CONSTRUCTION CONSIDERATIONS

Site Preparation/Floor-Slab Structurally Supported

Excessively organic soils and loose dumped fill materials generally undergo high volume changes when subjected to loads. This is detrimental to the behavior of pavements and floor slabs placed upon them.

In proposed pavement areas, the surest approach to the best long-term pavement performance would be for removal of the existing fill and organic soils and replacement with compacted structural fill. However, this is likely to be prohibitive from both an economic and construction standpoint.

As an alternate, it is recommended that existing fill soils be removed for a depth of at least one (1) foot beneath the proposed pavement and for a distance of at least ten (10) feet beyond the pavement area.

The exposed subgrade should then be proof rolled with a fully loaded 20-ton dump truck or other pneumatic tired, heavy construction equipment of similar size and weight under the direction of the geotechnical engineer. The proof rolling will provide near surface compaction of the existing subgrade fill soils and aid in the detection of any soft or excessively wet areas. Any areas which exhibit excessive yielding should be undercut until a relatively firm, non-yielding condition is achieved.

Be advised that the existing fill soils are considered to be highly moisture sensitive, and subgrade preparation, including the depth of undercutting, will be dependent upon moisture conditions at the time of construction. An adequate effort will be required to control surface runoff to help prevent the exposed subgrade from becoming wet or saturated, causing a significant decrease in strength. Construction traffic may also need to be controlled, depending upon moisture conditions, to avoid disturbance of the subgrade.

The client should be aware that this approach will include the risk of reduced pavement performance (and possible increased pavement maintenance cost).

After the existing fill soils are excavated, and an acceptable subgrade condition is achieved, new fills may then begin and should be monitored by a representative of the geotechnical engineer. The sample specifications for compacted fills and backfills, presented in an addendum to this report, can be utilized to minimize the volume changes and differential settlements which are detrimental to the behavior of footings, pavements and floor slabs. These specifications should be modified to suit the particular aspects of this project.

The fill should be a well graded granular material which should be placed in layers of not more than twelve (12) inches in thickness, at moisture contents at or near optimum, and compacted to a minimum density of 95 percent of the maximum dry density as determined by ASTM designation D-1557.

However, if cohesive soil is utilized for fill, it should be placed in layers of not more than nine (9) inches in thickness, and compacted to a minimum density of 95 percent of Standard Proctor - ASTM designation D-698.

The existing organic soils anticipated to be present at the basement floor level are not suitable for direct support of floor-slabs or for floor supporting fill due to the potential for long-term excess settlements. It is therefore recommended that the basement slab be designed as a structural slab being supported by the foundations on the underlying higher strength soils.

Groundwater Control

Groundwater was measured at fourteen and one half (14.5) ± and eleven ± feet at B-1 and B-2, respectively, after removal of the augers. Groundwater was not present at B-3 and B-4 at this time. However, considering the relative moisture contents of the samples and the subsurface profile, the long-term groundwater level is likely to be somewhat higher than the levels measured during the drilling, and may even be near the upper elevation of the organic soils.

Therefore, some difficulty may be encountered during excavation and construction of the proposed basement. Considering the depth of the required excavation, it is anticipated that a gravity drainage system, sump pump, or other conventional dewatering system will be appropriate. However, should it be elected to construct the foundations by removal and replacement of existing fill soils, a more comprehensive procedure may be required due to the depth required to reach suitable soils.

It may be expedient to drill auger holes or excavate test pits adjacent to the building area immediately prior to construction to determine the prevailing water table elevation.

The basement area should be protected by a suitable drainage system to lower the surrounding water table and to protect the floor from hydrostatic uplift. Where perimeter or underfloor drains are installed, they should be surrounded by a properly graded filter medium to prevent them from becoming clogged by the infiltration of fine sand and silt.

Excavations

Because of the depth of excavation required for the basement construction and the subsurface conditions, it will likely be necessary to provide lateral support for the slopes of the excavations. Several systems of bracing may be used. Each has its advantages and disadvantages, and the selection of a bracing system should be based on the relative merits of each. It is to be noted that provisions for shoring and bracing of deep excavations are required by OSHA and other building codes.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a sudden collapse of the embankment.

Basement Wall Design and Construction

Due to the potential for fluctuating groundwater levels at this site, it is recommended that a permanent drainage system be included in the basement area to prevent the build up of excess water pressures on basement walls, and uplift and water migration on the floor slab. The system should include slotted or

perforated drain tile along the exterior and interior of the perimeter foundation walls connected to a central sump crock that can be pumped as required. The drain lines should be connected at maximum fifteen (15) foot intervals by bleeder pipes passing through the foundation walls.

The drain lines should be surrounded with a minimum twelve (12) inch thick layer of free draining aggregate such as clean sand, or sand and gravel, containing no more than five (5) percent passing the No. 200 sieve. The drainage layer should be continuous from the foundation drains and should extend to within one (1) to two (2) feet of the surface. The drainage aggregate should be surrounded by a suitable filter fabric to help prevent clogging of the system with fine soils.

In addition, it is recommended that a free draining, granular fill be utilized for backfill within two (2) to three (3) feet of the basement walls. The material should consist of clean sand, or sand and gravel with no more than eight (8) percent passing the No. 200 sieve.

The upper one (1) to two (2) feet or so of basement wall backfill should consist of a clay cap to limit the downward infiltration of surface water. Final grading should also provide for positive drainage away from basement walls.

Based on the types of subsurface materials encountered by the borings and the recommended free draining backfill, an equivalent fluid pressure of 55 P.S.F. may be used as the horizontal component of the active earth pressure on the basement walls above the water table.

If surcharge loads will exist adjacent to the walls, an additional lateral pressure equal to the surcharge pressure times an earth pressure coefficient of 0.40, acting uniformly with depth, can be used.

Heavy compaction equipment should not be used adjacent to the walls as this may develop lateral pressures in excess of the value given above.

Additional Considerations

Considering the subsurface materials, it is recommended that buried utilities be provided with flexible joint details to allow for potential differential settlements between the utilities and the structure. Additionally, it is suggested that, where feasible, utility corridors be located beneath landscape type (non-load) areas to reduce the potential for settlement.

GENERAL COMMENTS

When the plans and specifications are more complete, or if significant changes are made in the character or location of the proposed structure, a consultation should be arranged to review them with respect to the prevailing soil conditions. At that time, it may be necessary to submit supplementary recommendations.

It is recommended that the services of a qualified geotechnical engineer be engaged to test and evaluate the bearing soils in the bottom of individual caissons, and to verify their depth.

Monitoring and testing should also be performed to verify that suitable materials are used for controlled fills and that they are properly placed and compacted.