

SCS ENGINEERSJune 24, 1994
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Ms. Patricia V. Berry
Hillsborough County
Department of Solid Waste
P. O. Box 1110
Tampa, Florida 33601

Subject: Definition of Sump Area, Southeast County Landfill, Hillsborough County, Florida, Permit No. S029-158504

Dear Patty:

As requested SCS Engineers (SCS) has reviewed the available data concerning the sump, leachate levels, and the projected settlement of the landfill. SCS has concluded that the SELF liner system provides better protection than that required in Chapter, 17-701.400, of the Florida Administrative Code (FAC). A designated sump area for the landfill needs to be defined taking into account the unique nature of the landfill liner and foundation design. The purpose of this letter is to provide the necessary background information and technical justification to support the definition of a sump area at the Southeast County Landfill (SELF).

In December 1993, the Hillsborough County Department of Solid Waste (HCDSW) requested that SCS evaluate the leachate levels at the SELF. A survey of the leachate levels and a review of the as-built sump configuration was conducted (see Figure 1). At the time of the survey, the leachate levels were approximately 5 feet above the bottom of the existing temporary leachate sump in Phase VI, which collects leachate from Phases I, II, III and IV. In a letter to the Florida Department of Environmental Protection (FDEP) dated March 11, 1994, SCS presented the leachate level data and concluded that some areas of the landfill had leachate levels in excess of the maximum 12-inch depth specified in Chapter 17-701.400(3)(b), FAC.

During a meeting on March 23, 1994 with Mr. Kim B. Ford (FDEP) and Mr. Paul Schifer of the Environmental Protection Commission (EPC), this topic was discussed. The FDEP requested additional evaluation of the leachate levels and definition of the SELF landfill sump. On May 12, 1994 the FDEP and EPC conducted an inspection of the SELF. During this inspection, the site inspection report indicated that the SELF was in violation of leachate head above the liner rule and that the FDEP would provide direction to the HCDSW upon further review.



Ms. Patricia V. Berry
June 24, 1994
Page 2

<u>Permit</u>	<u>Issued</u>	<u>Expires</u>
SC29-66321	2-22-84	
S029-158504	12-12-89	12-1-94

BACKGROUND

Site Description

The SELF is permitted by the FDEP as a Class I landfill. The SELF is located in southeastern Hillsborough County (see Figure 2) and has a permitted footprint of approximately 162 acres within the 2,030-acre Southeast County Solid Waste Facility Complex (see Figure 3). Waste Management of Florida, Inc. operates the landfill under contract with the HCDSW. The original permit SC29-66321 was issued by the FDEP on February 22, 1984. It was replaced by the current permit S029-158504, issued by the FDEP on December 12, 1989. The current permit expires on December 1, 1994.

Landfill Construction

The bottom liner consists of on-site waste phosphatic clay deposits ranging in depths from 4 to 18 feet. Perimeter berms were constructed to establish the landfill footprint and provide a minimum 4-foot thick bottom liner. The interior sideslopes of the perimeter berms were lined with 36-mil, scrim reinforced, hypalon to complete the containment system. A typical cross section of the landfill is shown in Figure 4.

Six separate landfill cells were constructed, with internal berms separating the cells (See Figure 5). The cells are referred to as Phases in the various design and permit documents. The phases of the landfill that have received waste include Phases I through IV. Construction of Phases V and VI was completed in two stages. The first stage, which included construction of the perimeter berms and installation of the sand surcharge loads, was completed in September 1990. The second stage included installation of the leachate collection system and was completed in January 1992. No refuse has been placed in Phases V or VI.

The initial surface of the phosphatic clay deposits was relatively flat at an approximate elevation of 120 feet National Geodetic Vertical Datum (NGVD). Substantial settlement will occur as refuse is placed in the landfill. The projected final contours of the top of the phosphatic clay deposits is shown in Figure 6. Settlements of up to 10 feet are expected near the center of the landfill, where the thickest phosphatic clay deposits are found. The design of the leachate collection system and the phased development of the landfill was based upon the calculated settlement of phosphatic clay deposits.

Leachate Collection and Disposal

The HCDSW is removing approximately 45,000 gallons per day of leachate from the SELF by tanker truck. The leachate is taken to two County wastewater treatment facilities for treatment. An on-site leachate treatment plant currently is under construction. The anticipated completion date for construction of the treatment plant is

Ms. Patricia V. Berry
June 24, 1994
Page 3

August 1994. This on-site treatment plant will allow the County to treat an average of 60,000 gallons per day of leachate with a peak flow rate of 120,000 gallons per day.

