach. (See Figure 4.8.5.2.3) A full bypass channel could be constructed through the park area on the right side of the dam. Construction of this bypass would require large scale regrading of the area as well loss of significant park space. Ft bridges would likely need to be constructed in order to access the right abutment. The bypass would be a 150 ft wide trapezoidal channel with a 2.5% slope and 3 riffles. This bypass would prevent overtopping of the dam up to the 5-year flow as well as allow for boat passage. Specific allowances for fish passage could be incorporated into a final design.

4.8.5.2.4 Riffle Pool

A riffle pool concept was developed for this reach (See Figure 4.8.5.2.4). The riffle pool would be the width of the dam (361 ft) with a 1% slope with 6 riffles beginning at the dam crest. Further hydraulic studies are needed to analyze the effect of a riffle pool on downstream flooding and upstream water surface elevations.

4.8.5.2.5 In-Stream Bypass Channel

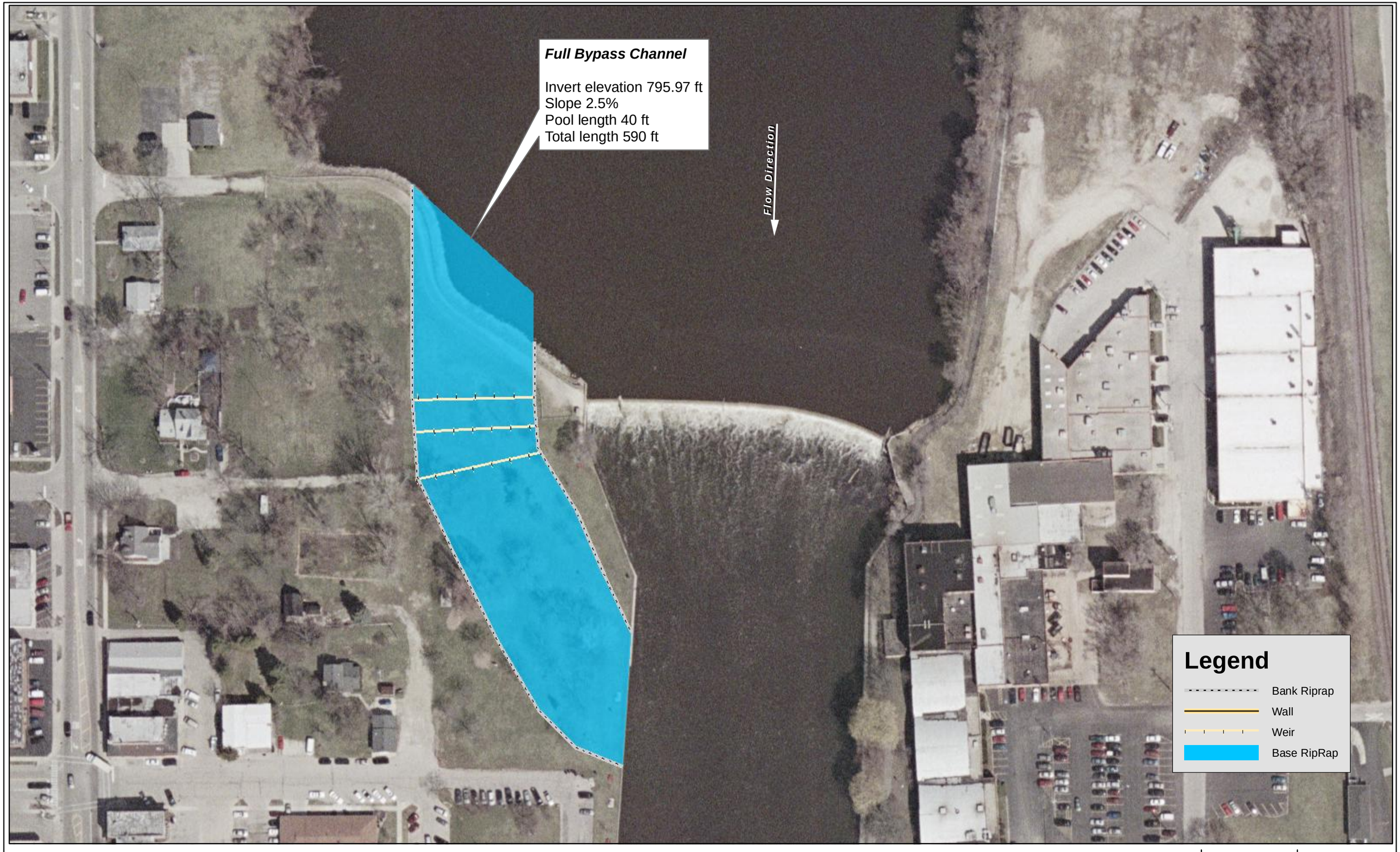
An in-stream bypass channel concept was developed for this dam (See Figure 4.8.5.2.5). A bypass could be constructed on the left bank along the dam abutment, beginning at the dam face. The bypass would by 150 ft wide with a 2.5% slope and 3 riffles. This bypass would prevent overtopping of the dam up to the 5-year flow as well as allow for boat passage. Specific allowances for fish passage could be incorporated into a final design.

4.8.5.2.6 Dam Face Modification

Dam face modification was not considered viable due to the range of potential alternatives.

4.8.5.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, full bypass channel, riffle pool, and in-stream bypass channel are $660,000, $7,790,000, $3,940,000, and $480,000, respectively. The opinion of cost of dam removal is $720,000.



0 50 100 Feet

FULL BYPASS

South Elgin Dam - Fox River

Elgin, Illinois

CTE | AECOM

Figure 4.8.5.2.3

South Elgin

0 50 100 Feet

RIFFLE POOL
ROCK RAMP

South Elgin Dam - Fox River

Elgin, Illinois

CTE | AECOM

Figure 4.8.5.2.4

South Elgin

0 50 100 Feet

INSTREAM BYPASS

South Elgin Dam - Fox River

Elgin, Illinois

CTE | AECOM

Figure 4.8.5.2.5

South Elgin

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.6 St. Charles Dam

CTE | AECOM

4.8.6 St. Charles Dam

The following section includes a description of the existing conditions of and proposed structural options for St. Charles Dam.

4.8.6.1 Existing Conditions Overview

St. Charles Dam was visited on January 11, 2007, and April 10, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The St. Charles Dam across the Fox River is owned by the State of Illinois and located 120 ft upstream of Illinois Route 64 in the center of town. The dam is limited to its two abutment training walls and a spillway. The six-ft high, 300-ft long dam has a broad concrete crest and steep face at an angle of approximately 60 degrees.

The right abutment is a concrete wall integral with the Hotel Baker and Waterfront Restaurant, which extends to the bridge. The Hotel Baker was built in 1928 and rehabilitated in 1997. It was listed in the National Register of Historic Places in 1978 by the National Trust for Historic Preservation. Some concrete cracks and spalls were visible, but high flow rates prevented detailed observations. The upstream right bank has six-ft high stone masonry walls and a large six-story tan brick building, Carroll Towers Apartments.

The St. Charles Municipal Center with its bell tower is located on the left bank. The left abutment has steep masonry training walls and a fish ladder that was flooded and full of debris at the time of inspection. Also located near the fish ladder is an approximately five-ft by five-ft area of damage to the flagstone abutment wall. The walls are in good condition and include a staircase to the water, however it points upstream such that it would be hard to launch canoes here. The downstream side has a 10-ft high wall overlooking the dam, while upstream the "Freedom Walk" is at water level without a wall or fence, behind a fire station.

The pool upstream of the dam is long and wide. Numerous docks, boats, and commercial river ride vessels are present. Its low velocity waters are a probable sediment deposition zone.

The new Main Street Bridge (Route 64) was built in 1997. It has four spans with a cosmetic arch facade and three piers in the river. High velocity flow was observed at the abutments, waterway, and piers. The decorate bridge includes metal rails, a sculpture of a fox, and four gazebos with benches overlooking the river.

A six-span railroad bridge is located approximately 1,200 ft upstream of the dam, with five massive gray concrete piers in the water.

Channel Type/Flow Regime

The near vertical smooth spillway face results in a plunging flow with a reverse roller extending approximately 15 ft out, followed by upwelling water. Four cells of violent, strong reverse eddies are present.

Surrounding Land Uses

Surrounding land uses are intense and include the Freedom Walk on the left bank, apartment buildings, commercial uses, and parking lots. Numerous concrete masonry walls line the channel. The Route 64 bridge is located just downstream of the dam.

General Dam & River Bank Condition

The dam appeared to have a deficiency which extends more than half way along the face of the dam. The dam may have had a portion of its face shear off. However, flows do not appear affected and no other deficiencies were visible. The right abutment is a building (Hotel Baker) with some spalling, surface cracks and patching in place. The left abutment is adjacent to a fish ladder which has some structural damage and is partially failed. Also near the fish ladder, there is an approximately 5 ft. by 5 ft. area of damage to the flagstone abutment wall.

Evidence of Roller

Yes, a reverse roller appears to occur extending approximately 10 ft to 15 ft downstream of dam face.

Portages

Upstream portages are present on each side of the river. River users are directed by a sign on the immediate upstream pedestrian bridge to use the left portage. This portage appears to be a long area of bank with a 2 to 3 ft vertical wall where one can somewhat haphazardly exit a canoe. It appears that the downstream, left bank portage is at the stairway just downstream of the dam face. One paddler's website suggested that this portage could be dangerous since it can place you into the roller.

The right upstream portage is at water level and a better design. However, there does not appear to be a portage on the right bank, downstream of the dam. There are no signs at any of the portages.

Warning/Information Signage

A few small warning signs: (Danger: Dam ahead portage left) on the upstream pedestrian bridge indicate the upcoming dam and the presence of a canoe portage on the river left. No warning signs were observed at the abutments.

Five (5) seasonal buoys are present upstream of the dam between May and September.

Construction Access

The right abutment is accessible by ft only from an outdoor dining area. The left abutment is accessible by pedestrians from an adjacent sidewalk. The dam face is accessible from the put-on area just downstream of the dam. Heavy construction equipment for demolition can access the river across the Freedom Walk, but only by utilizing a busy parking lot and installing an access road in the pool.

4.8.6.2 Options Assessment

4.8.6.2.1 Temporary Rock Fill

A rock fill concept has been developed for the St. Charles Dam with a slope of 6.5% beginning at an elevation of 683.09 ft, approximately 1.51 ft below the dam crest. The rock fill will experience sub-critical flow and the hydraulic jump at the dam crest will not be submerged during the 1-year and 5-year flow events. All FIS data was available for the dam; however, the extrapolated 1-year stage was below the bed invert elevation. The 1-year stage was estimated using the extrapolated 1-year discharge and the bed elevation at survey point 3. The fish ladder and river walk pose potential problems when placing rock fill. The river walk area will likely experience increased flooding during small storm events, while the fish ladder may not function as intended. Impacts to the downstream bridge must also be considered prior to implementation of the rock fill.

4.8.6.2.2 Dam Removal

Removal Feasibility

As with several of the other urban dams, the challenge here is access and lack of a low flow outlet for drawdown, as well as the upstream pool usage. The dam would have to be notched, perhaps from a barge, to initiate a drawdown. An access road and cofferdam could extend across the pool from a developed shore area.

Special Issues

The St. Charles Dam is a focus point of the downtown area. The historic Hotel Baker forms the right abutment.

The left abutment and banks are the St. Charles Municipal Complex with government offices, fire station and police station.

