Project Examples

Little Birch Lake Outlet Dam, Stearns County, Minnesota



Before



After

Background

The Little Birch Lake Outlet Dam was constructed in 1988. This dam sets the elevation for Little Birch Lake but is a barrier to fish passage and is in poor structural condition. Rather than pursuing a direct replacement, the Sauk River Watershed District (District)—with support from the Little Birch Lake Association—aimed to enhance its ecological functionality while maintaining the lake basin elevation through a modification of the outlet. The District hired Houston Engineering, Inc. (HEI) to design and construct this project.

The Project

The project began by our team conducting a site visit to document the existing dam's conditions. We delivered a technical memorandum summarizing the current conditions and recommended alternatives for dam maintenance or conversion to rock arch rapids.

The preliminary design phase involved reviewing and digitizing existing easements for the dam, completing a full topographic survey of the existing dam and outlet channel, and conducting a preliminary hydraulic analysis. We developed preliminary design drawings and provided technical writing assistance for a Conservation Partners Legacy grant application. **The District obtained $288,005 in grant funding to cover 90% of the preliminary estimate.**

During the project development and design phase, we hosted virtual coordination meetings with District staff and the Minnesota Department of Natural Resources (DNR) to discuss design specifics. We finalized the hydraulic analysis and documented a FEMA No-Rise. Our team then assembled the 90% design plans, held review meetings with District staff, the DNR, and the Little Birch Lake Association, and modified the plans based on their feedback. We updated the Opinion of Probable Construction Cost and completed the final design drawings and report, which were presented to the District Board for approval.

During the implementation phase, we prepared applications for District, DNR public waters, and US Army Corps of Engineers (USACE) Section 404 permits. Our team provided bidding support and construction administration services. As part of these services, our team performed construction observation, conducted construction staking, and will prepare record drawings post-construction.

The total cost for this task order is $83,325. The total project cost, including construction, is estimated to be $220,356. Construction was substantially completed in October of 2024.

Location
Stearns County, Minnesota

Client
Sauk River Watershed District

Contact
Jon Roeschlein
District Administrator
320.352.2231

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Project Highlights

- Grant application assistance, which resulted in a $288,005 grant to fund 90% of the project. However, the total project cost was $214,674, approximately $92,000 below the initial estimate.
- Construction administration services from bid drafting through project completion.
- Permitting assistance and agency coordination with the DNR and USACE.

Pelican Rapids Dam Removal, River Restoration, and Pedestrian Bridge
Pelican Rapids, Minnesota



Before



After

Background

Pelican Rapids is well known for its scenic and historical dam. The dam was constructed in the 1880s to provide power to a sawmill, which was later converted to a grain mill. Shortly after the turn of the century, a stone masonry wall was added. The dam is accompanied by Pelican Pete, the world's largest pelican. This scene is an area of pride for residents and a frequent stop-off point for passersby.

Houston Engineering, Inc. (HEI) was brought on by the City of Pelican Rapids, in partnership with the Minnesota Department of Natural Resources (DNR), to provide alternative solutions to replace or repair the aging timber crib dam.

The Project

The first study focused solely on the wall and its cause of collapse.

Problems with the wall were first observed in 2005 when a significant bulge was discovered. Eventually, a portion of the wall gave way. Seepage had been observed under the wall and is believed to have contributed to its collapse.

Additional funding was then acquired to complete an inspection on the concrete spillway.

The solution that HEI and the City landed on was to remove the existing dam infrastructure and replace it with rock arch rapids to improve safety, aquatic habitat, and recreation through the heart of downtown.

HEI's tasks included assessing the existing condition of the dam infrastructure and bank stabilization, conducting an Environmental Assessment Worksheet, performing preliminary and final design, producing final plans, and providing construction administrative services.

The removal of the dam and installation of rock arch rapids will restore the river's connectivity and recreate the historic river in the reservoir bed upstream of the dam.

Construction began in December of 2022 by drawing down the upstream reservoir, removing the dam infrastructure, and relocating the iconic Pelican Pete Statue. The project was completed in summer 2023 and was a ACEC Minnesota 2024 Grand Award Winner.

ACEC Minnesota
Engineering Excellence Award
Category-Water Resources

Location
Pelican Rapids, Minnesota

Client
City of Pelican Rapids

Contact
Lance Roisum
City Administrator
218.863.7076

Project Highlights

- Recovered and reconnected more than 30 miles of riverine habitat for fish and native mussels.
- Restored the fish passage so it complements other passages in the watershed.
- The project addressed and solved current maintenance and safety issues.
- Construction of a new pedestrian bridge over the rapids preserved connectivity in downtown with nearby parks.