DEFINITION OF SUMP AREA

SCS believes that the landfill sump area should be defined as the entire footprint of the landfill for the following reasons:

- Hydraulic characteristics of the liner design: The initial hydraulic conductivity of the waste phosphatic clay deposits (i.e., before waste loading) was measured to be 1×10^{-7} cm/sec or less¹. The post-consolidated hydraulic conductivity (i.e., after placement of 60 feet of solid waste and 95 percent consolidation is achieved) is projected to decrease to 3×10^{-9} cm/sec (Ardaman, 1983, p. 6-10).
- Performance of the liner design: As the landfill induced stresses consolidate the phosphatic clay deposits, an upward gradient is created by pore water being expressed upward into the sand leachate drainage layer. It is estimated that the liner will not be subjected to a downward gradient until 5 to 10 years after placement of the final cover (Ardaman, 1983, p. 6-10). Recent geotechnical investigations have confirmed that an upward gradient has developed in the waste phosphatic clay deposits, and the landfill foundation is consolidating at a rate consistent with the original estimates.² A copy of Ardaman's report is presented in Attachment 1.
- Equivalency analysis: Chapter 17-701.400(3)(b), FAC specifies the minimum thickness of the lower component of a composite liner system as a function of the maximum design hydraulic head and hydraulic conductivity of the soil barrier layer. The allowable liner design configurations were developed based on an equivalency analysis with the U.S. EPA Subtitle D liner design. The rule allows for thinner soil layers in the bottom component of the composite liner system with lower design leachate heads and lower hydraulic conductivities. In all cases, the rule assumes a downward gradient and an allowable leakage rate of approximately 0.008 to 0.41 gallons per day per acre from the bottom of the liner system. As stated above, the landfill liner system of the SELF should not experience a downward gradient until 5 to 10 years after the landfill closes and the final cover is installed. As such, the current liner design for the SELF far exceeds the minimum performance requirements of Chapter, 17-701.400 FAC.

equivalency
with subtitle D
standard

¹ Ardaman and Associates, Inc., *Hydrogeological Investigation*, February 1983.

² Ardaman and Associates, Inc., *Geotechnical Investigation*, March 1994.

Ms. Patricia V. Berry

June 24, 1994

Page 4

MAXIMUM ALLOWABLE LEACHATE HEAD OVER THE LINER

The maximum allowable leachate head over the liner should be such that the performance based criteria in Chapter 17-701, FAC are not exceeded (i.e., maximum allowable leakage rate) and the consolidation and strengthening of the foundation deposits are not constrained. As the waste phosphatic clay deposits consolidate, the pore pressures will dissipate over time. As long as the induced pore pressures exceed the approximate static pore pressure, the consolidation of the waste phosphatic clay deposits should continue as designed. Additionally, under these assumed conditions, the upward gradient would continue, and leakage from the landfill would not result.



This concept is illustrated in Figure 7. The figure was adapted from the most recent geotechnical investigation conducted by Ardaman and shows plots of the equilibrium pore pressures extrapolated from measured pore pressures in the field, the approximate static pore pressure line with 2 feet of leachate over the liner, and the equilibrium pressure line where induced pore pressures would be balanced by leachate head. The location of the test piezoprobe PP-2 (Phase 2 area) is representative of the anticipated worst case conditions after the 7-year consolidation period has occurred and most of the pore pressures have dissipated.

Based on the theoretical performance of the waste phosphatic clay deposits and the measured pore pressures in the field, leachate levels in the landfill up to 3.6 feet are acceptable.


CURRENT SITUATION


As stated in previous correspondence, the current leachate head over the liner varies from 4.83 feet at the temporary leachate sump located adjacent to Phase IV to 2 feet nearer some areas along the perimeter of the landfill. The HCDSW recently has increased the quantities of leachate being trucked and disposed of at County wastewater treatment facilities and has resumed leachate recirculation in accordance with its current permit. These actions have been taken to lower the leachate levels in the landfill. In addition, we anticipate that construction of the leachate treatment facility will be completed in the next two months, which will provide additional capacity for removal, treatment, storage, and disposal of leachate.

Ms. Patricia V. Berry
June 24, 1994
Page 5

Please do not hesitate to call if you have any questions.

