

 **Geo³T²**
April 11-12, 2017 

*Geotechnical, Geophysical,
Geoenvironmental Engineering
Technology Transfer
Conference & Expo*

GPR Study of Voids behind a Highway Bridge Retaining Wall

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ESP Associates
April 9, 2015



April 2011



November 2011



November 2013



November 2015



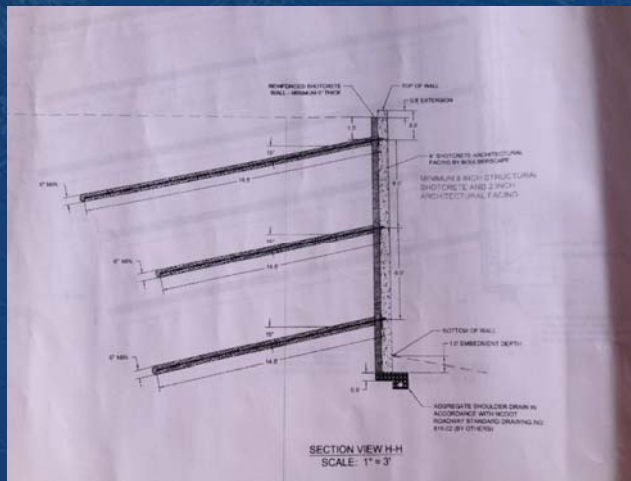
Site Visit



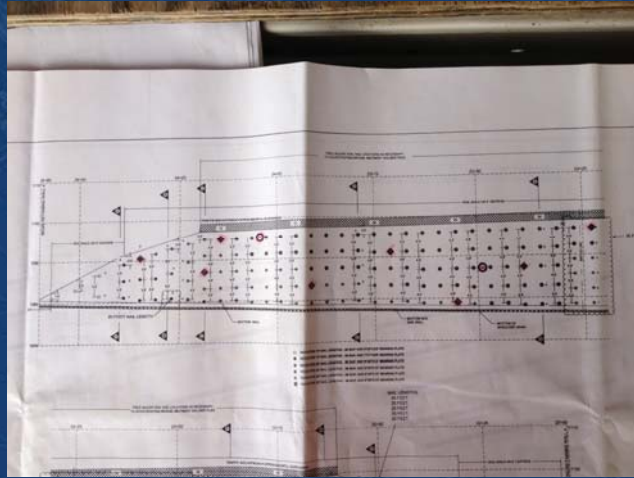
Site Visit



Construction Drawings



Construction Drawings



Construction Photos



