

I-95 / SR1 INTERCHANGE NEW CASTLE COUNTY CHRISTIANA, DE

I-95/SR1 INTERCHANGE NEW CASTLE, DELAWARE

Product: PARAWEB® & PARALOOP

Problem:

The SR 1/I-95 interchange is a full cloverleaf interchange that connects Interstate 95 to SR 1 and SR 7 in New Castle County, Delaware. I-95 runs from southwest to northeast through the interchange. The north-south intersecting highway is designated as SR 7 to the north of the interchange and SR 1 to the south of the interchange. SR 7 is a principal arterial road, while SR 1 is a multi-lane expressway that connects I-95 to Dover and has become the major north-south spine road in Delaware.

The main purpose of this project is to relieve congestion at a highly traveled interchange by adding high speed connecting on and off ramps, 2 new lanes on I-95 NB, and 6 new bridges. Due to limited foundation locations within the existing roadway and skewed flyover alignment, new bridges required post tensioning via integral pier caps and straddle bent type piers with draped tendons.

Solution:

16 MSE walls and 12 bridge abutments were built by using concrete panel squared units (size 10x5 ft with a thickness of 5.5 inches) reinforced by the use of polymeric PARAWEB strips having variable strength and spacing:

- Paraweb 2D/30 for a total quantity of 1,028,235 linear feet;
- Paraweb 2D/50 for a total quantity of 187,732 linear feet.

The straps were connected to the concrete panels by 8 connection loops each (called "PARALOOP") and such number was resulted by the stability checks carried on with the MSEW software.

The maximum wall height achieved is 40 ft and the total wall surface built is 172,000 sf.

To facilitate the acceptance of such a wall system reinforced with polymeric straps the DelDOT specified that at least one section of the wall had to be instrumented to monitor the wall performances over time. Section 4 of wall 7 at the Christiana Interchange was selected for the instrumentation program; the total height from the top of the foundation pad up to the top of the backfill is equal to 26.9 ft. The wall was fully instrumented and the data were collected since April 2012 up to September 2013 and then analyzed by Dov



A view of a finished bridge abutment and of a wall



During the construction: the panels and the fill material

Owner:

DELAWARE DEPARTMENT OF TRANSPORTATION (DDOT)

Contractor:

CHERRY HILL CONSTRUCTION

Engineer:

TEG ENGINEERING, LLC

Product Used:

PARAWEB & PARALOOP CONNECTIONS

Maccaferri, Inc.

10303 Governor Lane Blvd., Williamsport, MD 21795

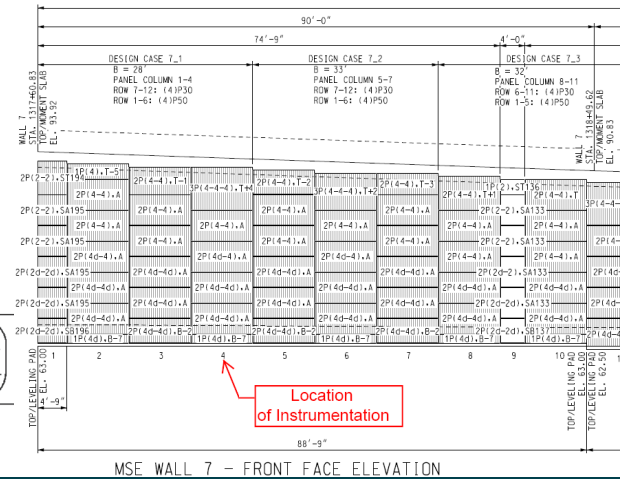
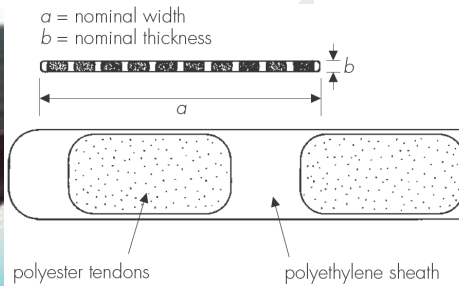
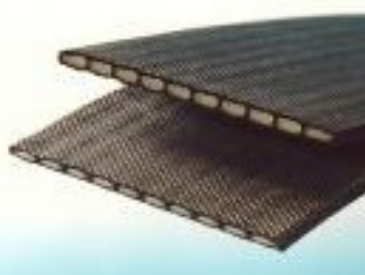
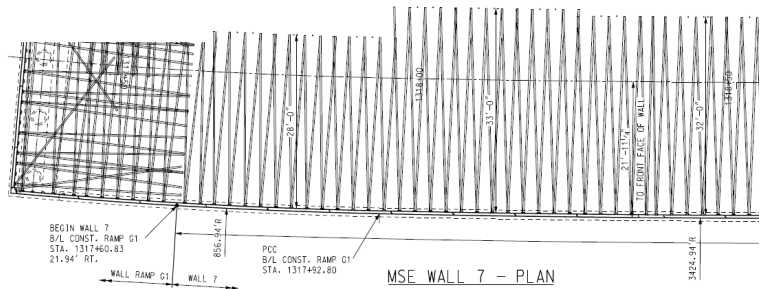
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Detailed view of the instrumented section with details of the PARAWEB polymeric strip reinforcement including its installation

Leshchinsky in the context of AASHTO design; the monitoring process is - in 2014 - still in progress. From the recorder data we had the confirmation that the design input were correct; the long-term loads in the straps and in the connection were at least 4 times smaller than predicted, the displacement at mid-height was negligibly small and the length of the reinforcing straps is adequate; for more detailed info about this test please contact the technical dept of Maccaferri Inc.

In spite of the fact that many other structures reinforced with PARAWEB has been designed and build worldwide (Europe, Africa, Middle East) using also different types panels and that such strip - as polymeric reinforcement component of the MacRES system - is certified by BBA (certificate issued on October 2012; 12/H191) this reference is a milestone in the USA market because it's the first relevant case of a wall designed, build and monitored by an USA DOT.

The reinforcement:

PARAWEB is a polymeric strip build and designed for soil reinforcement applications in combination mostly with concrete panel units. The material is manufactured from high tenacity polyester multifilament yarns aligned and co-extruded with polyethylene (LLDPE) to form a strip; the same type of material si also used to build the PARALOOP used for the connection to the concrete panel. The material is available in strengths up to 22,480 lb (100 kN) and in different types in order to match the all requirements in term of required LTDS in the various operating conditions.



A bridge abutment during - and at the end - of the construction



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