Very truly yours,

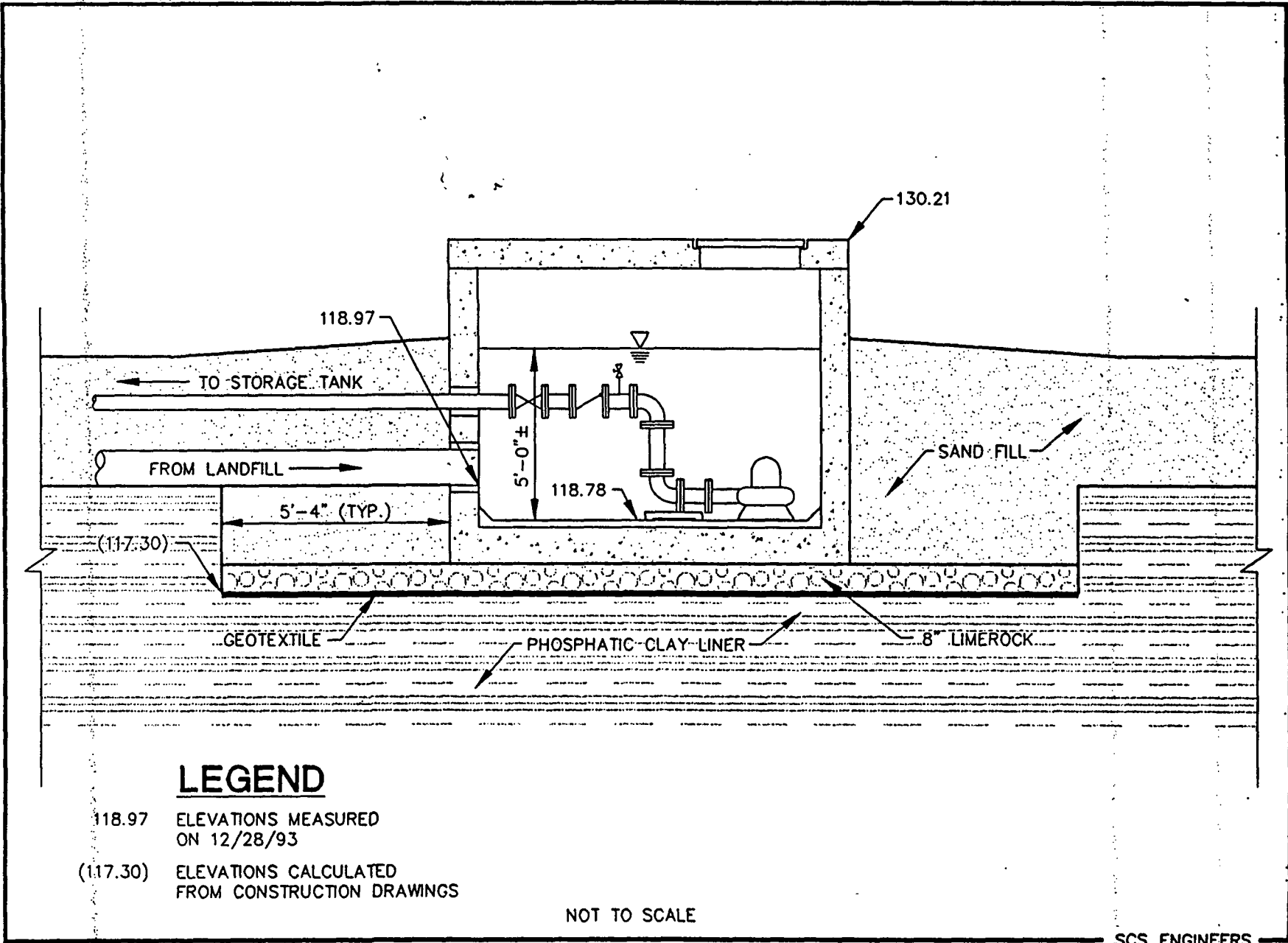

Larry E. Ruiz
Project Engineer



Robert B. Gardner, P.E.
Vice President
SCS ENGINEERS

LER/RBG:ler

Attachments



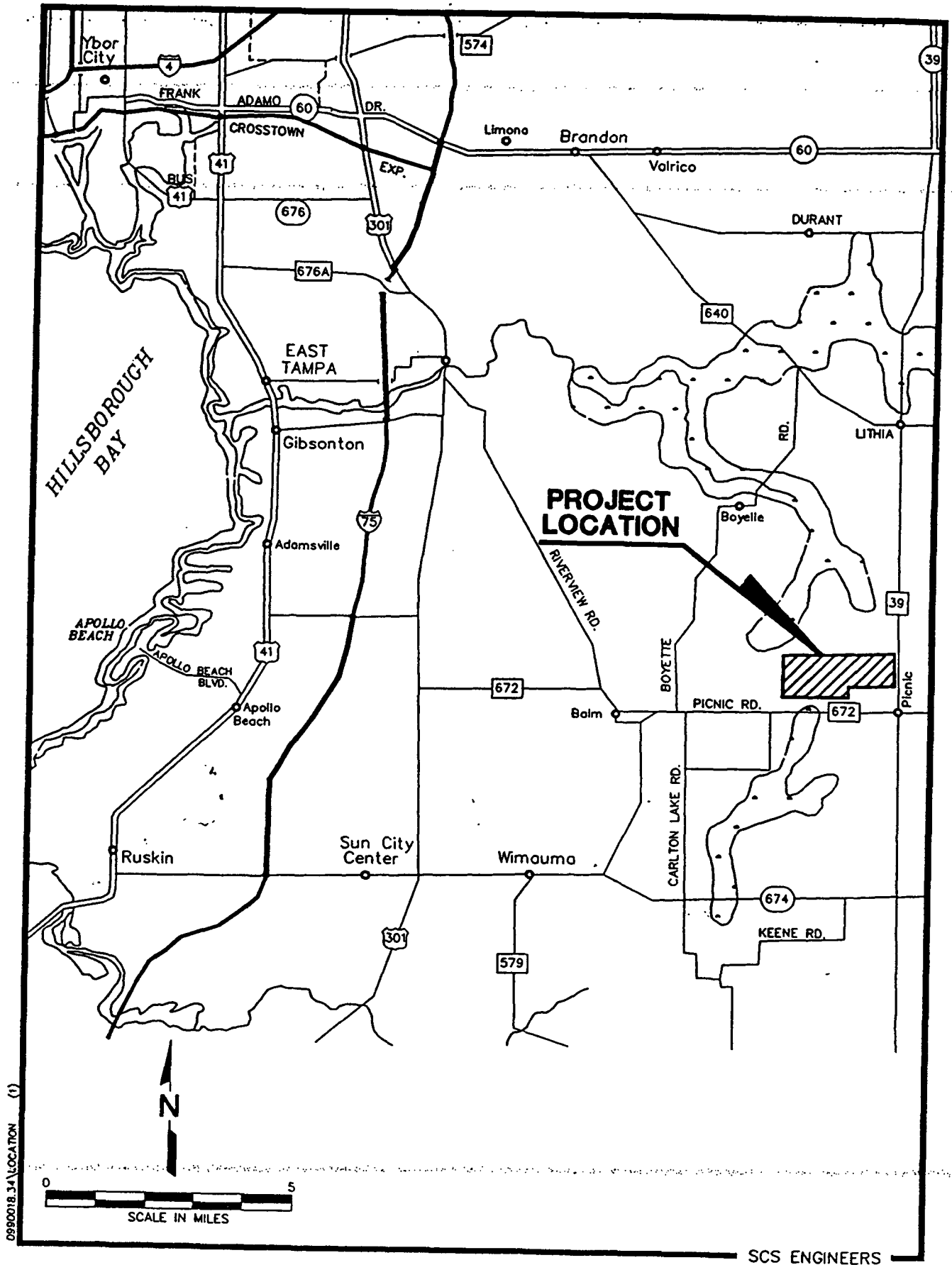
LEGEND

- 118.97 ELEVATIONS MEASURED ON 12/28/93
- (117.30) ELEVATIONS CALCULATED FROM CONSTRUCTION DRAWINGS

NOT TO SCALE

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Figure 1. Existing Temporary Sump in Phase VI.



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Figure 2. Location Map.

