Bond Behavior of FRP Laminates to Concrete Subjected to Varied Surface Preparation

Graduate Student: Jason Jeffries
Advisor: Dr. John J. Myers
Objectives

To study the influence of surface preparation of the concrete substrate with the bond to the FRP laminate.

Two test methods will be undertaken including a flexural test (Phase I) and a direct shear test (Phase II).
Background

- Importance of Bond
  - Composite Action
  - Stress Transfer
- Factors Analyzed
  - Surface Roughness
Imaging Device

Laser Profilometer connected with computer

Equipment

Laser profile
Phase I Test Matrix

- Beam
  - 2 in (51 mm) CFRP Strip
  - Bonded to Tension Face
  - 4 in (102 mm) Uwrap on Non Tested End
  - Bonded Length of 8 in (203 mm)
  - 4 in (102 mm) Unbonded Region at MidSpan
# Phase I Test Matrix

<table>
<thead>
<tr>
<th>Beam</th>
<th>Roughness</th>
<th>Bonded Length</th>
<th>Avg. $i_a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>8 in</td>
<td>6.35</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>8 in</td>
<td>9.51</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>8 in</td>
<td>9.35</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>8 in</td>
<td>9.41</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>8 in</td>
<td>9.57</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>8 in</td>
<td>10.10</td>
</tr>
</tbody>
</table>
Phase I Test Setup

Hinge

Saw Cut

2”

6”

10”

4”

48”

21”

42”

10”

4”

4”

8”

48”
Phase I Test Setup
During Testing

At End of Test
Conclusions

Phase I: Study is On-going.
No conclusions to date

Phase II: will involve 50 specimens that will be subjected to varied surface roughnesses using water jet technology and tested in a direct shear test.
Thank You!

Questions?