

APPENDIX I WORKING SURFACE/HAUL ROADS EVALUATION – SLIMES AREA



SpectraPave4 PRO™ Unpaved Road Application *** Report ***

DESIGN PARAMETERS

DESIGN REQUIREMENTS

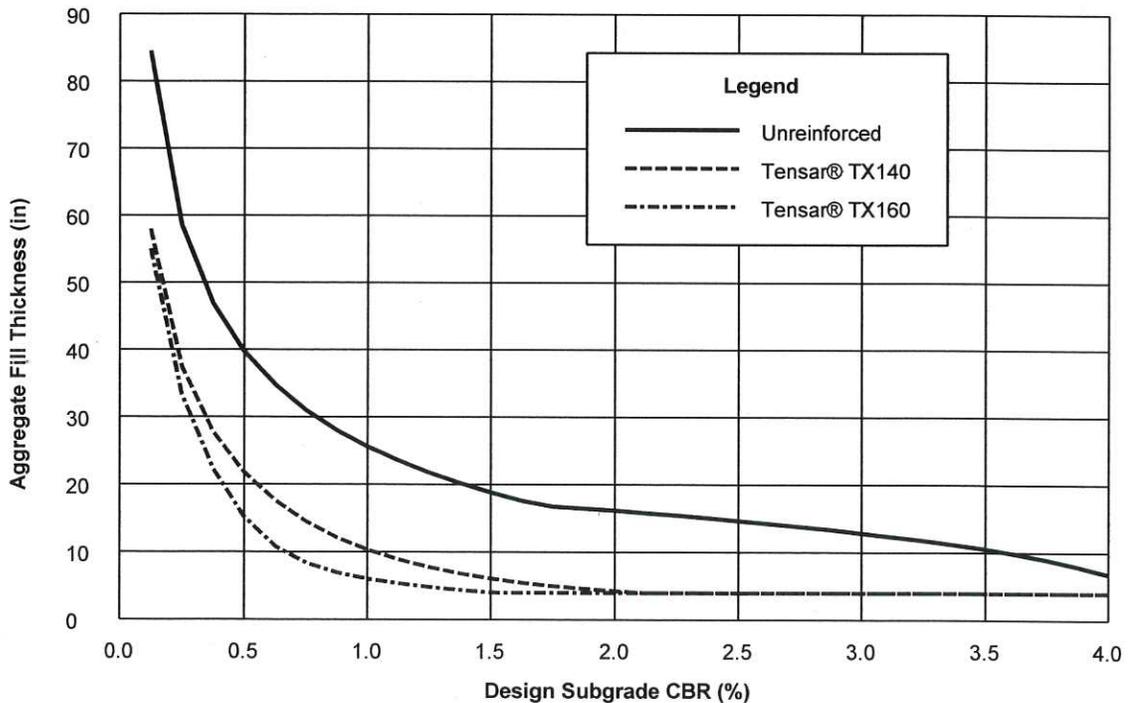
| Property | Value |
|------------------------|-------|
| Axle Load (kips) | 35 |
| Tire Pressure (psi) | 70 |
| Axle Passes (Each) | 1200 |
| Maximum Rut Depth (in) | 3.0 |

PAVEMENT SOIL PROPERTIES

| Property | Value |
|-------------------------|-------|
| Aggregate Fill CBR (%) | 20 |
| Design Subgrade CBR (%) | 0.25 |

RESULTS

| Geogrid | Aggregate Fill Thickness (in) | | Aggregate Fill Thickness Savings (in) | |
|--------------|-------------------------------|----------|---------------------------------------|-----|
| | Calculated | Required | (in) | (%) |
| Unreinforced | 58.66 | 59 | N/A | N/A |
| TX140 | 37.5 | 38 | 21 | 36 |
| TX160 | 33.34 | 34 | 25 | 42 |



| | |
|--------------|--------------------------------------|
| Project Name | Callahan Mine - Tailings Impoundment |
| Designer | TCC |
| Date | 10/15/14 |



SpectraPave4 PRO™ Unpaved Road Cost Analysis *** Report ***

COST ANALYSIS PARAMETERS

PROJECT SIZE

| | |
|-------------|-----|
| Length (ft) | 800 |
| Width (ft) | 250 |

AGGREGATE INFORMATION

| | |
|-----------------------------|-------|
| Total in place cost (\$/CY) | 20.00 |
|-----------------------------|-------|

