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A Report for

13207 NE Halsey St
1N2E 26DC 09000
~~4428~~ 2844/4

Portland Rescue Mission

Geotechnical Evaluation
Proposed Three New Buildings
Buildings No. 1, 2 and 3
Shepard's Door Facility
N.E. 132nd and N.E. Halsey
Portland, Oregon

Project No. EAAX-98-0112
Report No. 09-028-3613
February 17, 1998

BRAUN INTERTEC CORPORATION

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...g the Built and
... Environments

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503-289-1778 Fax: 289-1918

Engineers and Scientists Serving the Built and Natural Environments

February 17, 1998

Project No. EAAX-98-0112
Report No. 09-028-3613

Portland Rescue Mission
c/o Mr. David John
JDJ Construction
7682 S.W. Barnard Drive
Beaverton, Oregon 97007

Dear Mr. John:

Re: Geotechnical Evaluation for the Proposed Three New Buildings (Buildings 1, 2 and 3) at the Shepard's Door Facility, Portland Rescue Mission, N.E. 132nd and N.E. Halsey, Portland, Oregon

The geotechnical evaluation which was authorized on January 14, 1998, has been completed. The purpose of these services was to assist you, the architect and the engineer in designing foundations and preparing plans and specifications for construction of the new building.

Summary of Results

Four test pit excavations (TP-1 to TP-4) were completed in the proposed building area. The general soil profile was 1 foot of topsoil underlain by a brown, firm, clayey silt extending to a depth of 2½ to 7½ feet. This strata was underlain by a relatively dense, sandy, pebble/cobble gravel extending to the maximum explored depth of 8½ feet. The gravel strata is known to extend to depths of several tens of feet. Groundwater was not observed in the test pit excavations.

Summary of Recommendations

Based on the results of our test pit excavations, it is our opinion that the proposed buildings can be supported on conventional shallow spread footings designed for a net maximum allowable bearing pressure up to 2,000 pounds per square foot when founded on the upper brown, clayey, silt stratum or on an engineered structural fill. After the site has been stripped of topsoil, the concrete floor slabs may be placed over the upper brown, clayey silt after the subgrade has been proofrolled to confirm its firmness. Foundation systems founded directly on the gravel stratum may be designed for net maximum allowable bearing pressure for up to 4,000 psf.

General

Please refer to the attached report for a more detailed summary of our analyses and recommendations. If we can provide additional assistance, or observation and testing services during design and construction, please do not hesitate to contact us at (503) 289-1778 or 1(800) 783-6985.

Sincerely,

Scott B. Taylor, Manager
Geotechnical Department

REGISTERED PROFESSIONAL ENGINEER 5944 OREGON JULY 14 1967 CHARLES R. LANE

Charles R. Lane, P.E.
Senior Engineer

sbt\crl:drb

Attachment: Geotechnical Evaluation Report

c: Braun Intertec Corporation, St. Cloud Office
Mike Corl, Corl Vallaster

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3.2 Engineering Analysis

Engineering analysis and recommendations regarding general foundation design including allowable bearing pressures, minimum footing width and depth requirements and estimates of foundation settlement are included in this report. In addition, recommendations were developed addressing site preparation, placement and compaction of fill materials and site preparation of the floor slab areas.

4.0 Surface and Subsurface Features

Surface and subsurface features encountered at the time of our field services are described below.

4.1 Site Description

At the time of our field services, the project site was of uneven terrain, with Building Nos. 1 and 3 of elevations at or near street grade and Building No. 2 some 6' ± below street grade. Vegetation consisted primarily of small deciduous trees and several large evergreen trees with associated brush and blackberry bushes.

4.2 Soils and Geology

Soils generally encountered within the project region consist of extensive alluvial deposits (clays, silt, sand and gravel) attributed to a swollen late Pleistocene (post-glacial) Columbia River drainage system. Local streams and rivers subsequently reworked many of the surface deposits to their present day conditions. These units may be 100 ft or more in thickness and are believed to be underlain by semi-indurated sediments of the Pliocene age Troutdale formation. Specific units encountered during this investigation are described as follows:

<u>Topsoil</u> - 8 to 12 inches of dark brown organic clay silt with numerous roots.

<u>Clayey Silt</u> - 1½ to 5½ feet brown to light brown, firm clayey silt.

<u>Sandy Pebble to Cobble Gravel</u> - Brownish-gray, relatively dense. Sandy pebble/cobble gravel was encountered below the silt and extended to the maximum explored depth of 8½ feet. The sandy pebble/cobble gravel is anticipated to extend to several tens of feet.