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Otter Tail River Fish Passage Restoration: Rock Arch Rapids Installation at the Outlets of Little Pine, Big Pine, Rush, and Otter Tail Lakes Otter Tail County, Minnesota



Big Pine Lake

Background

The Otter Tail River flows through several lakes in Otter Tail County, including Little Pine, Big Pine, Rush, and Otter Tail Lakes. Dams at each of these lakes serve as an outlet to the Otter Tail River. However, each dam restricts fish passage during varying lake conditions. To improve fish passage, Houston Engineering Inc. (HEI) provided survey, design, and construction services for the East Otter Tail County Soil and Water Conservation District.

The Project

HEI worked closely with the Minnesota Department of Natural Resources (DNR) and EOTCSWCD on project design. The proposed project included rock arch rapids installation at the outlet of each of these lakes. This will improve upstream fish passage and recreational fishing opportunities throughout the Otter Tail River system. In addition to fish passage, rock arch rapids make a great habitat for fish spawning grounds.

HEI designed each of the rock arch rapids to include a riprap ramp at a 3% longitudinal slope from the crest elevation of each dam, extending downstream to the existing riverbed. Several boulder rock weirs with resting pools located between them were designed for each of the rock arch rapids. HEI determined the quantity of rock to be used in the construction of each rock arch rapids based on sonar surveys paired with traditional surveys at each site.

Fish passage restoration will enhance the habitat and spawning area for the Otter Tail River's fish community.

HEI coordinated and acquired all the necessary permits for the project. Construction of the project began in March of 2023 and was completed later the same year.



Otter Tail Lake

Location
Otter Tail County, Minnesota

Client
East Otter Tail County Soil and Water Conservation District

Contact
Darren Newville
District Manager
218.228.2373

Project Highlights

- Fish passage restored for Little Pine, Big Pine, Rush, and Otter Tail lakes.
- Facilitates lake levels and hydraulics.
- Enhanced fish habitat will support fish population growth and fishing opportunities.

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Fish Lake, Lake Lizzie, and Prairie Lake Dam Fish Passage Improvements
Pelican Rapids, Minnesota



Fish Lake–Before



Fish Lake–After

Background

Eight Dams Along Pelican River

Historically, there were eight dams along the Pelican River. These dams are barriers that make dispersal for river species difficult both up and downstream, but these structures can be converted in such a way that they are more favorable to passage of fish, muskrats, otters, shorebirds, waterfowl, salamanders, frogs, crayfish, and other invertebrate species.

As part of the Red River of the North Fisheries Management Plan, the Minnesota Department of Natural Resources (DNR) has listed goals of removing barriers to restore uninterrupted fish migration pathways.

The Clean Water Land and Legacy Amendment was passed in 2008, providing more funding opportunities for these types of projects.

The Project

Fish Lake Dam

Fish Lake Dam sets water levels for Pelican Lake, Fish Lake, and Bass Lake, a chain of lakes on the Pelican River. The original Fish Lake Dam was built in 1932 and has had a long and storied history. In 1937, the dam came under the control of the State Conservation Commission. The State of Minnesota made some repairs in 1967.

In 2003, the center island washed out, and a temporary patch was put in place until a more permanent solution could be completed. In 2013, some minor repairs were made, but exposed rebar and sheet pile remained. The Pelican Group of Lakes Improvement District (PGOLID) sought a permanent solution for the aging and dilapidated dam that improved fish and wildlife habitat as well as safety while maintaining current upstream lake levels.

Working with Houston Engineering, Inc. (HEI), the PGOLID concluded that the best permanent solution that accomplished the project goals would be to install a rock ramp and natural boulder arch rapids. HEI surveyed and designed the proposed project.

HEI worked closely with the DNR on the project design on behalf of the PGOLID. The project began construction in 2017 and was completed in 2018.

Location
Pelican Rapids, Minnesota

Client
Pelican Group of Lakes Improvement District

Contact
Jay Elshaug
Past Chair
218.846.1465

Project Highlights

- Improved fish migration along the Pelican River.
- Natural-looking rapids look right at home in the landscape.
- Potential spawning habitat created.
- Improved safety.
- Maintains current lake levels and hydraulics.

Watch a video of the stream flowing here:
https://youtu.be/npEE2JXlPEk View Online

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Fish Lake, Lake Lizzie, and Prairie Lake Dam Fish Passage Improvements
Pelican Rapids, Minnesota

Lake Lizzie and Prairie Lake Dams

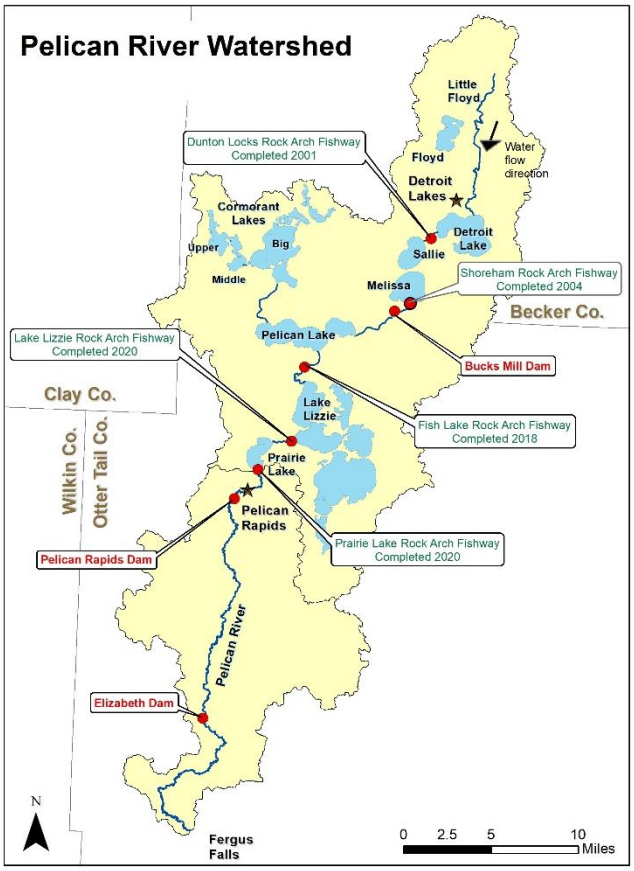
The Fish Lake Dam modification garnered a lot of curiosity from downstream lakes, who were interested in completing similar projects. Building on the success of the Fish Lake Dam, the DNR partnered with PGOLID again in 2019 to complete the Lizzie and Prairie dams in cooperation with their lake associations.

HEI was contracted to complete similar dam reconstructions for the Lake Lizzie and Prairie Lake dams. Construction began in winter 2019, and the dams were completed in summer 2020. With the completion of these three dam reconstructions, 20 miles of stream were reconnected for fish passage.

HEI also designed a fish passage project for Elizabeth Dam, which will be implemented in the near future as funding becomes available.

The History of Fish along the Pelican River

Historically, many species of fish use the Pelican River to migrate every year. However, with several dams constructed along the river these species were no longer seen upstream of the dams. For example, lake sturgeon were wiped out of the entire Red River Basin by the late 1800s, largely due to dam construction and habitat degradation. Now that dams were removed on the Red River, the sturgeon are back!





Lake Lizzie–Before



Lake Lizzie–After



Prairie Lake–Before



Prairie Lake–After

Seven Mile Creek Dam Modifications
Saint Peter, Minnesota



After

Background

The Nicollet County Soil and Water Conservation District (SWCD) sought to replace their low-head dam along Seven Mile Creek with a rock arch rapids installation. This replacement provides upstream fish migration and a safer alternative to the existing low-head dam.

Due to our experience designing and replacing similar dams with rock arch rapids, the SWCD hired Houston Engineering, Inc. (HEI) to complete survey, design, and construction administration of this project.

The Project

To develop accurate construction plans and quantities for the project's cost estimate, our team began the project by surveying the project site and reviewing existing information provided by the Minnesota Department of Natural Resources (DNR).

Our review also helped to verify that rock arch rapids would not adversely affect water levels upstream of the dam. To determine this, our water resources engineers completed hydraulic modeling of the existing outlet and proposed project.

This dam required a US Army Corps of Engineers (USACE) Section 404 permit and a DNR Public Waters Work Permit to be completed. Our environmental scientists coordinated with the USACE and DNR to complete these applications.

HEI provided construction administrative services to complete the project. These included developing the bid documents, coordinating a pre-construction meeting with the contractor, construction staking, and construction observation.



Before



During

Location
Saint Peter, Minnesota

Client
Nicollet County Soil and Water Conservation District

Contact
Kevin Ostermann
District Manager
507.931.2550

Project Highlights

- Replaced an aging low-head dam with rock arch rapids to improve the area's safety, ecological benefits, and provide upstream fish migration along Seven Mile Creek.
- Coordinated with the USACE and DNR to complete permit applications and comply with regulatory guidelines.

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