Portage Lake Lift Bridge
2014-2016 Rehabilitation
A Critical Link to the Keweenaw

- “Keweenaw Island” or “Copper Island”
  - Population 21,500 north of the bridge (44,000 on Peninsula)
  - Houghton County Airport
  - Both of area’s hospitals
  - 4 school districts on north,
    3 school districts on south
  - Contains the state and county maintenance facilities (plows)
  - MTU south of Bridge
1st bridge across the Portage

Photo Courtesy of Copperrange.org

1875-1895
2\textsuperscript{nd} Span Over the Portage

Photo Courtesy of Copperrange.org

1895-1959
Portage Lake Lift Bridge

- Open winter of 1959 but officially dedicated June 25, 1960
- Built 1957-1959
- World’s heaviest and widest double-decked lift bridge. The Lift Span weighs 4,500,000 lbs.
- Cost - $11,000,000
- Lower spans carried rail
- Lift span designed to carry vehicular traffic on both decks
- 250’ clear channel width
- Vertical clearances with water
  - 5 feet in lower position
  - 35 feet in Intermediate
  - 100 feet fully Open
MTU ties to Lift Bridge

• Engineering Staff
Portage Lake Lift Bridge

Floating the lift span in

Photo Courtesy of Copperrange.org
1st run of Ranger under new bridge
1959
By DAVID MAKI
The Daily Mining Gazette
HOUGHTON — The Portage Lake Lift Bridge, which replaced a bridge built in the 1890s, opened for business the morning of Dec. 20, 1959, and Hubert Peterson of Houghton Canal remembers it well.

Peterson drove the first car to cross the new bridge that morning, and while it might seem he’d have to race to be first in line, that wasn’t the case.

“I didn’t have to wait long, because the (police officer directing traffic) just told me to go,” he said. “I just happened to get there at the right time. I didn’t even know it was going to be open.”

Peterson, now 74, said he and his wife had crossed the old swing bridge that morning to get to Hancock, where they were going to pick up his brother-in-law from the bus station. While they were in Hancock, they decided to eat breakfast at the then-Suomi Café downtown. As they finished their meal, a soldier on his way home

I was looking forward (because) I didn’t even know the bridge was going to be open.

“That was a surprise for me and my wife.”

At least 14,000 cars traversed the 188-foot tall, quarter-mile long structure during the first half of that day, making life difficult for police officers like Matt Kobe of the Hancock City Police Department. Kobe, now deceased, was the officer who directed traffic that day. According to Kobe’s wife, Catherine, there was no honor involved; he was just lucky enough to be scheduled for day shift that morning.

Strangely, the bridge’s opening drew a story in the Dec. 19 Daily Mining Gazette. One day earlier, however, the Gazette announced the opening with a brief

The Portage Lake Lift Bridge sits vacant to the right of the swing bridge it was built to replace. The barricades were lifted Dec. 20, 1959 and more than 1,200 vehicles crossed the canal on the first day of operation. (Photo courtesy of Michigan Tech University Archives)
Portage Lake Lift Bridge
Rehabilitation Projects

• 1978 – Mechanical and Electrical
• 1994 – Complete Paint
• 1998 – Deck Overlay, Electrical upgrade
• 2015 – Mechanical, Electrical, Structural upgrade
Incredible Record of Reliability

Outages that affected traffic Between 1980 and 2014

• **Spring 1983** - 1 ½ hour outage due to loss of power during a lift
• **Fall 1988** - 1 ½ hour outage when scaffolding on the bridge tripped a limit switch during high winds while lifting
• **November 1994** - 3 hour closure due to portions of the containment falling onto the bridge deck during painting project. Closed to re-secure the containment.
• **August 2010** - 4 hour closure when a syncro tie relay failed during lift allowing bridge to get out of skew and stuck
Mechanical/Electrical Rehabilitation and Upgrade

**Duration:** December 2014-April 2016  
**Cost:** $8.39 million  
**Designer:** Modjesky and Masters Inc.  
**Contractor:** Zenith Tech Inc.  
Anticipated Fix Life  
20-50-year fix
Contractor Team