4.3 Groundwater

Groundwater was not encountered in any of our explorations. Variations in groundwater levels should be expected seasonally, annually and from location to location.

4.4 Seismic Considerations

The site falls within seismic Zone 3 with a seismic zone factor of 0.3 as classified by the Uniform Building Code of 1996. Based on the local geology and the soil conditions encountered, the soil profile at the site is S_3 with a site coefficient ('S' factor) of 1.2 (Table 16-J of UBC). Our evaluation of the subsurface conditions at the site did not indicate the potential for soil liquefaction or landslide hazards associated with a seismic event at the site, or in the vicinity of the project site. However, it should be noted that a site specific seismic evaluation was beyond the present scope of services for this project. Such an evaluation could be performed at an additional fee with your written authorization.

5.0 Conclusions and Recommendations

Based on the results of our field work, laboratory evaluation and engineering analysis, it is our opinion that the site is suitable for the proposed structure and associated improvements provided the following recommendations are incorporated into the design and construction of the project.

5.1 Site Preparation

In general, we recommend that all structural improvement areas be drained of surface water (pumping from a sump hole, if necessary), and stripped of surface vegetation, topsoil materials, highly saturated or disturbed soil, and any other deleterious materials encountered at the time of construction.

We envision that initial site preparation will consist of topsoil and fill soil stripping. We anticipate that topsoil and fill stripping and/or reworking of the surface soils to a depth of 12 to 24 inches may be required depending upon the extent of root systems. Additional site preparation will depend upon the proposed site grades and the proposed building features.

All required structural fill materials placed in the building and pavement areas should be moistened or dried as necessary to near optimum moisture conditions and compacted by mechanical means to a minimum of 95 percent of the maximum dry density as determined in accordance with ASTM test method D-1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches.

Placement of crushed rock should follow immediately after site grading to provide protection of the sensitive subgrade soils during construction activities. In traffic areas, the placement of a one-foot thick granular working base is generally recommended with thicker sections and/or geotextile fabrics recommended in heavily traveled areas. Generally, three to six inches of crushed rock is sufficient in foot traffic areas.

If geotechnical test pits are located in the building or pavement areas, re-excavate and replace the disturbed soil with compacted crushed aggregate. The crushed aggregate should be placed in lifts not to exceed 8 inches and should be compacted to a minimum of 95% relative compaction (ASTM D-1557).

5.1.1 Site Preparation During Dry Weather Construction

During the dry season, prior to the placement of any fills, all exposed subgrade surfaces should be proofrolled with a loaded dump truck. Areas found to be soft or otherwise unsuitable for support of structural loads should be overexcavated and replaced with compacted fill as described below.

The on-site native soils could be considered for use as fill provided they are free from organic materials and debris and the work is performed during dry weather. However, it is anticipated these materials will have a moisture content in excess of optimum, except perhaps during the driest months of the year, and accordingly, will require drying to achieve compaction. Should wet weather grading be anticipated, the use of on-site soils as fill will be difficult. Selected samples of the material to be used for fill should be submitted to our laboratory in order to evaluate the maximum density, optimum moisture content, and the suitability of the soil for use as fill.

5.1.2 Site Preparation During Wet Weather Construction

The on-site native soils are highly moisture sensitive and thus will not be suitable as structural fill during wet weather construction. An all-weather, clean granular fill containing less than 5 percent material passing the No. 200 sieve, such as sand, crushed rock, or sand and gravel, is recommended in order to achieve compaction during wet weather grading operations. During wet weather grading operations, all excavations should be performed using a smooth bladed tracked backhoe working from areas where material has yet to be removed or from the already placed structural fill. Subgrade areas should be cleanly cut to firm undisturbed soil.

Proofrolling of excavation bottoms is likely not appropriate during wet weather grading to avoid disturbance of moisture-sensitive soils. Should construction take place during wet weather, we recommend that a Braun Intertec representative be present to observe the subgrade to evaluate whether additional preparation is indicated.

5.2 Excavations

Excavation and construction operations may expose the on-site soils to inclement weather conditions. The stability of exposed soil may rapidly deteriorate due to precipitation or the action of heavy or repeated construction traffic. Accordingly, foundation and pavement area excavations should be adequately protected from the elements and from the action of repetitive or heavy construction loadings.

5.2.1 Construction Dewatering

Groundwater seepage in excavations should be anticipated during the wet season of the year. For most of the excavations for this project, pumping from sumps outside the limits of the excavation should control groundwater seepage and surface water ponding.

5.2.2 Excavations/Slopes

Temporary earth slopes may be cut near-vertical to heights of 5 feet. Excavations deeper than 5 feet should be performed in accordance with Department of Labor Occupational Safety and Health Administration (OSHA) guidelines for Type C soils. Job site safety is the responsibility of the project contractor.

5.3 Foundation Support

Based on the results of our geotechnical investigation, we recommend that in order to limit differential settlement, the new building not be supported on the upper soft soils. In our opinion, the proposed new building should be supported on the undisturbed native brown, clayey silt or properly prepared structural fills placed on brown, clayey silt strata using continuous and individual shallow spread footings. We recommend that continuous and individual spread footings be designed for a net maximum allowable bearing pressure of 2,000 pounds per square foot (psf) with a minimum footing width of 18 inches and 3 feet square, respectively.

Foundation systems placed in the dense underlying gravel strata may be designed for net maximum allowable bearing pressures of 4,000 psf.

The allowable pressure of 2,000 psf is intended for dead loads and sustained live loads and can be increased by one-third for the total of all loads, including short-term wind or seismic loads. Continuous footings should extend to a minimum depth of 18 inches beneath the lowest adjacent exterior grade to provide frost protection.

If the footings are placed on structural fill, the compacted fill should extend laterally one foot away from the edges of the footings for each one foot of fill below the footings when placed adjacent to a downhill slope. They may be excavated near vertical where the surface soils extend out level some distance, therefore providing a confining soil pressure against the fill. This oversizing, where a downhill slope is adjacent to the footing, is important to provide sufficient lateral stability in the fill soils directly below the footings.

Allowable lateral frictional resistance between the base of footings and the subgrade can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.30. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid density of 250 pounds per cubic foot (pcf) on footings poured "neat" against insitu soils or properly backfilled with structural fill. This recommended value includes a factor of safety of approximately 1.5, which is appropriate due to the amount of movement required to develop full passive resistance.

We estimate that foundations designed and constructed in accordance with the above recommendations will experience total settlements generally less than 1-inch and differential settlement between columns generally less than ½-inch.

If the footings are constructed during wet weather, it may be necessary to protect the foundation excavation bottoms from disturbance during construction activities. In this regard, we recommend that a 3- to 4-inch thickness of crushed rock be placed at the bottom of the footing excavations immediately after the excavation is completed. If footings are constructed during the drier summer months, this crushed rock layer should not be required.

5.4 Floor Slab Support

The proposed slab-on-grade may be supported on structural fills placed over native silty subgrade after the removal of topsoil and the upper silts have been proofrolled to detect any soft areas.

In order to provide uniform subgrade reaction beneath any proposed floor slab-on-grade, we recommend that floor slabs be underlain by a minimum of 6 inches of free-draining (a maximum size of 3/4 inch with less than 5 percent passing the No. 200 sieve) well-graded gravel or crushed rock base course. The base course material should be compacted to at least 95 percent of the maximum density obtainable by the ASTM D-1557 test procedure.

The crushed rock should provide a capillary break to limit migration of moisture through the slab. If additional protection against moisture vapor is desired, a vapor retarding membrane may also be incorporated into the design. Factors such as cost, special considerations for construction, and the floor coverings suggest that decisions on the use of vapor retarding membranes be made by the architect and owner.

5.5 Retaining Walls

Lateral earth pressures on walls which are not restrained at the top, such as retaining walls, etc., may be calculated on the basis of an equivalent fluid pressure of 35 pcf for level backfill and 60 pcf for steeply sloping backfill. Walls that are restrained from yielding at the top may be calculated on the basis of an equivalent fluid pressure of 55 pcf for level backfill and 90 pcf for steeply sloping backfill. Lateral loads may be resisted by passive pressures acting against footings and by frictional resistance between foundation elements and supporting soils. An equivalent fluid density of 250 pounds per cubic foot (pcf) and a friction factor of 0.30 may be used for design for foundations bearing on and resisted by native soils. The recommended equivalent fluid density includes a factor of safety of 1.5 which is appropriate due to the amount of movement required to develop full passive resistance.

All backfill for retaining walls, foundation walls, etc., should be select granular material (sand and/or sandy gravel). We anticipate that onsite material will not be suitable for this purpose and that it will be necessary to import material to the project for structure backfill.

