GROUND WATER

Drainage and Dewatering Investigations

HNTB Corporation - Invesco Field at Mile High

HNTB Corporation was a lead contractor on the construction of the $324 million, 76,000-seat Invesco Field at Mile High Stadium in Denver. During the course of design and early foundation construction, it was noted that the location of the stadium, in the alluvium of the South Platte River, might render the facility susceptible to potential foundation impacts from high ground water table conditions following storm or flood events.

Martin and Wood conducted a study of the potential for changes in the ground water table from such events and developed recommendations as to whether a foundation-wide subdrain system would be required. The study analyzed test and monitor hole data to develop a concise picture of the existing and longer-term average ground water table configuration.

With this in hand, Martin and Wood then carried out a series of analyses superimposing the worst recorded historical precipitation and flood events to determine the net impact on the ground water table. Such factors as hydrograph configuration and flood event duration, bank storage, effects of impervious surfaces, and combinations of severe events were incorporated into the overall analysis that showed that the likelihood of a water table rise capable of impacting the foundation components for even a brief period of time was extremely low. However, Martin and Wood ultimately recommended the subdrain system, first, as it would be a relatively very low cost "insurance" that would be easy to incorporate into the construction and, second, because there were other potential scenarios by which subsurface water could be a local problem, for example, the rupturing of one of the primary water mains for the building. The sub-drain system was installed.

RNL Design - Wellington A. Webb Office Building

The proposed $132 million office building for the City and County of Denver was to incorporate a three-level, underground parking garage. With a local water table of approximately 10-feet from ground level, dewatering was required, both for construction and for the permanent facility.

Martin and Wood carried out a dewatering analysis, provided a dewatering system layout design for the permanent structure, and assisted in the design of the progressive temporary construction dewatering system. Martin and Wood conducted aquifer testing to develop aquifer characteristics that were then incorporated into a ground water flow model simulation that was used to predict construction dewatering inflow rates, permanent system inflow rates, and to test and refine the conceptual designs that were ultimately consolidated into the final permanent system design.

During construction dewatering several small local areas of higher inflows were identified and incorporated into the model which was then able to accurately match the total inflows for the entire excavation. The model was allowed to run to essentially steady-state conditions to predict the longer-term permanent system flows for use in designing the pumping system that would ultimately maintain the garage in a dewatered state.

Martin and Wood Water Consultants, Inc.
602 Park Point Drive, Suite 275 ▪ Golden, CO 80401 ▪ Phone: (303)526-2600 ▪ Fax: (303)526-2624