Innovative Techniques for Construction & Rehabilitation of Bridges using Precast Modular Retaining Wall Systems

T. C. NEEL
Precast Modular Retaining Walls
Now used for Bridge Approaches
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• Highways
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• Highways
• Railroads
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- Highways
- Railroads
- New Construction & Replacement
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- Highways
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- Rehabilitation
Why Precast Retaining Walls?

• Reduces Bridge Length
• Replaces Spans, Piers
• Quality Control
• Reduces Maintenance

Saves: Time, Material, Cost

• Increases Service Life
Bridge Approach
Main St, Butler, PA, US

Replacement & New Construction
Original Bridge: Conventional Piers & Decks
Original Bridge: Conventional Piers & Decks

Replacement: Precast Retaining Wall
42’ High Precast Modular Retaining Wall Bridge Approach

Main Street Bridge Replacement, Butler, PA
Precast Retaining Wall - Project Benefits:

- Replaced Piers & Spans
- Reduced Construction Time
- Reduced Closure Time
- Reduced Costs by 30%
Bridge Approach & Widening with No Ground Improvement

I-95 Widening, Philadelphia, PA

Replacement & New Construction
Precast Retaining Wall Bridge Approaches

Reconstruction & Widening of I-95, Philadelphia, PA
Benefits of Precast Retaining Wall

Eliminated Jet-Grouting

I-95 Remained Open
Easy to Use Around Modular Stand-Alone Units
Railroad Bridge Approach & Grade Separation with Phased Construction

Replacement & New Construction

Port of Vancouver, Vancouver, WA
Port of Vancouver Freight and Waterfront Access
(Viaduct Replacement)

Original Viaduct
Precast Units allowed Phased Construction

Original RR Line & Viaduct

Service Route Remained Open

New Line with Precast Retaining Wall Grade Separations
Precast Units allowed Phased Construction

Original Viaduct Demolished

New Line Operational
Precast Units allowed Phased Construction

Approaches Completed

Both Lines Reopened
Benefits of Precast Retaining Wall

Phased Construction
No Delay in Service
Long-term Service Life, Maintenance Free
Rehabilitated Bridge

McDade Boulevard, City of Chester, PA
Original Bridge
Previous Condition & Deterioration
Using Innovative Precast Retaining Wall Eliminated:

- Extensive Form Work
- Reinforcing Installation
- Concrete Pumping & Curing Time
Precast Retaining Wall - Project Benefits:

- Precast Quality Control
- Ease of Construction in Restricted Work Area
- Saving Time, Cost, and Materials
Railroad Bridge
Bahçe-Nurdagi, Adana

New Construction
Double-sided Approach with Catenary
Railroad Bridges over Water
Seismic Considerations

AASTHO 2010

\[ K_{EQ} = \frac{1}{2} \sigma h^2 \left( \frac{PGA}{2} \right) \]

\[ E_{AE} = \frac{1}{2} \sigma h^2 \left( \frac{PGA}{2} \right) \]

AASTHO 2012

\[ K_H = \frac{1}{2} \sigma h^2 \left( \frac{PGA}{2} \right) \]

\[ P_{AE} = \frac{1}{2} \sigma h^2 \left( \frac{PGA}{2} \right) \]
Similar Project Completed in a Class I Earthquake Zone, Ontario, CA, US

Precast Retaining Wall - Project Benefits:

Construction in Limited ROW
Class I Earthquake Zone
Savings in Reduction of Bridge Length
Growing use of Precast Modular Retaining Walls

- Replace existing structures with
- Rehabilitate existing structures
- Increased service life, reduce
T-WALL®
RETAINING WALL SYSTEM
From Concept to Completion

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