All backfill behind walls should be placed in lifts not exceeding 6 inches in loose thickness and compacted to at least 90 percent of the maximum dry density obtainable by the ASTM D-1557 test procedure. Care in the placement of fill behind walls must be taken in order to insure that undue lateral loads are not placed on the wall.

5.6 Drainage Considerations

Any areas of the building which are to be developed below the exterior site grade must be provided with a well-designed drainage system in order to control hydrostatic pressures against walls, seepage of groundwater through base walls, etc.

Under no circumstances should surface runoff water be led into foundation drains. Foundation drains should be placed at the base of the footings to prevent surface and shallow perched water from migrating beneath the footings..

Surface run-off from roofs, parking areas, etc., should be tightlined to the storm sewer or other approved disposal areas.

5.7 Pavement Recommendations

The following recommendations are presented as preliminary for your consideration. The civil engineer for the project may have more traffic and project design data available than is presently known and may wish to modify and refine these pavement sections. We will, upon request be pleased to provide a more detailed pavement design when definite traffic and building plans are available.

Prior to placing the base or leveling course the subgrade should be proof-rolled with a loaded dump truck to detect areas or pockets of unusually soft material. These should then be excavated and replaced with suitable compacted fill. A geotextile fabric (Manufacturer's and Brands: Mirafi 500X, Amoco CEF Style 2002, or an approved alternate) should be placed over all fine-grained soils (silts-clays) prior to the placement of base rock to prevent subgrade intrusion into the granular structural fill.

5.7.1 Asphalt Pavement

Based on our experience and using a design California Bearing Ratio (CBR) value of 4 to 10 for subgrade soils and a designed life period of 20 years suggests the following pavement thicknesses. For entrance, truck and driveway areas, we assumed traffic would not exceed 25 equivalent 18-kip single axle loads (ESALs) per day. For car parking areas, we assumed 4 ESALs per day. If the anticipated traffic exceeds these values, we should be informed so that a specific pavement design is made for the project or the design can be modified by the site civil engineer.

A typical asphalt pavement section would be:

	Thickness	
Material	Entrance Service Roads	Car Parking
Asphalt Pavement (Ore. St. Class C)	4 inches	2½ inches
Crushed Rock Base (Ore. St. Spec.)	12 inches	8 inches

Asphalt pavement base course materials should consist of well-graded 1½-inch or ¾-inch minus crushed rock, having less than 5 percent material passing the No. 200 sieve. The base course and asphaltic concrete materials should conform to the requirement set forth in the latest edition of the State of Oregon, Standard Specifications for Highway Construction. The base course material should be compacted to at least 95 percent of the maximum density as determined by the ASTM D-1557 test designation. The asphaltic concrete material should be compacted to at least 90 percent of the theoretical maximum density as determined by ASTM D-2041 (Rice Specific Gravity).

5.7.2 Concrete Pavement

We recommend that concrete pavement be designed for a modulus of subgrade reaction of 150 pci. A typical concrete pavement section would be:

	Thickness	
Material	Entrance Service Roads	Car Parking
Concrete (4,000 psi)	8 inches	4 inches
Leveling Coarse (Sand or All-Weather Base)	2 inches	2 inches

5.8 Construction Monitoring

We request that we examine and identify soil exposures created during project excavations in order to verify that soil conditions are as anticipated. We recommend that the structural fills be continuously observed and tested by our representative in order to evaluate the thoroughness and uniformity of their compaction. If possible, samples of fill materials should be submitted to our laboratory for evaluation prior to placement of fills on-site.

Costs for the recommended observations during construction are beyond the scope of this current consultation. Such future services would be at an additional charge.

6.0 General

Our conclusions and recommendations described in this report are subject to the following general conditions.

6.1 Use of Report

This report is for the exclusive use of the addressee and their representative to use to design the proposed structure described herein and prepare construction documents. The data, analyses and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report.

6.2 Level of Care

Services performed by the geotechnical and materials engineer for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

We will be pleased to provide such additional assistance or information as you may require in the balance of the design phase of this project and to aid in construction control or solution of unforeseen conditions which may arise during the construction period.

