# PennDOT – Geotechnical Engineer Position Analysis Workbook

## Focus Group Participants

<table>
<thead>
<tr>
<th>Geotechnical Engineers:</th>
<th>Supervisors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Bredl, District 1-0</td>
<td></td>
</tr>
<tr>
<td>Dennis Neff, District 2-0</td>
<td></td>
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<tr>
<td>Robert Johnson, District 3-0</td>
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<tr>
<td>Leo Charney, District 4-0</td>
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<tr>
<td>Dudley Samuda, District 5-0</td>
<td></td>
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<tr>
<td>Bruce Shelly, District 6-0</td>
<td></td>
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<tr>
<td>Stephen Geidel, District 10-0</td>
<td></td>
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<tr>
<td>Joseph Schultz, District 11-0</td>
<td></td>
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<tr>
<td>Dave Whitlatch, District 12-0</td>
<td></td>
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<tr>
<td>Kerry Petrasic, Central Office, BOCM</td>
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</tr>
</tbody>
</table>

**Facilitator:**  
John Moser, The Ohio State University

**Scribe:**  
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This booklet was developed by the College of Transportation Professions of the Transportation University. Geotechnical Engineer personnel participated in a focus group to identify the duties, tasks, knowledge, skills and competencies required to be a high performing Geotechnical Engineer individual. This information will be used by the project team to develop the Suggested Curriculum. Not all Geotechnical Engineer personnel perform all the duties and tasks outlined in this workbook. This workbook reflects the work of the high performers that participated in the focus group.

THE COLLEGE OF
TRANSPORTATION PROFESSIONS

Dean: M. G. Patel
Assistant Dean: Steve Davis

Chair, School of Construction Community: Christine Reilly

PAW Workshop: July 13 and 14, 2004
Verified: September 2004

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HOW TO USE THIS BOOKLET

In 1998, The Department of Transportation formed five department-wide gap closure teams to close gaps identified during PennDOT’s first cursory assessment, dubbed EBAT I. The Internal Customer Service Team addressed several employee development issues including:

- Meaningful cross-training experiences
- Career development and promotion opportunities
- Training and development tied to the Department’s strategic direction

Although this Position Analysis Workbook (PAW) was developed to guide the Colleges of the Transportation University, their Schools and training committees develop training opportunities targeted to workplace needs, it has several other uses. It is a tool that employees can use to guide their own professional development, develop cross-training experiences, or prepare for promotional opportunities. The supervisor, mentor or coach can use it as a guide to provide appropriate learning experiences for protégés or subordinates. First, cross out any duties or tasks that do not apply to the way you do business in your organization. Then, this booklet can be used in the following ways:

Interviewing job candidates: By supplying the PAW to potential job candidates, you will provide them the opportunity to evaluate their own suitability for the position. Interviewers will be able to structure interview questions that are relevant to required job knowledge and skills.

Orienting a new employee: The PAW details all the job duties and the tasks that make up those duties. It is a road map for a new employee to learn the job right.

Structuring cross-training experiences: To do this, obtain the PAW for the OTHER position to discover the duties and tasks performed in THAT position. You and your mentor or supervisor will be able to structure a cross-training experience that is meaningful, not just sitting around reading manuals!

Planning training & developmental activities: All of us have areas of strength, and areas where we can use a little help. Use the Self-Assessment, and discuss with your supervisor or mentor the ways that you can learn new skills and competencies. If you want to improve your skills and knowledge, have your supervisor or mentor assess you, then compare his/her assessment with your self-assessment.

Preparing for promotion: By comparing your PAW to that of another position, you can start learning the skills and knowledge, and developing the competencies you will need to demonstrate in your next position.

Developing an Action Plan for Learning: If you make a plan, with specific dates attached, you’re making a commitment to yourself. Working on the Action Plan with your supervisor or mentor gives you an ally, and a little extra motivation.
### Geotechnical Engineer:

<table>
<thead>
<tr>
<th>DUTIES</th>
<th>TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Manage Subsurface Investigation Program</strong></td>
<td><strong>B Interpret Subsurface Information</strong></td>
</tr>
<tr>
<td>1 Participate in SIQAC activities</td>
<td>1 Review test boring logs</td>
</tr>
<tr>
<td>2 Certify drilling inspectors</td>
<td>2 Review lab results</td>
</tr>
<tr>
<td>3 Schedule boring program</td>
<td>3 Review field test results</td>
</tr>
<tr>
<td>4 Research existing geotechnical and geological information</td>
<td>4 Review existing geologic and geotechnical information</td>
</tr>
<tr>
<td>10 Administer drilling contracts</td>
<td>10 Evaluate need for additional SI and lab testing</td>
</tr>
<tr>
<td>11 Coordinate drilling site clearance</td>
<td>11 Assign soil and rock parameters</td>
</tr>
<tr>
<td>12 Supervise drilling operation</td>
<td>12 Validate soil and rock parameters</td>
</tr>
<tr>
<td>13 Resolve unforeseen issues during drilling</td>
<td>13 Evaluate long term instrumentation data</td>
</tr>
<tr>
<td>19 Coordinate lab testing</td>
<td></td>
</tr>
<tr>
<td>20 Verify accuracy of boring logs</td>
<td></td>
</tr>
<tr>
<td>21 Request survey data</td>
<td></td>
</tr>
</tbody>
</table>

#### Skills
- Writing, Reading, Organization, Speaking, Listening, Multi-Tasking, Time Management.

#### Knowledge

#### Competencies

#### Skills
- Observation. Investigative.

#### Knowledge

#### Competencies
<table>
<thead>
<tr>
<th>TASKS</th>
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</thead>
<tbody>
<tr>
<td>Conduct project site investigation</td>
<td></td>
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<tr>
<td>Develop boring plan</td>
<td></td>
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<tr>
<td>Develop drilling and lab testing contracts</td>
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<tr>
<td>Stakeout boring locations</td>
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<tr>
<td>Conduct pre-bid meeting</td>
<td></td>
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<tr>
<td>Review field boring logs</td>
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<tr>
<td>Monitor subsurface instrumentation</td>
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<tr>
<td>Evaluate the need for additional investigative methods</td>
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<tr>
<td>Perform field testing</td>
<td></td>
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<tr>
<td>Recommend laboratory testing schedule</td>
<td></td>
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<tr>
<td>Maintain core box inventory</td>
<td></td>
</tr>
<tr>
<td>Maintain subsurface information database</td>
<td></td>
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<tr>
<td>Review field boring logs</td>
<td></td>
</tr>
<tr>
<td>Review instrumentation results</td>
<td></td>
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<tr>
<td>Review subsurface anomalies</td>
<td></td>
</tr>
<tr>
<td>Evaluate groundwater conditions</td>
<td></td>
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<tr>
<td>Evaluate geologic setting</td>
<td></td>
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<tr>
<td>Review consultant subsurface related submissions</td>
<td></td>
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<tr>
<td>Identify failure mechanisms</td>
<td></td>
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<tr>
<td>Develop subsurface profile and geologic cross-sections</td>
<td></td>
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<tr>
<td>Review instrumentation results</td>
<td></td>
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<tr>
<td>Review subsurface anomalies</td>
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<td>Evaluate groundwater conditions</td>
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<td>Review consultant subsurface related submissions</td>
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<tr>
<td>Identify failure mechanisms</td>
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</table>
### Design Geotechnical Elements of Structures

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>1</th>
<th>Prepare RSGER</th>
<th>2</th>
<th>Address structure related mining and coal issues</th>
<th>3</th>
<th>Address structure related karst issues</th>
<th>4</th>
<th>Address corrosion potential of soil and rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>D</td>
<td>10</td>
<td>Evaluate end bearing pile design</td>
<td>11</td>
<td>Evaluate friction pile design</td>
<td>12</td>
<td>Evaluate caisson design</td>
<td>13</td>
<td>Evaluate micro pile design</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>19</td>
<td>Determine viable retaining wall alternatives</td>
<td>20</td>
<td>Assess retaining wall alternatives</td>
<td>21</td>
<td>Evaluate MSE wall design</td>
<td>22</td>
<td>Evaluate concrete cantilever wall design</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>28</td>
<td>Provide global stability analysis of slopes</td>
<td>29</td>
<td>Recommend foundation treatments</td>
<td>30</td>
<td>Evaluate design of other structure foundations (e.g. signs, high-mast soundwalls, lighting)</td>
<td>31</td>
<td>Prepare foundation report and structure boring sheets</td>
</tr>
</tbody>
</table>

**Skills**
- Writing
- Reading
- Organization
- Speaking
- Listening
- Multi-Tasking
- Time Management
- Drawing/Drafting
- Observation
- Investigative

**Knowledge**
- Construction Methods
- Soil Mechanics
- Foundation Analysis/Design
- Geology
- Hydrology
- Rock Mechanics
- Lab Testing (Soils & Rock Lab)
- Field Testing Techniques
- Advanced Math
- Chemistry
- Physics & Biology
- Materials Engineering
- Geosynthetic Engineering

**Competencies**
- Attention to Detail
- Honesty/Integrity
- Conscientiousness
- Decision Making
- Flexibility
- Organizational Skills
- Communications
- Written
- Organized
- Communications
- Oral
- Communications
- Listening

### Design Geotechnical Elements of Roadways

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>1</th>
<th>Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)</th>
<th>2</th>
<th>Address roadway related mining and coal issues</th>
<th>3</th>
<th>Address roadway related karst issues</th>
<th>4</th>
<th>Address soft foundation conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>10</td>
<td>Provide pavement design recommendations to PME</td>
<td>11</td>
<td>Provide acidic drainage mitigation plans</td>
<td>12</td>
<td>Provide wetlands, E&amp;S, and sediment pond recommendations</td>
<td>13</td>
<td>Develop hazardous waste removal plan</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>19</td>
<td>Conduct constructability and scheduling review</td>
<td>20</td>
<td>Review roadway PS&amp;E package</td>
<td>21</td>
<td>Review consultant roadway related submissions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Skills**
- Writing
- Reading
- Organization
- Speaking
- Listening
- Multi-Tasking
- Time Management
- Drawing/Drafting
- Observation
- Investigative

**Knowledge**
- Construction Methods
- Soil Mechanics
- Geology
- Pavement Engineering
- Hydrology
- Geophysical Techniques
- Drilling Procedures
- Rock Mechanics
- Lab Testing (Soils & Rock Lab)
- Field Testing Techniques
- Environmental Regulations
- Advanced Math
- Chemistry
- Physics & Biology
- Hazardous Materials Awareness

**Competencies**
- Attention to Detail
- Honesty/Integrity
- Conscientiousness
- Decision Making
- Flexibility
- Observant
- Communications
- Written
- Organized
- Communications
- Oral
- Communications
- Listening
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</thead>
<tbody>
<tr>
<td>5</td>
<td>Determine viable foundation alternatives</td>
<td>6</td>
<td>Assess foundation alternatives</td>
<td>7</td>
<td>Evaluate spread footing on soil</td>
</tr>
<tr>
<td>8</td>
<td>Evaluate spread footing on rock</td>
<td>9</td>
<td>Evaluate spread footing on slopes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Evaluate specialty foundation types (e.g. auger cast, pre-stress concrete)</td>
<td>15</td>
<td>Resolve settlement issues (e.g. magnitude, rate differential, down drag)</td>
<td>16</td>
<td>Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)</td>
</tr>
<tr>
<td>17</td>
<td>Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)</td>
<td>18</td>
<td>Evaluate reuse and retrofit of existing foundations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Evaluate soldier pile and lagging wall design</td>
<td>24</td>
<td>Evaluate tie back wall design</td>
<td>25</td>
<td>Evaluate soil nail wall design</td>
</tr>
<tr>
<td>26</td>
<td>Evaluate specialty wall designs (e.g. T-walls, modular block, adjacent caisson)</td>
<td>27</td>
<td>Provide retaining wall recommendations to bridge unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Review consultant structure related submissions</td>
<td>33</td>
<td>Evaluate construction scheduling and constructability</td>
<td>34</td>
<td>Review structural PS&amp;E package</td>
</tr>
</tbody>
</table>


### E: Provide Construction Consultation

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attend pre-construction meetings (e.g. pre-bid, pre-construction, partnering)</td>
</tr>
<tr>
<td>2</td>
<td>Approve borrow and waste area's</td>
</tr>
<tr>
<td>3</td>
<td>Administer compaction control program (e.g. testing, nuclear gauges, soils lab testing)</td>
</tr>
<tr>
<td>4</td>
<td>Address mining and coal issues during construction</td>
</tr>
<tr>
<td>5</td>
<td>Address unstable foundation and subgrade conditions</td>
</tr>
<tr>
<td>6</td>
<td>Address unstable soil and rock slope conditions</td>
</tr>
<tr>
<td>7</td>
<td>Address unforeseen groundwater conditions</td>
</tr>
<tr>
<td>8</td>
<td>Perform special subsurface testing (e.g. CPT, vane shear, pressure meter)</td>
</tr>
<tr>
<td>9</td>
<td>Supervise installation and monitoring of instrumentation</td>
</tr>
<tr>
<td>10</td>
<td>Evaluate monitoring results</td>
</tr>
<tr>
<td>11</td>
<td>Address project status meetings</td>
</tr>
<tr>
<td>12</td>
<td>Assist with structure and roadway redesign</td>
</tr>
</tbody>
</table>

**Skills**
- Writing, Reading, Organization, Speaking, Listening, Multi-Tasking, Time Management
- Surveying, Analytical, Interpreting, Inspecting, Observation, Investigative

**Knowledge**
- Construction Methods, Soil Mechanics, Foundation Analysis/Design, Geology
- Geotechnical Instrumentation, Geophysical Techniques, Drilling Procedures, Rock Mechanics
- Environmental Regulations, Advanced Math, Chemistry, Physics & Biology
- Hazardous Materials Awareness, Materials Engineering

**Competencies**
- Attention to Detail, Honesty/Integrity, Conscientiousness, Decision Making, Flexibility, Observant, Communications, Written, Organized, Communications, Oral, Communications, Listening

### F: Provide Maintenance Consultation

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Evaluate soil slope failures</td>
</tr>
<tr>
<td>2</td>
<td>Evaluate rock slope issues (e.g. failures, inventory, claims)</td>
</tr>
<tr>
<td>3</td>
<td>Address mining and coal issues for maintenance</td>
</tr>
<tr>
<td>4</td>
<td>Address karst issues for maintenance</td>
</tr>
<tr>
<td>5</td>
<td>Evaluate HOPs</td>
</tr>
<tr>
<td>6</td>
<td>Provide compaction control for utility cuts</td>
</tr>
<tr>
<td>7</td>
<td>Manage long term instrumentation program</td>
</tr>
<tr>
<td>8</td>
<td>Evaluate conditions for department force bridges</td>
</tr>
</tbody>
</table>

**Skills**
- Writing, Reading, Organization, Speaking, Listening, Multi-Tasking, Time Management
- Surveying, Analytical, Interpreting, Drawing/Drafting, Inspecting, Observation, Public Speaking

**Knowledge**
- Construction Methods, Soil Mechanics, Foundation Analysis/Design, Geology
- Geotechnical Instrumentation, Geophysical Techniques, Drilling Procedures, Rock Mechanics
- Environmental Regulations, Advanced Math, Chemistry, Physics & Biology
- Hazardous Materials Awareness, Lab Testing (Soils & Rock Lab)

**Competencies**
- Attention to Detail, Honesty/Integrity, Conscientiousness, Decision Making, Flexibility, Observant, Communications, Written, Organized, Communications, Oral, Communications, Listening
| 5 | Address karst issues during construction |
| 6 | Administer water testing program |
| 7 | Evaluate exploratory borings and test pits |
| 8 | Review blasting plan |
| 9 | Resolve project blasting issues (e.g. surveys, test blasts, problems) |
| 14 | Review temporary shoring submissions |
| 15 | Review design build and value engineering submissions |
| 16 | Approve foundation excavations |
| 17 | Evaluate pile driving issues (e.g. test piles, PDAs, pile hammer) |
| 18 | Evaluate drilled pile issues (e.g. pin piles, caissons, dowels) |
| 23 | Assist with construction claims |
| 24 | Manage geotechnical construction consultants |


Lab Testing (Soils & Rock Lab), Field Testing Techniques, Mining Techniques, PennDOT Policies & Procedures.
Geosynthetic Engineering, ECMS, OSHA Regulations, PennDOT Design Standards & Specifications, CPM.


| 5 | Evaluate drainage and erosion issues |
| 6 | Administer emergency repair contracts |
| 7 | Supervise maintenance repairs (e.g. slides, sinkholes, rock falls) |
| 8 | Evaluate pavement distress and posted roads |
| 9 | Investigate structure issues (e.g. movement, wall failures, backfill settlement) |
| 14 | Evaluate conditions for maintenance facility improvements |


Field Testing Techniques, Mining Techniques, Mining Laws & Regulations, PennDOT Policies & Procedures.
Materials Engineering, Geosynthetic Engineering, OSHA Regulations, PennDOT Design Standards & Specifications.