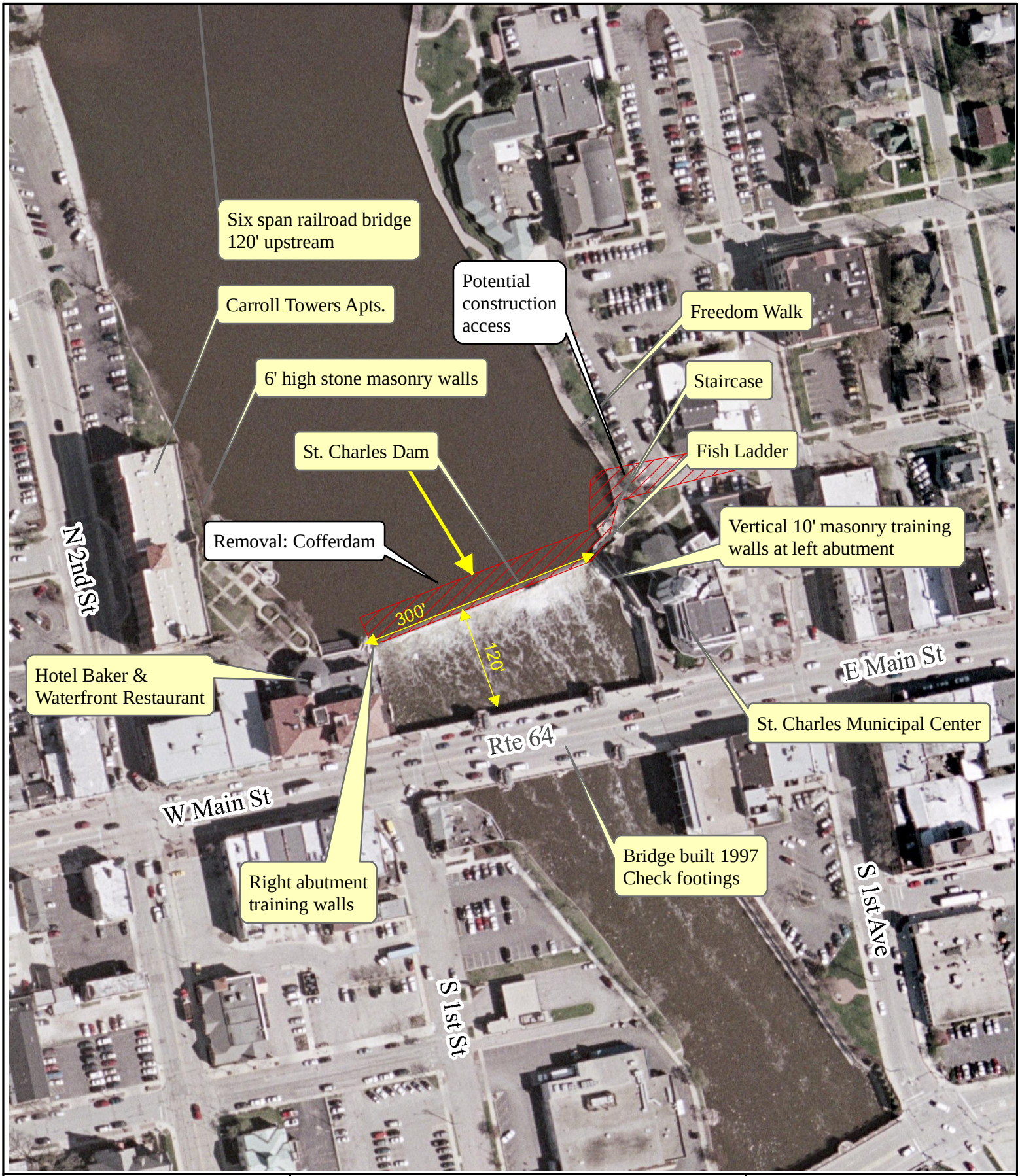
The large pool is actively used for recreation, with numerous docks and commercial paddle boat rides.

Access is limited by high vertical walls. The only option is the upstream left bank through the public parking lot.

The upstream railroad bridge and local retaining walls need to be protected from scour.

The downstream channel and Main Street Bridge have high flow velocities.

The large pond may contain sediments.



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IL Dam Removal Project
St. Charles Dam - Fox River

LOCATION: St. Charles, IL

MMI#: 3131-01
MXD: StCharles.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":150'

SHEET: Figure 4.8.6.2.2

4.8.6.2.3 Full Bypass Channel

A full bypass channel option was not considered for this dam due to an apparent lack of available public land for such a bypass. Additionally, a bypass would negatively impact the upstream pool and the recreation uses present there.

4.8.6.2.4 Riffle Pool

A riffle pool option was considered for this dam but was found to be infeasible due to the proximity of the downstream bridge to the dam. Placing the riffle pool upstream would require notching the full width of the dam essentially to the base, which would be considered equivalent to dam removal.

4.8.6.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was not considered for this reach since it would negatively impact the upstream pool and the major recreational uses present there.

4.8.6.2.6 Dam Face Modification

A dam face modification concept developed for this reach (See Figure 4.8.4.2.6). A stepped face structure with 7 steps is proposed for this dam. Construction would be quite difficult, especially considering the hotel / restaurant on the right abutment. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.8.6.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill and dam face modification are $1,820,000 and $3,100,000, respectively. The opinion of cost of dam removal is $2,250,000.

0 100 200 Feet

DAM FACE MODIFICATION

St. Charles Dam - Fox River

St. Charles, Illinois

CTE | AECOM

Figure 4.8.6.2.6

St. Charles

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.7 Geneva Dam

CTE | AECOM

4.8.7 Geneva Dam

The following section includes a description of the existing conditions of and proposed structural options for Geneva Dam

4.8.7.1 Existing Conditions Overview

Geneva Dam was visited on January 10, 2007, April 9, 2007, and April 13, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Geneva Dam on the Fox River is owned by the State of Illinois, and is located 300 ft upstream of Illinois Route 38 near the center of town. The dam consists of its two abutments and 13-ft high spillway, without embankments. The spillway has a length of 460 ft with a near rectangular six-ft wide cross-section, its broad crest slopes in the downstream direction.

The Route 38 Bridge has five concrete beam spans with shallow arch facades and four piers. The abutments are flush with concrete retaining walls. The dam's right abutment is a high concrete training wall in good condition. The right downstream bank is quite steep, with some erosion noted at the right downstream portion of the abutment.

The left abutment has vertical concrete training walls at the end of the spillway as well as bike trails, a scenic overlook, and paved canoe portage around the dam at Old Mill Park. The left downstream trail passes through a park and under Route 38, connecting to an island. Its bank has large boulder riprap and pre-cast concrete modular units. The left bank is in very good condition with minimal erosion.

The right bank has an 18-inch RCP stormwater outlet 100 ft downstream of the dam. The right bank area is marked as the State Street historic district. Downstream channel has high velocity, two to three ft per second.

The dam is posted "Danger, Swift Water, Keep Away from Dam," and yet public parks provide easy access. A concrete stairway leads from the rear of North River Lane retail area right to the water.

Channel Type/Flow Regime

The upstream channel is a wide long pool with low velocity. At the spillway, water plunges near vertical into tailwater, creating plunging flow and a reverse roller and a significant upwelling 20 to 40 ft out with a one-ft high mound. Several buoys, basketballs and barrels were trapped in the roller. Easy public access along the east bank and a nearby kayak shop encourage public access to the dam. High channel velocities extend downstream from the dam.

Surrounding Land Uses

Mixed land uses surround the Geneva Dam, including an overlook area with a narrow open space area and trail at Garden Club Park. Nearer to Route 38, is the three-story River Reception and Conference Center. Upstream of the dam is a large multi-building residential complex with landscaping to the pool. The wide, long upstream pool has many waterfront homes with landscaped properties, some with revetments and docks. Active recreational use of impoundments raises public interest. Old Mill Park, along the east bank, has a sculpture of original gears, driveshafts, and pullies that were used by the Bennett Mill to produce flour at this site.

General Dam & River Bank Condition

The dam has no obvious visual deficiencies. Some erosion is present at the right downstream portion of the abutment. The right bank exhibits erosion upstream and downstream of the dam. The right downstream bank is quite steep. The left bank, both upstream and downstream, is composed of riprap and is in very good condition with minimal erosion.

Evidence of Roller

A reverse roller extends approximately 25 ft downstream of dam. Debris observed stuck in roller. Backflows were readily observed.

Portages

Unmarked portages are present on the left bank both upstream and downstream of the dam. The upstream portage is a ramp with a rail and carpeting. The downstream portage is sufficiently downstream of the roller, just upstream of the immediate downstream bridge. The right abutment also has stairs just downstream that might serve as a boat/canoe launch. However, this boat launch is close to the face of the dam and may present a hazard to someone attempting to use the launch or attempting to wade into the channel to fish. There are no signs at any of the portages.

Warning/Information Signage

The dam has standard OWR warning signs (“Warning Hazardous Currents Present DO NOT Enter Spillway Area” posted in English and Spanish) and green and white signs, see photo 3.4.7.2-4 created by the City of Geneva warning of the dam to both pedestrians and river users. The standard OWR warning signs are visible to downstream users only and are readable from 15 yards. There were no warning signs for upstream river users. Five (5) seasonal warning buoys are present upstream of the dam between May and September.

Construction Access

The left abutment provides vehicular access from a small paved public parking lot, park, and an alley. The right is accessible from Garden Club Park, where one could go around the upstream wing wall. Restoration would be required.

4.8.7.2 Options Assessment

4.8.7.2.1 Temporary Rock Fill

A rock fill concept has been developed for Geneva Dam at a 7% slope beginning at an elevation of 671.74 ft NGVD, 3.66 ft below the crest of the dam. All FIS profiles and flow rates were available, and the 1 – 5 year stages and flows were extrapolated. The slope should produce sub-critical flow and the hydraulic jump at the dam crest should not be submerged.

4.8.7.2.2 Dam Removal

Removal Feasibility

This dam is located in an urban area with parks at both ends. It is accessible. There are no known low level outlets or raceways, so removal may require the dam to be notched to create a drawdown for removal. The large pool and low upstream velocities suggests there could be fine grain sediments in the pool. Post dam removal aesthetics would need to be addressed.

Special Issues

- There are heavily used public parks on the east bank, and upscale private properties on the west bank.
- The impoundment has many riverfront houses, some with docks.
- Signs indicate a State Street historic district.
- A pool this large could have significant fine grain sediment that could be released.
- The length of this spillway and the associated volume of concrete that would need to be demolished are high.

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IL Dam Removal Project
Geneva Dam - Fox River

LOCATION: Geneva, IL

MMI#: 3131-01
MXD: Geneva.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.8.7.2.2

4.8.7.2.3 Full Bypass Channel

A full bypass channel option was not considered due to an apparent lack of sufficient public land on either bank.

4.8.7.2.4 Riffle Pool

A riffle pool option was considered for this dam but was found to be infeasible due to the proximity of the downstream bridge to the dam. Placing the riffle pool upstream would require notching the full width of the dam essentially to the base, which would be considered equivalent to dam removal.

4.8.7.2.5 In-Stream Bypass Channel

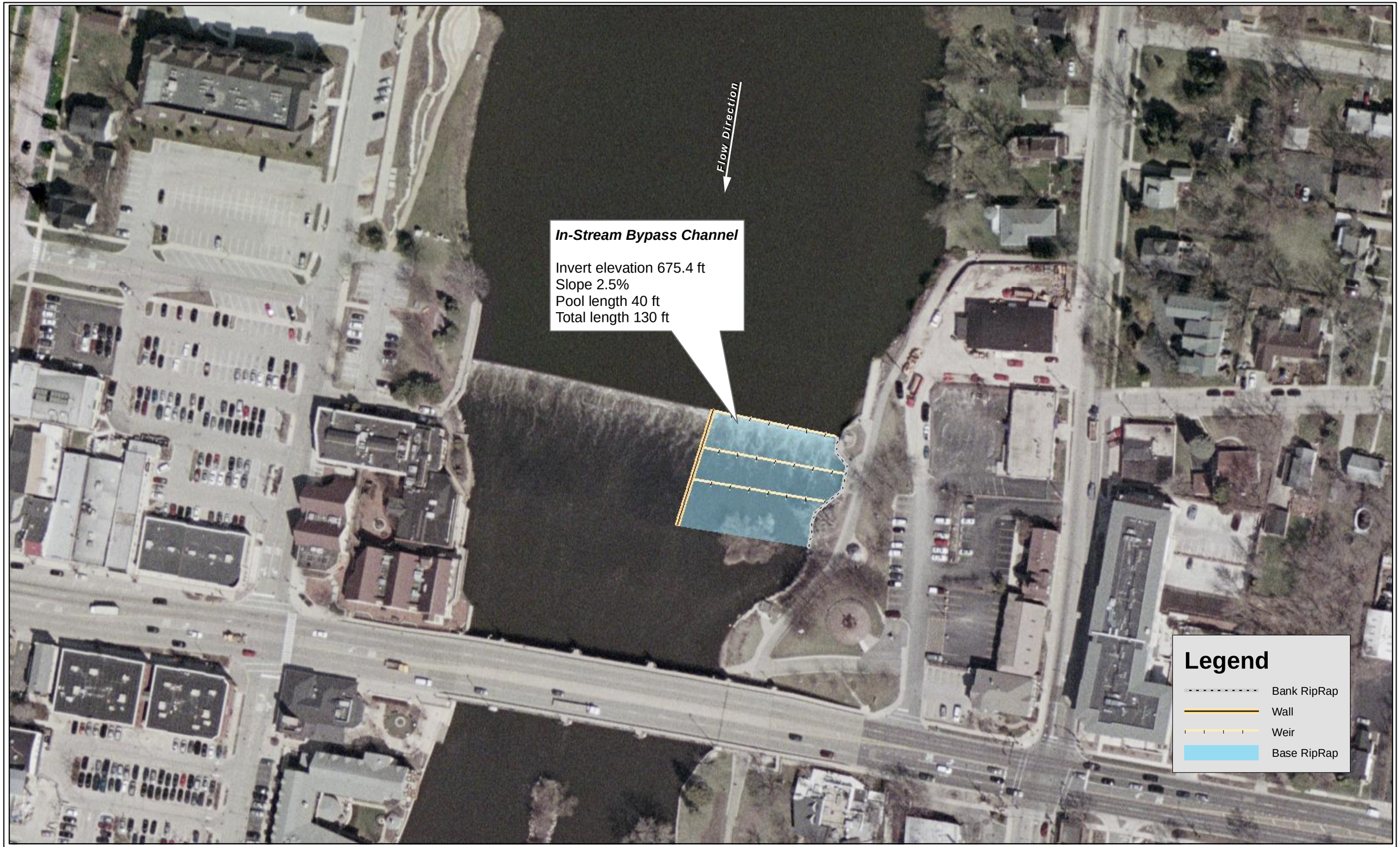
An in-stream bypass channel concept was developed for this dam (See Figure 4.8.7.2.5). A bypass could be constructed on the left bank along the dam abutment, beginning at the dam face. The bypass would by 150 ft wide with a 2.5% slope and 3 riffles. This bypass would prevent overtopping of the dam up to the 5-year flow as well as allow for boat passage. Specific allowances for fish passage could be incorporated into a final design.

