ATTACHMENT B
PRIMA DESHECHA LANDFILL
WASTE DISCHARGE REQUIREMENTS

STATE OF CALIFORNIA—CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9771 CLAIREMONT MESA BOULEVARD, SUITE B
SAN DIEGO, CA 92124-1331
TELEPHONE: (619) 467-2952
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CERTIFIED - RETURN RECEIPT REQUESTED
P 177 162 642

May 24, 1994

Ms. Suzanne McClanahan
Manager, Environmental Affairs
Integrated Waste Management Department
1200 N. Main Street, Suite 201
Santa Ana, California 92701

Dear Ms. McClanahan:

TENTATIVE ADDENDUM NO. 1 TO ORDER NO. 93-86, **An Addendum Modifying the Effective Date of Compliance with Monitoring and Reporting Program for Order No. 93-86 Waste Discharge Requirements for Municipal Solid Waste Landfills**

Enclosed for your review is a copy of the subject tentative Addendum. Our consulting agencies are presently reviewing the tentative Addendum.

This tentative Addendum and any changes therein will be presented to the Regional Board at its June 9, 1994 meeting. If adopted by the Regional Board, the Addendum would amend the effective date of compliance with the Monitoring and Reporting program contained in Order No. 93-86.

The June 9 meeting is open to public participation and will begin at 9:00 a.m. in the City of Encinitas City Council Chambers, 505 South Vulcan, Encinitas, California. You are welcome to comment on the tentative Addendum at or before the time of the meeting.

If you have any questions or comments concerning this tentative Addendum, please call Mark Alpert at (619)467-2963 no later than June 8, 1994.

Very truly yours,

Mark J. Alpert

MARK J. ALPERT
Senior Engineering Geologist

Enclosure

cc: Liz Haven, Clean Water Programs, State Water Resources Control Board, Sacramento

John Richards, Office of the Chief Counsel, State Water Resources Control Board, Sacramento

TENTATIVE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 1 TO ORDER NO 93-86

AN ADDENDUM MODIFYING THE EFFECTIVE DATE
OF COMPLIANCE WITH MONITORING AND REPORTING PROGRAM
FOR ORDER NO. 93-86
WASTE DISCHARGE REQUIREMENTS FOR MUNICIPAL
SOLID WASTE LANDFILLS

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On August 16, 1993, this Regional Board adopted Order No. 93-86, **Waste Discharge Requirement Amendment for all Municipal Solid Waste Landfills, To Implement State Water Resource Control Board Resolution No. 93-62, Adopted June 17, 1993, As State Policy For Water Quality Control Under Section 13140 of the California Water Code.** The state policy directs each Regional Board to revise waste discharge requirements (WDR) of municipal solid waste (MSW) landfills to comply with federal regulations known as Subtitle D. MSW landfills in the San Diego Region that are subject to Order No. 93-86:

WDR No.	Landfill	Owner/Operator
Order No. 87-53	Anza Sanitary Landfill	Riverside County
Order No. 87-51	Las Pulgas Sanitary Landfill	USMC Camp Pendleton
Order No. 76-40	Little Sycamore Canyon Sanitary Landfill	San Diego County
Order No. 90-09	Otay Annex Sanitary Landfill	San Diego County
Order No. 89-102	Prima Deshecha Canada Sanitary Landfill	Orange County
Res. No. 70-R12	Ramona Sanitary Landfill	San Diego County
Order No. 92-02	San Marcos Sanitary Landfill	San Diego County
Order No. 87-52	San Onofre Sanitary Landfill	USMC Camp Pendleton
Order No. 87-54	West Miramar Solid Waste Disposal Facility	City of San Diego

2. Pursuant to Section 8(a) of Order No. 93-86, **WATER QUALITY PROTECTION STANDARD**, the dischargers are required to implement applicable portions of the water quality monitoring program described in Order 93-86 by **October 9, 1994** for MSW landfills within one mile or less of a drinking water intake, or by **October 9, 1995** for MSW landfills that are more than one mile from the closest drinking water intake.

3. The revised water quality monitoring requirements established in California Code of Regulations Title 23, Division 3,Chapter 15, Article 5, became effective July 1, 1991. Article 5 requires operators of Class III landfills to submit a technical report to the Regional Boards by June 30, 1992. This report must contain proposed changes to the WDR which,when implemented,will bring the landfill into compliance with the new monitoring and reporting requirements of Article 5. The Regional Boards have until July 1, 1994 to revise monitoring reporting programs of landfills subject to these regulations.

4. California Water Code Section 13273 requires operators of solid waste disposal sites to perform a one time water quality assessment test (referred to as SWAT) to determine if hazardous waste is migrating into surface and/or ground water. A ranked list of landfills that must comply with SWAT testing was adopted by the State Water Resource Control Board in 1986 and 1988.

5. Results of SWAT reports generally indicate that measurable concentrations of inorganic and/or organic constituents have been detected in ground water downgradient from the landfills listed in Finding 1a. Therefore, Regional Board staff made a preliminary determination that waste constituents are migrating from these landfills. This determination concluded the dischargers responsibility for SWAT reporting under Water Code Section 13273 (d) and (e). However, to further evaluate the extent and nature of contamination, Regional Board staff determined it necessary to revise water quality monitoring programs to comply with Chapter 15 requirements. The purpose of the monitoring program would be: 1) to verify the results of the SWAT program; 2) improve the detection and evaluation monitoring programs; and, 3) and to initiate corrective action, if necessary.

6. These facilities are existing facilities and as such are exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Code of Regulations, Chapter 3, Article 19, Section 15301.

7. The Regional Board has considered all water resource related environmental factors associated with this discharge.

8. The Regional Board has notified the dischargers and all known interested parties of the intent to revise wasted discharge requirements for these existing discharges.

9. The Regional Board in a public meting heard and considered all comments pertaining to the existing discharges.

IT IS HEREBY ORDERED, That Order No. 93-86 is modified as follows:

1. The dischargers of the MSW landfills specified in Finding 1a, shall implement applicable portions of the water quality monitoring program specified in Section 8(a) of Order No. 93-86 by **October 9, 1994.** Each discharger shall submit a monitoring system report by no later than **August 9, 1994,** that meets the requirements of Section 8(b) and (c) of Order No. 93-86 to the satisfaction of the Regional Board's Executive Officer.

I, Arthur L. Coe, Executive Officer, do hereby certify the forgoing is a full, true, and correct copy of Amendment No. 1 to Order No. 93-86, adopted by the California Regional Water Quality Control Board, San Diego Region, on June 9, 1994

TENTATIVE

ARTHUR L. COE
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9771 CLAIREMONT MESA BOULEVARD, SUITE B
SAN DIEGO, CA 92124-1331
PHONE: (619) 467-2952

September 1, 1993

CERTIFIED - RETURN RECEIPT REQUESTED
P 419 601 719

Mr. Murray L. Cable, Director
Integrated Waste Management Department
County of Orange
1200 N. Main Street, Suite 201
Santa Ana, California 92701-0754

Dear Mr. Cable:

ADOPTION OF ORDER NO. 93-86, "WASTE DISCHARGE REQUIREMENT AMENDMENT FOR ALL MSW LANDFILLS IN THIS REGION, TO IMPLEMENT STATE WATER BOARD RESOLUTION NO. 93-62, ADOPTED JUNE 17, 1993, AS STATE POLICY FOR WATER QUALITY CONTROL UNDER SECTION 13140 OF THE WATER CODE" (PRIMA FACIE)

Enclosed is a copy of the subject Order which which was adopted by this Regional Board on August 16, 1993. This Order amends existing Waste Discharge Requirements for the active landfills by incorporating provisions of 40 CFR Parts 257 & 258 ("Subtitle D"). Compliance with the requirements of this Order will involve considerable effort on your part. Staff of this Regional Board will be making frequent inspections to ensure that compliance is achieved, and will be pleased to work with you and assist you.

Please note that Order No. 93-86 requires that several reports be submitted to this office prior to October 9, 1993. A summary of these reports are included below:

1. <u>100-Year Floodplain report</u>

   This report must provide documentation which indicates whether or not the landfill is located within the 100-year floodplain. If the landfill is located within the 100-year floodplain, then the County will need to provide information which demonstrates that the landfill will not: a) materially restrict the flow of the flood; b) materially reduce the temporary water storage capacity of the floodplain; and c) suffer washout, inundation, or other damage as a result of the flood.

2. <u>Wetlands report</u>

   This report must provide a demonstration of whether the landfill is located on or adjoining wetlands. The report must contain a copy of the material provided for a Section

404 permit and a copy of each Army Corps of Engineers response to the above submittals plus any additional information requested by the Regional Board.

3. Proximity to a drinking water intake report

This report must include a demonstration of whether or not the landfill is located within one mile of a drinking water intake, including any well, spring, or surface water intake used for such purpose. The County should identify all, if any, of the above on a topographic map within a one mile radius outside the 'existing footprint' of each landfill. The information contained in this report will determine the effective date of the detection monitoring program contained in Order No. 93-86.

4. Closure plan

The County has already submitted a preliminary closure and post/closure maintenance plan for the Prima Deshecha Canada Sanitary Landfill. Therefore no additional information is needed at this time for this item.

Please note that the County is required to follow the monitoring and reporting program contained in current Waste Discharge Requirements for Prima Deshecha Canada Sanitary Landfill (Order No. 89-102). The monitoring program contained in Order No. 93-86 does not go into effect until October 9, 1994 or 1995. The effective date of the detection monitoring program contained in Order No. 93-86 is based on the landfill's proximity to a drinking water intake.

In the future, Regional Board staff intends to amend the existing monitoring and reporting program for each active landfill in accordance with Article 5 requirements. This would be accomplished by Executive Officer approval. Please notify Regional Board staff if there are any proposed changes to the Article 5 reports submitted last year.

If you have any questions, please contact Ms. Carol Tamaki at (619) 467-2982.

Very truly yours,

ARTHUR L. COE
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

ORDER NO. 93-86

WASTE DISCHARGE REQUIREMENT AMENDMENT FOR ALL MSW LANDFILLS IN THIS REGION, TO IMPLEMENT STATE WATER BOARD RESOLUTION NO. 93-62, ADOPTED JUNE 17, 1993, AS STATE POLICY FOR WATER QUALITY CONTROL UNDER SECTION 13140 OF THE WATER CODE

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The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. Federal authority - The federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 USC §6901, *et seq.*, "SWDA"), authorizes development of nationwide standards for disposal sites for municipal solid waste (MSW), including criteria for sanitary landfills (SWDA §§1007, 4004, 42 USC §§6907, 6944);
2. Federal MSW regulations - On October 9, 1991, the United States Environmental Protection Agency (USEPA) promulgated regulations that apply, in California, to dischargers who own or operate Class II or Class III landfills at which municipal solid waste is discharged (MSW landfills), regardless of whether or not a permit is issued (Title 40, Code of Federal Regulations [CFR], Parts 257 and 258, "federal MSW regulations"). The majority of the federal MSW regulations become effective on October 9, 1993;
3. States to apply federal MSW regulations - Each state must "...adopt and implement a permit program or other system of prior approval and conditions to assure that each...[MSW landfill]...within such state...will comply with the...[federal MSW landfill regulations]." State regulations promulgated to satisfy this requirement are subject to approval by USEPA. (SWDA §§4003, 4005, 42 USC §§6943, 6945);
4. Approved state's authority - The permitting authority in an "approved state" (e.g., the Regional Board) may approve engineered alternatives to certain prescriptive standards contained in the federal MSW regulations, provided that the alternative meets all applicable conditions and performance standards contained therein (40 CFR §256.21);
5. State Policy For Water Quality Control - On June 17, 1993, the State Water Resources Control Board [State Water Board] adopted Resolution No. 93-62, entitled *Policy for Regulation of Discharges of Municipal Solid Waste*, as State Policy For Water Quality Control (Policy), under Section 13140 *et seq.* of the California Water Code (WC §§13140 *et seq.*). The Policy directs each Regional Board to revise the waste discharge requirements of each MSW landfill in its respective region to comply with the federal MSW regulations;
6. Policy applied through WDRs - All State agencies, including this Regional Board, are required to comply with State Policy For Water Quality Control

regarding any activities that could affect water quality (WC §13146). Regional Boards regulate discharges of waste that could affect the quality of waters of the state, including discharges of waste to land at MSW landfills, through the issuance and revision of waste discharge requirements (WC §13263);

7. Concurrent WDR revision - The Regional Board can amend the waste discharge requirements of a group of similarly situated dischargers through a single board action in cases where the amended requirements properly apply to each of the dischargers whose waste discharge requirements are so amended;

8. Need to document Existing Footprint - The federal MSW regulations apply only to those areas of the MSW landfill that are outside what is herein referred to as landfill's Existing Footprint; therefore, it is to the advantage of both the discharger and the Regional Board to establish convincing documentation of the landfill's Existing Footprint;

9. VOCs - Virtually all MSW landfills produce several volatile organic constituents (VOCs). VOCs exist in detectable concentrations in the gas and leachate produced by the landfill, and are not easily attenuated after being released from such a landfill; therefore, the federal MSW regulations require the use of VOCs as monitoring parameters;

10. Use of non-statistical tests - Statistical data-comparison methods typically used to detect the migration of wastes from a waste management unit cannot be used in cases where the constituent to be monitored has a background concentration which does not exceed the constituent's detection limit in at least ten percent of the background samples. In such cases, an alternative non-statistical testing methodology is necessary which is sensitive, reliable, and not prone to falsely identifying a release;

11. Exemption from CEQA - Adoption of these amendments to the existing waste discharge requirements (WDRs) for the dischargers listed in Section 1 of this Order, is categorically exempt from the provisions of the California Environmental Quality Act (Division 13, commencing with §21000, of the Public Resources Code, "CEQA") because it is an action by a regulatory agency taken for the protection of the environment, within the meaning of Section 15308 of the *Guidelines For Implementation of the California Environmental Quality Act* in Title 14 of the California Code of Regulations.

12. Hearing — The Regional Board has notified the dischargers listed in Section 1 of this Order and interested agencies and persons of its intent to amend, hereby, the WDRs previously adopted for each such discharger, and has provided all notified parties with an opportunity to submit their written views and recommendations.

Therefore be it resolved:

§1. APPLICABILITY.

This order amends the waste discharge requirements of each of the following dischargers. Each discharger shall comply with the provisions of this Order in addition to provisions of existing waste discharge requirements (WDRs) and addenda thereto (if applicable), provided that provisions of this order supersede any conflicting provision in the existing WDRs.

1. Order No. 92-02, Waste Discharge Requirements for County of San Diego, San Marcos Landfill, San Diego County.
2. Order No. 90-09, Waste Discharge Requirements for the County of San Diego, Otay Annex Sanitary Landfill, San Diego County.
3. Order No. 89-102, Waste Discharge Requirements for the County of Orange, Prima Deshecha Canada Sanitary Landfill, Orange County.
4. Order No. 87-54, Waste Discharge Requirements for the City of San Diego, West Miramar Solid Waste Disposal Facility, San Diego County.
5. Order No. 87-53, Waste Discharge Requirements for the Anza Sanitary Landfill, Riverside County.
6. Order No. 87-52, Waste Discharge Requirements for the United States Marine Corps Base, Camp Pendleton, San Onofre Sanitary Landfill, San Diego County.
7. Order No. 87-51, Waste Discharge Requirements for the United States Marine Corps Base, Camp Pendleton, Las Pulgas Sanitary Landfill, San Diego County.
8. Order No. 76-40, Waste Discharge Requirements for the County of San Diego, Little Sycamore Canyon Sanitary Landfill, San Diego County.

9. Resolution No. 70-R12, A Resolution Prescribing Requirements Regulating the Discharge of Wastes Into Ramona Sanitary Landfill Operated by the County of San Diego.

§2. DEFINITIONS.

The following terms of art apply to this Order.

- "Affected Persons" means all individuals who either own or occupy land outside the boundaries of the parcel upon which the landfill is located that has been or may be affected by the release of leachate or waste constituents (in gas or liquid phase) from an MSW landfill.
- "Background Monitoring Point" means a device (e.g., well) or location (e.g., a specific point along a lakeshore), upgradient or sidegradient from the landfill and assigned by this Order, where water quality samples are taken that are not affected by any release from the landfill and that are used as a basis of comparison against samples taken from downgradient Monitoring Points.
- "Composite liner" means a liner that consists of two or more components, which include a Synthetic Liner in direct and uniform contact with an underlying layer of prepared, low-permeability soil such that the net permeability of the resulting combination is significantly less than would be expected by reference to the permeability of the individual components layers.
- "Constituents of Concern (COC)" are those constituents which are likely to be in the waste in the MSW landfill or which are likely to be derived from waste constituents in the event of a release. The Constituents of Concern for each MSW landfill under §1 of this Order are those listed in the Monitoring and Reporting Program for that MSW landfill, pursuant to §10(a) of this Order.
- "Existing Footprint" means the portion of land covered by waste discharged to an MSW landfill unit as of midnight on the day before the Federal Deadline. The term includes the area under the active face of the landfill as well as all portions of the landfill unit containing waste that is obscured from view by daily, intermediate, or permanent cover. The term includes only areas covered with waste that is discharged in a manner that is consistent either with past operating practices or with modifications thereof

that ensure good management of the waste. The term has the same meaning as the area enclosed by the "waste boundaries of an existing MSWLF unit", as used in the definition of the federal term of art "lateral expansion" in 40 CFR §258.2.

- "Federal Deadline" means the date listed in 40 CFR §258(j)—currently October 9, 1993—when the majority of the provisions in the federal MSW regulations become effective.
- "Federal MSW regulations" means the regulations promulgated by the United States Environmental Protection Agency on October 9, 1991 (Title 40, Code of Federal Regulations [CFR], Parts 257 and 258).
- "Matrix effect" means any change in the method detection limit or practical quantitation limit for a given analyte as a result of the presence of other constituents–either of natural origin or introduced by man as a result of a release or spill–that are present in the sample of water or soil-pore gas being analyzed.
- "Method detection limit (MDL)" means the lowest concentration associated with a 99% reliability of a "non-zero" analytical result. The MDL shall reflect the detection capabilities of the specific analytical procedure and equipment used by the laboratory. MDLs reported by the laboratory shall not simply be restated from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived MDLs are expected to be not greater than published USEPA MDLs. If a lab suspects that, due to matrix or other effects, the detection limit for a particular analytical run differs significantly from the laboratory-derived MDL, the results should be flagged accordingly, along with an estimate of the detection limit achieved.
- "Monitoring Parameters" means the short list of constituents and parameters used for the majority of monitoring activity at a given MSW landfill. The Monitoring Parameters for each MSW landfill are listed in §9 of this Order. Monitoring for the short list of Monitoring Parameters constitutes "indirect monitoring", in that the results are used to indicate indirectly the success or failure of adequate containment for the longer list of Constituents of Concern.
- "Monitoring Point" means a device (e.g., well) or location (e.g., a specific point along a lakeshore), downgradient from the landfill and that is assigned in this Order, at which samples are collected for the purpose of detecting a

release by comparison with samples collected at Background Monitoring Points.

- "MSW" means municipal solid waste.
- "MSW landfill" - for the purpose of this Order, means a Class II or Class III landfill in this region that accepts, or has accepted, municipal solid wastes, and that is subject to regulation under either or both Chapter 15 and the federal MSW regulations.
- "Practical quantitation limit (PQL)" means the lowest constituent concentration at which a numerical concentration can be assigned with a 99% certainty that its value is within ±10% of the constituent's actual concentration in the sample. The PQL shall reflect the quantitation capabilities of the specific analytical procedure and equipment used by the laboratory. PQLs reported by the laboratory shall not simply be restated from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived PQLs are expected to be not greater than published USEPA PQLs. If the lab suspects that, due to matrix or other effects, the quantitation limit for a particular analytical run differs significantly from the laboratory-derived PQL, the results should be flagged accordingly, along with an estimate of the quantitation limit achieved.
- "Reporting Period" means the duration separating the submittal of a given type of monitoring report from the time the next iteration of that report is scheduled for submittal. Unless otherwise stated, the due date for any given report shall be 30 days after the end of its Reporting Period.
- "Sample size":

  (a) For Monitoring Points, means the number of data points -obtained from a given Monitoring Point during a given Reporting Period - used for carrying out the statistical or non-statistical analysis of a given analyte during a given Reporting Period; or

  (b) For Background Monitoring Points, means the number of new and existing data points - collected under §§2550.7(e)(11 and 12) from all applicable Background Monitoring Points in a given monitored medium–used to collectively represent the background concentration and variability of a given analyte in carrying out statistical or non-statistical analysis of that analyte during a given Reporting Period.

- "Synthetic Liner" means a layer of flexible, man-made material that is installed in accordance with the standard of the industry over an area of land prior to the discharge of waste.
- "VOCs" - see "volatile organic constituents (VOCs)"
- "VOC_{water}" means the composite monitoring parameter encompassing all VOCs that are detectable in less than ten percent of applicable background samples from a monitored water-bearing medium (e.g., the unsaturated zone, the uppermost aquifer, a zone of perched ground water, or a surface water body). This parameter is analyzed via the non-statistical analytical method described elsewhere in this Order to identify a release to waters of the state of VOCs whose presence in background water is detected too infrequently to allow statistical analysis.
- "Volatile organic constituents (VOCs)" means the suite of organic constituents having a high vapor pressure. The term includes at least the 47 organic constituents listed in Appendix I to 40 CFR Part 258.

§3. 100-YEAR FLOODPLAIN.

The discharger owning or operating an MSW landfill that will receive waste on or after the Federal Deadline, and that is located within the floodplain of a 100-year return interval storm shall comply with 40 CFR §§258.11 and 258.16 by doing either of the following:

(a) Report (Floodplain) - The discharger shall submit a report to the Regional Board by the Federal Deadline, that meets the requirements of 40 CFR §258.11 by demonstrating, to the satisfaction of the Regional Board's Executive Officer, that during the flood from a 100-year return interval storm the landfill:

(1) Flow restriction — Will not materially restrict the flow of the flood;

(2) Temporary storage capacity — Will not materially reduce the temporary water storage capacity of the floodplain; and

(3) Physical damage—Will not suffer washout, inundation, or other damage as a result of the flood; or

(b) Closure absent compliance - In case the requirements of §(a) of this section are not met to the satisfaction of the Regional Board, the discharger

shall close the landfill in accordance with 40 CFR §§258.16 and 258.60, and with Article 8 of Chapter 15.

§4. DOCUMENTING THE LANDFILL's EXISTING FOOTPRINT.

The discharger owning or operating an MSW landfill that will receive waste on or after the Federal Deadline, shall document the Existing Footprint of the waste using photographs and a topographic map, and shall submit a copy of such documentation in the form of a report to the Regional Board, which shall be submitted prior to, or as part of, the first scheduled monitoring report following the Federal Deadline.

§5. MSW LANDFILLS ON OR ADJOINING WETLANDS.

Discharge of municipal solid waste to a wetland—as that term is defined in 40 CFR §232.2(r)—or to any portion thereof is prohibited, unless the Regional Board finds that the discharger has successfully completed all demonstrations required for such discharge under 40 CFR §258.12(a). Such determination shall be based upon a report containing (a) a copy of the material considered by the U.S. Army Corps of Engineers (Army Corps) in granting a Section 404 Permit for such discharge, (b) a copy of each Army Corps response to those submittals, and (c) any additional materials requested by the Regional Board.

§6. LIQUIDS ACCEPTANCE.

As of the Federal Deadline, the discharge of leachate or landfill gas condensate to an MSW landfill is prohibited, unless:

(a) The landfill gas condensate or leachate is being returned to the landfill that produced it; and

(b) The portion of the landfill to which these materials are discharged is equipped with a containment system meeting the requirements of §7(a)(1 or 3) and (b) of this Order.

§7. CONTAINMENT SYSTEMS INSTALLED BEYOND THE EXISTING FOOTPRINT.

Discharge prohibition — As of the Federal Deadline, discharges of municipal solid waste to either an MSW landfill that has not received waste as of that date or to any area beyond the Existing Footprint of an MSW landfill unit are prohibited unless such discharge is to an area equipped with a containment system which is constructed in accordance with the standard of the industry and which meets the following additional requirements for both liners and leachate collection systems.

(a) Standards for liners.

(1) Post-Federal Deadline construction - Except as provided in either §7(a)(3) [for steep sideslopes] or §7(a)(2) [for new discharges to pre-existing liners], after the Federal Deadline, all containment systems shall include a composite liner that consists of an upper synthetic flexible membrane component (Synthetic Liner) and a lower component of soil, and that the Regional Board Executive Officer agrees meets the following requirements. The composite liner either:

(A) Prescriptive Design:

1. Upper component - Has a Synthetic Liner at least 40-mils thick (or at least 60-mils thick if of high density polyethylene) that is installed in direct and uniform contact with the underlying compacted soil component described in §7(a)(1)(A)2.; and

2. Lower component— Has a layer of compacted soil that is at least two feet thick and that has an hydraulic conductivity of no more than 1×10^{-7} cm/sec (0.1 feet/year); or

(B) Alternative design—Satisfies the performance criteria contained in 40 CFR §§258.40(a)(1) and (c), and satisfies the criteria for an engineered alternative to the above Prescriptive Design [as provided by 23 CCR §2510(b)], where the performance of the alternative composite liner's components, in combination, equal or exceed the waste containment capability of the Prescriptive Design;

(2) New discharges to liners constructed prior to the Federal Deadline - Except as provided in §7(a)(3) [for steep sideslopes], containment

systems that will begin to accept municipal solid waste after the Federal Deadline, but which have been constructed prior to the Federal deadline, are not required to meet the provisions of §7(a)(1) if the containment system includes a composite liner meets the following requirements to the satisfaction of the Regional Board Executive Officer. The liner must:

(A) Prescriptive Design — Feature as its uppermost component a Synthetic Liner at least 40-mils thick (or at least 60-mils if high density polyethylene) that is installed in direct and uniform contact with the underlying materia: and

(B) Performance — Meet the performance criteria contained in 40 CFR §§258.40(a)(1) and (c);

(3) Steep Sideslopes — Containment systems installed in those portions of an MSW landfill where an engineering analysis shows, to the satisfaction of the Regional Board Executive Officer, that sideslopes are too steep to permit construction of a stable composite liner that meets the prescriptive standards contained in §§7(a)(1 or 2) shall include an alternative liner that, to the satisfaction of the Regional Board Executive Officer, both meets the performance criteria contained in 40 CFR §§258.40(a)(1) and (c) and either:

(A) Composite liner - Is a composite liner and includes as its uppermost component a Synthetic Liner at least 40-mils thick (or at least 60-mils if high density polyethylene) that is installed in direct and uniform contact with the underlying materials; or

(B) Noncomposite liner - Is not a composite liner, but includes a Synthetic Liner at least 60-mils thick (or at least 80-mils if of high density polyethylene) that is installed in direct and uniform contact with the underlying materials.

(b) Standards for leachate collection - All liner systems shall include a leachate collection and removal system which, to the satisfaction of the Regional Board Executive Officer, conveys to a sump [or other appropriate collection area lined in accordance with §7(a)] all leachate reaching the liner, and which does not rely upon unlined or clay-lined areas for such conveyance.

§8. WATER QUALITY PROTECTION STANDARD.

(a) Monitoring program's beginning date — Unless the discharger proposes, and the Regional Board approves, an alternative water quality protection standard that meets the requirements of both 23 CCR §2550.2 and 40 CFR §§258.50 *et seq.*, the discharger shall monitor compliance with this Order using a water quality protection standard that is created in accordance with §§(b) and (c) of this section. The discharger shall implement the requirements of this section, as follows:

(1) Determination submittal — Dischargers listed in Section 1 of this Order have until October 9, 1993, to submit a report that demonstrates, to the satisfaction of the Regional Board Executive Officer, that their respective MSW landfill is not located within one mile of a drinking water intake, including any well, spring, or surface water intake used for such purpose;

(2) One mile or less — Unless the Regional Board finds that a landfill is not within one mile of a drinking water intake, the discharger shall submit a monitoring system report by no later than August 9, 1994, that meets the requirements of §§(b) and (c) of this section to the satisfaction of the Regional Board's Executive Officer, and shall implement applicable portions of the water quality monitoring program described in this Order by October 9, 1994;

(3) More than one mile — For any MSW landfill that the Regional Board finds is more than one mile from the closest drinking water intake, the discharger shall submit a monitoring system report by no later than August 9, 1995, that meets the requirements of §§(b) and (c) of this section to the satisfaction of the Regional Board's Executive Officer, and shall implement applicable portions of the water quality monitoring program described in this Order by October 9, 1995.

(b) Concentration Limits - The Concentration Limit for each Constituent of Concern shall be as determined under §12 of this Order.

(c) Report required (monitoring system) - The report required under §§(a)(2 or 3) of this section shall:

(1) Identification of ground water bodies — Identify all distinct bodies of ground water that could be affected in the event of a release from the landfill. This list shall include at least the uppermost aquifer underlying the landfill and any permanent or ephemeral zones of perched water underlying the landfill;

(2) Monitoring system performance - Demonstrate that the landfill's existing and proposed monitoring systems satisfy the following requirements:

(A) Ground water monitoring system(s) - The ground water monitoring system for each distinct ground water body identified above must meet the requirements of 40 CFR §§258.51(a,c, and d) and 23 CCR §2550.7(b); and

(B) Monitoring systems for other media - Only for dischargers whose waste discharge requirements, as of the effective date of this Order, have not been revised to incorporate the July 1, 1991, revisions to Article 5 of Chapter 15:

1. Surface water monitoring system(s) - An MSW landfill in close proximity to any affectable surface water body must meet the requirements of 23 CCR §2550.7(c); and

2. Unsaturated zone monitoring system(s) - An MSW landfill overlying an unsaturated zone that can be monitored feasibly must meet the requirements of 23 CCR §2550.7(d);

(3) Monitoring Points and Background Monitoring Points - Include a map showing the Monitoring Points and Background Monitoring Points validated under §(c)(2) of this section and showing the Point of Compliance under 23 CCR §2550.5 (i.e., the downgradient boundary of the unit, with respect to the flow direction of ground water in the uppermost aquifer);

(4) Compliance Period - Estimate the Compliance Period under 23 CCR §2550.6; and

(5) Constituents of Concern - Include a list of all Constituents of Concern under §§10 or 11 of this Order.

§9. MONITORING PARAMETERS.

Beginning on the date established under §8(a) of this Order (on October 9 of either 1994 or 1995), the discharger shall analyze water samples from each water-bearing medium separately for the following Monitoring Parameters— unless the Regional Board approves alternative Monitoring Parameters that meet the requirements of both 23 CCR §§2550.0 *et seq.* and 40 CFR §§258.54—and shall test the resulting data using either the statistical and non-statistical methods listed in §13(f) of this Order or alternative methods the Regional Board finds meets the requirements of 23 CCR §§2550.7(e)(6-10) and 40 CFR §258.53:

(a) Monitoring Parameters that use statistical methods:

(1) Metals surrogates under 40 CFR §258.54(a)(2) — pH, total dissolved solids (TDS), Chloride, Sulfate, and Nitrate Nitrogen;

(2) Each VOC in background—Each VOC that exceeds its respective MDL in at least ten percent of the samples taken from the Background Monitoring Points for a monitored water-bearing medium (i.e., surface water body, aquifer, perched zone, or soil-pore liquid) during a given Reporting Period; and

(b) Monitoring Parameter that uses non-statistical method - The composite monitoring parameter "VOC_{water}".

§10. CONSTITUENTS OF CONCERN (COCs) FOR LANDFILLS LACKING A FUNCTIONING LCRS.

As of the date established under §8(a) of this Order (on October 9 of either 1994 or 1995), for any MSW landfill that does *not* have both a liner and a leachate collection and removal system (LCRS) that produces leachate:

(a) Known constituents plus Appendix II - The "COC list" (list of Constituents of Concern required under 23 CCR §2550.3) is hereby revised to include all constituents listed in the waste discharge requirements as of the effective date of this Order, in addition to all constituents listed in Appendix II to 40 CFR Part 258 (Appendix II constituent). The discharger shall monitor all COCs every five years, pursuant to §13(b)(3) of this Order; and

(b) Background sampling for new constituents - For each Appendix II constituent that is newly added to the MSW landfill's COC list, the discharger shall establish a reference background value by analyzing at least one sample each quarter from each Background Monitoring Point for a period of at least one year, beginning with the date of this Order. Once this reference set of background data is collected, the discharger shall include it as a separate, identified item in the next monitoring report submittal.

§11. CONSTITUENTS OF CONCERN (COCs) FOR LANDFILLS HAVING A FUNCTIONING LCRS.

Beginning on the date established under §8(a) of this Order (on October 9 of either 1994 or 1995), for any MSW landfill equipped both with a liner and with a leachate collection and removal system (LCRS) that produces leachate, the discharger shall develop and maintain the Constituent of Concern (under 23 CCR §2550.3, "COC list") as follows.

(a) Building and augmenting the COC list - The Constituents of Concern list includes:

(1) Known constituents - All waste constituents listed in the waste discharge requirements as of the effective date of this Order; and

(2) Onging leachate analysis program - Each constituent listed in Appendix II to 40 CFR Part 258 (Appendix II constituent) that is not already a COC for the landfill, and that both:

(A) October leachate sample and report - Is detected in a sample of the landfill's leachate which the discharger shall collect during October of each year.

The discharger shall report to the Regional Board by no later than January 31 of a given year the analytical results of the leachate sample taken the previous October, including an identification of all detected Appendix II constituents that are not on the landfill's Constituent of Concern list (non-COCs); and

(B) April retest of leachate and report - Is also detected in a retest leachate sample collected the following April.

The discharger need take and analyze this retest sample only in cases where the annual leachate sample, taken the previous October under §(a)(2)(A) of this section, identifies non-COCs. The retest sample shall be analyzed only for the non-COCs detected in the October sample. During any year in which an April leachate retest is carried out, the discharger shall submit a report to the Regional Board, by no later than August 1 of that year, identifying all constituents which must be added to the landfill's COC list as a result of having been detected in both the (previous calendar year's) October sample and in the April retest sample;

(b) Background sampling for new constituents [23 CCR §2550.7(e)(6)] - For each Appendix II constituent that is newly added to the MSW landfill's COC list [pursuant to §(a)(2)(B) of this section], the discharger shall establish a reference background value in each monitored medium by analyzing at least one sample each quarter from each Background Monitoring Point for a period of at least one year following the date the constituent is submitted to the Regional Board as a new COC. Once this reference set of background data is collected, the discharger shall include it as a separate, identified item in the next monitoring report submittal.

§12. CONCENTRATION LIMITS.

As of the date established under §8(a) of this Order (on October 9 of either 1994 or 1995), the concentration limit for any given Constituent of Concern or Monitoring Parameter in a given monitored medium (e.g., the uppermost aquifer) at an MSW landfill shall be as follows, and shall be used as the basis of comparison with data from the Monitoring Points in that monitored medium:

(a) Background per revised Article 5 — The background value established in the WDRs by the Regional Board for that constituent and medium, pursuant to 23 CCR §§2550.4 and 2550.7(e)(6,7,10, and 11);

(b) Concurrent background — The constituent's background value, established anew during each Reporting Period using only data from all samples collected during that Reporting Period from the Background Monitoring Points for that monitored medium. Either:

(1) The mean (or median, as appropriate) and standard deviation (or other measure of central tendency, as appropriate) of the constituent's background data; or

(2) The constituent's MDL, in cases where less than 10% of the background samples exceed the constituent's MDL; or

(c) CLGB option for corrective action—A concentration limit greater than background, as approved by the Regional Board for use during-or-after corrective action [see 23 CCR §§2550.4(c-i)].

§13. DETECTION MONITORING PROGRAM (DMP) UNDER REVISED ARTICLE 5.

The following detection monitoring program begins to apply to each MSW landfill listed in §1 of this Order on the date established under §8(a) of this Order (on October 9 of either 1994 or 1995), unless and until the Regional Board revises the waste discharge requirements for the landfill to include an alternative detection monitoring program that complies both with the federal MSW regulations and with the most recent revisions to Article 5 of Chapter 15.

(a) SAMPLING AND ANALYTICAL METHODS - Sample collection, storage, and analysis shall be performed according to the most recent version of Standard USEPA Methods (USEPA publication "SW-846"), and in accordance with an approved sampling and analysis plan. Water and waste analysis shall be performed by a laboratory approved for these analyses by the State of California. Specific methods of analysis must be identified. If methods other than USEPA-approved methods or Standard USEPA Methods are used, the exact methodology must be submitted for review and must be approved by the Regional Board Executive Officer prior to use. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements. In addition, the discharger is responsible for seeing that the laboratory analysis of all samples from Monitoring Points and Background Monitoring Points meets the following restrictions:

(1) Method selection - The methods of analysis and the detection limits used shall be appropriate for the expected concentrations. For detection monitoring of any constituent or parameter that is found in concentrations which produce more than 90% non-numerical determinations (i.e., "trace" or "ND") in data from Background Monitoring Points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any Matrix Effects involved;

(2) "Trace" results - Analytical results falling between the MDL and the practical quantitation limit (PQL) shall be reported as "trace", and shall be accompanied both by the (nominal or estimated) MDL and PQL values for that analytical run;

(3) Nominal MDL and PQL - MDLs and PQLs shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These nominal MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from USEPA analytical method manuals. If the lab suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived nominal MDL/PQL values, the results shall be flagged accordingly, along with an estimate of the detection limit and quantitation limit actually achieved;

(4) QA/QC data - All QA/QC data shall be reported, along with the sample results to which it applies, including the method, equipment, and analytical detection limits, the recovery rates, an explanation for any recovery rate that is less than 80%, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recovery. In cases where contaminants are detected in QA/QC samples (i.e., field, trip, or lab blanks), the accompanying sample results shall be appropriately flagged;

(5) Common laboratory contaminants - Upon receiving written approval from the Executive Officer, an alternative statistical or non-statistical

procedure can be used for determining the significance of analytical results for a constituent that is a common laboratory contaminant (e.g., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate) during any given Reporting Period in which QA/QC samples show evidence of laboratory contamination for that constituent. Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Regional Board staff;

(6) Unknowns - Unknown chromatographic peaks shall be reported, along with an estimate of the concentration of the unknown analyte. When unknown peaks are encountered, second column or second method confirmation procedures shall be performed to attempt to identify and more accurately quantify the unknown analyte; and

(7) MDL and PQL - The MDL and PQL shall be determined in accordance with the definitions of those terms in Article 2 of this Order.

(b) REQUIRED MONITORING REPORTS.

(1) Detection monitoring report twice-annually - For each monitored medium, all Monitoring Points assigned to detection monitoring [under §8(c)(2) of this Order], and all Background Monitoring Points shall be monitored once each Winter/Spring and Summer/Fall (Winter/Spring and Summer/Fall Reporting Periods end on March 31 and September 30, respectively) for the Monitoring Parameters listed in §9 of this Order. Monitoring for Monitoring Parameters shall be carried out in accordance with §§(d)(2) and (f) of this section, and the report shall meet the requirements of §(b)(4) of this section.

(2) Annual summary report - The discharger shall submit an annual report to the Regional Board covering the previous monitoring year. The Reporting Period ends March 31. This report may be combined with the Winter/Spring detection monitoring report under §(b)(1) of this section, and shall meet the requirements of §(b)(4) of this section in addition to the following:

(A) Graphical Presentation of Analytical Data [under 23 CCR §2550.7(e)(14)] - For each Monitoring Point and Background Monitoring Point, submit in graphical format the laboratory analytical data for all samples taken within at least the

previous five calendar years. Each such graph shall plot the concentration of one or more constituents over time for a given Monitoring Point or Background Monitoring Point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot downgradient data. On the basis of any aberrations noted in the plotted data, the Executive Officer may direct the discharger to carry out a preliminary investigation [23 CCR §2510(d)(2)], the results of which will determine whether or not a release is indicated;

(B) Table and diskette(s) - All monitoring analytical data obtained during the previous two six-month (Monitoring Parameter) Reporting Periods, presented in tabular form as well as on diskettes (either in MS-DOS/ASCII format or in another file format acceptable to the Regional Board Executive Officer). Data sets too large to fit on a single diskette may be submitted on disk in a commonly available compressed format (e.g., PK-ZIP or NORTON BACKUP) acceptable to the Regional Board Executive Officer. The Regional Board regards the submittal of data in hard copy and on diskette as "...the form necessary for..." statistical analysis [23 CCR §2550.8(h)], in that this facilitates periodic review by the Regional Board's statistical consultant;

(C) Compliance record discussion - A comprehensive discussion of the compliance record, and of any corrective actions taken or planned which may be needed to bring the discharger into full compliance with the landfill's waste discharge requirements;

(D) Waste allocation map - A map showing the area, if any, in which filling has been completed during the previous calendar year;

(E) Summary of changes - A written summary of monitoring results and monitoring system(s), indicating any changes made or observed since the previous annual report; and

(F) Leachate control - For units having leachate monitoring/control facilities, an evaluation of their effectiveness, pursuant to 23 CCR §§2543(b,c, & d).