## Perform Administrative Duties

1. Submit ESS information (e.g. timesheets, expense requests, leave slips)
2. Process correspondence (e.g. email, letters, phone calls)
3. Respond to special requests (e.g. politicians, upper management, customers)
4. Train inspectors on geotechnical techniques
5. Complete customer satisfaction surveys
6. Review clearance transmittals
7. Assist in maintaining geotechnical publications
8. Maintain department equipment (e.g. vehicles, office equipment, specialty equipment)
9. Manage open end geotechnical contracts

### Skills
- Writing.
- Reading.
- Organization.
- Speaking.
- Listening.
- Multi-Tasking.
- Time Management.
- Interpreting.
- Observation.
- Public Speaking.

### Knowledge
- PennDOT Policies & Procedures.
- Environmental Regulations.
- Union Contract/Labor Relations.
- Slope Failure Mechanisms.
- Rock Mechanics.
- Geotechnical Instrumentation.
- Geology.
- Mining Laws & Regulations.
- Rock Fall Remediation.
- ECMS.
- Hazardous Materials Awareness.

### Competencies
- Attention to Detail.
- Honesty/Integrity.
- Conscientiousness.
- Decision Making.
- Flexibility.
- Observant.
- Communications, Written.
- Organized.
- Communications, Oral.
- Communications, Listening.

## Monitor Mining Activities

1. Monitor surface mine variances
2. Monitor non-coal deep mine and tunneling variances
3. Review requests for mining permits
4. Monitor six month deep mine maps

### Skills
- Writing.
- Reading.
- Organization.
- Speaking.
- Listening.
- Multi-Tasking.
- Time Management.
- Surveying.
- Analytical.
- Interpreting.
- Inspecting.
- Observation.
- Investigative.

### Knowledge
- Geotechnical Instrumentation.
- Geophysical Techniques.
- Drilling Procedures.
- Rock Mechanics.
- Environmental Regulations.
- Materials Engineering.
- OSHA Regulations.

### Competencies
- Attention to Detail.
- Honesty/Integrity.
- Conscientiousness.
- Decision Making.
- Flexibility.
- Observant.
- Communications, Written.
- Organized.
- Communications, Oral.
- Communications, Listening.

## Manage Geotechnical Staff

1. Manage unit resources (e.g. staff, work assignments, equipment)
2. Approve ESS information (e.g. timesheets, expense requests, leave slips)
3. Develop position descriptions
4. Complete EPRs (e.g. goals, ratings, objectives)
5. Address employee grievance issues
6. Participate in disciplinary action process
7. Advise employees of SEAP
8. Monitor employee certifications and licenses

### Skills
- Writing.
- Reading.
- Organization.
- Speaking.
- Listening.
- Multi-Tasking.
- Time Management.
- Interpreting.
- Observation.
- Investigative.

### Knowledge
- Construction Methods.
- Soil Mechanics.
- Foundation Analysis/Design.
- Geology.
- Drilling Procedures.
- Rock Mechanics.
- Lab Testing (Soils & Rock Lab).
- Union Contract/Labor Relations.
- Advanced Math.
- Chemistry.
- Physics & Biology.
- Hazardous Materials Awareness.
- Environmental Regulations.

### Competencies
- Attention to Detail.
- Honesty/Integrity.
- Conscientiousness.
- Decision Making.
- Flexibility.
- Observant.
- Communications, Written.
- Organized.
- Communications, Oral.
- Communications, Listening.
| 5 | Provide construction school and other technical training |
| 6 | Attend meetings (e.g. staff, technical, management) |
| 7 | Maintain project files |
| 8 | Serve on interview teams |
| 9 | Perform project management duties (e.g. SOWs, man-hour estimates, invoices) |
| 14 | Evaluate new products and technology |
| 15 | Provide media interviews |
| 16 | Serve in acting capacity for immediate supervisor |
| 17 | Complete accident reports |
| 18 | Prepare budget requests |


| 5 | Meet with coal companies |
| 6 | Monitor long wall and pillar mining impacts |
| 7 | Monitor mine repair contracts |
| 8 | Maintain mine permit database and library |
| 9 | Monitor new mining legislation and regulations |


| 5 | Manage overtime (e.g. track, equalize, budget) |
| 6 | Conduct employee interviews |
| 7 | Mentor subordinates |
| 8 | Assign training opportunities |
| 9 | Review completed work assignments |


<table>
<thead>
<tr>
<th>J</th>
<th>Continue Professional Development</th>
<th>1</th>
<th>Participate in required and elective training</th>
<th>2</th>
<th>Assess unit training needs</th>
<th>3</th>
<th>Prepare technical papers</th>
<th>4</th>
<th>Maintain certifications and licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Skills</td>
<td></td>
<td>Writing, Reading, Organization, Speaking, Listening, Multi-Tasking, Time Management, Observation, Public Speaking, Investigative.</td>
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<td></td>
<td>Competencies</td>
<td></td>
<td>Attention to Detail, Honesty/Integrity, Conscientiousness, Decision Making, Flexibility, Observant, Communications, Written, Organized, Communications, Oral, Communications, Listening.</td>
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<tr>
<td></td>
<td>K</td>
<td>Coordinate with Other Organizations</td>
<td>1</td>
<td>Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)</td>
<td>2</td>
<td>Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)</td>
<td>3</td>
<td>Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)</td>
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<td></td>
<td>Skills</td>
<td></td>
<td>Writing, Reading, Organization, Speaking, Listening, Multi-Tasking, Time Management, Interpreting, Inspecting, Observation, Public Speaking, Investigative.</td>
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<td>Competencies</td>
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<td>Attention to Detail, Honesty/Integrity, Conscientiousness, Decision Making, Flexibility, Observant, Communications, Written, Organized, Communications, Oral, Communications, Listening.</td>
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<td></td>
<td>5 Serve on technical committees (e.g. District, State, Interstate)</td>
<td>6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)</td>
<td>7 Review professional literature</td>
<td>8 Participate in professional organizations</td>
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Geosynthetic Engineering.

Leadership. Problem Solving.

<table>
<thead>
<tr>
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<th>5 Collaborate with universities and professional organizations</th>
<th>6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)</th>
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Learning Opportunities for Geotechnical Engineer

24-Hour Hazardous Waste Operations Training
D13 Develop hazardous waste removal plan
G19 Manage open end geotechnical contracts

8-Hour Hazardous Waste Operations Refresher Training
D13 Develop hazardous waste removal plan
G19 Manage open end geotechnical contracts

Advanced Tips and Techniques for Maintaining PC Hardware & Software
G13 Maintain department equipment (e.g. vehicles, office equipment, specialty equipment)

APC/PennDOT
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)

Business Writing
C1 Prepare RSGER
C17 Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)
C31 Prepare foundation report and structure boring sheets
D1 Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)
D18 Prepare final GER per Publication 293 (pre-final and final, as required)
G1 Submit ESS information (e.g. timesheets, expense requests, leave slips)
G2 Process correspondence (e.g. email, letters, phone calls)
G2 Process correspondence (e.g. email, letters, phone calls)
G3 Respond to special requests (e.g. politicians, upper management, customers)
I2 Approve ESS information (e.g. timesheets, expense requests, leave slips)
J5 Serve on technical committees (e.g. District, State, Inter-state)
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)
J8 Participate in professional organizations
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K2 Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K5 Collaborate with universities and professional organizations
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

Construction Management Training Workshop
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)

Construction of Walls and Reinforced Soil Slopes
A4 Research existing geotechnical and geological information
A8 Stakeout boring locations
A14 Review field boring logs
C19 Determine viable retaining wall alternatives
C20 Assess retaining wall alternatives

Context Sensitive Solutions Training
A5 Conduct project site investigation
J1 Participate in required and elective training
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)

Creating Optimism in the Workplace
I8 Assign training opportunities
I10 Address employee grievance issues

Design and Construction of MSE Walls and Reinforced Soil Slopes
A4 Research existing geotechnical and geological information
A8 Stakeout boring locations
A14 Review field boring logs
C19 Determine viable retaining wall alternatives
C20 Assess retaining wall alternatives

Design and Operation of Work Zone Traffic Control
A6 Develop boring plan
A12 Supervise drilling operation
# Learning Opportunities for Geotechnical Engineer

## Design of MSE Walls and Reinforced Soil Slopes
- C20 Assess retaining wall alternatives
- C21 Evaluate MSE wall design
- D8 Design special treatments for slope stabilization (e.g. RSS, soil nails, dowels)

## Drilled Shafts
- A11 Coordinate drilling site clearance
- A12 Supervise drilling operation

## Drilled Shafts Foundation Inspection
- A2 Certify drilling inspectors
- A10 Administer drilling contracts
- A11 Coordinate drilling site clearance
- A12 Supervise drilling operation
- A22 Evaluate drilling inspectors
- C5 Determine viable foundation alternatives
- C6 Assess foundation alternatives