4.8.7.2.6 Dam Face Modification

A dam face modification concept developed for this reach (See Figure 4.8.7.2.6). A stepped face structure with 4 steps is proposed for this dam. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.8.7.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, in-stream bypass channel, and dam face modification are $860,000, $780,000, and $1,410,000, respectively. The opinion of cost of dam removal is $2,380,000.



0 55 110 Feet

INSTREAM BYPASS

Geneva Dam - Fox River

Geneva, Illinois

CTE | AECOM

Figure 4.8.7.2.5

Geneva

0 50 100 Feet

DAM FACE MODIFICATION

Geneva Dam - Fox River

Geneva, Illinois

CTE | AECOM

Figure 4.8.7.2.6

Geneva

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.8 Batavia Dam

CTE | AECOM

4.8.8 Batavia Dam

The following section includes a description of the existing conditions of and proposed structural options for Batavia Dam

4.8.8.1 Existing Conditions Overview

Batavia Dam was visited on January 10, 2007, April 10, 2007, and April 13, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Batavia Dam is owned by the City of Batavia, and is located approximately ¼ mile upstream of the Wilson Street Bridge. The dam is the site of the former Challenge Industrial Complex that manufactured windmills and a wagon works. Signs along the Batavia Riverwalk Park highlight historic sites. Depot Pond was part of a headrace system that formed an island. It is now surrounded by multi-family residential buildings.

The original Challenge Dam was a timber crib structure built about 1835. The present nine-ft high 230-ft long concrete dam was built around 1910 for water power. The spillway has a concrete ogee shape weir with a slope face and horizontal apron. The spillway is breached for approximately 50 ft at the left steep abutment and has significant cracking and chipping throughout. It has a head loss of approximately six ft and appears to be built on bedrock.

The east end of the spillway abuts one of the three story brick Challenger Wind and Feed Mill buildings. The left end of the spillway has an approximately 50 ft wide breach with rapid white water flow and standing waves. It may have been a headrace site. The left bank tailrace existing from the mill building is in poor condition, with cracks, displacement, and spalling.

The channel from the dam to Wilson Street is 200 ft wide with shallow flow over bedrock. The left bank downstream of the dam is the site of the former Challenge Windmill and Feed Company, founded in 1867, closed in 1946. The two and three-story brown brick buildings are directly on the riprapped riverbank and some extend to the edge of water. The old factories are deteriorating and in need of immediate attention.

The spillway's right end merges into exposed bedrock, with layers of exposed thin foliated limestone. This 75-ft wide rock overflow zone appears to be an intentional use of the rock. Shallow rapid flow and easy access make it an attractive play area, without fences or warning signs. The right abutment has a low concrete wall serving as an abutment, supporting the River Trail, benches, and an overlook adjacent to the Riverain Point apartments.

The left upstream bank has a short section of wall and brick mills buildings near the end of the dam, followed by a parking lot above a 10 ft high rock and concrete bank. The

right bank is fully developed with Riverain Point apartment units, but is low and easily crossed with vehicles.

The upstream pool is approximately 1,500 ft wide with a long central island. The pool's size suggest is could have trapped sediment.

Channel Type/Flow Regime

The ogee shaped spillway has a sloping face and short horizontal concrete apron. The smooth spillway flow results in a medium strength undulating hydraulic jump with a 1.5 ft standing wave. Waters move downstream without a noticeable reversal. Just adjacent to the left abutment there is turbulent white water, which extends for 75 ft downstream. The right bank rock exposure and spillway alignment create an unusual lateral flow pattern that could sweep people away from shore. Mid-channel is low velocity, with high velocity cells on the east bank and from the right bank's rock formation. This is a dangerous site for waders due to easy access and complex flow patterns.

Surrounding Land Uses

Land use surrounding the Batavia Dam consists of multi-family residential, with commercial and industrial mill buildings. The River Trail is located adjacent to the river and is a local recreational amenity.

General Dam & River Bank Condition

The dam is breached (partially failed) for approximately 35 ft at the left abutment. The dam has significant cracking and chipping along and throughout the remaining dam crest. The left abutment is an old factory which is deteriorating and in need of immediate attention. The right abutment has the remains of a training wall which may have been removed or possibly just failed; some flow goes outside of the channel at this point and over a small waterfall and re-enters the channel. A historic stone wall, in deteriorating condition, serves as a secondary right abutment upstream and there is a new concrete wall downstream of the dam face.

Evidence of Roller

Yes, the roller extends 10 to 15 ft downstream in addition the right abutment has a roller extending approximately an additional 15 ft downstream of the dam face. Just adjacent to the left abutment there are heavy rapids, with a very strong current and an apparent roller which extends approximately 30 ft downstream of the breached dam face. All appear to be reverse rollers.

Portages

The right bank has a marked upstream portage just upstream of the dam face. However the portage appears to be only a sign and lacks any visible design or a rail. It is quite close to the dam face. The downstream portage is a ramp leading to a mildly sloped sandy area. There is no sign. Additionally, there is a set of stairs at the Depot Pond further downstream which might be used as a portage.

The left upstream bank does not appear to have any feasible portage points for at least a quarter mile. There appears to be a boat launch from a road that dead ends at the river.

Warning/Information Signage

IDNR 2006 field operations crews indicate that they place buoys upstream of the dam. The number of buoys was not specified.

Construction Access

The right bank offers vehicular access to both up and downstream areas, but requires encroaching on landscaped private property and across the Batavia River trail. Restoration would be necessary if this were used for construction access. There is also vehicular access to the right abutment by means of an access road behind the residential apartments. Access is also available from the upstream left bank, but a ramp would be necessary for equipment to reach the pool bed.

4.8.8.2 Options Assessment

An extensive study of alternatives for the Batavia Dam has been previously prepared (McLaughlin Water Engineers, Ltd., 2000). This study analyzed several potential alternatives for the Batavia Dam, including dam removal.

4.8.8.2.1 Temporary Rock Fill

A rock fill may not be feasible at Batavia given the restrictions on increasing the downstream water surface (McLaughlin Water Engineers, Ltd., 2000). However, a rock fill design has been provided to assess potential costs. A rock fill was designed with a top of fill elevation of 661.06 ft NGVD and a slope of 6.5%. A riprap D_{30} size of 1.5 ft would be need based on a 50 year design storm event.

Special Considerations

Right and left abutments would need modification to insure the stability and safety of the rock fill.

Detailed plans were not available for the dam face; however, the face appears to be an ogee spillway. Special consideration should be made in the final design of the rock fill to appropriately transition from the face to the rock. It has been assumed here that the top of fill would abut the face approximately 4.04 ft below the crest.

Sub-critical flow will occur during the 10 year event as well as the 1 – 5 year, eliminating a hydraulic jump at the toe and a reverse roller at the dam crest.

4.8.8.2.2 Dam Removal

Removal Feasibility

The dam is already partially breached, and there is good access along the right bank trail and through shallow water. If the dam were removed, there would likely be moderate bed exposure wherein a significant amount of mud flat would be exposed behind the wide pool and Depot Pond. The left end of the spillway is breached and should be repaired, modified, or removed.

Special Issues

- The dam site has been landscaped as an integral part of the Batavia River trail system.
- Many riverfront apartments/condominiums overlook the dam and pool.
- The lateral headrace pond, called the Depot Pond, as part of the port system.
- A timber boardwalk with a large gazebo, dated 1994, overlooks the duck pond area impounded by the dam.
- The Batavia Riverwalk is supplemented by nature plants by the Batavia Plain Dirt Gardeners and the Wildflower Sanctuary won a USEPA award.
- The left breach has a short headcut extending upstream.
- The face of the dam is generally in good condition, but several large spalls are visible even from a distance.

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IL Dam Removal Project
Batavia North Dam - Fox River

LOCATION:
Batavia, IL

MMI#: 3131-01
MXD: NoBatavia.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":300'

SHEET:
Figure 4.8.8.2.2

4.8.8.2.3 Full Bypass Channel

A full bypass channel option was not considered for this dam due to significant development on both banks and an apparent lack of available public land for such a bypass. A possibility for a canoe chute exists across the peninsula between Depot Pond and the Fox River through an existing creek (McLaughlin Water Engineers, Ltd., 2000). This canoe chute would only convey low level flows and would not significantly reduce the roller hazard.

4.8.8.2.4 Riffle Pool

A riffle pool option was considered for this dam but was found to be infeasible due limitation of increasing stages in the downstream reach (McLaughlin Water Engineers, Ltd., 2000). Placing the riffle pool upstream would require notching the full width of the dam essentially to the base, which would be considered equivalent to dam removal. An option including dam removal and the placement of rock riffles is included in a previous study conducted by McLaughlin Water Engineers, Ltd., 2000; however, evaluation of this option was beyond the scope of this study.

4.8.8.2.5 In-Stream Bypass Channel

An in-stream bypass option was considered for this dam but was found to be infeasible since the dam is in a very poor condition and would require complete replacement prior to such a notch.

4.8.8.2.6 Dam Face Modification

Dam face modification was considered for this dam but was found to be infeasible since the dam is in a very poor condition and would require complete replacement prior the addition of a stepped face.

4.8.8.2.7 Summary of Cost

The opinion of cost for the temporary rock fill option is $3,210,000 and the opinion of cost of dam removal is $2,030,000.

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.9 North Aurora Dam

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4.8.9 North Aurora Dam

The following section includes a description of the existing conditions of and proposed structural options for North Aurora Dam.

4.8.9.1 Existing Conditions Overview

North Aurora Dam was visited on January 9, 2007, and March 22, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The North Aurora Dam is owned by the State of Illinois. This run-of-river dam is located approximately 260 ft upstream (north) of the Route 56 Bridge over the Fox River. The bridge is a five span concrete arch structure with four concrete piers and one abutment in the water.

The dam has a six-ft high, 390-ft long concrete ogee crest spillway with a straight alignment. The face of the spillway appears to have several submerged steps. Both ends have concrete training walls and earth embankments. Total concrete wall length is approximately 50 ft on each side. The upstream training walls are one ft thick and extend seven ft above water. The water drop is approximately six ft. A plaque states the dam was built in 1975.

The right abutment has a canoe take-out on the upstream side and stairs to the water on the downstream side. The left side of the dam is a three-ft high 200-ft long earth embankment leading to the concrete training walls. The dam is in overall good condition, however slight spalling was observed on the first two steps and minor chipping was observed on the right abutment. Moderate bank erosion is occurring of the left downstream side of the dam.

A raceway is located approximately 200 ft east of the spillway alongside the police station (former mill site). It has one open active sluice gate, approximately three ft square, and two dry bays that are partially filled. The 25-ft wide tailrace leads under a Route 56 bridge and back to the Fox River. The headrace inlet is approximately 200 ft upstream of the dam and was submerged. There are no facilities for fish passage at this dam.

Channel Type/Flow Regime

The dam was inspected during fairly high flow rates after overnight thunder-storms with two inches of rain. The spillway face slopes at approximately 45 degrees into the tailwater, creating a plunging jet and hydraulic jump with a reverse roller extending 20 ft downstream of the dam. It would be difficult to float or swim away from the roller.

A whirlpool was located approximately 330 ft upstream of the dam on the left bank. The cause of this strong undertow is the submerged inlet to the headrace, where one of three gates has active flow.

Surrounding Land Uses

The right abutment and bank is public park land, providing easy access to the dam. However, construction access would create disturbance in need of restoration. The upstream right pond bank is low earth with some trees along the water line. The left side of the dam is surrounded by an historical park, commemorating the Hartsburg and Hawksley Mill, one of the last water powered mills in the Midwest (to 1930's). The park has benches and tables, as well as the east bank paved bituminous bike trail. The landward end of the park has the municipal police station.

The downstream right bank has a low masonry wall. A firehouse (Station #1) is located on the higher terrace along Route 56 overlooking the dam area. The downstream side of the concrete training wall has a bi-lingual warning sign about the currents.

The lower branch of the Fox River bike trail passes over the right abutment and then under the bridge, with an eight-ft wide paved bituminous surface. The upper "through" trail parallels the right bank approximately 80 ft from the water.

General Dam & River Bank Condition

The dam is a step structure. Slight spalling was observed on the first two steps. The right abutment had minor chipping and the left abutment appeared in new condition.

Evidence of Roller

Yes, a hydraulic jump with a reverse roller was observed extending to between 10 and 20 downstream of the dam.

Portages

The right upstream bank has an unmarked portage adjacent to the dam abutment. It has a mild sandy slope and is quite close to the dam face. There are two unmarked portage locations on the downstream right bank: 1) A set of stairs adjacent to the abutment are very close to the dam face; and, 2) portage the IL 56/ State Street bridge, the immediate downstream bridge. The left bank has potential upstream and downstream portage points which might be used on occasion by river users. There are no signs at any of the portages.

Warning/Information Signage

The dam has standard IDNR warning signs ("Warning Hazardous Currents Present DO NOT Enter Spillway Area", posted in English & Spanish) visible to downstream river users only. These signs are readable from 15 yards. There were no warning signs for upstream river users. According to IDNR, buoys are in place during the warmer months. IDNR observed six (6) seasonal warning buoys upstream of the dam, one (1) seasonal warning buoy is placed downstream of the dam during their 2006 inspection.

Construction Access

Vehicular access is not currently available at this site. However, vehicle access through the public parks is possible to both the left and right abutment areas, as well as the downstream face. Extensive park disturbance, requiring closure and later restoration, would be required.

4.8.9.2 Options Assessment

4.8.9.2.1 Temporary Rock Fill

A rock fill may to be feasible at North Aurora; however, there are a few concerns as discussed below. The rock fill would begin at elevation 641.63 ft NGVD, approximately 4.37 ft below the crest, and would extend downstream at a slope of 6.5%.

Special Considerations

- The dam has been modified to include a stepped face. It appears the steps extend several ft downstream. It is unknown whether the steps prevent the formation of a reverse roller during the 1 – 5 year events. A rock fill could begin at the end of the steps or be placed on top of one or more of the steps.
- The right and left banks appear to be low-lying parks. More analysis is needed to determine if they would experience increased flooding.
- To prevent the formation of a reverse roller at the dam crest during the 5 year event, the top of fill elevation was set equal to the maximum allowable (i.e., the safety factor of 1 ft has been removed).
- Sub-critical flow will occur during the 10 year event as well as the 1 – 5 year, eliminating a hydraulic jump at the toe and a reverse roller at the dam crest.
- The downstream 1-year elevation was computed using normal depth and the downstream, bed elevation. The water surface elevation directly downstream of the dam crest was then approximated based on the FIS water surface slope.

4.8.9.2.2 Dam Removal

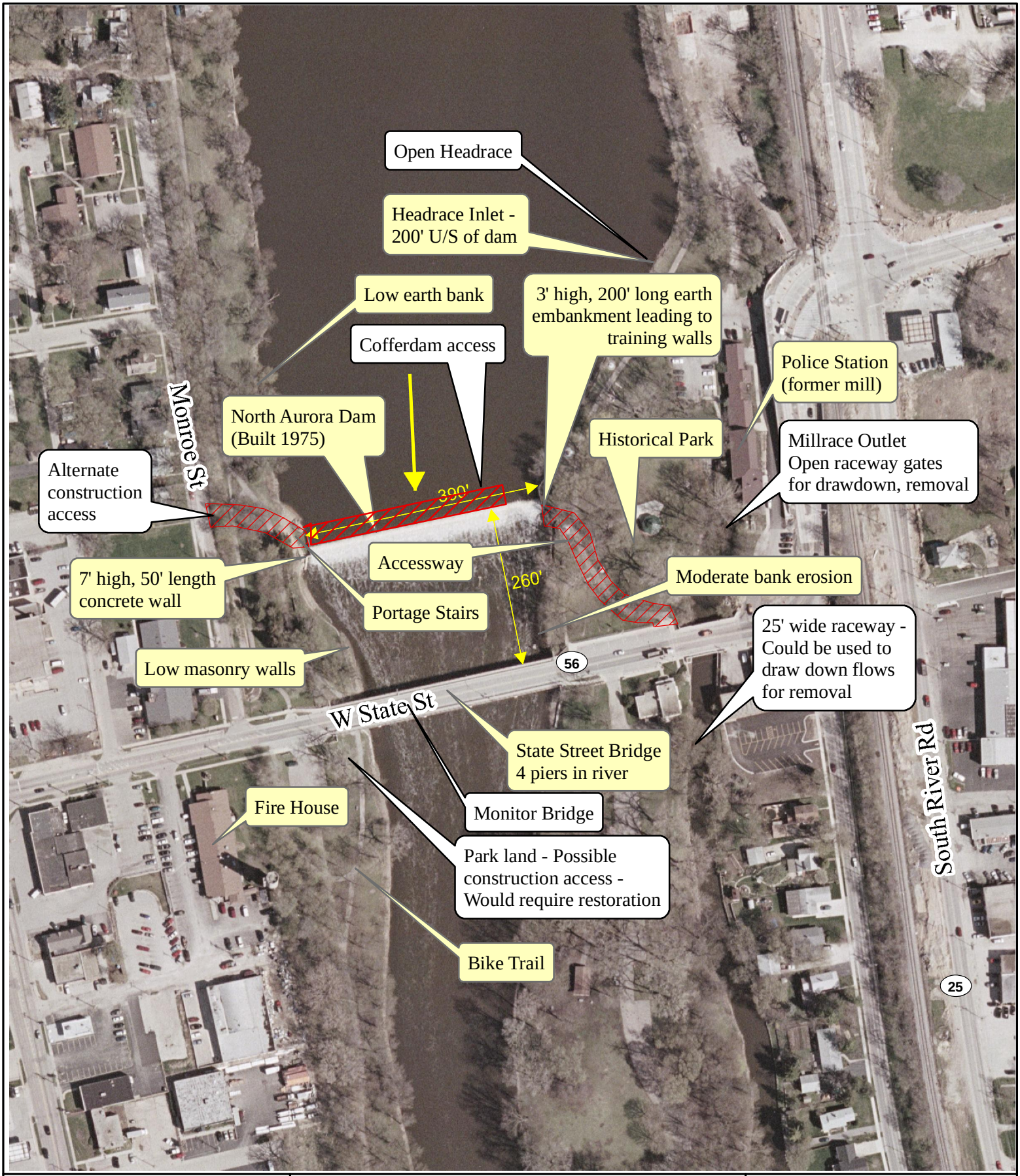
Removal Feasibility

For purposes of dam removal, the existing left bank raceway could be used to draw down a significant portion of summer low flows. The headrace and/or gates could be modified to increase the discharge flow. An access road and cofferdam could be installed on the upstream side of the dam, from either end for access during demolition. Use of both ends would be more economical, even though more restoration would be required. Otherwise, larger raceway bypass flows would be needed or a cofferdam with multiple large culverts. Shallow water at the base of the spillway enables face and toe modifications without removal.

In lieu of the long spillway length, the end of the dam could be left in place as a fishing pier and would also support the training wall areas. The downstream bridge does not appear to be a significant factor as long as asymmetric flows are avoided.

Special Issues

- Downstream currents from the dam to the bridge are quite fast, on the order of four to five ft per second. This would be a difficult site for an access road, despite its firm gravel bed.
- Both ends of the dam have popular well maintained public parks and bikeways. The dam is an integral part of the riverbank experience.
- Previous probes of the pool (taken approximately five years ago) found several ft of soft fine grain sediments near the banks. It would be difficult to contain this material.
- An eight-ft diameter, above-grade chamber at the left training wall could support utilities. It would need to be evaluated during design.



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IL Dam Removal Project
North Aurora Dam - Fox River

LOCATION: North Aurora, IL

MMI#: 3131-01
MXD: H:NoAurora.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.8.9.2.2

4.8.9.2.3 Full Bypass Channel

A full bypass option was considered for this dam but was found to be infeasible due to the limited available public land adjacent to the dam. The existing millrace on the river left was considered as a potential bypass option; however, adjacent residences and the State Street / IL 56 Bridge significantly limit the ability to expand the current millrace into a full bypass channel. A canoe chute could be feasibly constructed in this area; however, a significant decrease in the downstream roller would not be possible.

4.8.9.2.4 Riffle Pool

A riffle pool option was considered for this dam but was found to be infeasible due to the proximity of the downstream bridge to the dam. Placing the riffle pool upstream would require notching the full width of the dam essentially to the base, which would be considered equivalent to dam removal.

4.8.9.2.5 In-Stream Bypass Channel

An in-stream bypass channel concept was developed for this dam (See Figure 4.8.9.2.5). A bypass could be constructed on the right bank along the dam abutment, beginning upstream of the dam. The dam face would be notched to enable the installation of the bypass. The bypass would by 150 ft wide with a 2.5% slope and 5 riffles. This bypass would prevent overtopping of the dam up to the 5-year flow as well as allow for boat passage. Specific allowances for fish passage could be incorporated into a final design.

4.8.9.2.6 Dam Face Modification

A dam face modification concept developed for this reach (See Figure 4.8.9.2.6). Although a stepped face currently is in place at this dam, at least one drowning has occurred at this dam. This may indicate that the current steps may be ineffective at reducing the roller and should be studied. A replacement stepped face structure with 6 steps is proposed for this dam. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.8.9.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, in-stream bypass channel, and dam face modification are $850,000, $1,610,000, and $3,860,000, respectively. The opinion of cost of dam removal is $1,550,000.

0 55 110 Feet

INSTREAM BYPASS

North Aurora Dam - Fox River

North Aurora, Illinois

CTE | AECOM

Figure 4.8.9.2.5

North Aurora

0 50 100 Feet

DAM FACE MODIFICATION

North Aurora Dam - Fox River

North Aurora, Illinois

CTE | AECOM

Figure 4.8.9.2.6

North Aurora

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.10 Aurora East Dam

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4.8.10 Aurora East Dam

The following section includes a description of the existing conditions of and proposed structural options for Aurora East Dam

4.8.10.1 Existing Conditions Overview

Aurora East Dam was visited on January 10, 2007, and March 22, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The East Aurora Dam is located in downtown Aurora, between the river's east (left) bank and an island, immediately upstream of East Galena Boulevard. A second (west) dam spans the right channel from the island to the right bank.

The dam is composed of its abutments and spillway. There are no flanking embankments. The concrete ogee spillway has a height of eight ft and a length of 190 ft with an allowable head of four ft (i.e. the depth above the spillway before overtopping). The hydraulic drop is approximately six ft. The east dam did not exhibit any visible deficiencies along the dam crest or face.

The left abutment is a concrete wall that extends downstream as a concrete retaining wall. The left bank has a heavy ornamental iron fence on the wall and the Rotary Plaza with flags and benches adjacent to the Gallery 44 Art Studio and Budget Finance Corp. The left upstream bank has approximately 60 linear ft of steep grass bank above the dam, then a high concrete wall merging to the East New York Street Bridge abutment. All walls are relatively new and in good condition.

The dam's right end is at a 10-ft long non-overflow platform for a gate control and low level outlet. The right bank of the dam supports an urban outdoor plaza associated with the Copley Theater and North Island Commercial Center. The right abutment is damaged, with is an approximately six-ft by six-ft section of eroded concrete, undermining the wall. Vegetation is growing in this area.

The dam is located approximately 90 ft upstream of East Galena Boulevard and approximately 300 ft downstream of East New York Street. The East New York Street Bridge is a four span concrete structure (three arches, one rectangular) with three piers in the water. Its abutments are flush with channel retaining walls.

The downstream bridge is a twin span concrete arch with two one-way traffic lanes, two parking lanes, and two sidewalks. It has one pier in the water and abutments flush with newer retaining walls. The Hollywood gambling casino is located upstream of East New York Street, with floating river boats.

The right channel goes around the west side of the island and casino, with a spillway between East New York Street and East Galena Boulevard. A hardscape canoe/fishway

extends along the right bank, with a concrete walk. The right spillway has a length of approximately 150 ft and a height of eight ft, with concrete retaining walls at both ends. It has a vertical six-ft fall and deep plunging flow, with a low reverse roller. Severe upwelling occurs for 50 ft downstream.

Channel Type/Flow Regime

The Aurora East Dam spillway has a steep downstream face that creates plunging flow and a reverse vertical eddy. A change in roller direction may indicate a structural problem in the dam. Downstream water is very turbulent for 20 ft, with white water extending for 50 ft almost to the first bridge. The toe of the spillway appears to have a (submerged) apron that flips the water up in a three-ft high standing wave. It is a very dangerous configuration.

Surrounding Land Uses

Land uses surrounding the Aurora East Dam are intensive, including bridges upstream and downstream of the dam, an upstream floating casino, and island in the center of the river that supports dense development, including an urban outdoor plaza.

General Dam & River Bank Condition

The dam is a step structure. Slight spalling was observed on the first two steps. The right abutment had minor chipping and the left abutment appeared in new condition.

Evidence of Roller

Yes, a hydraulic jump was observed extending to between 10 and 20 downstream of the dam. Whether this was a reverse roller was indeterminent.

Portages

There is an unmarked, relatively steep portage/boat launch on the left upstream bank. However, this portage is downstream of the seasonal warning buoys. NO portage downstream along the left bank was observed. The west dam was a canoe chute which may or may not be in operation, according to a paddler's website. A portage may also exist in this area, but was not observed. There are no signs at any of the portages.

Warning/Information Signage

The dam has standard IDNR warning signs ("Warning Hazardous Currents Present DO NOT Enter Spillway Area", posted in English and Spanish) visible only to downstream river users. These signs are readable from approximately 15 yards. There were no warning signs for upstream river users. IDNR observed five (5) seasonal warning buoys in the channel upstream of and shared by the east and west dams during their summer inspection.

Construction Access

There is no vehicular access to the dam, due to the constraining sidewalks. Vertical walls and rails limit any pedestrian access. Extensive site disturbance and restoration is required.

4.8.10.2 Options Assessment

Option selection should be made with consideration of possible impacts on Aurora West Dam, since these act as one system to maintain the upstream pool.

