ACCELERATED CONSTRUCTION AND EMERGENCY REPLACEMENT OPTIONS FOR PRE-ENGINEERED STRUCTURES

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CONTECH Engineered Site Solutions

Bridge, Drainage, Erosion Control, Retaining Walls, Sanitary, Soil Stabilization, Stormwater
Plate:

Precast:

Truss:
Plate:
- MULTI-PLATE®/Aluminum Structural Plate
- Aluminum Box Culvert
- SUPER-SPAN™/SUPER-PLATE®

Precast:
- CON/SPAN®
- BEBO®

Truss:
- Steadfast Bridges®
- Continental® Bridge
Bridge Span Ranges

- **Plate**  
  5-52 ft

- **Precast**  
  12-102 ft

- **Vehicular Steel Truss Bridges**  
  10-150 ft

- **Pedestrian Steel Truss Bridges**  
  10-250 ft and more

**Span (ft)**: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150
Truss Bridge Styles

- Archway®
- Capstone®
- Keystone®
- Connector®
- Link®
- Steel Stringer
- Expressway®
- Gateway®
- Cable Stayed

*Pedestrian Only
# Structural Plate Shapes

<table>
<thead>
<tr>
<th>Shapes</th>
<th>Sizes — Span x Rise</th>
<th>Arch (single radius)</th>
<th>5’ x 1’9”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round</td>
<td>5’ to 26’</td>
<td></td>
<td>25’ x 12’6”</td>
</tr>
<tr>
<td>Vertical Ellipse</td>
<td>4’8” x 5’2” to 5’</td>
<td></td>
<td>20’1” x 7’6”</td>
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<tr>
<td></td>
<td>to 25’ x 27’7”</td>
<td></td>
<td>45’0” x 18’8”</td>
</tr>
<tr>
<td>Underpass</td>
<td>12’2” x 11’0” to 20’4”</td>
<td>20’1” x 9’1” to 35’4” x 20’0”</td>
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<tr>
<td></td>
<td>to 17’9”</td>
<td>High-Profile Arch *</td>
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<tr>
<td>Pipe-Arch</td>
<td>6’1” x 4’7” to 20’7”</td>
<td>23’-11” x 23’-4” to 30’4” x 25’-10”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to 13’2”</td>
<td>Pear-Arch</td>
<td></td>
</tr>
<tr>
<td>Horizontal Ellipse</td>
<td>7’4” x 5’6” to 14’11”</td>
<td>23’-8” x 25’-5” to 29’-11”</td>
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</tr>
<tr>
<td></td>
<td>to 11’2”</td>
<td>Pear</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Horizontal Ellipse</td>
<td>19’4” x 12’9” to 37’2” x 22’2”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Box Culvert</td>
<td>8’9” x 2’6” to 35’3” x 13’7”</td>
</tr>
</tbody>
</table>
## CON/SPAN® WATERWAY CHARTS

### SHORT SPAN SERIES

![Short Span Series Diagram]

<table>
<thead>
<tr>
<th>RISE (FT.)</th>
<th>SPAN (FT.)</th>
<th>WATERWAY AREA (SQUARE FEET)</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>12</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>54</td>
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<tr>
<td>6</td>
<td>12</td>
<td>66</td>
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<td>7</td>
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<td>78</td>
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<td>9</td>
<td>12</td>
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<td>12</td>
<td>114</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>145</td>
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</table>

### INTERMEDIATE SPAN SERIES

![Intermediate Span Series Diagram]

<table>
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<tr>
<th>RISE (FT.)</th>
<th>SPAN (FT.)</th>
<th>WATERWAY AREA (SQUARE FEET)</th>
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<tbody>
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<td>16</td>
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<tr>
<td>6</td>
<td>20</td>
<td>87</td>
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<tr>
<td>7</td>
<td>20</td>
<td>103</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
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<td>20</td>
<td>135</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>151</td>
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</table>

### LONG SPAN SERIES

![Long Span Series Diagram]

<table>
<thead>
<tr>
<th>RISE (FT.)</th>
<th>SPAN (FT.)</th>
<th>WATERWAY AREA (SQUARE FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>28</td>
<td>195</td>
</tr>
<tr>
<td>9</td>
<td>32</td>
<td>223</td>
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<tr>
<td>10</td>
<td>36</td>
<td>251</td>
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<tr>
<td>11</td>
<td>36</td>
<td>279</td>
</tr>
<tr>
<td>12</td>
<td>42</td>
<td>304</td>
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<td>13</td>
<td>42</td>
<td>333</td>
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<td>14</td>
<td>48</td>
<td>364</td>
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<td>15</td>
<td>48</td>
<td>392</td>
</tr>
<tr>
<td>16</td>
<td>48</td>
<td>420</td>
</tr>
</tbody>
</table>

1. If = 10" (20' & 32' spans)
2. If = 14" (24' & 42' spans)
3. If = 12" (30' & 42' spans)
I-88 Emergency Bridge Replacement

NYSDOT: Sidney, NY
Project Details

- Temporary Bridge originally considered
- 60 – Precast 42’ span x 12’ rise CON/SPAN arch units
- Cast-in-place pedestal wall foundations on piles
- 21’ of fill on top of arch units, 9’ of which were lightweight
- 3 precast units cast each day to meet schedule
I-88 Emergency Bridge Replacement
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I-88 Emergency Bridge Replacement
Summary & Conclusions