## Driven Pile Foundations - Design and Construction
- C6 Assess foundation alternatives
- C10 Evaluate end bearing pile design
- C11 Evaluate friction pile design
- C12 Evaluate caisson design
- C13 Evaluate micro pile design
- C15 Resolve settlement issues (e.g. magnitude, rate differential, down drag)
- C16 Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)

## Dynamic Time Management: Critical Elements
- G6 Attend meetings (e.g. staff, technical, management)
- G16 Serve in acting capacity for immediate supervisor
- I1 Manage unit resources (e.g. staff, work assignments, equipment)

## ECMS Wave 3 - PENNDOT EMPLOYEES ONLY
- G19 Manage open end geotechnical contracts

## EDMS Enterprise Content Collection
- A24 Maintain subsurface information database
- G7 Maintain project files

## Effective Presentations
- F6 Administer emergency repair contracts
- G4 Train inspectors on geotechnical techniques
- G5 Provide construction school and other technical training
- G6 Attend meetings (e.g. staff, technical, management)
- J8 Participate in professional organizations

## Evelyn Wood Reading Dynamics for Business Professionals
- G2 Process correspondence (e.g. email, letters, phone calls)
- J7 Review professional literature

## FHWA Demo Project
- D4 Address soft foundation conditions
- D9 Provide recommendations for subgrade stabilization

## General Soil Mechanics Course
- B11 Assign soil and rock parameters

## Geotech Conference
- J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)

## Geotechnical & Foundation Engineering: Module 1 - Subsurface Investigations
- A3 Schedule boring program
- A4 Research existing geotechnical and geological information
- A5 Conduct project site investigation
- A6 Develop boring plan
- A7 Develop drilling and lab testing contracts
- A10 Administer drilling contracts
- A12 Supervise drilling operation
- A14 Review field boring logs
- A15 Monitor subsurface instrumentation
- A16 Evaluate the need for additional investigative methods
- A17 Perform field testing
- A18 Recommend laboratory testing schedule
- A19 Coordinate lab testing
- A20 Verify accuracy of boring logs
- B1 Review test boring logs
- B2 Review lab results
- B3 Review field test results
- B4 Review existing geologic and geotechnical information
- B5 Develop subsurface profile and geologic cross-sections
- B6 Review instrumentation results
Learning Opportunities for Geotechnical Engineer

B10 Evaluate need for additional SI and lab testing
B11 Assign soil and rock parameters
B12 Validate soil and rock parameters
B13 Evaluate long term instrumentation data
B14 Review consultant long term instrumentation data
C1 Prepare RSGER
C31 Prepare foundation report and structure boring sheets
D7 Design embankments and fills
D16 Prepare construction monitoring and special testing plans
D18 Prepare final GER per Publication 293 (pre-final and final, as required)
E13 Perform special subsurface testing (e.g. CPT, vane shear, pressure meter)

Geotechnical and Foundation Engineering: Module 11 - Geotechnical Instrumentation
A4 Research existing geotechnical and geological information
A15 Monitor subsurface instrumentation
A16 Evaluate the need for additional investigative methods
B3 Review field test results
B6 Review instrumentation results
B13 Evaluate long term instrumentation data
D16 Prepare construction monitoring and special testing plans
E3 Administer compaction control program (e.g. testing, nuclear gauges, soils lab testing)
E13 Perform special subsurface testing (e.g. CPT, vane shear, pressure meter)
E19 Supervise installation and monitoring of instrumentation
E20 Evaluate monitoring results
F12 Manage long term instrumentation program

Geotechnical and Foundation Engineering: Module 5 - Rock Slopes
A4 Research existing geotechnical and geological information
D5 Design rock cut slopes and rock fall mitigation
E8 Review blasting plan
E9 Resolve project blasting issues (e.g. surveys, test blasts, problems)
E11 Address unstable soil and rock slope conditions
F2 Evaluate rock slope issues (e.g. failures, inventory, claims)
F7 Supervise maintenance repairs (e.g. slides, sinkholes, rock falls)

Grammar and Usage Seminar
D19 Conduct constructability and scheduling review
E1 Attend pre-construction meetings (e.g. pre-bid, pre-construction, partnering)
E21 Attend project status meetings
E23 Assist with construction claims
G3 Respond to special requests (e.g. politicians, upper management, customers)
I10 Address employee grievance issues
I11 Participate in disciplinary action process
I12 Advise employees of SEAP
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K2 Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K5 Collaborate with universities and professional organizations
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

Highway Geology Symposium
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)

Highways in the River Environment
C1 Prepare RSGER

How to Be a More Effective Team Leader
G19 Manage open end geotechnical contracts
I1 Manage unit resources (e.g. staff, work assignments, equipment)

How to Become a Great Communicator
E21 Attend project status meetings
E23 Assist with construction claims
G3 Respond to special requests (e.g. politicians, upper management, customers)
Learning Opportunities for Geotechnical Engineer

G6 Attend meetings (e.g. staff, technical, management)
I1 Manage unit resources (e.g. staff, work assignments, equipment)
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K2 Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K5 Collaborate with universities and professional organizations
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

How to De-Junk and De-Stress Your Life
G1 Submit ESS information (e.g. timesheets, expense requests, leave slips)
G2 Process correspondence (e.g. email, letters, phone calls)
G3 Respond to special requests (e.g. politicians, upper management, customers)
G9 Perform project management duties (e.g. SOWs, man-hour estimates, invoices)
G10 Complete customer satisfaction surveys
G11 Review clearance transmittals
G13 Maintain department equipment (e.g. vehicles, office equipment, specialty equipment)
G17 Complete accident reports
G18 Prepare budget requests
G19 Manage open end geotechnical contracts
J1 Participate in required and elective training

How to Give Exceptional Customer Service Over the Phone
G2 Process correspondence (e.g. email, letters, phone calls)
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

How to Handle People with Tact and Skill
F6 Administer emergency repair contracts
G2 Process correspondence (e.g. email, letters, phone calls)
I1 Manage unit resources (e.g. staff, work assignments, equipment)
I7 Mentor subordinates
I10 Address employee grievance issues
I11 Participate in disciplinary grievance process
I12 Advise employees of SEAP

How to Handle the Challenges of Change
G1 Submit ESS information (e.g. timesheets, expense requests, leave slips)
I2 Approve ESS information (e.g. timesheets, expense requests, leave slips)
J1 Participate in required and elective training

How to Maintain and Organize Files and Records
A22 Evaluate drilling inspectors
A23 Maintain core box inventory
A24 Maintain subsurface information database
C32 Review consultant structure related submissions
D20 Review roadway PS&E package
D21 Review consultant roadway related submissions
E2 Approve borrow and waste area’s
E3 Administer compaction control program (e.g. testing, nuclear gauges, soils lab testing)
G7 Maintain project files

How to Motivate Others
I1 Manage unit resources (e.g. staff, work assignments, equipment)
I7 Mentor subordinates

How to Proofread
G2 Process correspondence (e.g. email, letters, phone calls)
I9 Review completed work assignments
J5 Serve on technical committees (e.g. District, State, Inter-state)
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)
Learning Opportunities for Geotechnical Engineer

J8 Participate in professional organizations

**How to Supervise People**

I1 Manage unit resources (e.g. staff, work assignments, equipment)
I4 Complete EPRs (e.g. goals, ratings, objectives)
I5 Manage overtime (e.g. track, equalize, budget)
I7 Mentor subordinates
I9 Review completed work assignments

**How to Troubleshoot and Maintain PCs**

G13 Maintain department equipment (e.g. vehicles, office equipment, specialty equipment)

**How to Work with People**

I1 Manage unit resources (e.g. staff, work assignments, equipment)
I2 Approve ESS information (e.g. timesheets, expense requests, leave slips)
I4 Complete EPRs (e.g. goals, ratings, objectives)
I6 Conduct employee interviews
I7 Mentor subordinates
I8 Assign training opportunities
I10 Address employee grievance issues
I11 Participate in disciplinary action process

**LRFD for Highway Bridge Substructures**

C7 Evaluate spread footing on soil
C8 Evaluate spread footing on rock
C9 Evaluate spread footing on slopes
C10 Evaluate end bearing pile design
C11 Evaluate friction pile design
C12 Evaluate caisson design
C13 Evaluate micro pile design
C14 Evaluate specialty foundation types (e.g. auger cast, pre-stress concrete)
C15 Resolve settlement issues (e.g. magnitude, rate differential, down drag)
C16 Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)
C21 Evaluate MSE wall design
C22 Evaluate concrete cantilever wall design
C23 Evaluate soldier pile and lagging wall design
C24 Evaluate tie back wall design
C25 Evaluate soil nail wall design
C26 Evaluate specialty wall designs (e.g. T-walls, modular block, adjacent caisson)
C27 Provide retaining wall recommendations to bridge unit
C29 Recommend foundation treatments
C30 Evaluate design of other structure foundations (e.g. signs, high-mast soundwalls, lighting)
C31 Prepare foundation report and structure boring sheets
C32 Review consultant structure related submissions

