

HATCHERY MAINTENANCE

Hagerman National Fish Hatchery

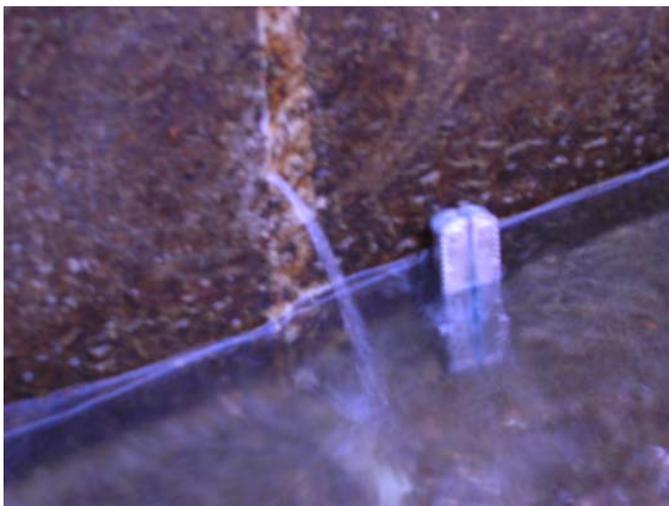
Raceway Expansion Joint Project



U.S. Fish and Wildlife Service

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Worn Expansion Joints

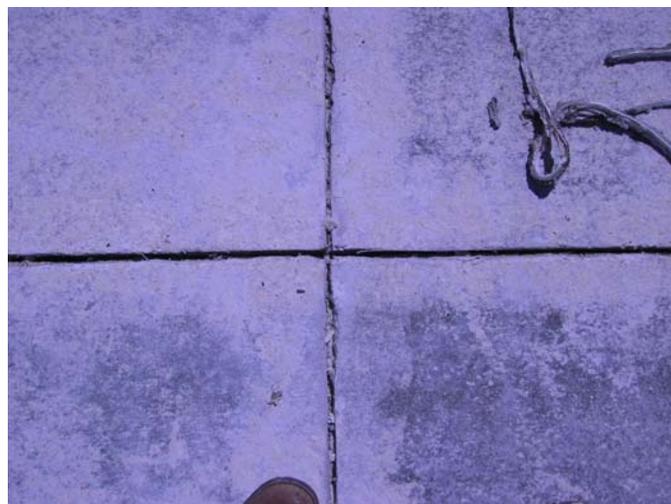


In May, 2010 the Hagerman National Fish Hatchery (Hatchery) crew observed water leaking through the expansion joints in several places in the Steelhead Raceways during the annual de-watering. The water had seeped underneath the upper and middle deck raceways and was draining into the bottom deck.



Upon further inspection, the Hatchery found numerous places where the expansion joint caulking was cracked and separated from the concrete which would allow water to seep out below the raceways.

Caulk Removal



Since there is a limited window of opportunity when the raceways are dewatered, a contractor was hired to replace the 2500 feet of expansion joints. They pulled out the old caulking with screwdrivers and prying tools. The joints were then prepped with an angle grinder and sanding discs. Cleaned joints were swept and blown out with compressed air. After prep work, the contractor installed backer rod and applied SIKA-Flex Primer 429 (used for submerged SIKA-Flex applications). The contractor applied SIKA-FLEX 1A to the primed expansion joints and then tooled the caulk.

Within 24 hours, The Hatchery staff observed large bubbles in the caulk. These bubbles were caused by moisture in the concrete. The caulking was applied in the cool mornings. By afternoon, the top of the caulk was dry to the touch, but was still tacky underneath. The hot afternoon sun drew moisture vapor into the tacky component of the caulking where it was trapped by the dry skin over the top; thus creating bubbles in the expansion joints.

Caulking Bubbling



Unfortunately, the only repair for bubbled SIKA-Flex 1A is to remove the affected caulking and replace it. Since the SIKA-Flex 1A requires one to two weeks for proper curing, the Hatchery did not have time for this repair before the Steelhead Raceways were filled with water late July.

Future Application methods

The Hatchery contacted Scott Isaac, SIKA-Flex sales representative (801-282-5440), for methods to deal with submerged concrete joints. Mr. Isaac suggested several techniques to prevent problems with submerged expansion joint repairs:

1. Before application, a moisture vapor test should be conducted by duct taping a heavy mil (4-6 mm) visqueen over the joint. The plastic is left for 18-24 hours and then checked for condensation. If condensation is present, the concrete has >4% moisture and should be further dried.
2. Backer rod should be installed for several reasons: First, the backer rod prevents caulking from sticking to the bottom substrate. This reduces the chance that it will pull away from the sides. Second, it makes a guide to ensure uniform depth between 1/4 and 1/2 inch. Third, it helps ensure an hour-glass shape to the finished product. The hour glass shape is formed on the bottom by the backer rod and on the top by tooling. The hour glass shape ensures extra caulking on the adherence edge and a narrower band of caulking over the gap to

facilitate expansion across the joint. The caulking should be applied at a 2 to 1 ratio of width to depth, i.e. the width should be twice the depth.

3. In circumstances where it is difficult to completely dry the concrete (by the moisture vapor test) two techniques can be attempted to ensure good adhesion and avoid bubbling:
 - A) Apply SIKA-Flex 1A in the early evening after the temperature has started to cool. This will allow the SIKA-Flex 1A to set-up to a rubbery consistency overnight before the heat of the day drives moisture into the product. Once the product is set, the moisture underneath is not a problem.
 - B) Use a two part product like SIKA-Flex 2C SL. This product cures faster before the moisture becomes a problem. However, a **professional** and experienced contractor should install this product.

Many of these techniques and specifications are available in the SIKA-Flex 1A datasheet available on the web:

<http://www.sikacorp.com/con-prod-name.htm>

Other Products

Mr. Isaac also showed the Hatchery several other products including the Sikadur[®] Combiflex[®] System. This system uses a flexible strip to seal over the top of the joint and create a water tight seal. It can be applied over the existing failed joint sealant. The Hatchery may try this product in 2011 if any of the repaired expansion joints fail. The Sikadur[®] Combiflex[®] System technical datasheet is available at:

<http://www.sikacorp.com/tds-cpd-sikadurcombiflex-us.pdf>

Mr. Isaac also explained the SikaFix[®] for sealing leaks through concrete cracks and joints. The hydrophobic compound reacts with water to seal joints without removing the water. The Hatchery has interest in this product for repairing several leaks in the joints of the Off Line Settling Ponds. The factsheet for SikaFix[®] is available at:

<http://www.sikacorp.com/fs-cpd-sikafixhh-us.pdf>