- Zenith Tech, Inc – Prime Contractor
- Stafford Bandlow Engineering – Engineering Expert in Movable bridges.
- SPE, Inc – Iron Workers
- Calacci Construction – Mill Wrights
- Faith Technologies – Electrical
- Link Controls – Motor Drives, System Integration
- Calumet Machine – Balance Chains, Pinions, Shafts, Hydraulic Cylinders, Misc Fabricated parts
- Dan R. Dalton, Inc. – Heat Straightening
- Civil Coatings and Construction- Painting
Project details

- Lift cable replacement
- Balance chain rehabilitation
- Electrical and mechanical upgrades
- Lift motor drive replacements
- Spot painting
- Deck repairs
- Structural steel repairs
- New warning and barrier gates
Early Procurement Contract

• Procured long lead time items
  - Pinion Forgings
  - Index couplings
  - Wire Ropes
  - Balance Chain Bushings
Replacing Lift Cables

- Replace lift cables
- Mid-January to Late March
Replacing Lift Cables

- Disconnection (10 hours)
  January 17
  - Pin Counterweight
  - Jack Lift Span approx. 2’
  - Place temporary ramp for emergency vehicles to pass during this time
  - Disconnect all old cables
  - Lower lift span to bridge seats for winter
Portage Lake Lift Bridge

• Jacking Plan
Replacing Lift Cables
Jacking

• Jacks – for raising the lift span
Replacing Lift Cables

• Jacking
Counterweight hangers
Portage Lake Lift Bridge

- Pinning Counterweight
Lift Cables
Disconnected
Replacing Lift Cables

- Replace all 84 2-3/8” cables - one at a time
- 20-minute closures throughout winter (night work)
Portage Lake Lift Bridge

- Wire Rope Removal Plan
• Wire rope replacement
Equipment and rigging
Portage Lake Lift Bridge

- Wire ropes
Reconnecting Lift Cables

- Reconnect New cables to lift span (11.5-hour closure) March 21
  - Jack the liftspan approx. 3’
  - Position emergency ramp
  - Connect new cables
  - Lower the liftspan a distance to relieve pressure on counterweight hangers
  - Unpin counterweight and lower lift span with bridge machinery.
Reconnecting Lift Cables
Emergency ramps
Ambulance crossing on ramps
Balance Chain Replacement

- During Winter
- Shift traffic to inside lanes
- Set up rigging/equipment
- Close bridge 2 hours to lower/raise chains
- 8 chains – 2 closures per chain.
Balance Chain Removal Plan

Portage Lake Lift Bridge

- Balance Chain Removal Plan
Balance Chains Coming Down
Portage Lake Lift Bridge

• Balance Chain Removal
Portage Lake Lift Bridge
• Balance Chains Removal
Portage Lake Lift Bridge

- Balance Chains Reinstallation
Portage Lake Lift Bridge

- Upper machinery room - upgrades

Drive equipment upgrade
Portage Lake Lift Bridge

• Pinion gear and sheave
Backlash measurements
Upper machinery room - upgrades
Portage Lake Lift Bridge

- Upper machinery room - upgrades
Motor Drive Replacements
Span Position and Speed Sensors
Shimming of Bridge Seats
Final Adjustments

• Indexing adjustments
• Lower and Intermediate Bridge Seat shimming
• Adjustment of cable tensions (within each corner)
• Achieve equal load sharing
• Allow all corners to seat at same time
• Ensure automatic Skew control of Span during operation
Barrier Gates
Operator House Repairs

Repair floor damage
Substructure Patching
Portage Lake Lift Bridge

- **Mobility challenge: bridge closures**
  - Eight 2-hour closures: (2 AM-4 AM) February 2015
  - 168 intermittent 15-20-minute closures: January-March 2015, nighttime (7 PM-6 AM)
  - Eight 2-hour closures: March 2015, (2 AM-4 AM)
Average Daily Traffic

