ABSTRACTS 2003 Technical Forum

Indian Grave Tunnel Bypass Project

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Indian Grave Tunnel on the Norfolk Southern rail line near Caryville, Tennessee, has incurred stability problems since construction in 1869. Primary difficulties have centered on the tunnel's location within the fault zone of the Jacksboro Fault of the Cumberland (Pine Mountain) thrust block. Distress in the tunnel was first noted approximately 20 years after construction completion and continued until abandonment in 1985. Engineering studies were begun in 1976 to develop alternative plans for the removal of rail traffic from the tunnel. Schemes included a new tunnel bore, an open cut at the existing tunnel location, and a bypass open cut. The open cut bypass option was finally chosen and construction operations began in 1983. Cut slope failures began to occur almost immediately after construction started. The complex nature of the fault zone lithology necessitated an additional geotechnical investigation that resulted in revised cut slope designs to address field conditions. A combination of slope angle adjustments, slope pinning, concrete walls, and gabion installations were utilized to counteract the highly distorted shales and limestones of the fault zone. The bypass track has been in service for several years and no signs of slope instability are apparent, but periodic inspection and maintenance programs are continuing.

Interstate 77 Abandoned Underground Mine Remediation Project

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During 2001, the Ohio Department of Transportation (ODOT) completed a significant project for the purpose of remediating unstable surface and subgrade conditions related to an abandoned underground coal mine lying beneath Interstate 77 in northeastern Ohio. An abandoned underground mine map indicated that 800 feet of the interstate highway was underlain by coal mine workings. An ODOT subsurface investigation found mine workings at a depth of 25 to 35 feet below the road surface. An ODOT Abandoned Underground Mine Inventory and Risk Assessment of the location determined it to be a high risk site requiring immediate mine stabilization work. An emergency contract was established and construction began in May, 2001. The resulting emergency project construction included air rotary and sonic drilling, and placement of cement flyash grout in mine workings beneath 2000 feet of roadway. This project required 25,000 cubic yards of grout and was completed in October, 2001 at a cost of $7.9 million.

Development of a Rockfall Hazard Rating Matrix for the State of Ohio

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Rockfalls along Ohio roadways pose a considerable risk to traffic safety, create maintenance problems, and exert a strain on the limited funds. In order to assist ODOT in selecting potentially hazardous rock slopes, a relative rating matrix was developed. As compared to the geology for other rating systems, the geology in Ohio is characterized by the presence of alternating sequences of relatively flat lying durable and non-durable sedimentary rocks. Because of this, Ohio's rating system concentrates on differential weathering and undercutting.

The data collected were statistically analyzed to determine significant variables that characterize slopes. The significant variables identified can be used to evaluate other rock slopes in areas with similar geology.

Rock-Cut Design and Construction of the Auxiliary Spillway with Road Relocation at Dewey Lake, KY

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Dewey Lake is an earthen flood control dam constructed in 1949, located in eastern Kentucky. To correct an identified hydraulic deficiency at the project, several modifications have been constructed, which include a 129-foot wide auxiliary spillway and relocation of a segment of an existing highway. The auxiliary spillway was constructed in a low point along a topographic ridge and is cut through sedimentary rock of the Middle-Pennsylvanian aged Breathitt Formation. The spillway and highway relocation required rock-cut designs that incorporated rock fall hazard analysis, effects of lithologic weathering and wedge/block analysis. A concrete spillway sill is designed to withstand head-cut erosion during a flood event and includes rock anchors. Construction difficulties that were overcome included blasting vibration concerns with perched boulders located above local residences and field changes to the cut-slope design as a result of differing topography. Construction of this auxiliary spillway and relocated highway was completed in the summer of 2002.

Establishing Baseline Practices and Identifying User Needs for Electronic Archiving and Web Dissemination of Geotechnical Data

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This paper presents the findings and recommendations of the User Scenario Work Group (USWG) in identifying a baseline of current practices within the geo-professional community and prioritizing desired functional requirements in the development of a comprehensive geotechnical information management system. This work was conducted as an initial phase of a larger project to demonstrate the effectiveness of a web based virtual data center for the dissemination of geotechnical data from multiple linked databases of various government and private sector organizations. A online survey was administered over the course of several months to practitioners across the nation. The results from the survey were compiled and examined to provide direction and to the other project teams in the development of user-driven prototype data system.

Rock-Cut Design and Construction of the Grundy Redevelopment Site Grundy, VA

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The town of Grundy was specifically named as a community to receive flood protection measures under section 202 of the Energy and Water Development Appropriations Act of 1981. The Grundy project consists of several components which include preparing a 13-acre redevelopment site (above the 100-year flood elevation), relocation of Norfolk Southern Railroad track, numerous other relocation and demolition contracts, and construction of a ringwall around the central business district. The redevelopment site constructed adjacent to the Levisa Fork River consists of a 3-million cubic meter cut through sedimentary rock of the Pennsylvanian-aged Norton Formation. This cut will be directly adjacent to the relocated railroad. Partnerships created with property owners and project stakeholders influenced the cost and design of the project. Design work on the massive rock-cut included rock fall modeling, effects of differential weathering, structural analysis, and design of a massive soil nail wall. Deep zones of weathered shale, problems with fly-rock, and planar instability created significant project design challenges, resulting in schedule delays and cost overruns.