

## **Grouting and Ground Modification Experience**

- Member of three-person Grouting Consulting Board for the New York City Bureau of Environmental Protection's Delaware Aqueduct System. The system includes 45 miles of tunnel, supplying New York City with 50 to 55 percent of its raw water. The tunnel is leaking an estimated 30 mgd. The two areas of the tunnel believed to be the sources of the leakage are between 600 to 700 ft below ground surface. A program of geotechnical grouting from the surface is under review.
- As a Grouting Consultant, performed a field inspection of the approximately 6-mile long utilidor tunnels in Barrow, Alaska. The tunnels contain a sanitary sewer line, a potable water line, telephone lines, electrical distribution cables, fiber optics, and cable TV service. During the spring and summer months of each year, high inflows of surface/groundwater enters the tunnels causing safety and maintenance problems. Mr. Henn evaluated and advised on a grouting program to cut off the water inflows into the tunnels.
- As a Grouting Consultant for the Providence, Rhode Island Narragansett Bay CSO project, worked on the grout program design and field grouting of the S-1 shaft. The S-1 shaft is a 26 ft diameter, 245 ft deep main access shaft. The upper 120 ft of the shaft is in soil with the remaining 125 ft in rock. The shaft grout curtain was installed to reduce water inflows during shaft excavation and for the completed facility.
- As Construction Engineer, Mr. Henn was responsible for foundation grouting of rock for the second powerhouse and existing dam/spillway at the Rock Island Dam in Wenatchee, Washington.
- Chairman of the American Underground Construction Association's Committee on Backfilling and Contact Grouting of Tunnels and Shafts.
- Instructor for the University of Florida's Fundamentals of Grouting Short Course.
- Supervisor for the ongoing field demonstration and testing program for the comparison of penetration of grouts made with various ultrafine cement products.
- Author of the American Society of Civil Engineer's text book titled, "Practical Guide to Grouting of Underground Structures."
- Worked as Construction Consultant for the grouting and ground modification program of the L.A. Metro Eastside Extension. Work included jet grouting, compaction grouting, as well as, chemical and cementitious grouting of soils.

### ***Resume to use for Ground Improvement:***

#### **Summary of Qualifications**

Mr. Henn has more than 43 years of heavy construction experience with a concentration in hydroelectric, underground, water resources, and transportation projects. During his career, Mr. Henn has held positions from Field Engineer through Superintendent to Construction Manager on both direct-hire construction and construction management assignments. The projects have ranged in value from \$2 to \$900M. He has a strong background in general civil construction,

mass and specialty concrete placement, deep foundations, shaft and tunnel excavation and lining, and marine construction. Mr. Henn's underground experience includes conventional drill and blast, tunnel boring machine, roadheader, and NATM tunnel excavation methods in hard rock, mixed-face, and soft-ground conditions. He has experience with deep shaft and large chamber excavations. He has worked with cast-in-place and precast concrete, shotcrete and pipe tunnel lining systems. His foundation background consists of mass excavations, geotechnical and compaction grouting, sheet piling, construction dewatering, post tension anchors, rock bolting, soldier pile and lagging, structural slurry wall construction, drilled shafts, and soil nailing. His ground modification experience has included planning, design and construction implementation of the following methods:

|                            |                    |
|----------------------------|--------------------|
| Compaction grouting        | Jet grouting       |
| Chemical grouting          | Deep soil mixing   |
| Cementitious grouting      | Dewatering         |
| Micro-fine cement grouting | Lime stabilization |

Mr. Henn is currently Vice President and Director of Construction Services for Haley & Aldrich. He is responsible for overall operation of the Construction Services Group and the Tunnel and Trenchless Technology Team (T4). The Construction Services Group performs on-site Construction Management, Resident Engineering and Inspection Services. The Group also provides construction support services in areas of construction methods and equipment evaluation, cost and scheduling, value engineering, constructability and claims avoidance reviews, performing claim evaluations and negotiations, litigation support, and technical support to design teams. T4 provides underground engineering and design/design build services.

## **Relevant Project Experience**

### **Research Project**

**University of Florida, Grouting Research Project.** Directed a cooperative research project between Haley & Aldrich, The University of Florida and major industrial providers of ultra-fine Cementitious grout. The research evaluated the penetration results of grouts made with various ultra-fine cement products. The research evaluated penetration of ultra-fine cement grout products in a highly controlled field testing environment.

**DART, Light Rail Starter System, North Central Line Section, Dallas, TX.** As Project Manager and Site Construction Manager, Mr. Henn was responsible for construction management and inspection services for the project. The work consisted of 32,150 LF of 21'-6" dia., mixed-face and rock tunnels utilizing TBM, roadheader, and NATM excavation methods. The project also included numerous shafts, two underground stations, cross passageways, and chamber excavations. An additional 3 miles of U-wall, cut-and-cover construction, elevated and at-grade track, three above ground passenger stations, and ventilation and utility structures. Construction costs for the North Central Line Section \$170M, the total project costs were \$844M. **Track subbase was lime stabilized at all at grade and depressed sections on the project.** Mr. Henn laid out an extensive compaction and chemical grouting program to minimize surface settlement above the tunnels. The compaction and chemical grouting program included the use of ground penetrating radar to verify the effectiveness of the compaction and chemical grouting results. Extensive specification sections were developed for the entire program.

**Kent Falls and Rainbow Falls Hydroelectric Projects, Plattsburgh, NY.** Mr. Henn was the Site Construction Manager for the repair and replacement of water control gates, 5,900 LF of 14-

ft dia. welded steel penstock, and various concrete hydraulic structures. He also designed and supervised the foundation grouting program.

**Rocky Reach Hydroelectric Project, Wenatchee, WA.** Mr. Henn was the Site Construction Manager responsible for construction management and field engineering of the dam stabilization program utilizing foundation grouting, post-tensioned anchoring and structural concrete repair and replacement.

**Rock Island Dam Project, Wenatchee, WA.** Mr. Henn supervised the spillway gate relocations. He managed subcontractors performing installation of a cellular cofferdam, demolition of the existing reinforced concrete dam and spillway, rock excavation for a new eight-unit powerhouse, foundation grouting, and mass concrete placements.

**LA Metro Eastside Extension, Los Angeles, CA.** Mr. Henn served as a Construction Consultant. The project consists of approximately 42,000 LF of 22-ft dia. soft ground transit tunnels and four cut-and-cover stations in heavily urbanized downtown Los Angeles. Specifically, Mr. Henn examined the use of EPBMs for the project with special attention on production rate, surface settlement issues, ground treatment, one pass bolted gasketed precast concrete lining systems, and muck handling and removal. He also reviewed contract packaging, construction costs and schedules, and performed constructability and claims avoidance reviews.

**Chemical Grouting Evaluation Study, Utilidor/Tunnel, Barrel, AL.** As project manager Mr. Henn executed an evaluation of the applicability of chemical grouting to reduce groundwater inflows to a seven-mile utilidor/tunnel through the “downtown” section of Barrel, Alaska. Different chemical grouting application methods were evaluated and a grouting program was recommended.

**Disputes Review Boards.** Mr. Henn has served on twelve DRBs; he has been Chairman on three of the Boards. The total construction value for the twelve projects is over \$338 million.