4.8.10.2.1 Temporary Rock Fill

A rock fill concept has been developed for the Aurora East Dam with a slope of 6% starting at elevation 624.44 ft NGVD, 3.96 ft below the crest of the dam. The rock fill will experience sub-critical flow and the hydraulic jump at the dam crest will not be submerged during the 1-year, 5-year and the 10-year flow events. All FIS data was available for the dam; however, the extrapolated 1-year stage was below the bed invert elevation. The 1-year stage was estimated using the extrapolated 1-year discharge and the bed elevation. Additional engineering would have to be conducted to determine how the rock fill should be placed against the ogee style spillway. For the purposes of this report, it is assume that the rock fill is placed flush against the dam face.

4.8.10.2.2 Dam Removal

Removal Feasibility

Urban site conditions severely limit access to this dam. Removing just the east spillway would divert water from the west spillway, with flows past the casino barge. The short spillway and narrow channel would result in high velocity. Removal of both spillways should be considered.

Special Issues

- The dam is located in an "arts and entertainment" downtown area with heavy vehicle and pedestrian traffic.
- Both ends of the dam have urban pedestrian plazas. The best access is via the small left bank upstream retail parking lot for Broadway Appliance & Furniture Co.
- The waters impounded by the dam support the casinos' floating river boats. Removing the dam would lower water levels and increase scour.
- The East New York Street Bridge with the "wet" piers is only 100 ft upstream of the dam. Dam removal would increase scour potential.
- Removing just the east dam would lower the pool below the crest of the west dam, drying the west channel and pulling all flows to the narrow east channel. A detailed hydraulic analysis is required to further evaluate this.
- If the east dam is considered for removal, then the west dam should also be considered. They are not independent hydraulic structures, but serve as a pair. Removal of just one of the two dam sections is not advisable, as flow would simply concentrate in a single cell, causing high velocities and likely result in erosion and even more dangerous conditions. The intense amount of development and uses of land in the area will make removal difficult.

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IL Dam Removal Project
Aurora East Dam - Fox River

LOCATION:
Aurora, IL

MMI#: 3131-01
MXD: EAurora_Location.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET:
Figure 4.8.10.2.2

4.8.10.2.3 Full Bypass Channel

A full bypass channel was not considered for this reach due to lack of available public land for such a bypass.

4.8.10.2.4 Riffle Pool

A riffle pool was considered for this dam but was found to be infeasible due to the proximity of upstream and downstream bridges to the dam. Insufficient space is available for the maximum 2.5% slope and to maintain a distance of 100 ft from the upstream of the bridge faces.

4.8.10.2.5 In-Stream Bypass Channel

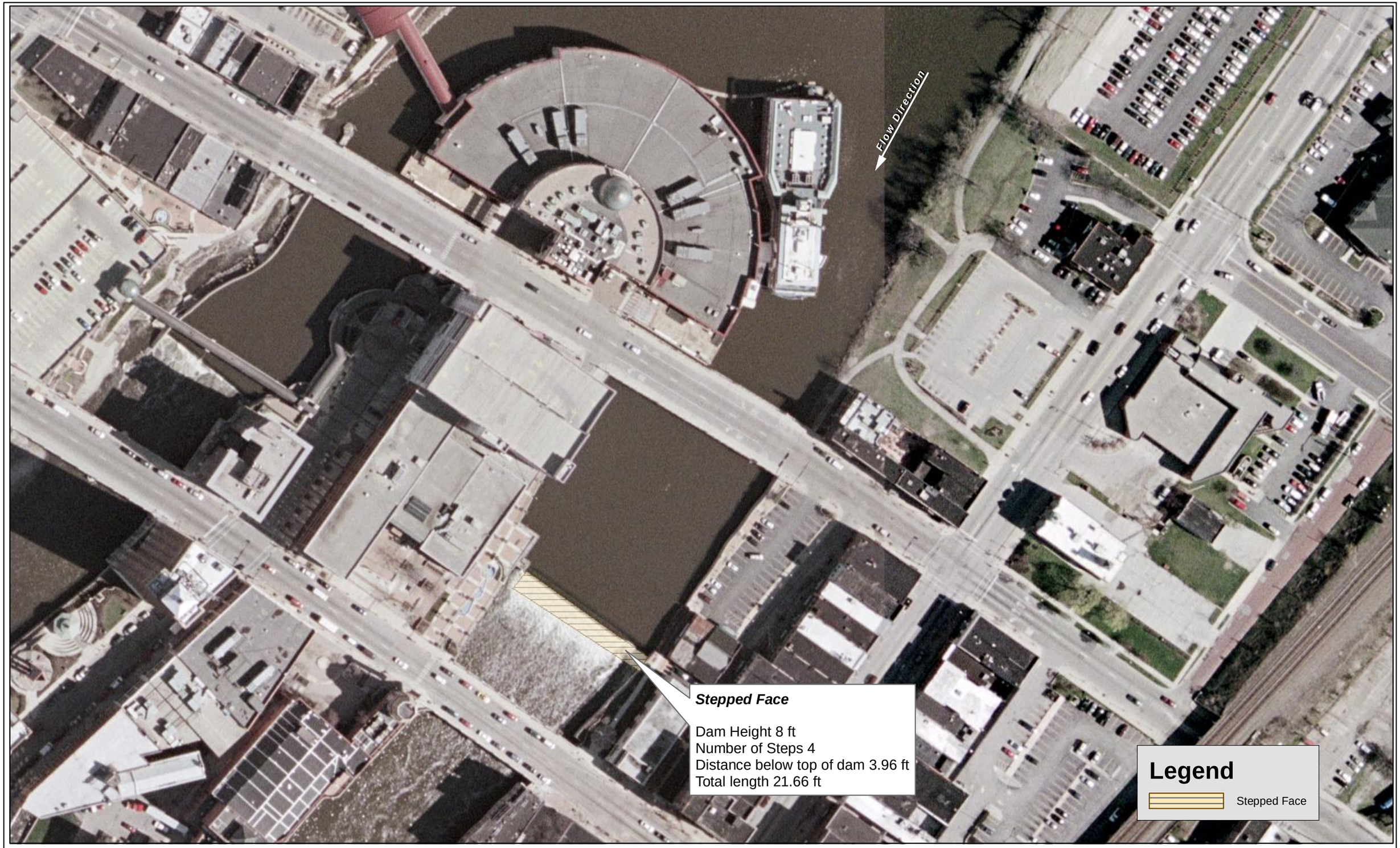
An in-stream bypass was considered for this dam but was found to be infeasible due to the proximity of upstream and downstream bridges to the dam. Insufficient space is available for the maximum 2.5% slope and to maintain a distance of 100 ft upstream and downstream of bridge faces.

4.8.10.2.6 Dam Face Modification

A dam face modification concept was developed for this reach (See Figure 4.8.10.2.6). A stepped face structure with 8 steps is proposed for this dam. The largest issue for this option would be construction access. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.8.10.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill and dam face modification are $490,000 and $1,560,000, respectively. The opinion of cost of dam removal is $2,900,000.



0 50 100 Feet

DAM FACE MODIFICATION

Aurora East Dam - Fox River

Aurora East, Illinois

CTE | AECOM

Figure 4.8.10.2.6

Aurora East

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.11 Montgomery Dam

CTE | AECOM

4.8.11 Montgomery Dam

The following section includes a description of the existing conditions of and proposed structural options for Montgomery Dam

4.8.11.1 Existing Conditions Overview

Montgomery Dam was visited on January 10, 2007 and April 9, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Montgomery Dam is owned by the State of Illinois. It is located 2.3 miles south of Aurora and 0.4 miles upstream (north) of Montgomery. This dam is composed of a left embankment and abutment, spillway with three steps, and right abutment.

The left earth embankment extends from Route 25, approximately 240 ft to the left abutment. It is in good condition with a 10-ft wide asphalt bike path along its crest and gentle grass side slopes. This abutment has a large raised grass overlook with 12-ft high reinforced concrete training walls with parapet rails along the spillway. A USGS stream gauge station is located in a round concrete structure. The downstream left embankment exhibits moderate erosion and is in need of repair.

The concrete spillway has a straight, broad crest with a height of seven ft and a length of 330 ft. The hydraulic drop is estimated to be four ft. Its face appears to be a series of three concrete steps that dissipate energy.

A four span highway bridge is located approximately 2,100 ft downstream. The bridge has three concrete piers in the water. Each span consists of concrete beams and facade concrete arch faces. A single low level outlet with a modern gate valve type rise and control goes under the left embankment.

The right upstream bank along the pool has a series of small single family houses. The right downstream bank is fairly high and steep, with grass cover and some superficial erosion near the dam and for 75 ft downstream. The houses have various stone and concrete revetments along the river. The left downstream bank has a large seven-ft diameter outfall with a concrete headwall approximately 250 ft downstream of the dam. The right bank has a small parking lot near the dam providing good access.

The abutment walls are approximately 75 ft long by 12 ft high. They are both in good condition. A plaque on the left abutment states "Built 1967, Division of Waterways."

Portions of the left embankment have an erosion protection lining composed of pre-cast concrete blocks. There is a mild reverse eddy in this area. Some of the concrete revetment has been damaged by scour.

Both upstream river banks are very low, only one to two ft above water levels. During construction, cofferdams must not raise water levels. The left side of the island could be used for diversion. A 120 to 150 ft wide canal-like water body extends upstream of the left embankment, separate from the main river by a peninsula of parkland with a trail.

The upstream bridge three spans should be checked for potential scour.

Channel Type/Flow Regime

The toe of the spillway has a shallow hydraulic jump that generally pulls away from the dam without a riffle. The roller extends to 10 to 20 ft downstream of dam face. However, two segments do have reverse currents, at the center and right abutment. Upstream approach velocities were one ft per second, while downstream exit velocities were up to four ft per second.

Even in poor weather, the park had a steady flow of bikers and walkers. The downstream face of left and right training walls both have bi-lingual warning signs.

Surrounding Land Uses

The Montgomery Dam is located in the Fox River Valley Park District. The well maintained park has tables and benches under trees on a grass lawn. The entire left bank, both upstream and downstream, is public park land.

General Dam & River Bank Condition

The` dam has three (3) steps. The horizontal and vertical alignment of the dam appears good. No obvious deficiencies were noted along the dam crest and face, although these were partially obscured by the flow over the dam. The downstream left bank exhibits heavy erosion and is in need of repair. Both concrete abutments appeared to be in relatively good condition with small minor cracks horizontal and vertical alignment good at both. USGS gaging station located on left abutment.

Evidence of Roller

Yes, roller extends to 10 to 20 ft downstream of dam face. The roller appears to be a standard hydraulic jump with flow downstream.

Portages

There do not appear to be any established portages. Portages on left bank are difficult due to residential areas upstream and steep slopes downstream. An upstream right bank portage area is lacking and is likely performed currently with some difficulty as the bank is fairly steep. A flatter area on the downstream right bank provides a location for easy for portage.

There are no signs at any of the portages.

Warning/Information Signage

The dam has standard OWR warning signs ("Warning Hazardous Currents Present DO NOT Enter Spillway Area", posted in English and Spanish) visible to downstream river users only. These signs are readable from approximately 45 ft. There were no warning signs for upstream river users. IDNR observed three (3) seasonal warning buoys upstream of the dam during their summer inspection.

Construction Access

There is excellent access to the Montgomery Dam via the left abutment and spillway through the park. Heavy equipment could use the bikeway, but would probably damage it, requiring post-construction repaving. A small parking lot for the bikeway is located at the left upstream side of the embankment adjacent to Route 25.

The right abutment has access direct from River Street, just downstream of the dam face. A steep but stable grass covered 15-ft high bank leads to the toe of the spillway from Montgomery Park.

4.8.11.2 Options Assessment

4.8.11.2.1 Temporary Rock Fill

A rock fill concept has been developed for Montgomery Dam at a 6% slope beginning at an elevation of 613 ft NGVD, 1 ft below the crest of the dam. All FIS profiles and flow rates were available, and the 1 – 5 year stages and flows were extrapolated. The slope should produce sub-critical flow and the hydraulic jump at the dam crest should not be submerged for the 1-year and 2-year events. The 5 year hydraulic jump at the dam crest is within 0.25 ft of submergence, suggesting that a more detailed hydraulic analysis is necessary to determine whether it will be submerged. The dam also has a series of steps, requiring additional engineering before construction of the rock fill. For the purposes of this report, it is assumed that the rock fill begins flush, 1 ft below the crest.