- Culvert washed out on June 27th
- A week later the precaster started fabrication
- Last of arch units installed August 19th
- NYSDOT got buy-in from all stakeholders on schedule
- Use of a pre-approved Precast Modular System allowed for rapid construction

I-88 Emergency Bridge Replacement
SR 144 Emergency Culvert Replacement
INDOT SEYMOUR DISTRICT: Morgan County, IN
Project Details

- Culvert washed out on June 7\(^{th}\), 2008 during 100 year plus rainfall event
- 100’ – 20’-7” span x 13’-2” rise MULTI-PLATE Pipe arch
- Culvert produced and delivered with 15 days of July 29\(^{th}\) order
- Two days to assemble and install structure
- Road opened on September 6th
SR 144 Emergency Culvert Replacement
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SR 144 Emergency Culvert Replacement
SR 144 Emergency Culvert Replacement
SR 144 Emergency Culvert Replacement
SR 144 Emergency Culvert Replacement
SR 144 Emergency Culvert Replacement
Summary & Conclusions

- Replacement structure provided larger hydraulic opening and improved alignment
- DOT sense of urgency and available technical support helped reduce construction time
- Use of “off the shelf” multi-plate structure allowed for speedy replacement

SR 144 Emergency Culvert Replacement
SR 18 Emergency Culvert Replacement
CALTRANS: Lucerne Valley, CA
Project Details

• 10 – Precast 12’ span x 10’ rise CON/SPAN arch units w/ precast headwalls and wingwalls
• Precast units diverted from another project
• Cast-in-place slab foundation
• CALTRANS director committed to reopening highway in 2 weeks

SR 18 Emergency Culvert Replacement
Typical Cross Section

SR 18 Emergency Culvert Replacement
SR 18 Emergency Culvert Replacement
SR 18 Emergency Culvert Replacement
SR 18 Emergency Culvert Replacement
Summary & Conclusions

- Replacement structure provided larger hydraulic opening and improved alignment
- Emergency nature of the project helped clear obstacles that would have increased project time
- Use of “off the shelf” precast structure allowed for 2 week replacement

SR 18 Emergency Culvert Replacement
SEPTA Accelerated Bridge Replacement
Project Details

- SEPTA could not afford extended down time to replace the structure.
- 35 – Precast 32’ span x 13’ rise CON/SPAN arch units including wingwalls, foundations and headwalls.
- The South Eastern Pennsylvania Transportation Authority, or SEPTA, provides commuter rail service throughout Philadelphia and its four suburban counties.
- Replacement of the existing structure to accommodate both the private road for the college and the shared use path for the township.

SEPTA Accelerated Bridge Replacement
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SEPTA Accelerated Bridge Replacement
SEPTA Accelerated Bridge Replacement
SEPTA Accelerated Bridge Replacement
Summary & Conclusions

• Construction transpired over Labor Day Weekend (August 29th – September 1st)
• CONSPAN chosen as a result of extensive rail experience, aesthetics and speed of installation
• Demolition commenced at 4AM Friday morning
• The precast installation was completed in 14 hours
• The trains were back in service for the first run at 5AM Tuesday morning
• The project required close coordination between 4 public agencies, a college, and the contractor

SEPTA Accelerated Bridge Replacement
I-90 Over Anderson Drive
NYSDOT: Albany, NY
Project Details

- Minimal impact to I-90 was the main selection criteria
- 40 – Precast 36’ span x 11’ rise CON/SPAN arch units including 10 pie-shaped pieces and headwalls
- Unique construction process of building a bridge under existing structure limited impact to both interstate and local road

I-90 Over Anderson Drive
Plan view

I-90 Over Anderson Drive
3-D Model

I-90 Over Anderson Drive
I-90 Over Anderson Drive
I-90 Over Anderson Drive
I-90 Over Anderson Drive
Summary & Conclusions

- Staged Construction process took 5 weeks to complete
- Closure time and inconvenience to the public was greatly reduced
- Prefabricated bridge greatly reduced overall construction period – pieces were installed in 5 working days

I-90 Over Anderson Drive
Project Details

- Reduce the amount of closure time and traffic disturbance to hours per day
- 54 – Precast 28’ span x 11’ rise CON/SPAN arch units including precast wingwalls and headwalls
- In a single day operation, the arch units were slid into position leaving the existing bridge beams and abutments in place.
- Structure was backfill with grouted through holes cored in shoulder of existing roadway

Dayton-Springfield Road
Springfield Road
Summary & Conclusions

- Project specification stipulated 14 day road closure time and inconvenience to the public was greatly reduced
- Actual closure time was 12 partial days, the road was reopened for traffic through most of the day
- Successfully replaced existing structure in a cost-effective manner while minimizing the closure time on the road

Dayton-Springfield Road
Conclusions

• All 6 projects demonstrated that the use prefabricated bridge elements decrease construction duration
• Pre-approved systems can cut months out of schedules
• Sense of urgency from DOT combined with road opening commitments to public plays a factor
• The use of on-site manufacturing facilities creates opportunities to save significant time on construction schedules
Plate:

Precast:

Truss: