Designing and Constructing Roads with Geogrid

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Geogrid in a Pavement System

- Primary function is reinforcement through a.) lateral restraint, b.) improved bearing capacity and c.) tensioned membrane effect.
- Reduce costs by reducing pavement structure thicknesses and increases pavement life
Geogrid Mechanisms

Figure 1. Lateral restraint reinforcement mechanism.

Source: U.S. Army Corps of Engineers ETL 1110-1-189
Geogrid Mechanisms

Figure 2. Improved bearing capacity reinforcement mechanism.

Source: U.S. Army Corps of Engineers ETL 1110-1-189
Geogrid Mechanisms

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Why Use Geogrid?

• Subgrade Improvement
  - Reduction of undercutting poor soils
  - Provides a solid construction platform
  - Protection of soft subgrade soils

• Pavement Base Reinforcement
  - Stiffening aggregate base
  - Reduction in pavement thickness
  - Extended pavement life
General Geogrid Design

• Based on strength (CBR) of existing subgrade and traffic data
• Worked with manufacturer and used their design software to determine our proposed pavement structure based on our soils and traffic data
Salo Road Design Considerations

- 2-mile long Rural Major Collector
- ADT 255
- 2% Commercial Traffic
- Soil consisting mainly of sandy organic silts with pockets of “topsoil” and cobble in fill areas.
- Existing 0”-12” of pit run aggregate base under 1.5”-8” of bituminous “road mix”
Salo Road Design Considerations

• Existing 10’ lanes and 3’ aggregate shoulders
• Existing pavement severely alligatored and rutted
• Unrealistic to undercut all bad subgrade areas
• Didn’t want to raise the grade due to existing narrow footprint
• Didn’t want to spend a fortune to fix but didn’t want to be back in <10years
Design Considerations

• Had prior experience with biaxial geogrid with good results
• Worked with company representative and utilized their design software to determine our project met minimum cover requirements of 6” of 22A over the geogrid.
• Proposed plan was formed
Proposed Project: Phase 1

- Cold mill 8” of existing HMA, agg base and subbase starting at centerline going outward at 2%
- Contractor grade and roll subgrade prior to placing georgrid (include this in SP)
Proposed Project: Phase 2

• Place geogrid on subbase
• Rolls were 13.1’ wide x 246’ long
• Contractor would roll them out and overlap at least 1’ on centerline and on the ends (overlap depends on subgrade strength)
• Use zip ties as needed to hold down
• Trial and error to find what worked best
• Found that keeping roll close to gravel seemed to work best
Proposed Project: Phase 3

• Placing 6” of 22A on the geogrid was done by dumping on previously placed aggregate and pushing onto the grid with a dozer
• Dozer operator would start on centerline and push aggregate to the edges being careful to cover the centerline overlap in the correct direction
• Laborer would measure how far each truck load needed to make it based on its weight
• Performed random depth checks to ensure proper aggregate thickness
Geogrid Information

• Wrote a SP and based acceptance on manufacturer’s certification with test results that the product met certain physical properties
• Tensar Triax TX 140 was used on the project
• Unit price was $1.75 per Syd which was about $27,000 per mile for the project
Lessons Learned

• Geogrid won’t bridge muck/peat
• Don’t run trucks on subgrade if possible
• Make sure dozer is pushing the right way over the centerline overlap
• Make sure the dozer is lifting its blade at the end of the push
• Fold over and crease small waves in the grid and pile aggregate on it to hold it down until it is permanently covered
Lessons Learned

• Set up extra aggregate to touch up areas that are light
Questions?

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