

Watson Bowman Acme, 95 Pineview Drive, Amherst, NY 14228
April 6, 2007

WaboCrete II - High Performance Expansion Joint Header

By James Derrigan, P.E.

Summary

WaboCrete II Elastomeric Concrete has been extensively tested and found to be an excellent product for its intended purpose. The product was subjected to over 200,000 repetitions on a full scale, high speed, high load cycle track and proved that it can withstand even the most demanding applications. The product was evaluated for “normal” wear, abrasion, and impact resistance. The performance of the product made one researcher remark “the overall performance of WaboCrete II as a header material was remarkable”. The product has been successfully used in heavy duty bridge and highway, parking decks, stadiums, and plaza deck applications for decades. The test results validate what has been known for years, the WaboCrete II formula combines the proper balance of hardness, strength, flexibility, and durability.

The next time an expansion joint manufacturer approaches you about their header product, ask them for a copy of their cycle test report.



“The overall performance of WaboCrete II as a header material was remarkable”

Test Track Description and Simulation Analysis

The University of Central Florida Department of Civil Engineering constructed a circular accelerated test track designed to simulate high speed, high load traffic conditions over an expansion joint opening. The concrete pavement was 50 feet in diameter to the centerline of a 4 foot wide concrete slab pavement. The pavement was designed, based on AASHTO guides, to accommodate a dual wheel assembly and designed to support an 18kip axle load.



Built into the test track are two bridge sections in which an expansion joint opening was created. Into each opening an expansion joint system, utilizing WaboCrete II as the header product, was installed. The loading apparatus consisted of three steel beams mounted at the center of the track. At the end of each beam assembly was a dual tractor truck wheel. A centrally mounted water tank was used to generate additional weight to the dual wheel assemblies. The apparatus was powered by a 220 Hp diesel engine.

The test program was developed to continuously monitor the performance of each expansion joint system placed on the large-scale test track, under the application of repetitive dual wheel load-

ing. The sum of the repetitions successfully endured was used to equate the tested joint materials to a simulated life expectancy (SLE) of normal highway use.

An 11,000 lb half axle wheel load was used for the accelerated wear, high load testing program. This wheel loading is equivalent to a 22,000 lb single axle load. An equivalent wheel load factor generally defines the damage per pass caused on a specific system by the vehicle in question relative to the damage per pass of an arbitrarily selected standard moving vehicle on the same system. Researchers selected the most widely used form of load equivalency factors, established in the AASHTO Guide for Pavement Structures, to determine the minimum number of repetitions. A simulated 5 year life expectancy would thus require a minimum of 200,000 repetitions of test track loading.

Accelerated Wear, High Load Testing Program

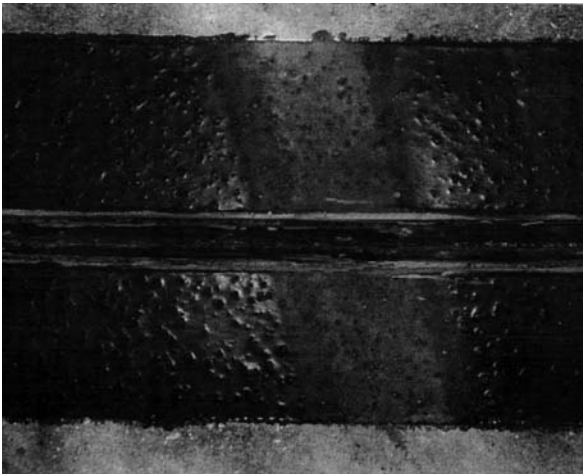
The primary objective of the test program was to establish a record of wear capabilities for the WaboCrete II expansion joint header system through accelerated testing procedures. WaboCrete II was subjected to over 200,000 load repetitions with an 11,000 lb half axle dual wheel applied load. The test program included an evaluation of normal wear followed by abrasion testing and finally impact testing. The normal wear test consisted of running the test track over the expansion joint system for approximately 70,000 load repetitions. The WaboCrete II expansion joint header system was then covered with a mixture of coarse sand and small aggregates and subjected to an additional 30,000 load repetitions. Finally, one side of the expansion joint system was raised up approximately ¼" to create a vertical deflection between opposing sides

of the expansion joint opening. This application was then subjected to an additional 101,000 load repetitions. The WaboCrete II expansion joint system was subjected to a total of approximately 201,000 load repetitions, simulating over 5 years of wear in a high load application.