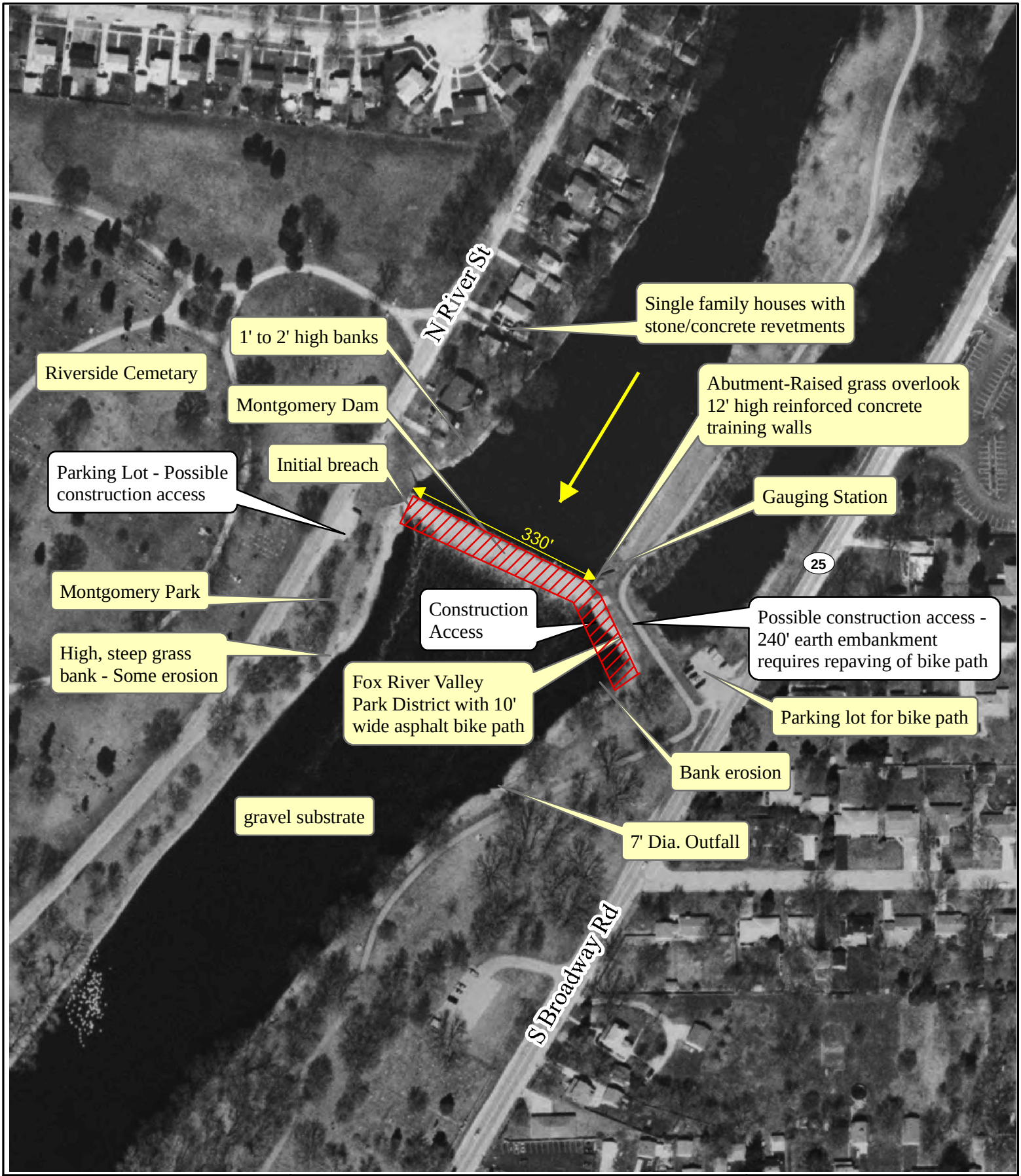
4.8.11.2.2 Dam Removal

Removal Feasibility

The Montgomery Dam has shallow water along its banks, encouraging pedestrian access. The favorable construction access and low flow intensity would enable relatively easy removal.

Special Issues

There are no special issues at this dam. As with any dam removal, evaluation of pre- and post-condition velocities, water levels, and sediment management would be necessary.



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IL Dam Removal Project
Montgomery Dam - Fox River

LOCATION: Montgomery, IL

MMI#: 3131-01
MXD: Montgomery.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.8.11.2.2

4.8.11.2.3 Full Bypass Channel

A full bypass channel concept was developed for this reach, but was found to be infeasible. A full bypass channel option was conceptualized through the existing left channel, but insufficient drop was available to convey the 5-year flow. However, conversion of this left channel into a canoe chute / bypass could allow river users to safely avoid the dam without portaging. Also flows could be eliminated over Montgomery dam for lower flow events.

4.8.11.2.4 Riffle Pool

A riffle pool concept was developed for this reach (See Figure 4.8.11.2.4). The riffle pool would be the width of the dam (327 ft) with a 1% slope with 8 riffles beginning at the dam crest. Further hydraulic studies are needed to analyze the effect of a riffle pool on downstream flooding and upstream water surface elevations. Effects on the outlet from the left upstream channel must also be examined.

4.8.11.2.5 In-Stream Bypass Channel

An in-stream bypass channel concept was developed for this reach, but was found to be infeasible. A full bypass channel option was conceptualized through the existing left channel, but insufficient drop was available to convey the 5-year FIS flow.

4.8.11.2.6 Dam Face Modification

A dam face modification option was not developed for this reach. A stepped face currently is in place at this dam.

4.8.11.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of costs for the temporary rock fill and riffle pool options are $1,360,000 and $7,530,000, respectively. The opinion of cost of dam removal is $670,000.

0 50 100 Feet

RIFFLE POOL
ROCK RAMP

Montgomery Dam - Fox River

Montgomery, Illinois

CTE | AECOM

Figure 4.8.11.2.4

Montgomery

Evaluation of Public Safety at Run-of-River Dams

4.8 *Fox River Dams*

4.8.12 Yorkville Dam

CTE | AECOM

4.8.12 Yorkville Dam

The following section includes a description of the existing conditions of and proposed structural options for Yorkville Dam

4.8.12.1 Existing Conditions Overview

Yorkville Dam was visited on January 11, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

General Dam & River Bank Condition

The dam is currently under construction. Four (4) additional steps are being added to the existing structure. A fish ladder is being added to river-right and a canoe chute will replace the leftmost portion of the dam. No visible defects were observed. Large riprap was observed in the channel. This riprap had been previously placed in the scour hole to attempt improve dam safety.

Evidence of Roller

Yes, a reverse roller at the existing dam (left side) appears very severe extending 10-20 ft, however, elevated flow was present due to the closing of a portion of the dam to enable construction. It was uncertain whether a roller existed in the newly upgraded portion of the dam (river-right), rather this appeared to be a standard hydraulic jump flowing downstream. Jump extended about 20 ft.

Portages

The left bank has an upstream portage with a path leading from a forest preserve. This portage is unmarked. Further downstream, near the dam, there is an unauthorized boat launch which is accompanied by a sign stating “Restricted area. No entry”. Downstream of the dam, on the left bank, there is a public portage which is accessible by a stairway. No portages were observed on the right bank. There are no signs at any of the portages.

Warning/Information Signage

The dam has standard IDNR warning signs (“Warning Hazardous Currents Present DO NOT Enter Spillway Area” posted in English and Spanish) visible to downstream river users and pedestrians. These signs are readable from approximately 15 yards. Additional warning signs are placed in the vicinity of the dam stating “Restricted Entry. No Entry.” There were no warning signs for upstream river users. IDNR observed fifteen (15) seasonal warning buoys upstream of the dam during their summer inspection.

4.8.12.2 Options Assessment

A dam safety improvement project is currently under construction at Yorkville Dam that prevented the consideration of a structural option. This redesign includes a stepped face with 4 steps and an in-stream bypass.

4.8.12.2.1 Temporary Rock Fill

A temporary rock fill option was not considered due to the major safety improvement project currently under construction.

4.8.12.2.2 Dam Removal

Dam removal option was not considered for this reach due to the major safety improvement project currently under construction.

4.8.12.2.3 Full Bypass Channel

A full bypass channel option was not considered for this reach due to the safety measures currently under construction. A canoe chute is currently under construction which will be meant to provide passage around the dam.

4.8.12.2.4 Riffle Pool

A riffle pool option was not considered for this dam due to the current safety measures. A stepped face which is currently under construction will be meant to reduce and / or eliminate the roller.

4.8.12.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was not considered for this reach due to the current safety measures currently under construction. A canoe chute is currently under construction which will be meant to provide passage around the dam.

4.8.12.2.6 Dam Face Modification

A stepped face is currently under construction will be meant to reduce and / or eliminate the roller.

4.8.12.2.7 Summary of Cost

No options were considered due to the major safety improvements currently in progress.

Evaluation of Public Safety at Run-of-River Dams

4.9 *Des Plaines River Dams*

4.9.1 Hofmann Dam

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4.9 *Des Plaines River Dams*

The following section includes a description of the existing conditions of and proposed structural options for dams located on the Des Plaines River.

4.9.1 Hofmann Dam

The following section includes a description of the existing conditions of and proposed structural options for Hofmann Dam.

4.9.1.1 Existing Conditions Overview

Hofmann Dam was visited on December 9, 2006, and February 3, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Hoffman Dam consists of a 258-ft long poured-in-place concrete ogee spillway situated between concrete channel retaining walls on both banks. The dam has no earth embankments and no non-overflow sections.

The crest of the concrete spillway is straight and level with good alignment and no evidence of large spalls. However, overflowing water prevents a detailed view of the structure. The spillway crest itself has an accumulation of woody debris (logs, branches, leaf pack) in the center of the channel.

The left bank downstream of the dam has a ±12-ft high concrete retaining wall in good condition with good alignment. The left upstream concrete retaining wall extends one ft above grade with three removable, ±40-ft long pipe rails running through I-beam posts, approximately six ft on center, bolted to the concrete. This wall has several vertical cracks all the way through it. One-inch expansion joints are located at the midpoint, and approximately 24 ft and eight ft from the spillway crest. Concrete effluescence is present on the riverside of the wall.

Located along the right abutment is the seven-story tall stone clad Hofmann Tower. The tower was built in 1908 of reinforced concrete and was placed on the National Register of Historic Places in 1978. The right upstream wall near the tower is flush with the ground and is approximately five ft above the normal water level, with no railing. The base of the tower has water inlets with two vertical bar racks. The wall has many deep cracks and old postholes.

Upstream of the tower, the remains of an old dock or pier system are present, with 10 concrete piers that extend out eight ft or so from shore. The right downstream retaining wall extends approximately three ft above grade and is in good condition, with a concrete sidewalk on the landward side of the wall.

The downstream channel is crossed by Millbridge Road/Joliet Avenue (two 12-ft lanes, with two concrete sidewalks) on a three-span simply supported pre-cast concrete beam bridge. The structure has two solid concrete piers approximately three ft wide and 10 ft high with upstream steel nose guards. The bridge has three heavy horizontal metal pedestrian railings on posts with no parapets, matching the left channel retaining wall. The channel banks immediately downstream of the bridge have concrete lined slope protection.

The downstream channel between the Hofmann Dam and the Millbridge Road/Joliet Avenue Bridge is fully confined by the concrete walls. Mid-channel has an occasionally exposed bar of cobbles and rocks to 18-inch diameter. This bar splits the flow, resulting in two to three ft per second velocities along the face of the walls under normal and low flow conditions. The channel is devoid of vegetation.

A spillway bypass system consists of a gated inlet, an underground conduit, and an outlet that discharges into the downstream channel. The left side of the impoundment near the bypass inlet is very shallow with some visible woody debris approximately 60 ft upstream of the spillway. The inlet is located on the left bank, approximately 75 ft upstream of the spillway. It has concrete wingwalls and headwalls that are in fair condition, with some concrete spalling and several exposed on-half inch diameter rusted steel reinforcing bars.

A single valve-opening rise extends above the concrete deck of the bypass channel. No operating handle is present. The structure is equipped with a vertical sluice gate approximately six ft wide with an iron frame bolted to the headwalls. Six-inch wide stop log slots with an approximate seven-ft span are present in the wingwalls; however no stop logs or inlet screens are present.

The existing, 1950 dam has a straight ogee crest spillway slightly downstream of the earlier arch shape spillway and retains some of the earlier channel walls and bypass conduit. The 1950 reconstruction plans also included new west channel retaining walls and channel dredging downstream of the new dam. The walls were installed; however, it is unclear whether downstream channel dredging was performed.

Previous sediment probing (August 2001) of the riverbed found 1 to 3 ft of unconsolidated sediment in the area upstream of the Hofmann Dam. Based upon 1950 plans and these observations, there may be a sharp rise in the riverbed between the Hofmann Dam and the area upstream of the original dam.

Channel Type/Flow Regime

The spillway has a steep face and high velocity flow with a supported hydraulic jump and reverse roller.

Surrounding Land Uses

Land uses surrounding the Hoffman Dam include the Hoffman Tower, some undeveloped land on the downstream side, and numerous commercial structures and parking lots. The dam is flanked by vertical concrete walls on both sides.

General Dam & River Bank Condition

The dam had no obvious visible deficiencies. Horizontal and vertical alignment of the dam crest and face is good. Debris consisting of logs and branches was observed in the middle of the dam crest. Embankments have vertical wall with rails and otherwise have minor erosion along left and right upstream and downstream banks. Horizontal and vertical alignment of both abutments is good.

Evidence of Roller

Yes, a strong reverse roller extending to approximately 15 ft downstream of dam face was observed.

Portages

Portages are not apparent and are unmarked. A portage is likely on left bank just upstream of historic mill structure. Portage would be difficult due to trees and medium forest. Multiple portage locations are downstream of dam.

Warning/Information Signage

A single warning sign on Hofmann Tower warns upstream river users “Danger Dam Ahead”. This sign is readable to upstream boaters a possibly 10 yards. However, this sign may easily be missed and is a bit faded and not large enough. Other signage included warnings against picnicking and fishing at points near to the dam. IDNR noted four (4) seasonal buoys upstream of the dam during their 2006 inspection.