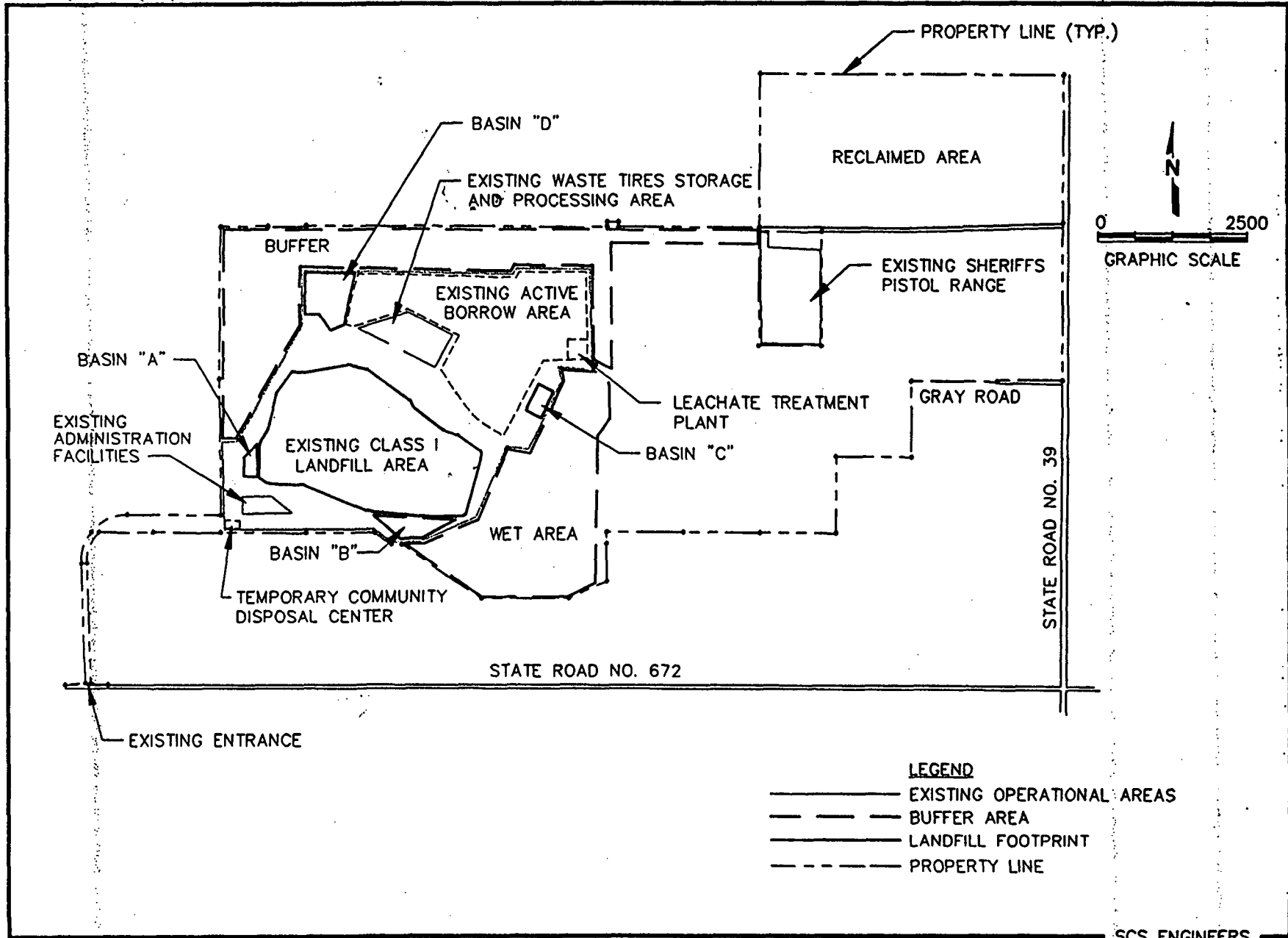
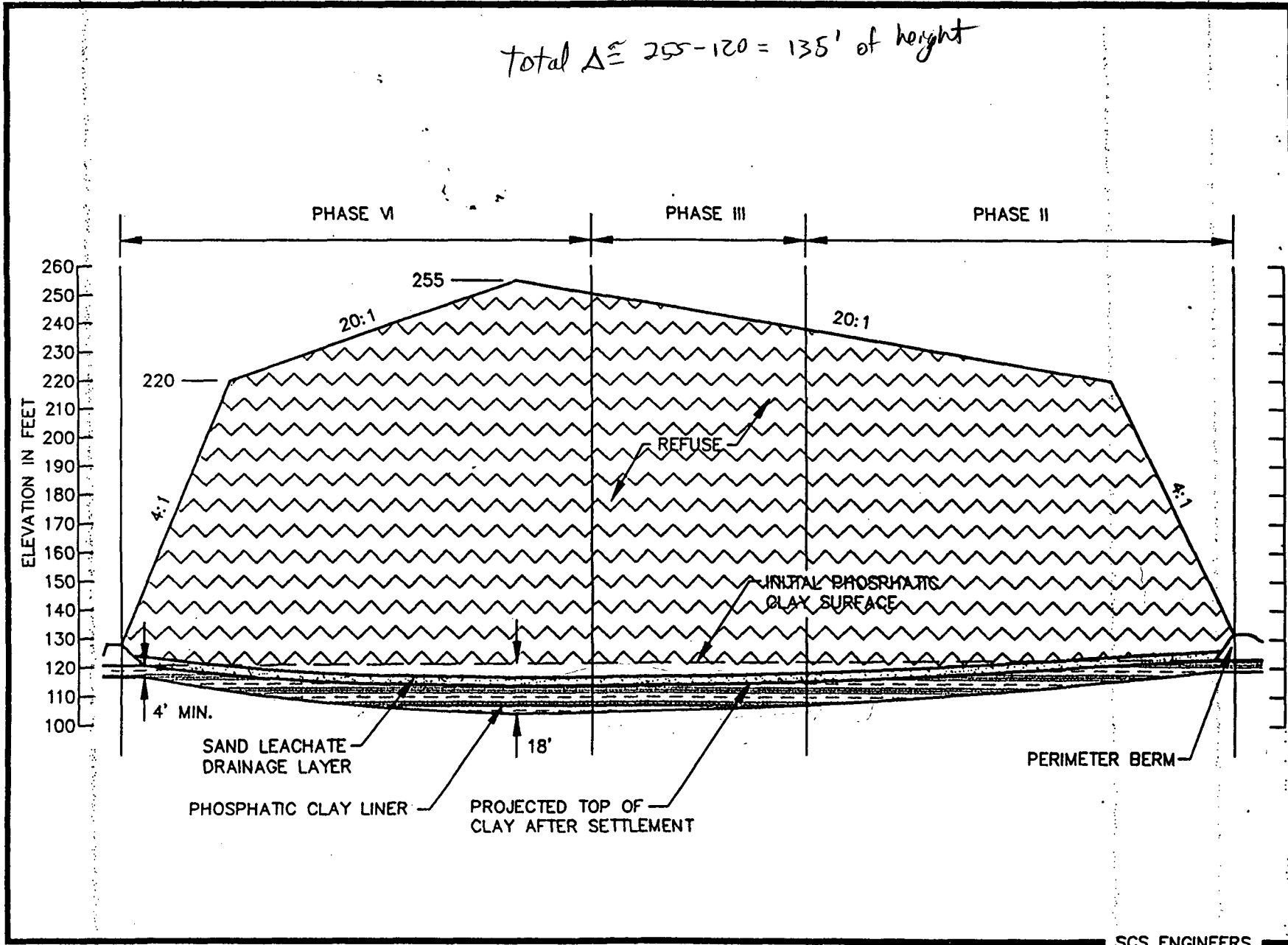


