DESIGN TYPE: STRESS-LAMINATED SLAB DECK
YEAR BUILT: 1990
DESIGN ENGINEER: WHEELER CONSOLIDATED
FABRICATED BY: WOODSTOCK, INC. & SCHAFF LUMBER COMPANY
INSTALLED BY: ANLAAN CORP., GRAND RAPIDS
SPANS: JORDAN RIVER
LOCATION: NE¼ OF SEC. 32 T31N R6W

From Jct of US-131 in Mancelona go north on M-66 about 9 miles to Graves Crossing Road. Turn east and go about ¼ mile to bridge.
Graves Crossing Bridge

BRIDGE GEOMETRY

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spans:</td>
<td>2</td>
</tr>
<tr>
<td>Number of Lanes:</td>
<td>2</td>
</tr>
<tr>
<td>Total Length (feet):</td>
<td>38</td>
</tr>
<tr>
<td>Out-to-Out Width (feet):</td>
<td>27</td>
</tr>
<tr>
<td>Curb-to-Curb Width:</td>
<td>25</td>
</tr>
<tr>
<td>Lamina Size:</td>
<td>4&quot;x12&quot;</td>
</tr>
</tbody>
</table>

| Load Rating:           | HS-20  |
| Average Daily Traffic: |        |
| Abutment Material:     | TimberPiling |
| Superstructure Lumber Tally: | 11.8 MBF |
| Superstructure Cost:   |        |
| Superstructure Cost/ft²: | $45  |
| Total Project Cost:    | $142,000 |

BRIDGE MATERIALS

DECK

<table>
<thead>
<tr>
<th>Species:</th>
<th>Red Pine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity:</td>
<td>11.8 MBF Lbr Tally</td>
</tr>
<tr>
<td>Preservative:</td>
<td>CCA w/ water repellent</td>
</tr>
<tr>
<td>Retention:</td>
<td>0.4 lbs./ft³</td>
</tr>
<tr>
<td>Stressing Rods:</td>
<td>8</td>
</tr>
</tbody>
</table>

SUBSTRUCTURE

<table>
<thead>
<tr>
<th>Type:</th>
<th>Timber Piling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species:</td>
<td>Red Pine</td>
</tr>
<tr>
<td>Preservative:</td>
<td>Creosote</td>
</tr>
</tbody>
</table>

GUIDE RAILS

| Species:          | Glu-Lam Douglas Fir 6" x 8" |
| Preservative:     | Creosote |

WEARING SURFACE

Asphalt (3") over geotextile fabric

LOCAL IMPACT

Before replacement in 1991, Graves Crossing consisted of a series of four corrugated steel culverts with a 3-ton posted load limit. The culverts were in poor condition and insufficient to meet hydraulic flow requirements at the site. Past roadway washouts and severe scour problems required that the culverts be replaced with a new bridge structure designed for greater hydraulic capacity. In addition, a new bridge capable of supporting standard highway loads was needed to provide safe access for fire-fighting vehicles, school buses, and logging trucks. Replacement of the existing culverts with a skewed bridge was determined to be the best alternative, because it would allow alignment of the abutments with the natural stream channel and reduce adverse impacts on the Jordan River.

Construction of the Graves Crossing bridge was contractually administered by the Antrim County Road Commission. A temporary bridge (Bailey-type) was installed by the Michigan National Guard to provide uninterrupted traffic flow to residents during bridge construction.

BRIDGE PERFORMANCE

Reference: Field Performance of Timber Bridges - Graves Crossing Stress-Laminated Deck Bridge - Forest Service Research Paper FPL-RP-539. The document reports, based on 2 years of field observations, the bridge is performing well with no structural or serviceability deficiencies.

FABRICATION & ERECTION

The bridge is constructed from locally grown, CCA treated red pine lumber with water repellent additive to minimize wood swelling and contracting. Panels were nailed together for shipment to the bridge site where they were placed on a timber substructure and stressed together. Along side of the traffic bridge is a pedestrian bridge made from stringers and decking connecting the walkway from State Forest Campground on one side of the river with the canoe livery on the other side. The bridge site was configured so as to ease the launching of canoes while minimizing erosion of soil into the river.

FUNDING SOURCES

USDA Forest Service: 17%  
Other Sources: 83%

LOCAL CONTACT

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WIT Program Proposal Number: NA-11-90  
Federal Grant Identifier: NA-90-0135

COOPERATING AGENCIES

Conservation Resource Alliance

USDA FOREST SERVICE  
NORTHEASTERN AREA  
STATE & PRIVATE FORESTRY

MICHIGAN DNR