Construction Access

The area between Fairbanks Road and the left (Riverside) bank of the Des Plaines River is lawn. In general, access for a construction staging area is good, with little or no tree removal required for site access.

4.9.1.2 Options Assessment

4.9.1.2.1 Temporary Rock Fill

A rock fill concept has been developed for Hofmann Dam at a 6.5% slope beginning at an elevation of 599.94 ft NGVD, 3.56 ft below the crest of the dam. All FIS profiles and flow rates were available, and the 1 – 5 year stages and flows were extrapolated. The slope should produce sub-critical flow and the hydraulic jump at the dam crest should not be submerged for the 1-year and 5-year. Sub-critical flow should occur for the 10-year event but a submerged hydraulic jump at the dam crest may still occur. Impacts to the left abutment outlet culvert and the downstream bridge should be assessed prior construction.

4.9.1.2.2 Dam Removal

Removal Feasibility

The United States Army Corps of Engineers (ACOE) Flood Damage Reduction Study for the upper Des Plaines River in 1996 analyzed the effects of removing the Hofmann Dam on upstream water surface elevations. Based on their analysis, the Corps concluded that removal of the dam would result in limited water surface level reductions for approximately one mile upstream of the dam and would have no impact beyond that. MMI reviewed these results as part of a previous modeling efforts and found general concurrence with the Corps results.

The full removal of the Hofmann Dam spillway is feasible and would provide free passage of water, sediment and fish. The spillway is wider than the natural channel and therefore it may be desirable to reshape the existing channel to concentrate low flow in a well-defined thalweg. Full removal would provide maximum flood protection upstream by drawing down water levels. However, it would also expose sediments in the pool area and would allow for their potential erosion.

Special Issues

- Pedestrian access to the Des Plaines River from the Village of Lyons side could be accomplished by building upon the existing concrete retaining wall structure extending out along the top of the existing dam to create a walkway and accessway down to the newly created stream bank. Grading in this area can be designed to provide a gradual transition from the higher elevation of the upland to the new edge of river.
- Pedestrian access from the Village of Riverside bank could be accomplished through a new connection to Swan Pond Park or by constructing direct access via stairways leading down from the existing concrete wall.
- As with any dam removal, design will need to consider sediment management, erosion, and post-construction water levels.

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IL Dam Removal Project
Hofmann Dam- Des Plaines River

LOCATION:
Riverside, IL

MMI#: 3131-01
MXD: H:Hofmann.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET:
Figure 4.9.1.2.2

4.9.1.2.3 Full Bypass Channel

A full bypass channel option was not considered for this reach due to the lack of apparent available public space adjacent to the dam.

4.9.1.2.4 Riffle Pool

A riffle pool option was considered for this dam but was found to be infeasible due to the proximity of the downstream bridge to the dam. Placing the riffle pool upstream would require notching the full width of the dam essentially to the base, which would be considered equivalent to dam removal.

4.9.1.2.5 In-Stream Bypass Channel

An in-stream bypass channel concept was developed for this reach (See Figure 4.9.1.2.5). A 100-ft wide bypass, with a 2.5% slope could be most easily constructed on the left bank. This would involve notching approximately 100 ft of the dam. The bypass should be constructed mostly upstream of the dam, due to the proximity of the downstream bridge. This bypass would prevent overtopping of the dam up to the 5-year FIS flow as well as allow for boat passage. Detailed survey would be required to further determine the feasibility of this solution as well as examine downstream flooding on the left bank.

4.9.1.2.6 Dam Face Modification

A dam face modification concept developed for this reach (See Figure 4.9.1.2.6). A stepped face structure with 9 steps is proposed for this dam. The stepped face would extend approximately 28 ft downstream of the dam face. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.9.1.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of cost for the temporary rock fill, in-stream bypass channel and dam face modification are $900,000, $1,290,000, and $2,820,000, respectively. The opinion of cost of dam removal is $1,850,000.

0 50 100 Feet

INSTREAM BYPASS

Hofmann Dam - Des Plaines River

Riverside, Illinois

CTE | AECOM

Figure 4.9.1.2.5

Hofmann

0 50 100 Feet

DAM FACE MODIFICATION

Hofmann Dam - Des Plaines River

Riverside, Illinois

CTE | AECOM

Figure 4.9.1.2.6

Hofmann

Evaluation of Public Safety at Run-of-River Dams

4.10 *Vermillion River Dams*

4.10.1 Danville Dam

CTE | AECOM

4.10 *Vermillion River Dams*

The following section includes a description of the existing conditions of and proposed structural options for Danville Dam, located on the Vermillion River.

4.10.1 Danville Dam

The following section includes a description of the existing conditions of and proposed structural options for Danville Dam.

4.10.1.1 Existing Conditions Overview

Danville Dam was visited on January 20, 2007, and March 19, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Danville Dam is owned by the City of Danville and is located at a broad river bend to the right, with a 50-ft high steep bank at the left abutment and a 15-ft high bank at the right floodplain. The dam has a 20-ft long left non-overflow section, a 240-ft long, 11-ft high concrete spillway, and right training walls flush with the right floodplain. The spillway has a vertical drop of approximately six ft with deep plunging flow. An upwelling boil extends 10 to 12 ft downstream. Unusual features of this dam include three large concrete piers, one at each abutment plus at the weir center. They are approximately 30 ft tall, 30 ft long, and six ft thick. They possibly supported a bridge or cables at one time.

The left training wall adjacent to the steep slope is approximately 30 ft high, thick and crooked. It can remain in place to support the slope, however abutments on the left bank are pulling away from the dam. The left bank has limited ft access and no heavy equipment access. Two 25-ft high slope failures are present just downstream of the dam, caused by turbulence. One hundred yards upstream of the dam on the left bank is a deteriorated three-story tall, 20-ft square abandoned gate house or pump station structure. Severe erosion of left bank was observed immediately downstream of the dam.

The right bank is 15 ft high, bare, and near vertical. Dam access can be achieved across a ¼-mile wide floodplain, with an inclined ramp to the water line. There are numerous large concrete elements, parts of abandoned retaining walls and slabs, lying along the west bank. There is no evidence of functional control gates to regulate water levels, a major problem due to significant flows at this site. Significant erosion was observed along the right bank downstream of the dam.

The spillway crest and face could not be observed during inspection due to high flow rates. The spillway thickness could not be determined, but is assumed to average 50 percent of it height above the river bed. Limited survey data suggests it is 12 ft high.

Survey also shows that upstream and downstream river bed elevations are similar, suggesting little sediment near the dam.

Channel Type/Flow Regime

The river has a large watershed and associated base flow. The USGS operates a stream gauge on the Vermillion River near Danville. It has a watershed area of 1,290 square miles and mean September flows of 281 cfs. Annual peak flow ranges from 10,000 to 30,000 cfs, with a great scatter, and increasing over the 90 years of record. The unusually wide flow range complicates removal. During inspection, the spillway had plunging flow and a moderate roller. There appears to be a deep plunge pool, followed by shallow sand bars downstream.

Surrounding Land Uses

The surrounding lands are undeveloped. The access routes are limited by topography and vegetation, but not land use.

General Dam & River Bank Condition

Spillway conditions could not be determined due to high flow. Abutments on left bank pulling away from dam. Significant erosion along right bank downstream of dam. Severe erosion of left bank immediately downstream of dam.

Evidence of Roller

Significant roller observed.

Portages

None observed.

Warning/Information Signage

Warning signs located on left and right abutment piers of S. Gilbert Road. Two (2) warning buoys located downstream of S. Gilbert Road about 1400 ft. upstream on the dam were noted.

Construction Access

The primary access would most likely need to occur along the right floodplain, across private land. The bank is steep and unstable; therefore, a ramp would need to be constructed into the pool. The left bank is very high and steep with groundwater seeps. During low flow, the dam might be approached from far downstream along the toe of the left bank.

4.10.1.2 Options Assessment

4.10.1.2.1 Temporary Rock Fill

A rock fill concept similar to the others presented here may not be feasible for the Danville Dam. The dam experiences some of the highest flow rates and is one of the shortest dams at 220 ft. As a result, the dam maintains high tailwater elevations and the rock fill requires large stones sizes (D_{30} of 4.2 ft) due to high velocities. At a 5% slope, the 2-year and 5- year will both experience submerged hydraulic jumps at the dam crest. As a result, the reverse roller will only be eliminated during the 1-year flow event. An alternative for reducing the stone size is to use a grouted rock fill in combination with a smaller stone. However, this will not address the need to eliminate the reverse roller. It may be more feasible to not construct a rock fill and instead investigate the long-term structural solutions.

4.10.1.2.2 Dam Removal

Removal Feasibility

The Danville Dam will be difficult to remove due to deep fast water and limited access; consequently it will be relatively expensive. There are no known gates to draw down water levels. Fortunately, there is no significant sediment on the survey map.

This dam needs a careful inspection during low flow and a study of historic documents to learn how it was made, as a clue as to how to dismantle it. Construction photographs and drawings from 1906, if available, would be helpful in this effort.

Based on preliminary observations, it is likely that the crest of the spillway will need to be notched near the left end, using a weir saw or explosives. Alternatively, a low level temporary bypass could be installed behind the right abutment to divert water. After partial drawdown, a barge or fill area can be used as a work platform for further demolition.

Special Issues

- The left and right banks downstream of the dam are both erosion-prone and could collapse if drawdown waters cause asymmetric flow or eddies. The upstream banks may also be prone to severe erosion, unless stabilized, after drawdown.
- The Route 150 bridge over the main stem and 136 bridge over the north fork upstream of the dam both have piers in the water that could be prone to scour and need to be checked, along with the Ellsworth Park area channel, dams, and outfalls.
- Secondary structures, namely concrete piers, at the Danville Dam should be secured or removed. They are an unattractive nuisance.

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IL Dam Removal Project
Danville Dam - Vermilion River

LOCATION:
Danville, IL

MMI#: 3131-01
MXD: H:Danville.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.10.1.2.2

4.10.1.2.3 Full Bypass Channel

A full bypass channel option was considered for this reached but was deemed infeasible due to the large width needed for such a bypass. A full bypass would be required to be more than half the dam width. Additionally a large amount of forest would need to be removed.

4.10.1.2.4 Riffle Pool

A riffle pool concept was developed for this reach (See Figure 4.10.1.2.4). The riffle pool would be the width of the dam (220 ft) with a 1% slope with 7 riffles beginning at the dam crest. Further hydraulic studies are needed to analyze the effect of a riffle pool on downstream flooding and upstream water surface elevations.

4.10.1.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was considered for this reached but was deemed infeasible due to the large width needed for such a bypass. An in-stream bypass would need to be more than half the dam width to convey 21,500 cfs (i.e., the 5-year FIS flow). This would essentially result in full dam removal.

4.10.1.2.6 Dam Face Modification

A dam face modification concept developed for this reach (See Figure 4.10.1.2.6). A stepped face structure with 11 steps is proposed for this dam. These steps would extend to approximately 45 ft downstream of the dam crest and would begin 1 ft below the dam crest. Hydraulic studies and physical modeling of the proposed structure would be required to determine a final design and the effectiveness of the stepped face.

4.10.1.2.7 Summary of Cost

The costs for each option vary due to the type of material used, required access to the site, and other considerations that are discussed in the detailed cost section. The opinions of costs for the temporary rock fill, riffle pool, and dam face modification options are $2,190,000, $7,220,000, and $2,520,000, respectively. The opinion of cost of dam removal is $2,050,000.

RIFFLE POOL
ROCK RAMP

Danville Dam - Vermillion River

Danville, Illinois

CTE | AECOM

Figure 4.10.1.2.4

Danville

0 50 100 Feet

DAM FACE MODIFICATION

Danville Dam - Vermillion River

Danville, Illinois

CTE | AECOM

Figure 4.10.1.2.6

Danville

Evaluation of Public Safety at Run-of-River Dams

4.11 *Sangamon River Dams*

4.11.1 Riverside (Carpenter) Park Dam

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4.11 *Sangamon River Dams*

The following section includes a description of the existing conditions of and proposed structural options for dams located on the Sangamon River.

4.11.1 Riverside (Carpenter) Park Dam

The following section includes a description of the existing conditions of and proposed structural options for Riverside (Carpenter) Park Dam.

4.11.1.1 Existing Conditions Overview

Riverside (Carpenter) Park Dam was visited on January 20, 2007, January 26, 2007, and March 20, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Riverside Park Dam consists of a run-of-river concrete weir with a concrete right abutment. The left end of the weir and left abutment have already been removed. This portion was removed by the city when a new water supply for Springfield was built. The breach is 100 ft wide and is possible to navigate during low flow conditions as long as they stay to the left, where velocity was estimated at one to three ft per second during field inspection.

The spillway has a broad crest approximately three ft thick with a rectangular cross-section. The channel approaching the dam is unconfined with active broad floodplains on both banks. The left downstream bank is approximately 30 ft high with severe erosion. Limestone is visible on its lower six ft.

During visual inspections, the remaining spillway crest was approximately six ft above the water line with a significant log jam against it. The right central part of the dam has an approximate 75-ft long, one-ft deep spillway that concentrates low flows. However, it appears the original full dam length of 400 ft was subject to seasonal overflow. Ledge or fracture rock is exposed in the central upstream side of the dam, and sediment has deposited a beach at the right upstream end of the dam.