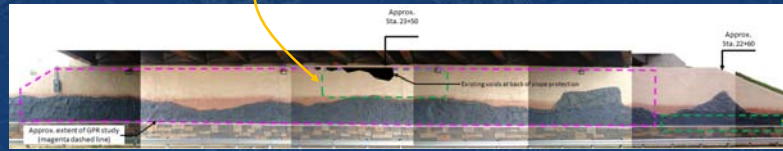
Construction Photos



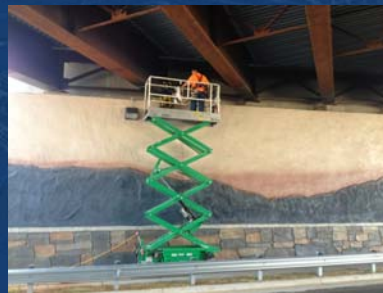
Construction Photos



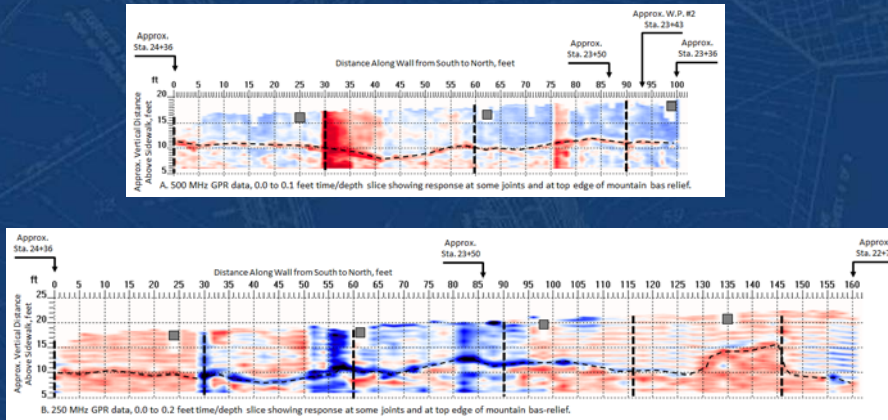
Locations of Slumping



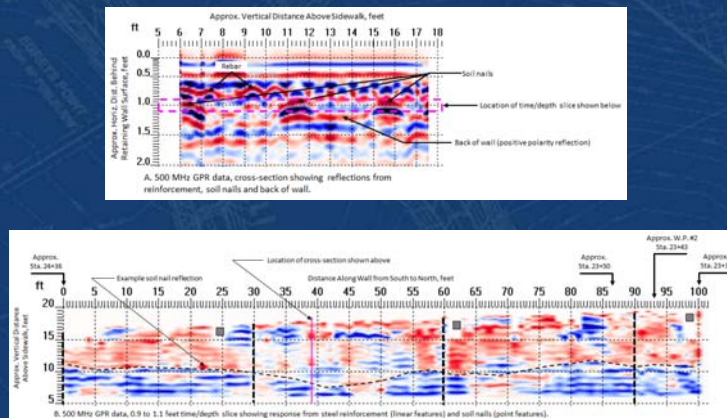
GPR Data Collection on Wall



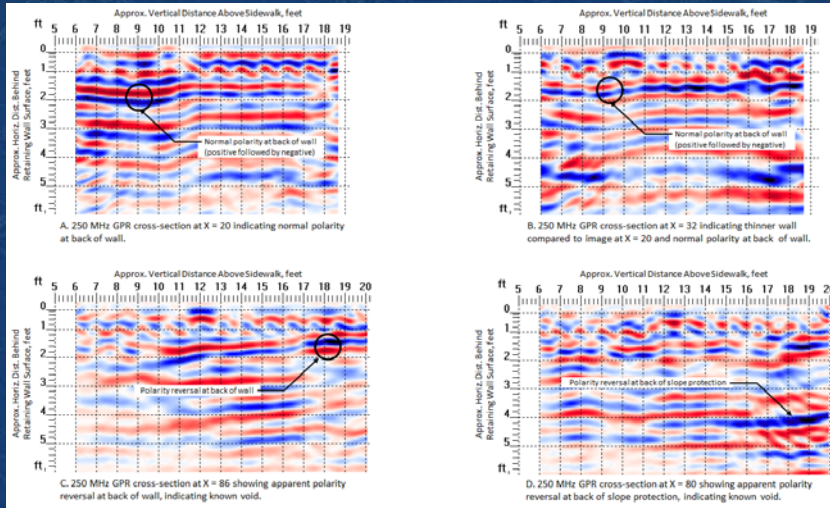
GPR Depth Slices, 0.1' Depth



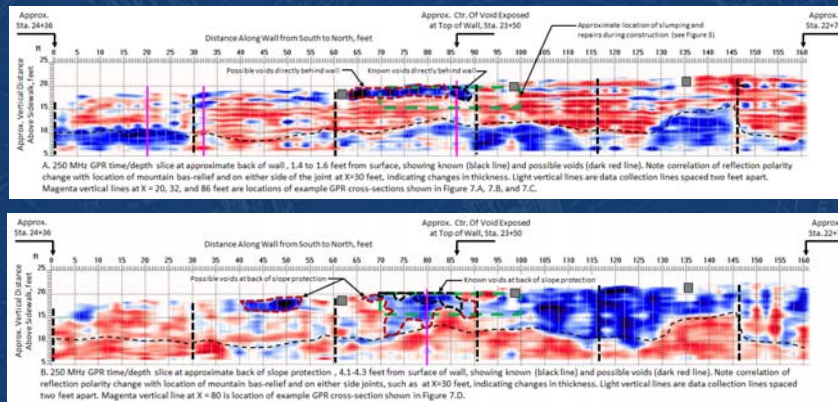
GPR Depth Slice, 1.0' Depth



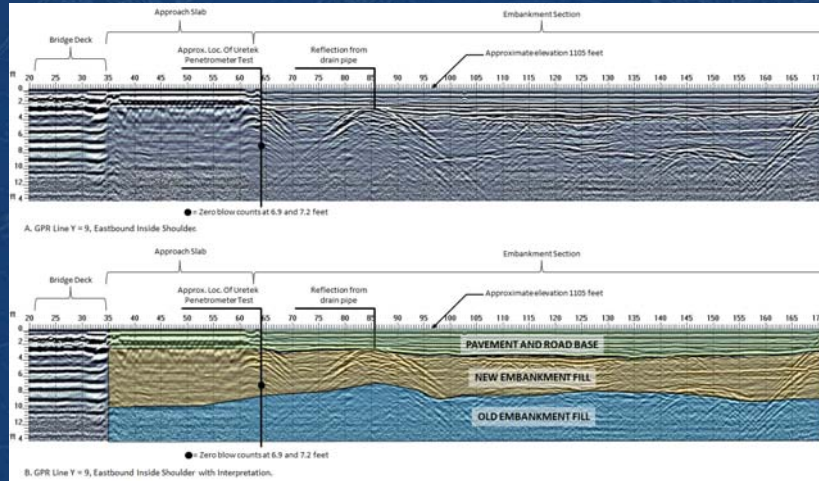
GPR Polarity Changes



GPR Depth Slices, 1.5' and 4.2' Depth



GPR Data, EB Inside Shoulder