Sincerely,

Scott B. Taylor, Manager
Geotechnical Department

Charles R. Lane, P.E.
Senior Engineer

sbt/crl:drb

Attachments: General Location Map
Site Map
Test Pit Logs

c: Mr. Mike Corl, Corl Vallaster
Braun Intertec Corporation, St. Cloud Office

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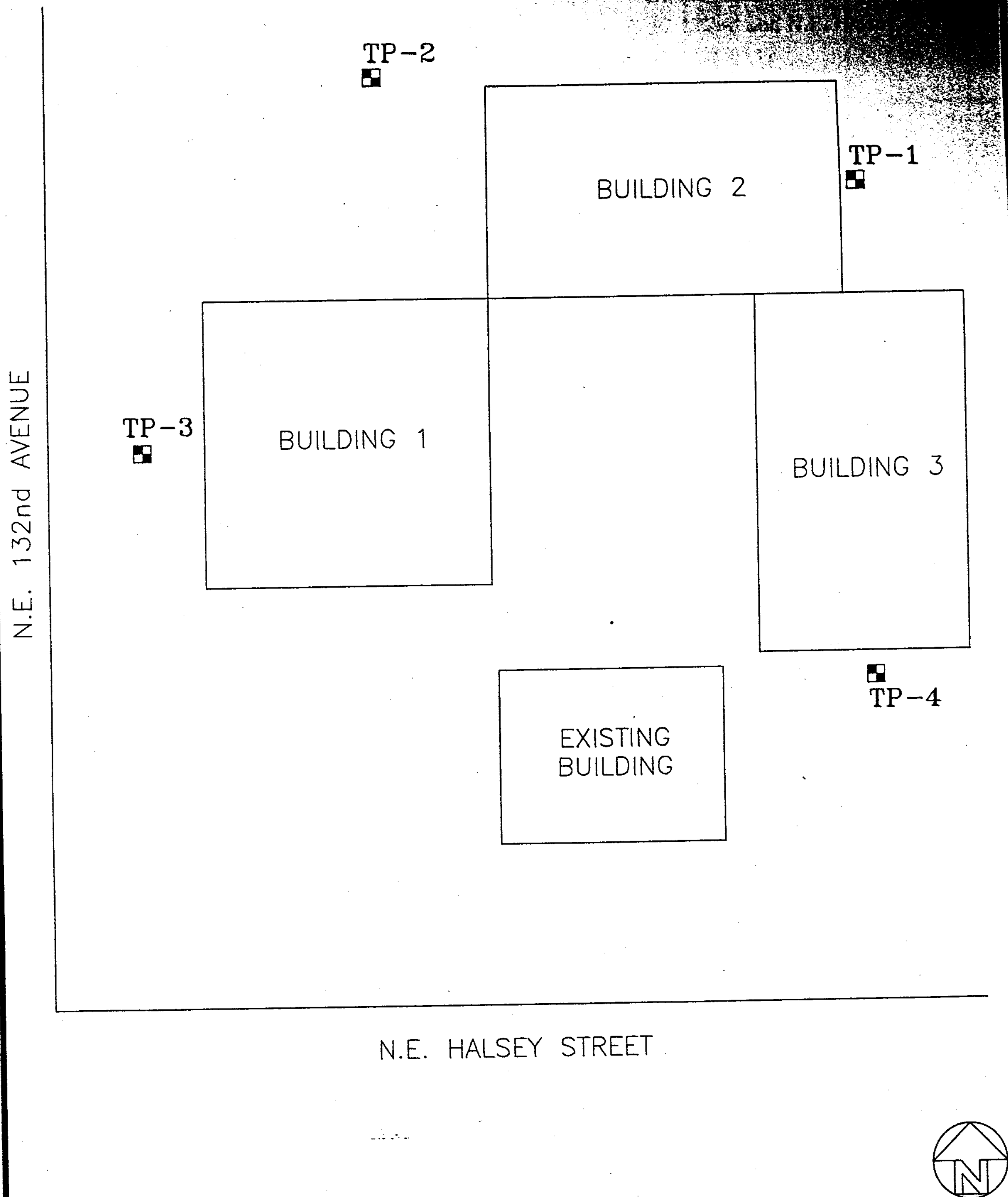

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TEST PIT LOCATIONS
SHEPHERDS DOOR
PORTLAND RESCUE MISSION
N.E. HALSEY STREET & 132nd AVENUE
PORTLAND, OREGON

DRAWN BY: R.F.
JOB NO: EAAX-98-0112
DATE: 2-13-98
DRAWING NO: 1 OF 1
FIGURE NO: 1
SCALE: N.T.S.