Channel Type/Flow Regime

The USGS operates a stream gauge upstream of the dam at Riverton. The watershed area is 2,618 square miles, with a mean September flow of 514 cfs. Typical annual floods range from 10,000 to 30,000 cfs and are very significant. The dam has a partial horizontal breach that allows canoe and boat passage. There was no spillway overflow during inspection.

Surrounding Land Uses

Land uses surrounding the Riverside Park Dam consist of mature forested floodplains on both banks. Farther upstream, the existing gravel access road passes the Springfield Police Department.

General Dam & River Bank Condition

The left side of dam is missing or has been breached. The owner of Riverside Stables, who also rents canoes, said the dam was blown up by the City when a new water supply for Springfield was built. First inspection was attempted but the river was out of bank and left and right access roads were flooded. Site was re-inspected on January 26 from left bank access road. Bypass channel is eroding the left bank, including the high left bank downstream of the dam, which appears to be a potentially serious erosion problem.

Evidence of Roller

No, water was bypassing remaining section of spillway and not going over dam structure.

Portages

No need to portage; breach appeared large enough to safely canoe.

Warning/Information Signage

None observed.

Construction Access

The left abutment area is easy to access via a gravel trail from the end of Old Waterworks Road, through the Color Plant property. The earthen roadway leads to a boat ramp upstream of the dam. The right bank, where the remaining dam is joined, is not accessible by vehicle due to its broad soft floodplain soils in the undeveloped Springfield Park District property.

4.11.1.2 Options Assessment

4.11.1.2.1 Temporary Rock Fill

A rock fill concept is not suggested for the Riverside Park Dam since the dam has failed.

4.11.1.2.2 Dam Removal

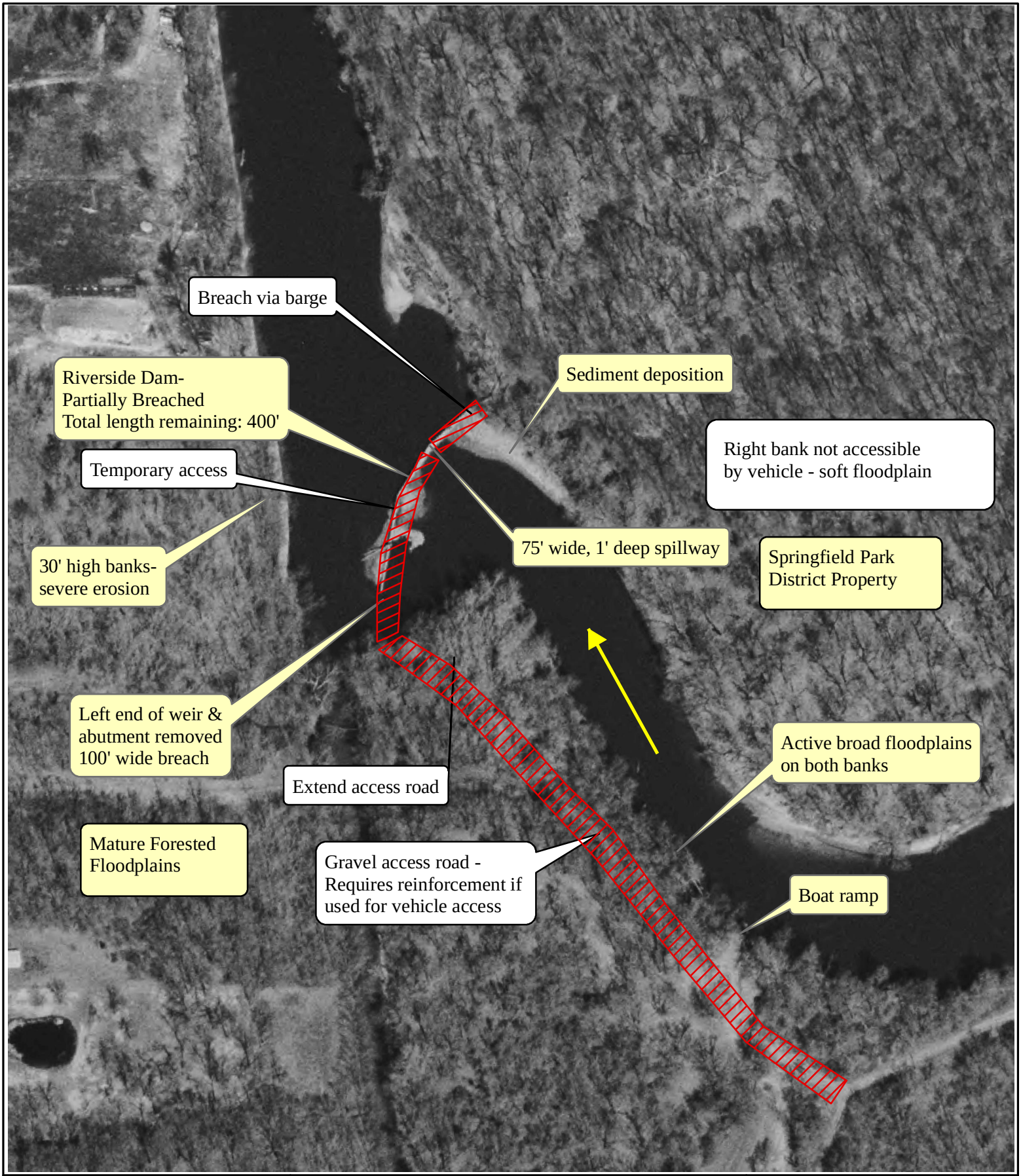
Removal Feasibility

The Riverside Park Dam does not require modification for canoe passage under low flow conditions. However, severe left bank erosion is occurring and a large log jam is stuck against the remaining spillway.

Further breaching if so desired for boat passage or flood control could be achieved either by use of a barge or another notch. Barges with moderate size equipment can be launched from a gravel boat launch 500 ft upstream. A barge with a compressor and drill rig could place charges to blow the dam and leave pieces in place. Alternately, one could breach the right end to allow flow, and then fill the existing left breach to gain heavy equipment access to haul the remaining pieces away.

Special Issues

- The light duty gravel access road from Old Water Works Road to the dam was probably used to construct the original dam and to more recently to breach the left end. This road cannot withstand heavy or extensive traffic for construction equipment and will need to be reinforced with stone for support.
- The area surrounding the dam is subject to flooding and has several vernal pools. There may be wetland regulatory issues.



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IL Dam Removal Project
Riverside Dam- Sangamon River

LOCATION:
Springfield, IL

MMI#: 3131-01
MXD: H:Riverside.mxd
SOURCE:

N

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET:
Figure 4.11.1.2.2

4.11.1.2.3 Full Bypass Channel

A full bypass channel option was not considered for this dam due to the existing in-stream bypass to the left of the dam.

4.11.1.2.4 Riffle Pool

A riffle pool option was not considered for this dam due to the poor condition of the dam.

4.11.1.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was considered for this reached but was deemed infeasible due to the large width needed for such a bypass. An in-stream bypass currently exists on the left side of the dam, but does not fully convey the 5-year FIS flow (28,500 cfs), according to preliminary calculations. An in-stream bypass would need to be more than half the dam width to convey 28,500 cfs (i.e., the 5-year FIS flow). This would essentially result in full dam removal.

4.11.1.2.6 Dam Face Modification

A dam face modification option was not considered for this dam due to the poor condition of the dam.

4.11.1.2.7 Summary of Cost

The only option considered for Riverside Park Dam was dam removal, with an opinion of cost of $270,000.

Evaluation of Public Safety at Run-of-River Dams

4.11 *Sangamon River Dams*

4.11.2 Petersburg Dam

CTE | AECOM

4.11.2 Petersburg Dam

The following section includes a description of the existing conditions of and proposed structural options for Petersburg Dam.

4.11.2.1 Existing Conditions Overview

Petersburg Dam was visited on January 20, 2007, and March 20, 2007. Observations made on these occasions and a review of IDNR summaries form the basis for the existing conditions summary.

Dam Structure and Channel Condition

The Petersburg Dam is located at a right river bend with high banks on the left (with the center of town) and a lower floodplain on the right. The 210-ft long, 16-ft high run-of-river dam is created by rock and gravel fill topped by a four to six-inch cap of unformed rough concrete. The crest of the dam is approximately four ft above the tailwater level. The central part of the dam is partially breached with turbulent through flow. The head differential of two ft is distributed over approximately 60 ft of river length. It is unclear whether the dam was made this way or if it had a level crest that failed or was partially removed.

The shape of the dam is an arch, pointing downstream, which is very unusual. The left and right ends of the dam appear to be subject to periodic overflows. Each end is approximately 60 ft long and 25 ft wide by four ft high. The center breach is approximately 120 ft wide and is only partial depth. Large submerged rocks create flow "mounds." The inner ends of the dams, at the edges of the breach, have concrete cap failures.

The dam is easily accessible from the left end, where a ftpath-ramp leads from the top of bank to the structure. It could easily be improved for heavy equipment.

The downstream channel has a large scour pool some 600 ft across. Its right bank is near vertical and approximately 15 ft high. A boat launch in a public park is located approximately 500 ft downstream on the left bank. The left bank, high and steep, is partially wooded and partially covered with demolition concrete pieces.

The spillway has been repaired in the past with a wet unformed concrete mass poured across the crest. This concrete cap is breaking up in numerous areas, requiring further repair or removal.

Channel Type/Flow Regime

The Sangamon River has a USGS gauge some distance upstream of the project site. The gauge watershed is 2,618 square miles, while the dam site will be somewhat larger. At the gauge, mean September flows are only 514 cfs, but annual flood flows range from 10,000 to 30,000 cfs.

The flow regime has a low velocity approach channel, with water 10 ft below the top of banks. The jet has up to three standing waves with reverse crests, and tapers out over 150 ft downstream.

Surrounding Land Uses

The right bank and abutment are located along mature forested floodplain. The left bank and abutment are behind the water department building and are accessible from public land.

General Dam & River Bank Condition

Dam was submerged during inspection so condition could not be determined. Later non-site investigation revealed that the dam has been breached.

Evidence of Roller

Possible roller near left bank.

Portages

None observed.

Warning/Information Signage

None observed.

Construction Access

The left bank and abutment of the Petersburg Dam are easy to access via a gravel ramp from the Water Department property. The right end of the dam has poor access, across a forested floodplain and agricultural fields.

4.11.2.2 Options Assessment

4.11.2.2.1 Temporary Rock Fill

Rock fill has already been placed at Petersburg Dam; however, the dam still experiences a roller. Additional rock fill can be placed that may reduce the roller further. The crest elevation of the dam is unknown, as well as the amount of fill that has been placed. Therefore, a general rock fill concept has been developed to provide a rough opinion of cost. Additional surveys should be performed to determine the crest elevation and amount of fill. In addition, the exact location of the dam along the bed profile is unknown and should be surveyed. The following general characteristics have been used to provide a cost opinion:

- A fill slope of 5%.
- A D30 value of 2.0 ft
- A crest elevation of 477.5 ft NGVD and a top of fill elevation of 476.5 ft NGVD.

4.11.2.2.2 Dam Removal

Removal Feasibility

The Petersburg Dam is already partially breached in the center but does not provide good canoe passage, and is easily accessible for play use. Minor grading of the left abutment could create an access ramp for heavy equipment. Using the left end of the dam as a platform, clamshell cranes or long boom back hoes with a "thumb" could remove rocks to deepen the existing breach. Then the left end of the dam can be removed with a back hoe. The access area appears to be owned by the City of Petersburg Water Department.

The right end of the dam has no vehicular access. It could be left in place, or accessed via pontoon boat and a compressor to set small charges to crack the cap. The access route is approximately 800 yards long across a field and through floodplain forest.

Special Issues

- The City of Petersburg Water Department appears to have a water supply well in the public park downstream of the dam. Water quality protection measures during construction would need to be implemented.
- There is extensive bank erosion downstream of the dam on the right bank.
- The left bank, partially armored with demolition waste concrete, is also susceptible to toe erosion. Removal design will need to consider the position, shape and power of the flow jet.

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IL Dam Removal Project
Petersburg Dam- Sangamon River

LOCATION: Petersburg, IL

MMI#: 3131-01
MXD: H:Petersburg.mxd
SOURCE:

Existing Conditions and Proposed Removal

DATE: 04/10/07
SCALE: 1":200'

SHEET: Figure 4.11.2.2.2

4.11.2.2.3 Full Bypass Channel

A full bypass channel option was considered for this reached but was deemed infeasible due to the large width needed for such a bypass. A full bypass would be required to be more than half the dam width. Additionally, a large amount of forest would need to be removed.

4.11.2.2.4 Riffle Pool

A riffle pool option was not considered for this dam due to the poor condition of the dam.

4.11.2.2.5 In-Stream Bypass Channel

An in-stream bypass channel option was considered for this reached but was deemed infeasible due to the large width needed for such a bypass. A full bypass would be required to be more than half the dam width. Additionally, a large amount of forest would need to be removed.

4.11.2.2.6 Dam Face Modification

A dam face modification option was not considered for this dam due to the poor condition of the dam.

4.11.2.2.7 Summary of Cost

The only options that were considered were the temporary rock fill option, with an opinion of cost of $1,020,000, and dam removal, with an opinion of cost of $290,000.