“WaboCrete II was subjected to over 200,000 load repetitions simulating 5 years of high load wear”



WaboCrete II is installed on the test track



Normal Wear - WaboCrete II after 70,000 load repetitions



Abrasive Test - WaboCrete II after 100,000 load repetitions

Accelerated Wear Test Results

After approximately 70,000 load repetitions of normal wear, the WaboCrete II header remained in excellent condition. There were no signs of debonding of the header material and the wear under the wheel path was minor and considered negligible.

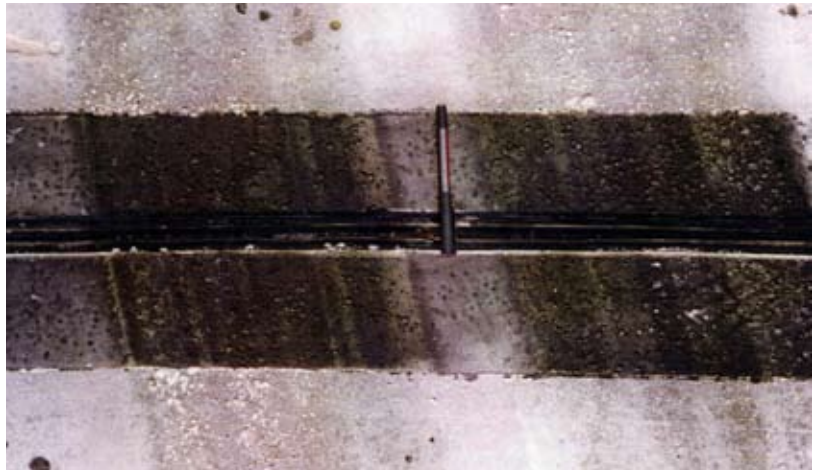
Following the normal wear test, the WaboCrete II system was covered with a mixture of coarse sand and small aggregate and tested for abra-

sion resistance. After approximately 30,000 load repetitions, the material still remained in excellent condition. There were no signs of debonding between the WaboCrete II header and the concrete.

Following the abrasion resistance testing, one side of the joint opening was raised ¼" to obtain a vertical deflection between opposing slabs. After approximately 101,000 load repetitions the WaboCrete II system remained in great condition. There were no signs of debonding between the WaboCrete II header and the concrete.



Vertical Displacement Cross View



Impact Testing - WaboCrete II after 201,000 load repetitions

Conclusions

Upon completion of the normal wear test (from 0 to 70,000 repetitions), the WaboCrete II header remained in excellent condition. There were no signs of debonding and wear was negligible. The abrasion test (from 70,000 to 100,000 repetitions) produced similar results, the WaboCrete II material remained in excellent condition. After the final impact test (from 100,000 to 201,000 repetitions) the WaboCrete II header material remained in great condition. The change in elevation did not produce any signs of debonding and once again, wear was minimal. WaboCrete II remained in excellent condition following accelerated wear testing which simulated over 5 years of wear and tear on the system.

WaboCrete II, when properly installed, can accommodate a variety of different environmental and real world conditions. WaboCrete II has been specially formulated with the proper balance of liquid to aggregate ratio to create a product that combines the best in hardness, strength, flexibility, and durability. Watson Bowman Acme formulated the product to meet the demands of today's expansion control applications and is proud to be the original producer of the product.



Photograph illustrates the flexibility of WaboCrete II

“WaboCrete IIcombines the best in hardness, strength, flexibility, and durability”



www.wbacorp.com

We are continually improving the Watson Bowman Acme website, enhancing your ability to easily navigate through our products and services. WBA has evolved over the years, but one priority has remained the same: to provide you with the accurate information you need, when you need it.

Technical Expertise, Innovation, Custom Solutions & Quality.



© 2007 Watson Bowman Acme Corp.
All rights reserved / Printed in USA
WABO-TR-070406