Figure 3. Site Plan.



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Figure 4. Typical Landfill Cross Section.

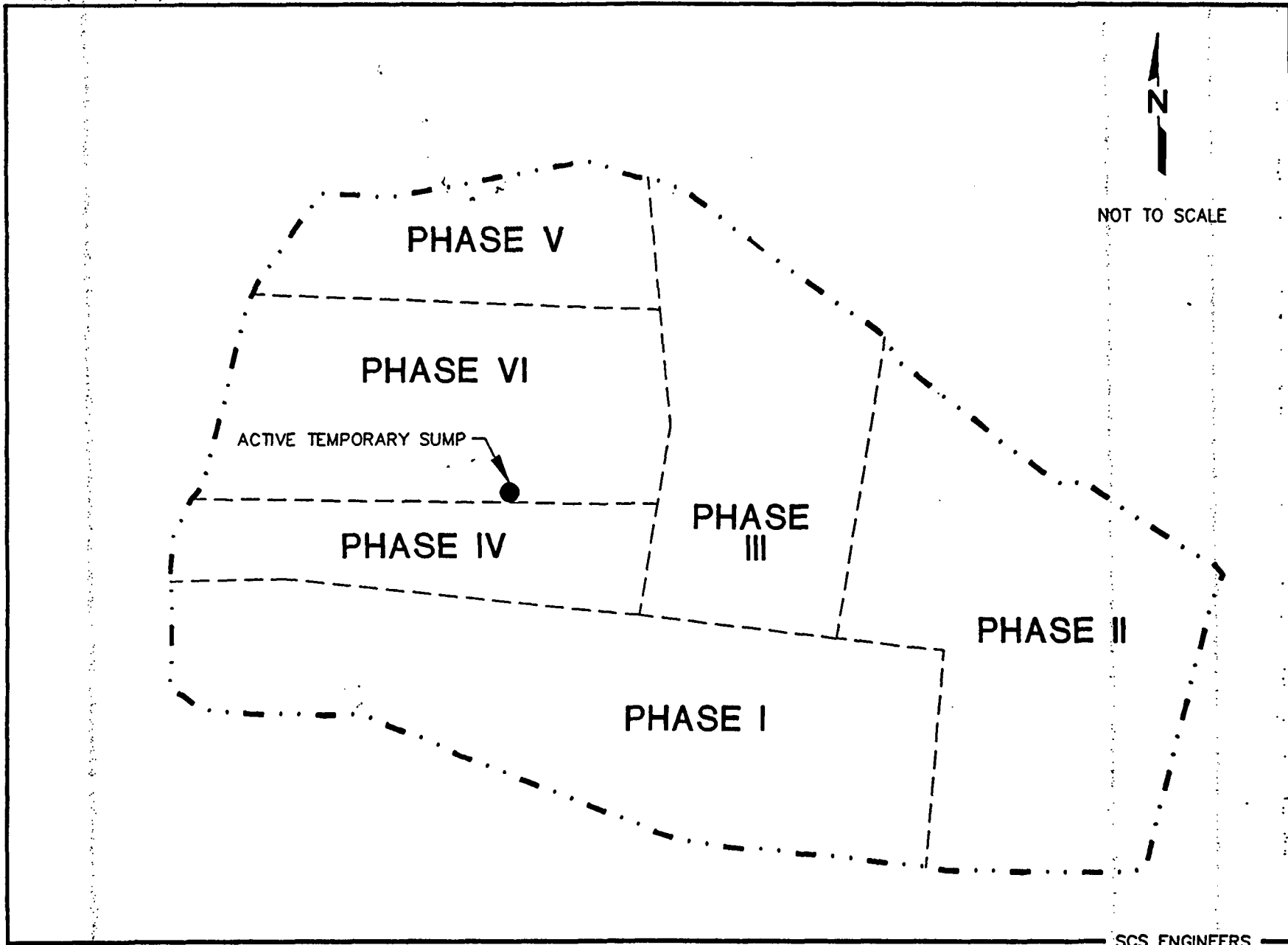


Figure 5. Landfill Phases.

