Akron-Canton Airport Runway 5/23 Safety Area Improvements-Embankment

Summit/Stark Counties, Ohio

Project Description

Client:
Akron-Canton Airport
c/o Baker & Associates
100 Airside Drive
Moon Township, PA 15107

Contact:
Mr. David Folmar, P.E., PMP
(412) 269-6300

Performance Period:
September 2005 to March 2006

Project Costs:
$228,000 (Fee)

PGI's Role:
Geotechnical Exploration

Pro Geotech, Inc. (PGI) was retained by Baker & Associates (BA) to provide geotechnical engineering services for the design and construction of Runway 5-23 which was extended to the south in order to satisfy the Safety Area requirements. This extension required construction of an embankment approximately 1525 feet in length. The height and width of the embankment ranged from approximately 45 feet to 70 feet, and 875 feet to 1000 feet, respectively. The approximate quantity of the soil required to construct this embankment was 5.1 million cubic yards. The required soil for constructing the proposed embankment was borrowed from airport-owned property located south of Shuffel St. NW. The pavement of Runway 5-23 was extended to the southwest approximately 1300 feet in length and approximately 300 feet was constructed on the newly formed embankment subgrade soils. Taxiway F was also extended to the southwest, parallel to Runway 5-23 in conjunction with the extension of Runway 5-23 pavement. A total of 110 test borings were advanced for embankment design purposes. These embankment test borings were advanced to approximate depths, which ranged from 24.0 to 113.3 feet below the existing ground. Another 25 test borings were advanced at the borrow site to investigate the suitability of the borrow soils to be used for proposed embankment construction. These borrow test borings were advanced approximate depths ranging from 10.0 to 60.0 feet below the existing ground surface. We completed the field exploration using 3 drilling rigs.

The laboratory testing program consisted of Moisture Content Determination, Particle-Size Analysis, Atterberg Limits, Direct Shear Test of Soils under Consolidated Drained Conditions, Unconfined Compressive Strength of Cohesive Soils, One-Dimensional Consolidation Properties of Soils, Compaction Characteristics of Soil using Modified Effort, and CBR of Laboratory-Compacted soils on selected soil samples and classifying the soils in accordance with the USCS Soil Classification System. Based on the subsurface soil conditions encountered at the borrow site test boring locations, soils were predominantly granular in nature. However, cohesive soils were also encountered in some of the test borings. The foundation soils that were encountered at the proposed embankment site consisted predominantly of non-cohesive soils in most of the boring locations. However, layers of wet and weak cohesive soils were encountered particularly at the wetland area. This wetland area raised some concern due to long term settlement and potential slope instability of the proposed embankment. Settlement and slope stability analyses were performed for designing the proposed embankment. The additional quantity of the borrow site soil was calculated to account for the volume change of the foundation soils due to placement of the proposed embankment fill above it. The Safety Factors obtained from our computer analysis for the proposed embankment slopes constructed in all areas were well above or close to the required Safety Factor 1.30 with the exception of the wetland areas. The lower Safety Factors were obtained for the proposed embankment constructed in the wetland areas particularly in the back slope and the left slope for short-term stability.

The recommendations including construction of temporary counter berm and installation of instruments to monitor the settlement and pore water pressure were provided in the geotechnical report to improve the short-term slope stability of the embankment in the wetland areas during construction. The counter berm was built concurrently with the proposed embankment along the wetland area. A total of four (4) settlement devices were installed to monitor the settlement and a total of 15 vibrating wire piezometers were installed to monitor the excessive pore water pressures which developed during construction of the embankment. Also included in the geotechnical report were recommendations for pavement design parameters which were obtained from the laboratory testing of existing embankment subgrade soils for the runway and taxiway extension and for borrow soils to be used for the proposed embankment construction.