IMPLEMENTATION AND ADMINISTRATION OF
GEOTECHNICAL ENGINEERING PROCESSES

PURPOSE:

The purpose of this procedure is to establish responsibilities among the Offices and Districts, and promote sound engineering practices and consistency in ODOT’s administration of geotechnical engineering work. Adherence to this procedure will help ensure efficient and cost-effective management of the transportation system. Management of risks related to safety of the driving public likewise will be accomplished.

The Division of Planning, Office of Geotechnical Engineering will direct and coordinate the statewide implementation and administration of this procedure.

REFERENCES:

Policy 20-003(P)
Construction and Materials Specifications
Specifications for Subsurface Investigations
Bridge Design Manual
Manual for Abandoned Underground Mine Inventory and Risk Assessment
Project Development Process
Construction Inspection Manual
Geotechnical Engineering Design Checklists
Geotechnical Bulletins
Pavement Design and Rehabilitation Manual

DEFINITIONS:

CGE: Construction Geotechnical Engineer in the Office of Construction Administration
CSE: Construction Structures Engineer in the Office of Construction Administration
DGE: District Geotechnical Engineer
FEC: Foundation Engineering Coordinator in the Office of Structural Engineering
PROCEDURE STATEMENT:

I. Central Office Division Of Planning Responsibility.

The Office of Geotechnical Engineering will assure that the Department’s needs related to geotechnical issues are addressed by performing the following functions:

A. Designate a Geotechnical Program Coordinator (GPC). The GPC will:

1. Act as a liaison between the Districts and Central Office and be the principal point of contact with the District Geotechnical Engineer (DGE) with regard to geotechnical issues. The GPC shall coordinate with the Foundation Engineering Coordinator (FEC) on matters related to ODOT’s geotechnical program.

2. The GPC will pay particular attention to technical and procedural guidance, training, and quality assurance.

3. The GPC will assist the DGE to help the District achieve a quality geotechnical program.

B. Develop and implement ODOT policies, procedures, manuals, and guidance related to geotechnical engineering.

C. Provide technical support for geotechnical aspects of planning, design, construction, and maintenance. Issues include determination of a subsurface investigation appropriate for the stage of project development and site conditions; identification, avoidance, and remediation of geologic hazards and other geotechnical issues requiring treatment; earthwork; foundations for roadway earth retaining structures; foundations for facilities; slope stability; settlements; subgrade treatments; hydrogeology; constructability; and maintenance practices.

D. Develop and maintain an electronic database of geotechnical records currently in storage for approximately 21,000 projects. The data shall be made accessible through the web to both internal and external users. Creation of electronic copies of these records will ensure their preservation. The Office of Geotechnical Engineering will coordinate with the Division of Information Technology. The geotechnical data management system shall be developed to capture all data performed by ODOT and its consultants. Contract requirements with consultants,
as defined in the Specifications for Subsurface Investigations, will be modified by
the Office of Geotechnical Engineering to require electronic submission of
gеotechnical data compatible with the database. This system shall be operational
within three years of the effective date of this procedure.

E. Develop and maintain inventory of geologic hazards of sites which are affected by
landslide, rockfall, or mine subsidence. The inventories shall include sufficient
detail for each site such that a rating of the relative risk and an estimate of
remediation costs can be determined. The DGE shall be responsible for
population of the inventory databases. The Office of Geotechnical Engineering
will provide technical assistance, training, and will perform quality assurance to
assure accuracy and statewide uniformity of the site ratings. The inventories will
be utilized as planning tools for the management of geologic hazard sites, with
consideration given to risk assessment and cost; and to administer the Geologic
Site Management Program. The inventory databases shall be operational within
three years of the effective date of this procedure.

F. Perform subsurface investigations with its own drill crews. The Office of
Geotechnical Engineering will determine how to allocate its in-house resources to
the best advantage of ODOT, and perform its support functions accordingly. The
Office of Geotechnical Engineering will assist the District to obtain subsurface
investigation from external sources, as appropriate.

G. Perform quality assurance of District geotechnical activities.

H. Provide training based on District needs related to planning, design, construction
and maintenance.

I. Conduct a research program related to geotechnical engineering and implement
the results through policies and practices.

J. Perform project-level design support to the Office of Pavement Engineering by
providing geotechnical recommendations for major rehabilitation pavement
projects.

K. Provide project-level design support and act as geotechnical engineer on behalf of
the Office of Production.

L. Provide project level construction support.

M. Act as coordinator for geotechnical issues among the Districts, Central Office,
FHWA, other public agencies, consultants, and contractors.

N. Report to the Deputy Director of Planning on the progress of the Department’s geotechnical program.

II. Central Office Division Of Highway Management Responsibility.

The Office of Structural Engineering will assure that the Department's needs related to structure foundation issues are addressed by performing the following functions:

A. Designate a Foundation Engineering Coordinator (FEC). The FEC will:
   1. Act as a liaison between the Districts and Central Office and be the principal point of contact with the District Geotechnical Engineer (DGE) in regards to the bridge and related structure foundation issues.
   2. The FEC will pay particular attention to technical and procedural guidance, training, and quality assurance and will coordinate all efforts with the Geotechnical Program Coordinator (GPC).
   3. The FEC will provide support to the GPC in assisting the DGE to help the District achieve a quality geotechnical program.