- Portage Lake Lift Bridge – 24,900
- Ambassador Bridge – 19,500
- Blue Water Bridge – 15,400
- Mackinac Bridge – 10,100
- International Bridge – 5,800
Imagine if you couldn’t get home to your kids ...
... or if your kids couldn’t get home to you.
Communications challenge

• **Issues surrounding bridge closures:**
  – Police, fire and ambulance access
  – Airport and bus schedules
  – Universities and schools – academic and sports calendars
  – Busy winter tourism season
  – Snowmobile access
  – Road maintenance and Emergency utility crew staging
  – Logging

• **How do we engage all of the stakeholder groups to coordinate bridge closures?**

• **How do we make sure all of them stay informed during the project?**
Communications challenge

• Stakeholder Engagement
  – Communications working group organized very early on – in May, 2014 – to discuss issues. Ongoing monthly meetings with:
    • Area emergency personnel
    • Law enforcement
    • Hospitals
    • Utility companies
    • Airport and transit officials
    • Schools
    • Sports organizations
    • Local units of government
    • Businesses
  – Researched area events calendars to identify quietest time periods
Communications Solutions

- We got the message out through traditional means:
  - Newspapers, TV, radio stations
  - Public meetings
  - Presentation to a joint meeting of the Hancock and Houghton city councils
  - Project Brochures
Communications Solutions

• We also used many other methods:
  – Digital message boards
    • 16 total DMS boards
    • Blanketed area around bridge
    • Even placed signs on snowmobile trails
  – Posters at marinas for maritime traffic info
  – Animated presentation at Houghton County Fair kiosk
Communications Solutions

- Short-range AM radio for closure alerts
- Social media: MDOT_UP twitter feed and statewide Facebook posts
Communications Solutions

 – Project specific email list:
   • About 130 people from our working group, area schools, hospitals, government officials, transit organizations, businesses, interested citizens
   • Gathered names from working group, but also at public meetings
   • Sent them all official press releases and notices
   • Targeted high-level people in each organization who then spread the word internally
Communications Outcomes

• Things we did:
  – Developed 911 procedures
  – Coordinated all-night closures with area events
  – Scheduled 2 AM–4 AM closures based on communications with key players
  – Provided for emergency ramps
  – Arranged hospitality rooms for motorists
Communications Outcomes

• Things others did: Exceptional buy-in from many stakeholders
  – MTU did its own poster and information campaign
  – Airlines made flight adjustments
  – MTU Hockey game times were adjusted
  – Cities provided extra police coverage at bridge during closures
Communications successes

- Message has been delivered

And so it begins: Massive bridge project starts today

January 5, 2015
By KURT HAUGLIE (khauglie@mininggazette.com), The Daily Mining Gazette

HANCOCK/HOUGHTON - Although a few baseline measurements were taken in mid-December, the main work for the maintenance project on the Portage Lake Lift Bridge began today.

Al Anderson, Michigan Department of Transportation project manager, said workers from contractor Waukesha, Wis.-based Zenith Tech worked on getting the bridge ready for the removal of the lift cables.

The workers were setting closure of the southbound lanes on the bridge to allow access to the lift cables.

No problem

Portage Lake Lift Bridge closure goes off without incident

January 16, 2015
By Don Roblee (droblee@mininggazette.com), The Daily Mining Gazette

HOUGHTON/HANCOCK - The Copper Country made it through Saturday night's planned closure of the Portage Lake Lift Bridge without any major incidents, and only a handful of people were trapped on the wrong side of the Portage Waterway.

Despite blustery winds and some snow, all planned work was completed and the bridge reopened an hour ahead of schedule.

"The main goal was to release the lift cables from the span and they did that," said Michigan Department of Transportation Project Engineer Al Anderson. "The wind didn't cause any issues - we didn't know if it would or wouldn't."
Happy Customers!

Polls

Have you been affected by the bridge closures?

a. Yes
   18%

b. No
   82%

Comments

No comments posted for this poll.