

Geotechnical Bulletin No.1 (GB1): Plan Subgrades (July 11, 2003)

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or

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Background

- \$11 million of subgrade stabilization change orders in 2000
- \$10 million of subgrade stabilization change orders in 2001
 - Senior Leadership asked OGE and Construction to reduce subgrade related change orders
- 2001 FHWA review of ODOT Geotechnical Engineering Program
 - All 12 Districts claim soft subgrades are the typical construction problem
- Contingency quantities skew bids and are not acceptable for subgrade stabilization plan notes
- Subgrade stabilization, or treatment, is *currently* performed for constructability purposes only → the improved subgrade strength is not *currently* considered in the pavement design
- Limits and quantities of partial stabilization are verified and adjusted in the field based on proof rolling and visual observation

Interim Guidelines for Plan Subgrade Treatments (November 2001)

- Design Procedure to predict areas of anticipated instability and plan vertical and horizontal limits of subgrade treatment and treatment type
- Based on procedures used for years in construction
- Predict areas of anticipated instability
 - Natural moisture content $>$ optimum moisture +3%
 - Optimum moisture content based on Atterberg limits for cohesive soils
- Identify depth, type, and % area of treatment
 - Based on average lowest standard penetration blow count (N) recorded in top 5.0 feet of proposed subgrade
- Type and location of project affects stabilization options (new vs. rehabilitation, urban vs. rural)
- Rubblize and Roll not a rehabilitation option when average N $<$ 15 bpf
- Reference to 2002 CMS
- Only consider lime if $PI \geq 20$, otherwise use cement
- When average N is less than 5 bpf, only consider undercut

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- Refined optimum moisture content estimate (establish a minimum value)
- Maximum $N = 30$ bpf for averaging
- Eliminate $N > 20$ bpf stabilization procedure
- Eliminate % area to be treated - too much like a contingency
- Establish minimum laboratory testing requirements (lab classify [including hydrometer] 2 samples within top 5.0 feet of proposed subgrade)
- Establish boring locations based on type of rehabilitation
- Establish global treatment threshold - consider when $> 30\%$
- Eliminate Average Lower $N - 1$ standard deviation

Future Modifications Being Considered

- Treatment required where average lower $N < 10$ bpf, regardless of moisture content
- Exclude bedrock subgrade when averaging N
- Average N should always be rounded to nearest whole number
- Explore considering lime for $PI > 16$

Subgrade Investigation Recommendations

- Must clearly present methods, locations and dimensions (including depth) of treatment - see SSI 5.3.2.1
- Never visually classify A-4b, A-7-5, A-2-5 soils present in top 3.0 feet of proposed subgrade
- No need to regurgitate the specifications
- Segregate and analyze alignment appropriately (by station, left and right, pavement/widened portion, etc.)
- Always present calculations (see SSI 5.3.2). Interpretation column is the most important
- Always consider construction: partial rubblize and roll, piecemeal chemical stabilization, etc. may not be practical
- Design CBR = Average or 50th percentile CBR (optimum conditions)
- Never design pavement unless scoped