Olmsted Floating Approach Walls
Olmsted Site

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Introduction

Olmsted Floating Approach Walls
Olmsted Locks & Approach Walls - Today
Olmsted Approach Walls – Design Criteria

- Maintain Open River Navigation During Construction
- Build Without Cofferdam
- Minimize Structural Mass to reduce Seismic Loads
- Water Velocities During Construction Up to 2.4 m/s (8fps)
- River Level May Change up to 18.3 m (60 ft) in one Season
- Resist Direct Barge Impact; Loads Up to 17,800 kN (4 million lbs)
- Resist Lateral Barge Impact; Loads to be Determined
- Minimize the Use of Divers During Construction of Divers
Olmsted Floating Approach Walls

Barge Impact
Raked Barge After Impacting a “Bullnose”
WES Barge Impact Model Testing
WES Barge Impact Model Testing Results

Over 300 Model test impacts run by WES personnel

Model tests generated Impact Velocity and Angle of Impact

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## Final Olmsted Approach Walls Design

**Barge Impact Loads (KIPS)**

<table>
<thead>
<tr>
<th>Design Condition</th>
<th>Lower Walls kip</th>
<th>Upper Middle Wall kip</th>
<th>Upper River Wall kip</th>
<th>Nose Pier kip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual</td>
<td>300</td>
<td>300</td>
<td>600</td>
<td>4000</td>
</tr>
<tr>
<td>Unusual</td>
<td>450</td>
<td>600</td>
<td>900</td>
<td>----</td>
</tr>
<tr>
<td>Extreme</td>
<td>500</td>
<td>800</td>
<td>1000</td>
<td>----</td>
</tr>
</tbody>
</table>
Olmsted Floating Approach Walls

Nose Pier & Pylon
Nose Piers & Pylons
Precast Shell Elements Placed over Shafts

SECTION D

ELEVATION 257-292.0

SECTION A

ELEVATION 292-310.0
Founded on 10’ Diameter Drilled Shafts

- Casings were fabricated in Idaho before steel prices spiked
- Casings are 44 m long, in one piece
- Casing thickness Varies from 2 – 3 cm
10-Ft Diameter Casing & Custom Vibratory Hammer
Approach Wall Pylon & Nose Pier

DRILLED SHAFTS

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Positioning & Driving a Casing –
Ringer Crane Mounted on Jumbo Barge

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Approach Wall Pylon & Nose Pier

BASE SHELL
Setting Precast Concrete Top
“Delta” Elements on Top of Nose Pier Base Shell
Approach Wall Pylon & Nose Pier

Pylon Shaft Elements
Installing Precast Concrete Pylon Shell Elements over Drilled Shafts
Painting for Visibility

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Olmsted Floating Approach Walls

The Pontoons
Typical Pontoon Cross Section
Graving Yard & Casting Basin
Overview of Graving Yard Site
March 1, 2001

Overview of Graving Dock Site March 1, 2001
Post tensioning with over 6.9 MPa (1000 psi)
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Floating Off the Casting Beds
Casting Basin Flooding Begins
Casting Yard Relationship to Float-out Storage Basin

Mooring Dolphins
Basin is flooding – pontoons at lower casting elevations get wet first

First two rows are wet, water not yet to third row
Basin Superflood Complete
Pontoons all Afloat and Have Been Moored to Dolphins
Completed Pontoons Ready to Transport to Olmsted Site

Note Breached Dike
Transporting a Completed Pontoon from Casting Yard to Olmsted Site

I-24 Bridge near Paducah
Completed Pontoon Arriving at Olmsted
Integration and Installation at The Olmsted Site
Integrating Pontoons at Olmsted

Integration Bolt Holes with Rubber “Donuts” surrounding each hole
Integrating Pontoons at Olmsted
Aligning Pontoons for Integration

- Pontoon in shadow; water temperature warmer than air or pontoon
- Pontoon in the sun; water temperature cooler than air or pontoon
- Hard Points Must be Level to Integrate

Temperature Extremes
- Air -14 to +108 deg F
- Water +37 to +87 deg F
Checking Horizontal Alignment on Primary Impact face at Olmsted

07/23/2003

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Dewatering box in case future repairs are necessary below the water line
Integration Seals at Perimeter of Pontoon and around each Bolt Hole
Integrating Pontoons at Olmsted
Installing an Integrated Floating Wall

This was a 90 Minute Operation!

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Final Installation of 508 m (1667 ft) Long Upper River Wall in February 2004

Duration of Installation: 1½ hours
High Mast Lighting was installed after pontoons were integrated and installed in final positions.
River in Flood January 2005
Pontoons Ride the Floods
Construction Cost

Award Amount
$98,981,000

Final Amount
$106,360,000

7.45% Growth
Olmsted Approach Walls Team

INCA Engineers
Glosten Associates
Geomatrix
Elcon Associates
John Priedeman
Washington DOT

USACE
Louisville District
Headquarters
Portland District
Nashville District
ERDC (WES)

Massman Construction Co.

SUBCONTRACTORS:
Bar-Tie Reinforcing Inc.
Gerald Chambers & Sons, Inc.
Luhr Bros., Inc.
Plateau Electrical Constructors, Inc.
Thomas Industrial Coatings

SUPPLIERS:
Alfab, Inc.
AmeriSteel
Eaton Metal Products Co.
Egyptian Concrete Co.
Federal Materials Concrete

Steven M. Hain Co.
Hydraulic Power Systems, Inc.
Ingram Barge Co.
James Marine Inc.
Steward Machine Co.
VSL/Vstructural

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