B. Develop and implement ODOT policies related to foundation engineering.

C. Provide technical support for foundation engineering aspects of planning, design, construction, and maintenance. Issues include determination of a subsurface investigation appropriate for the proposed structure and site conditions; foundation type selection; foundation design; earth retaining structure design; and constructability.

D. Perform quality assurance of District foundation engineering activities.

E. Provide training based on District needs related to planning, design, construction and maintenance.

F. Conduct a research program related to foundation engineering and implement the results through policies and practices.

G. Act as coordinator for foundation engineering issues among the Districts, Central Office, FHWA, other public agencies, consultants, and contractors.
H. Provide technical expertise to the Office of Production related to structure foundations.

I. Provide project level construction support.

J. Report to the Deputy Director of Highway Management on structure foundation related issues.

III. Central Office Division Of Construction Management Responsibility.

The Office of Construction Administration will designate a Construction Geotechnical Engineer (CGE) and a Construction Structures Engineer (CSE). The Office of Construction Administration will assure that the Department's needs related to earthwork and structure foundation construction are addressed through project level support, construction administration assistance, training, and quality assurance. The CGE and CSE shall be the initial point of contact for the District for earthwork and structure foundation issues in construction. The Office of Construction Administration will report to the Deputy Director of Construction Management on earthwork and structure foundation construction related issues.

IV. District Responsibilities.

A. The District Deputy Director is responsible for appointing personnel to implement and manage the District’s geotechnical activities.

B. The District Deputy Director shall appoint a District Geotechnical Engineer (DGE). The DGE shall be a professional engineer registered in the state of Ohio, have a practical knowledge of geotechnical engineering, and meet minimum qualifications established by the Office of Geotechnical Engineering. All communications between the Central Office and the District related to geotechnical issues shall go through the DGE. The DGE will assure that the District’s responsibilities related to geotechnical issues are addressed appropriately. The DGE will:

1. Implement and manage the District’s geotechnical activities.

2. Perform or oversee all District geotechnical activities as defined in the Project Development Process. These activities include the planning, design, construction, and maintenance of projects (including earthwork, structure foundations, retaining structures, slope stability, settlements, subgrade treatments, constructability, remediation of geohazards).
3. Perform office and field geotechnical reconnaissance, including planning for subsurface investigations, review of archived geotechnical and plan information, review of geologic information, identification of geologic hazards and problem geotechnical conditions.

4. Provide and review project geotechnical scope of services.

5. Provide quality assurance on the geotechnical aspects of design contracts.

6. Perform consultant ratings related to geotechnical work.

7. Perform or oversee geotechnical analysis and recommendations for in-house design.

8. Review consultant geotechnical reports, recommendations, and plans.

9. Address geotechnical pre-bid questions.


11. Populate the geologic hazard inventories with site data. Inventories for landslides and rockfall shall be completed within two years of the databases becoming operational. The inventory of abandoned underground mine sites shall be as stated in the policy and procedures for Abandoned Underground Mine Inventory and Risk Assessment, 27-006.

12. Provide support for and oversee maintenance activities related to geotechnical issues.

13. Act as liaison between the District, and the Office of Geotechnical Engineering and the Office of Structural Engineering with regard to geotechnical and structure foundation issues.

V. TRAINING:

The DGE shall have a practical knowledge of geotechnical engineering and shall be familiar with, as a minimum, the reference documents listed above. Initial training for the DGE will be provided by the GPC, FEC, CGE, CSE, or other instructors, using NHI, FHWA, or other training academies, as deemed appropriate by the Office of Geotechnical Engineering. Ongoing training requirements shall include regularly scheduled coordination meetings and training sessions, specialized classes, and field trips.
VI. FISCAL ANALYSIS:

Involving geotechnical experts throughout the Project Development Process and operational improvements provides opportunities for savings. Earthwork items for work complete in calendar year 2003 totaled $84 million in bid amount plus $27 million in net change orders. Percent changes in the actual amount paid for earthwork items when compared to the bid amount were 40 percent for extra work and 8 percent for non-performed work. The net change to the bid amount was an increase of 32 percent. For the period 1995 to 2003, percent changes in the actual amount paid for earthwork items when compared to the bid amount were 21 percent for extra work and 8 percent for non-performed work. The net change to the bid amount was an increase of 13 percent. Bridge substructure costs are estimated to be $50 million annually.

Accurate determination of bid quantities and reduction of plan errors and omissions will result in direct savings in construction costs and tighter bids. Refinement of the planning and design process, effective use of resources, and in-house operational savings will also occur as a result of implementation of this policy. Based on earthwork and foundation costs for the years 1996 through 2003 and projecting forward considering increased funding in future years, a 10 percent reduction of earthwork and foundation construction costs will affect an estimated savings of $16 million annually for the years 2004 through 2015.

The cost to implement this policy and procedure ranges between zero and $1.3 million annually. There will be no cost to implement this policy where the District or Office assigns the duties to current staff without the creation of a new position. A new position including salary and fringes would cost on the average about $100,000 per year. Were all of the Districts and the Office of Structural Engineering to each add one full-time TE3 or TE4 position, the cost would be about $1.3 million annually.

The data which is to be included in the Geotechnical Data Management electronic database is estimated to have a value of approximately $500 million.