In the early 1930’s, a series of dry stack masonry retaining walls were constructed along a portion of state Highway 290, in Texas. This road descends along the side slopes of a mesa leading into the Pecos River Valley and accesses the Fort Lancaster Historic Site. Most of these original walls have performed satisfactory with no major signs of distress or need for repairs. However, one of the walls had experienced significant retained material loss creating voids underneath the existing road surface. These cavities caused significant washout areas that produced “sinkhole” like features in the existing pavement and led to a partial closure of the roadway.

In late 2014, the Texas Department of Transportation let a project to permanently renovate the retaining wall and repair the road voids beneath the pavement. The tasks consisted of installing soil nails through the existing boulder stacked facing, repairing the existing voids under the pavement by over-excavating and backfilling, preparing a new reinforced gunite (pneumatically placed concrete/shotcrete) fascia, and finishing the wall with a sculpted facing that would resemble the existing, nearby walls.

GeoStabilization teamed up with Gibson and Associates, an established General Contractor in the Dallas, Texas, area. The team completed the project ahead of schedule and within 5% of the estimated bid price.

Some of the challenges surmounted by the project team included:

- The original contract specified that either solid bar or Hollow Bar Soil Nails (HBSNs) be employed in the project. However, installing a solid bar in these drilling conditions would have required a permanent casing for the installation. GeoStabilization chose to use the HBSNs as these nails have a sacrificial bit on their end that actually drills into the ground while pumping grout. This grout flow flushes the drill tailings and penetrates the fractures in the surrounding soils to increase the bond strength values between 110 to 300 percent. When installing the first few HBSNs, difficulties arose. The existing wall was completely full of voids and no grout return was observed at the face; but grout could be observed coming out of the bottom of the wall. GeoStabilization’s solution was to install rock anchors instead of soil nails. Because of the existing geology and how the road was built, up to 60-ft long rock bolts were used to traverse all the way through the roadway fill and into the existing...
native limestone bedrock. This created a rock socket at the end of each nail that provided the necessary bolt pullout resistance and allowed a much faster installation procedure.

• Because of the historic nature of the site, during construction the production crews were not allowed to disturb the land beneath the wall and had to access the wall from above. Therefore, every project task had to be performed from man lifts in a constrained space. The logistics for having multiple pieces of equipment working simultaneously in this area posed multiple sequencing challenges that had to be addressed to successfully complete the project on time and within budget.

• The project’s location was hundreds of miles away from any major city or transportation depot. This limited access to materials and equipment created a logistical challenge for the operations crew. Additionally the project site was so remote that no cell phone service existed, which severely limited communication at the jobsite. Therefore satellite phones were employed and all shipments had to be properly scheduled and managed.

Overall, the project was a great success and the Texas Department of Transportation was very pleased with the results.