Battling Mother Nature During the Reconstruction of Garretts Mill Road Bridge
Presenters

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May 15-16, 2018 over 16 inches of rain fell on Southern Washington County (9.45 inches of which in 45 minutes).

Garretts Mill Road Bridge over Israel Creek was overtopped and the flood plain inundated.

The bridge and roadway was rendered unusable.
Source: Julie E. Greene May 29, 2018; South County resident Sophia Turner talks to Maryland Lt. Gov. Boyd Rutherford across a damaged bridge on Garretts Mill Road in Knoxville on May 16, 2018 during his visit to inspect damage left after strong thunderstorms caused severe flash flooding overnight.
Washington County issued an RFP for Design-Build Replacement Project on July 5, 2018.

Building Systems Inc. (Contractors) / Brudis & Associates, Inc. (Designers) was Awarded the Contract on August 24, 2018.

The Project involved Hydraulically In-Kind Replacement of the Bridge and Roadway.
Hydrologic Modelling

- Win TR-20 & GIS Hydro was used
- Drainage Area = 9.8 Sq. Miles
- No gage data available
- Calibration conducted using FRR equation and Tasker upper 67% confidence limits
- Existing condition land use was used

Summary of Discharges for Israel Creek at Garretts Mill Road

<table>
<thead>
<tr>
<th>RETURN PERIOD (yr)</th>
<th>Existing Development Conditions WinTR-20 Estimate (ft³/s)</th>
<th>Ultimate Development Conditions WinTR-20 Estimate (ft³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>640</td>
<td>620</td>
</tr>
<tr>
<td>10</td>
<td>1,780</td>
<td>1,740</td>
</tr>
<tr>
<td>25</td>
<td>3230</td>
<td>3180</td>
</tr>
<tr>
<td>50</td>
<td>4,150</td>
<td>4,080</td>
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<tr>
<td>100</td>
<td>5,190</td>
<td>5,140</td>
</tr>
<tr>
<td>500</td>
<td>8,150</td>
<td>8,070</td>
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</table>

- Hydrology report submitted and approved by MDE using Expedited Reviewers
GOALS:

HEC-RAS Model used to accomplish the following goals:

• Assess the impacts of proposed design on Shear Stress, Flooding Conditions and Overtopping Conditions
• Find optimum size of proposed structure
• Provide hydraulic parameter for scour analysis

RESULTS & RECOMMENDATIONS:

• No adverse impacts to the WSEL
• Hydraulic in-kind replacement with 26 ft long 28 ft wide CON/SPAN O-SERIES bridge
• Scour protection - Not an issue due to rock outcrops at shallow depths

Hydraulic Report submitted and approved by MDE
STORMWATER MANAGEMENT

REQUIREMENTS

• Project LOD = 0.35 Ac ( > 5000 SF)
• SWM is required
STORMWATER MANAGEMENT

WATER QUALITY:

• ESDv Required = 148 CF
• Additional nutrients (Phosphorus) reduction required
• Emergency project
• All SWM options were evaluated but not feasible
• Granted SWM qualitative control waiver under section 3.2.3 of Washington County’s SWM ordinance

WATER QUANTITY:

• No increase in peak discharges at downstream of bridge
• SWM quantity control requirement satisfied
EROSION AND SEDIMENT CONTROL

REQUIREMENTS

• Project LOD > 5000 SF
• Excavation > 100 cy
• E & S design and permit required

Three phases were implemented:

• Phases 1 & 2 - Demolition & Abutment foundation (emergency)
• Phase 3 - Superstructure, Roadway
EROSION AND SEDIMENT CONTROL

Demolition & Abutment Sub-foundation (Phases 1 & 2)
• Construction entrance
• Silt fence
• Temporary stream diversion using concrete blocks
• Filter bag and pump

Superstructure & Roadway (Phase 3)
• Stream diversion using concrete barrier
<table>
<thead>
<tr>
<th>DAYS SINCE NTP</th>
<th>ACTIVITY</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>NTP/BEGIN DESIGN</td>
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<tr>
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<td>HYDROLOGY REPORT SUBMITTED</td>
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<td>HYDROLOGY APPROVAL GRANTED</td>
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<td>EMERGENCY PACKAGE SUBMITTED</td>
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<tr>
<td>60</td>
<td>PHASE 1 &amp; 2 CONSTRUCTION STARTED</td>
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<td>140</td>
<td>SWM &amp; EROSION CONTROL PERMIT PERMIT GRANTED:</td>
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<tr>
<td>300</td>
<td>PHASE 3 CONSTRUCTION COMPLETED</td>
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</table>
Demolition

- Bridge was lifted by crane.
In-Stream Work

- In-stream diversion used, but high levels of rainfall and underground flow made this option unusable.
In-Stream Work

- Pump and pipe diversion was ultimately used with three additional pumps evacuating the work area for subfooting concrete pours.
New Bridge Installation
Questions ??
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