(3) COC Report at least every five years - In the absence of release being indicated [i.e., under §§(b)(2)(A), (c)(3), (c)(6)(C), or (f)(3) of this section], the discharger shall monitor all constituents of concern (COCs) and submit a report (COC Report) as follows:

(A) Reporting Period for COCs - The discharger shall sample all Monitoring Points and Background Monitoring Points for each monitored medium for all COCs every fifth year, beginning with the Spring of 1996 (first Reporting Period ends March 31, 1996), with subsequent COC monitoring efforts being carried out every fifth year thereafter alternately in the Fall (Reporting Period ends September 30) and Spring (Reporting Period ends March 31). The COC Report may be combined with any Monitoring Parameter Report [under §(b)(1) of this section] or Annual Summary Report [under §(b)(2) of this section] having a Reporting Period that ends at the same time. The COC Report shall meet the requirements of §(b)(4) of this section;

(B) Monitoring Parameters not repeated — The discharger shall monitor for all Constituents of Concern in accordance with §§(d)(2) and (f) of this section, provided that such monitoring need only encompass those Constituents of Concern that do not also serve as Monitoring Parameters.

(4) Minimum monitoring report contents - All reports shall be submitted no later than one month following the end of their respective Reporting Period. The reports shall be comprised of at least the following, in addition to the specific contents listed for each respective report type under §§(b)(1,2, or 3) of this section:

(A) Transmittal letter - A letter summarizing the essential points in the report. This letter shall include a discussion of any requirement violations found since the last such report was submitted, and shall describe actions taken or planned for correcting those violations. If the discharger has previously

submitted a detailed time schedule for correcting said requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the transmittal letter. Each monitoring report and the transmittal letter shall be signed by a principal executive officer at the level of vice president or above, or by his/her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The transmittal letter shall contain a statement by this official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct;

(B) Compliance evaluation summary - For Detection Monitoring and COC Reports only, a compliance evaluation summary containing at least:

1. Flow rate/direction - For each monitored ground water body, a description and graphical presentation (e.g., arrow on a map) of the velocity and direction of ground water flow under/around the Unit, based upon water level elevations taken during the collection of the water quality data submitted in the report;
2. Well information - For each monitoring well addressed by the report, a description of the method and time of water level measurement, and a description of the method of purging used both before sampling to remove stagnant water in the well, and after sampling to remove the water that was in the well bore while the sample was being taken; and
3. Sampling Information - For each Monitoring Point and Background Monitoring Point addressed by the report, a description of the type of pump--or other device--used and its vertical placement for sampling, and a detailed description of the sampling procedure (number and description of the samples, field blanks, travel blanks, and duplicate samples taken, the type of containers and preservatives used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other observations);

(C) Map - A map (or copy of an aerial photograph) showing the locations of observation stations, Monitoring Points, and Background Monitoring Points;

(D) Laboratory data - For Detection Monitoring and COC Reports only, the laboratory results of all analyses, in compliance with §(a) of this section;

(E) Leachate and run on/off control statement - A statement as to the condition and performance of any leachate monitoring and control facilities, and of the run-off/run-on control facilities; and

(F) Waste placement and type - The quantity and types of wastes discharged and the locations in the landfill where waste has been placed since submittal of the last such report.

(c) CONTINGENCY RESPONSES.

(1) Leachate seep - The discharger shall immediately report by telephone concerning the discovery any previously unreported seepage from the disposal area. A written report shall be filed with the Regional Board within seven days, containing at least the following information:

(A) Map — A map showing the location(s) of seepage;

(B) Flow rate — An estimate of the flow rate;

(C) Description — A description of the nature of the discharge (e.g., all pertinent observations and analyses); and

(D) Corrective measures approved (or proposed for consideration) by the Regional Board Executive Officer.

(2) Response to an initial indication of a release - Should the initial statistical or non-statistical comparison [under §(f)(1 or 2) of this section, respectively] indicate, for any Constituent of Concern or Monitoring Parameter, that a release is tentatively identified, the discharger shall immediately notify their designated Regional Board staff contact verbally as to the Monitoring Point(s) and constituent(s) or parameter(s) involved, shall provide written notification by certified mail within seven days of such determination [23 CCR §2550.8(j)(1)], and shall carry out a discrete retest in accordance with §§(d)(2) and (f)(3) of this section. If the retest confirms the existence of a release, the discharger shall carry out the requirements of §(c)(4) of this section. In

any case, the discharger shall inform the Regional Board of the outcome of the retest as soon as the results are available, following up with written results submitted by certified mail within seven days of completing the retest.

(3) Physical evidence of a release - If either the discharger or the Regional Board Executive Officer determines that there is significant physical evidence of a release [23 CCR §2550.1(3)], the discharger shall conclude that a release has been discovered and shall:

(A) Notify — Immediately notify the Regional Board of this fact by certified mail (or acknowledge the Regional Board's determination);

(B) Investigate — Carry out the requirements of §(c)(4) of this section for all potentially-affected monitored media; and

(C) Additional work — Carry out any additional investigations stipulated in writing by the Regional Board Executive Officer for the purpose of identifying the cause of the indication.

(4) Release discovery response - If the discharger concludes that a release has been discovered:

(A) COC scan - If this conclusion is *not* based upon monitoring for all Constituents of Concern, pursuant to §(b)(3) of this section, then the discharger shall, sample for all Constituents of Concern at all Monitoring Points in the affected medium and submit them for laboratory analysis within thirty days of discovery. Within seven days of receiving the laboratory analytical results, the discharger shall notify the Regional Board, by certified mail, of the concentration of all Constituents of Concern at each Monitoring Point; this notification shall include a synopsis showing, for each Monitoring Point, those constituents that exhibit an unusually high concentration. Because the data from this scan is not to be statistically tested against background, only a single datum is required for each Constituent of Concern at each Monitoring Point [23 CCR §2550.8(k)(1)];

(B) Submittal of proposed EMP - The discharger shall, within 90 days of discovering the release, submit a Revised Report of Waste Discharge proposing an Evaluation Monitoring Program

that 1. meets the requirements of 23CCR §2550.8(k)(5) and §2550.9, and 2. satisfies the requirements of 40 CFR §258.55(g)(1)(ii) by committing to install at least one monitoring well at the facility boundary directly downgradient of the center of the release, immediately after delineating the nature and extent of the release under 23 CCR §2550.9(b);

(C) Submittal of engineering feasibility study - The discharger shall, within 180 days of discovering the release, submit a preliminary engineering feasibility study meeting the requirements of 23 CCR §2550.8(k)(6); and

(D) Initiation of nature-and-extent delineation — The discharger shall immediately begin delineating the nature and extent of the release by installing and monitoring assessment wells as necessary to assure that the discharger can meet the requirement [under 23 CCR §2550.9(b)] to submit a delineation report within 90 days of when the Regional Board directs the discharger to begin the Evaluation Monitoring Program. This report shall show the vertical and horizontal limits of the release for all Constituents of Concern. This delineation effort shall be carried out in addition to any ongoing monitoring program (e.g., detection monitoring program); nevertheless, the discharger's delineation effort shall encompass all relevant monitoring data.

(5) Release beyond facility boundary - Any time the discharger concludes (or the Regional Board Executive Officer directs the discharger to conclude) that a release from the Unit has proceeded beyond the facility boundary, the discharger shall so notify all persons who either own or reside upon the land that directly overlies any part of the plume (Affected Persons).

(A) Initial notice - Initial notification to Affected Persons shall be accomplished within 14 days of making this conclusion and shall include a description of the discharger's current knowledge of the nature and extent of the release.

(B) Updated notice - Subsequent to initial notification, the discharger shall provide updates to all Affected Persons, including any persons newly affected by a change in the

boundary of the release, within 14 days of concluding there has been any material change in the nature or extent of the release.

(C) Submittal - Each time the discharger sends a notification to Affected Persons [under §§(c)(5(A or B), above], the discharger shall provide the Regional Board, within seven days of sending such notification, with both a copy of the notification and a current mailing list of Affected Persons.

(6) Response to VOC Detection in Background.

(A) Detection and verification - Except for VOCs validated as not having come from the landfill, under §(c)(6)(B), any time the laboratory analysis of a sample from a Background Monitoring Point, sampled for VOCs under §(f) of this section, shows either a. two or more VOCs above their respective MDL, or b. one VOC above its respective PQL, then the discharger shall immediately notify the Regional Board by phone that possible background contamination has occurred, shall follow up with written notification by certified mail within seven days, and shall obtain two new independent VOC samples from that Background Monitoring Point and send them for laboratory analysis of all detectable VOCs within thirty days. If either or both these retest samples validates the presence of VOC(s) at that Background Monitoring Point, using the above procedure, the discharger shall:

1. Notification - Immediately notify the Regional Board about the VOC(s) verified to be present at that Background Monitoring Point, and follow up with written notification submitted by certified mail within seven days of validation; and
2. Report - Within 180 days of validation, submit a report, acceptable to the Executive Officer, which examines the possibility that the detected VOC(s) originated from the Unit (e.g., using concentration gradient analyses) and proposes appropriate changes to the monitoring program.

(B) VOCs not from landfill - If, after reviewing the report submitted under §(c)(6)(A)2., the Executive Officer determines that the VOC(s) detected originated from a source other than the

Unit, the Executive Officer will make appropriate changes to the monitoring program.

(C) VOCs likely from landfill - If, after reviewing the report submitted under §(c)(6)(A)2., the Executive Officer determines that the detected VOC(s) most likely originated from the Unit, the discharger shall conclude that a release has been detected and shall immediately begin carrying out the requirements of §(c)(4) of this section.

(d) WATER SAMPLING AND ANALYSIS FOR DETECTION MONITORING.

(1) Water quality monitoring systems - The monitored media, and the Monitoring Points and Background Monitoring Points for each such medium, are those listed in the Monitoring and Reporting Program for the landfill, pursuant to §8(c) of this Order.

(2) Thirty-Day Sample Procurement Limitation.

(A) Latter third / thirty days — For any given monitored medium, samples shall be taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period [under §(b) of this section] shall all be taken during the latter third of the Reporting Period within a span not exceeding 30 days, and shall be taken in a manner that insures sample independence to the greatest extent feasible [23 CCR §2550.7(e)(12)(B)]. Sample procurement shall be carried out as late in the Reporting Period as feasible, considering the time needed to analyze the samples, analyze the resulting data, and to prepare and submit the monitoring report within thirty days after the end of the Reporting Period.

(B) Elevation / Field Parameters — Ground water sampling shall also include an accurate determination of the ground water surface elevation and field parameters (temperature, electrical conductivity, turbidity) for that Monitoring Point or Background Monitoring Point [23 CCR §2550.7(e)(13)]. Ground water elevations taken prior to purging the well and sampling for Monitoring Parameters shall be used to fulfill the Spring and Fall

ground water flow rate/direction analyses required under §(e), below.

(C) Data analysis ASAP — Statistical or non-statistical analysis shall be carried out as soon as the monitoring data is available, in accordance with §(f) of this section.

(e) Quarterly Determination of Ground Water Flow Rate/Direction [23 CCR §2550.7(e)(15)] - For each monitored ground water body, the discharger shall measure the water level in each well and determine ground water flow rate and direction at least quarterly, including the times of expected highest and lowest elevations of the water level for the respective ground water body. Ground water elevations for all background and downgradient wells for a given ground water body shall be measured within a period of time short enough to avoid temporal variations in ground water flow which could preclude accurate determination of ground water flow rate and direction [40CFR 258.53(d)]. This information shall be included in the twice-yearly monitoring reports required under §(b)(1) of this section.

(f) Statistical and Non-Statistical Analysis of Sample Data During a Detection Monitoring Program - The following data analysis methods shall be used at MSW landfills unless and until the discharger proposes, and the Regional Board revises the waste discharge requirements to include, data analysis methods that comply with the July 1, 1991, revision of Article 5 of Chapter 15 (revised Article 5); nevertheless, dischargers who own or operate MSW landfills having waste discharge requirements that have been revised to comply with revised Article 5 shall use the following non-statistical data analysis methods for constituents that cannot be addressed by statistical means and shall use the following statistical analysis scheme on those constituents for which the Regional Board has not yet approved a statistical method.

The discharger subject to this section shall use the most appropriate of the following methods to compare the downgradient concentration of each monitored constituent (or parameter) with its respective background concentration to determine if there has been a release from the Unit. For any given data set, the discharger shall first decide if statistical analysis is possible, by reference to the relative frequency with which the constituent is detected in background samples [see §(f)(1)]. For a constituent that qualifies for statistical analysis, the discharger shall proceed sequentially

down the list of statistical analysis methods listed in §§(f)(1)(A—C), using the first method for which the data qualifies. Those constituents for which no statistical method [under §(f)(1)] is appropriate shall be analyzed by the non-statistical method in §(f)(2). If the initial statistical/non-statistical analysis tentatively indicates the detection of a release, the discharger shall implement the retest procedure under §(f)(3).

(1) Statistical Methods. The discharger shall use one of the following statistical methods to analyze Constituents of Concern or Monitoring Parameters which exhibit concentrations exceeding their respective MDL in at least ten percent of the background samples taken during that Reporting Period. Except for pH, which uses a two-tailed approach, the statistical analysis for all constituents and parameters shall be one-tailed (testing only for statistically significant increase relative to background):

(A) One-Way Parametric Analysis of Variance (ANOVA), followed by multiple comparisons [§2550.7(e)(8)(A)] - This method requires at least four independent samples from each Monitoring Point and Background Monitoring Point during each sampling episode. It shall be used when the background data for the parameter or constituent, obtained during a given sampling period, has not more than 15% of the data below the PQL. Prior to analysis, replace all "trace" determinations with a value halfway between the PQL and the MDL values reported for that sample run, and replace all "non-detect" determinations with a value equal to half the MDL value reported for that sample run. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the discharger shall conclude that a release is tentatively indicated for that parameter or constituent and shall immediately implement the retest procedure under §(f)(3);

(B) One-Way Non-Parametric ANOVA (Kruskal-Wallis Test), followed by multiple comparisons - This method requires at least nine independent samples from each Monitoring Point and

Background Monitoring Point; therefore, the discharger shall anticipate the need for taking more than four samples per Monitoring Point, based upon past monitoring results. This method shall be used when the pooled background data for the parameter or constituent, obtained within a given Sampling Period, has not more than 50% of the data below the PQL. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the discharger shall conclude that a release is tentatively indicated for that parameter or constituent and shall immediately implement the retest procedure under §(f)(3); or

(C) Method of Proportions - This method shall be used if the "combined data set" -- the data from a given Monitoring Point in combination with the data from the Background Monitoring Points -- has between 50% and 90% of the data below the MDL for the constituent or parameter in question. This method 1. requires at least nine downgradient data points per Monitoring Point per Reporting Period, 2. requires at least thirty data points in the combined data set, and 3. requires that $n * P > 5$ (where n is the number of data points in the combined data set and P is the proportion of the combined set that exceeds the MDL); therefore, the discharger shall anticipate the number of samples required, based upon past monitoring results. The test shall be carried out at the 99% confidence level. If the analysis results in rejection of the Null Hypothesis (i.e., that there is no release), the discharger shall conclude that a release is tentatively indicated for that constituent or parameter, and shall immediately implement the retest procedure under §(f)(3).

(2) Non-Statistical Method - The discharger shall use the following non-statistical method for analyzing all constituents which are not amenable to statistical analysis by virtue of having being detected in less than 10% of applicable background samples. A separate variant of this test is

used for the VOC_{water} Composite Monitoring Parameter and for qualifying Constituents of Concern. Regardless of the test variant used, the method involves a two-step process: (A) from all constituents to which the test variant applies, compile a list of those constituents which exceed their respective MDL in the downgradient sample from a given Monitoring Point, then (B) evaluate whether the listed constituents meet either of the test variant's two possible triggering conditions. For each Monitoring Point, the list described above shall be compiled based on either: the data from the single sample (for that constituent) taken during that Reporting Period from that Monitoring Point, or (where several independent samples have been analyzed for that constituent at a given Monitoring Point) the data from the sample which contains the largest number of detected constituents. Background shall be represented by the data from all samples taken from the appropriate Background Monitoring Points during that Reporting Period (at least one sample from each Background Monitoring Point). The method shall be implemented as follows:

(A) Version for the Volatile Organics Composite Monitoring Parameter For Water Samples (VOC_{water}) - For any given Monitoring Point, the VOC_{water} Monitoring Parameter is a composite parameter addressing all detectable VOCs, including at least all 47 VOCs listed in Appendix I to 40 CFR Part 258, and all unidentified peaks. The discharger shall compile a list of each VOC which 1. exceeds its MDL in the Monitoring Point sample (an unidentified peak must exceed its presumed MDL to be a candidate for the list), *and also* 2. exceeds its MDL in *less than* ten percent of the samples taken during that Reporting Period from that medium's Background Monitoring Points. The discharger shall conclude that a release is tentatively indicated for the VOC_{water} composite Monitoring Parameter if the list *either* 1. contains two or more VOCs (>MDL), *or* 2. contains one VOC that exceeds its PQL;

(B) Version for Constituents of Concern - As part of the Constituent of Concern monitoring effort required under §(b)(3) of this section, for each Monitoring Point, the discharger shall compile a list of constituents of concern that exceed their respective MDL at the Monitoring Point yet do so in less than

ten percent of the background samples taken during that Reporting Period. The discharger shall conclude that a release is tentatively indicated if the list *either* **1.** contains two or more constituents (>MDL), *or* **2.** contains one constituent which exceeds its PQL.

(3) Discrete Retest [23 CCR §2550.7(e)(8)(Œ)] - In the event that the discharger concludes that a release has been tentatively indicated [pursuant to §§(f)(1 or 2), above], the discharger shall collect two new suites of samples (for VOC_{water} or for the indicated Constituent[s] of Concern) from the indicating Monitoring Point within 30 days of such indication. Resampling of the Background Monitoring Points is optional. As soon as the retest data is available, the discharger shall use the same statistical method (or non-statistical comparison) as that which provided the tentative indication of a release to separately analyze each of the two suites of retest data for the affected Monitoring Point. For any indicated Monitoring Parameter or Constituent of Concern, if the test results of either (or both) of the retest data suites confirms the original indication, the discharger shall conclude that a release has been discovered and shall carry out the requirements of §(c)(4) of this section. All retests shall be carried out only for those Monitoring Point(s) at which a release is tentatively indicated, and only for the Constituent of Concern or Monitoring Parameter which triggered the indication there, as follows:

(A) ANOVA retest - If a (parametric or non-parametric) ANOVA method was used in the initial test, the retest shall involve only a repeat of the multiple comparison procedure, carried out separately on each of the two new suites of samples taken from the indicating Monitoring Point;

(B) Method of Proportions retest - If the Method of Proportions statistical test was used, the retest shall consist of a full repeat of the statistical test for the indicated constituent or parameter, carried out separately on each of the two new suites of samples from the indicating Monitoring Point;

(C) Non-Statistical Method retest - If the non-statistical method was used:

1. For VOC_{water} - Because the VOC_{water} composite Monitoring Parameters is a single parameter which addresses an entire family of constituents likely to be present in any landfill release, the scope of the laboratory analysis for each of the two retest samples shall include all VOCs detectable in that retest sample. Therefore, a confirming retest for either parameter shall have validated the original indication even if the detected constituents in the confirming retest sample(s) differs from those detected in the sample which initiated the retest;
2. For COCs - Because all Constituents of Concern that are jointly addressed in the non-statistical test under §(f)(2)(B), above, remain as individual Constituents of Concern, the scope of the laboratory analysis for the non-statistical retest of Constituents of Concern shall address only those constituents detected in the sample which initiated the retest.

§14. CLOSURE/POST-CLOSURE PLAN.

(a) Older closed units exempted — This section applies only to MSW landfills that have received waste on or after October 9, 1991.

(b) Recently closed units - The discharger who owns or operates an MSW land fill that received waste on or after October 9, 1991, that will have stopped receiving waste by the Federal Deadline, and that will have completed final closure within six months after the last receipt of waste shall submit a report to the Regional Board by the Federal Deadline. This report shall either (1) validate that the landfill's final cover meets the requirements of 40 CFR §258.60(a), or (2) include any necessary updates to the closure plan and propose changes to the final cover necessary to bring the landfill into compliance with 40 CFR §258.60(a);

(c) Operating units - The discharger who owns or operates an MSW landfill that received waste on or after October 9, 1991, and that will not have initiated final closure as of the Federal Deadline, shall submit a closure and post-closure maintenance plan (or submit suitable modifications to a pre-existing plan) by the Federal Deadline, that complies with 40 CFR §§258.60 and 258.61 and with Article 8 of Chapter 15.

§15. DEED NOTATION AT MSW LANDFILLS.

(a) Schedule - All MSW landfills listed in §1 of this Order shall comply with the requirements of §(b) of this section in accordance with the following schedule:

(1) Early closures - Dischargers owning or operating an MSW landfill that completed final closure prior to October 9, 1991, shall comply with §(b) of this section and provide proof of such compliance to the Regional Board by October 9, 1995;

(2) Closed since October 8, 1991 - For all MSW landfills that completed final closure between the close of business on October 8, 1991, and the effective date of this Order, the discharger shall comply with §(b) of this section and provide proof of such compliance to the Regional Board by the Federal Deadline;

(3) Operating MSW landfills - For all MSW landfills that are either operating or have not completed closure, as of the effective date of this Order, the discharger shall comply with §(b) of this section and provide proof of such compliance to the Regional Board within sixty days after completing final closure.

(b) Notation - In accordance with the deadline provided under §(a) of this section, the discharger shall provide proof to the Regional Board that the deed to the landfill facility property, or some other instrument that is normally examined during title search, has been modified to include, in perpetuity, a notation to any potential purchaser of the property stating that:

(1) Parcel history — The parcel has been used as an MSW landfill;

(2) Parcel use limitations — Land use options for the parcel are restricted in accordance with the post-closure land uses set forth in the post-closure plan and in WDRs for the landfill; and

(3) New owner's responsibility — In the event that the discharger defaults on carrying out either the post-closure maintenance plan or anycorrective action needed to address a release, then the responsibility for carrying out such work falls to the property owner.

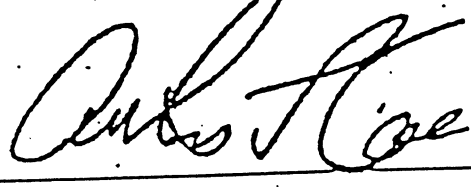
§16. INTERIM CLASSIFICATION.

This section applies to all MSW landfills listed in §1 that, as of the effective date of this Order, have not been reclassified under 23 CCR §§2510(d,e), 2530(b), and 2591(c).

(a) Interim Class III status granted - MSW landfills subject to this section are hereby granted interim status as Class III landfills under Chapter 15, as of the effective date of this Order, unless and until the landfill is reclassified in accordance with that chapter.

(b) Revised ROWD required - Dischargers owning or operating an MSW landfill subject to this section shall submit a revised report of waste discharge by October 9, 1994, that is in full compliance with Article 9 of Chapter 15 and that provides all information necessary for the Regional Board to reclassify the landfill pursuant to 23 CCR §§2510(d,e) and 2591(c). Dischargers who have submitted such a report prior to the effective date of this Order shall submit a letter to that effect, in place of resubmitting the report.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on August 16, 1993.



Arthur L. Coe

Executive Officer

INDEX TO ORDER

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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Copy: DH, OV, MW, SP, Files
Tom Ellis

June 8, 1999

Interested Parties

Subject: **Addendum No. 1 to Order No. 93-86, Waste Discharge Requirements For Soils Containing Nonhazardous Concentrations Of Petroleum Hydrocarbons, Organic and Inorganic Compounds, Metals, and Pesticides**

Enclosed is a copy of the subject addendum adopted by the California Regional Water Quality Control Board (Regional Board) on June 7, 1999. This addendum establishes maximum concentration limits for the discharge of soils containing petroleum hydrocarbons, organic and inorganic compounds, metals, and pesticides to Class III waste management units that have liners and leachate collection systems that comply with the requirements of Title 27 of the California Code of Regulations (27 CCR).

Class III waste management units that have liners and leachate collection systems may accept soils containing organic and inorganic compounds, metals, and pesticides at concentration limits not to exceed hazardous concentration levels established in 22 CCR using the waste extraction test (WET) or the Toxicity Characteristic Leaching Procedure (TCLP) analysis. A copy of the current levels as established in 22 CCR is attached. In addition, this order establishes maximum concentration limits for the acceptance of soils containing petroleum hydrocarbons.

For questions regarding Addendum No. 1 to Order No. 93-86 please contact Brian McDaniel at (619) 627-3927.

Very truly yours,

John H. Robertus

John H. Robertus
Executive Officer

Enclosure: Addendum No. 1 to Order No. 93-86
Maximum Concentration Limit Tables

cc: Interested Parties

Interested Party Mailing List

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Attachment 1
Addendum 1 to Order 93-86

Table 1- Maximum Concentration Limits For Soils Containing Nonhazardous Concentrations Of Metals and Pesticides and organic and inorganic compounds. (Reference: CCR Title 22, Section 66261.24 as Amended).

Contaminant (CAM 17*)	Maximum Concentration Limits STLC** mg/l
Antimony	15
Arsenic	5.0
Barium	100
Beryllium	0.75
Cadmium	1.0
Chromium	5
Cobalt	80
Copper	25
Lead	5.0
Mercury	0.2
Molybdenum	350
Nickel	20
Selenium	1.0
Silver	5
Thallium	7.0
Vanadium	24
Zinc	250
Contaminant	**STLC (mg/l)**
Aldrin	0.14
Chlordane	0.25
DDT, DDE, DDD	0.1
2,4-Dichlorophenoxyacetic acid	10
Dieldrin	0.8
Dioxin (2,3,7,8-TCDD)	0.001
Endrin	0.02
Heptachlor	0.47
Kepone	2.1
Lead compounds, organic	-
Lindane	0.4
Methoxychlor	10
Mirex	2.1
Pentachlorophenol	1.7
Polychlorinated biphenyls (PCBs)	5.0
Toxaphene	0.5
Trichloroethylene	204
2,4,5-Trichlorophenoxypropionic acid	1.0

* *California Metals 22 CCR 66261.24*

***STLC - Soluble Threshold Limit Concentration*

Attachmer
Addendur Order 93-86

Table 2- Ma : Concentration Limits For Soils Containing Nonhazardous Concentrations Of Metals, Pesticides and Organic organic Compounds using Toxicity Characteristic Leaching Procedure (TCLP) analysis.(Re: :: CCR Title 22, Section 66261.24 as Amended).

Contaminant	Maximum Concentration Limits Regulatory Level (Mg/l)
Arsenic	5.0
Barium	100.0
Benzene	0.5
Cadmium	1.0
Carbon tetrach	0.5
Chlordane	0.03
Chlorobenzene	100.0
Chloroform	6.0
Chromium	5.0
0-Cresol	200.0
m-Cresol	200.0
p-Cresol	200.0
Cresol, total	200.0
2,4- D	10.0
1,4-Dichloroben	7.5
1,2-Dichloroeth	0.5
1,1-Dichloroeth	0.7
2,4-Dinitrotoluer	0.13
Endrin	0.02
Heptachlor (anc ide)	0.008
Hexachlorobenz	0.13
Hexachlorobutac	0.5
Hexachloroethar	3.0
Lead	5.0
Lindane	0.4
Mercury	0.2
Methoxychlor	10.0
Methyl ethyl ketc	200.0
Nitrobenzene	2.0
Pentachlorophen	100.0
Pyridine	5.0
Selenium	1.0
Silver	5.0
Tetrachloroethyle	0.7
Toxaphene	0.5
Trichloroethylene	0.5
2,4,5-Trichlorophe	400.0
2,4,6-Trichlorophe	2.0
2,4,5-TP (Silvex)	1.0
Vinyl Chloride	0.2

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

ADDENDUM No. 1 TO ORDER NO. 93-86

MAXIMUM CONCENTRATION LIMITS FOR SOILS CONTAINING NONHAZARDOUS CONCENTRATIONS OF PETROLEUM HYDROCARBONS, ORGANIC AND INORGANIC COMPOUNDS, METALS, AND PESTICIDES FOR MSW LANDFILLS WITH SUBTITLE D LINERS

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On August 16, 1993, this Regional Board adopted Order No. 93-86, **Waste Discharge Requirement (WDR) Amendment for all Class III Municipal Solid Waste (MSW) Landfills in this Region, to Implement State Water Board Resolution No. 93-62, Adopted June 17, 1993, as State Policy for Water Quality Control under Section 13140 of the Water Code.** Order No. 93-86 established compliance with Federal Regulations (40 CFR parts 247 & 248, referred to as Subtitle D).

2. Landfills with liners and leachate collection systems approved in accordance with California Code of Regulations, Title 27, Division 2 (hereinafter 27 CCR) provides enhanced waste containment and an additional level of protection against leakage as compared to unlined landfills.

3. As amended, Order No. 93-86 would establish concentration limits for the discharge of soils containing nonhazardous concentrations of petroleum hydrocarbons, organic and inorganic compounds, metals and pesticides to lined cells of operating landfills.

4. Section 25157.8(a) of the California Health and Safety Code prohibits the disposal of waste containing total lead in excess of 350 parts per million (ppm), copper in excess of 2500 ppm, and Nickel in excess of 2000 ppm to other than a Class I hazardous waste site, unless (1) the appropriate Regional Water Quality Control Board amends waste discharge requirements to specifically allow the disposal of the waste and (2) the appropriate local enforcement agency has revised the solid waste facility permit of the facility to specifically allow the disposal of the waste.

5. Soils containing non-hazardous concentrations of petroleum hydrocarbons, organic and inorganic compounds, metals and pesticides discharged to lined waste management units shall be considered to not pose a significant threat to water quality if concentration levels are below the threshold concentrations listed in the Discharge Specifications of this Order.

6. Soil wastes shall be considered to pose a threat to water quality if it has contamination levels above the threshold concentrations listed in the specifications of this Order and may not be discharged at these sites.

7. The discharge of Hazardous waste, as defined in California Code of Regulations (CCR) Title 22 Division 3, Chapter 30, Article 11 is prohibited.

8. MSW landfills subject to this order are existing facilities and as such are exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Code of Regulations, Chapter 3, Article 19, Section 15301.

9. The Regional Board in a public meeting heard and considered all comments pertaining to the modification of Order No. 93-86.

10. The Regional Board has notified all known interested parties of its intent to modify Order No. 93-86.

IT IS HEREBY ORDERED, That Order No. 93-86 be modified as follows:

Add the following

A. DISCHARGE SPECIFICATIONS

1. Soil samples shall be taken in accordance with sampling guidelines set forth in the most recently promulgated edition of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846", U.S. Environmental Protection Agency. At a minimum, for quantities of soil less than or equal to 500 cubic yards, four samples per 100 cubic yards will be taken. For quantities of soil between 500 to 5000 cubic yards, an additional sample shall be taken for every 500 cubic yards.

2. MSW Class III landfills shall have an approved load check program in compliance with 27 CCR Section 20870.

3. Waste soils shall be discharged into lined areas specifically approved by the Regional Board in accordance with 27 CCR. Soils may also be utilized for daily landfill cover within lined units if approved for such use by the appropriate agencies

4. All wastes received at the landfill are to be certified California non-hazardous according to 22 CCR.

5. Lined Class III Waste Management Units, as designed, may accept only soils contaminated with petroleum hydrocarbons, organic and inorganic compounds, metals, and pesticides below the following concentration limits which could pose a threat to water quality if discharged in an uncontrolled manner:

   a. Soils containing nonhazardous concentrations of metals and pesticides, organic and inorganic compounds shall not exceed hazardous waste classifications as determined using the waste extraction test (WET) (Reference CCR Title 22, Section 66261.24 as amended).

   b. Soils containing nonhazardous concentrations of metals, pesticides, organic and inorganic compounds shall not exceed maximum concentrations of contaminants using Toxicity Characteristic Leaching Procedure (TCLP) analysis (Reference: CCR Title 22, Section 66261.24 as Amended).

c. The discharge of total lead at concentrations shall not exceed the threshold for hazardous concentration established in 22 CCR. The current level is 1000 mg/kg (ppm). This Order would not effect the concentration levels established in Section 25157.8(a) for Nickel and Copper as these are equivalent to the threshold for hazardous waste for concentration levels in 22 CCR.

d. Soils containing nonhazardous concentrations of petroleum hydrocarbons. The following maximum concentration levels will be used to determine if soils containing petroleum hydrocarbons are acceptable for disposal.

Petroleum Hydrocarbon Contaminant	Maximum Concentration Limits	
Gasoline and lighter end hydrocarbons (C_4 -C_{12})	1,000 ppm TPH	1,000 -5,000 ppm TPH w/RCI and 96 hour bioassay
Diesel fuel, Kerosene Oil, Jet Fuel, (C_8-C_{22}) heavy end hydrocarbons	3,000 ppm TPH	3,000 -15000 ppm TPH w/RCI and 96 hour bioassay
Hydraulic Oil, Cutting and Grinding Oil, Virgin Motor Oil, Waste Oil (C_8-C_{40} heavy end hydrocarbons)	3000 ppm TRPH	3,000 -15000 ppm TPH w/RCI and 96 hour bioassay

TPH - Total Petroleum Hydrocarbon
TRPH - Total Recoverable Petroleum Hydrocarbon
RCI - Hazardous Waste Criteria for Reactivity, Corrosivity, Ignitiability and 96 Hour Acute Bioassay as established by CCR 22

6. Test Methods for Soils Containing Petroleum Hydrocarbons:

The following test methods shall be performed for soils containing Petroleum Hydrocarbons.

Petroleum constituent	TPH (8015M) Gas	TPH (8015 M Diesel	(EPA 418.1)	BTEX (8020)	Lead (TCLP)	Metals (Cd, Cr, Pb, Ni, Zn), OX, and PCBs	Semi-Volatile Organics (8270 or EPA 625)	Volatile organics (8260)	Metals (CAM 17), and PCBs
Leaded Gasoline	■			■	■				
Unleaded gasoline	■			■	*				
Kerosene Oil		■		■					
Jet Fuel		■		■					
Diesel Fuel		■		■					
Hydraulic Oil		■	■	■		■			
Cutting and Grinding Oil		■	■	■		■			
Virgin Motor Oil		■	■	■			■		
Waste Oil		■	■	■			■	■	■

* with documentation that only unleaded gas was historically on site

7. Test Methods for Soils Containing Metals and Pesticides

The analyses can include the following methodologies:

TPH (418.1 or 8015M)	TCLP Analysis (8 RCRA metals)
8260	CAM 17
8270 (Semi-VOCs)	8080 (Chlorinated pesticides & PCBs)
8150 (herbicides)	

8. Recordkeeping

Copies of the waste approvals will be kept on file at the facility and at a minimum will include:

a. Certification from the generator certifying that the analyses submitted is representative of the material to be disposed.

b. Analytical data or Material and Safety Data Sheets representing the waste stream.

c. The Chain-of-Custody form showing the sample's integrity was not compromised.

d. The approximate yardage of the material and the transporter information.

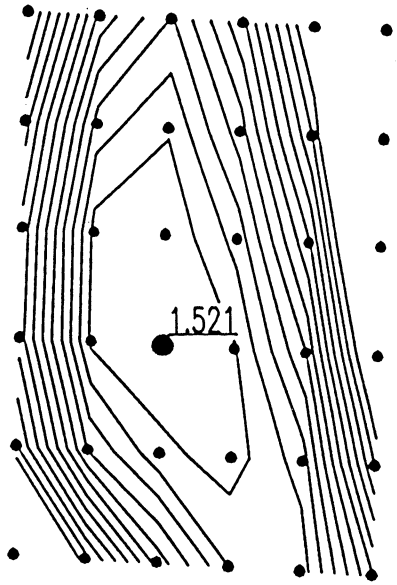
I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on June 7, 1999.

