Crack Bridging Properties of PCS-355

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Photo 1

Photo 2

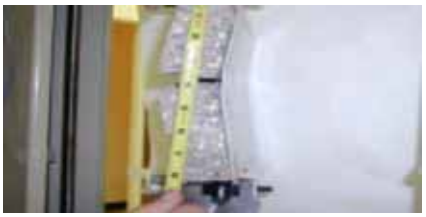

Photo 3

Photo 4 shows the gap at 1".

A polyurea system developed by Polyurea Coating Systems, Inc. will bridge gaps and cracks up to 1" wide developing in a concrete surface. PCS-355/ PCS-30 system membrane will not crack, tear, or lose adhesion along the shoulders of the crack after repeated stretching of a 1" gap.

The Pentagon recently constructed a 280,000 ft^2 concrete structure to serve as a remote delivery facility (RDF) for services and goods provided to the Pentagon office facilities. The RDF is located below grade and constructed as a directed blast structure to provide security to the Pentagon proper in the event of a directed attack by way of incoming goods. The roof of the deck will be backfilled and developed into a park atmosphere with grass, plants, trees, and esplanade. Figure 1 shows the surface of the RDF.

Polyurea Coating Systems Inc. (PCSI) provided PCS-30 primer and PCS-355 polyurea to waterproof the concrete deck, walls, and planter boxes prior the backfill and flora. PCS-30 100% solids epoxy penetrating primer was applied at 2-3 mils over the concrete surfaces. PCS-355 polyurea was then applied at 80-100 mils to provide the waterproofing membrane. As portions of the deck were completed, flood tests were performed to ensure no leaks developed. The entire deck was coated in this manner until full waterproofing was achieved.

Due to the unique design of the building, to provide directed blast protection, cracks began to develop in large unsupported spans of concrete. In addition, the Washington D.C. location of the structure, temperature extremes of 0°F to over 100°F are expected. A concern developed that these temperature fluctuations and the unique design of the structure may aggravate crack formation in the concrete to the extent that the waterproofing membrane may be compromised. PCSI evaluated the PCS-355/PCS-30 system to demonstrate the flexibility and toughness of the membrane over constantly moving structures.

PCSI technicians prepared a 1.75" thick concrete block for priming. A 2-3 mil layer of PCS-30 penetrating primer was applied by brush and allowed to dry for 12 hours. PCS-30 penetrates the surface of the concrete adding strength to the outer surface, sealing pinholes and providing a chemical bond to the PCS-355 polyurea topcoat. PCS-355 was applied at 60 mils and allowed to fully cure. The block was then cracked to the concrete/membrane interface. Eye hooks were inserted into the block ends perpendicular to the crack. The block

Photo 5

was inserted into an Instron type tensile instrument by the eye hooks. Tension was put on the block to secure the apparatus and zeroed. Ambient temperature was 77 °F. Figure 2 shows the block in it's initial stage prior to pulling on the crack.

Tension was initiated at 0.5"/min with an upward motion of the cross arm. Photo 3 shows the block after a gap of approximately ½" was created in the concrete.

The cross arm was allowed to return to initial state and the test was re-run. These procedures were repeated 10 times before the test was terminated.

Close inspection of the PCS-355/ PCS-30 system membrane showed no cracks, tears, or loss of adhesion along the shoulders of the crack. Photo 5 shows the block and membrane in it's initial state after repeated stretching to 1".

These tests were repeated at –20°F and up to a 1/8" gap. Again, no compromise of the PCS-355/ PCS-30 system was noted.

The engineers and architects at Pen-Ren approved the PCS-355/ PCS-30 system for the RDF.