**Making Meetings Produce**

A9 Conduct pre-bid meeting
B14 Review consultant subsurface related submissions
D19 Conduct constructability and scheduling review
E1 Attend pre-construction meetings (e.g. pre-bid, pre-construction, partnering)
E15 Review design build and value engineering submissions
E21 Attend project status meetings
E23 Assist with construction claims
F6 Administer emergency repair contracts
F14 Evaluate conditions for maintenance facility improvements
J5 Serve on technical committees (e.g. District, State, Inter-state)
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

**Management Problems of the Technical Person in a Leadership Role**

I1 Manage unit resources (e.g. staff, work assignments, equipment)

**Media Relations**

G15 Provide media interviews
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
Learning Opportunities for Geotechnical Engineer

**Microsoft Access - Advanced**
- D4 Address soft foundation conditions
- D9 Provide recommendations for subgrade stabilization

**Microsoft Outlook Level I**
- G2 Process correspondence (e.g. email, letters, phone calls)

**Microsoft Outlook Level II**
- G2 Process correspondence (e.g. email, letters, phone calls)

**Microsoft PowerPoint 2000, Beginner Level**
- K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)

**Microstation CADD - Basics**
- C31 Prepare foundation report and structure boring sheets

**Negotiating Techniques**
- A7 Develop drilling and lab testing contracts
- A13 Resolve unforeseen issues during drilling
- F6 Administer emergency repair contracts
- G3 Respond to special requests (e.g. politicians, upper management, customers)
- G6 Attend meetings (e.g. staff, technical, management)
- G19 Manage open end geotechnical contracts
- H5 Meet with coal companies
- J5 Serve on technical committees (e.g. District, State, Inter-state)
- K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
- K2 Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)
- K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
- K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

**NHI Course: Geotechnical and Foundation Engineering**
- C17 Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)
- C18 Evaluate reuse and retrofit of existing foundations
- C29 Recommend foundation treatments
- C30 Evaluate design of other structure foundations (e.g. signs, high-mast soundwalls, lighting)
- C34 Review structural PS&E package
- D1 Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)
- D4 Address soft foundation conditions
- D7 Design embankments and fills
- D10 Provide pavement design recommendations to PME
- D11 Provide acidic drainage mitigation plans
- D17 Conduct final field view of alignments
- E2 Approve borrow and waste area’s
- E4 Address mining and coal issues during construction
- E7 Evaluate exploratory borings and test pits
- E10 Address unstable foundation and subgrade conditions
- E22 Assist with structure and roadway redesign
- F5 Evaluate drainage and erosion issues
- F9 Investigate structure issues (e.g. movement, wall failures, backfill settlement)

**NHI Course: Construction of MSE Walls and Reinforced Soil Slopes**
- C21 Evaluate MSE wall design

**NHI Course: Design of MSE Walls and Reinforced Soil Slopes**
- C21 Evaluate MSE wall design

**NHI Course: Drilled Shaft Foundation Inspection**
- C12 Evaluate caisson design

**NHI Course: Drilled Shafts**
- C12 Evaluate caisson design

**NHI Course: Driven Pile Foundation Inspection**
- C10 Evaluate end bearing pile design

**NHI Course: Driven Pile Foundations - Construction Monitoring**
- C31 Prepare foundation report and structure boring sheets

**NHI Course: Driven Pile Foundations – Design and Construction**
- C10 Evaluate end bearing pile design
Learning Opportunities for Geotechnical Engineer

NHI Course: Geosynthetics Engineering Workshop
D9 Provide recommendations for subgrade stabilization

NHI Course: Micropile Design and Construction
C13 Evaluate micro pile design

NHI Course: Module 2 Geotechnical Contracting and Quality Assurance / Quality Control
A1 Participate in SIQAC activities
A7 Develop drilling and lab testing contracts
A10 Administer drilling contracts
A11 Coordinate drilling site clearance
A12 Supervise drilling operation
A13 Resolve unforeseen issues during drilling
A18 Recommend laboratory testing schedule
A19 Coordinate lab testing
A20 Verify accuracy of boring logs
B1 Review test boring logs
B2 Review lab results
B3 Review field test results
B6 Review instrumentation results
B13 Evaluate long term instrumentation data
B14 Review consultant subsurface related submissions
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
C31 Prepare foundation report and structure boring sheets
C32 Review consultant structure related submissions
D1 Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)
D14 Prepare construction details
D15 Prepare special provisions
D19 Conduct constructability and scheduling review
D20 Review roadway PS&E package
D21 Review consultant roadway related submissions
E15 Review design build and value engineering submissions
E22 Assist with structure and roadway redesign
E23 Assist with construction claims
E24 Manage geotechnical construction consultants
F6 Administer emergency repair contracts
G19 Manage open end geotechnical contracts
H7 Monitor mine repair contracts

NHI Course: Module 4 Ground Improvement Techniques
A3 Schedule boring program
A4 Research existing geotechnical and geological information
A6 Develop boring plan
A11 Coordinate drilling site clearance
A12 Supervise drilling operation
B4 Review existing geologic and geotechnical information
B7 Review subsurface anomalies
B8 Evaluate groundwater conditions
B9 Evaluate geologic setting
B13 Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)
B14 Review consultant subsurface related submissions
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
C17 Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)

NHI Course: Module 6 Earth Retaining Structures
A4 Research existing geotechnical and geological information
A14 Review field boring logs
C19 Determine viable retaining wall alternatives
C20 Assess retaining wall alternatives
C22 Evaluate concrete cantilever wall design
C23 Evaluate soldier pile and lagging wall design
C24 Evaluate tie back wall design
C25 Evaluate soil nail wall design
C26 Evaluate specialty wall designs (e.g. T-walls, modular block, adjacent caisson)

NHI Course: Module 7 Shallow Foundations
A3 Schedule boring program
A6 Develop boring plan
A14 Review field boring logs
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
C16 Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)

NHI Course: Module 8 Deep Foundations
A3 Schedule boring program
A6 Develop boring plan
A12 Supervise drilling operation
A14 Review field boring logs
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
Learning Opportunities for Geotechnical Engineer

E14 Review temporary shoring submissions
E16 Approve foundation excavations
E17 Evaluate pile driving issues (e.g. test piles, PDAs, pile hammer)
E18 Evaluate drilled pile issues (e.g. pin piles, caissons, dowels)

NHI Course: Module 9 Geotechnical Earthquake Engineering
A4 Research existing geotechnical and geological information
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
C17 Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)
C18 Evaluate reuse and retrofit of existing foundations
C19 Determine viable retaining wall alternatives
C28 Provide global stability analysis of slopes
F6 Administer emergency repair contracts

NHI Course: Module 10 Geotechnical Aspects of Pavements
A8 Stakeout boring locations
A3 Schedule boring program
A4 Research existing geotechnical and geological information
A6 Develop boring plan
A14 Review field boring logs
A16 Evaluate the need for additional investigative methods
C4 Address corrosion potential of soil and rock
D18 Prepare final GER per Publication 293 (pre-final and final, as required)

NHI Course: Rock Blasting Course
E8 Review blasting plan
E9 Resolve project blasting issues (e.g. surveys, test blasts, problems)

NHI Course: Soil Slope and Embankment Design and Construction
A4 Research existing geotechnical and geological information
A11 Coordinate drilling site clearance
A12 Supervise drilling operation
C4 Address corrosion potential of soil and rock
C9 Evaluate spread footing on slopes

D7 Design embankments and fills

NHI Course: Soils and Foundations Workshop
A3 Schedule boring program
A5 Conduct project site investigation
A6 Develop boring plan
A7 Develop drilling and lab testing contracts
B2 Review lab results
B3 Review field test results
B14 Review consultant subsurface related submissions
C1 Prepare RSGER
C5 Determine viable foundation alternatives
C6 Assess foundation alternatives
C7 Evaluate spread footing on soil
C8 Evaluate spread footing on rock
C9 Evaluate spread footing on slopes
C10 Evaluate end bearing pile design
C11 Evaluate friction pile design
C12 Evaluate caisson design
C15 Resolve settlement issues (e.g. magnitude, rate differential, down drag)
C16 Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)
C22 Evaluate concrete cantilever wall design
C27 Provide retaining wall recommendations to bridge unit
C28 Provide global stability analysis of slopes
C29 Recommend foundation treatments
C31 Prepare foundation report and structure boring sheets
D1 Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)
D18 Prepare final GER per Publication 293 (pre-final and final, as required)
E13 Perform special subsurface testing (e.g. CPT, vane shear, pressure meter)
E16 Approve foundation excavations
E17 Evaluate pile driving issues (e.g. test piles, PDAs, pile hammer)
F9 Investigate structure issues (e.g. movement, wall failures, backfill settlement)
J1 Participate in required and elective training

PennDOT Leadership Academy for Managers
J1 Participate in required and elective training
## Learning Opportunities for Geotechnical Engineer

### PennDOT Leadership Academy for Supervisors

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<td>I1</td>
<td>Manage unit resources (e.g. staff, work assignments, equipment)</td>
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<td>I4</td>
<td>Complete EPRs (e.g. goals, ratings, objectives)</td>
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<td>I7</td>
<td>Mentor subordinates</td>
</tr>
<tr>
<td>I9</td>
<td>Review completed work assignments</td>
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### Plans Reading Course

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<tr>
<td>I8</td>
<td>Assign training opportunities</td>
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### Powerful Listening Skills

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<tr>
<td>G8</td>
<td>Serve on interview teams</td>
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<tr>
<td>I1</td>
<td>Manage unit resources (e.g. staff, work assignments, equipment)</td>
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<td>I10</td>
<td>Address employee grievance issues</td>
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<td>I11</td>
<td>Participate in disciplinary action process</td>
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<tr>
<td>I12</td>
<td>Advise employees of SEAP</td>
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<tr>
<td>J5</td>
<td>Serve on technical committees (e.g. District, State, Inter-state)</td>
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### Principles of Writing Highway Construction Specifications

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<tbody>
<tr>
<td>D15</td>
<td>Prepare special provisions</td>
</tr>
<tr>
<td>D20</td>
<td>Review roadway PS&amp;E package</td>
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</tbody>
</table>

### Project Management and Partnering Leadership

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>E1</td>
<td>Attend pre-construction meetings (e.g. pre-bid, pre-construction, partnering)</td>
</tr>
<tr>
<td>E24</td>
<td>Manage geotechnical construction consultants</td>
</tr>
</tbody>
</table>

### Public Involvement Facilitation

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<tbody>
<tr>
<td>G6</td>
<td>Attend meetings (e.g. staff, technical, management)</td>
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</table>

### Quality Assurance for Bid Package Preparation

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<tbody>
<tr>
<td>D20</td>
<td>Review roadway PS&amp;E package</td>
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</table>

### Real-World Solutions to Dealing with Attitude Problems in the Workplace

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<thead>
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<tbody>
<tr>
<td>I1</td>
<td>Manage unit resources (e.g. staff, work assignments, equipment)</td>
</tr>
<tr>
<td>I7</td>
<td>Mentor subordinates</td>
</tr>
<tr>
<td>I10</td>
<td>Address employee grievance issues</td>
</tr>
<tr>
<td>I11</td>
<td>Participate in disciplinary action process</td>
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<tr>
<td>I12</td>
<td>Advise employees of SEAP</td>
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### Seismic Design and Retrofit of Highway Bridges

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<tr>
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<tbody>
<tr>
<td>C5</td>
<td>Determine viable foundation alternatives</td>
</tr>
<tr>
<td>C6</td>
<td>Assess foundation alternatives</td>
</tr>
<tr>
<td>C17</td>
<td>Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)</td>
</tr>
<tr>
<td>C18</td>
<td>Evaluate reuse and retrofit of existing foundations</td>
</tr>
<tr>
<td>C19</td>
<td>Determine reuse and retrofit of existing foundations</td>
</tr>
<tr>
<td>C28</td>
<td>Provide global stability analysis of slopes</td>
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</table>

### Senior Inspector-in-Charge

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<tbody>
<tr>
<td>C20</td>
<td>Assess retaining wall alternatives</td>
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</table>

### Specification Writing

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<tr>
<td>C17</td>
<td>Develop special provisions to address unusual foundation conditions (e.g. PDAs, O-cells, liquefaction)</td>
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<tr>
<td>D14</td>
<td>Prepare construction details</td>
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<tr>
<td>D15</td>
<td>Prepare special provisions</td>
</tr>
<tr>
<td>D20</td>
<td>Review roadway PS&amp;E package</td>
</tr>
<tr>
<td>F6</td>
<td>Administer emergency repair contracts</td>
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<tr>
<td>G11</td>
<td>Review clearance transmittals</td>
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### Standard First Aid and Automated External Defibrillator

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<tbody>
<tr>
<td>I7</td>
<td>Mentor subordinates</td>
</tr>
<tr>
<td>J1</td>
<td>Participate in required and elective training</td>
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### Statewide DGS Meetings

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<tr>
<td>J6</td>
<td>Participate in conferences and workshops (e.g. TRB, ASCE, HGS)</td>
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### Technical Writing Skills

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<tbody>
<tr>
<td>C1</td>
<td>Prepare RSGER</td>
</tr>
<tr>
<td>C16</td>
<td>Provide foundation recommendations to bridge unit (e.g. type, elevation, parameters)</td>
</tr>
<tr>
<td>C27</td>
<td>Provide retaining wall recommendations to bridge unit</td>
</tr>
<tr>
<td>C29</td>
<td>Recommend foundation treatments</td>
</tr>
<tr>
<td>C31</td>
<td>Prepare foundation report and structure boring sheets</td>
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<tr>
<td>D1</td>
<td>Prepare preliminary GER per Publication 293 (Phase 1 and 2, as required)</td>
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<tr>
<td>D9</td>
<td>Provide recommendations for subgrade stabilization</td>
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<tr>
<td>D17</td>
<td>Conduct final field view of alignments</td>
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<tr>
<td>F6</td>
<td>Administer emergency repair contracts</td>
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<tr>
<td>G14</td>
<td>Evaluate new products and technology</td>
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</table>
Learning Opportunities for Geotechnical Engineer

J1 Participate in required and elective training
J3 Prepare technical papers
K1 Collaborate with regulatory agencies (e.g. DEP, DCNR, SCS)
K2 Collaborate with trade and vendor organizations (e.g. ACEC/PA, APC, Tri-State Drillers)
K3 Collaborate with inter-department agencies (e.g. BQAD, MTD, BOMO)
K4 Collaborate with local organizations (e.g. citizens groups, emergency services, local government)
K5 Collaborate with universities and professional organizations
K6 Collaborate with other transportation agencies (e.g. FHWA, PATC, other state DOTs)

Travel Procedures
I2 Approve ESS information (e.g. timesheets, expense requests, leave slips)

Transportation and Research Board
J6 Participate in conferences and workshops (e.g. TRB, ASCE, HGS)

Use of Critical Path Method
D19 Conduct constructability and scheduling review
D20 Review roadway PS&E package
E21 Attend project status meetings
E23 Assist with construction claims

Value Engineering Workshop
C31 Prepare foundation report and structure boring sheets
C33 Evaluate construction scheduling and constructability
D18 Prepare final GER per Publication 293 (pre-final and final, as required)
D19 Conduct constructability and scheduling review
D21 Review consultant roadway related submissions
E15 Review design build and value engineering submissions

Winter School Topic: Basic Piling
C10 Evaluate end bearing pile design
C11 Evaluate friction pile design
C12 Evaluate caisson design

Winter School Topic: Basic Structures
C31 Prepare foundation report and structure boring sheets

Winter School Topic: Environmental Permits and Safe Fills
E2 Approve borrow and waste area's

Winter School Topic: Lime Stabilization
G5 Provide construction school and other technical training

Winter School Topic: Materials/Core Boring
G5 Provide construction school and other technical training

Winter School Topic: OSHA
C31 Prepare foundation report and structure boring sheets

Winter School Topic: Soil Borings
A14 Review field boring logs
B1 Review test boring logs
B3 Review field test results
C31 Prepare foundation report and structure boring sheets
G5 Provide construction school and other technical training
## SELF-ASSESSMENT/MENTOR’S ASSESSMENT

**Key for Current Level of Aptitude:**

0 = Expert: Extremely skilled. Can demonstrate this competency in highly-complex situations; could instruct others in the development or application of this competency.

1 = Intermediate: Skilled. Can demonstrate this competency in most situations; might require some help in complex situations; could instruct others in the application of this competency in basic situations.

2 = Novice: Has limited experience demonstrating this competency. Would benefit from some help if the situation was not straightforward.

3 = None: Cannot, or has not had the opportunity to, demonstrate this competency.