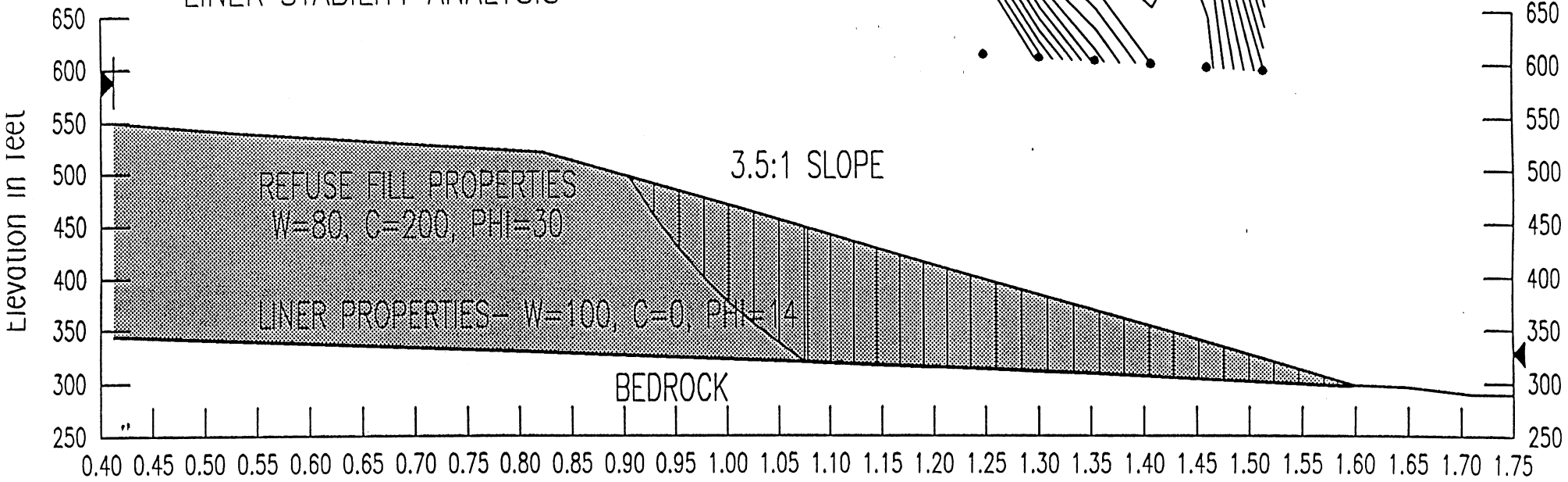
JOHN H. ROBERTUS
Executive Officer

ATTACHMENT C
SLOPE STABILITY CROSS-SECTIONS AND MAP

PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION A–A'

LINER STABILITY ANALYSIS





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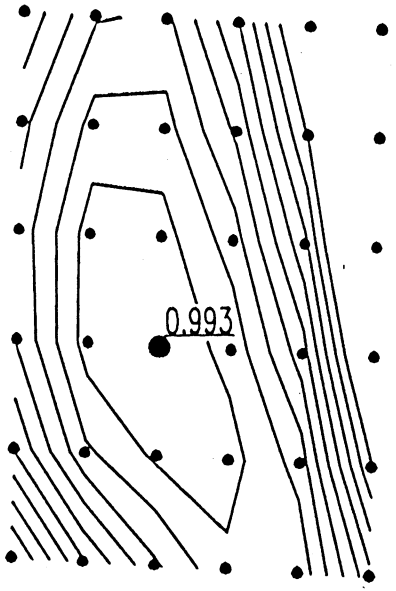
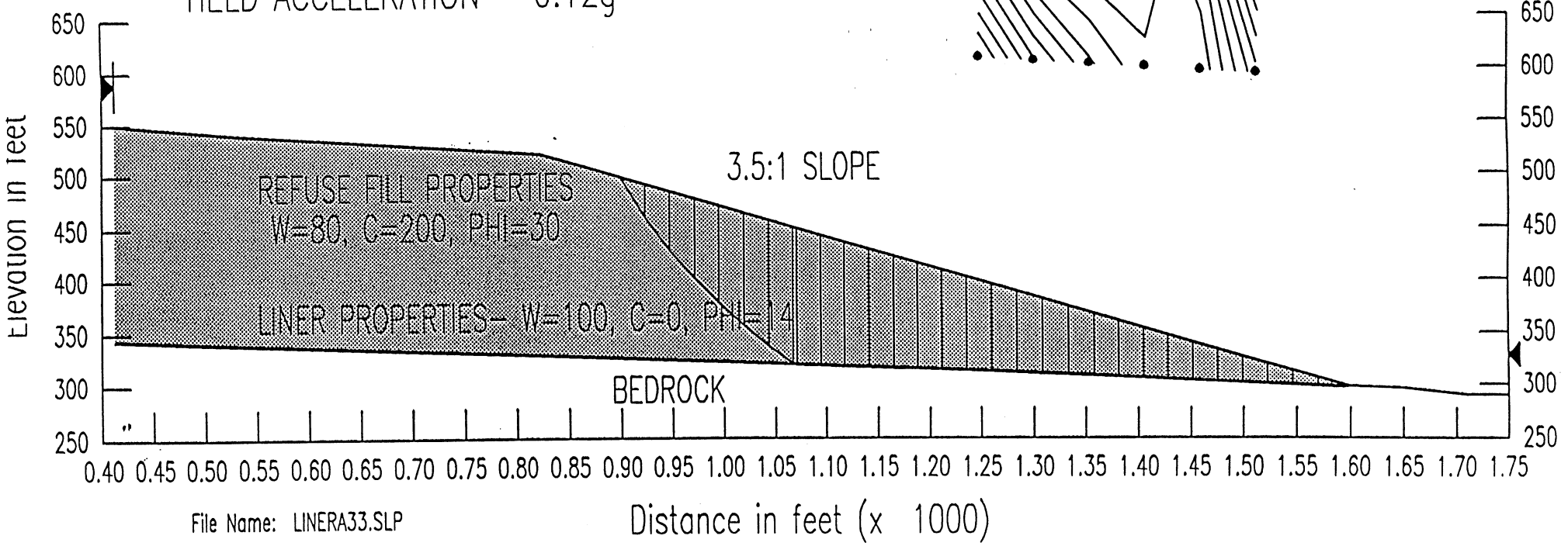
PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION A–A'

YIELD ACCELERATION = 0.12g





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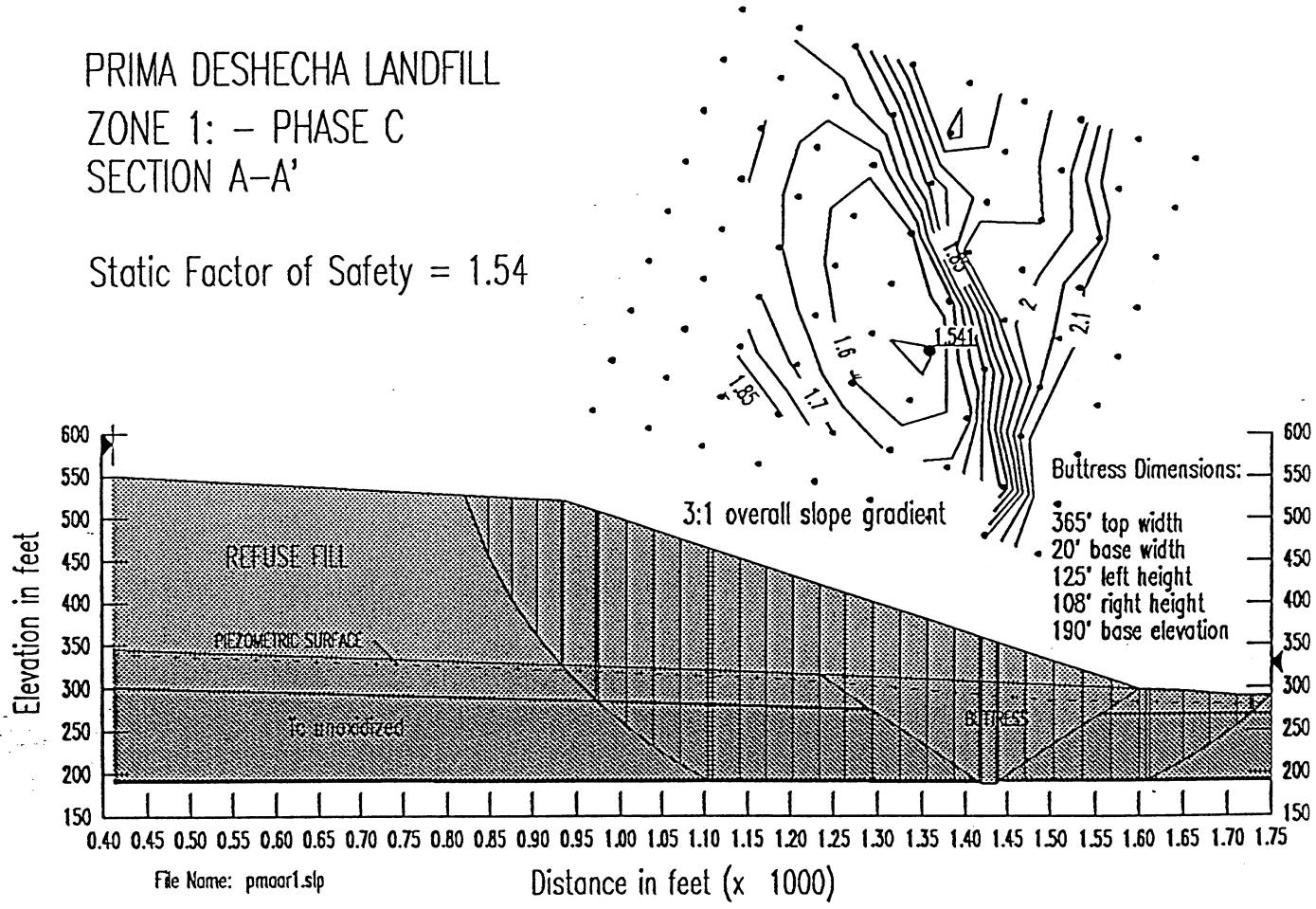
PRIMA DESHECHA LANDFILL
ZONE 1: – PHASE C
SECTION A–A'

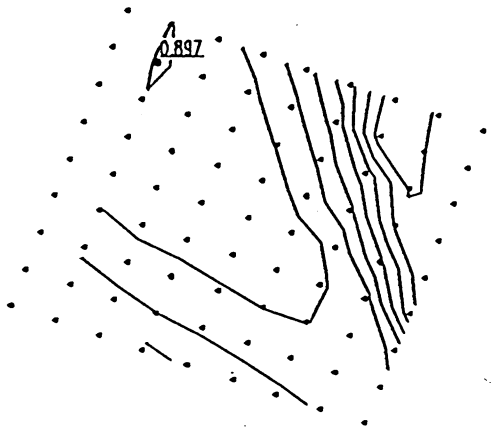
Static Factor of Safety = 1.54

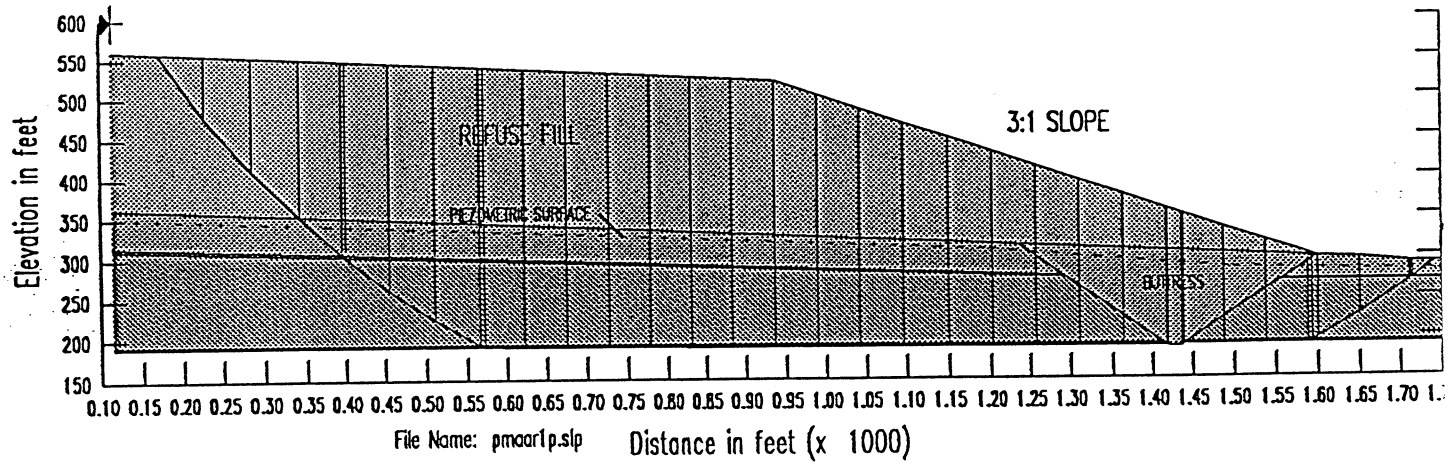


PRIMA DESHECHA LANDFILL

ZONE 1: PHASE C
SECTION A–A'

Pseudostatic Factor of Safety = 0.90

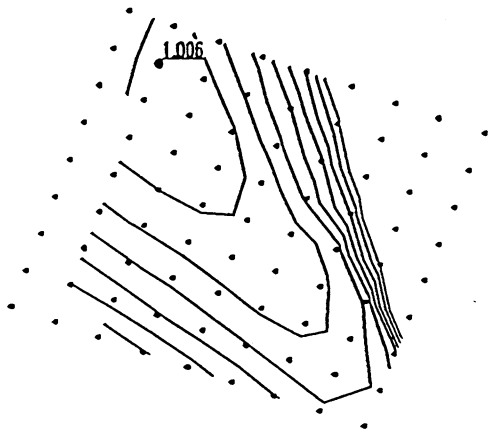


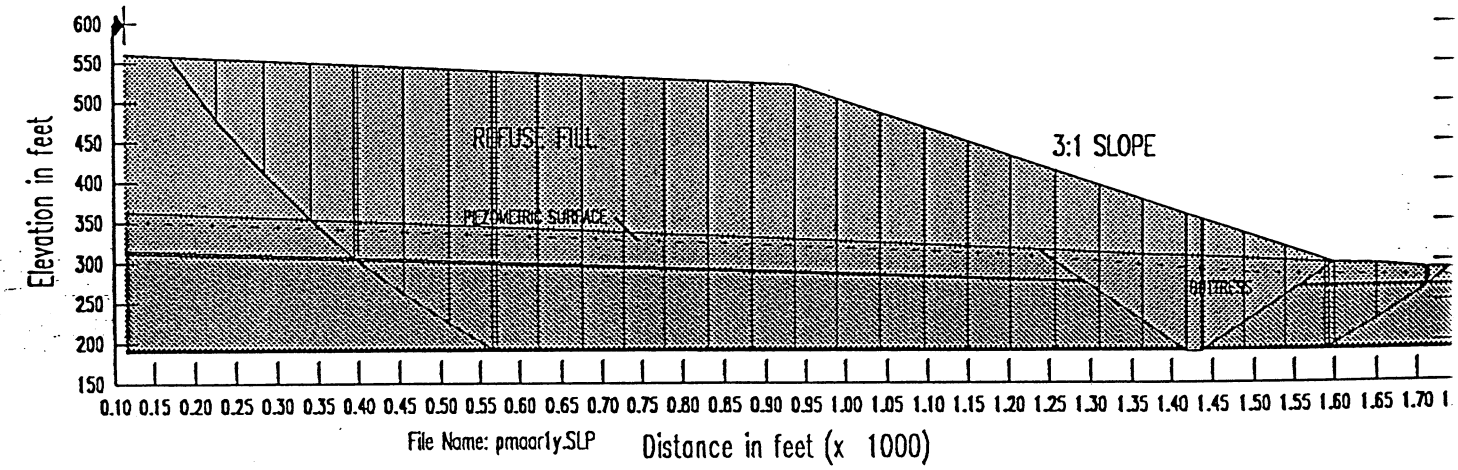


PRIMA DESHECHA LANDFILL

ZONE 1: PHASE C
SECTION A-A'

YIELD ACCELERATION = 0.11g

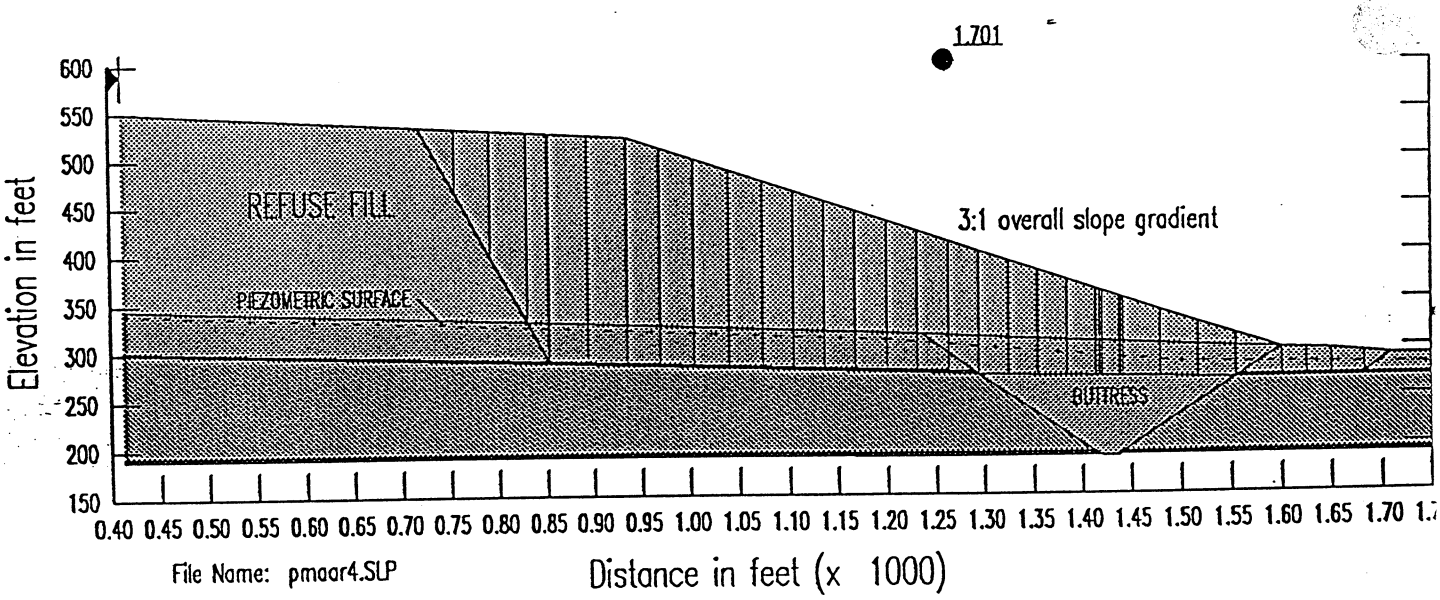




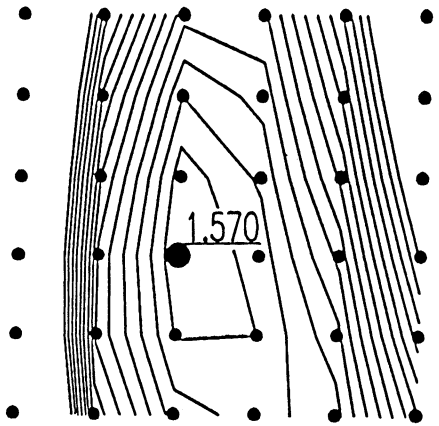
PRIMA DESHECHA LANDFILL

ZONE 1: PHASE C
SECTION A–A'

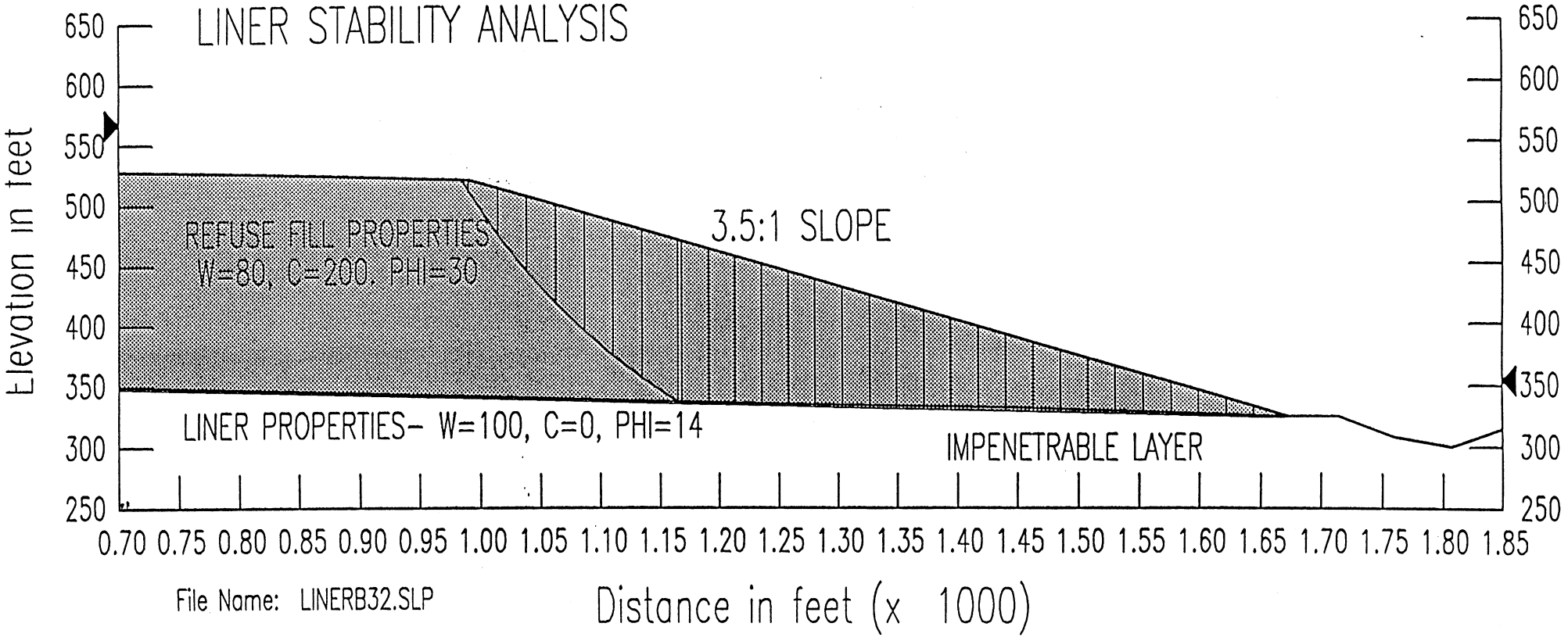
Static Factor of Safety = 1.70



PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION B–B'

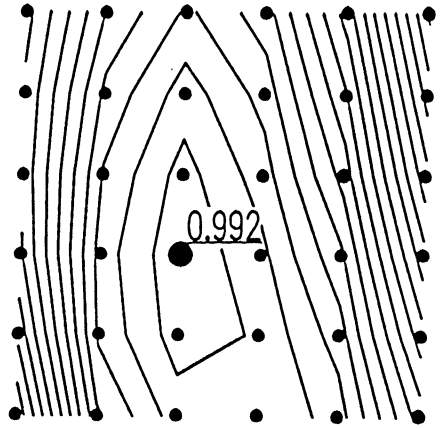


LINER STABILITY ANALYSIS

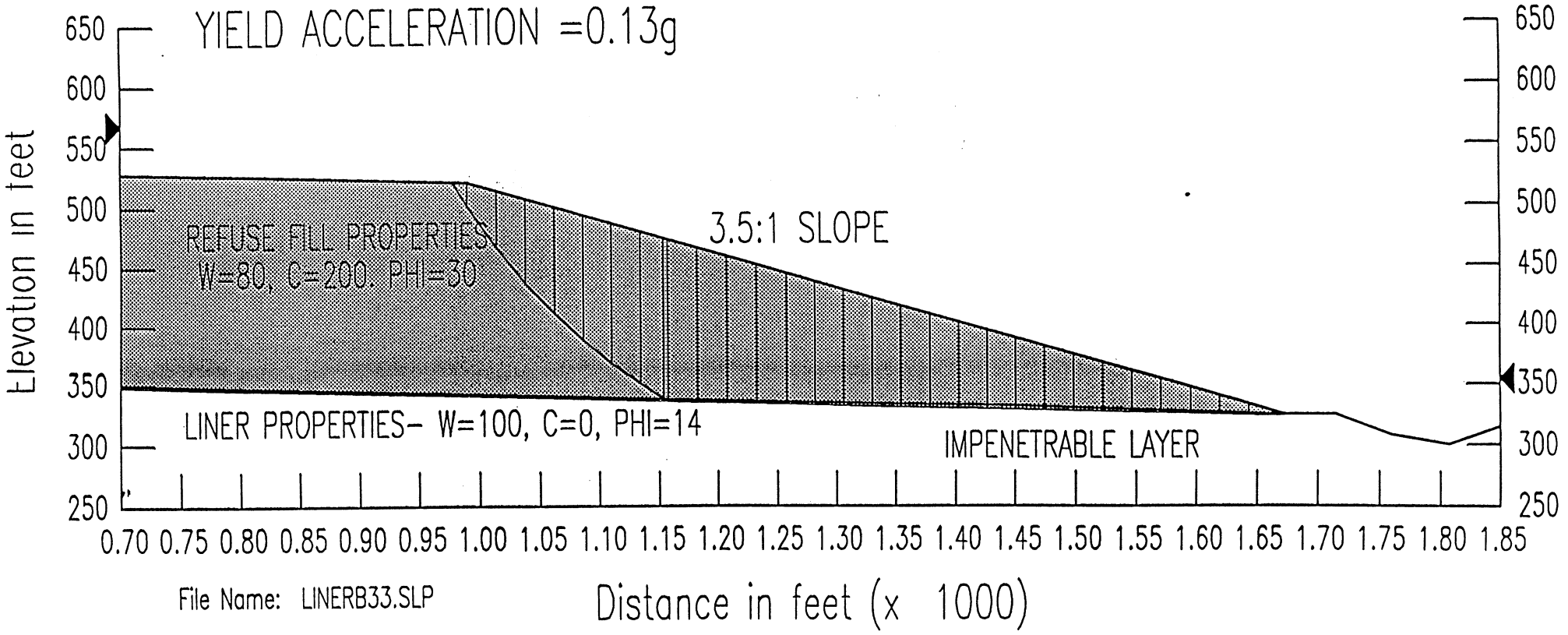


File Name: LINERB32.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION B–B'



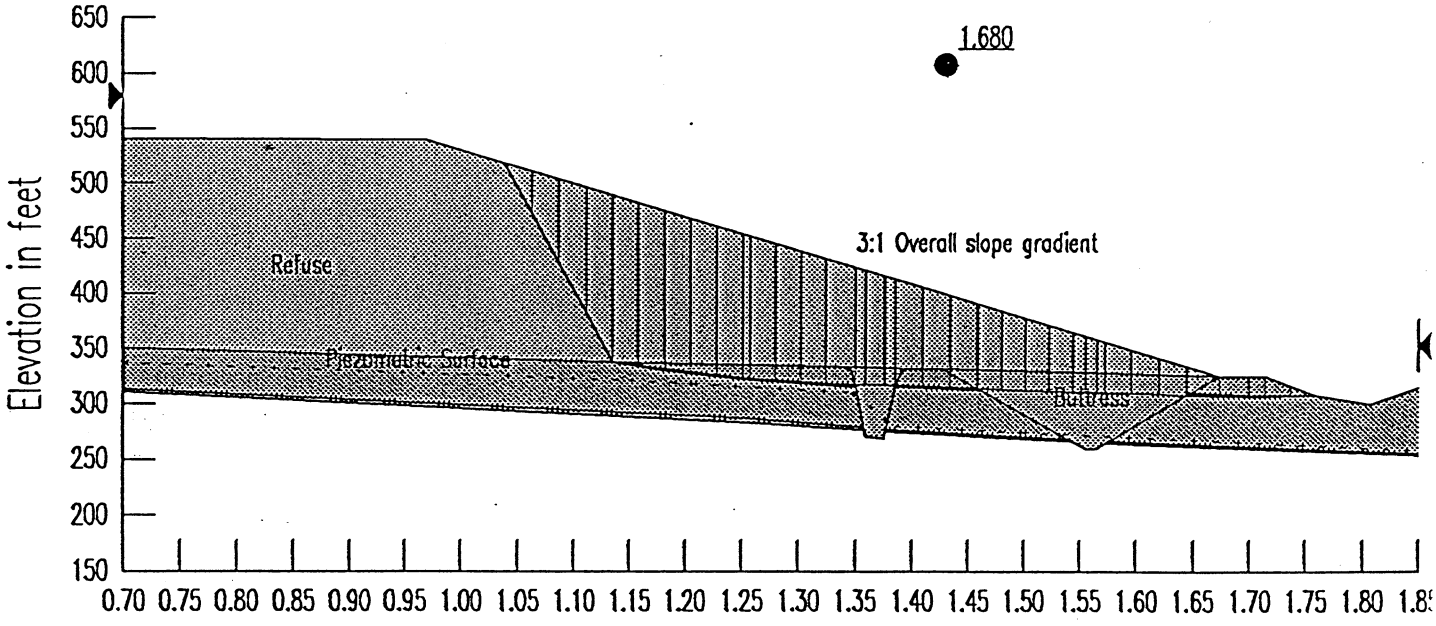
YIELD ACCELERATION =0.13g



File Name: LINERB33.SLP

Prima Deshecha Landfill
Zone 1 – Phase C
Section B–B'

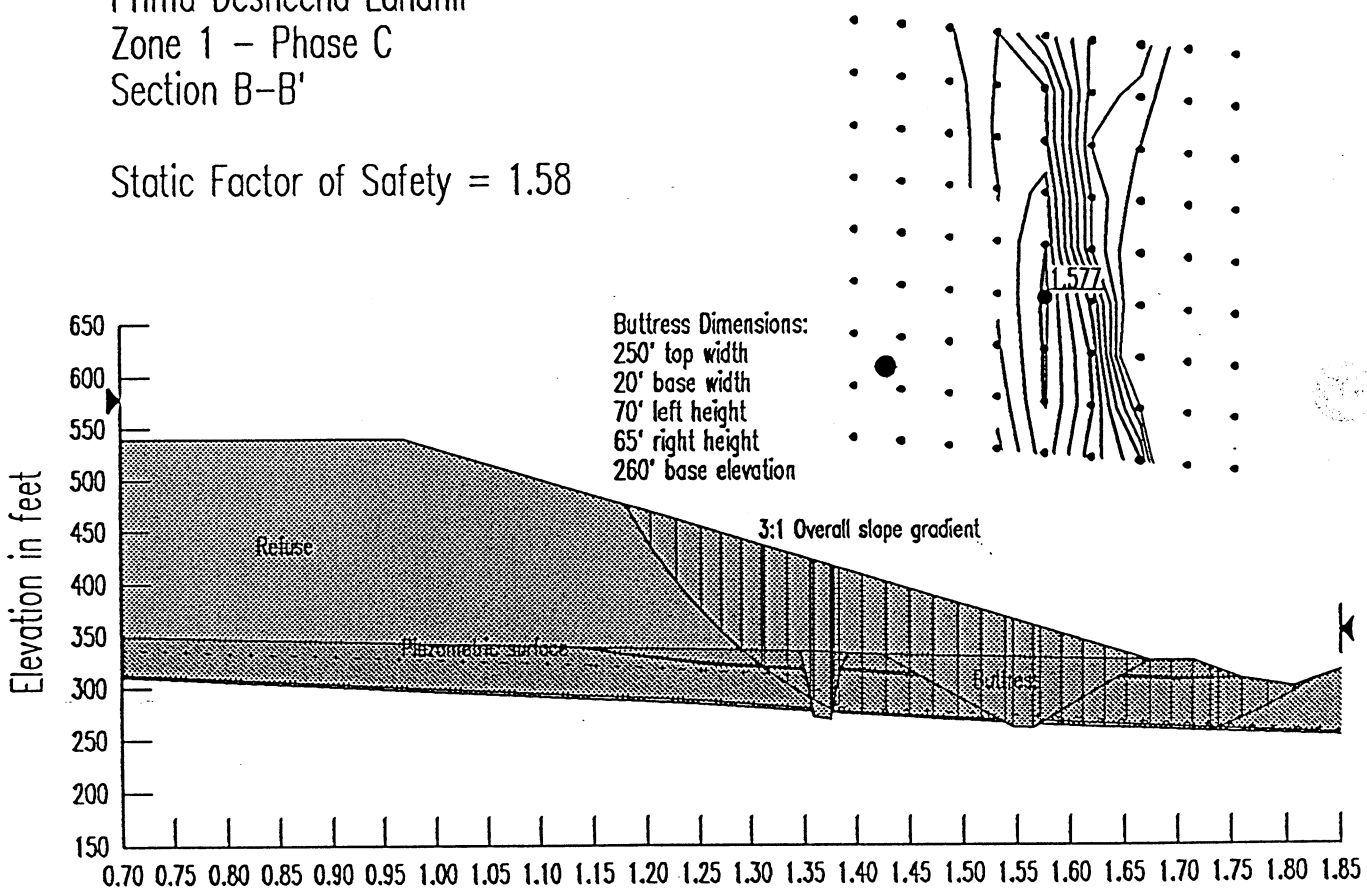
Static Factor of Safety = 1.68



File Name: DES3R7.SLP

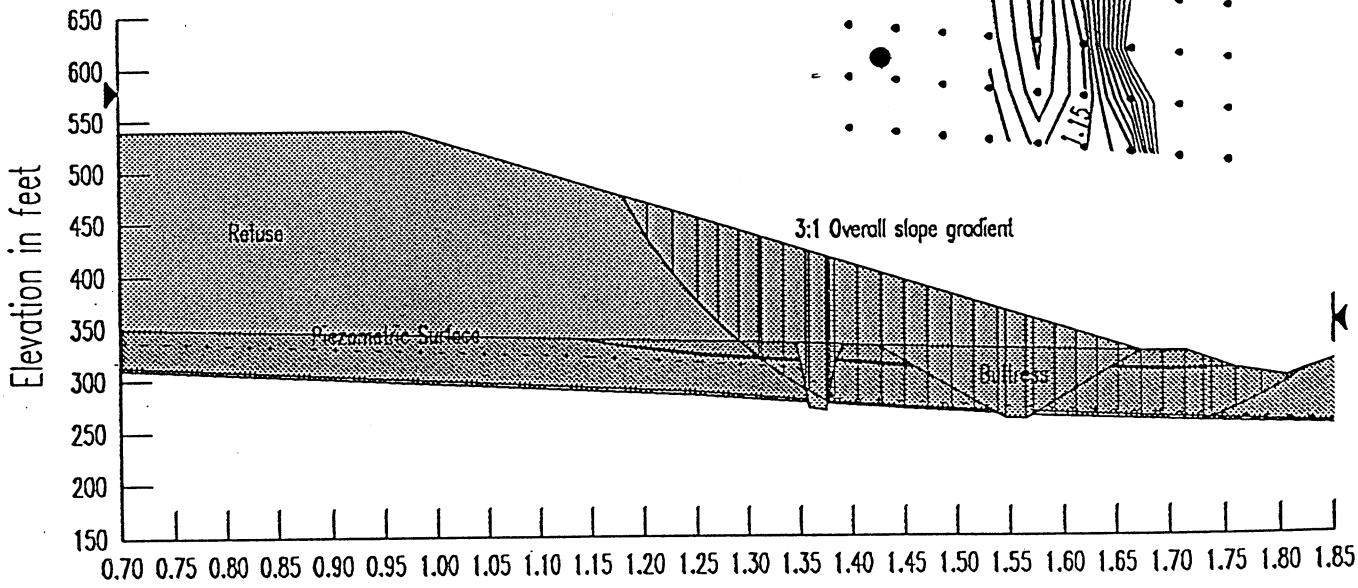
Prima Deshecha Landfill
Zone 1 – Phase C
Section B–B'

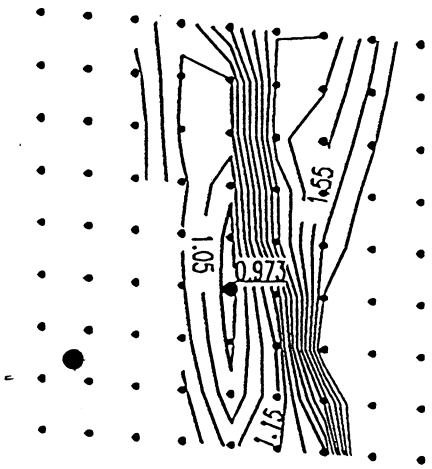
Static Factor of Safety = 1.58



Prima Deshecha Landfill
Zone 1 – Phase C
Section B–B'

Pseudostatic Factor of Safety = 0.97

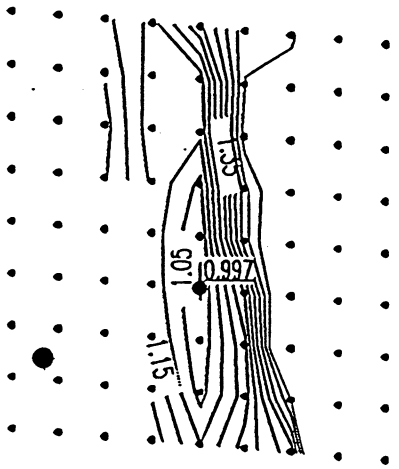


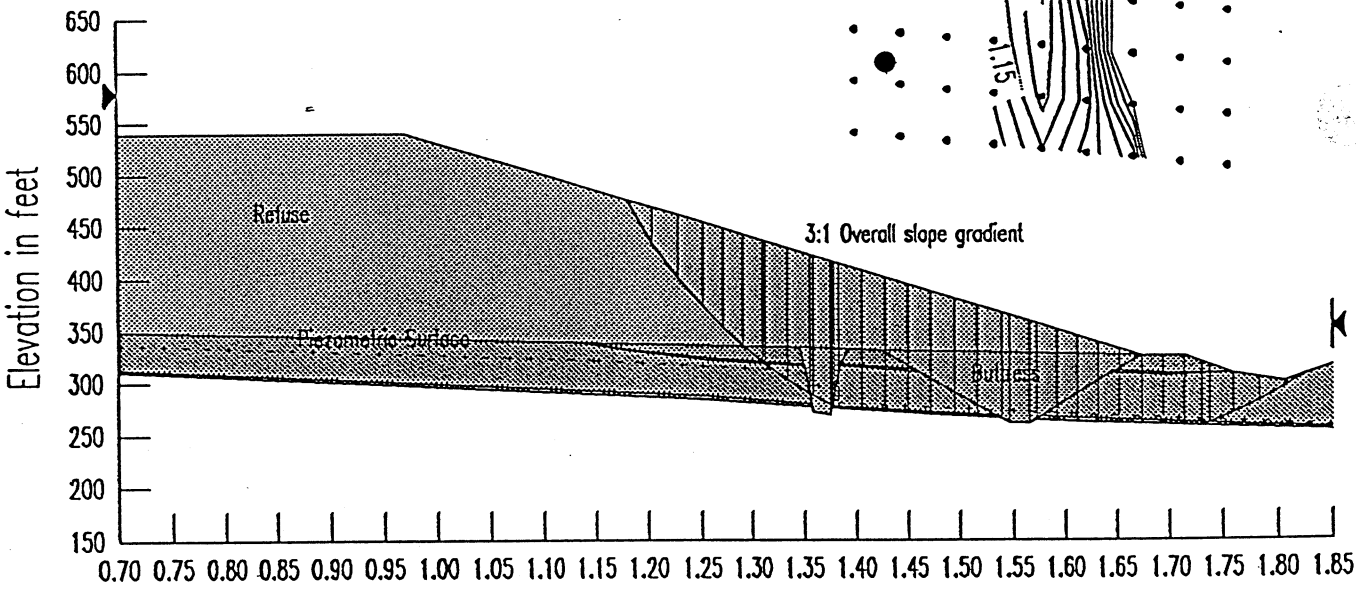


File Name: DES3R6P.SLP

Prima Deshecha Landfill
Zone 1 – Phase C
Section B–B'

Yield Acceleration = 0.14g

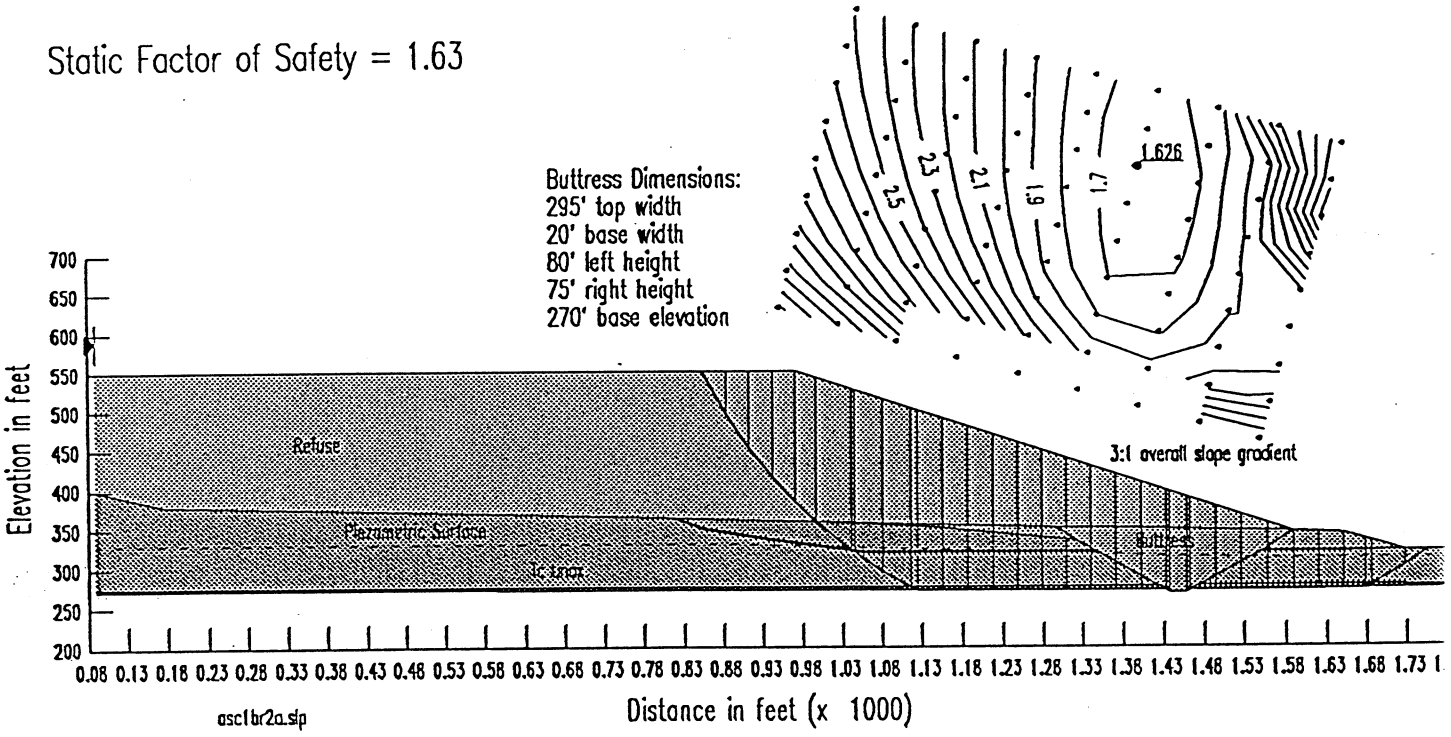




File Name: DES3R6Y.SLP

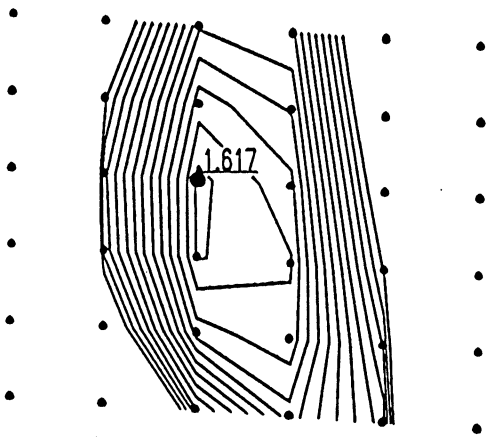
Prima Deshecha Landfill
Zone 1 – Phase C
Section C–C'

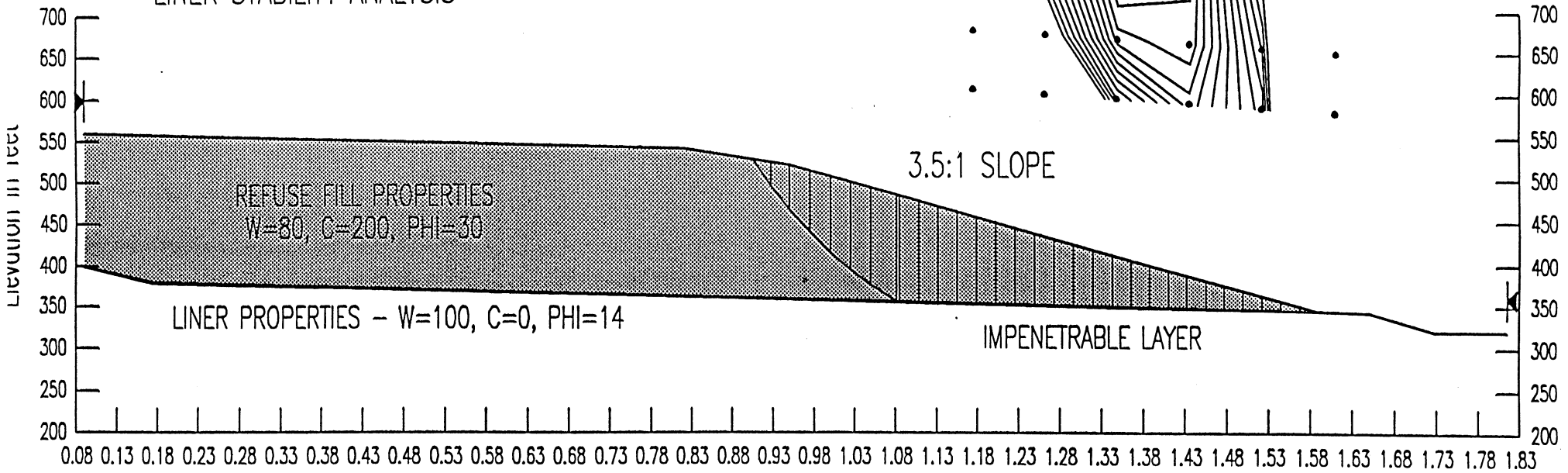
Static Factor of Safety = 1.63



PRIMA DESHECHA LANDFILL
ZONE 1 - PHASE C
CROSS SECTION C-C'