TOP SURFACE CONSTRAINT

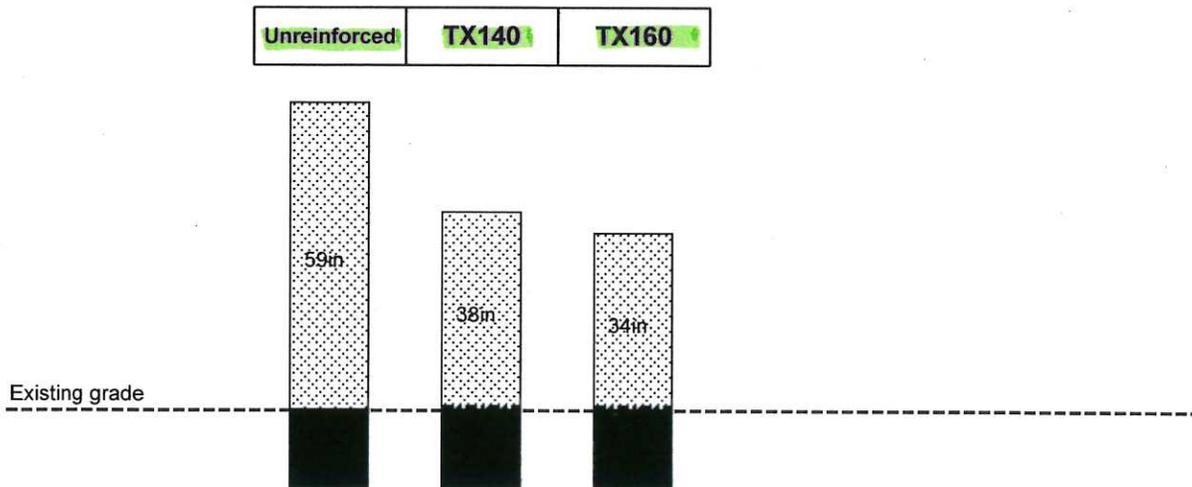
There are no restrictions on the top level of the pavement. Therefore, irrespective of the required fill thickness, there is no requirement for undercut of the existing formation.

GEOSYNTHETIC INFORMATION

| | Tensar TX140 | Tensar TX160 |
|---------------------------|--------------|--------------|
| Material Cost (\$/SY) | 2.50 | 4.50 |
| Roll Width (ft) | 13.10 | 13.10 |
| Installation Cost (\$/SY) | 0.25 | 0.25 |
| Minimum Overlap (ft) | 3 | 3 |

RESULTS

Legend: Aggregate fill Existing subgrade Additional fill required - - - - - Geogrid



| | | | |
|-------------------------|-----------|-------------------------------------|-------------------------------------|
| Aggregate costs | \$728,395 | \$469,136 | \$419,753 |
| Geogrid costs | \$0 | \$75,106 | \$129,729 |
| Undercut costs | \$0 | \$0 | \$0 |
| Additional fill costs | \$0 | \$0 | \$0 |
| Total project costs | \$728,395 | \$546,862 544,342 | \$552,102 549,482 |
| Overall project savings | \$0 | \$184,153 ✓ | \$178,913 ✓ |
| Percent savings | 0% | 25% | 25% |

| | |
|--------------|--------------------------------------|
| Project Name | Callahan Mine - Tailings Impoundment |
| Designer | TCC |
| Date | 10/15/14 |

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SpectraPave4 PRO™ Unpaved Road Application *** Report ***

DESIGN PARAMETERS

DESIGN REQUIREMENTS

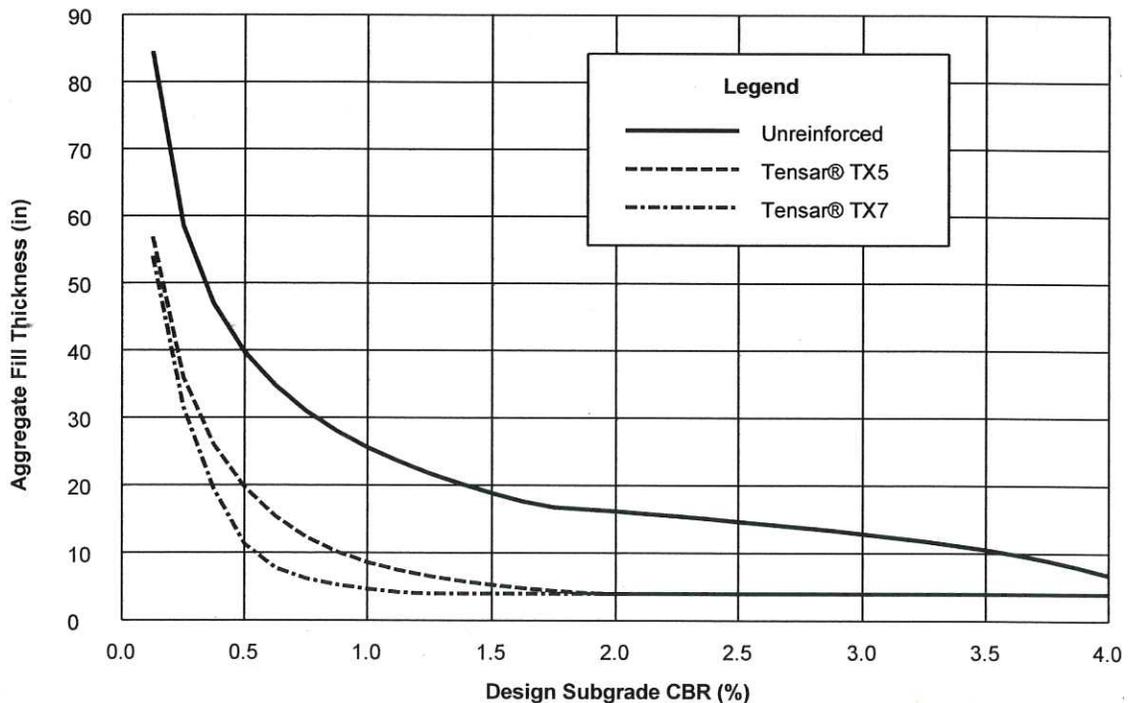
| Property | Value |
|------------------------|-------|
| Axle Load (kips) | 35 |
| Tire Pressure (psi) | 70 |
| Axle Passes (Each) | 1200 |
| Maximum Rut Depth (in) | 3.0 |

PAVEMENT SOIL PROPERTIES

| Property | Value |
|-------------------------|-------|
| Aggregate Fill CBR (%) | 20 |
| Design Subgrade CBR (%) | 0.25 |

RESULTS

| Geogrid | Aggregate Fill Thickness (in) | | Aggregate Fill Thickness Savings (in) | |
|--------------|-------------------------------|----------|---------------------------------------|-----|
| | Calculated | Required | (in) | (%) |
| Unreinforced | 58.66 | 59 | N/A | N/A |
| TX5 | 36.03 | 36 | 23 | 39 |
| TX7 | 31.6 | 32 | 27 | 46 |



| | |
|--------------|--------------------------------------|
| Project Name | Callahan Mine - Tailings Impoundment |
| Designer | TCC |
| Date | 10/15/14 |

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SpectraPave4 PRO™ Unpaved Road Cost Analysis *** Report ***

COST ANALYSIS PARAMETERS

PROJECT SIZE

| | |
|-------------|-----|
| Length (ft) | 800 |
| Width (ft) | 250 |

AGGREGATE INFORMATION

| | |
|-----------------------------|-------|
| Total in place cost (\$/CY) | 20.00 |
|-----------------------------|-------|

TOP SURFACE CONSTRAINT

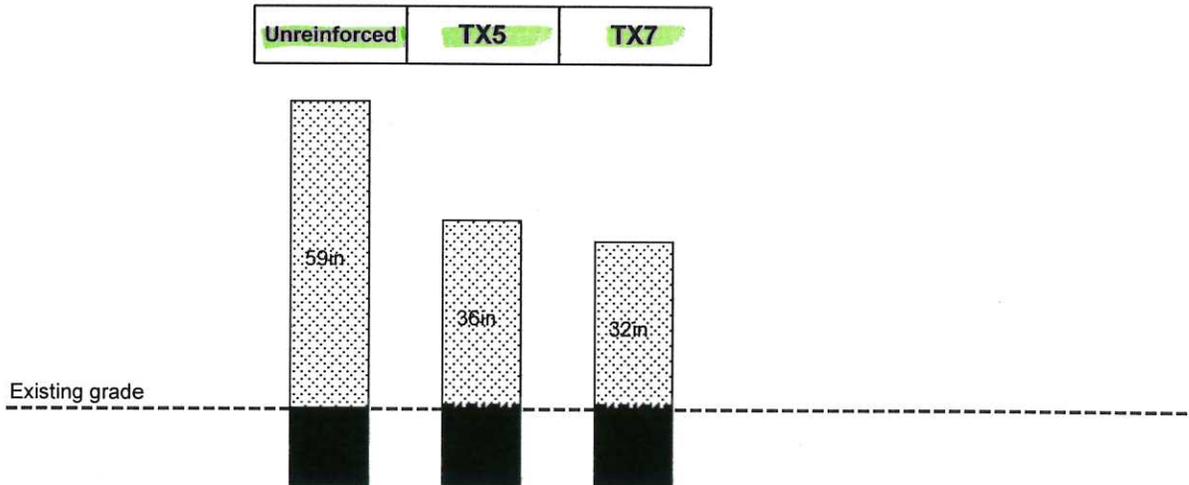
There are no restrictions on the top level of the pavement. Therefore, irrespective of the required fill thickness, there is no requirement for undercut of the existing formation.

GEOSYNTHETIC INFORMATION

| | Tensar TX5 | Tensar TX7 |
|---------------------------|------------|------------|
| Material Cost (\$/SY) | 3.50 | 5.50 |
| Roll Width (ft) | 13.10 | 13.10 |
| Installation Cost (\$/SY) | 0.25 | 0.25 |
| Minimum Overlap (ft) | 3 | 3 |

RESULTS

Legend: Aggregate fill Existing subgrade Additional fill required Geogrid



| | Unreinforced | TX5 | TX7 |
|--------------------------------|------------------|------------------|------------------|
| Aggregate costs | \$728,395 | \$444,444 | \$395,062 |
| Geogrid costs | \$0 | \$102,417 | \$157,040 |
| Undercut costs | \$0 | \$0 | \$0 |
| Additional fill costs | \$0 | \$0 | \$0 |
| Total project costs | \$728,395 | \$546,862 | \$552,102 |
| Overall project savings | \$0 | \$181,533 | \$176,293 |
| Percent savings | 0% | 25% | 24% |

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| | |
|--------------|--------------------------------------|
| Project Name | Callahan Mine - Tailings Impoundment |
| Designer | TCC |
| Date | 10/15/14 |



SpectraPave4 PRO™ Unpaved Road Application *** Report ***

DESIGN PARAMETERS

DESIGN REQUIREMENTS

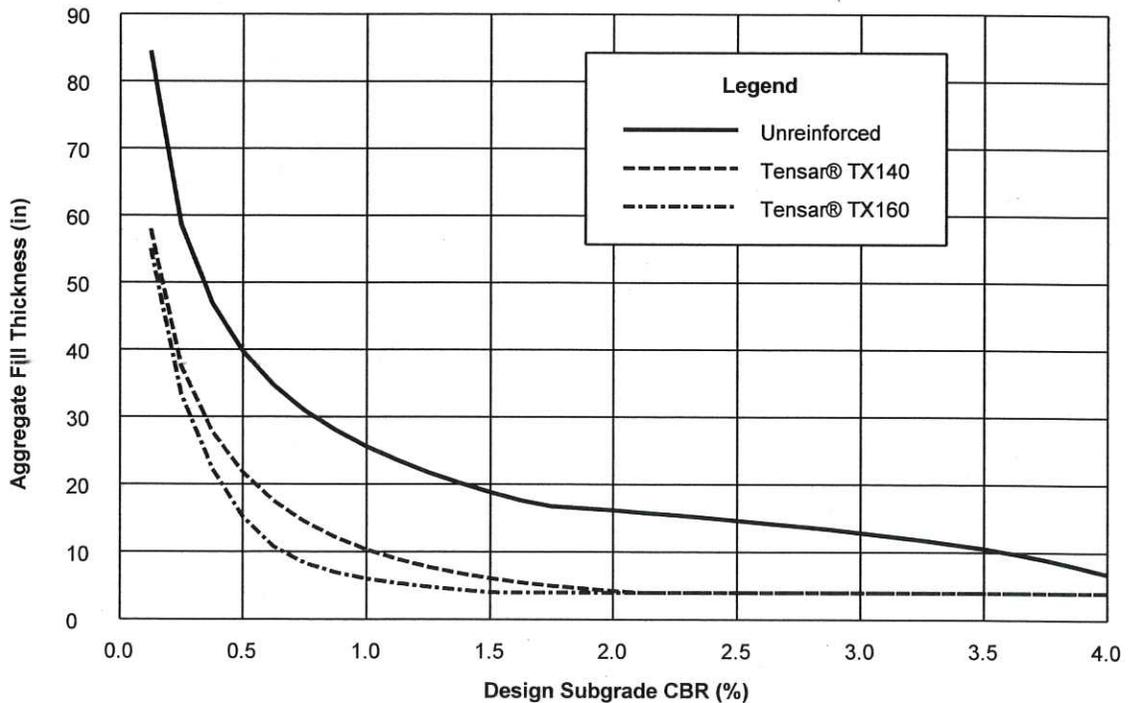
| Property | Value |
|------------------------|-------|
| Axle Load (kips) | 35 |
| Tire Pressure (psi) | 70 |
| Axle Passes (Each) | 1200 |
| Maximum Rut Depth (in) | 3.0 |

PAVEMENT SOIL PROPERTIES

| Property | Value |
|-------------------------|-------|
| Aggregate Fill CBR (%) | 20 |
| Design Subgrade CBR (%) | 0.5 |

RESULTS

| Geogrid | Aggregate Fill Thickness (in) | | Aggregate Fill Thickness Savings (in) | |
|--------------|-------------------------------|----------|---------------------------------------|-----|
| | Calculated | Required | (in) | (%) |
| Unreinforced | 39.77 | 40 | N/A | N/A |
| TX140 | 21.8 | 22 | 18 | 45 |
| TX160 | 15.2 | 16 | 24 | 60 |



| | |
|--------------|--------------------------------------|
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SpectraPave4 PRO™ Unpaved Road Cost Analysis *** Report ***

COST ANALYSIS PARAMETERS

PROJECT SIZE

| | |
|-------------|-----|
| Length (ft) | 800 |
| Width (ft) | 250 |

AGGREGATE INFORMATION

| | |
|-----------------------------|-------|
| Total in place cost (\$/CY) | 20.00 |
|-----------------------------|-------|

TOP SURFACE CONSTRAINT

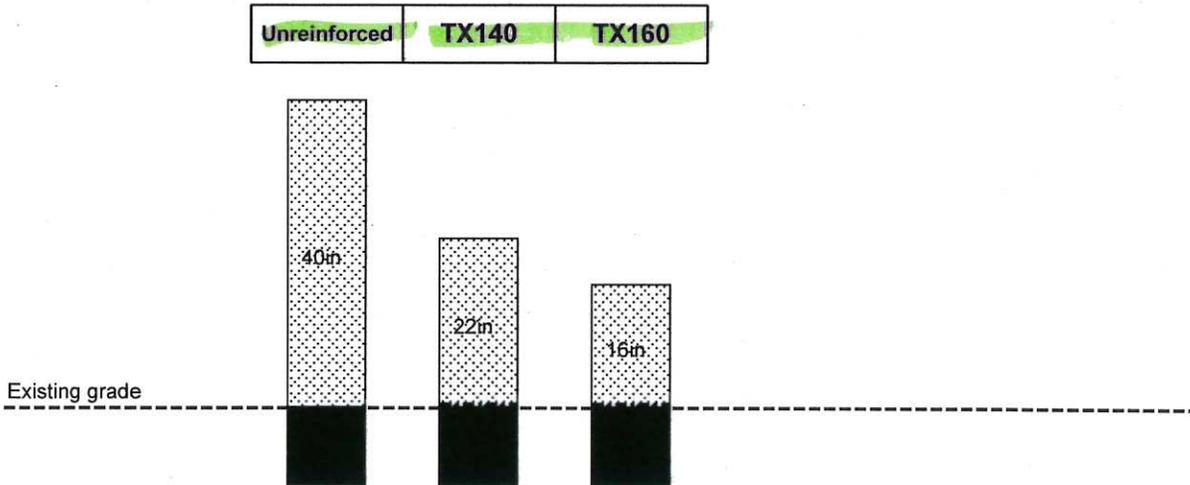
There are no restrictions on the top level of the pavement. Therefore, irrespective of the required fill thickness, there is no requirement for undercut of the existing formation.

GEOSYNTHETIC INFORMATION

| | Tensar TX140 | Tensar TX160 |
|---------------------------|--------------|--------------|
| Material Cost (\$/SY) | 2.50 | 4.50 |
| Roll Width (ft) | 13.10 | 13.10 |
| Installation Cost (\$/SY) | 0.25 | 0.25 |
| Minimum Overlap (ft) | 2 | 2 |

RESULTS

Legend: Aggregate fill Existing subgrade Additional fill required Geogrid



| | Unreinforced | TX140 | TX160 |
|-------------------------|--------------|-------------|-------------|
| Aggregate costs | \$493,827 | \$271,605 | \$197,531 |
| Geogrid costs | \$0 | \$70,441 | \$121,671 |
| Undercut costs | \$0 | \$0 | \$0 |
| Additional fill costs | \$0 | \$0 | \$0 |
| Total project costs | \$493,827 | \$542,046 | \$542,348 |
| Overall project savings | \$0 | \$151,781 ✓ | \$174,625 ✓ |
| Percent savings | 0% | 31% | 35% |

| | |
|--------------|--------------------------------------|
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SpectraPave4 PRO™ Unpaved Road Application *** Report ***

DESIGN PARAMETERS

DESIGN REQUIREMENTS

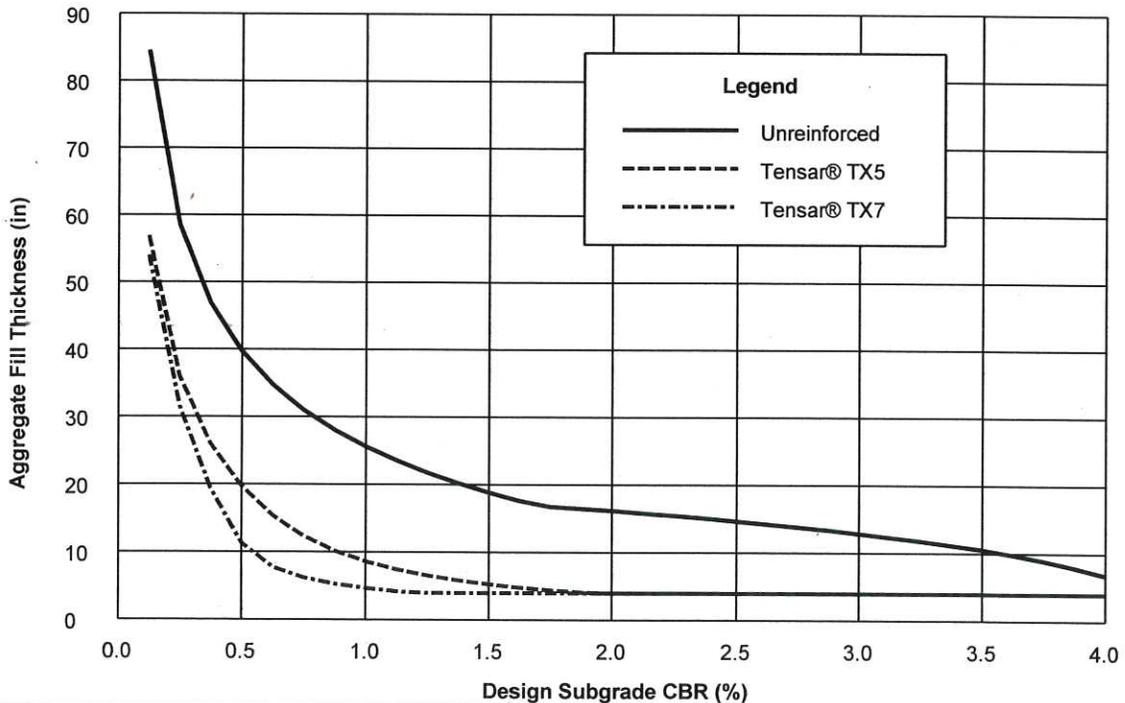
| Property | Value |
|------------------------|-------|
| Axle Load (kips) | 35 |
| Tire Pressure (psi) | 70 |
| Axle Passes (Each) | 1200 |
| Maximum Rut Depth (in) | 3.0 |

