Reeseville Railroad Bridge Design Improvements in Response to 500-year Flood in Beaver Dam River Watershed

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Agenda

• Site Background
• June 2008 Storm Event
• Hydrology and Hydraulics Modeling
• Proposed Design
Site Background
Site Location Map
Reeseville Railroad Statistics

• Originally built in 1858
• Track length is approx. 1.2 miles
• Embankment is approx. 5 to 8 feet above marsh bottom
• Track settles approx. 0.2 in/year due to organic soil base
• Serves approx. 300,000 Amtrack passengers per year
• Transports approx. 4.7 billion ton-miles of freight per year
• Track has closed due to flooding at least 8 times since 1930
June 2008 Storm Event
Gage Locations

- Rock River Gage
- Beaver Dam River Gage
- Project Site
- Crawfish River Gage
Rainfall for June 2008 Flood

Rock River at Waupun, WI
(USGS Gage 05423500)
Discharge Hydrograph for June 2008 Flood

Beaver Dam River at Beaver Dam, WI
(USGS Gage 05425912)
June 2008 Flood Photographs
June 2008 Flood Photographs
June 2008 Flood Photographs
June 2008 Flood Photographs
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June 2008 Flood Photographs
June 2008 Flood Statistics

- Rainfall began 6/4/08 and lasted for 9 days
- Total rainfall was 14.48 inches
- Rainfall and discharge probabilities are estimated as greater than 500-year events
- Track was closed from 6/9/08 through 6/29/08 (20 days)
- Peak water surface elevation at site occurred on 6/16/08
Hydrology and Hydraulics Modeling
Modeling Approach

• Hydrology
  – HEC-HMS
  – Clark unit hydrograph method
  – Reeseville marsh treated as reservoir
  – Input parameters calibrated to gage data
  – Iterate input parameters and reservoir rating curve until accurate calibration is achieved

• Hydraulics
  – HEC-RAS steady flow
  – Reservoir rating curve used as starting condition
Watershed Map
Reeseville Marsh

BRIDGE AT MILE 139.08

BRIDGE AT MILE 138.03
## Model Calibration

### Optimized Parameter Results for Trial "Trial 1"

- **Project:** CP  
- **Optimization Trial:** Trial 1
- **Start of Trial:** 02 Jun 2008, 00:00  
- **End of Trial:** 10 Sep 2008, 00:00  
- **Compute Time:** 06 Mar 2011, 14:20:47  
- **Basin Model:** Watershed_Jun_2008  
- **Meteorologic Model:** Jun_2008  
- **Control Specifications:** Jun_2008

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Model Calibration

Discharge Calibration at Beaver Dam Gage

- HEC-HMS Output
- Observed

Date:
- 06/02/08
- 06/12/08
- 06/22/08
- 07/02/08
- 07/12/08
- 07/22/08
- 08/01/08
- 08/11/08
- 08/21/08
- 08/31/08
- 09/10/08

Discharge (cfs):
- 0
- 500
- 1000
- 1500
- 2000
- 2500

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Model Calibration

Stage Calibration at Project Site

- HEC-HMS Output
- Observed

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Modeling Conclusions

• Hydrology
  – Calibrated model output compared well with gage data
  – Calibrated model used with Huff distribution storms to determine design discharge at project site
  – Reeseville marsh reservoir elevations used as downstream starting condition in HEC-RAS model

• Hydraulics
  – Flat hydraulic grade line confirms that marsh acts as reservoir for high flow events
  – Model used to determine impact of design alternatives
Proposed Design
Proposed Design

PHASE 1
BENCH INTO EXISTING EMBANKMENT, RAISE
GRADE TO TOP OF EMBANKMENT (2 STAGES
MAY BE REQUIRED), ESTABLISH TRACK.

PHASE 2
PREPARE SECOND HALF OF EMBANKMENT
AS ABOVE.
Questions?

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