LINER STABILITY ANALYSIS

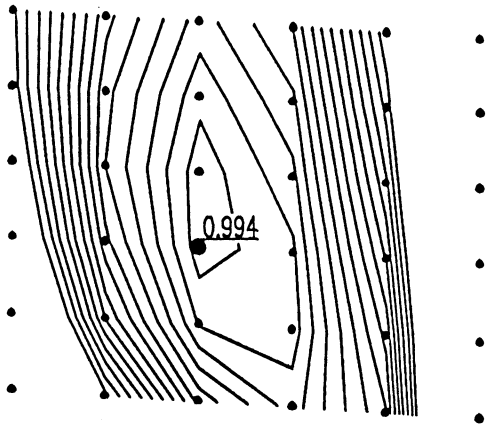


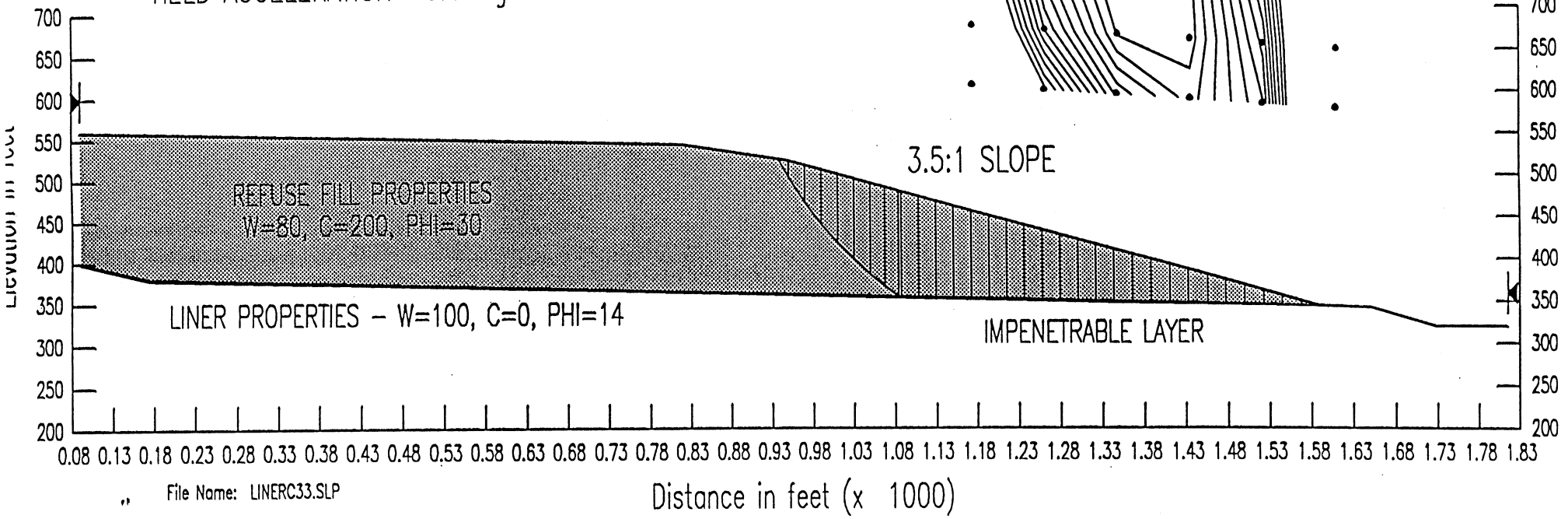


File Name: LINERC32.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION C–C'

YIELD ACCELERATION =0.135g



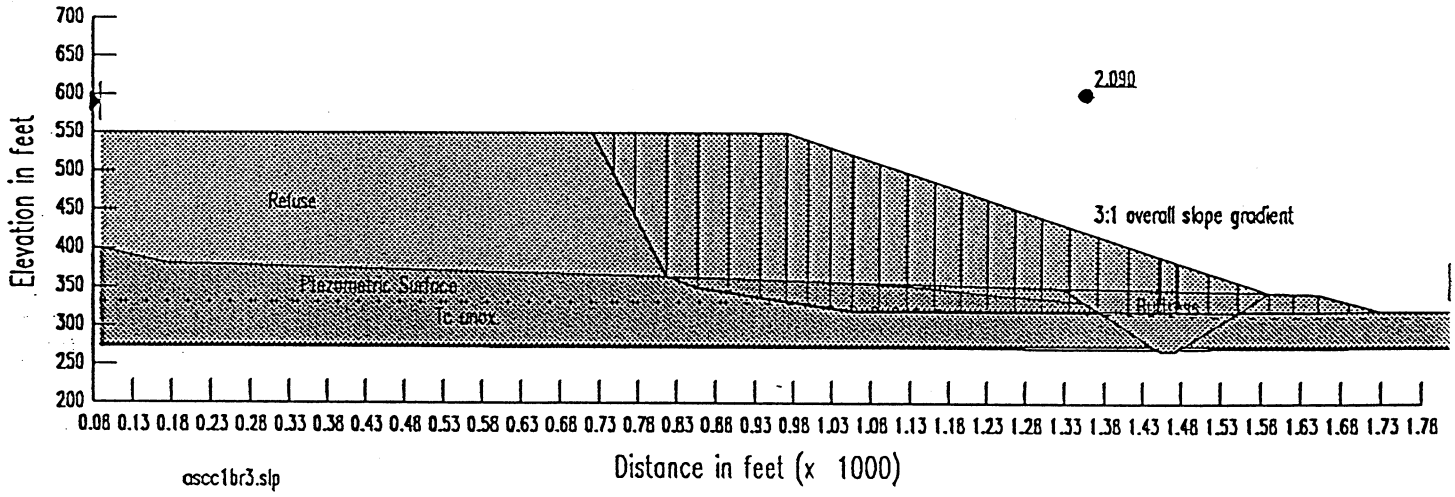


File Name: LINERC33.SLP

Prima Deshecha Landfill

Zone 1: Phase C
Section C–C'

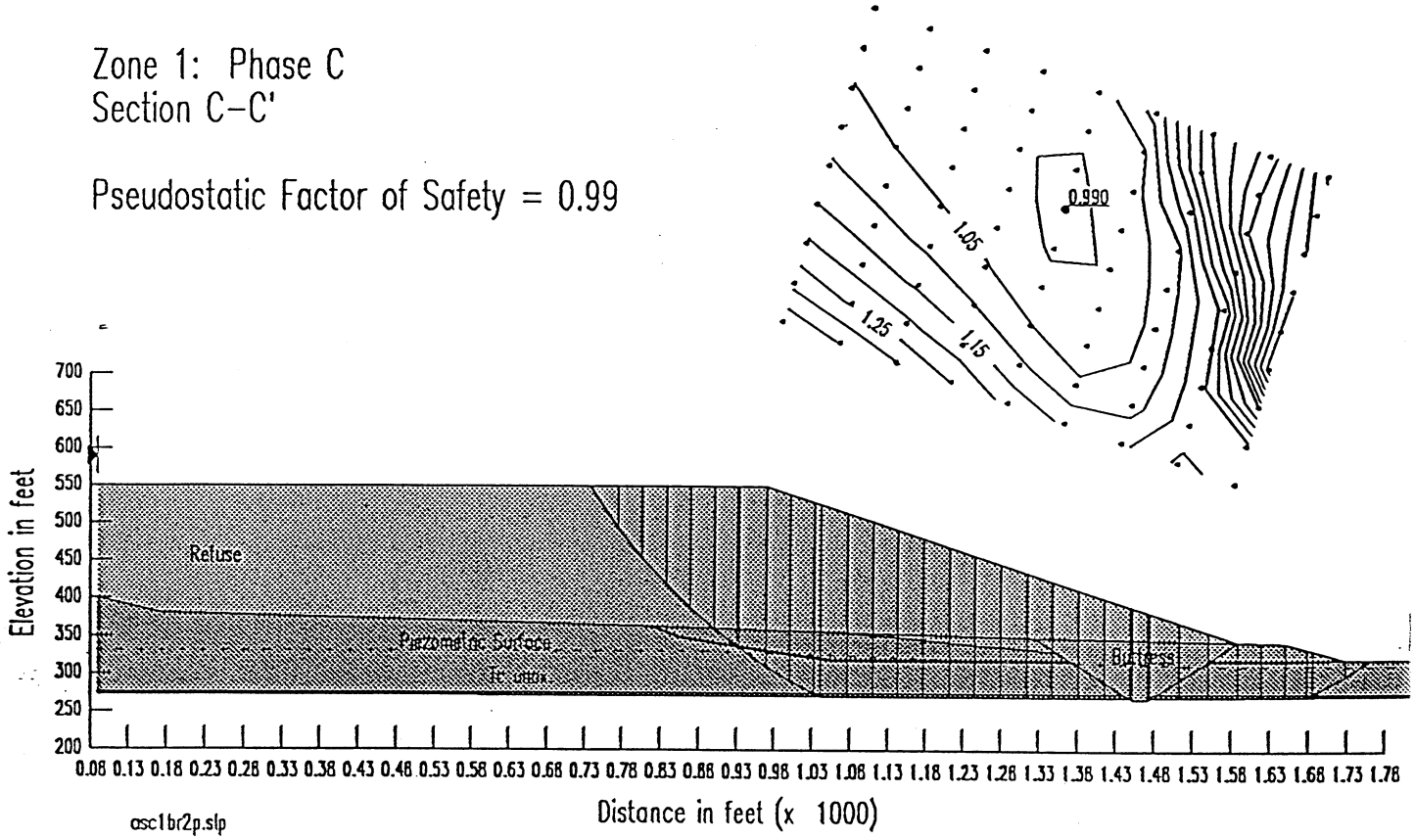
Static Factor of Safety = 2.1



Prima Deshecha Landfill

Zone 1: Phase C
Section C–C'

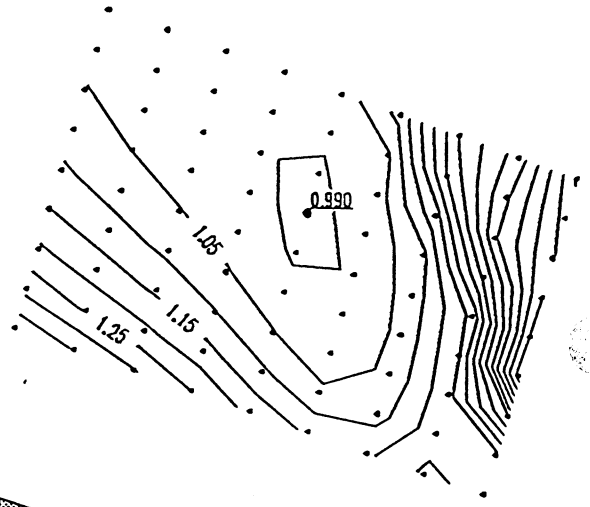
Pseudostatic Factor of Safety = 0.99

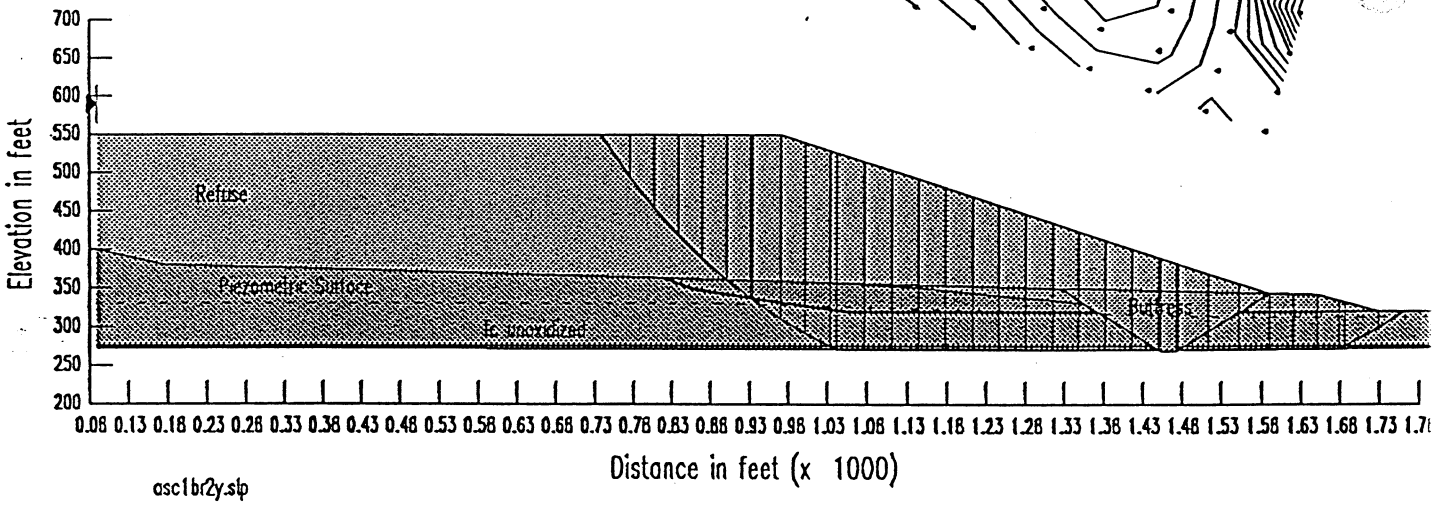


Prima Deshecha Landfill

Zone1: Phase C
Section C-C'

Yield Acceleration = 0.15g

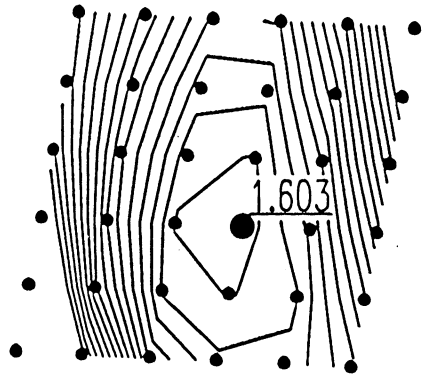


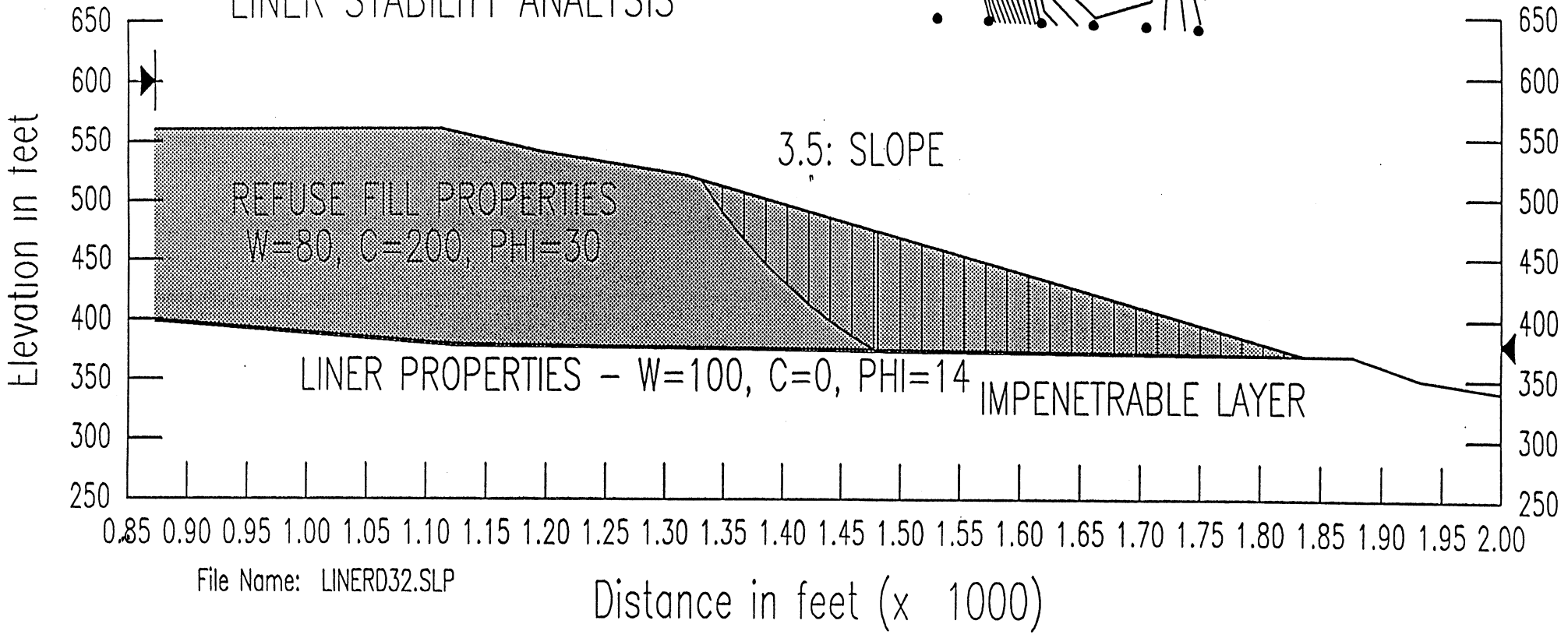


asc1br2y.slp

PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION D–D'

LINER STABILITY ANALYSIS

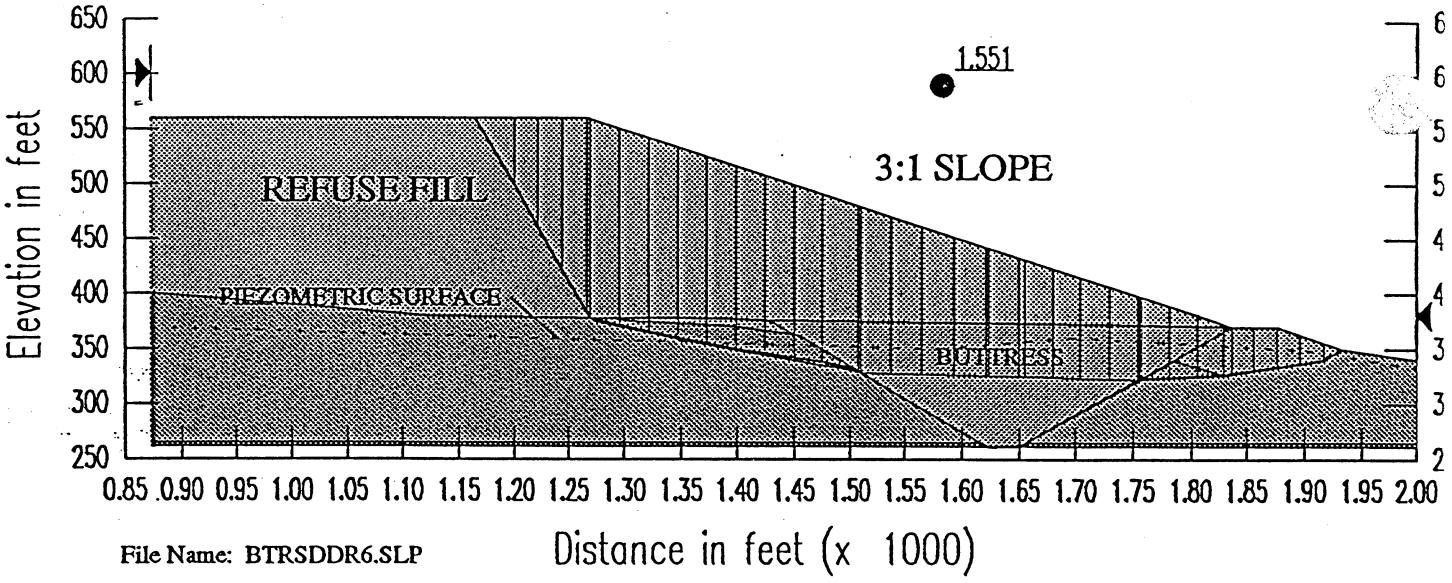




File Name: LINERD32.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 - PHASE C
CROSS SECTION D-D'

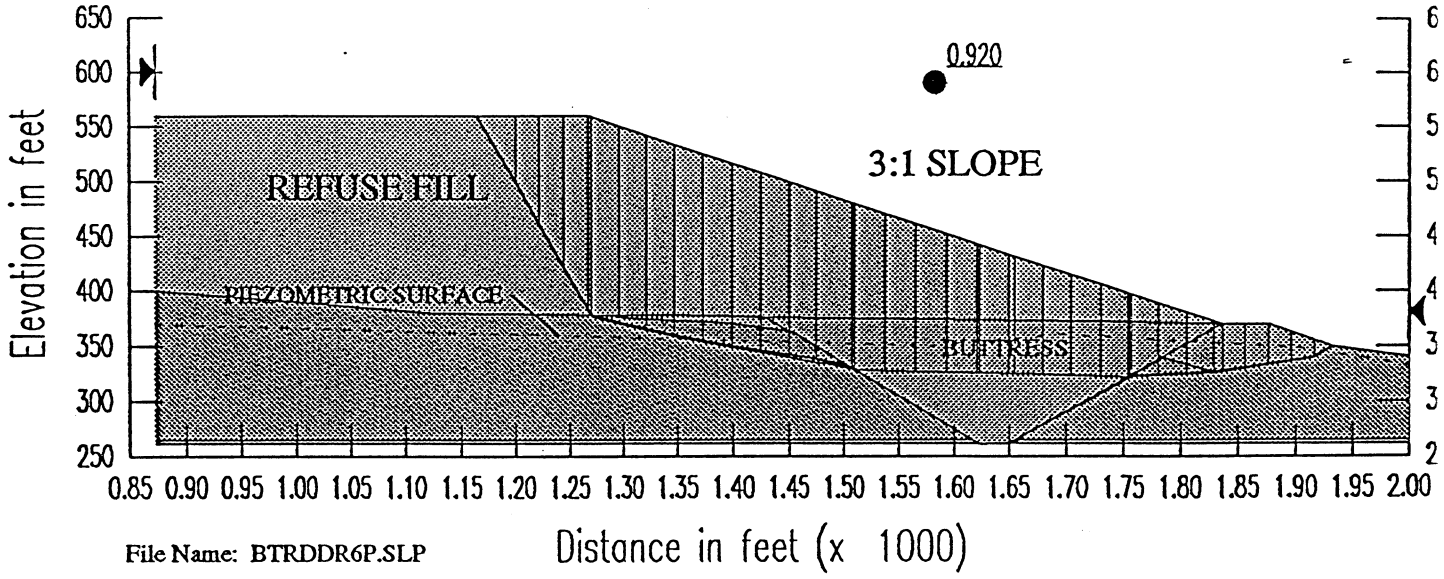
STATIC FACTOR OF SAFETY = 1.55



File Name: BTRSDDR6.SLP

Prima Deshecha Landfill
Zone 1 - Phase C
Section D-D'

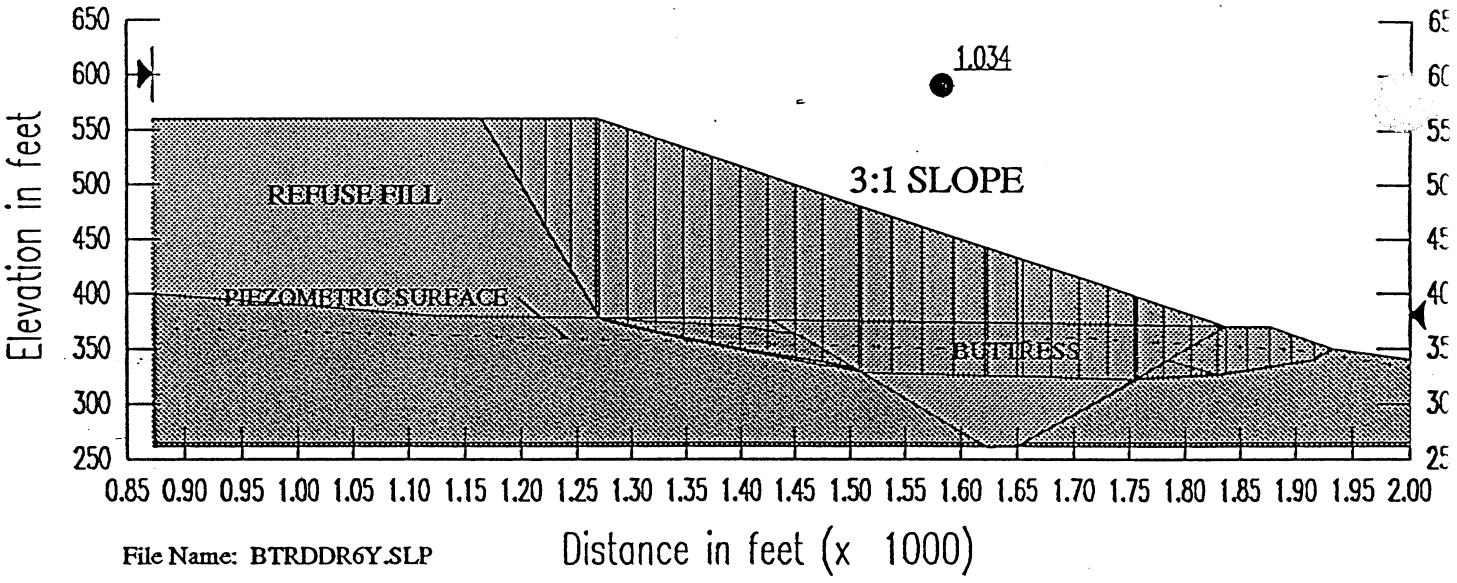
Pseudostatic Factor of Safety = 0.92



File Name: BTRDDR6P.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 - PHASE C
CROSS SECTION D-D'

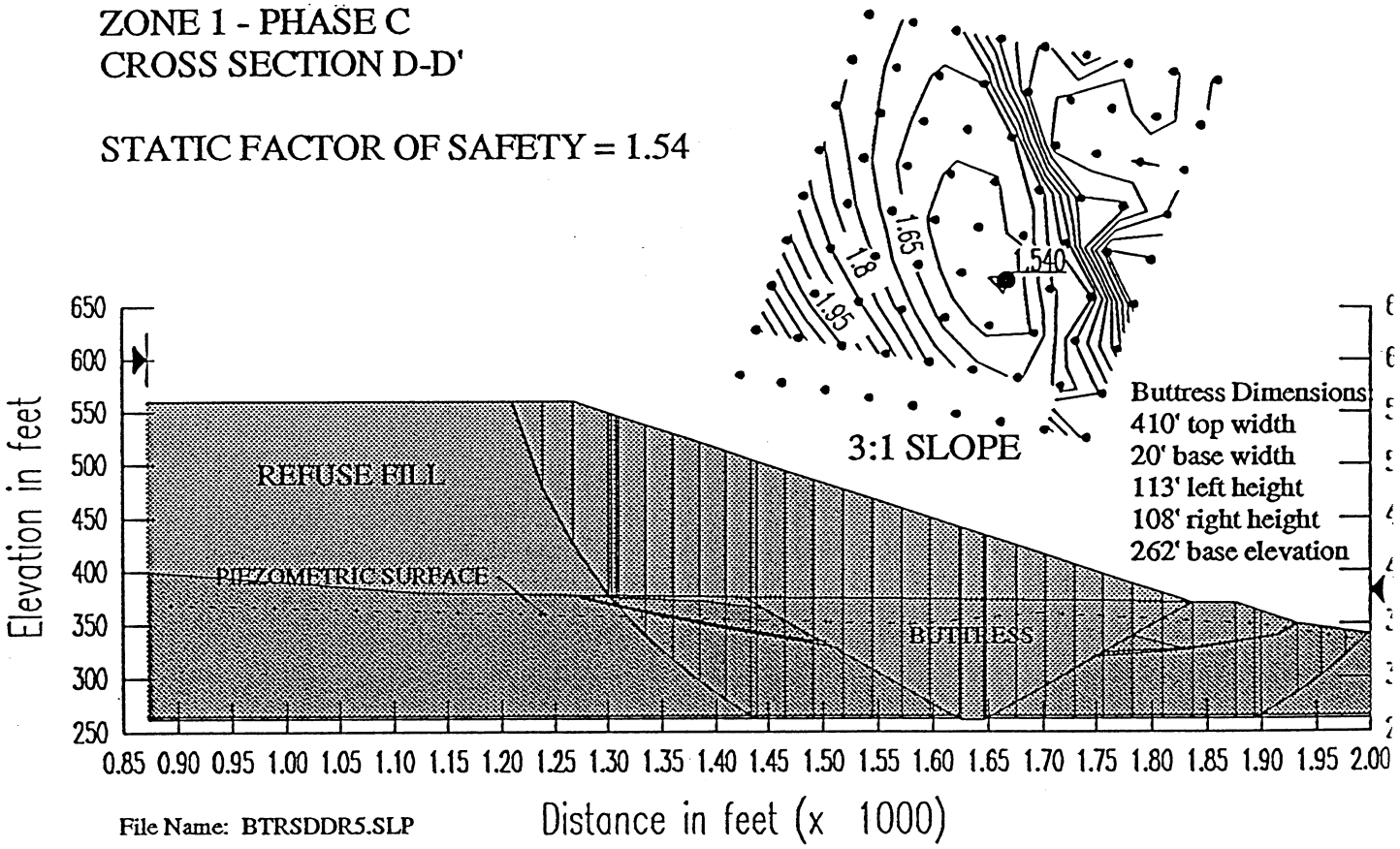
Yield Acceleration = 0.11g



File Name: BTRDDR6Y.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 - PHASE C
CROSS SECTION D-D'

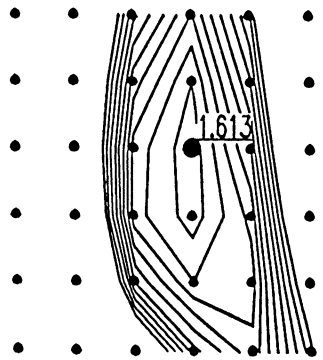
STATIC FACTOR OF SAFETY = 1.54

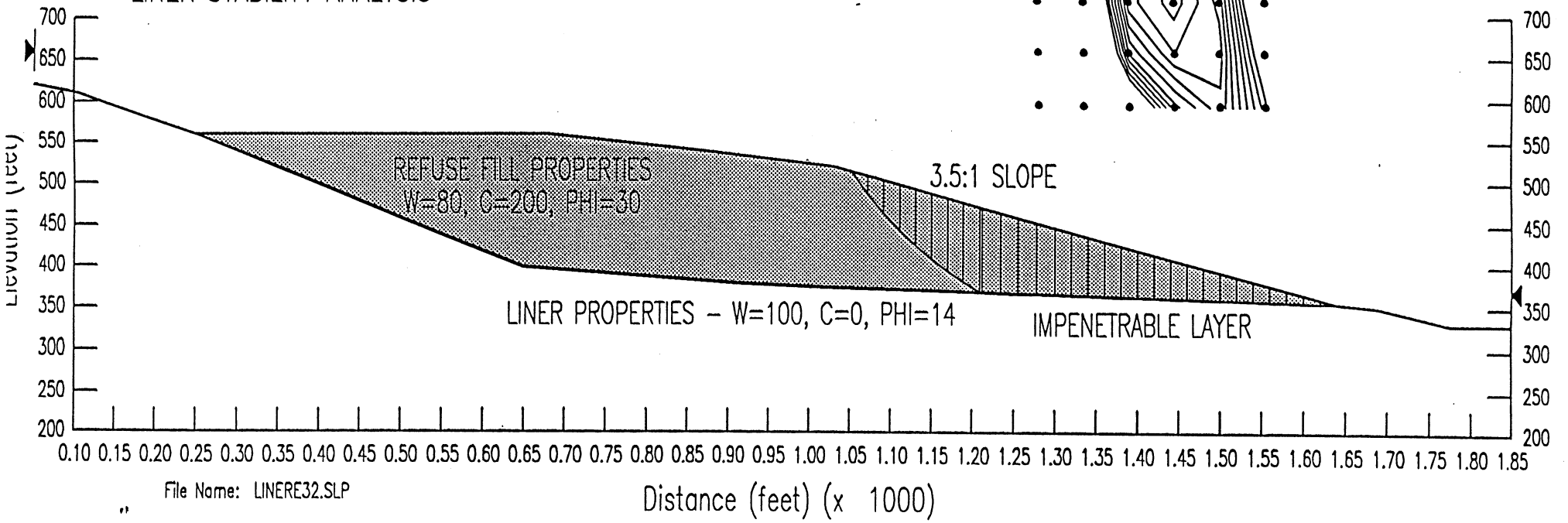


File Name: BTRSDDR5.SLP

PRIMA DESHECHA LANDFILL
ZONE 1 - PHASE C
CROSS SECTION E-E'

LINER STABILITY ANALYSIS

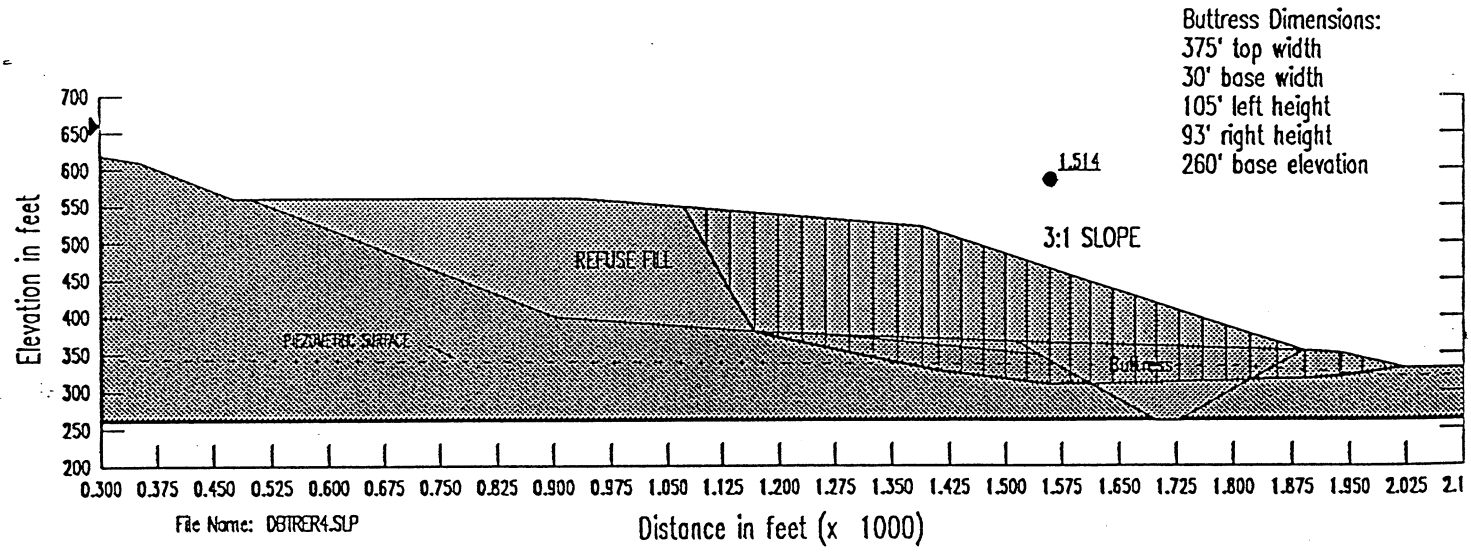




File Name: LINERE32.SLP

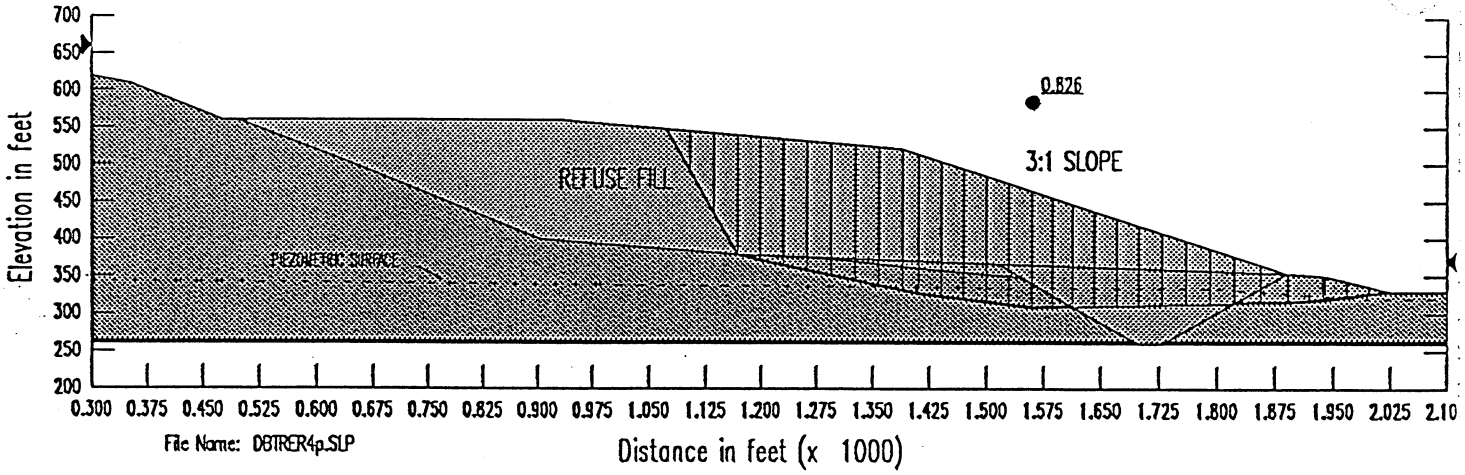
Prima Deshecha Landfill
Zone 1 – Phase C
Section E–E'

Static Factor of Safety = 1.51



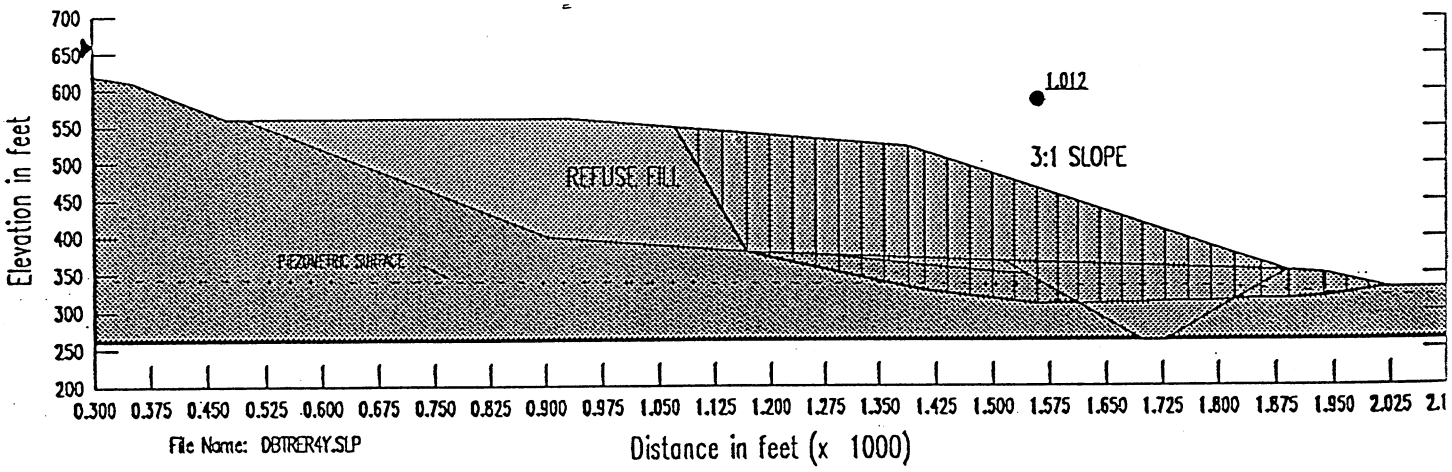
Prima Deshecha Landfill
Zone 1 – Phase C
Section E–E'

Pseudostatic Factor of Safety = 0.83



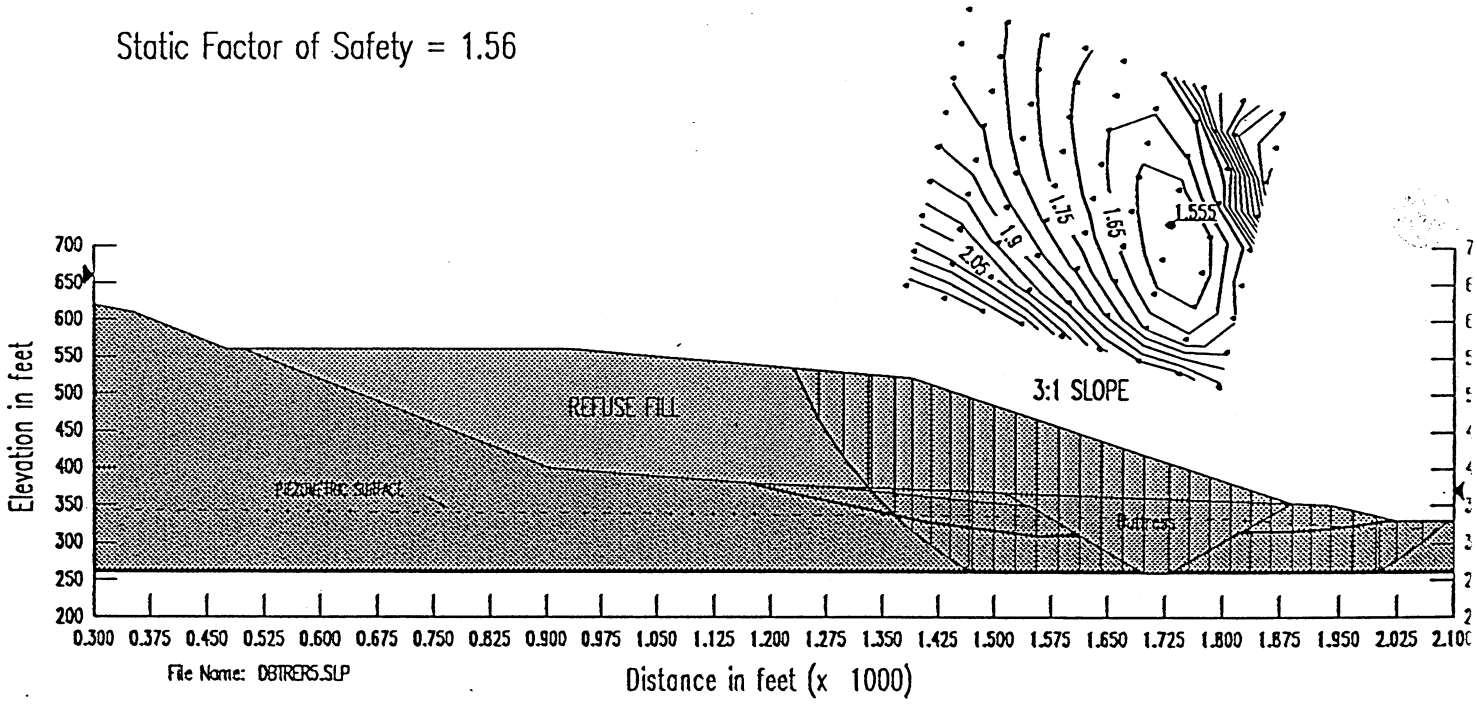
Prima Deshecha Landfill
Zone 1 – Phase C
Section E–E'

Yield Acceleration = 0.09g



PRIMA DESHECHA LANDFILL
ZONE 1 – PHASE C
CROSS SECTION E–E'

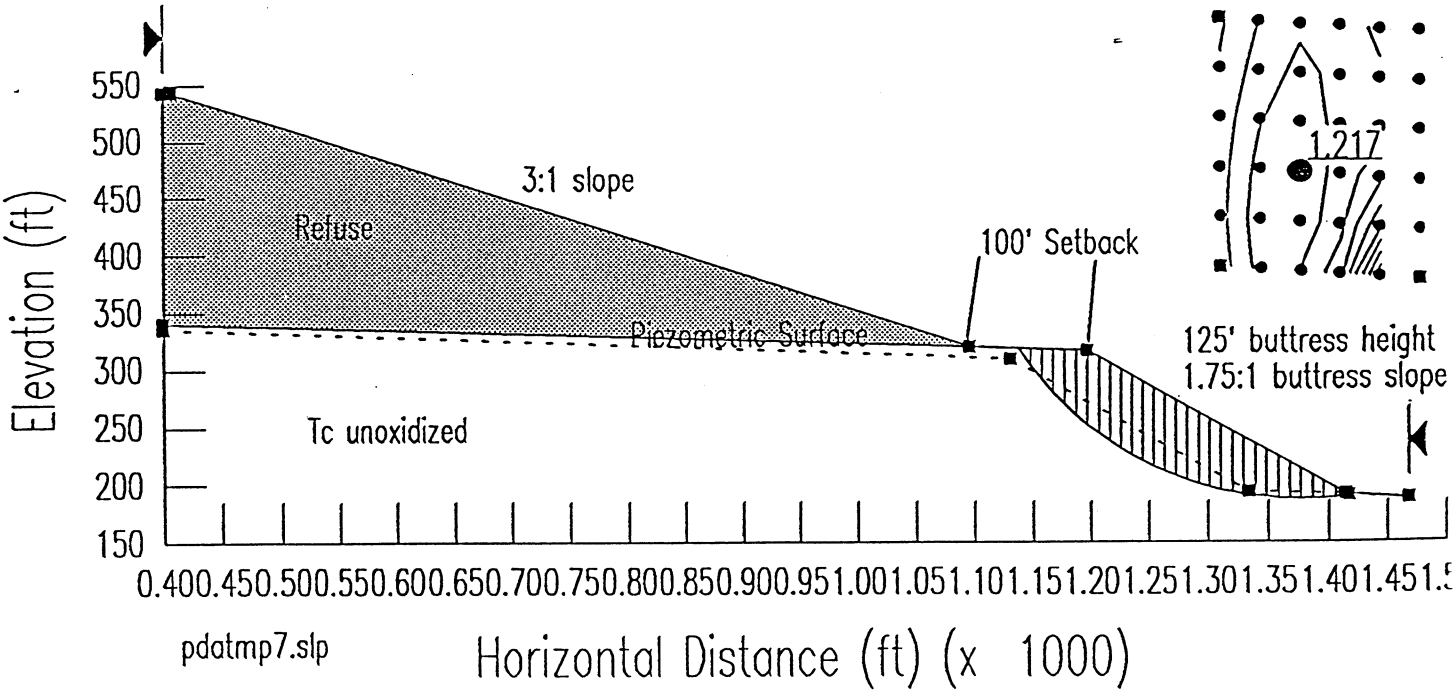
Static Factor of Safety = 1.56



Prima Deshecha Landfill

Zone 1 – Phase C
Section A–A'
Buttress Stability

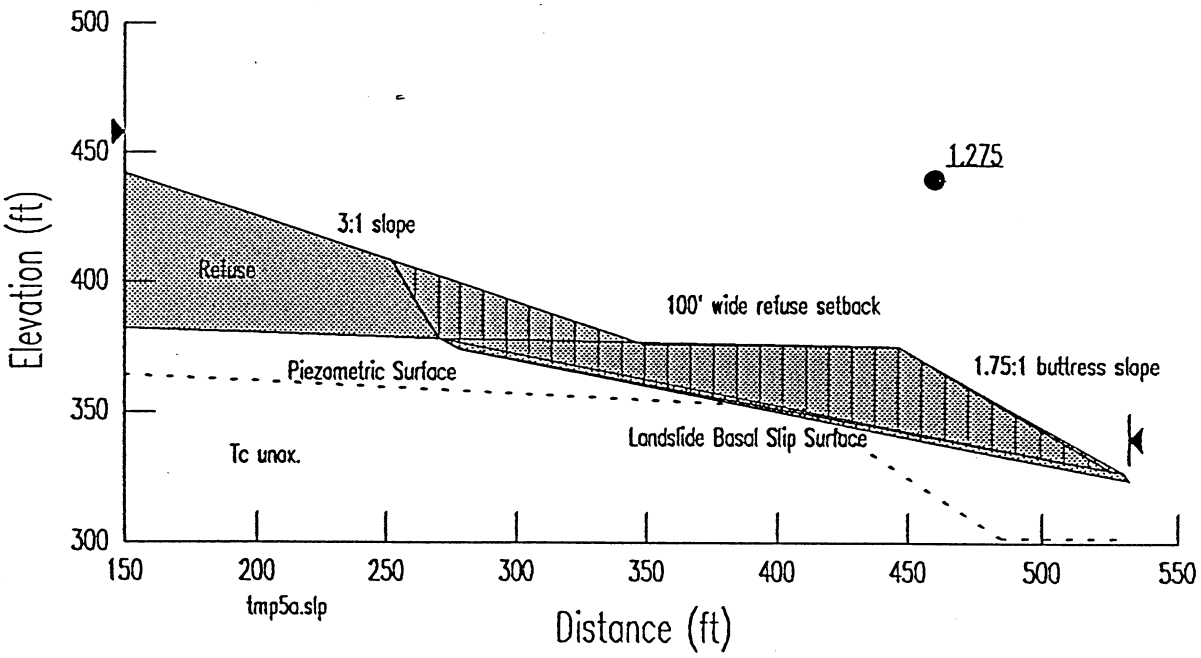
Static Factor of Safety = 1.22



Prima Deshecha Landfill
Zone 1 – Phase C
Section D–D'

Buttress Stability

Static Factor of Safety = 1.28



ATTACHMENT D
CAPACITY CALCULATIONS

PRIMA DESHECHA LANDFILL
REVISED ZONE 1 STOCKPILE AND CAPACITY INFORMATION
(34-ACRE FOOTPRINT EXPANSION)

TPD (1)	DESCRIPTION	DATE			STOCKPILE INFORMATION					REFUSE CAPACITY INFORMATION				DESCRIPTION
		START	END	YEARS	STOCKPILE MATERIAL AT BEGINNING	EXCAVATED MATERIAL TO STOCKPILE	COMPACTED FILL, STABILIZATION KEY & STABILIZATION FILL	LINER, COVER, & LCRS DRAINAGE LAYER	STOCKPILE MATERIAL AT END	WASTE WEIGHT TONS (2)	WASTE WEIGHT C.Y. (3)	DAILY AND INTERIM COVER C.Y. (4)	AIRSPACE CONSUMED (10)	
3000 tpd	Zone 1 - Phase A	1/1/00	7/20/00	0.55	0	190,372 (7)			0	507,531	761,486	190,372	951,858	3,000 tpd and 4:1 cover ratio starting 1/1/00; Phase A1 exc. matl. needed for Phase A daily cover
3000 tpd		7/21/00	2/13/02	1.57	0	542,148 (8)			0	1,445,367	2,168,593	542,148	2,710,741	Portion of Phase B exc. matl. needed for Phase A daily cover
3000 tpd	Zone 1 - Phase A1	2/14/02	8/23/03	1.52	0	643,700 (8)	49,000	69,875 (12)	0	1,399,183	2,099,300	524,825	2,624,125	Mass exc. to start one year prior to the phase accepting fill; Portion of Phase B exc. matl. needed for Phase A1 daily cover
3000 tpd	Zone 1 - Phase B	8/24/03	12/31/03	0.35	0	1,947,152 (8,9)	918,000	140,000 (12)	767,490	324,349	486,645	121,661	608,306	Mass exc. to start one year prior to the phase accepting fill
3500 tpd		1/1/04	11/26/05	1.90	767,490				0	2,046,130	3,069,962	767,490	3,837,452	3,500 tpd starting 1/1/104
3500 tpd		11/27/05	12/16/05	0.05	0	21,648 (10)			0	57,714	86,593	21,648	108,241	Portion of Phase C exc. matl. needed for Phase B daily cover
3500 tpd	Zone 1 - Phase C	12/17/05	12/31/06	1.04	0	3,620,352 (10)	46,000	230,000 (12)	2,926,584	1,113,769	1,671,071	417,768	2,088,838	Mass exc. to start one year prior to the phase accepting fill
4000 tpd		1/1/07	12/23/11	4.98	2,926,584				633,152	6,114,291	9,173,729	2,293,432	11,467,162	4,000 tpd starting 1/1/07
4000 tpd	Zone 1 - Phase D	12/24/11	5/14/17	5.39	633,152	2,901,000 (11)	21,000	280,000 (12)	749,152	6,622,344	9,936,000	2,484,000	12,420,000	Mass exc. to start one year prior to the phase accepting fill
ZONE 1 TOTAL				**18.35**		**9,881,000**	**1,034,000**	**719,875**		**20,302,376**	**30,572,878**	**7,736,511**	**38,309,389**	
ZONE 4 TOTAL				**48.32**		**47,470,500**	**12,937,000**	**5,133,000**		**59,342,494**	**89,036,000**	**22,259,000**	**111,295,000**	
TOTAL				**66.68**		**57,351,500**	**13,971,000**	**5,852,875**		**79,644,870**	**119,608,878**	**29,995,511**	**149,604,389**	

(1) Refuse inflow rate assumptions: 3,000 tpd - 1/1/00 to 12/31/03; 3,500 tpd - 1/1/04 to 12/31/06; 4,000 tpd - 1/1/07 thereafter.
(2) Assumes operating year of 307 days per year.
(3) Assumes unit weight of waste inplace is 1,333 lbs/cy for Zone 1.
(4) Assumes unit weight of waste inplace is 1,333 lbs/cy for Zone 4
(5) Assumes waste to soil ratio is 3:1 through 12/13/99 and 4:1 from 1/1/00 and thereafter
(6) Topography date (10/13/98) used to determine airspace volume.
(7) Phase A1 Net Excavation material to stockpile.
(8) Phase B Net Excavation material to stockpile.
(9) Required excavation grading volume for realignment of creek for Stockpile 1 (V=1.65 million cy).
(10) Phase C Net Excavation material to stockpile.
(11) Phase D Net Excavation material to stockpile.
(12) Does not account for final cover; accounts for 3-foot liner.

PRIMA DESHECHA LANDFILL
REVISED ZONE 1 STOCKPILE INFORMATION
(34-ACRE FOOTPRINT EXPANSION)

STOCKPILE	DATE	TPD	ANNUAL DAILY COVER	NET AMOUNT STOCKPILED AT THE BEGINNING	EXCAVATION FOR NEXT PHASE	AMOUNT TO STOCKPILE
Phase A1	02/14/01	3,000	0	0	0	0
Phase B	08/24/02	3,000	345,461	0	889,152	1,234,613
Phase C	12/17/04	3,500	403,038	0	3,344,352	3,747,390
Phase C1	12/17/04	3,500	403,038	0	1,672,176	2,075,214
Phase C2	12/21/07	4,000	403,038		1,672,176	2,075,214
Phase D	12/24/10	4,000	460,615	633,152	2,600,000	3,693,767
Phase D1	12/24/10	4,000	460,615	633,152	1,300,000	2,393,767
Phase D2	03/05/14	4,000	460,615		1,300,000	1,760,615

The mass excavation and construction of the liner system in Phases C and D are likely to occur in two stages due to the projected life of each phase. Phases C1, C2, D1 and D2 stockpile dates and amounts are approximate and based on dividing the phase life and stockpile amounts in half.

EARTHWORK QUANTITIES

DATE 3/10/00 JOB PRIMA DESHECHA LANDFILL
CALC BY TT STOCKPILE ON EAST PORTION OF PHASE B
SCALE 200
CHKD BY GVN (stock-0321.xls)

CONTOUR	AREA	CUT AVG. AREA	CUT DIST	CUT CU. YDS.	AREA	FILL AVG. AREA	FILL DIST	FILL CU. YDS.
330					0.00			
340		0	10	0.0	9.18	183600	10	68000.0
360		0	20	0.0	14.59	475400	20	352148.1
380		0	20	0.0	12.49	541600	20	401185.2
400		0	20	0.0	10.40	457800	20	339111.1
420		0	20	0.0	7.00	348000	20	257777.8
440		0	20	0.0	4.00	220000	20	162963.0
460		0	20	0.0	1.85	117000	20	86666.7
480		0	20	0.0	0.49	46800	20	34666.7
		0				9800		
TOTAL				0	TOTAL			1,703,000

ATTACHMENT E
HYDROLOGY CALCULATIONS

PRIMA DESHECHA LANDFILL
Pre-Developed Condition (Existing USGS Topo)

Storm Events (24-hour)	Peak Flowrate
2-year Pre-Developed Condition	552 cfs
5-year Pre-Developed Condition	841 cfs
10-year Pre-Developed Condition	1088 cfs
100-year Pre-Developed Condition	1757 cfs

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**************************************************************************

                    F L O O D   R O U T I N G   A N A L Y S I S
          USING ORANGE/SAN BERNARDINO COUNTY UNIT-HYDROGRAPH (1986 MANUAL)
          (c) Copyright 1989-90 Advanced Engineering Software (aes)
                    Ver. 1.6A  Release Date: 9/30/90  Serial # 8985

                                Analysis prepared by:

                          BRYAN A. STIRRAT & ASSOCIATES
                             1360 VALLEY VISTA DRIVE
                          DIAMOND BAR, CALIFORNIA 91765
                        (909) 860-7777  *  FAX (909) 860-8017

 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR UNIT HYDROGRAPH - PRE-DEVELOPED CONDITION                        *
* PRIMA DESHECHA LANDFILL                                                 *
* REALIGNMENT TO THE SOUTH                                                *
 **************************************************************************

  FILE NAME: PDVUH2.DAT
  TIME/DATE OF STUDY: 10:31  2/25/2000              BY: TT


**************************************************************************
  FLOW PROCESS FROM NODE     1.00 TO NODE     1.11 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>UNIT-HYDROGRAPH ANALYSIS<<<<<
==========================================================================

    (UNIT-HYDROGRAPH ADDED TO STREAM #1)

      WATERSHED AREA =    1308.390 ACRES
      BASEFLOW =    .000 CFS/SQUARE-MILE
      *USER ENTERED "LAG" TIME =     .643 HOURS
      VALLEY(UNDEVELOPED/DESERT) S-GRAPH SELECTED
      MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =   .200
      LOW LOSS FRACTION =  .200
      *HYDROGRAPH MODEL #1 SPECIFIED*

      SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=   .19
      SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=   .40
      SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =   .54
      SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =   .87
      SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.17
      SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.10

      PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
        5-MINUTE FACTOR =  .942
       30-MINUTE FACTOR =  .942
        1-HOUR FACTOR =  .942
        3-HOUR FACTOR =  .991
        6-HOUR FACTOR =  .996
       24-HOUR FACTOR =  .997

      UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
      UNIT INTERVAL PERCENTAGE OF LAG-TIME =  12.960


      RUNOFF HYDROGRAPH LISTING LIMITS:
      MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
      MODEL TIME(HOURS) FOR END OF RESULTS = 18.00
```

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.123	177.729
2	3.680	404.610
3	7.722	639.565
4	13.388	896.585
5	20.770	1167.950
6	29.402	1365.986
7	38.653	1463.801
8	47.883	1460.526
9	55.339	1179.755
10	61.156	920.419
11	65.533	692.618
12	69.167	574.916
13	71.963	442.504
14	74.258	363.166
15	76.212	309.203
16	78.072	294.251
17	79.661	251.447
18	81.163	237.711
19	82.476	207.737
20	83.733	198.878
21	84.880	181.493
22	85.957	170.454
23	86.895	148.431
24	87.772	138.738
25	88.551	123.308
26	89.329	123.046
27	90.106	123.023
28	90.782	106.855
29	91.352	90.210
30	91.922	90.258
31	92.491	89.996
32	92.964	74.806
33	93.379	65.625
34	93.793	65.625
35	94.207	65.435
36	94.602	62.596
37	94.991	61.571
38	95.380	61.476
39	95.760	60.093
40	96.062	47.835
41	96.348	45.165
42	96.633	45.118
43	96.909	43.781
44	97.148	37.726
45	97.381	36.913
46	97.614	36.915
47	97.835	34.863
48	98.019	29.092
49	98.200	28.711
50	98.381	28.710
51	98.544	25.754
52	98.674	20.604
53	98.804	20.508
54	98.934	20.555
55	99.063	20.460
56	99.192	20.460
57	99.322	20.460
58	99.451	20.460

59	99.580	20.460
60	99.710	20.460
61	99.839	20.460
62	99.968	20.460
63	100.000	5.014

TOTAL STORM RAINFALL(INCHES) = 2.09
TOTAL SOIL-LOSS(INCHES) = .40
TOTAL EFFECTIVE RAINFALL(INCHES) = 1.69

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 43.5893
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 184.6817

24-HOUR STORM
RUNOFF HYDROGRAPH

HYDROGRAPH IN FIVE-MINUTE INTERVALS(CFS)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	150.0	300.0	450.0	600.0
14.083	63.4182	108.67	. Q . V	.	.	.	
14.167	64.1827	111.01	. Q . V	.	.	.	
14.250	64.9656	113.67	. Q . V	.	.	.	
14.333	65.7691	116.68	. Q . V	.	.	.	
14.417	66.5959	120.05	. Q . V	.	.	.	
14.500	67.4482	123.75	. Q . V	.	.	.	
14.583	68.3276	127.69	. Q . V	.	.	.	
14.667	69.2354	131.81	. Q . V	.	.	.	
14.750	70.1710	135.85	. Q . V	.	.	.	
14.833	71.1344	139.89	. Q . V	.	.	.	
14.917	72.1259	143.96	. Q . V	.	.	.	
15.000	73.1465	148.19	. Q . V	.	.	.	
15.083	74.1975	152.62	. Q V	.	.	.	
15.167	75.2811	157.33	. Q V	.	.	.	
15.250	76.3997	162.42	. Q V	.	.	.	
15.333	77.5566	167.98	. Q V	.	.	.	
15.417	78.7537	173.81	. Q V	.	.	.	
15.500	79.9932	179.98	. Q V	.	.	.	
15.583	81.2786	186.64	. Q V	.	.	.	
15.667	82.6148	194.01	. Q V	.	.	.	
15.750	84.0084	202.35	. Q V	.	.	.	
15.833	85.4703	212.27	. Q V	.	.	.	
15.917	87.0234	225.51	. Q V	.	.	.	
16.000	88.7095	244.81	. Q V	.	.	.	
16.083	90.7145	291.13	. Q	.	.	.	
16.167	93.0984	346.15	. V Q	.	.	.	
16.250	95.8683	402.18	. V Q	.	.	.	
16.333	99.0239	458.20	. V Q	.	.	.	
16.417	102.5343	509.71	. V	. Q	.	.	
16.500	106.2750	543.15	. V	. Q	.	.	
16.583	110.0800	552.49	. V	. Q	.	.	
16.667	113.7782	536.98	. V	. Q	.	.	
16.750	117.0855	480.22	. V	. Q	.	.	
16.833	120.0093	424.54	. V Q	.	.	.	
16.917	122.5906	374.80	. Q V	.	.	.	
17.000	124.9395	341.07	. Q	V .	.	.	
17.083	127.0602	307.93	. Q	V .	.	.	
17.167	129.0144	283.75	. Q	. V .	.	.	
17.250	130.8374	264.70	. Q	. V .	.	.	
17.333	132.5703	251.62	. Q	. V .	.	.	
17.417	134.1956	236.01	. Q	. V .	.	.	
17.500	135.7425	224.61	. Q	. V .	.	.	
17.583	137.2025	211.99	. Q	. V .	.	.	
17.667	138.5981	202.64	. Q	. V	.	.	
17.750	139.9270	192.96	. Q	. V	.	.	
17.833	141.1986	184.64	. Q	. V	.	.	
17.917	142.4081	175.61	. Q	. V	.	.	
18.000	143.5698	168.69	. Q	. V	.	.	

END OF FLOOD ROUTING ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 OCEMA HYDROLOGY CRITERION)
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Ver. 5.8A Release Date: 8/28/90 Serial # 7985

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************************** DESCRIPTION OF STUDY **************************
* 2-YEAR PRE-DEVELOPED CONDITION HYDROLOGY (EXISTING USGS TOPO)          *
* PRIMA DESHECHA LANDFILL                                                *
* REALIGNMENT TO THE SOUTH                                               *
**************************************************************************

 FILE NAME: PDEV2.DAT
 TIME/DATE OF STUDY: 10:28  2/25/2000          BY: TT
==========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
          -*TIME-OF-CONCENTRATION MODEL*-

 USER SPECIFIED STORM EVENT(YEAR) =  2.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .90
 *USER-DEFINED TABLED RAINFALL USED*
 NUMBER OF [TIME,INTENSITY] DATA PAIRS =  5
  1)  5.000;  2.260
  2)  15.000;  1.200
  3)  30.000;  .810
  4)  60.000;  .540
  5) 120.000;  .370

**************************************************************************
 FLOW PROCESS FROM NODE    1.00 TO NODE    1.01 IS CODE =  2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  900.00
 UPSTREAM ELEVATION(FEET) =  1125.00
 DOWNSTREAM ELEVATION(FEET) =  1020.00
 ELEVATION DIFFERENCE(FEET) =  105.00
 TC(MIN.) =  .935*[(  900.00** 3.00)/(  105.00)]** .20 =  21.833
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.022
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =  7.40
 TOTAL AREA(ACRES) =  10.00  PEAK FLOW RATE(CFS) =  7.40

**************************************************************************
 FLOW PROCESS FROM NODE    1.01 TO NODE    1.02 IS CODE =  9
--------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION(FEET) =  1020.00
 DOWNSTREAM NODE ELEVATION(FEET) =  940.00
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```
CHANNEL LENGTH THRU SUBAREA(FEET) =  950.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =  .941
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.09
AVERAGE FLOW DEPTH(FEET) =  .79  FLOOD WIDTH(FEET) =  7.91
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.11  TC(MIN.) = 24.94
SUBAREA AREA(ACRES) =  25.50  SUBAREA RUNOFF(CFS) =  17.02
EFFECTIVE AREA(ACRES) =  35.50  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  35.50  PEAK FLOW RATE(CFS) =  23.69
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  .93  FLOOD WIDTH(FEET) =  9.27
FLOW VELOCITY(FEET/SEC.) =  5.51  DEPTH*VELOCITY =  5.12

****************************************************************************
FLOW PROCESS FROM NODE    1.02 TO NODE    1.03 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  940.00
DOWNSTREAM NODE ELEVATION(FEET) =  860.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  700.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =  .898
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.01
AVERAGE FLOW DEPTH(FEET) =  .99  FLOOD WIDTH(FEET) =  9.86
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.66  TC(MIN.) = 26.61
SUBAREA AREA(ACRES) =  33.10  SUBAREA RUNOFF(CFS) =  20.80
EFFECTIVE AREA(ACRES) =  68.60  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  68.60  PEAK FLOW RATE(CFS) =  43.11
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.09  FLOOD WIDTH(FEET) =  10.84
FLOW VELOCITY(FEET/SEC.) =  7.34  DEPTH*VELOCITY =  7.97

****************************************************************************
FLOW PROCESS FROM NODE    1.03 TO NODE    1.04 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  860.00
DOWNSTREAM NODE ELEVATION(FEET) =  700.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1200.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =  .835
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.25
AVERAGE FLOW DEPTH(FEET) =  1.16  FLOOD WIDTH(FEET) =  11.62
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.43  TC(MIN.) = 29.03
SUBAREA AREA(ACRES) =  43.80  SUBAREA RUNOFF(CFS) =  25.04
EFFECTIVE AREA(ACRES) = 112.40  AVERAGED Fm(INCH/HR) =  .20
```

```
TOTAL AREA(ACRES) =  112.40   PEAK FLOW RATE(CFS) =    64.25
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.22   FLOOD WIDTH(FEET) =  12.20
FLOW VELOCITY(FEET/SEC.) =  8.63   DEPTH*VELOCITY =  10.55


****************************************************************************
 FLOW PROCESS FROM NODE     1.04 TO NODE     1.05 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    700.00
 DOWNSTREAM NODE ELEVATION(FEET) =    580.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =   .808
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.10
 AVERAGE FLOW DEPTH(FEET) =  1.34   FLOOD WIDTH(FEET) =  13.37
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.24   TC(MIN.) =  30.27
 SUBAREA AREA(ACRES) =  95.50   SUBAREA RUNOFF(CFS) =  52.22
 EFFECTIVE AREA(ACRES) =  207.90   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  207.90   PEAK FLOW RATE(CFS) =   113.68
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.48   FLOOD WIDTH(FEET) =  14.74
 FLOW VELOCITY(FEET/SEC.) =  10.46   DEPTH*VELOCITY =  15.44


****************************************************************************
 FLOW PROCESS FROM NODE     1.05 TO NODE     1.06 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    580.00
 DOWNSTREAM NODE ELEVATION(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =   .766
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.10
 AVERAGE FLOW DEPTH(FEET) =  1.75   FLOOD WIDTH(FEET) =  17.47
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  4.58   TC(MIN.) =  34.85
 SUBAREA AREA(ACRES) =  98.90   SUBAREA RUNOFF(CFS) =  50.41
 EFFECTIVE AREA(ACRES) =  306.80   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  306.80   PEAK FLOW RATE(CFS) =   156.38
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.83   FLOOD WIDTH(FEET) =  18.26
 FLOW VELOCITY(FEET/SEC.) =  9.38   DEPTH*VELOCITY =  17.15


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    400.00
 DOWNSTREAM NODE ELEVATION(FEET) =    335.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
"V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =   5.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =   .745
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.60
AVERAGE FLOW DEPTH(FEET) =   2.02   FLOOD WIDTH(FEET) =   20.21
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.33   TC(MIN.) =  37.18
SUBAREA AREA(ACRES) =   78.30   SUBAREA RUNOFF(CFS) =   38.43
EFFECTIVE AREA(ACRES) =  385.10   AVERAGED Fm(INCH/HR) =   .20
TOTAL AREA(ACRES) =  385.10   PEAK FLOW RATE(CFS) =   189.03
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  2.08   FLOOD WIDTH(FEET) =   20.79
FLOW VELOCITY(FEET/SEC.) =   8.74   DEPTH*VELOCITY =  18.20


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  37.18
 RAINFALL INTENSITY(INCH/HR) =   .75
 AVERAGED Fm(INCH/HR) =   .20
 EFFECTIVE STREAM AREA(ACRES) =  385.10
 TOTAL STREAM AREA(ACRES) =  385.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    189.03


****************************************************************************
 FLOW PROCESS FROM NODE     1.00 TO NODE     1.51 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
 UPSTREAM ELEVATION(FEET) =   1125.00
 DOWNSTREAM ELEVATION(FEET) =   1000.00
 ELEVATION DIFFERENCE(FEET) =    125.00
 TC(MIN.) =  .935*[(  800.00** 3.00)/(  125.00)]** .20 =   19.646
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.079
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =      5.78
 TOTAL AREA(ACRES) =      7.30   PEAK FLOW RATE(CFS) =      5.78


****************************************************************************
 FLOW PROCESS FROM NODE     1.51 TO NODE     1.52 IS CODE =   9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   1000.00
 DOWNSTREAM NODE ELEVATION(FEET) =    940.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   800.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
```

2 YEAR RAINFALL INTENSITY(INCH/HR) = .999
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.32
AVERAGE FLOW DEPTH(FEET) = .68 FLOOD WIDTH(FEET) = 6.74
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 3.09 TC(MIN.) = 22.73
SUBAREA AREA(ACRES) = 11.20 SUBAREA RUNOFF(CFS) = 8.05
EFFECTIVE AREA(ACRES) = 18.50 AVERAGED Fm(INCH/HR) = .20
TOTAL AREA(ACRES) = 18.50 PEAK FLOW RATE(CFS) = 13.30
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = .75 FLOOD WIDTH(FEET) = 7.52
FLOW VELOCITY(FEET/SEC.) = 4.71 DEPTH*VELOCITY = 3.55

****
FLOW PROCESS FROM NODE 1.52 TO NODE 1.53 IS CODE = 9

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==
UPSTREAM NODE ELEVATION(FEET) = 940.00
DOWNSTREAM NODE ELEVATION(FEET) = 800.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1450.00
"V" GUTTER WIDTH(FEET) = .00 GUTTER HIKE(FEET) = .001
PAVEMENT LIP(FEET) = .001 MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) = 5.00
2 YEAR RAINFALL INTENSITY(INCH/HR) = .892
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.88
AVERAGE FLOW DEPTH(FEET) = .89 FLOOD WIDTH(FEET) = 8.88
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 4.11 TC(MIN.) = 26.85
SUBAREA AREA(ACRES) = 31.70 SUBAREA RUNOFF(CFS) = 19.74
EFFECTIVE AREA(ACRES) = 50.20 AVERAGED Fm(INCH/HR) = .20
TOTAL AREA(ACRES) = 50.20 PEAK FLOW RATE(CFS) = 31.27
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = .99 FLOOD WIDTH(FEET) = 9.86
FLOW VELOCITY(FEET/SEC.) = 6.43 DEPTH*VELOCITY = 6.35

****
FLOW PROCESS FROM NODE 1.53 TO NODE 1.54 IS CODE = 9

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==
UPSTREAM NODE ELEVATION(FEET) = 800.00
DOWNSTREAM NODE ELEVATION(FEET) = 500.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1700.00
"V" GUTTER WIDTH(FEET) = .00 GUTTER HIKE(FEET) = .001
PAVEMENT LIP(FEET) = .001 MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) = 10.00
2 YEAR RAINFALL INTENSITY(INCH/HR) = .810
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.96
AVERAGE FLOW DEPTH(FEET) = 1.03 FLOOD WIDTH(FEET) = 10.25
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 3.16 TC(MIN.) = 30.01
SUBAREA AREA(ACRES) = 57.60 SUBAREA RUNOFF(CFS) = 31.62
EFFECTIVE AREA(ACRES) = 107.80 AVERAGED Fm(INCH/HR) = .20
TOTAL AREA(ACRES) = 107.80 PEAK FLOW RATE(CFS) = 59.18
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 1.12 FLOOD WIDTH(FEET) = 11.23
FLOW VELOCITY(FEET/SEC.) = 9.39 DEPTH*VELOCITY = 10.56

```
****************************************************************************
 FLOW PROCESS FROM NODE    1.54 TO NODE    1.06 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   500.00
 DOWNSTREAM NODE ELEVATION(FEET) =   400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1700.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) = 10.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  .770
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.40
 AVERAGE FLOW DEPTH(FEET) =  1.48  FLOOD WIDTH(FEET) =  14.74
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  4.42  TC(MIN.) = 34.43
 SUBAREA AREA(ACRES) =  40.60  SUBAREA RUNOFF(CFS) =  20.83
 EFFECTIVE AREA(ACRES) = 148.40  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 148.40  PEAK FLOW RATE(CFS) =  76.14
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 1.52  FLOOD WIDTH(FEET) =  15.13
 FLOW VELOCITY(FEET/SEC.) =  6.65  DEPTH*VELOCITY = 10.07


****************************************************************************
 FLOW PROCESS FROM NODE    1.06 TO NODE    1.07 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   400.00
 DOWNSTREAM NODE ELEVATION(FEET) =   335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1200.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) = 10.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  .746
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.32
 AVERAGE FLOW DEPTH(FEET) =  1.57  FLOOD WIDTH(FEET) =  15.72
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.73  TC(MIN.) = 37.17
 SUBAREA AREA(ACRES) =  58.10  SUBAREA RUNOFF(CFS) =  28.52
 EFFECTIVE AREA(ACRES) = 206.50  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 206.50  PEAK FLOW RATE(CFS) =  101.38
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 1.65  FLOOD WIDTH(FEET) =  16.50
 FLOW VELOCITY(FEET/SEC.) =  7.45  DEPTH*VELOCITY = 12.30


****************************************************************************
 FLOW PROCESS FROM NODE    1.06 TO NODE    1.07 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) = 37.17
 RAINFALL INTENSITY(INCH/HR) =  .75
 AVERAGED Fm(INCH/HR) =  .20
 EFFECTIVE STREAM AREA(ACRES) = 206.50
```

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TOTAL STREAM AREA(ACRES) =  206.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.38

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    290.39    37.18       .200      591.60
2    290.39    37.17       .200      591.49

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =   290.39  Tc(MIN.) =  37.177
EFFECTIVE AREA(ACRES) =   591.60  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =   591.60


****************************************************************************
 FLOW PROCESS FROM NODE     1.07 TO NODE     1.08 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   335.00
 DOWNSTREAM NODE ELEVATION(FEET) =   320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) =  10.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  .718
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.03
 AVERAGE FLOW DEPTH(FEET) =  3.37  FLOOD WIDTH(FEET) =  33.69
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.04  TC(MIN.) =  40.22
 SUBAREA AREA(ACRES) =  221.80  SUBAREA RUNOFF(CFS) =  103.41
 EFFECTIVE AREA(ACRES) =  813.40  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  813.40  PEAK FLOW RATE(CFS) =  379.24
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  3.49  FLOOD WIDTH(FEET) =  34.86
 FLOW VELOCITY(FEET/SEC.) =  6.24  DEPTH*VELOCITY =  21.77
 ** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    379.24    40.22       .200      813.40
2    379.26    40.21       .200      813.29
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =  379.26  Tc(MIN.) =  40.21
 AVERAGED Fm(INCH/HR) =  .20  EFFECTIVE AREA(ACRES) =  813.29


****************************************************************************
 FLOW PROCESS FROM NODE     1.08 TO NODE     1.09 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   320.00
 DOWNSTREAM NODE ELEVATION(FEET) =   270.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) =  10.00
   2 YEAR RAINFALL INTENSITY(INCH/HR) =  .691
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
```

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TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.70
AVERAGE FLOW DEPTH(FEET) =  3.10  FLOOD WIDTH(FEET) =  30.95
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.06  TC(MIN.) =  43.27
SUBAREA AREA(ACRES) =  170.10  SUBAREA RUNOFF(CFS) =  75.10
EFFECTIVE AREA(ACRES) =  983.39  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  983.50  PEAK FLOW RATE(CFS) =  434.17
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  3.16  FLOOD WIDTH(FEET) =  31.54
FLOW VELOCITY(FEET/SEC.) =  8.73  DEPTH*VELOCITY =  27.55

****************************************************************************
FLOW PROCESS FROM NODE    1.09 TO NODE    1.10 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  270.00
DOWNSTREAM NODE ELEVATION(FEET) =  245.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
"V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =  10.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =  .667
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.74
AVERAGE FLOW DEPTH(FEET) =  3.51  FLOOD WIDTH(FEET) =  35.05
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.58  TC(MIN.) =  45.85
SUBAREA AREA(ACRES) =  197.20  SUBAREA RUNOFF(CFS) =  82.94
EFFECTIVE AREA(ACRES) = 1180.59  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) = 1180.70  PEAK FLOW RATE(CFS) =  496.53
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  3.57  FLOOD WIDTH(FEET) =  35.64
FLOW VELOCITY(FEET/SEC.) =  7.82  DEPTH*VELOCITY =  27.88

****************************************************************************
FLOW PROCESS FROM NODE    1.10 TO NODE    1.11 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  245.00
DOWNSTREAM NODE ELEVATION(FEET) =  230.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
"V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =  10.00
  2 YEAR RAINFALL INTENSITY(INCH/HR) =  .646
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.95
AVERAGE FLOW DEPTH(FEET) =  3.88  FLOOD WIDTH(FEET) =  38.76
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.40  TC(MIN.) =  48.25
SUBAREA AREA(ACRES) =  127.80  SUBAREA RUNOFF(CFS) =  51.27
EFFECTIVE AREA(ACRES) = 1308.39  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) = 1308.50  PEAK FLOW RATE(CFS) =  524.86
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  3.88  FLOOD WIDTH(FEET) =  38.76
FLOW VELOCITY(FEET/SEC.) =  6.99  DEPTH*VELOCITY =  27.09
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)    =  1308.50  TC(MIN.) =  48.25
EFFECTIVE AREA(ACRES) =  1308.39  AVERAGED Fm(INCH/HR)=  .20
```

PEAK FLOW RATE(CFS) = 524.86

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)	Fm(INCH/HR)	Ae(ACRES)
1	524.79	48.26	.200	1308.50
2	524.86	48.25	.200	1308.39

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END OF RATIONAL METHOD ANALYSIS

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FLOOD ROUTING ANALYSIS
USING ORANGE/SAN BERNARDINO COUNTY UNIT-HYDROGRAPH (1986 MANUAL)

Ver. 1.6A Release Date: 9/30/90 Serial # 8985

Analysis prepared by:

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DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777 * FAX (909) 860-8017

********** DESCRIPTION OF STUDY **********
* 5-YEAR UNIT HYDROGRAPH - PRE-DEVELOPED CONDITION *
* PRIMA DESHECHA LANDFILL *
* REALIGNMENT TO THE SOUTH *
****

FILE NAME: PDVUH5.DAT
TIME/DATE OF STUDY: 10:32 2/25/2000 BY: TT

****
FLOW PROCESS FROM NODE 1.00 TO NODE 1.11 IS CODE = 1

>>>>>UNIT-HYDROGRAPH ANALYSIS<<<<<

(UNIT-HYDROGRAPH ADDED TO STREAM #1)

WATERSHED AREA = 1304.760 ACRES
BASEFLOW = .000 CFS/SQUARE-MILE
*USER ENTERED "LAG" TIME = .599 HOURS
VALLEY(UNDEVELOPED/DESERT) S-GRAPH SELECTED
MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) = .200
LOW LOSS FRACTION = .200
HYDROGRAPH MODEL #1 SPECIFIED

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH)= .27
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)= .58
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = .79
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 1.27
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 1.73
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 3.17

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = .942
30-MINUTE FACTOR = .942
1-HOUR FACTOR = .942
3-HOUR FACTOR = .991
6-HOUR FACTOR = .996
24-HOUR FACTOR = .997

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 13.912

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.206	190.255
2	4.046	448.115
3	8.684	731.909
4	15.097	1011.972
5	23.533	1331.058
6	33.113	1511.752
7	43.109	1577.224
8	52.239	1440.660
9	59.176	1094.692
10	64.293	807.400
11	68.418	651.008
12	71.559	495.626
13	74.086	398.696
14	76.196	332.991
15	78.179	312.926
16	79.876	267.772
17	81.451	248.422
18	82.846	220.178
19	84.149	205.545
20	85.367	192.265
21	86.434	168.373
22	87.420	155.568
23	88.281	135.885
24	89.116	131.721
25	89.951	131.721
26	90.707	119.249
27	91.322	97.052
28	91.934	96.587
29	92.541	95.766
30	93.033	77.713
31	93.478	70.224
32	93.923	70.269
33	94.363	69.294
34	94.782	66.148
35	95.199	65.817
36	95.616	65.882
37	95.972	56.046
38	96.277	48.249
39	96.583	48.249
40	96.883	47.363
41	97.142	40.762
42	97.392	39.520
43	97.643	39.521
44	97.872	36.198
45	98.067	30.793
46	98.262	30.704
47	98.455	30.438
48	98.608	24.192
49	98.747	22.019
50	98.886	21.888
51	99.025	21.976
52	99.164	21.888
53	99.303	21.888
54	99.441	21.888
55	99.580	21.888
56	99.719	21.888
57	99.858	21.888
58	99.996	21.888

59	100.000	.578

TOTAL STORM RAINFALL(INCHES) = 3.16
TOTAL SOIL-LOSS(INCHES) = .60
TOTAL EFFECTIVE RAINFALL(INCHES) = 2.56

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 64.9445
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 278.6823

24-HOUR STORM
RUNOFF HYDROGRAPH

HYDROGRAPH IN FIVE-MINUTE INTERVALS(CFS)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	225.0	450.0	675.0	900.0
14.083	98.6029	167.43	. Q . V	.	.	.	
14.167	99.7788	170.75	. Q . V	.	.	.	
14.250	100.9803	174.45	. Q . V	.	.	.	
14.333	102.2098	178.52	. Q . V	.	.	.	
14.417	103.4703	183.03	. Q . V	.	.	.	
14.500	104.7641	187.86	. Q . V	.	.	.	
14.583	106.0933	193.00	. Q . V	.	.	.	
14.667	107.4589	198.28	. Q . V	.	.	.	
14.750	108.8612	203.61	. Q . V	.	.	.	
14.833	110.3007	209.03	. Q . V	.	.	.	
14.917	111.7796	214.73	. Q . V	.	.	.	
15.000	113.2995	220.69	. Q . V	.	.	.	
15.083	114.8635	227.10	. Q V	.	.	.	
15.167	116.4748	233.96	. Q V	.	.	.	
15.250	118.1381	241.51	. Q V	.	.	.	
15.333	119.8580	249.73	. Q V	.	.	.	
15.417	121.6390	258.60	. Q V	.	.	.	
15.500	123.4853	268.08	. Q V	.	.	.	
15.583	125.4038	278.58	. Q V	.	.	.	
15.667	127.4031	290.30	. Q V	.	.	.	
15.750	129.4954	303.80	. Q V	.	.	.	
15.833	131.6984	319.87	. Q V	.	.	.	
15.917	134.0497	341.42	. Q V	.	.	.	
16.000	136.6169	372.76	. Q V	.	.	.	
16.083	139.6947	446.89	. QV	.	.	.	
16.167	143.3940	537.14	. V Q	.	.	.	
16.250	147.7412	631.21	. V	Q	.	.	
16.333	152.6931	719.02	. V	.Q	.	.	
16.417	158.2118	801.31	. V	.	Q	.	
16.500	164.0053	841.22	. V	.	Q	.	
16.583	169.7873	839.54	. V	.	Q	.	
16.667	175.1842	783.64	. V	.	Q	.	
16.750	179.8896	683.23	. V	Q	.	.	
16.833	183.9859	594.78	. Q	.	.	.	
16.917	187.6616	533.70	. Q V	.	.	.	
17.000	190.9507	477.58	. Q	V	.	.	
17.083	193.9561	436.38	. Q.	V	.	.	
17.167	196.7424	404.57	. Q	.	V	.	
17.250	199.3820	383.28	. Q	.	V	.	
17.333	201.8566	359.31	. Q	.	V	.	
17.417	204.2064	341.18	. Q	.	V.	.	
17.500	206.4294	322.79	. Q	.	V.	.	
17.583	208.5497	307.86	. Q	.	V.	.	
17.667	210.5739	293.93	. Q	.	V	.	
17.750	212.4961	279.10	. Q	.	V	.	
17.833	214.3364	267.21	. Q	.	V	.	
17.917	216.0942	255.23	. Q	.	.V	.	
18.000	217.7942	246.84	. Q	.	.V	.	

END OF FLOOD ROUTING ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 OCEMA HYDROLOGY CRITERION)
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Ver. 5.8A Release Date: 8/28/90 Serial # 7985

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```
************************** DESCRIPTION OF STUDY **************************
* 5-YEAR PRE-DEVELOPED CONDITION HYDROLOGY (EXISTING USGS TOPO)          *
* PRIMA DESHECHA LANDFILL                                                *
* REALIGNMENT TO THE SOUTH                                               *
**************************************************************************

 FILE NAME: PDEV5.DAT
 TIME/DATE OF STUDY: 10:29  2/25/2000              BY: TT
============================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
            -*TIME-OF-CONCENTRATION MODEL*-

 USER SPECIFIED STORM EVENT(YEAR) =    5.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .90
 *USER-DEFINED TABLED RAINFALL USED*
 NUMBER OF [TIME,INTENSITY] DATA PAIRS =  5
  1)  5.000;  3.190
  2) 15.000;  1.720
  3) 30.000;  1.160
  4) 60.000;   .790
  5) 120.000;   .530

**************************************************************************
 FLOW PROCESS FROM NODE     1.00 TO NODE     1.01 IS CODE =  2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  900.00
 UPSTREAM ELEVATION(FEET) =  1125.00
 DOWNSTREAM ELEVATION(FEET) =  1020.00
 ELEVATION DIFFERENCE(FEET) =  105.00
 TC(MIN.) = .935*[(  900.00** 3.00)/(  105.00)]** .20 =  21.833
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.465
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =    11.38
 TOTAL AREA(ACRES) =    10.00  PEAK FLOW RATE(CFS) =    11.38

**************************************************************************
 FLOW PROCESS FROM NODE     1.01 TO NODE     1.02 IS CODE =  9
--------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  1020.00
 DOWNSTREAM NODE ELEVATION(FEET) =  940.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =  950.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.75
AVERAGE FLOW DEPTH(FEET) =  .93  FLOOD WIDTH(FEET) =  9.27
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.75  TC(MIN.) = 24.59
SUBAREA AREA(ACRES) =  25.50  SUBAREA RUNOFF(CFS) =  26.67
EFFECTIVE AREA(ACRES) =  35.50  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  35.50  PEAK FLOW RATE(CFS) =  37.13
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.09  FLOOD WIDTH(FEET) =  10.84
FLOW VELOCITY(FEET/SEC.) =  6.32  DEPTH*VELOCITY =  6.86


****************************************************************************
FLOW PROCESS FROM NODE    1.02 TO NODE    1.03 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  940.00
DOWNSTREAM NODE ELEVATION(FEET) =  860.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  700.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.305
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.68
AVERAGE FLOW DEPTH(FEET) =  1.18  FLOOD WIDTH(FEET) =  11.81
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.52  TC(MIN.) = 26.11
SUBAREA AREA(ACRES) =  33.10  SUBAREA RUNOFF(CFS) =  32.93
EFFECTIVE AREA(ACRES) =  68.60  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  68.60  PEAK FLOW RATE(CFS) =  68.25
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.30  FLOOD WIDTH(FEET) =  12.98
FLOW VELOCITY(FEET/SEC.) =  8.10  DEPTH*VELOCITY =  10.53


****************************************************************************
FLOW PROCESS FROM NODE    1.03 TO NODE    1.04 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  860.00
DOWNSTREAM NODE ELEVATION(FEET) =  700.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1200.00
"V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) =  5.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.225
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.34
AVERAGE FLOW DEPTH(FEET) =  1.38  FLOOD WIDTH(FEET) =  13.77
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.14  TC(MIN.) = 28.25
SUBAREA AREA(ACRES) =  43.80  SUBAREA RUNOFF(CFS) =  40.42
EFFECTIVE AREA(ACRES) = 112.40  AVERAGED Fm(INCH/HR) =  .20
```

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TOTAL AREA(ACRES) =  112.40   PEAK FLOW RATE(CFS) =    103.73
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.48   FLOOD WIDTH(FEET) =   14.74
FLOW VELOCITY(FEET/SEC.) =  9.55   DEPTH*VELOCITY =  14.09


****************************************************************************
 FLOW PROCESS FROM NODE     1.04 TO NODE     1.05 IS CODE =  9
 ----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    700.00
 DOWNSTREAM NODE ELEVATION(FEET) =    580.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.184
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.26
 AVERAGE FLOW DEPTH(FEET) =  1.61   FLOOD WIDTH(FEET) =  16.11
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.11   TC(MIN.) =  29.36
 SUBAREA AREA(ACRES) =  95.50   SUBAREA RUNOFF(CFS) =  84.57
 EFFECTIVE AREA(ACRES) =  207.90   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  207.90   PEAK FLOW RATE(CFS) =   184.10
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.75   FLOOD WIDTH(FEET) =  17.47
 FLOW VELOCITY(FEET/SEC.) =  12.06   DEPTH*VELOCITY =  21.09


****************************************************************************
 FLOW PROCESS FROM NODE     1.05 TO NODE     1.06 IS CODE =  9
 ----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    580.00
 DOWNSTREAM NODE ELEVATION(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.118
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.21
 AVERAGE FLOW DEPTH(FEET) =  2.10   FLOOD WIDTH(FEET) =  20.99
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  4.08   TC(MIN.) =  33.44
 SUBAREA AREA(ACRES) =  98.90   SUBAREA RUNOFF(CFS) =  81.67
 EFFECTIVE AREA(ACRES) =  306.80   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  306.80   PEAK FLOW RATE(CFS) =   253.36
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  2.20   FLOOD WIDTH(FEET) =  21.96
 FLOW VELOCITY(FEET/SEC.) =  10.50   DEPTH*VELOCITY =  23.09


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  9
 ----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    400.00
 DOWNSTREAM NODE ELEVATION(FEET) =    335.00
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CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
"V" GUTTER WIDTH(FEET) =    .00  GUTTER HIKE(FEET) =   .001
PAVEMENT LIP(FEET) =   .001  MANNING'S N = .0400
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =   5.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.092
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.64
AVERAGE FLOW DEPTH(FEET) =  2.43  FLOOD WIDTH(FEET) =  24.31
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.07  TC(MIN.) =  35.51
SUBAREA AREA(ACRES) =  78.30  SUBAREA RUNOFF(CFS) =  62.86
EFFECTIVE AREA(ACRES) =  385.10  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  385.10  PEAK FLOW RATE(CFS) =  309.16
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  2.51  FLOOD WIDTH(FEET) =  25.09
FLOW VELOCITY(FEET/SEC.) =  9.82  DEPTH*VELOCITY =  24.66


****************************************************************************
 FLOW PROCESS FROM NODE    1.06 TO NODE    1.07 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  35.51
 RAINFALL INTENSITY(INCH/HR) =  1.09
 AVERAGED Fm(INCH/HR) =  .20
 EFFECTIVE STREAM AREA(ACRES) =  385.10
 TOTAL STREAM AREA(ACRES) =  385.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =  309.16


****************************************************************************
 FLOW PROCESS FROM NODE    1.00 TO NODE    1.51 IS CODE =  2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  800.00
 UPSTREAM ELEVATION(FEET) =  1125.00
 DOWNSTREAM ELEVATION(FEET) =  1000.00
 ELEVATION DIFFERENCE(FEET) =  125.00
 TC(MIN.) = .935*[(  800.00** 3.00)/(  125.00)]** .20 =  19.646
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =    8.85
 TOTAL AREA(ACRES) =    7.30  PEAK FLOW RATE(CFS) =    8.85


****************************************************************************
 FLOW PROCESS FROM NODE    1.51 TO NODE    1.52 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  1000.00
 DOWNSTREAM NODE ELEVATION(FEET) =  940.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  800.00
 "V" GUTTER WIDTH(FEET) =    .00  GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001  MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
```

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  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.444
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.83
 AVERAGE FLOW DEPTH(FEET) =  .79  FLOOD WIDTH(FEET) =  7.91
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.76  TC(MIN.) =  22.41
 SUBAREA AREA(ACRES) =  11.20  SUBAREA RUNOFF(CFS) =  12.53
 EFFECTIVE AREA(ACRES) =  18.50  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  18.50  PEAK FLOW RATE(CFS) =  20.70
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  .89  FLOOD WIDTH(FEET) =  8.88
 FLOW VELOCITY(FEET/SEC.) =  5.25  DEPTH*VELOCITY =  4.67

****************************************************************************
 FLOW PROCESS FROM NODE    1.52 TO NODE    1.53 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  940.00
 DOWNSTREAM NODE ELEVATION(FEET) =  800.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  5.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.309
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.70
 AVERAGE FLOW DEPTH(FEET) =  1.05  FLOOD WIDTH(FEET) =  10.45
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.61  TC(MIN.) =  26.01
 SUBAREA AREA(ACRES) =  31.70  SUBAREA RUNOFF(CFS) =  31.63
 EFFECTIVE AREA(ACRES) =  50.20  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  50.20  PEAK FLOW RATE(CFS) =  50.10
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.18  FLOOD WIDTH(FEET) =  11.81
 FLOW VELOCITY(FEET/SEC.) =  7.18  DEPTH*VELOCITY =  8.50

****************************************************************************
 FLOW PROCESS FROM NODE    1.53 TO NODE    1.54 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  800.00
 DOWNSTREAM NODE ELEVATION(FEET) =  500.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.202
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.89
 AVERAGE FLOW DEPTH(FEET) =  1.24  FLOOD WIDTH(FEET) =  12.40
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.86  TC(MIN.) =  28.88
 SUBAREA AREA(ACRES) =  57.60  SUBAREA RUNOFF(CFS) =  51.94
 EFFECTIVE AREA(ACRES) =  107.80  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  107.80  PEAK FLOW RATE(CFS) =  97.20
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.36  FLOOD WIDTH(FEET) =  13.57
 FLOW VELOCITY(FEET/SEC.) =  10.55  DEPTH*VELOCITY =  14.34
```

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****************************************************************************
 FLOW PROCESS FROM NODE     1.54 TO NODE     1.06 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    500.00
 DOWNSTREAM NODE ELEVATION(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.126
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.31
 AVERAGE FLOW DEPTH(FEET) =   1.77   FLOOD WIDTH(FEET) =   17.67
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.88   TC(MIN.) =  32.76
 SUBAREA AREA(ACRES) =   40.60   SUBAREA RUNOFF(CFS) =   33.84
 EFFECTIVE AREA(ACRES) =  148.40   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  148.40   PEAK FLOW RATE(CFS) =    123.68
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.83   FLOOD WIDTH(FEET) =   18.26
 FLOW VELOCITY(FEET/SEC.) =   7.42   DEPTH*VELOCITY =  13.56


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    400.00
 DOWNSTREAM NODE ELEVATION(FEET) =    335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.096
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.28
 AVERAGE FLOW DEPTH(FEET) =   1.89   FLOOD WIDTH(FEET) =   18.84
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.41   TC(MIN.) =  35.17
 SUBAREA AREA(ACRES) =   58.10   SUBAREA RUNOFF(CFS) =   46.86
 EFFECTIVE AREA(ACRES) =  206.50   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  206.50   PEAK FLOW RATE(CFS) =    166.57
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.98   FLOOD WIDTH(FEET) =   19.82
 FLOW VELOCITY(FEET/SEC.) =   8.48   DEPTH*VELOCITY =  16.82


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  35.17
 RAINFALL INTENSITY(INCH/HR) =   1.10
 AVERAGED Fm(INCH/HR) =   .20
 EFFECTIVE STREAM AREA(ACRES) =  206.50
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TOTAL STREAM AREA(ACRES) =  206.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =    166.57

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    474.93    35.51      .200     591.60
2    474.18    35.17      .200     587.86

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =   474.93  Tc(MIN.) =  35.514
EFFECTIVE AREA(ACRES) =   591.60  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =   591.60


****************************************************************************
 FLOW PROCESS FROM NODE    1.07 TO NODE    1.08 IS CODE =  9
 ----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   335.00
 DOWNSTREAM NODE ELEVATION(FEET) =   320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.059
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.83
 AVERAGE FLOW DEPTH(FEET) =  4.05  FLOOD WIDTH(FEET) =  40.52
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.68  TC(MIN.) =  38.20
 SUBAREA AREA(ACRES) =  221.80  SUBAREA RUNOFF(CFS) =  171.45
 EFFECTIVE AREA(ACRES) =  813.40  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  813.40  PEAK FLOW RATE(CFS) =  628.76
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  4.23  FLOOD WIDTH(FEET) =  42.28
 FLOW VELOCITY(FEET/SEC.) =  7.04  DEPTH*VELOCITY =  29.76
 ** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    628.76    38.20      .200     813.40
2    628.95    37.86      .200     809.66
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =  628.95  Tc(MIN.) =  37.86
 AVERAGED Fm(INCH/HR) =  .20  EFFECTIVE AREA(ACRES) =  809.66


****************************************************************************
 FLOW PROCESS FROM NODE    1.08 TO NODE    1.09 IS CODE =  9
 ----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   320.00
 DOWNSTREAM NODE ELEVATION(FEET) =   270.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.030
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
```

```
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.90
 AVERAGE FLOW DEPTH(FEET) =  3.74  FLOOD WIDTH(FEET) =  37.40
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.69  TC(MIN.) =  40.55
 SUBAREA AREA(ACRES) =  170.10  SUBAREA RUNOFF(CFS) =  127.05
 EFFECTIVE AREA(ACRES) =  979.76  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  983.50  PEAK FLOW RATE(CFS) =  731.80
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  3.82  FLOOD WIDTH(FEET) =  38.18
 FLOW VELOCITY(FEET/SEC.) =  10.04  DEPTH*VELOCITY =  38.36


****************************************************************************
 FLOW PROCESS FROM NODE    1.09 TO NODE    1.10 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  270.00
 DOWNSTREAM NODE ELEVATION(FEET) =  245.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.002
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.82
 AVERAGE FLOW DEPTH(FEET) =  4.27  FLOOD WIDTH(FEET) =  42.67
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.27  TC(MIN.) =  42.82
 SUBAREA AREA(ACRES) =  197.20  SUBAREA RUNOFF(CFS) =  142.33
 EFFECTIVE AREA(ACRES) = 1176.96  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 1180.70  PEAK FLOW RATE(CFS) =  849.47
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  4.37  FLOOD WIDTH(FEET) =  43.64
 FLOW VELOCITY(FEET/SEC.) =  8.92  DEPTH*VELOCITY =  38.94


****************************************************************************
 FLOW PROCESS FROM NODE    1.10 TO NODE    1.11 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  245.00
 DOWNSTREAM NODE ELEVATION(FEET) =  230.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
   5 YEAR RAINFALL INTENSITY(INCH/HR) =  .976
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.97
 AVERAGE FLOW DEPTH(FEET) =  4.74  FLOOD WIDTH(FEET) =  47.35
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.09  TC(MIN.) =  44.91
 SUBAREA AREA(ACRES) =  127.80  SUBAREA RUNOFF(CFS) =  89.27
 EFFECTIVE AREA(ACRES) = 1304.76  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 1308.50  PEAK FLOW RATE(CFS) =  911.44
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  4.78  FLOOD WIDTH(FEET) =  47.75
 FLOW VELOCITY(FEET/SEC.) =  8.00  DEPTH*VELOCITY =  38.19
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)   =  1308.50  TC(MIN.) =  44.91
 EFFECTIVE AREA(ACRES) =  1304.76  AVERAGED Fm(INCH/HR)=  .20
```

PEAK FLOW RATE(CFS) = 911.44

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)	Fm(INCH/HR)	Ae(ACRES)
1	908.91	45.26	.200	1308.50
2	911.44	44.91	.200	1304.76

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END OF RATIONAL METHOD ANALYSIS

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FLOOD ROUTING ANALYSIS
USING ORANGE/SAN BERNARDINO COUNTY UNIT-HYDROGRAPH (1986 MANUAL)

Ver. 1.6A Release Date: 9/30/90 Serial # 8985

Analysis prepared by:

BRYAN A. STIRRAT & ASSOCIATES
1360 VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
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********** DESCRIPTION OF STUDY **********
* 10-YEAR UNIT HYDROGRAPH - PRE-DEVELOPED CONDITION *
* PRIMA DESHECHA LANDFILL *
* REALIGNMENT TO THE SOUTH *
****

FILE NAME: PDVUH10.DAT
TIME/DATE OF STUDY: 10:32 2/25/2000 BY: TT

****
FLOW PROCESS FROM NODE 1.00 TO NODE 1.11 IS CODE = 1

>>>>>UNIT-HYDROGRAPH ANALYSIS<<<<<

(UNIT-HYDROGRAPH ADDED TO STREAM #1)

WATERSHED AREA = 1303.640 ACRES
BASEFLOW = .000 CFS/SQUARE-MILE
*USER ENTERED "LAG" TIME = .577 HOURS
VALLEY(UNDEVELOPED/DESERT) S-GRAPH SELECTED
MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) = .200
LOW LOSS FRACTION = .200
HYDROGRAPH MODEL #1 SPECIFIED

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH)= .34
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)= .73
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = .98
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 1.56
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 2.10
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 3.79

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = .942
30-MINUTE FACTOR = .942
1-HOUR FACTOR = .942
3-HOUR FACTOR = .991
6-HOUR FACTOR = .996
24-HOUR FACTOR = .997

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 14.443

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.252	197.339
2	4.263	474.718
3	9.238	784.451
4	16.115	1084.126
5	25.115	1418.904
6	35.198	1589.705
7	45.583	1637.314
8	54.380	1386.955
9	61.005	1044.440
10	65.871	767.263
11	69.772	614.990
12	72.737	467.499
13	75.116	375.082
14	77.251	336.599
15	79.130	296.173
16	80.838	269.199
17	82.330	235.329
18	83.733	221.183
19	85.012	201.696
20	86.177	183.604
21	87.213	163.276
22	88.131	144.758
23	88.997	136.624
24	89.864	136.603
25	90.663	125.964
26	91.304	101.147
27	91.940	100.208
28	92.567	98.929
29	93.072	79.485
30	93.534	72.854
31	93.996	72.874
32	94.448	71.212
33	94.881	68.397
34	95.315	68.291
35	95.740	67.033
36	96.079	53.558
37	96.397	50.104
38	96.715	50.103
39	97.008	46.267
40	97.268	40.978
41	97.529	41.022
42	97.782	39.998
43	97.993	33.260
44	98.195	31.854
45	98.398	31.896
46	98.571	27.377
47	98.716	22.771
48	98.860	22.770
49	99.005	22.771
50	99.149	22.770
51	99.293	22.770
52	99.438	22.770
53	99.582	22.770
54	99.727	22.770
55	99.871	22.770
56	100.000	20.323

TOTAL STORM RAINFALL(INCHES) = 3.78
TOTAL SOIL-LOSS(INCHES) = .70
TOTAL EFFECTIVE RAINFALL(INCHES) = 3.08

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 76.4002
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 334.0818

24-HOUR STORM
RUNOFF HYDROGRAPH

HYDROGRAPH IN FIVE-MINUTE INTERVALS(CFS)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
14.083	116.0829	198.03	Q	V			
14.167	117.4757	202.24	Q	V			
14.250	118.9016	207.04	Q	V			
14.333	120.3645	212.40	Q	V			
14.417	121.8688	218.43	Q	V			
14.500	123.4176	224.89	Q	V			
14.583	125.0137	231.75	Q	V			
14.667	126.6569	238.60	Q	V			
14.750	128.3474	245.45	Q	V			
14.833	130.0853	252.35	Q	V			
14.917	131.8730	259.57	Q	V			
15.000	133.7124	267.10	Q	V			
15.083	135.6076	275.17	Q	V			
15.167	137.5624	283.84	Q	V			
15.250	139.5827	293.35	Q	V			
15.333	141.6745	303.73	Q	V			
15.417	143.8425	314.79	Q	V			
15.500	146.0903	326.38	Q	V			
15.583	148.4252	339.03	Q	V			
15.667	150.8561	352.97	Q	V			
15.750	153.3999	369.35	Q	V			
15.833	156.0819	389.43	Q	V			
15.917	158.9559	417.30	Q	V			
16.000	162.1230	459.86	Q	V			
16.083	165.9852	560.78		VQ			
16.167	170.7098	686.02		V	Q		
16.250	176.3366	817.02		V	Q		
16.333	182.7863	936.50		V		Q	
16.417	189.9793	1044.42		V			Q
16.500	197.4730	1088.08		V			Q
16.583	204.8604	1072.64		V			Q
16.667	211.5253	967.75		V		Q	
16.750	217.2829	836.02		V	Q		
16.833	222.2697	724.07		Q			
16.917	226.7274	647.26		Q	V		
17.000	230.7119	578.55		Q	V		
17.083	234.3518	528.52		Q	V		
17.167	237.7608	494.98		Q	V		
17.250	240.9555	463.87		Q	V		
17.333	243.9689	437.55		Q	V		
17.417	246.8024	411.42		Q	V		
17.500	249.4964	391.17		Q	V		
17.583	252.0500	370.78		Q	V		
17.667	254.4736	351.91		Q	V		
17.750	256.7738	333.99		Q	V		
17.833	258.9650	318.15		Q	V		
17.917	261.0724	305.99		Q	V		
18.000	263.1117	296.11		Q	V		

END OF FLOOD ROUTING ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 OCEMA HYDROLOGY CRITERION)
(c) Copyright 1982-90 Advanced Engineering Software (aes)
Ver. 5.8A Release Date: 8/28/90 Serial # 7985

Analysis prepared by:

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************************** DESCRIPTION OF STUDY **************************
* 10-YEAR PRE-DEVELOPED CONDITION HYDROLOGY (EXISTING USGS TOPO)         *
* PRIMA DESHECHA LANDFILL                                                *
* REALIGNMENT TO THE SOUTH                                               *
**************************************************************************

 FILE NAME: PDEV10.DAT
 TIME/DATE OF STUDY: 10:30  2/25/2000            BY: TT
==========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
          -*TIME-OF-CONCENTRATION MODEL*-

 USER SPECIFIED STORM EVENT(YEAR) =  10.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .90
 *USER-DEFINED TABLED RAINFALL USED*
 NUMBER OF [TIME,INTENSITY] DATA PAIRS =  5
  1)  5.000;  4.060
  2) 15.000;  2.160
  3) 30.000;  1.450
  4) 60.000;   .980
  5) 120.000;  .660

**************************************************************************
 FLOW PROCESS FROM NODE    1.00 TO NODE    1.01 IS CODE =  2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  900.00
 UPSTREAM ELEVATION(FEET) =  1125.00
 DOWNSTREAM ELEVATION(FEET) =  1020.00
 ELEVATION DIFFERENCE(FEET) =  105.00
 TC(MIN.) = .935*[( 900.00** 3.00)/(  105.00)]** .20 =  21.833
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.837
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =  14.73
 TOTAL AREA(ACRES) =  10.00  PEAK FLOW RATE(CFS) =  14.73

**************************************************************************
 FLOW PROCESS FROM NODE    1.01 TO NODE    1.02 IS CODE =  9
--------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION(FEET) =  1020.00
 DOWNSTREAM NODE ELEVATION(FEET) =  940.00
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CHANNEL LENGTH THRU SUBAREA(FEET) = 950.00
"V" GUTTER WIDTH(FEET) = .00 GUTTER HIKE(FEET) = .001
PAVEMENT LIP(FEET) = .001 MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) = 5.00
10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.714
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.11
AVERAGE FLOW DEPTH(FEET) = 1.03 FLOOD WIDTH(FEET) = 10.25
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 2.59 TC(MIN.) = 24.42
SUBAREA AREA(ACRES) = 25.50 SUBAREA RUNOFF(CFS) = 34.74
EFFECTIVE AREA(ACRES) = 35.50 AVERAGED Fm(INCH/HR) = .20
TOTAL AREA(ACRES) = 35.50 PEAK FLOW RATE(CFS) = 48.37
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 1.20 FLOOD WIDTH(FEET) = 12.01
FLOW VELOCITY(FEET/SEC.) = 6.71 DEPTH*VELOCITY = 8.07

****
FLOW PROCESS FROM NODE 1.02 TO NODE 1.03 IS CODE = 9

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==
UPSTREAM NODE ELEVATION(FEET) = 940.00
DOWNSTREAM NODE ELEVATION(FEET) = 860.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 700.00
"V" GUTTER WIDTH(FEET) = .00 GUTTER HIKE(FEET) = .001
PAVEMENT LIP(FEET) = .001 MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) = 5.00
10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.647
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.30
AVERAGE FLOW DEPTH(FEET) = 1.30 FLOOD WIDTH(FEET) = 12.98
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 1.41 TC(MIN.) = 25.83
SUBAREA AREA(ACRES) = 33.10 SUBAREA RUNOFF(CFS) = 43.12
EFFECTIVE AREA(ACRES) = 68.60 AVERAGED Fm(INCH/HR) = .20
TOTAL AREA(ACRES) = 68.60 PEAK FLOW RATE(CFS) = 89.36
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 1.44 FLOOD WIDTH(FEET) = 14.35
FLOW VELOCITY(FEET/SEC.) = 8.68 DEPTH*VELOCITY = 12.47

****
FLOW PROCESS FROM NODE 1.03 TO NODE 1.04 IS CODE = 9

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==
UPSTREAM NODE ELEVATION(FEET) = 860.00
DOWNSTREAM NODE ELEVATION(FEET) = 700.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1200.00
"V" GUTTER WIDTH(FEET) = .00 GUTTER HIKE(FEET) = .001
PAVEMENT LIP(FEET) = .001 MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) = .20000
MAXIMUM DEPTH(FEET) = 5.00
10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.552
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) = .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.88
AVERAGE FLOW DEPTH(FEET) = 1.53 FLOOD WIDTH(FEET) = 15.33
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 2.02 TC(MIN.) = 27.85
SUBAREA AREA(ACRES) = 43.80 SUBAREA RUNOFF(CFS) = 53.28
EFFECTIVE AREA(ACRES) = 112.40 AVERAGED Fm(INCH/HR) = .20

```
TOTAL AREA(ACRES) =  112.40   PEAK FLOW RATE(CFS) =    136.72
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.63   FLOOD WIDTH(FEET) =   16.30
FLOW VELOCITY(FEET/SEC.) =  10.29   DEPTH*VELOCITY =  16.79


****************************************************************************
 FLOW PROCESS FROM NODE     1.04 TO NODE     1.05 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    700.00
 DOWNSTREAM NODE ELEVATION(FEET) =    580.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.503
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.08
 AVERAGE FLOW DEPTH(FEET) =   1.79   FLOOD WIDTH(FEET) =   17.86
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.04   TC(MIN.) =  28.89
 SUBAREA AREA(ACRES) =   95.50   SUBAREA RUNOFF(CFS) =  111.95
 EFFECTIVE AREA(ACRES) =  207.90   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  207.90   PEAK FLOW RATE(CFS) =    243.72
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.94   FLOOD WIDTH(FEET) =   19.43
 FLOW VELOCITY(FEET/SEC.) =  12.92   DEPTH*VELOCITY =  25.12


****************************************************************************
 FLOW PROCESS FROM NODE     1.05 TO NODE     1.06 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    580.00
 DOWNSTREAM NODE ELEVATION(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
   10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.408
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.93
 AVERAGE FLOW DEPTH(FEET) =   2.34   FLOOD WIDTH(FEET) =   23.33
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.81   TC(MIN.) =  32.70
 SUBAREA AREA(ACRES) =   98.90   SUBAREA RUNOFF(CFS) =  107.49
 EFFECTIVE AREA(ACRES) =  306.80   AVERAGED Fm(INCH/HR) =   .20
 TOTAL AREA(ACRES) =  306.80   PEAK FLOW RATE(CFS) =    333.46
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  2.43   FLOOD WIDTH(FEET) =   24.31
 FLOW VELOCITY(FEET/SEC.) =  11.29   DEPTH*VELOCITY =  27.46


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    400.00
 DOWNSTREAM NODE ELEVATION(FEET) =    335.00
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
"V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =   5.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.378
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.41
AVERAGE FLOW DEPTH(FEET) =  2.69   FLOOD WIDTH(FEET) =  26.85
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.92   TC(MIN.) =  34.62
SUBAREA AREA(ACRES) =  78.30   SUBAREA RUNOFF(CFS) =  82.98
EFFECTIVE AREA(ACRES) =  385.10   AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  385.10   PEAK FLOW RATE(CFS) =  408.13
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  2.78   FLOOD WIDTH(FEET) =  27.82
FLOW VELOCITY(FEET/SEC.) =  10.55   DEPTH*VELOCITY =  29.36


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  34.62
 RAINFALL INTENSITY(INCH/HR) =  1.38
 AVERAGED Fm(INCH/HR) =  .20
 EFFECTIVE STREAM AREA(ACRES) =  385.10
 TOTAL STREAM AREA(ACRES) =  385.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    408.13


****************************************************************************
 FLOW PROCESS FROM NODE     1.00 TO NODE     1.51 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DENSE COVER
 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  800.00
 UPSTREAM ELEVATION(FEET) =  1125.00
 DOWNSTREAM ELEVATION(FEET) =  1000.00
 ELEVATION DIFFERENCE(FEET) =  125.00
 TC(MIN.) =  .935*[(  800.00** 3.00)/(  125.00)]** .20 =  19.646
   10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.940
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 SUBAREA RUNOFF(CFS) =    11.43
 TOTAL AREA(ACRES) =     7.30   PEAK FLOW RATE(CFS) =    11.43


****************************************************************************
 FLOW PROCESS FROM NODE     1.51 TO NODE     1.52 IS CODE =   9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  1000.00
 DOWNSTREAM NODE ELEVATION(FEET) =  940.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  800.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =   5.00
```

```
 10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.818
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.19
AVERAGE FLOW DEPTH(FEET) =  .87  FLOOD WIDTH(FEET) =  8.69
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.57  TC(MIN.) =  22.22
SUBAREA AREA(ACRES) =  11.20  SUBAREA RUNOFF(CFS) =  16.31
EFFECTIVE AREA(ACRES) =  18.50  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  18.50  PEAK FLOW RATE(CFS) =  26.95
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  .99  FLOOD WIDTH(FEET) =  9.86
FLOW VELOCITY(FEET/SEC.) =  5.54  DEPTH*VELOCITY =  5.48

****************************************************************************
FLOW PROCESS FROM NODE    1.52 TO NODE    1.53 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  940.00
DOWNSTREAM NODE ELEVATION(FEET) =  800.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00
"V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =  5.00
 10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.08
AVERAGE FLOW DEPTH(FEET) =  1.16  FLOOD WIDTH(FEET) =  11.62
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.41  TC(MIN.) =  25.63
SUBAREA AREA(ACRES) =  31.70  SUBAREA RUNOFF(CFS) =  41.56
EFFECTIVE AREA(ACRES) =  50.20  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  50.20  PEAK FLOW RATE(CFS) =  65.82
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.32  FLOOD WIDTH(FEET) =  13.18
FLOW VELOCITY(FEET/SEC.) =  7.58  DEPTH*VELOCITY =  10.00

****************************************************************************
FLOW PROCESS FROM NODE    1.53 TO NODE    1.54 IS CODE =  9
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =  800.00
DOWNSTREAM NODE ELEVATION(FEET) =  500.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00
"V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0450
PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
MAXIMUM DEPTH(FEET) =  10.00
 10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.530
SOIL CLASSIFICATION IS "D"
NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.58
AVERAGE FLOW DEPTH(FEET) =  1.38  FLOOD WIDTH(FEET) =  13.77
"V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.68  TC(MIN.) =  28.31
SUBAREA AREA(ACRES) =  57.60  SUBAREA RUNOFF(CFS) =  68.95
EFFECTIVE AREA(ACRES) =  107.80  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =  107.80  PEAK FLOW RATE(CFS) =  129.04
END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  1.52  FLOOD WIDTH(FEET) =  15.13
FLOW VELOCITY(FEET/SEC.) =  11.27  DEPTH*VELOCITY =  17.07
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     1.54 TO NODE     1.06 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    500.00
 DOWNSTREAM NODE ELEVATION(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1700.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0450
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.420
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.86
 AVERAGE FLOW DEPTH(FEET) =  1.96   FLOOD WIDTH(FEET) =  19.63
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  3.61   TC(MIN.) =  31.91
 SUBAREA AREA(ACRES) =  40.60   SUBAREA RUNOFF(CFS) =  44.58
 EFFECTIVE AREA(ACRES) =  148.40   AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  148.40   PEAK FLOW RATE(CFS) =  162.94
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  2.02   FLOOD WIDTH(FEET) =  20.21
 FLOW VELOCITY(FEET/SEC.) =  7.98   DEPTH*VELOCITY =  16.14


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    400.00
 DOWNSTREAM NODE ELEVATION(FEET) =    335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
 "V" GUTTER WIDTH(FEET) =    .00   GUTTER HIKE(FEET) =   .001
 PAVEMENT LIP(FEET) =   .001   MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.384
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.80
 AVERAGE FLOW DEPTH(FEET) =  2.10   FLOOD WIDTH(FEET) =  20.99
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.27   TC(MIN.) =  34.19
 SUBAREA AREA(ACRES) =  58.10   SUBAREA RUNOFF(CFS) =  61.93
 EFFECTIVE AREA(ACRES) =  206.50   AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  206.50   PEAK FLOW RATE(CFS) =  220.12
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  2.20   FLOOD WIDTH(FEET) =  21.97
 FLOW VELOCITY(FEET/SEC.) =  9.12   DEPTH*VELOCITY =  20.06


****************************************************************************
 FLOW PROCESS FROM NODE     1.06 TO NODE     1.07 IS CODE =  1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  34.19
 RAINFALL INTENSITY(INCH/HR) =  1.38
 AVERAGED Fm(INCH/HR) =  .20
 EFFECTIVE STREAM AREA(ACRES) =  206.50
```

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TOTAL STREAM AREA(ACRES) =  206.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =    220.12

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    626.97    34.62      .200      591.60
2    625.44    34.19      .200      586.74

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =   626.97  Tc(MIN.) =  34.624
EFFECTIVE AREA(ACRES) =   591.60  AVERAGED Fm(INCH/HR) =  .20
TOTAL AREA(ACRES) =   591.60


****************************************************************************
 FLOW PROCESS FROM NODE    1.07 TO NODE    1.08 IS CODE =  9
 ----------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   335.00
 DOWNSTREAM NODE ELEVATION(FEET) =   320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.339
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.37
 AVERAGE FLOW DEPTH(FEET) =  4.48  FLOOD WIDTH(FEET) =  44.82
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.49  TC(MIN.) =  37.11
 SUBAREA AREA(ACRES) =  221.80  SUBAREA RUNOFF(CFS) =  227.29
 EFFECTIVE AREA(ACRES) =  813.40  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  813.40  PEAK FLOW RATE(CFS) =  833.53
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  4.70  FLOOD WIDTH(FEET) =  46.96
 FLOW VELOCITY(FEET/SEC.) =  7.56  DEPTH*VELOCITY =  35.51


****************************************************************************
 FLOW PROCESS FROM NODE    1.08 TO NODE    1.09 IS CODE =  9
 ----------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   320.00
 DOWNSTREAM NODE ELEVATION(FEET) =   270.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1600.00
 "V" GUTTER WIDTH(FEET) =   .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.56
 AVERAGE FLOW DEPTH(FEET) =  4.17  FLOOD WIDTH(FEET) =  41.69
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.53  TC(MIN.) =  39.64
 SUBAREA AREA(ACRES) =  170.10  SUBAREA RUNOFF(CFS) =  168.25
 EFFECTIVE AREA(ACRES) =  983.50  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) =  983.50  PEAK FLOW RATE(CFS) =  972.81
 END OF SUBAREA "V" GUTTER HYDRAULICS:
```

```
DEPTH(FEET) =  4.27  FLOOD WIDTH(FEET) =  42.67
FLOW VELOCITY(FEET/SEC.) =  10.69  DEPTH*VELOCITY =  45.62
** PEAK FLOW RATE TABLE **
     Q(CFS)  Tc(MIN.)  Fm(INCH/HR)  Ae(ACRES)
1    972.81    39.64      .200     983.50
2    974.01    39.20      .200     978.64
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =  974.01  Tc(MIN.) =  39.20
AVERAGED Fm(INCH/HR) =  .20  EFFECTIVE AREA(ACRES) =  978.64


****************************************************************************
 FLOW PROCESS FROM NODE    1.09 TO NODE    1.10 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  270.00
 DOWNSTREAM NODE ELEVATION(FEET) =  245.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.273
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.46
 AVERAGE FLOW DEPTH(FEET) =  4.76  FLOOD WIDTH(FEET) =  47.55
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  2.11  TC(MIN.) =  41.32
 SUBAREA AREA(ACRES) =  197.20  SUBAREA RUNOFF(CFS) =  190.39
 EFFECTIVE AREA(ACRES) = 1175.84  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 1180.70  PEAK FLOW RATE(CFS) =  1135.22
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  4.87  FLOOD WIDTH(FEET) =  48.72
 FLOW VELOCITY(FEET/SEC.) =  9.56  DEPTH*VELOCITY =  46.62


