



## Case Study

**application** | MSE Pile Supported Embankment  
**location** | Geneva Road, Provo, UT  
**product** | Miragrid® 8XT (50,000 SY)

**job owner** | UDOT  
**engineer** | Terracon  
**contractor** | Kiewit Construction  
**date of installation** | August, 2011

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

### THE CHALLENGE

South of Salt Lake City is the I-15 CORE Project in Provo, Utah. In 2011, at 1.4 billion dollars, this is one of the largest roadway construction projects in the nation. Geneva Road is a major frontage road west of the I-15 Freeway. Kiewit Construction was awarded the 4-mile widening contract on this UDOT design build project. Their team engineer, Terracon Consultants, faced design issues putting in a grade separation near Center Street over three high use railroad tracks for UPRR and the new Utah FrontRunner commuter rail. The challenge was designing an MSE wall embankment on soft foundation soils with limited

right-a-way boundaries, fast track construction schedule and the risk of high potential seismic loads.

### THE DESIGN

A 30-foot high MSE Pile Supported Embankment was designed with multiple layers of geosynthetics to support the roadway embankment on the soft soils. The design used conventional timber piles integrated with geogrid reinforcement in the soil embankment and MSE wall technology. To reduce construction costs, timber piles were not used under the entire embankment; instead only three rows of timber piles were designed four feet on center below the MSE Wall face and multiple layers of geogrid were used to distribute the embankment load to the pile foundation. The geogrid was also designed to provide lateral constraint in the embankment in the event of high seismic loads. In these type of pile

supported embankments, fewer layers of high strength polyester geotextiles are also typically used.

### THE CONSTRUCTION

Over 2000 timber piles shipped across the country from Louisiana were driven to a depth of 35 feet. Two layers of biaxial geogrid were installed in the sand backfill above the wooden capped piles. The embankment construction commenced with MSE Walls constructed over the timber pile foundation. Up to 4 layers of Miragrid® 8XT geogrid were installed inside the MSE Walls. Miragrid® 8XT geogrid was placed in three eighths inch minus stone and sand backfill and spaced in two foot vertical lifts. Being a uniaxial geogrid (high strength in the roll direction), Miragrid® 8XT geogrid was placed 3 feet back from the MSE wall facing panels and unrolled across the entire embankment width.



Multiple layers of Miragrid® 8XT placed across the entire embankment width.

**THE PERFORMANCE**

A unique design of strategically placed timber piles used in conjunction with multiple layers of Miragrid® 8XT geogrid resulted in an efficient embankment design on soft soils. The design allowed for single stage MSE wall grade separation construction of the bridge approach embankment without typical surcharge delays to meet the project schedule.



Timber piles being cut to design lengths.



Two foot thick compacted stone and sand backfill between the Miragrid® 8XT layers.

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