Conclusions

- Voids behind retaining wall formed by water flow into and around areas of slumping/flowable fill during construction before closure pour made.
- Vertical settlement of approach slab caused by loose material left in place during construction.



ESP Mobile Mapper Data



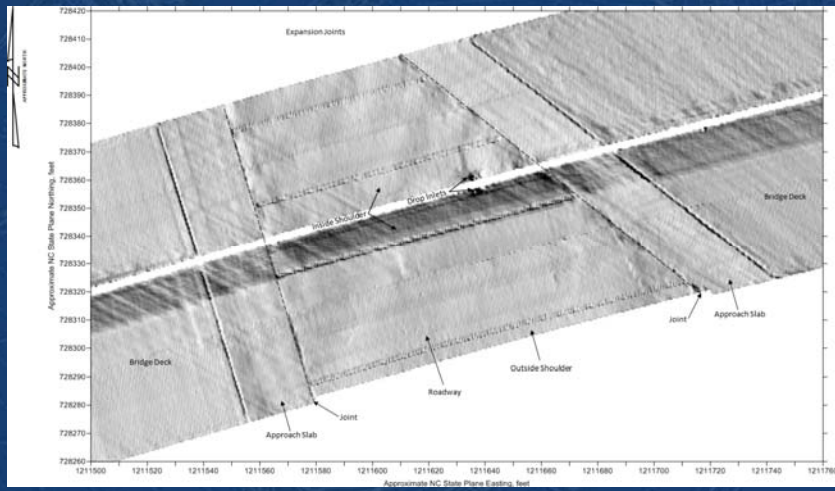
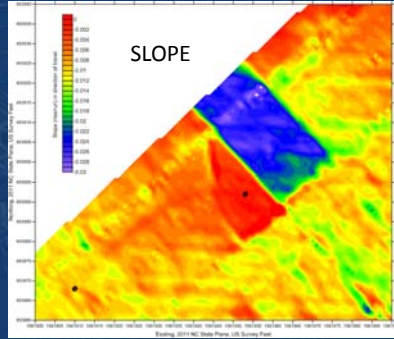
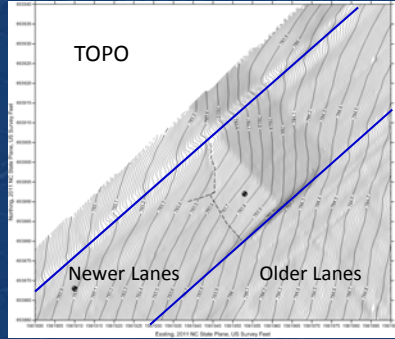
- Two 3D lasers
- 4 to 6 cameras
- A military grade IMU
- Two GPS receivers
- Collect continuous point data clouds at highway speeds

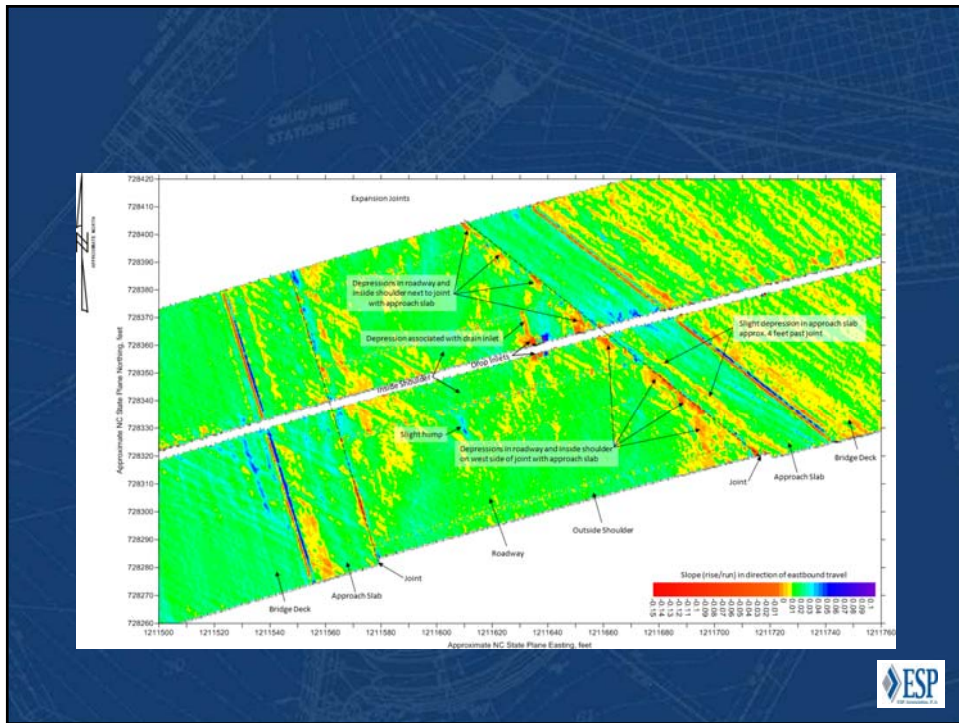
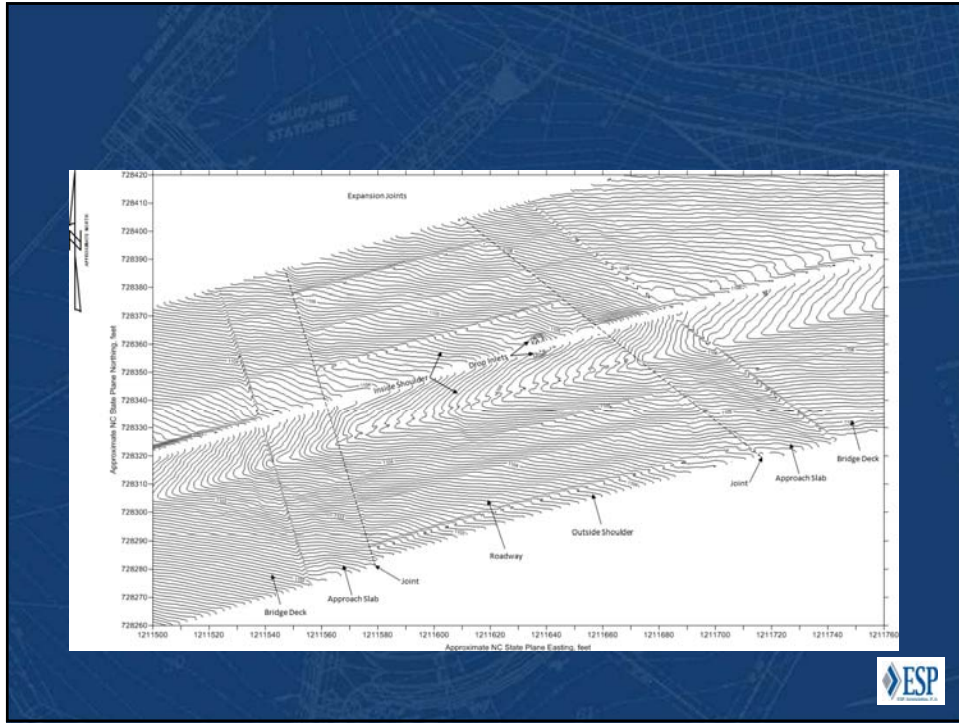