PAVEMENT SOIL PROPERTIES

| Property | Value |
|-------------------------|-------|
| Aggregate Fill CBR (%) | 20 |
| Design Subgrade CBR (%) | 0.5 |

RESULTS

| Geogrid | Aggregate Fill Thickness (in) | | Aggregate Fill Thickness Savings (in) | |
|--------------|-------------------------------|----------|---------------------------------------|-----|
| | Calculated | Required | (in) | (%) |
| Unreinforced | 39.77 | 40 | N/A | N/A |
| TX5 | 19.73 | 20 | 20 | 50 |
| TX7 | 11.34 | 12 | 28 | 70 |



| | |
|--------------|--------------------------------------|
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| Designer | TCC |
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SpectraPave4 PRO™ Unpaved Road Cost Analysis *** Report ***

COST ANALYSIS PARAMETERS

PROJECT SIZE

| | |
|-------------|-----|
| Length (ft) | 800 |
| Width (ft) | 250 |

AGGREGATE INFORMATION

| | |
|-----------------------------|-------|
| Total in place cost (\$/CY) | 20.00 |
|-----------------------------|-------|

TOP SURFACE CONSTRAINT

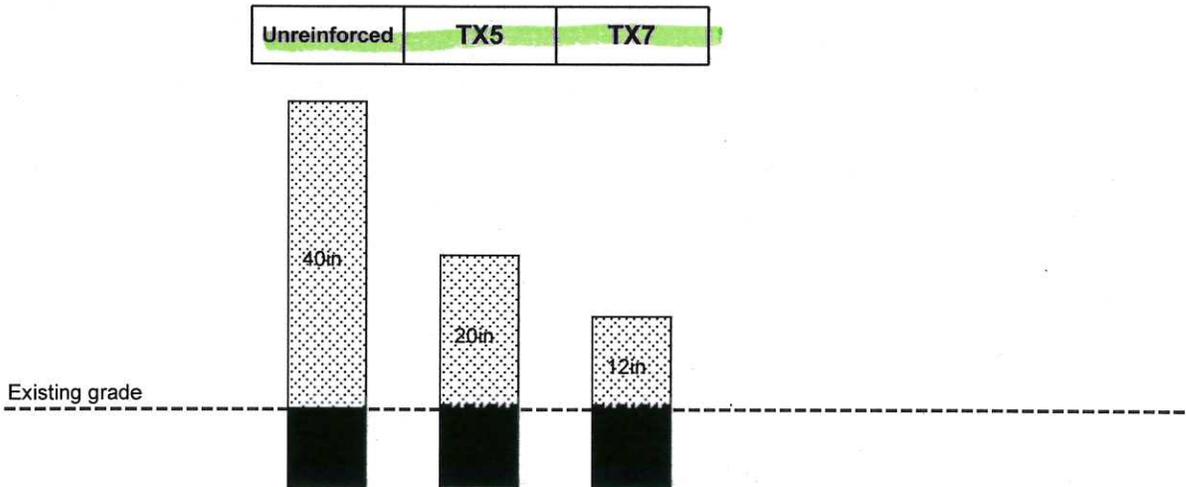
There are no restrictions on the top level of the pavement. Therefore, irrespective of the required fill thickness, there is no requirement for undercut of the existing formation.

GEOSYNTHETIC INFORMATION

| | Tensar TX5 | Tensar TX7 |
|---------------------------|------------|------------|
| Material Cost (\$/SY) | 3.50 | 5.50 |
| Roll Width (ft) | 13.10 | 13.10 |
| Installation Cost (\$/SY) | 0.25 | 0.25 |
| Minimum Overlap (ft) | 2 | 2 |

RESULTS

Legend: Aggregate fill Existing subgrade Additional fill required - - - - - Geogrid



| | Unreinforced | TX5 | TX7 |
|----------------------------|------------------|------------------|------------------|
| Aggregate costs | \$493,827 | \$246,914 | \$148,148 |
| Geogrid costs | \$0 | \$96,056 | \$147,286 |
| Undercut costs | \$0 | \$0 | \$0 |
| Additional fill costs | \$0 | \$0 | \$0 |
| Total project costs | \$493,827 | \$342,970 | \$295,434 |
| Overall project savings | \$0 | \$150,858 | \$198,393 |
| Percent savings | 0% | 31% | 40% |

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| | |
|--------------|--------------------------------------|
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| Designer | TCC |
| Date | 10/15/14 |