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PORTLAND, OREGON

SURFACE ELEVATION **6' +/-BSG** DATUM

TEST PIT NUMBER **TP-1** SHEET **1** OF **1**
PROJECT NAME **Portland Rescue Mission**
LOCATION **N.E. 132nd and N.E. Halsey, Portlannd, Oreg**
PROJECT NUMBER **EAAX-98-0112**
LOGGED BY **Scott Taylor**

SAMPLE INFORMATION								
DEPTH FEET	SAMPLE TYPE	POCKET PENETR, tsf	MOIS-TURE, %	U.S.C.S. SYMBOL	STRATA	DESCRIPTION	REMARKS	ELEVATION FEET
				OL		Organic topsoil roots, etc.		
2 4 6				ML		Brown to light brown, firm to medium stiff, relatively dry, clayey silt		
8				GM		Gray relativelly dense, coarse, sandy pea to pebble gravel		
						Test pit terminated @ 8.5 ft.	Ground water was not encountered in test pit excavation.	

BACKHOE CONTRACTOR **Dale Britton**
BACKHOE TYPE **Backhoe** **Rubber Tire**
DATE STARTED **1/15/98** ENDED **1/15/98**

SITE CONDITIONS

TPL AX112 2/13/98

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TEST PIT NUMBER	**TP-2**	SHEET	**1** OF **1**
PROJECT NAME	**Portland Rescue Mission**		
LOCATION	**N.E. 132nd and N.E. Halsey, Portlannd, Oreg**		
PROJECT NUMBER	**EAAX-98-0112**		
LOGGED BY	**Scott Taylor**		

SURFACE ELEVATION **5' +/-BSG** DATUM

SAMPLE INFORMATION					STRATA	DESCRIPTION	REMARKS	ELEVATION FEET
DEPTH FEET	SAMPLE TYPE	POCKET PENETR, tsf	MOIS-TURE, %	U.S.C.S. SYMBOL				
				OL		Organic topsoil roots, etc.		
2				ML		Brown, firm to stiff, relatively dry, clayey silt		
4				CL		Light brown, very stiff, dry, silty clay		
6								
8				GM		Brown-gray, silty sandy cobble-pebble gravel		
						Test pit terminated at 8.5 ft.	Ground water was not encountered in test pit excavation.	

BACKHOE CONTRACTOR	**Dale Britton**
BACKHOE TYPE	**Rubber Tire Backhoe**
DATE STARTED	**1/15/98** ENDED **1/15/98**

SITE CONDITIONS

TPL AX112 2/17/98

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TEST PIT NUMBER	TP-3	SHEET	1 OF 1
PROJECT NAME	Portland Rescue Mission		
LOCATION	N.E. 132nd and N.E. Halsey, Portlannd, Oreg		
PROJECT NUMBER	EAAX-98-0112		
LOGGED BY	Scott Taylor		

SURFACE ELEVATION 1' +/-BSG DATUM

SAMPLE INFORMATION					STRATA	DESCRIPTION	REMARKS	ELEVATION FEET
DEPTH FEET	SAMPLE TYPE	POCKET PENETR, tsf	MOIS-TURE, %	U.S.C.S. SYMBOL				
				OL		Organic Topsoil		
2				ML		Brown, firm to stiff, clayey silt, moist		
4				GM		Brown-gray, silty - sandy pebble to cobble gravel		
6						Test pit terminated @ 6 ft.	Ground water was not encountered in test pit excavation.	

BACKHOE CONTRACTOR	Dale Britton
BACKHOE TYPE	Backhoe Rubber Tire
DATE STARTED	1/15/98 ENDED 1/15/98

SITE CONDITIONS

TPL AX112 2/13/98

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TEST PIT NUMBER	TP-4
SHEET	1 OF 1
PROJECT NAME	Portland Rescue Mission
LOCATION	N.E. 132nd and N.E. Halsey, Portlannd, Oreg
PROJECT NUMBER	EAAX-98-0112
SURFACE ELEVATION	Street Gr
DATUM	
LOGGED BY	Scott Taylor

SAMPLE INFORMATION					STRATA	DESCRIPTION	REMARKS	ELEVATION FEET
DEPTH FEET	SAMPLE TYPE	POCKET PENETR, tsf	MOIS-TURE, %	U.S.C.S. SYMBOL				
				OL		Topsoil - Grass		
				ML		Clayey Silt - Brown, firm, moist		
2								
				GM		Silty Sandy Pebble to Cobble Gravel - Brown		
4						Test pit terminated @ 4 ft.	Ground water was not encountered in test pit excavation.	

BACKHOE CONTRACTOR	Dale Britton
BACKHOE TYPE	Backhoe Rubber Tire
DATE STARTED	1/15/98
ENDED	1/15/98
SITE CONDITIONS	

TPL AX112 2/13/98

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS