FOUNDATION INVESTIGATION

PROPOSED PROFESSIONAL SCHOOL BUILDINGS
PORTLAND, OREGON

PORTLAND STATE UNIVERSITY
INTRODUCTION

This report presents the results of a foundation investigation for the proposed professional services buildings for Portland State University. The buildings are to be located on the block bounded by S.W. 6th and Broadway Avenues and S.W. Harrison and Montgomery Streets. The location of the proposed buildings, with respect to adjacent streets, is shown on the Plot Plan, Plate 1.

The purpose of this investigation was to provide recommendations for building foundation and floor slab support. To accomplish this purpose, the scope of our investigation included:

1. A review of previous explorations performed by Dames & Moore adjacent to this site.
2. Drilling, logging, and sampling of five test borings at this site.
3. Laboratory testing of selected soil samples obtained from the borings.
4. Engineering analyses to serve as a basis for our recommendations.
5. Preparation of this report summarizing our findings.

PROPOSED CONSTRUCTION

As indicated on the plot plan, construction will consist of three phases:

Phase I - A seven-story education building in the southwest portion of the site.

Phase II - A seven-story business building in the southeast portion of the site.

Phase III - A five-story theater and a six-story social work and urban affairs building in the northern half of the site.
Floor grades of about elevation 151\(^\circ\) on the west half of the site and elevation 137\(^\circ\) on the east half of the site have been selected to conform closely to the existing site grades. Fills will not exceed 4 to 5 ft and cuts will generally be less than about 10 ft. Both cuts and fills will be at a maximum near the center of the site and will taper out to near zero along the east and west property lines. Buildings will have slab-on-grade lower floors and will be of either steel or concrete construction.

**SITE CONDITIONS**

**Surface Conditions**

The northeast corner of the property is occupied by Francis Manor, a three-story brick building 35 by 80 ft in plan with a lowest floor elevation at about 140. A small lawn area is located just east of this building. The remainder of the site is paved for automobile parking, with occasional planter areas. The site slopes generally downward to the east, ranging in elevation from about 152 at the southwest corner of the site to about elevation 140 at the northeast corner.

Reportedly, the majority of this site was at one time occupied by various one- and two-story wood-frame buildings.

**Subsurface Conditions**

Subsurface conditions were explored by means of five borings drilled at the locations indicated on the plot plan. A discussion of the method of exploration, together with detailed logs of the borings, is presented in Appendix A, Field Explorations.

The borings reveal that the site generally is underlain by sandy silts which increase in sand content with depth, grading to relatively clean sands at depths of 13 to 30 ft. Transitions between soil layers are gradual.

\* All elevations refer to City of Portland datum.
Previous explorations have revealed that occasional thin clayey silt layers may be present in the lower sand formation.

Boring 4 encountered approximately 6½ ft of silt and sand fill overlying natural soils. It is possible that similar areas of fill exist in other portions of the site where old buildings have been demolished and existing basements or cellars have been backfilled.

No groundwater was encountered in any of the borings.

CONCLUSIONS AND RECOMMENDATIONS

General

Pertinent physical properties of the various soils encountered were evaluated by means of laboratory tests. A description of the tests performed, together with the various test results, are presented in Appendix B, Laboratory Tests. The various field and laboratory results indicate that all of the on-site soils possess relatively good strength and relatively low compressibility, with the soil properties becoming more favorable with depth.

Site Preparation

In building areas, the surface of the site should be stripped to firm natural soils free of organic material. This will require the removal of all pavement, grass, sod and existing building foundations. In addition, it should be anticipated that some old building rubble or fill, such as that revealed by Boring 4, may be encountered and will have to be overexcavated and backfilled. The silty soils exposed by site stripping will become soft and easily disturbed when wet. It is very desirable that site preparation be accomplished during the dry season of the year (typically late June through September). If site grading...
is accomplished during the wet season, it may be necessary to overexcavate and install a granular working blanket.

Generally design floor grades have been selected to correspond closely to existing ground elevations, and only minor cutting and filling will be required after site stripping. A comparison of spot elevations at the site with tentative design floor grades reveals the need for some cuts of up to perhaps 11 ft and fills of up to 4 to 5 ft in some areas near the center of the site.

