



## **2010 ODOT/FHWA FRP Workshop**

Bonded FRP (Fiber Reinforced Polymer) Repairs for Concrete Structures

**December 2nd-3rd, 2010**

**ODOT Barlow Bldg., Room 107**

**3700 SE 92nd Ave., Portland, OR 97266**

# 2010 ODOT/FHWA Workshop

## Repair-Retrofit of Concrete Structures Using FRP Composites

### Day 1: December 2nd, 2010

|               |                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:00 – 8:30   | Registration                                                                                                                                                                                                                   |
| 8:30 – 8:45   | Introduction   Louis N. Triandafilou, P.E, FHWA                                                                                                                                                                                |
| 8:45 – 9:45   | Session I   Amir Mirmiran, Ph.D., PE, FIU<br><b>Purpose and scope of training, handouts</b><br><b>General introduction to FRP materials</b>                                                                                    |
| 9:45 – 10:00  | Coffee Break                                                                                                                                                                                                                   |
| 10:00 – 10:50 | Session II   Amir Mirmiran, Ph.D., PE, FIU<br><b>Construction Specifications</b><br>Qualifications and submittals<br>Safety issues<br>Storage, handling and disposal requirements                                              |
| 10:50 – 11:00 | Break                                                                                                                                                                                                                          |
| 11:00 – 12:00 | Session III   Mohsen Shahawy, Ph.D., PE, SDR<br><b>Construction Specifications</b><br>Substrate repair<br>Defects in concrete and reinforcement<br>Concrete restoration<br>Surface preparation                                 |
| 12:00 – 1:00  | Lunch                                                                                                                                                                                                                          |
| 1:00 – 3:00   | Session IV   Mohsen Shahawy, Ph.D., PE, SDR<br><b>Construction Specifications</b><br>FRP installation<br>Environmental conditions<br>Wet lay-ups<br>Pre-cured systems<br>Near-surface mounted systems<br>Curing and protection |
| 3:00 – 3:15   | Coffee Break                                                                                                                                                                                                                   |
| 3:15 – 4:15   | Research in Progress   Dr. Chris Higgins<br><b>Shear Strength and Environmental Durability</b>                                                                                                                                 |
| 4:15 – 4:45   | Questions, Discussion, and Feedback                                                                                                                                                                                            |
| 4:45          | Adjourn                                                                                                                                                                                                                        |

## Day 2 : December 3rd, 2010

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:00 – 10:00  | <b>Session V   Amir Mirmiran, Ph.D., PE, FIU</b><br><b>Construction Specifications</b><br><b>Inspection and quality assurance</b><br>Inspection procedures<br>Daily inspection<br>Materials inspection<br>Test methods (Fiber orientation, debonding, cure of resin, adhesion, and cured thickness)<br><b>Repair of defective work</b><br>Criticality of defects, size and location<br>Repair procedures and acceptance criteria                                                       |
| 10:00 – 10:15 | <b>Coffee Break</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 10:15 – 11:30 | <b>Session VI   Mohsen Shahawy, Ph.D., PE, SDR</b><br><b>Process Control</b><br>Quality assurance policy, responsibilities<br>QA procedures<br>Project startup requirements<br>Material qualification and acceptance<br>Removal of defective concrete and restoration of concrete<br>Inspection of concrete substrate<br>Application conditions<br>FRP application process<br>Identification of defective work<br>Post-application quality control tests<br>General job administration |
| 11:30 – 12:00 | <b>Questions, Discussion, and Feedback</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 12:00 – 1:00  | <b>Lunch</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 1:00 – 3:00   | <b>Session VII   Mohsen Shahawy, Ph.D., PE, SDR</b><br><b>Field applications</b><br><b>Examples of repair applications</b>                                                                                                                                                                                                                                                                                                                                                             |
| 3:00 – 3:15   | <b>Coffee Break</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3:15 – 4:00   | <b>Other applications</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4:00 – 4:30   | <b>Questions, Discussion, and Feedback</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4:30          | <b>Adjourn</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Seating is limited, registration is required !**

**Contact: Lorrie Schaefer 503-378-5224 for registration**

**Link: <http://s-salemrev-69/stc/student/psciis.dll?class=student&code=EG005700>**

A detailed map of the area around the ODOT Barlow Building in Portland, Oregon. The map shows the intersection of SE Powell Blvd (US-26) and SE 92nd Ave. The ODOT Barlow Building is highlighted with a blue circle and labeled. Other landmarks include the War Veterans Memorial Fwy (I-205), Lents Park, and various local businesses and schools. The map also shows the surrounding street grid, including SE 88th Ave, SE 90th Ave, SE 94th Ave, SE 96th Ave, SE 98th Ave, SE 100th Ave, SE 101st Ave, and SE 102nd Ave. The map is oriented with North at the top.

**Barlow School – ODOT Building**  
**3700 SE 92nd Ave., Portland, Oregon**  
**503-731-3244**

### Driving Directions to Barlow School from Salem:

- From I-205, take Exit 228 toward I-84/The Dalles/Seattle.
- Take the Powell Blvd./US-26/Division St. exit – Exit 19.
- Turn left onto SE Powell Blvd/US-26.
- Turn left onto SE 92nd Avenue.
- End at 3700 SE 92nd Avenue.

**From North – Airport area:**

- From I-205 heading south
- Take the Powell Blvd./US-26/Division St. exit – Exit 19.
- Stay on the Powell Blvd and Turn right onto SE Powell Blvd/US-26.
- Turn left onto SE 92nd Avenue.
- End at 3700 SE 92nd Avenue