Design and Construction of Microtunneling Projects

Purpose and Background

Significant technical advances and increases in the utilization of microtunneling have occurred in North America in the past decade permitting the installation underground of small/medium diameter pipes in virtually all ground conditions with the minimum of surface disturbance.

Microtunneling techniques, while becoming increasingly wider in their range of application and diameter range, do incorporate many of the complexities of modern large diameter tunnels including the challenges of technically demanding tunneling.

This course is specifically tailored for those interested in microtunneling and describes the technique in depth together with comparisons with other trenchless techniques such as horizontal directional drilling etc. The course provides an in-depth review of microtunneling including all its aspects. Techniques for subsurface investigation and characterization and how these are best applied to microtunneling will be discussed.

The course reviews how this sub-surface information is then used in designing, specifying, planning, and costing for microtunneling projects.

The selection of an appropriate microtunneling technique (auger, slurry or EPB) and tunneling systems (such as various pipe materials or segments in various ground conditions), will be discussed, as well as the set-up and configuration of the tunneling equipment for each project.

The seminar examines the selection, sizing, and construction of various shafts for tunneling, and key aspects of microtunnel design, specification, planning, monitoring and management, including risk assessment and management. New trends and the state of the art in microtunneling will also be discussed.

Case Histories and Group Discussion: The seminar includes a number of relevant short videos and several microtunneling case histories. It provides practical applications and group involvement and discussion of the various techniques discussed together with relevant course materials to be retained by the attendees. A list of suggested reading will also be provided.

To register your group, call John Wyrick at 703.295.6184
Summary Outline

DAY ONE

Introduction to Microtunneling and its Role in Underground Construction
- Seminar Overview
- Participants background
- A brief historical overview
- A brief review of all trenchless techniques, HDD, pipe ramming etc. in comparison to microtunneling
- Review of microtunneling and principal uses

Sub-Surface Characterization in Soil and Rock for Microtunneling
- Geotechnical site investigation for microtunneling
- Characterization of soils for microtunneling
- Characterization rock mass for microtunneling
- Soil and rock permeability
- Interpretation of site investigation data for microtunneling

Microtunneling Methods
- Definition of microtunneling
- Face support, settlement & minimum cover
- Equipment selection criteria auger/slurry/EPB
- Auger microtunneling
- Slurry microtunneling
- EPB microtunneling
- Use of bentonite in microtunneling
- Ground excavation capabilities
- Rock excavation in microtunneling
- Rational for cutter head configurations and overcut
- Case histories

Microtunneling Techniques
- Microtunneling system manufacturers and selection
- Site layouts and size requirements
- Launching and recovery of microtunnel systems
- Jacking systems
- Jacking force prediction and monitoring
- Lubrication for microtunneling
- Planning for and use of interjacks
- Alignment control
- House connection/pilot pipe systems
- Special features
- Case histories

DAY TWO

Jacking Pipe and Segmental Linings for Microtunneling
- Jacking pipe types
- Key factors in selecting jacking pipes
- Jacking pipe & lining capabilities & performance
- Jacking pipe specification
- Special jacking pipes
- Use of segmental linings in microtunneling
- Segment specification

Shaft Construction for Microtunneling
- Review of available techniques and their suitability
- Shaft sizing for microtunneling
- Rib & lag and steel supports
- Sheet piles
- Jet grouting
- Caissons
- Slurry walls
- Ground freezing
- Case histories

Planning, Productivity and Costing for Microtunneling
- Development of projects
- Key aspects of planning for microtunneling
- Planning and equipment selection
- Drive lengths and depth capabilities
- Productivities
- Cost and costing for microtunneling
- Case study

Microtunneling Prequalification, Specifications, Submittals and Monitoring
- Contract documents for successful microtunneling
- Dispute mitigation and resolution measures
- Prequalification for microtunneling
- Specification for microtunneling
- Submittals for microtunneling
- Operational monitoring data acquisition and reporting
- Site staff training

DAY THREE

Microtunnel Planning, Management Risk and Safety
- Site investigation
- Conceptual planning
- Key planning issues
- Risk identification mitigation and management
- Environmental concerns
- Operation safety

Potential Problems in Microtunneling and Shaft Construction
- Groundwater control
- Excavating and dealing with obstructions
- Cobbles boulders and hard rock
- Microtunneling in very soft ground and wood
- Mixed face microtunneling
- Operational concerns
- Ground improvement methods and ground freezing
- Issues concerning long drives
- Case histories

New Developments, Trends and Techniques in Microtunneling
- New trends in site investigation techniques
- Excavation techniques and capabilities
- Modern high capability microtunneling systems
- Soil removal and separation
- Curved microtunneling
- Long drive capability
- New technical developments
- Retractable machines and other special techniques
- Pipe arch microtunneling
- Lake taps

Plus specifically relevant case studies and videos

Group participation in discussion of case histories and attendees’ particular concerns or projects

Bibliography of suggested reading
Seminar Benefits

- Select suitable investigation techniques, investigate and analyze ground conditions for microtunneling
- Provide firm data to assist in making informed decisions regarding microtunnel equipment selection, microtunnel lining selection and shaft construction methods
- Develop techniques to mitigate anticipated and unanticipated microtunneling problems
- Develop microtunnel prequalification, specifications and construction schedules more accurately
- Understand the microtunneling process better and how to monitor microtunneling projects and interpret the data
- Manage and risk mitigate microtunnel construction projects more successfully and safely
- You will have the opportunity to discuss case histories and to discuss particular concerns or projects

Who Should Attend?

- Sewer, storm water and utility managers
- Construction and project managers
- Engineers (both field and design office)
- Construction supervisory personnel
- Construction cost estimators
- Graduate civil or geotechnical engineers
- Individuals in the construction industry including contractor’s personnel wanting a firm grounding in modern microtunneling techniques and practices

Seminar Instructor

David G. Abbott, C.Eng, M.ASCE, has a B.Eng. degree from Liverpool University in England in civil engineering and is a registered professional engineer throughout Europe. He is a Senior Associate with Jason Consultants. He has over 34 years of experience in construction and has been actively involved in the design and construction of tunneling, pipe jacking, microtunneling, and other forms of trenchless technology for many years. His international experience is extensive having worked in Europe, SE Asia, North, South and Latin America. David is a well-known speaker at North American and international tunneling and trenchless technology conferences and seminars and he has presented more than 30 papers at various forums and conferences in many countries. He has also written numerous articles for technical journals and is a technical advisor on the ASCE Utility Tunneling Video.

His expertise covers all aspects of project development from project evaluation and feasibility study through conceptual and detailed engineering to equipment selection, project construction and operation management. Since 1983, he has been involved with more than 300 tunneling, pipejacking, and microtunneling, projects.

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