Except for surface stripping all excavated natural soils would be suitable for use as engineered fill if the work is conducted during dry weather when adequate moisture control can be maintained. On-site soils installed as fill should be compacted to a dry density equivalent to at least 92 percent of the maximum dry density obtainable by the Modified A.A.S.H.T.O. Method of Compaction (Designation T-180). During wet weather, on-site silts would be virtually impossible to compact. Suitable wet weather fill would consist of any relatively well-graded granular soil having a maximum size of not more than 4 in. and having not more than 5 percent of the portion passing the No. 4 sieve passing the No. 200 sieve. Granular fills should be compacted to a dry density equivalent to at least 95 percent of the maximum dry density obtainable by the Modified A.A.S.H.T.O. Method of Compaction. All fills should be installed in maximum 8 in. thick lifts and compacted with suitable compaction equipment.

Although undisturbed natural soils may stand nearly vertical for short periods of time, we recommend that temporary unsupported excavation slopes for heights up to 12 ft be made no steeper than 1 Horizontal to 1 Vertical. This steepness assumes that there would be no surcharge (such as storage of construction material, street parking, etc.) within a
horizontal distance of about 5 ft from the top of the slope. Also we suggest that the top edge of unsupported slopes of this steepness be located no closer than about 5 ft horizontally from adjacent underground utilities in the street. Exposed slopes may require erosion protection during wet weather.

**Foundation Support - Shallow Footings**

The proposed building may be supported on conventional spread foundations established on undisturbed natural silts or sands or on compacted fill installed in accordance with the preceding recommendations. Existing on-site fills are not suitable for foundation support. Footings established in this manner may be designed for an allowable bearing pressure in accordance with the graph on page 6. Lower bearing pressures may be required to limit settlement.

Settlement magnitudes will vary depending upon the column load, the bearing pressure, and depth of the footing. Estimated settlements for various foundation configurations are presented on pages 7 and 8. If the spacing between adjacent footings is at least 2/3 of the footing width then the footings should settle independently. For closer spacings, the settlement of one footing may affect adjacent footings, and more detailed analyses is required. Foundation settlements are anticipated to occur rapidly upon application of the design loads.

The bottoms of footings terminated in silty soils can be easily disturbed during wet weather. As such if footings are excavated during the wet season, we recommend that a 4 in. thick layer of compacted crushed rock be installed in the footing bottoms immediately after they are excavated and approved. Inspection of footing bottoms should be performed by a qualified engineer/inspector.
May 19, 1986

City of Portland
Bureau of Buildings
1120 S.W. 5th Avenue
Portland, Oregon 97204

Attention: Mr. Mike Hagerty
Structural Engineer

Gentlemen:

Professional School Building
Phase II
S.W. Harrison Street and 5th Avenue
for Portland State University

In response to recent discussions between yourself and kpff, we have reviewed the status of the footing excavation along Column line 2 which is immediately adjacent to the existing mat.

According to information from the old building plans, the bottom of the existing mat is mostly at elevation el 136 with smaller portions of the length at el 134 and 137 ft 9 in. The proposed 5 1/2 ft wide footing along Column Line 2 will be located at el 134. The excavation has been made in firm silty sand materials and no evidence of soil sloughing below the edge of the existing mat has been noted to date. We understand that the contractor proposes to pour the new footing neat against the excavation immediately adjacent to the existing mat.

We understand that the existing mat was designed for a real load bearing pressure of 4 kip/sq ft on the basis of our report recommendations dated January 29, 1980. However, the actual real load bearing pressure is only 2 kip/sq ft. We understand that the new strip footing along Column line 2 will sustain real load bearing pressures of between 2.5 and 4 kip/sq ft.

It is our opinion that no adverse settlement consequences will result from the existing mat or new footing as a result of the proposed construction. We recommend that concrete be poured for the footing along Column line 2 as soon
as possible. We understand that the top of the footing will be poured to el 137 ft 4 in. We recommend that an additional 6 in. of concrete be placed to el 137 ft 10 in. along those portions near footing where the bottom of the existing mat is at el 137 ft 9 in.

Very truly yours,

DAMES & MOORE

Anthony J. Wright, Associate

cc: kpff
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