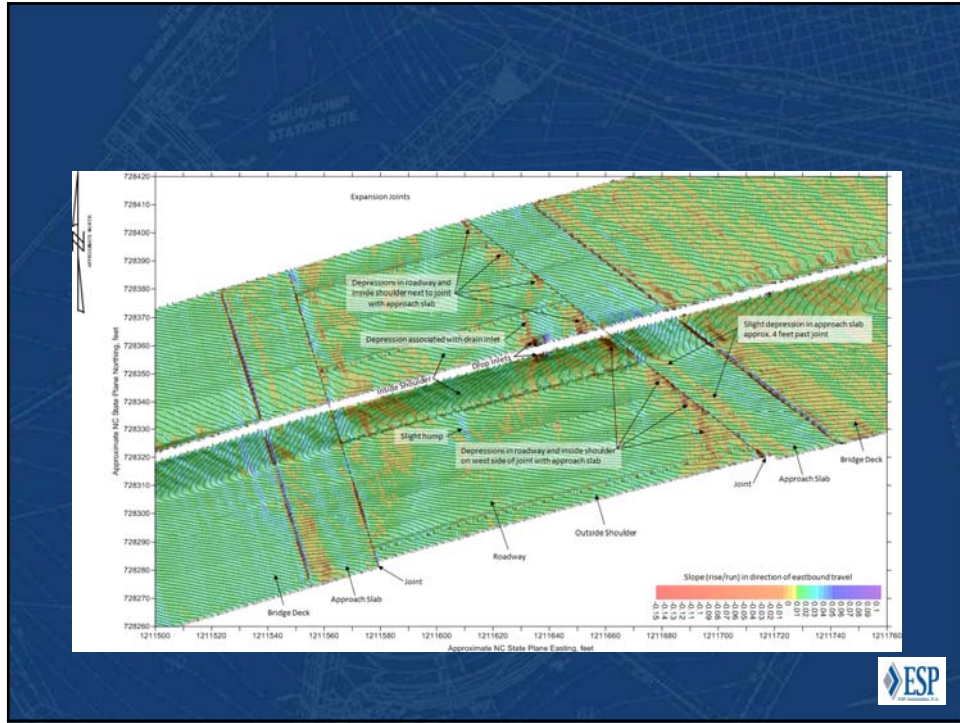
Example Mobile LiDAR Study I-85, Salisbury



Mobile LiDAR Data







Repairs - 2016

- Filled voids with 20 CY of foamed concrete
- Milled down roadway to remove bumps and added asphalt overlay
- Monitoring indicates no additional movement