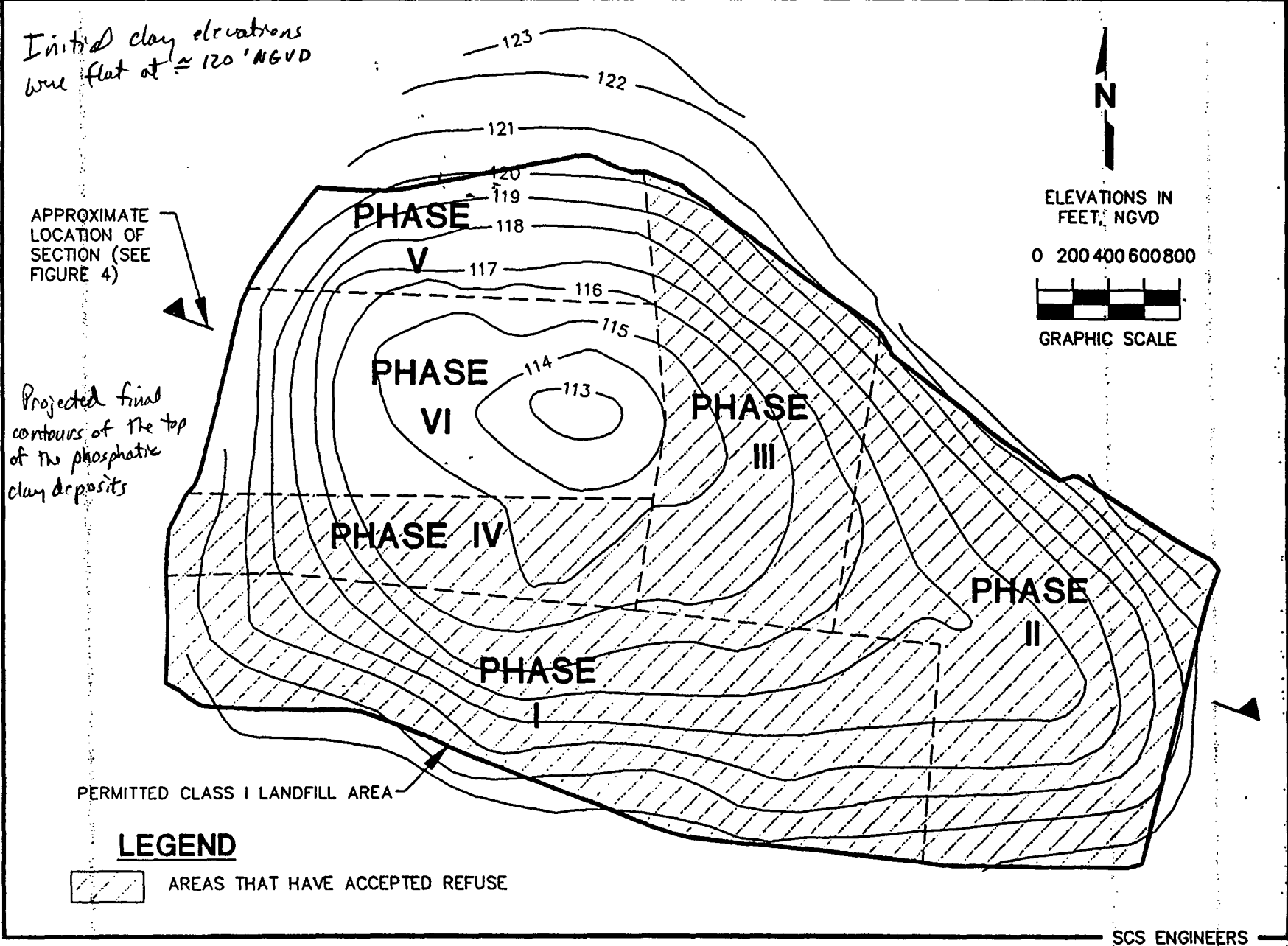
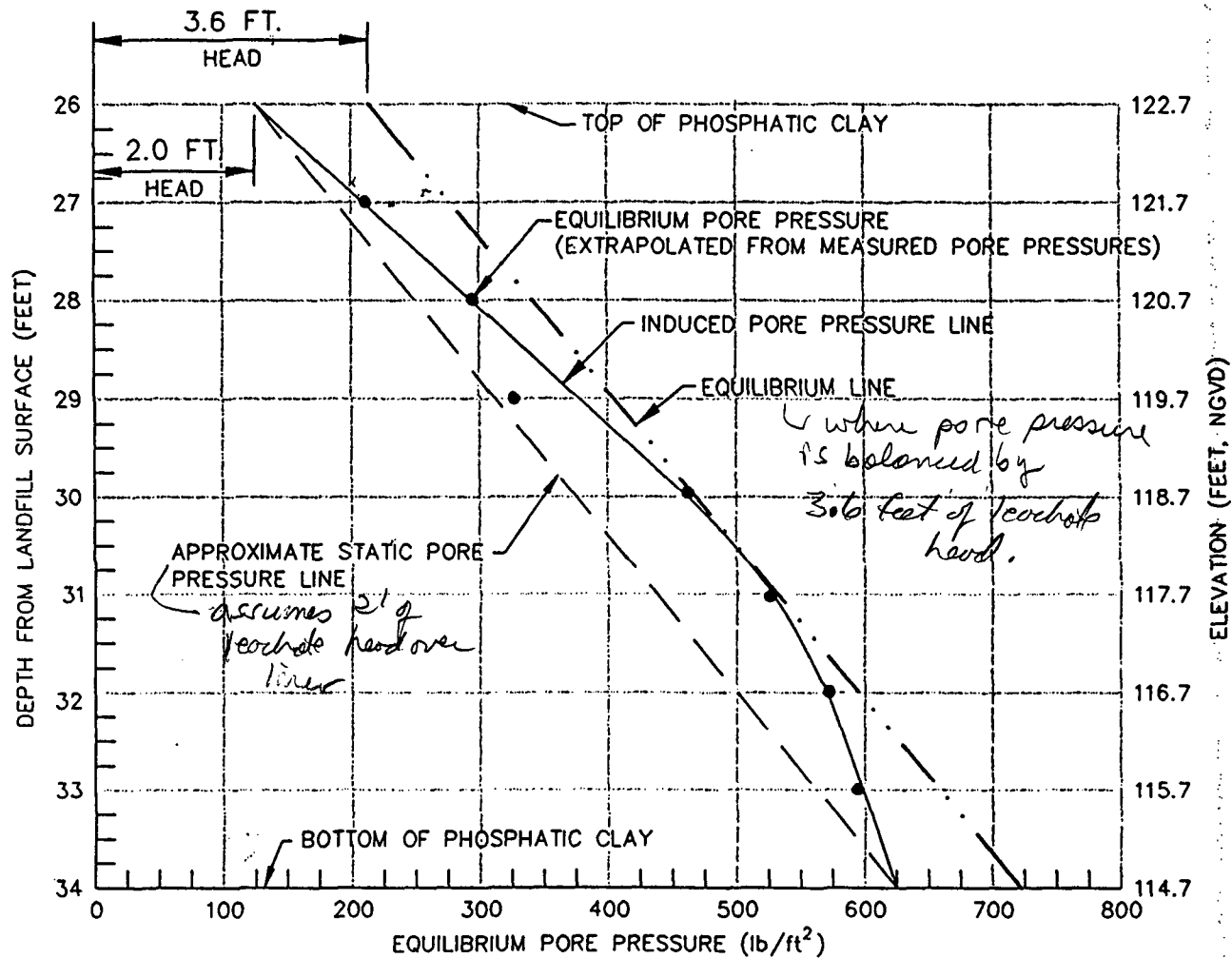


Figure 6. Projected Top of Clay Liner After Settlement.



SOURCE: GEOTECHNICAL INVESTIGATION BY ARDAMAN & ASSOCIATES, INC.
DATED MARCH 7, 1994.

$$\frac{16}{62.4} = \text{ft head}$$

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Figure 7. Pore Pressure Versus Depth Relationship From Piezoprobe Test Results at PP-2.