****************************************************************************
 FLOW PROCESS FROM NODE    1.10 TO NODE    1.11 IS CODE =  9
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =  245.00
 DOWNSTREAM NODE ELEVATION(FEET) =  230.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 "V" GUTTER WIDTH(FEET) =  .00  GUTTER HIKE(FEET) =  .001
 PAVEMENT LIP(FEET) =  .001  MANNING'S N = .0400
 PAVEMENT CROSSFALL(DECIMAL NOTATION) =  .20000
 MAXIMUM DEPTH(FEET) =  10.00
  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.242
 SOIL CLASSIFICATION IS "D"
 NATURAL OR AGRICULTURE SUBAREA LOSS RATE, Fm(INCH/HR) =  .2000
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.57
 AVERAGE FLOW DEPTH(FEET) =  5.28  FLOOD WIDTH(FEET) =  52.82
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  1.95  TC(MIN.) =  43.26
 SUBAREA AREA(ACRES) =  127.80  SUBAREA RUNOFF(CFS) =  119.88
 EFFECTIVE AREA(ACRES) = 1303.64  AVERAGED Fm(INCH/HR) =  .20
 TOTAL AREA(ACRES) = 1308.50  PEAK FLOW RATE(CFS) =  1222.84
 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  5.32  FLOOD WIDTH(FEET) =  53.21
 FLOW VELOCITY(FEET/SEC.) =  8.64  DEPTH*VELOCITY =  45.98
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)   =  1308.50  TC(MIN.) =  43.26
 EFFECTIVE AREA(ACRES) =  1303.64  AVERAGED Fm(INCH/HR)=  .20
```

PEAK FLOW RATE(CFS) = 1222.84

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)	Fm(INCH/HR)	Ae(ACRES)
1	1219.21	43.70	.200	1308.50
2	1222.84	43.26	.200	1303.64

==========

==========

END OF RATIONAL METHOD ANALYSIS

ATTACHMENT F
SLOPE STABILITY CROSS-SECTIONS ITERATIONS

FIGURE 1 - PRIMA-STOCKPILE STABILITY EVALUATION
SECTION 5-5' EXISTING CONDITION
FILE: A-A1.SLP

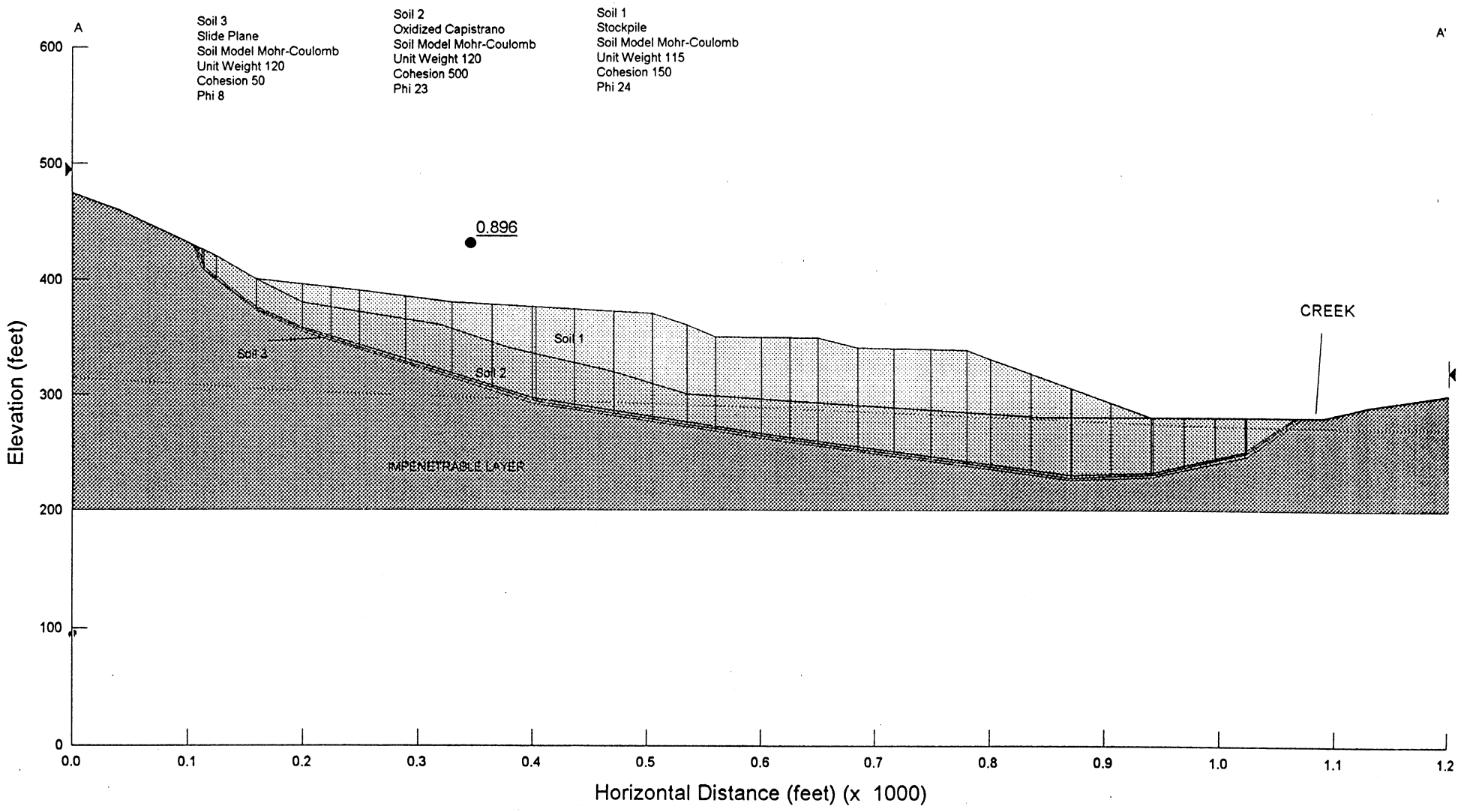


FIGURE 2- PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' EXISTING CONDITIONS
FILE: B-B1.SLP

Soil 1
Stockpile
Soil Model Mohr-Coulomb
Unit Weight 115
Cohesion 150
Phi 23

Soil 2
Oxidized Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Oxidized Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

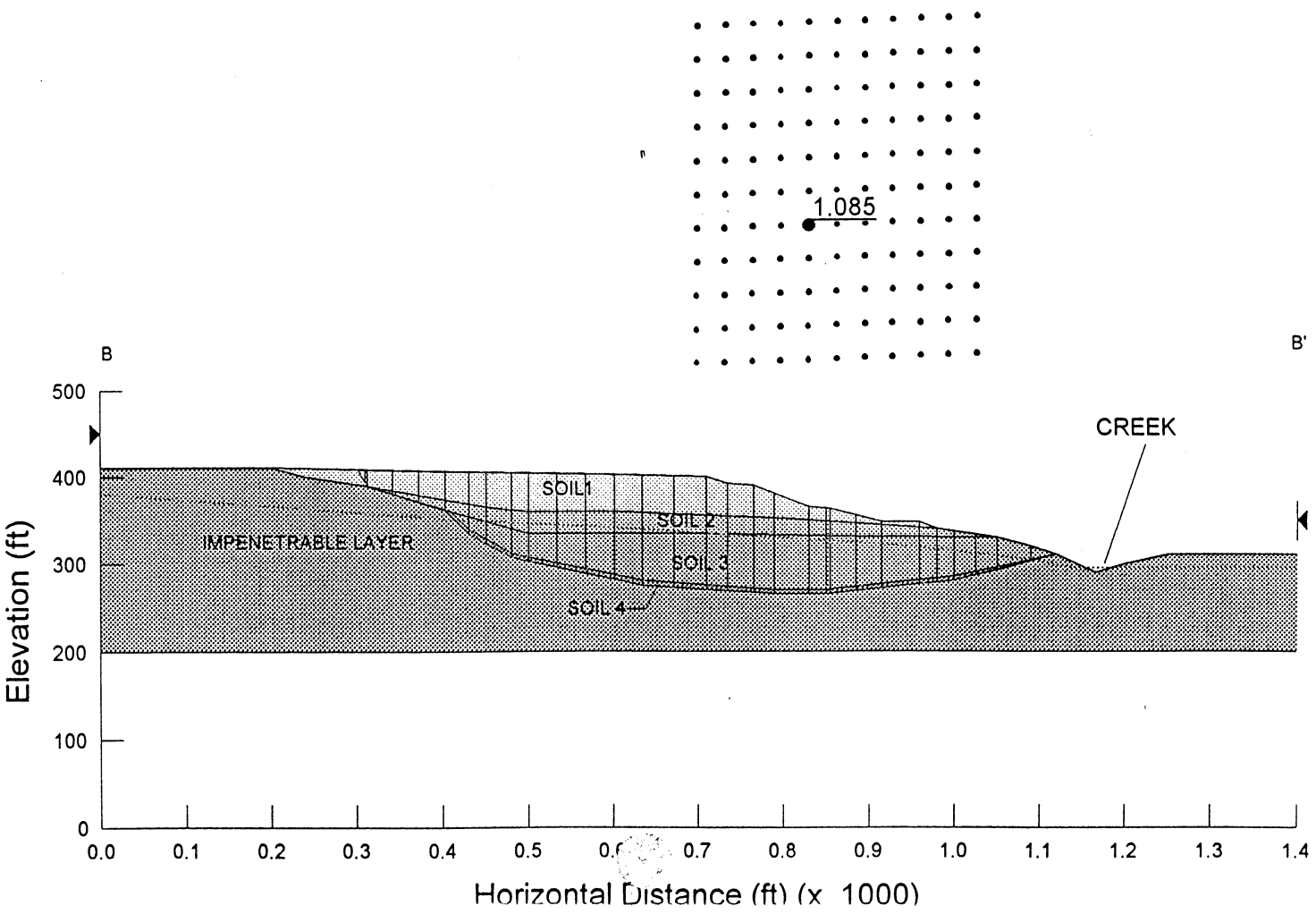


FIGURE 3 - PRIMA-STOCKPILE STABILITY EVALUATION
SECTION 5-5'- PARTIAL REMOVAL OF STOCKPILE
FILE: A-A1FX.SLP

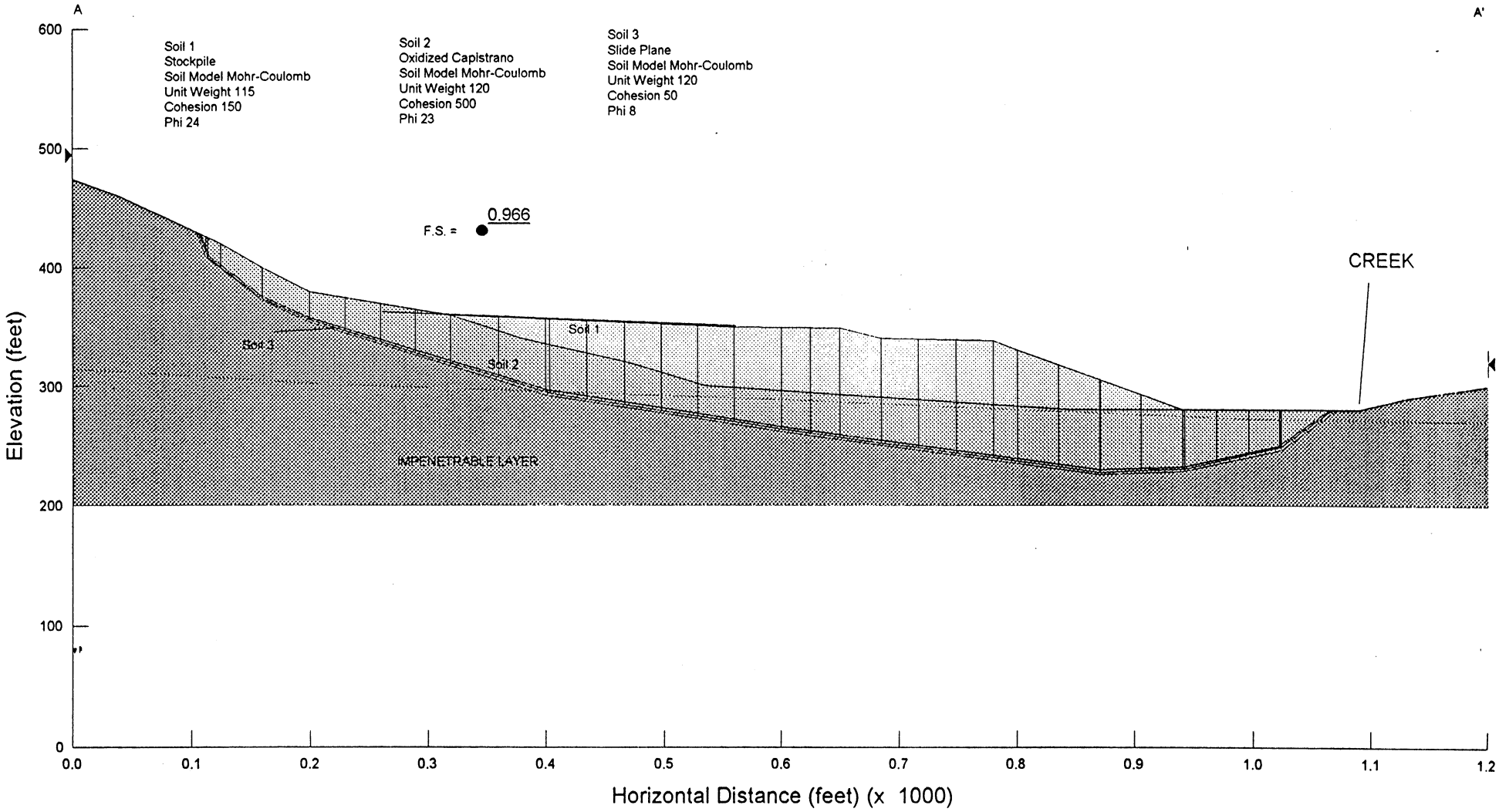


FIGURE 4 - PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE COMPLETELEY REMOVED
FILE: A-A1FX1.SLP

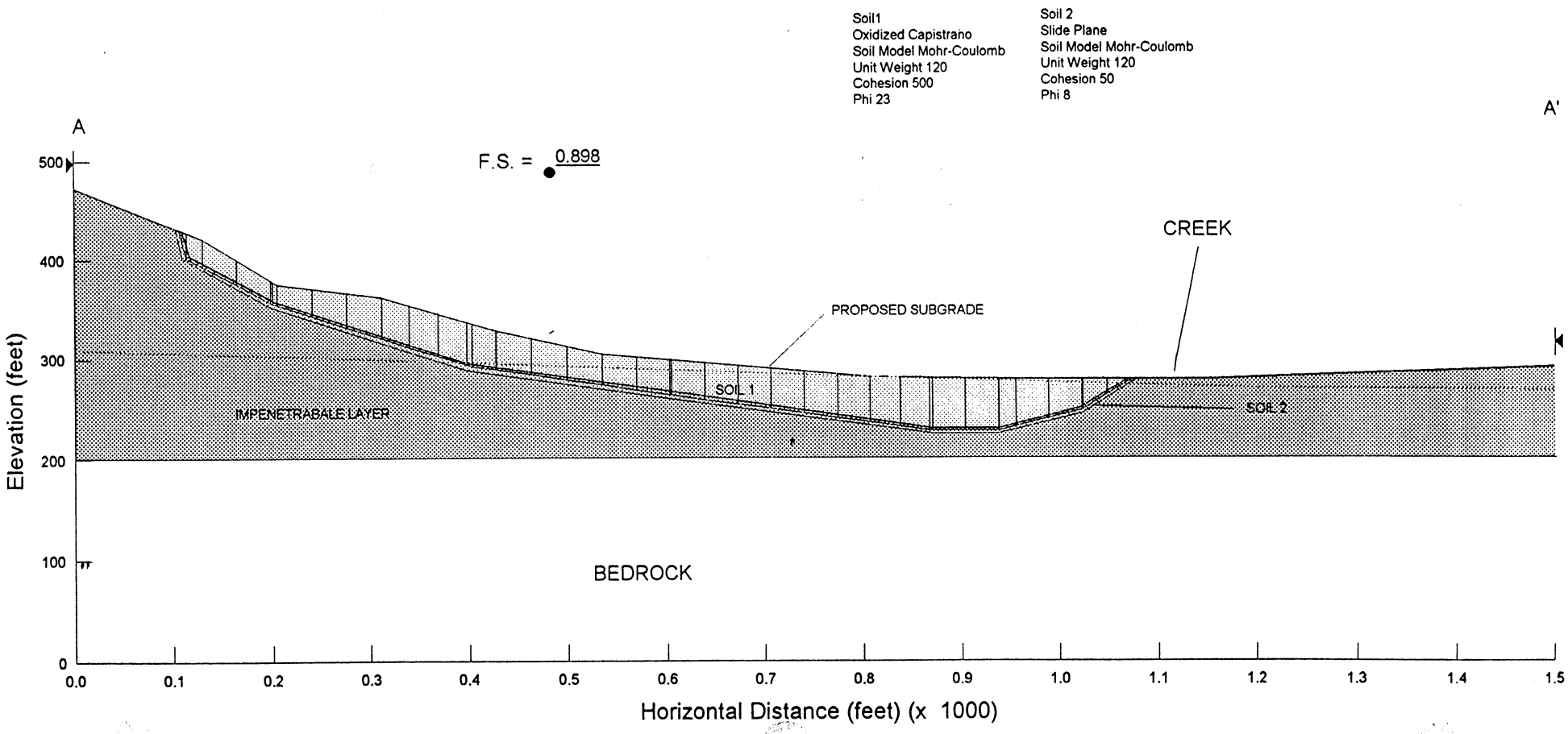


FIGURE 5(a) - PRIMA-STOCKPILE STABILITY EVALUATION
SECTION 5-5'- STOCKPILE REMOVED
BACKFILL SOUTH OF THE CREEK
FILE: A-A1RDF1.SLP

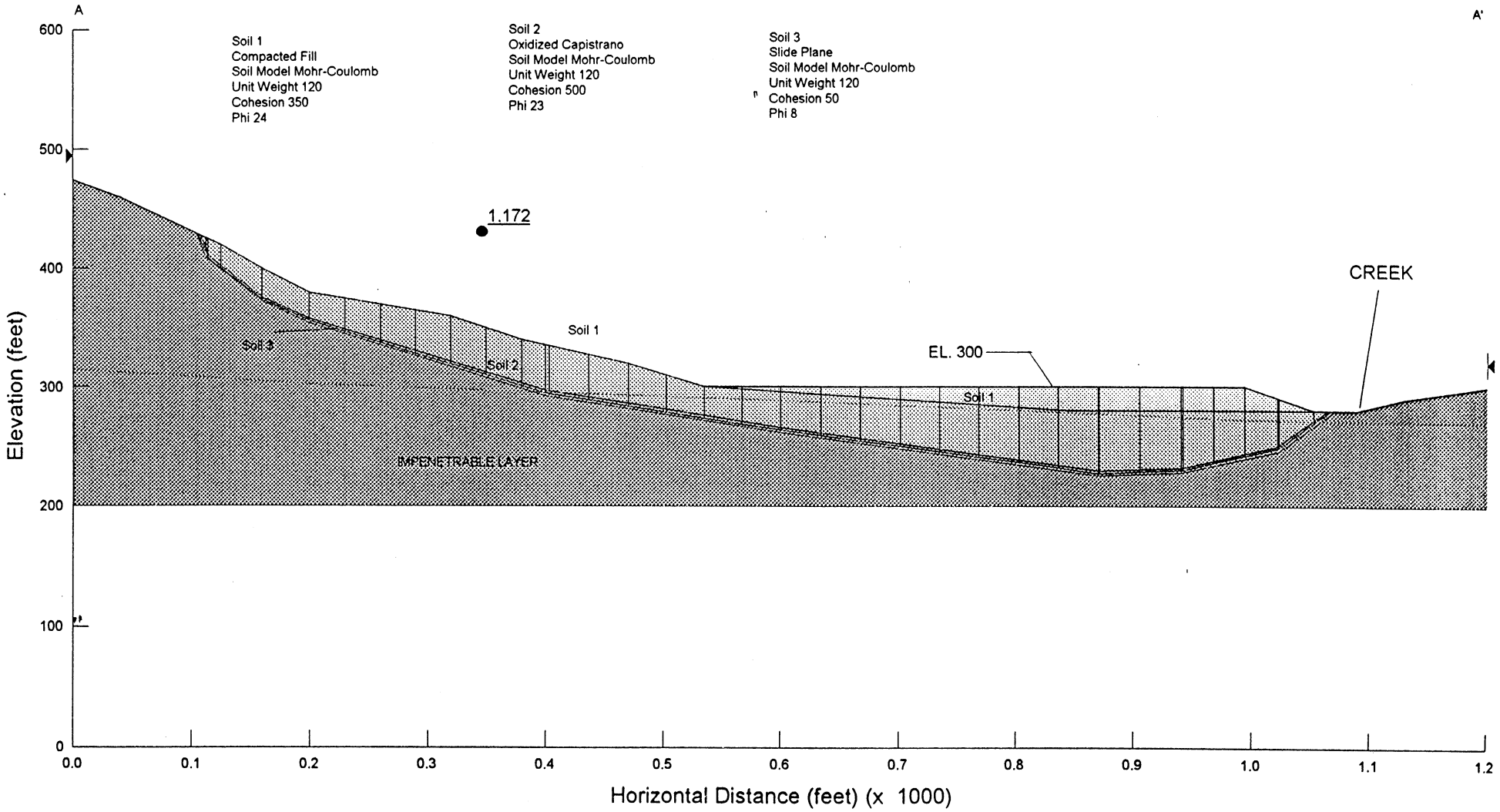


FIGURE 5(b) - PRIMA-STOCKPILE STABILITY EVALUATION
SECTION 5-5' -STOCKPILE REMOVED
BACKFILL SOUTH OF THE CREEK
FILE: A-A1RDF.SLP

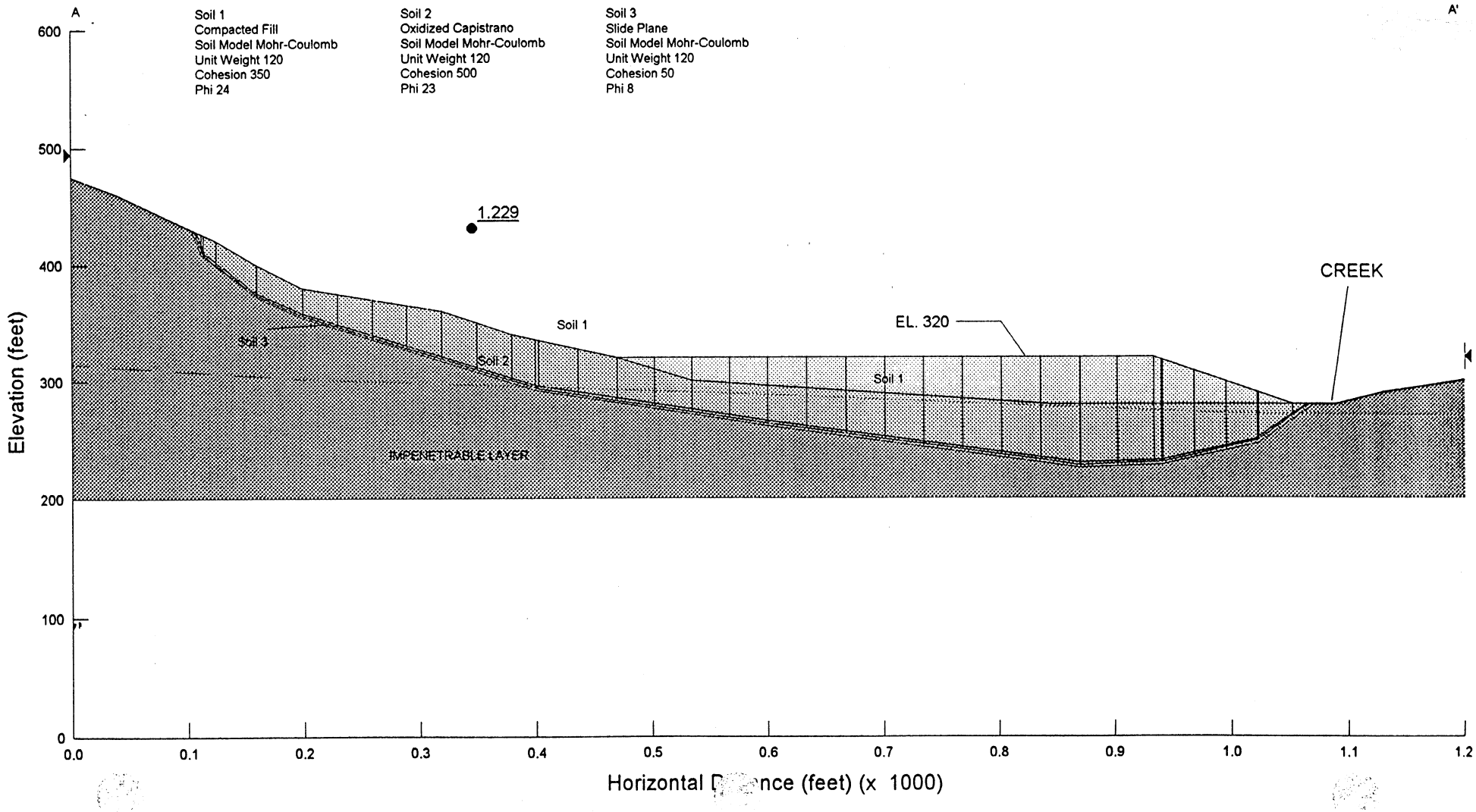


FIGURE 6 - PRIMA-STOCKPILE STABILITY EVALUATION
SECTION 5-5'- STOCKPILE IN PLACE
BACKFILL AT TOE OF STOCKPILE TO EL. 315
FILE: A-A1F1.SLP

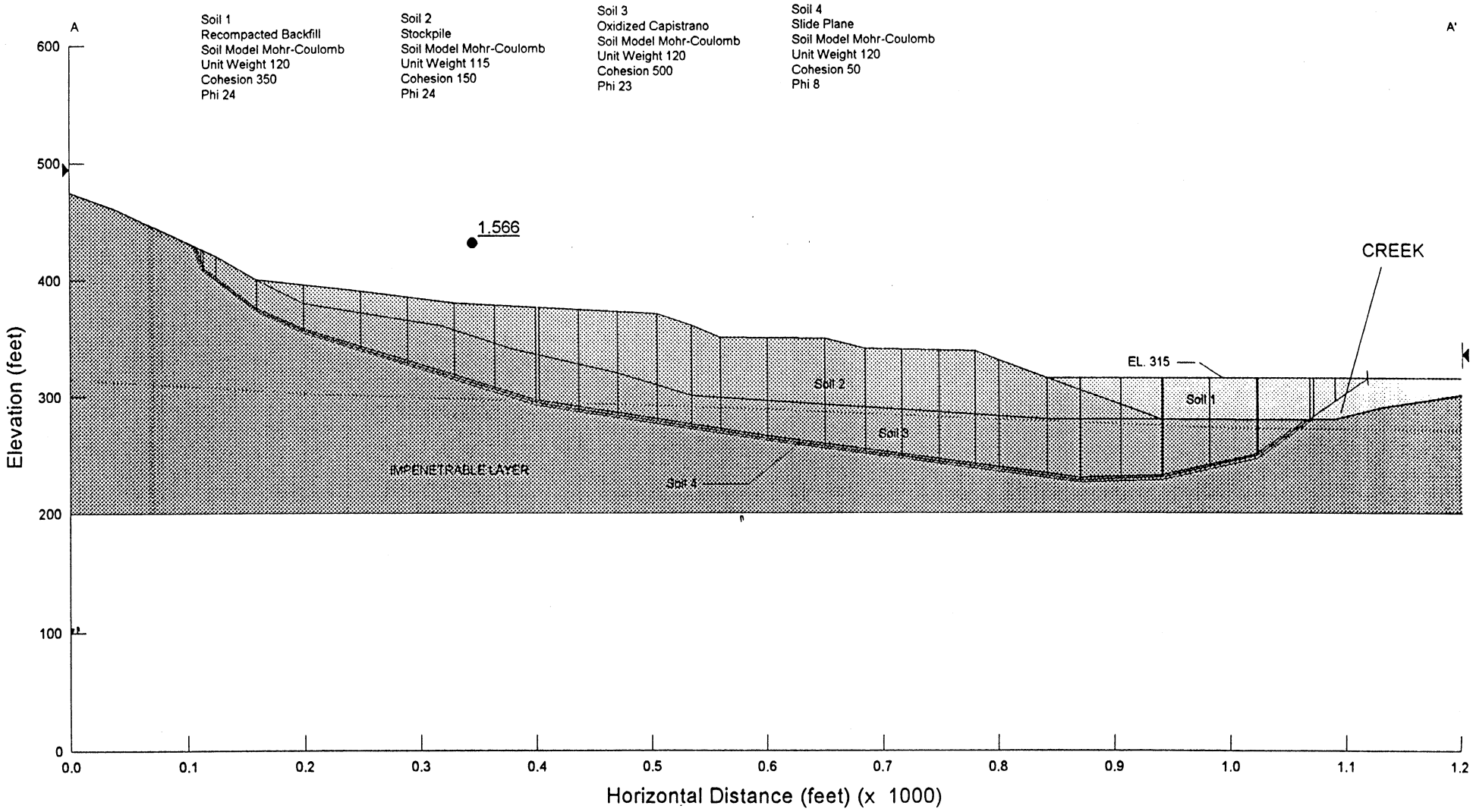


FIGURE 7(a)- PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' BUTTRESS FILL AT TOE OF SLIDE TO EL. 330
FILE: B-B1NEW.SLP

Soil 1
Stockpile
Soil Model Mohr-Coulomb
Unit Weight 115
Cohesion 150
Phi 23

Soil 2
Oxidized Capistrano(may be removed)