**Key for Importance to Job Performance:**

0 = N/A: Not applicable to my job

1 = Low: Not that critical to success in my job

2 = Medium: Important to success in my job

3 = High: Extremely critical to success in my job

<table>
<thead>
<tr>
<th>COMPETENCY</th>
<th>CURRENT LEVEL OF APTITUDE</th>
<th>IMPORTANCE TO JOB PERFORMANCE</th>
<th>PRIORITY FOR DEVELOPMENT (A x B)</th>
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<tbody>
<tr>
<td><strong>Analytical Reasoning:</strong> Uses a logical, systematic, sequential approach for various work assignments; approaches a complex task or problem by breaking it down into its component parts; determines root cause and effect of geotechnical problems on the basis of data; recognizes when data supports or refutes other data; analyzes data or information to identify patterns, trends and relationships; identifies errors in analysis; draws conclusions on the basis of analysis; develops recommendations based on results of data analysis; weighs the costs, benefits, risks and chances for success of various alternative solutions.</td>
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<td><strong>Attention to Detail:</strong> Is thorough when performing work and conscientious about attending to detailed procedures related to various projects or tasks occurring simultaneously; observes details of the work environment and takes note of geotechnical conditions; is persistent in completing and encouraging others to complete tasks and assignments; reviews consultant geotechnical reports and contractual documents to meet operational requirements and ensure compliance with standards.</td>
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<td><strong>Budgeting/Resource Balancing:</strong> Prepares and justifies budget, monitors expenses, manages procurement and contracting; insures that objectives are properly resourced according to organizational priorities.</td>
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<td><strong>Communications, Listening:</strong> Listens to complex geotechnical information to identify problems and clarify communications; listens and responds to questions; listens to customers, partners and subordinates to acquire information, determine needs, or solve problems; uses active listening techniques to clarify understanding; focuses on what others say, both in their words and underlying meaning.</td>
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<tr>
<td>COMPETENCY</td>
<td>CURRENT LEVEL OF APTITUDE</td>
<td>IMPORTANCE TO JOB PERFORMANCE</td>
<td>PRIORITY FOR DEVELOPMENT (A x B)</td>
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<tr>
<td>Communications, Oral:</td>
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<tr>
<td>Communicates, discusses or explains complex geotechnical information clearly; ability to quickly evaluate audience and effectively question to draw out useful information to accomplish a task; communicates effectively with subordinates, partners and customers; recognizes and clarifies miscommunications; explanations are well organized and communicated clearly and accurately; engages in two-way exchanges to achieve understanding; speaks and adapts to listeners with widely diverse levels of knowledge or expertise; speaks clearly, using correct English grammar and syntax.</td>
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<tr>
<td>Communications, Written:</td>
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<tr>
<td>Communicates purpose in writing in a succinct and organized manner, using appropriate context, time, and place; reviews, edits and/or issues written material for various audiences; prepares and responds to correspondence received electronically or in hard copy; consistently uses proper English grammar, punctuation, and spelling; chooses appropriate vocabulary and style for each communiqué.</td>
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<tr>
<td>Conscientiousness:</td>
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<tr>
<td>Displays a high level of effort and commitment towards performing work; is persistent in completing and encouraging others to complete assignments in a timely manner; works well with others and independently; demonstrates responsible behavior; follows rules and procedures; exhibits pride in work and in the care of the instrumentation and equipment.</td>
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<td>Decision Making:</td>
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<tr>
<td>Exercises good judgment by making sound, well-informed and objective decisions; considers risks, evaluates and recommends solutions; perceives the impact and implications of decisions; makes effective and timely decisions, even when data is limited; is proactive; gathers, analyzes and interprets reports, surveys and other geotechnical data and uses the information as the basis for decisions.</td>
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<tr>
<td>Flexibility:</td>
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<tr>
<td>Is aware of and adapts to changing or new information; adapts behavior, style or standard methods in response to new information, changing conditions, or unexpected obstacles; knows when and if standard procedures and policies can be modified to meet a specific need; develops or recommends “short-cuts” without sacrificing quality; deals effectively with disruptions in work plans caused by unexpected situations; incorporates innovative techniques into existing processes or ongoing projects.</td>
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<tr>
<td>Honesty/Integrity:</td>
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<tr>
<td>Displays a high standard of ethical conduct and understands the impact of violating this standard on the organization, self, and the public; contributes to maintaining the integrity of the organization; is perceived by others to be trustworthy and honest; conducts, reviews and submits accurate geotechnical evaluations, assessments and reports.</td>
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<tr>
<td>Interpersonal Acumen:</td>
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<tr>
<td>Establishes, develops, and maintains constructive and cooperative relationships with others based on mutual trust and professionalism; considers and responds appropriately to the needs, feelings, and capabilities of different people in different situations; is tactful, and treats others with patience and respect; gives feedback tactfully; develops and maintains positive relationships with subordinates, partners and customers; is sensitive to individual differences; relates well to people from varied backgrounds.</td>
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<tr>
<td>COMPETENCY</td>
<td>CURRENT LEVEL OF APTITUDE</td>
<td>IMPORTANCE TO JOB PERFORMANCE</td>
<td>PRIORITY FOR DEVELOPMENT (A x B)</td>
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<td>------------------------------------------------</td>
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<tr>
<td>Leadership: Influences, motivates and challenges subordinates to achieve organization’s and department’s goals; is respected and trusted by subordinates and management; gains the confidence and support of others in the organization; provides leadership within the organization; actively participates in Department-wide projects, initiatives and committees.</td>
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<tr>
<td>Mathematical Reasoning: Applies advanced mathematical or statistical concepts and formulas to analyze data or solve geotechnical and civil engineering problems; determines the appropriate mathematical or statistical methods that are applicable to a particular situation.</td>
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<tr>
<td>Observant: Notices the details of the operation, and the site where the work is to be performed; identifies special situations that may require special safety measures, or a different approach; notices obstacles that may interfere with the use of geotechnical equipment.</td>
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<tr>
<td>Organized: Approaches work in a systematic fashion; collects, compiles and organizes geotechnical information that is used to prepare and review project documents, schedules and status reports; develops methods and systems to assure that all aspects of work are completed in an efficient manner; makes good use of time; is able to keep multiple operations moving forward simultaneously; maintains accurate records and prepares accurate reports; plans and prioritizes personal work activities.</td>
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<tr>
<td>Problem Solving: Anticipates and identifies problems, and identifies and evaluates sources of information to generate alternatives; determines accuracy and relevance of information; makes recommendations or presents alternatives based on experience, information, standards and field conditions; uses logic and a systematic process to solve problems; solves problems cooperatively with others.</td>
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<tr>
<td>Self-Management: Sets goals and priorities for own work and coordinates activities and timelines with others to ensure task goals and deadlines are met; completes work and meets deadlines in spite of multiple interruptions; displays a high level of initiative, effort, and commitment toward completing assignments and responding to requests in a timely manner; is organized and able to work on multiple diverse projects simultaneously making good use of available resources; works well independently as well as with others; is motivated to do good work; demonstrates responsible behavior; prioritizes work effectively.</td>
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<tr>
<td>Technical Competence: Uses knowledge that is acquired through formal training or extensive experience to perform the job; works with, understands, and evaluates technical information related to the job; advises others on technical issues; advises organization leaders and managers on training issues; keeps informed of advances in the field; seeks to keep up-to-date on the technical aspects of the job.</td>
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<tr>
<td>Technology Application: Identifies, selects, and applies appropriate field and office equipment, tools, and instruments to work situations; is proficient in the use of specialized instrumentation, computer software packages or other technology required by the job; uses computers, computer applications and the internet to research information and benchmarking practices.</td>
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The format for this Assessment was developed by Dr. William Rothwell, The Pennsylvania State University. Used with permission.
## SUGGESTED CURRICULUM FOR GEOTECHNICAL ENGINEER

