IMPLEMENTATION AND ADMINISTRATION OF
GEOTECHNICAL ENGINEERING PROCESSES

POLICY STATEMENT:

The Ohio Department of Transportation recognizes the critical role geotechnical engineering plays in the planning, design, construction, and maintenance of the State’s transportation system. It shall be the policy of ODOT to fully utilize best practices for the management of geotechnical and geologic data, subsurface investigations, analysis, design, contracting, and maintenance practices according to geotechnical engineering principles.

The purpose of this policy is to establish responsibilities among the Offices and Districts, and promote sound practices and consistency in ODOT’s administration of geotechnical engineering work. Adherence to this policy 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 policy.

AUTHORITY:

ORC 5501.02, 5501.03, 5501.11, 5501.14, and 5501.31.

REFERENCES:

Standard Procedure 509-003(SP)
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
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
GPC: Geotechnical Program Coordinator in the Office of Geotechnical Engineering

SCOPE:

This policy is applicable to all Districts, Divisions, and Offices of the Ohio Department of Transportation.

BACKGROUND AND PURPOSE:

The Project Development Process requires consideration of geologic conditions and geotechnical features from project inception through construction and maintenance. To date, the design and construction processes and organizational structure of ODOT have not supported continuous hands-on involvement of geotechnical experts. As a result, overly conservative designs are common, as are errors, omissions, and risky designs costing the public money, time, and inconvenience. ODOT’s ability to manage risk associated with both geotechnical design and construction features and natural and man-made geologic hazards is diluted by the lack of attention to geotechnical issues. The Department data indicates that extra work change orders for earthwork items, measured as a percentage of the bid amount, are occurring at a rate greater than the overall percent of extra work change orders. Additionally the non-performance of significant quantities of earthwork bid items allows the contractors to unbalance their bids. This results in compromising the integrity of the bidding process. Similar problems exist for bridge substructures and earth retaining structures. Systematic management of ODOT’s resources and the risks associated with geologic hazards, namely landslides, rockfall, and mine subsidence, has not been addressed. Resources spent on such projects have historically been on an emergency basis without the benefit of an objective process for project selection. A Geologic Site Management Program has been implemented as an attempt to provide the objective process.

This policy establishes that each District shall name a District Geotechnical Engineer (DGE). The DGE shall be given authority by the District Deputy Director to oversee, perform, coordinate, review, and evaluate geotechnical issues in all involved offices in the District throughout the Project Development Process. The DGE shall have a practical knowledge of geotechnical engineering meeting minimum qualifications established by the Office of Geotechnical Engineering. The Office of Geotechnical Engineering shall designate a
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Geotechnical Program Coordinator (GPC) who shall act as a liaison between the DGE and the Office of Geotechnical Engineering. The GPC will assist the DGE by disseminating policies and best-practices, providing training, and providing access to technical and operational support available through the Office of Geotechnical Engineering. The Office of Structural Engineering shall designate a Foundation Engineering Coordinator (FEC) who shall assist the DGE with regard to structure foundation issues. The Office of Construction Administration shall designate a Construction Geotechnical Engineer (CGE) and a Construction Structures Engineer (CSE) who shall assure that the Department's needs related to earthwork and structure foundation construction are addressed.

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.

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.