An NCDOT Geotechnical Standard Presentation

Scott Hidden, P.E.
Support Services Supervisor
Geotechnical Engineering Unit (GEU)
What is a Geotechnical Standard?

- It is a standard maintained by the Technical Support Group of the GEU Support Services Section
- Standard provisions and drawings are effective with some letting date and are intended to be used as is
- Standard notes and cells should be included and modified based on project specific designs
- Do not assume that a standard is applicable to every situation!
Why are standards so conservative?

- Complexity vs. Conservatism
- If a standard is too complex, it will not get used.
- If a standard is too conservative, it will not be widely applicable or if it is, it will be too expensive.
What standards are available?

- All major types of retaining walls (MSE, Gravity, Soil Nail, Soldier Pile and Anchored)
- Rock Embankments
- Rock Plating
- Reinforced Soil Slopes (RSS)
- Embankment Monitoring
- Standard Shoring and Temporary Soil Nail Walls
- Rock Slope Materials
- Pile Driving Criteria
- Geotextile for Pavement Stabilization
What product lists are available?

- Polymer Slurries
- MSE Retaining Wall Systems (for panels and SRW units)
- SRW Units for Standard Segmental Gravity Walls
- Pile Points and Splicers
- Wire Mesh and Nets
- Geogrids (administered by M&T)
- Geotextiles (under development)
- Precast Retaining Wall Units (future development)
Where can I find these standards?

- GEU Website –
  connect.ncdot.gov/resources/geological

- NCDOT Approved Product Lists –
  https://apps.dot.state.nc.us/vendor/approvedproducts/

- Geotechnical Design Cell Library –
  Geotechnical_Design_English.cel

- GEU Contacts –
  Scott Hidden (919) 707-6856, shidden@ncdot.gov
  or
  Eric Williams (919) 707-6876, ewilliams@ncdot.gov
How do I keep informed of changes?

Sign up for the Geotechnical Distribution List to receive NCDOT Geotech Alerts

(it’s free and we promise not to flood your inbox or use your email for marketing purposes!😊)
How to Use Standard Temporary Wall Drawings

- Determine minimum required reinforcement length from table on sheet 3 (global stability or pullout controls)
- Standard temporary wall example
  - Surcharge case with $H = 18$ ft
  - Class III select material for shoring backfill in the reinforced zone
  - Groundwater depth below bottom of reinforced zone is 10 ft

<table>
<thead>
<tr>
<th>SLOPE OR SURCHARGE CASE</th>
<th>GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)</th>
<th>SLOPING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)</th>
<th>$H$ − WALL HEIGHT (FT)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td></td>
<td>&gt; 0 TO 7 FOR $H &lt; 20$, &gt; 0 TO 10 FOR $H \geq 20$</td>
<td>A-2-4 SOIL</td>
<td>29</td>
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<td>SURCHARGE CASE</td>
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</tbody>
</table>

$L$ − MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)
(FOR ALL REINFORCEMENT TYPES)
How to Use Standard Temporary Wall Drawings

- **Determine minimum required geotextile reinforcement strength** from table on sheet 3 (strength controls)
- **Standard temporary wall example (continued)**
  - Surcharge case with H = 18 ft and 18" of embedment (minimum)
  - Class III select material for shoring backfill in the reinforced zone
  - Groundwater depth below bottom of reinforced zone is 10 ft
How to Use Standard Temporary Wall Drawings

- Reinforcement layers for standard temporary walls are numbered from the top down!
How to Use Standard Temporary Wall Drawings

- Select geotextile reinforcement that meets standard shoring provision (type 5 and 8 oz/sq yd mass per unit area) and ultimate tensile strength requirements in the MD.

- Standard temporary wall example (continued)
  - For Mirafi HP geotextile series, ultimate tensile strength (wide width tensile strength) ranges from 2640 to 7200 lb/ft and 2400 to 6000 lb/ft is required.
What is in the pipeline?

Standard Concrete Ditch Behind Wall for all retaining wall types - modified roadway standard base ditch
What is in the pipeline?

- Drilled Pier Axial Resistance Spreadsheet
  - Calculates developed factored side and tip resistances and required tip resistance for drilled piers in sand, clay, IGM, weathered rock and hard rock
  - Follows LRFD design based on AASHTO 6th Edition
  - Incorporates NCDOT GEU design policy for drilled piers in weathered rock (material classification not covered in AASHTO)
  - Includes tip resistance methods based on both RMR and GSI
Questions?