<table>
<thead>
<tr>
<th>Phase One</th>
<th>Phase Two</th>
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<tbody>
<tr>
<td>24-Hour Hazardous Waste Operations Training</td>
<td>Advanced Tips and Techniques for Maintaining PC Hardware &amp; Software</td>
</tr>
<tr>
<td>Construction of Walls and Reinforced Soil Slopes</td>
<td>Context Sensitive Solutions Training</td>
</tr>
<tr>
<td>Design and Construction of MSE Walls and Reinforced Soil Slopes</td>
<td>Design and Operation of Work Zone Traffic Control</td>
</tr>
<tr>
<td>Drilled Shafts</td>
<td>Dynamic Time Management: Critical Elements</td>
</tr>
<tr>
<td>Drilled Shafts Foundation Inspection</td>
<td>ECMS Wave 3 - PENNDOT EMPLOYEES ONLY</td>
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<tr>
<td>General Soil Mechanics Course</td>
<td>EDMS Enterprise Content Collection</td>
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<tr>
<td>Geotechnical &amp; Foundation Engineering: Module 1 - Subsurface Investigations</td>
<td>FHWA Demo Project</td>
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<tr>
<td>Geotechnical and Foundation Engineering: Module 11 - Geotechnical Instrumentation</td>
<td>Highways in the River Environment</td>
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<tr>
<td>Geotechnical and Foundation Engineering: Module 5 - Rock Slopes</td>
<td>Microstation CADD - Basics</td>
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<tr>
<td>Highway Geology Symposium</td>
<td>Negotiating Techniques</td>
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<tr>
<td>LRFD for Highway Bridge Substructures</td>
<td>NHI Course: Geosynthetics Engineering Workshop</td>
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<tr>
<td>NHI Course: Construction of MSE Walls and Reinforced Soil Slopes</td>
<td>NHI Course: Module 2 Geotechnical Contracting and Quality Assurance / Quality Control</td>
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<tr>
<td>NHI Course: Design of MSE Walls and Reinforced Soil Slopes</td>
<td>NHI Course: Module 9 Geotechnical Earthquake Engineering</td>
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<tr>
<td>NHI Course: Drilled Shaft Foundation Inspection</td>
<td>Quality Assurance for Bid Package Preparation</td>
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<tr>
<td>NHI Course: Drilled Shafts</td>
<td>Seismic Design and Retrofit of Highway Bridges</td>
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<tr>
<td>NHI Course: Driven Pile Foundation Inspection</td>
<td>Use of Critical Path Method</td>
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<tr>
<td>NHI Course: Driven Pile Foundations - Construction Monitoring</td>
<td>Value Engineering Workshop</td>
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<td>NHI Course: Driven Pile Foundations – Design and Construction</td>
<td>Winter School Topic: Environmental Permits and Safe Fills</td>
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<tr>
<td>NHI Course: Geotechnical and Foundation Engineering</td>
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<td>NHI Course: Geotechnical Aspects of Pavements</td>
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<td>NHI Course: Micropile Design and Construction</td>
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<td>NHI Course: Module 10 Geotechnical Aspects of Pavements</td>
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<td>NHI Course: Module 4 Ground Improvement Techniques</td>
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<td>NHI Course: Module 6 Earth Retaining Structures</td>
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<td>NHI Course: Module 7 Shallow Foundations</td>
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<td>NHI Course: Module 8 Deep Foundations</td>
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<td>NHI Course: Rock Blasting Course</td>
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<tr>
<td>NHI Course: Soil Slope and Embankment Design and Construction</td>
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<td>NHI Course: Soils and Foundations Workshop</td>
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<td>Plans Reading Course</td>
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<td>Winter School Topic: Basic Piling</td>
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<td>Winter School Topic: Basic Structures</td>
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<td>Winter School Topic: Soil Borings</td>
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</table>
## SUGGESTED CURRICULUM FOR GEOTECHNICAL ENGINEER

### Phase Three
- How to Be a More Effective Team Leader
- How to Motivate Others
- How to Supervise People
- Making Meetings Produce
- Management Problems of the Technical Person in a Leadership Role
- Media Relations
- Principles of Writing Highway Construction Specifications
- Project Management and Partnering Leadership
- Real-World Solutions to Dealing with Attitude Problems in the Workplace
- Specification Writing
- Technical Writing Skills

### Phase Four
- Business Writing
- Creating Optimism in the Workplace
- Effective Presentations
- Evelyn Wood Reading Dynamics for Business Professionals
- Grammar and Usage Seminar
- How to Become a Great Communicator
- How to De-Junk and De-Stress Your Life
- How to Give Exceptional Customer Service Over the Phone
- How to Handle People with Tact and Skill
- How to Handle the Challenges of Change
- How to Maintain and Organize Files and Records
- How to Proofread
- How to Troubleshoot and Maintain PCs
- How to Work with People
- Microsoft Access - Advanced
- Microsoft Outlook Level I
- Microsoft Outlook Level II
- Microsoft PowerPoint 2000, Beginner Level
- PennDOT Leadership Academy for Managers
- PennDOT Leadership Academy for Supervisors
- Powerful Listening Skills
- Public Involvement Facilitation
- Standard First Aid and Automated External Defibrillator
- Travel Procedures

### ONGOING

*Learning experiences to develop subject-matter expertise, maintain awareness of industry best practices, close identified skill/knowledge gaps, and prepare for additional assigned duties.*

- 8-Hour Hazardous Waste Operations Refresher Training
- APC/PennDOT Construction Management Training Workshop
- Geotech Conference
- Senior Inspector-in-Charge
- Statewide DGS Meetings
- Transportation and Research Board
### ACTION PLAN FOR PROFESSIONAL DEVELOPMENT

<table>
<thead>
<tr>
<th>Developmental Activity</th>
<th>Skill/Competency Addressed</th>
<th>Date/Time Frame for Developmental Activity</th>
<th>Knowledge Transfer Activity</th>
<th>Follow-up Evaluation Date</th>
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<tbody>
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**Developmental Activity:** This may be a training class, a conference, or participation on a particular project. All learning does not take place in a classroom. You can learn by shadowing an experienced peer to learn how they handle a particular situation. There are books and articles, audio and videotapes available for your use in the Knowledge Center. You can even take a course over the internet.

**Skill/Competency Addressed:** What, specifically, do you want to learn from this activity?

**Date/Time Frame for Developmental Activity:** When are you going to do it?

**Knowledge Transfer Activity:** What are you going to do on the job to demonstrate that you have learned what you planned to learn?

**Follow-up Date:** When will you meet with your mentor, coach or supervisor to discuss your learning experience, and your on-the-job application?
RESOURCES
FOR THE
GEOTECHNICAL ENGINEER

ACRONYMS
ACEC/PA - American Council of Engineering
Companies of Pennsylvania
APC - Associate PA Constructors
ASCE - American Society of Civil Engineers
BOMO - Bureau of Maintenance Operations
BQAD - Bridge Quality Assurance Division
CADD - computer aided design and drafting
CPM - Critical Path Method
CPT – Cone Penetration Test
DCNR - Department Conservation of Natural Resources
DEP - Department of Environmental Protection
DOT - Department of Transportation
ECMS - Engineering & Construction Management System
EDMS - Electronic Document Management System
E&S - Erosion and Sedimentation
EPR - Employee Performance Reviews
ESS - Employee Self-Service
FHWA - Federal Highway Administration
GER - Geotechnical Engineering Report
HGS - Highway Geology Symposium
HOP - Highway Occupancy Permits
IRWA - International Right of Way Association
LRFD – Load and Resistance Factored Design
MSE - Mechanically Stabilized Earth
MTD - Materials and Testing Division
NHI – National Highway Institute
O-CELL - Osterberg Cells
OSHA - Occupational Safety and Health
PC – Personal Computer
PDA - Pile Driving Analyzer
PME - Pavement Management Engineer
PS&E - Plans, Specifications and Estimates
RSGER - Reconnaissance, Soils, Geological Engineering Report
RSS - Reinforced Soil Slope
SCS - Soil Conservation Services
SEAP - State Employee Assistance Program
SI - Subsurface Investigation
SIQAC - Subsurface Investigation Quality Assurance Committee
SOW - Scope of Work
TRB - Transportation and Research Board

FUTURE TRENDS AND CONCERNS
1. Loss of leadership and knowledge base due to retirement.
2. Inadequate funding.
3. Inadequate staffing.
4. Accelerated project delivery schedules.
5. Rapidly changing technology.
7. Construction cost overruns related to geotechnical issues.
8. Construction claims related to geotechnical issues.
9. Improved access to information.
10. Improved support from Central Office.
11. Increased use of geophysics and insitu testing.
12. Lack of geotechnical engineering parenthetical’s.
13. Management’s lack of understanding of geotechnical operations.
14. Lack of feedback from construction.
15. Not enough competent geotechnical consultants.
16. Inability of consultants to synthesize subsurface information.
RESOURCES
FOR THE
GEOTECHNICAL ENGINEER

CONSTRUCTION RELATED WEBSITES
1. PennDOT Website, www.dot.state.pa.us
2. Engineering and Construction Management System Website, www.dot2.state.pa.us
3. Occupational Safety & Health Administration, www.osha.gov

DEPARTMENT PUBLICATIONS
(many of these can be found on P drive, P:\PennDOT shared)
1. Publication 2, Project Office Manual
2. Publication 10, Design Manual Part 1, Transportation Project Development Process
6. Publication 15, Design Manual Part 4, Structures (Corresponding to AASHTO Standard Specs)
7. Publication 15M, Design Manual Part 4, Structures (Corresponding to AASHTO LRFD Bridge Design Specs)
8. Publication 19, Field Test Manual
10. Publication 72M, Roadway Construction Standards
11. Publication 219M, Bridge Construction Standards
13. Publication 293, Geotechnical Engineering Manual
15. Publication 408, Specifications