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Recompacted Flill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 4
Oxidezed Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 5
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

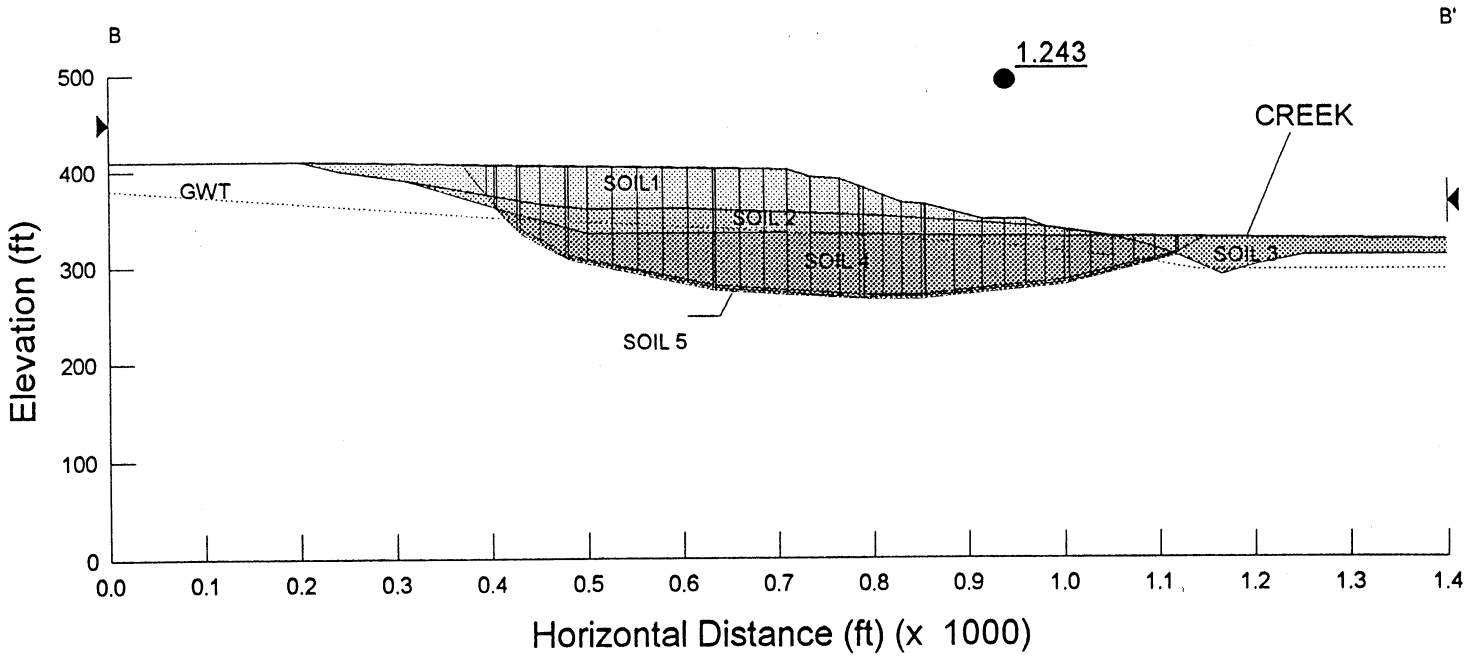


FIGURE 7(b)- PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' BUTTRESS FILL AT TOE OF SLIDE TO EL. 348
FILE: B-B1NEWf.SLP

Soil1
Recompacted Flill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Stockpile
Soil Model Mohr-Coulomb
Unit Weight 115
Cohesion 150
Phi 23

Soil 3
Oxidized Capistrano(may be removed)
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 4
Oxidezed Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 5
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

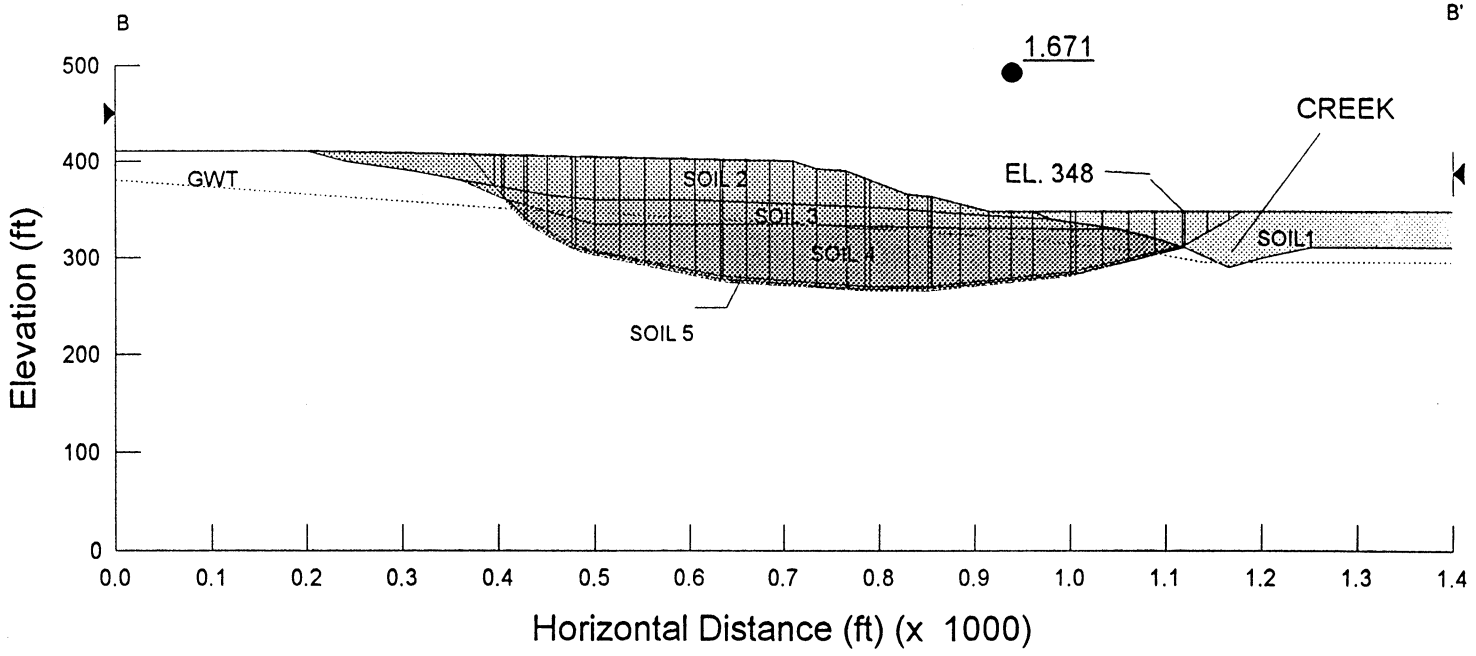


FIGURE 8(a)- PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE REMOVED
BUTTRESS FILL OVER LANDSLIDE AREA
FILE: A-A1RFF.SLP

Soil 1
Recompacated Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Oxidized Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

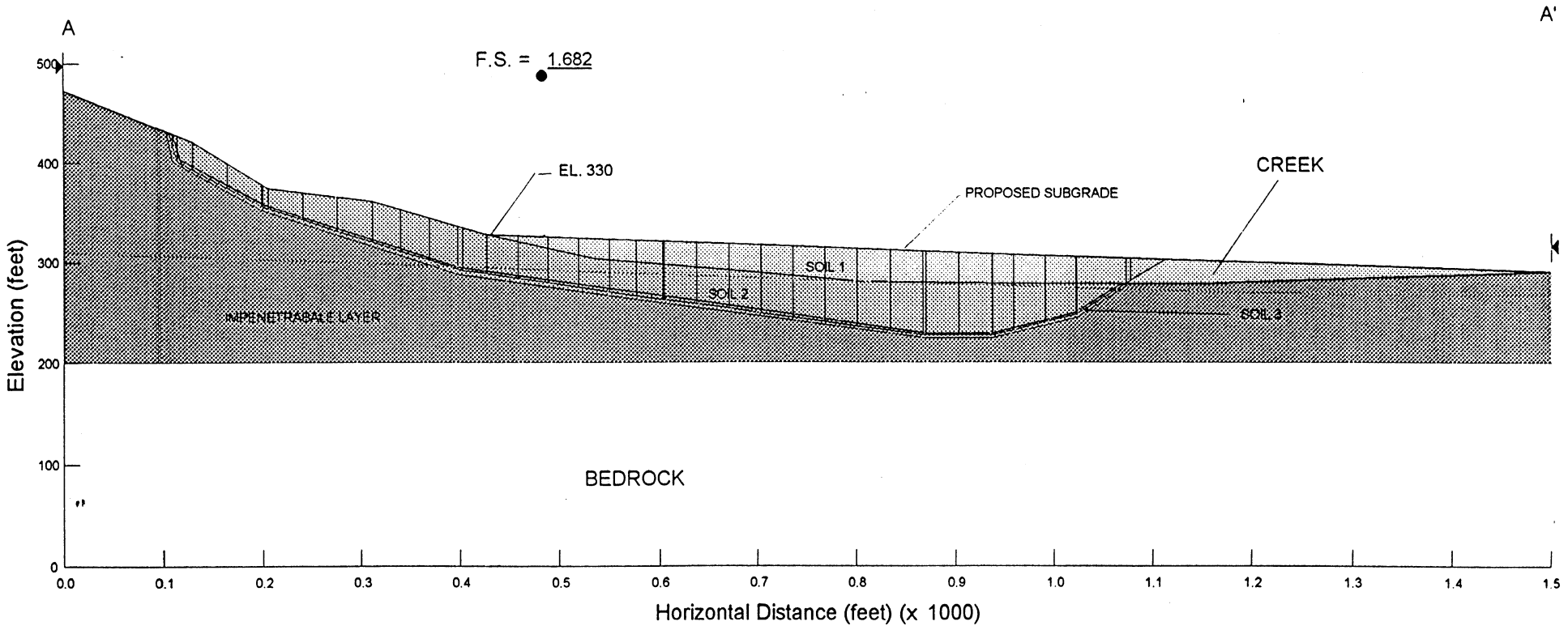


FIGURE 8(b)- PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE REMOVED
BUTTESS FILL OVER STOCKPILE AREA
FILE: A-A1RFF2.SLP

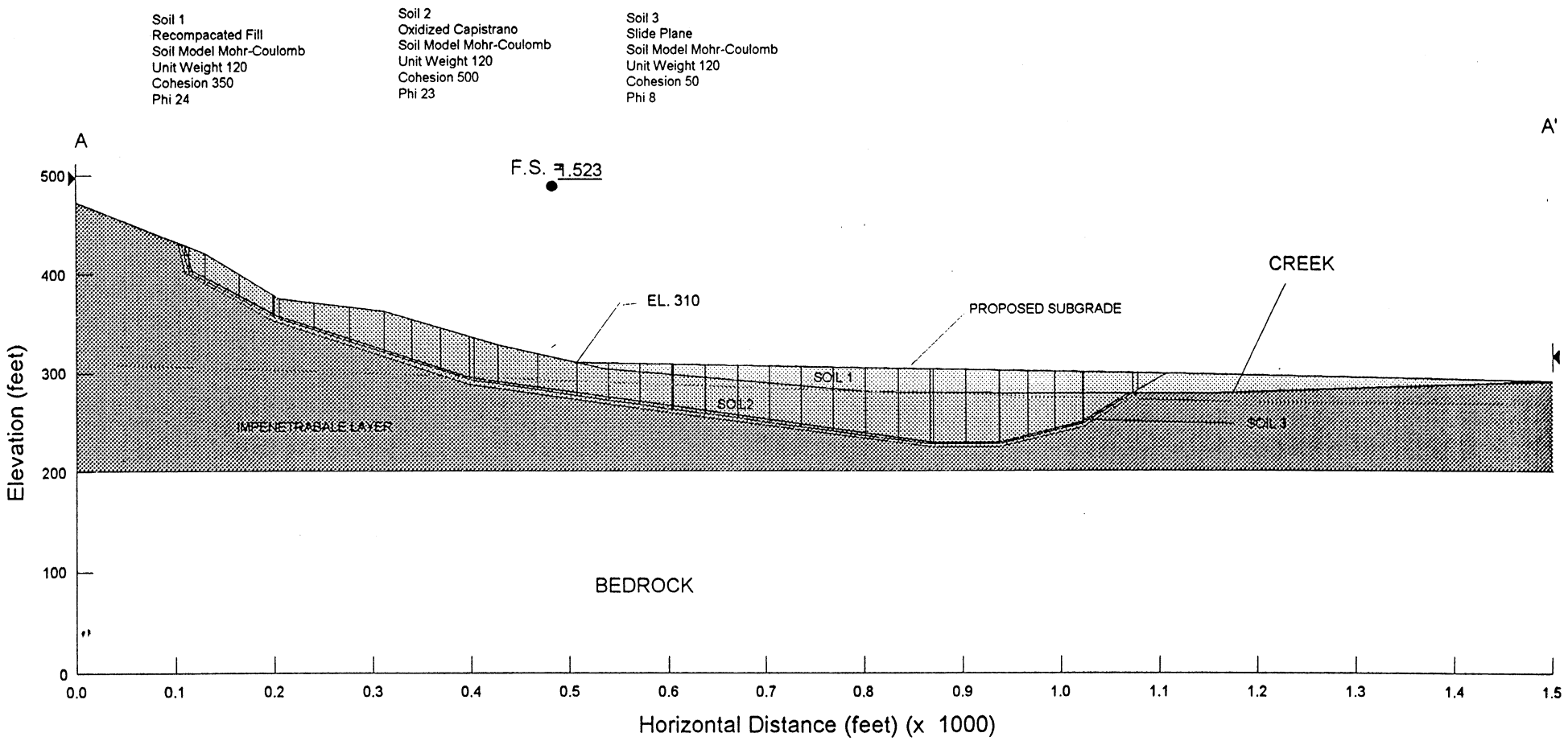


FIGURE 8(c)- PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5' - STOCKPILE REMOVED
BUTTRESS FILL OVER STOCKPILE AREA
FILE: A-A1RFF1.SLP

Soil 1
Recompacated Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Oxidized Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

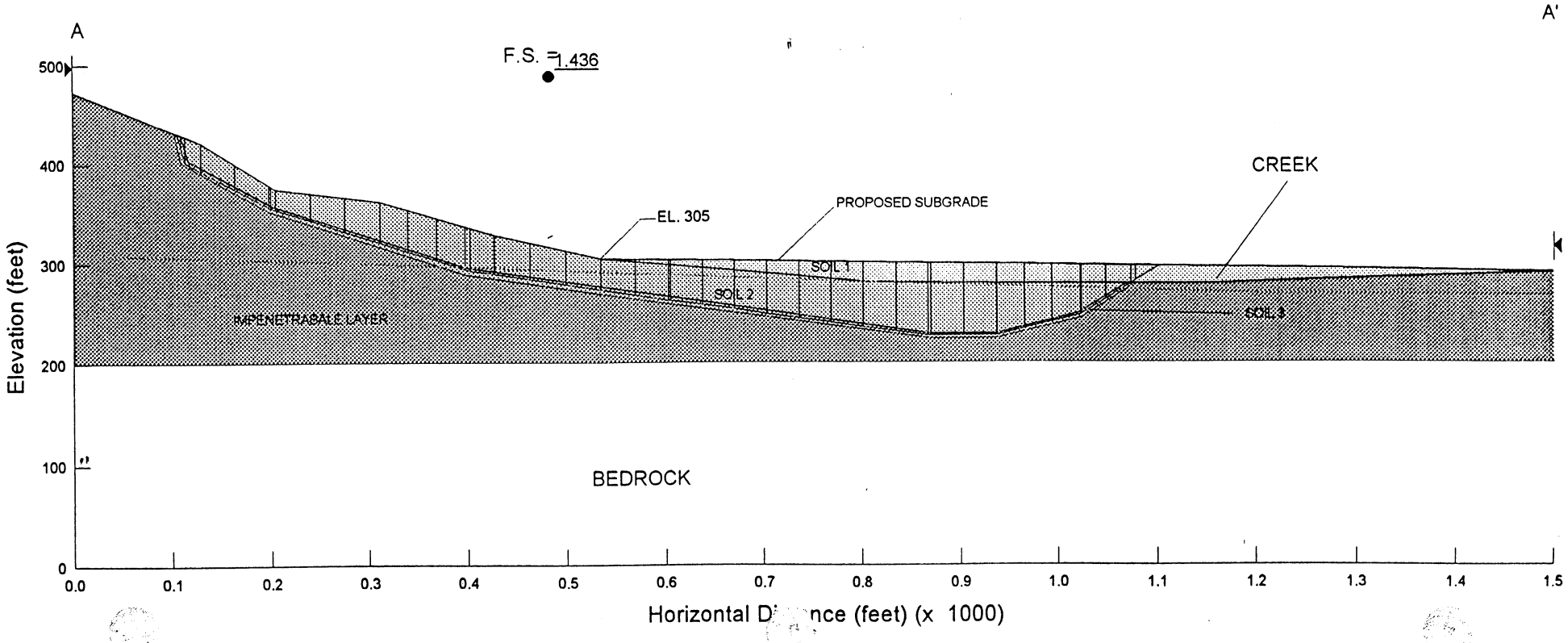


FIGURE 9(a)- PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5' - STOCKPILE REMOVED, BUTTRESS FILL OVER LANDSLIDE AREA
STABILITY OF LANDSLIDE SCARP SOUTH OF BUTTRESS FILL
FILE: A-A1RFFS.SLP

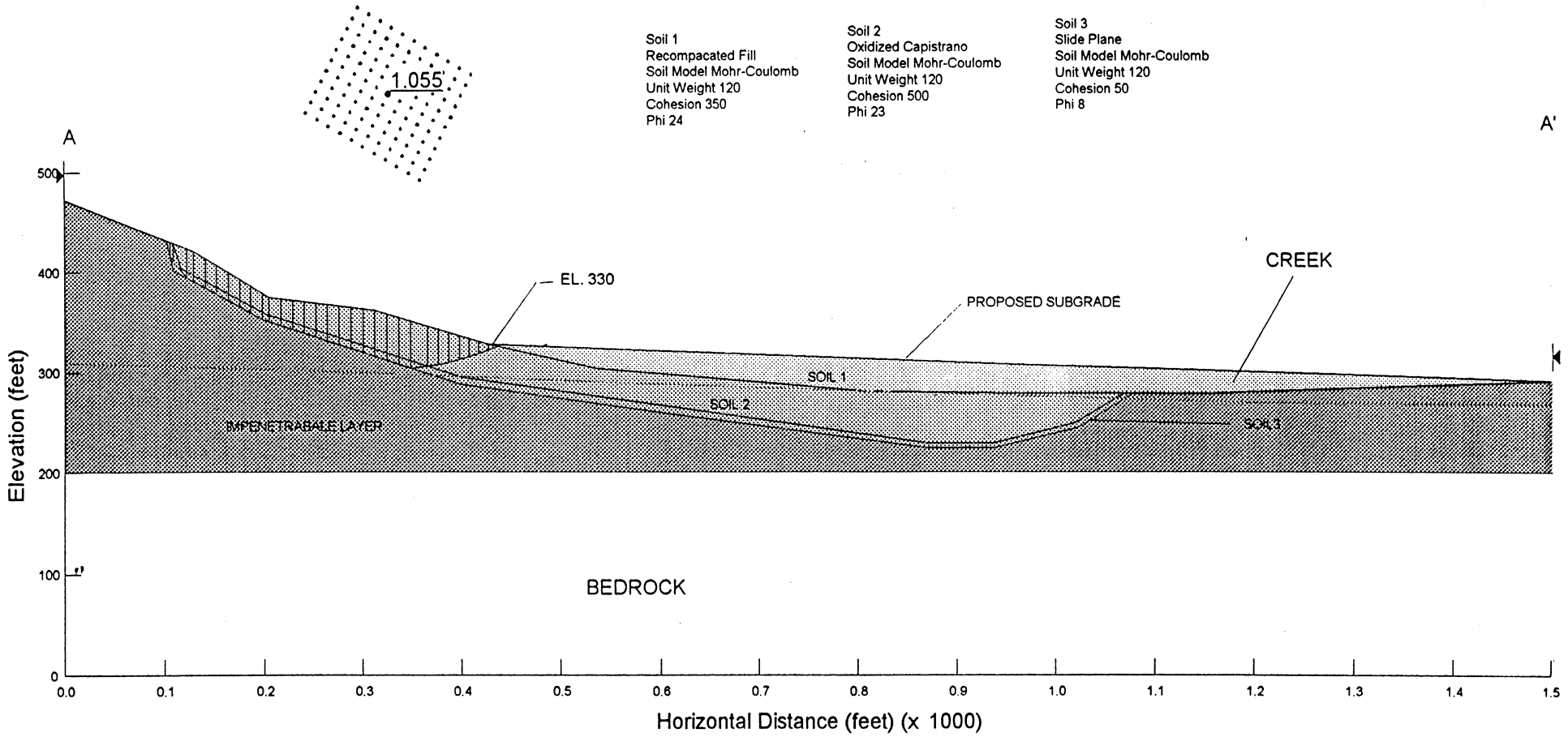


FIGURE 9(b)- PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE REMOVED, BUTTRESS FILL OVER STOCKPILE AREA
STABILITY OF LANDSLIDE SCARP SOUTH OF BUTTRESS FILL
FILE: A-ARFF2S.SLP

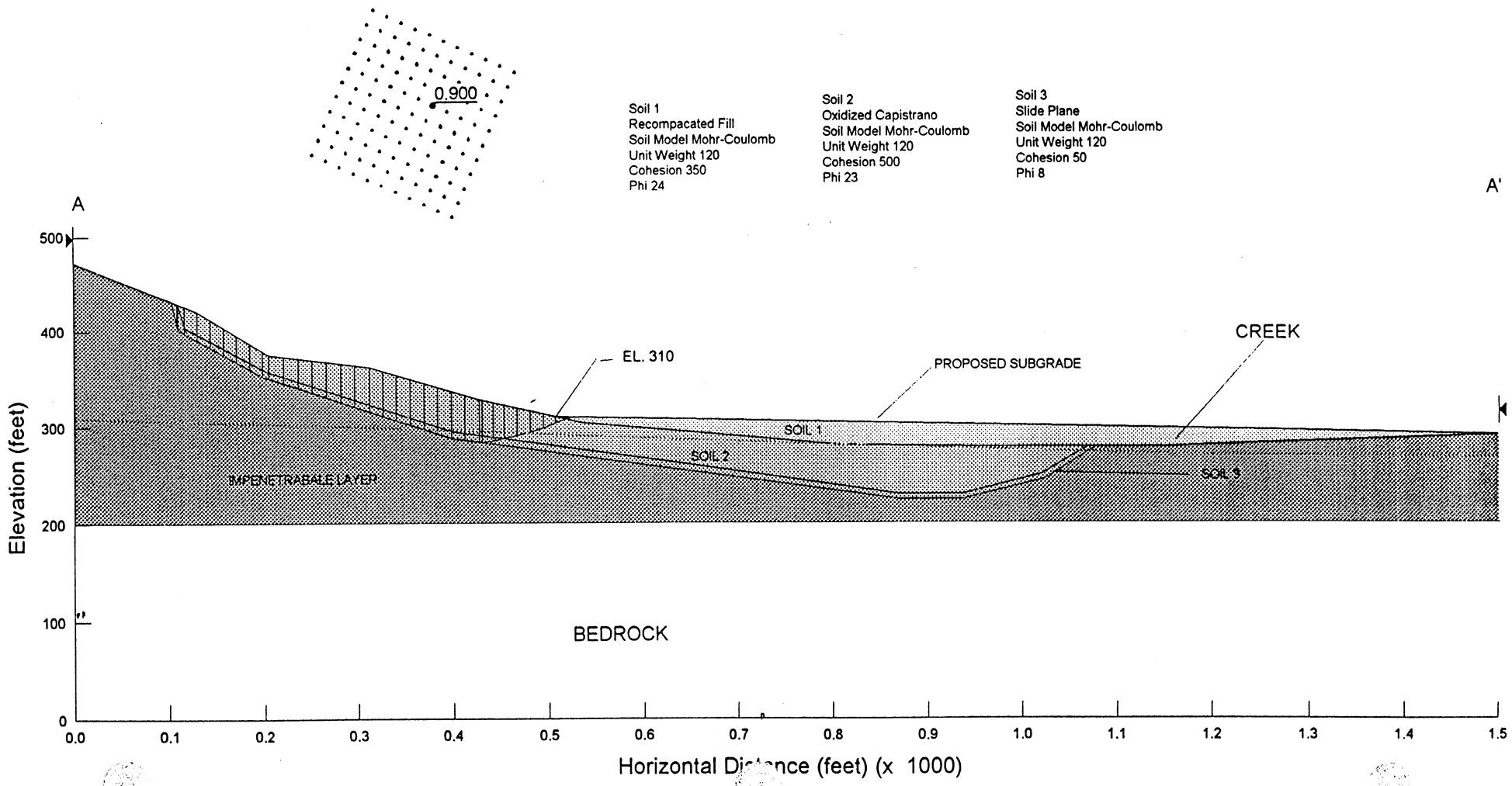


FIGURE 9(c) - PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE REMOVED, BUTTRESS FILL OVER LANDSLICE AREA
STABILITY OF LANDSLIDE SCARP SOUTH OF BUTTRESS FILL
FILE: A-ARFF1S.SLP

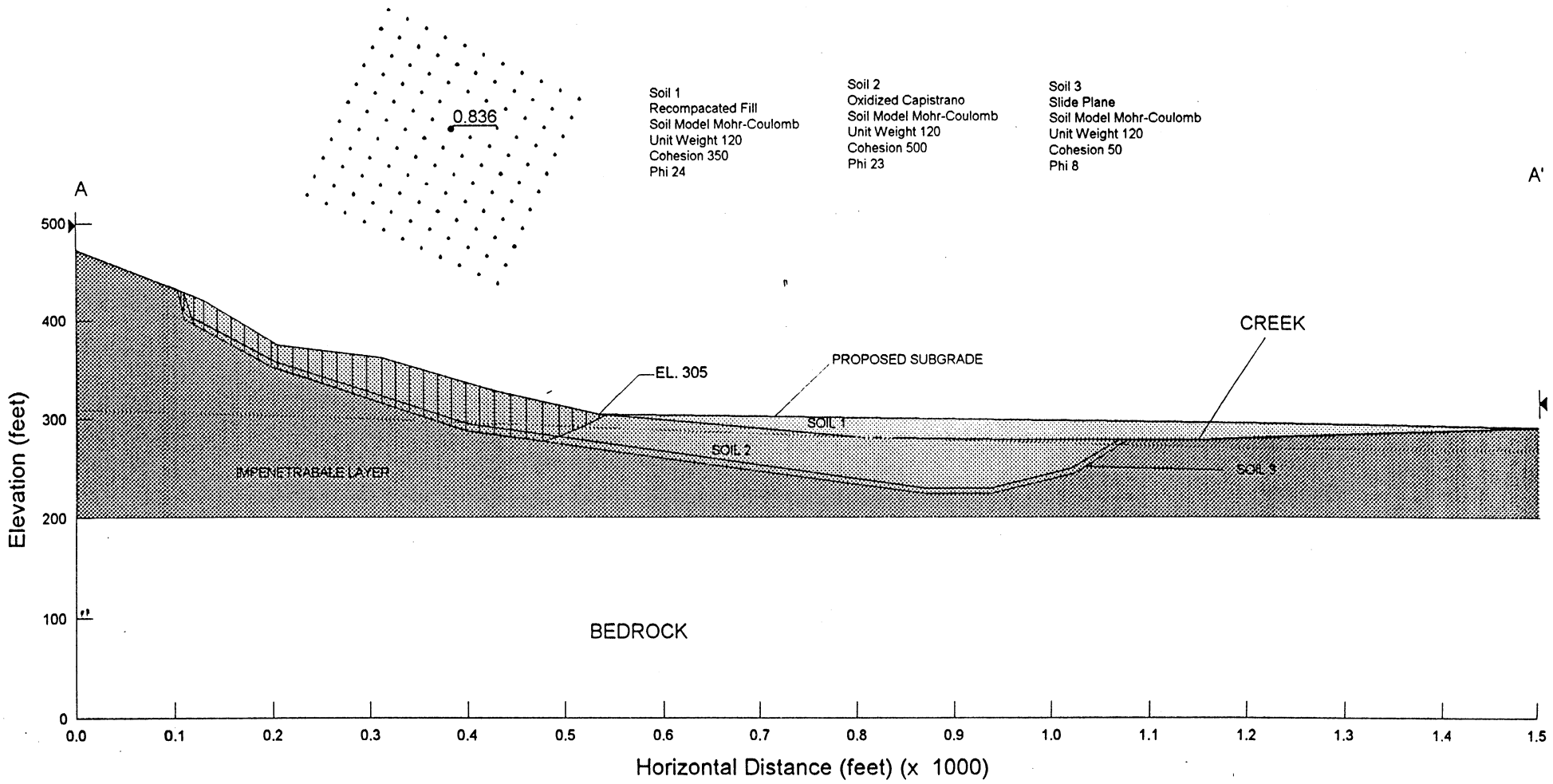


FIGURE 10 - PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5'- STOCKPILE REMOVED
STABILITY OF NATIVE SLOPE ABOVE LANDSLIDE
FILE: A-A1RB1.SLP

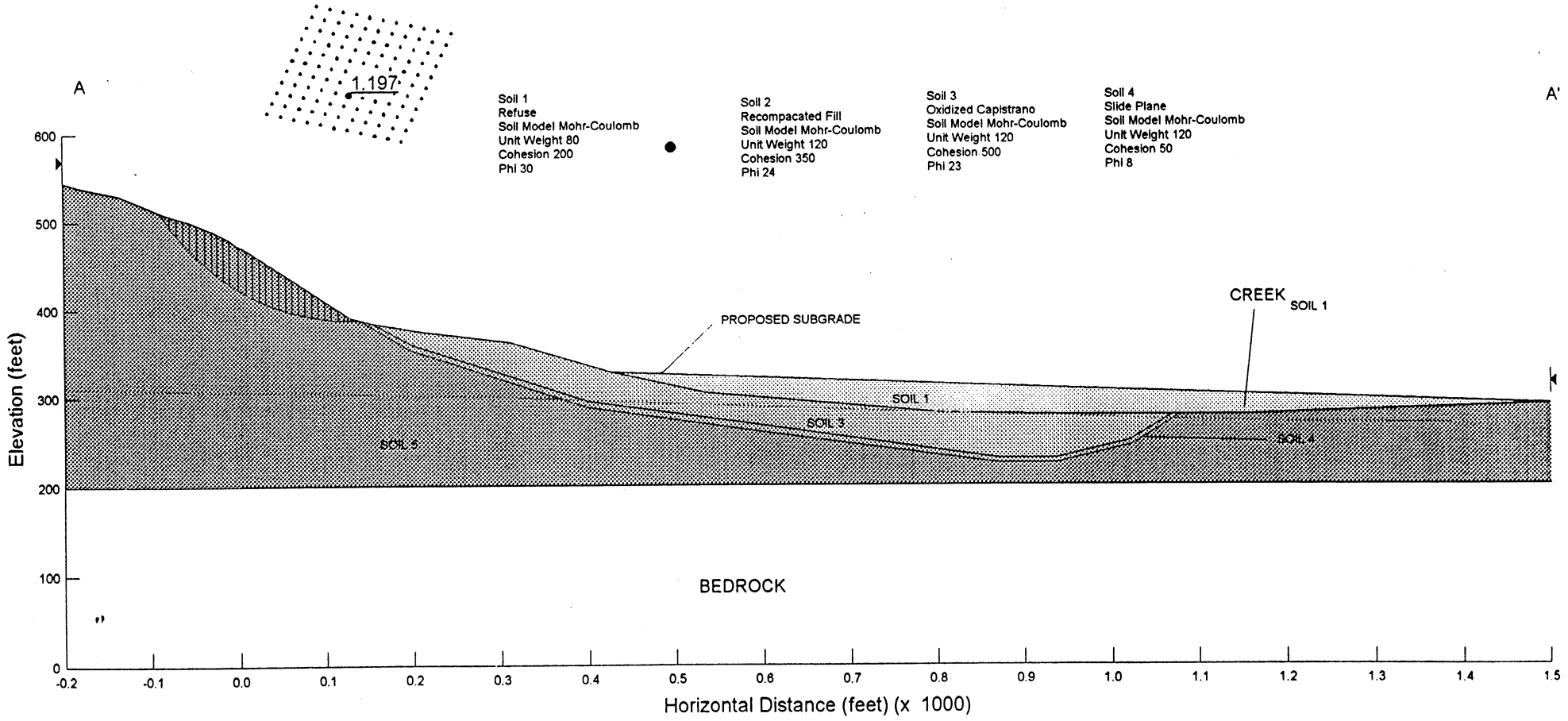


FIGURE 11-PRIMA DESHECHA LANDFILL- ZONE 1
SECTION 5-5' STOJCKPILE REMOVED AND A TERRACE CJUT INTO LANDSLIDE
FILE: A-A1RF.SLP

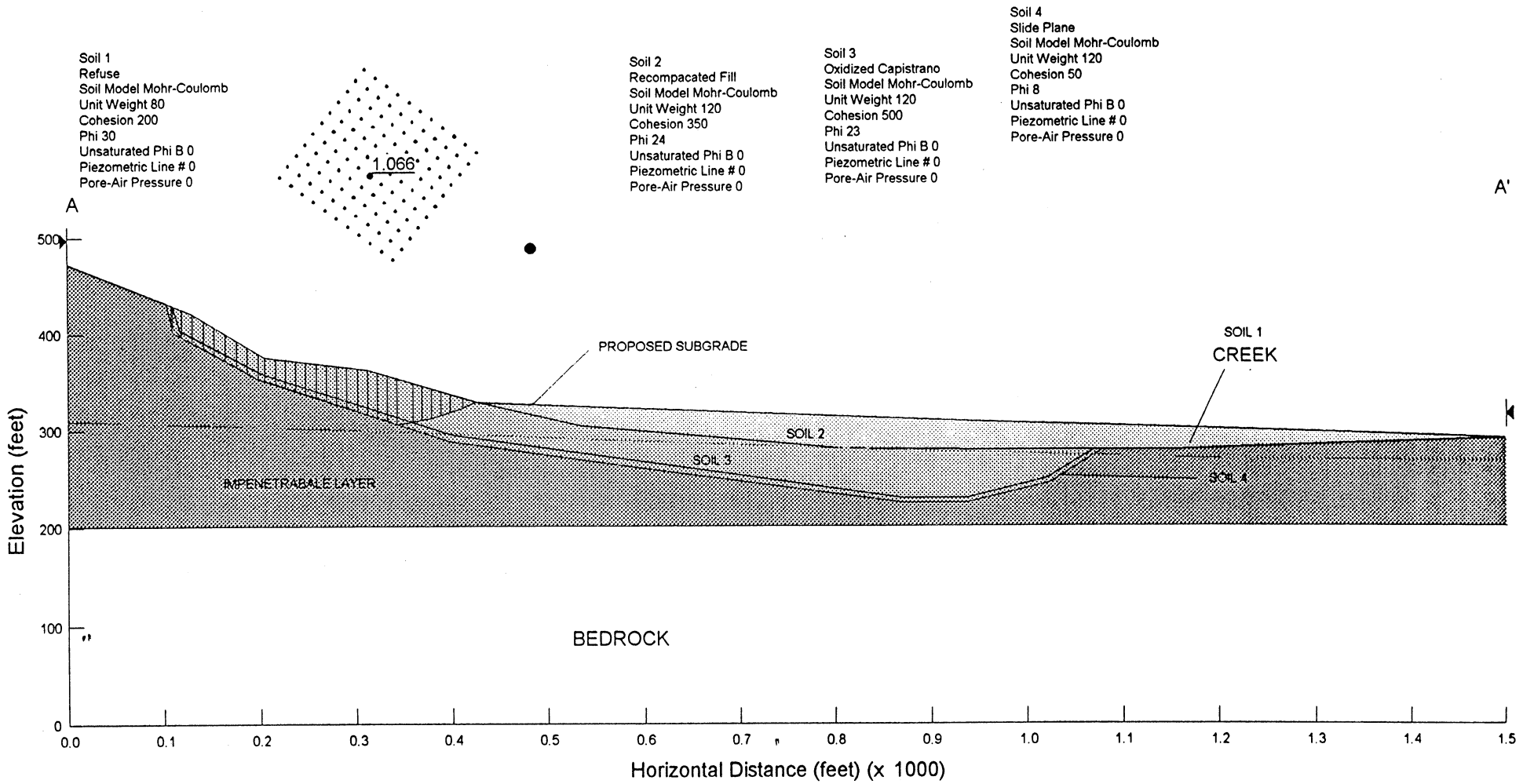


FIGURE 12- PRIMADESHECHA LANDFILL ZONE 1
SECTION 5-5'- BUTTRESS FILL IN LANDSLIDE AREA AND REFUSE FILL IN PLACE
FILE: A-A1RC.SLP

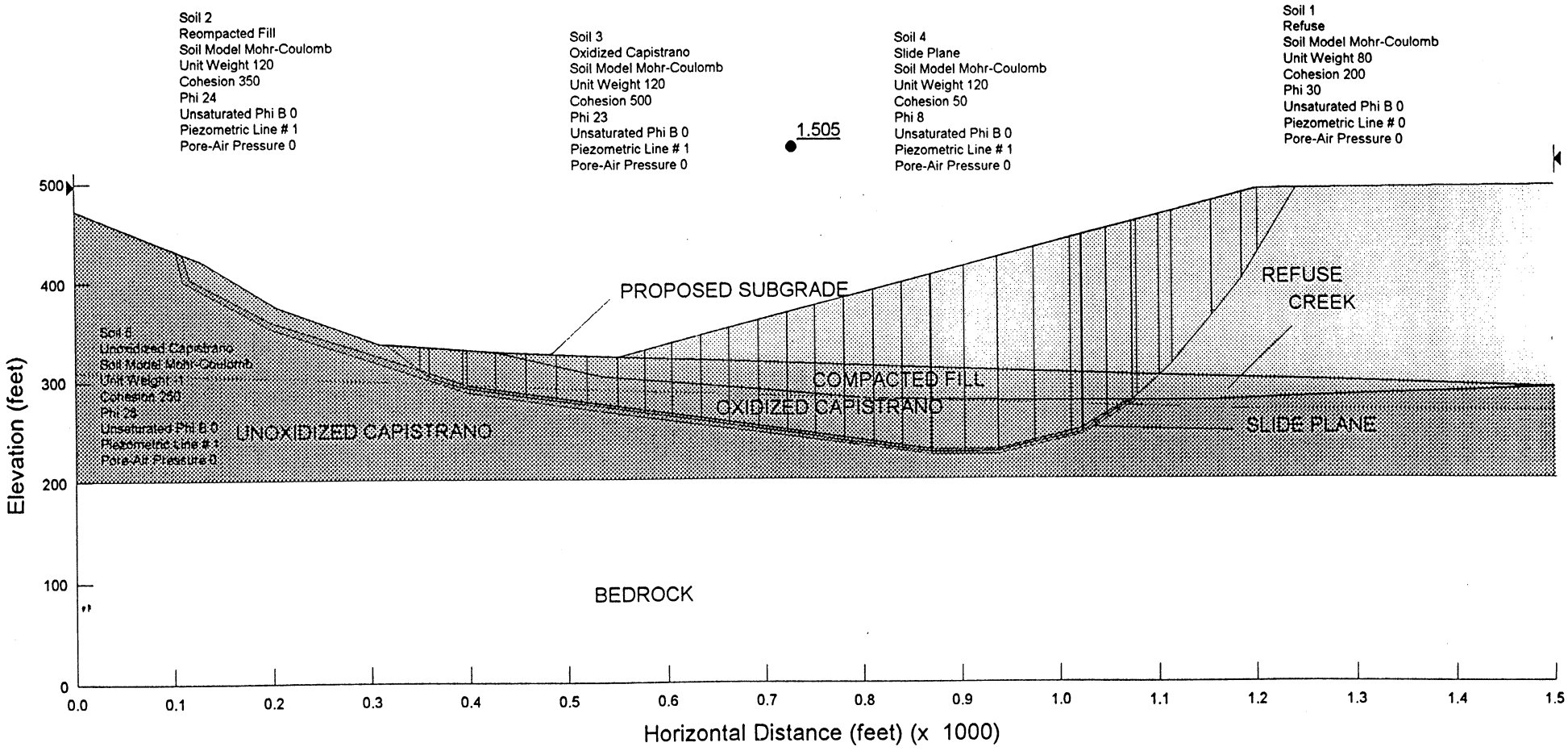


FIGURE 13(a)-PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' BUTTRESS FILL AND REFUSE FILL OVER BUTTRESS FILL
FILE: B-B1R1.SLP

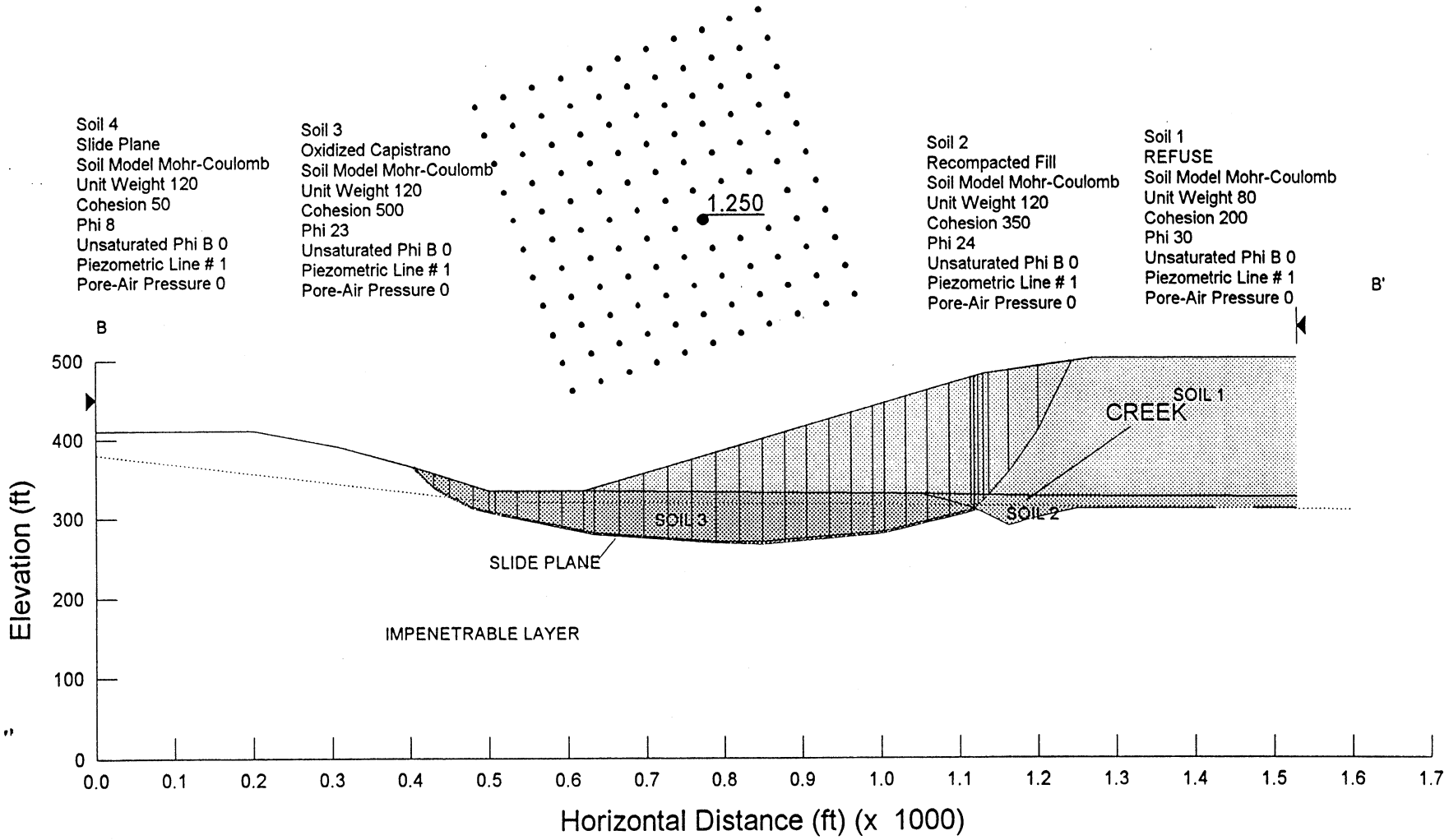


FIGURE 13(b)- PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' WITH STABILIZATION FILL SOUTH OF CREEK AND REFUSE FILL OVER BUTTRESS
FILE: B-B1R3B.SLP

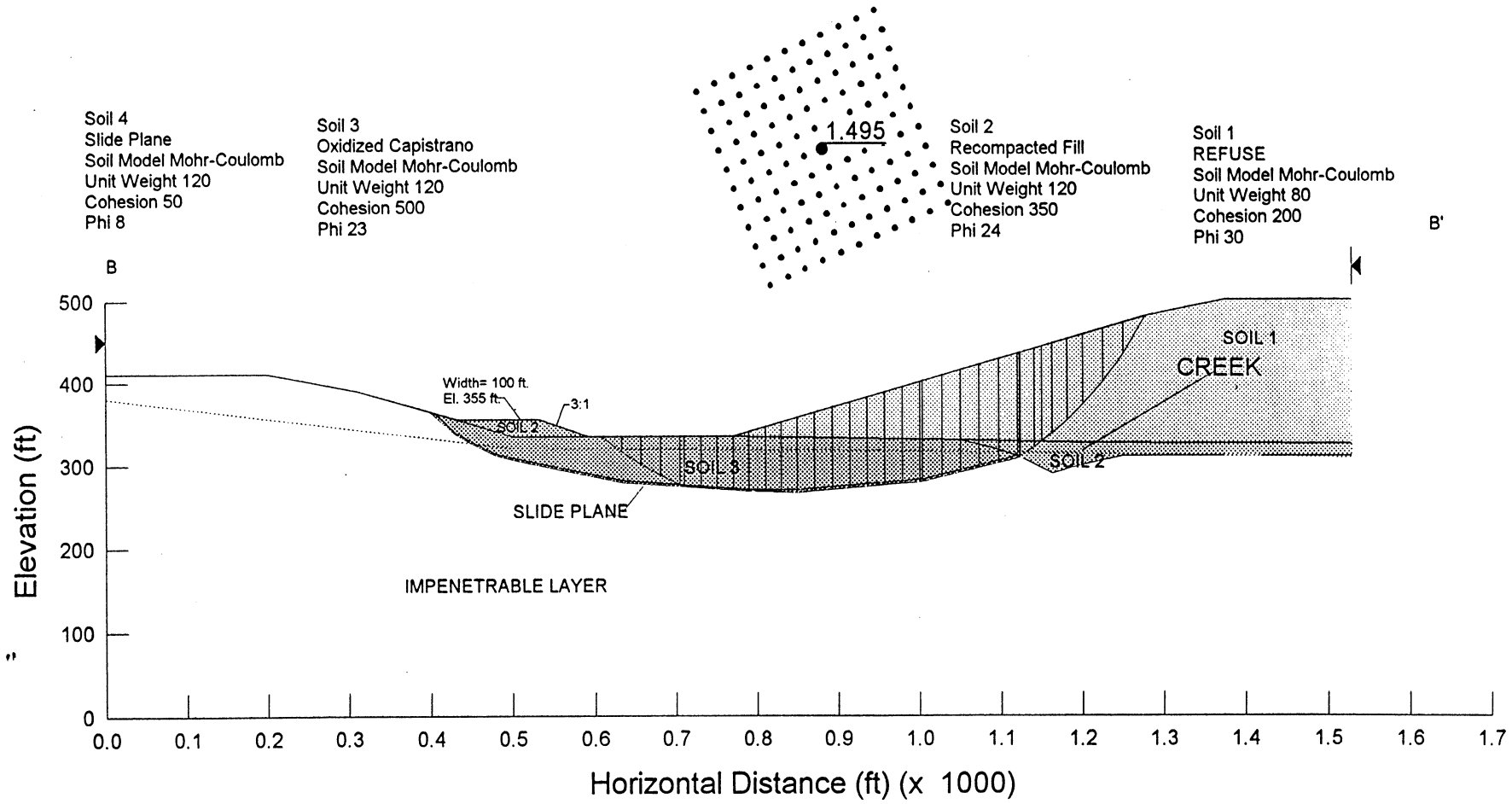
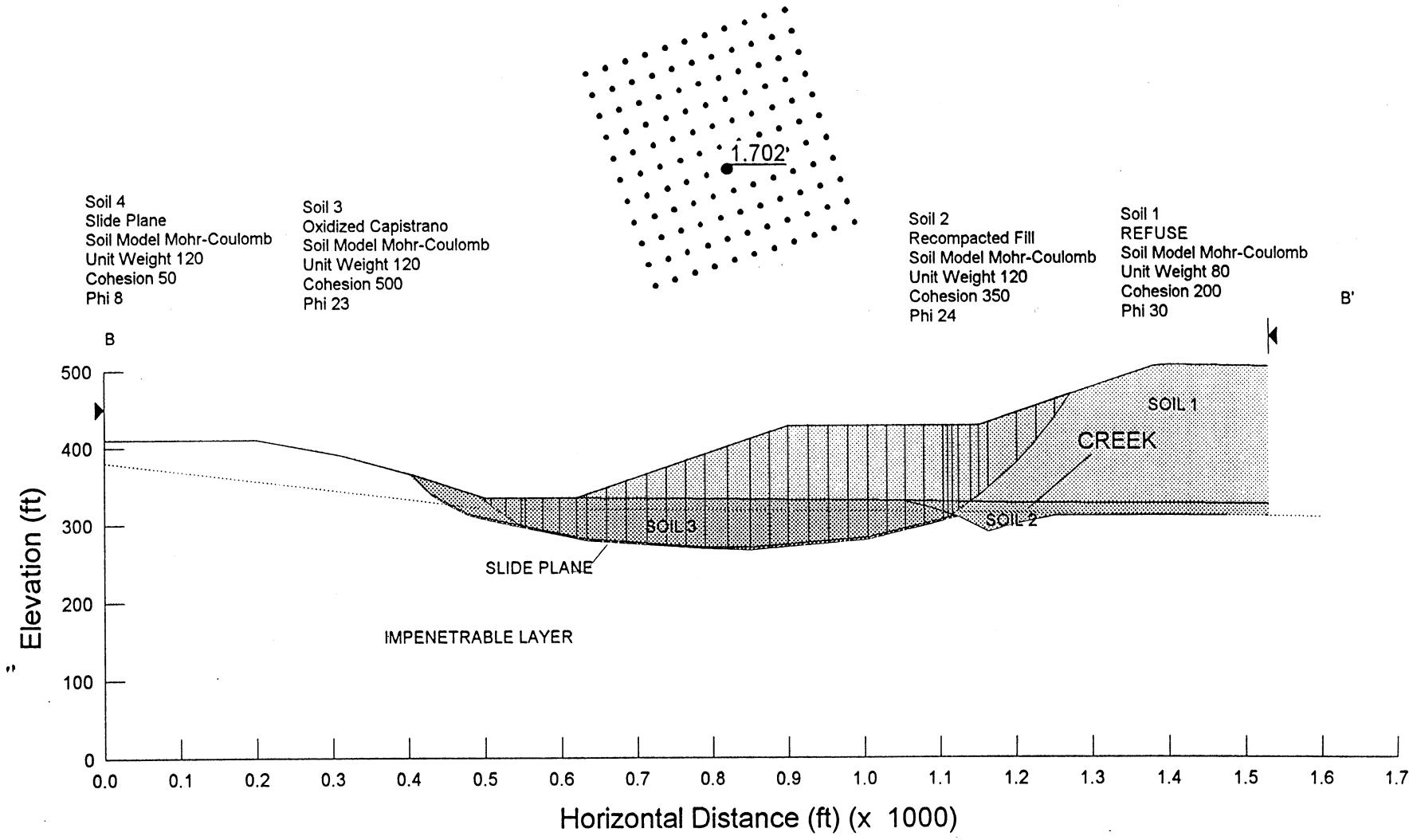


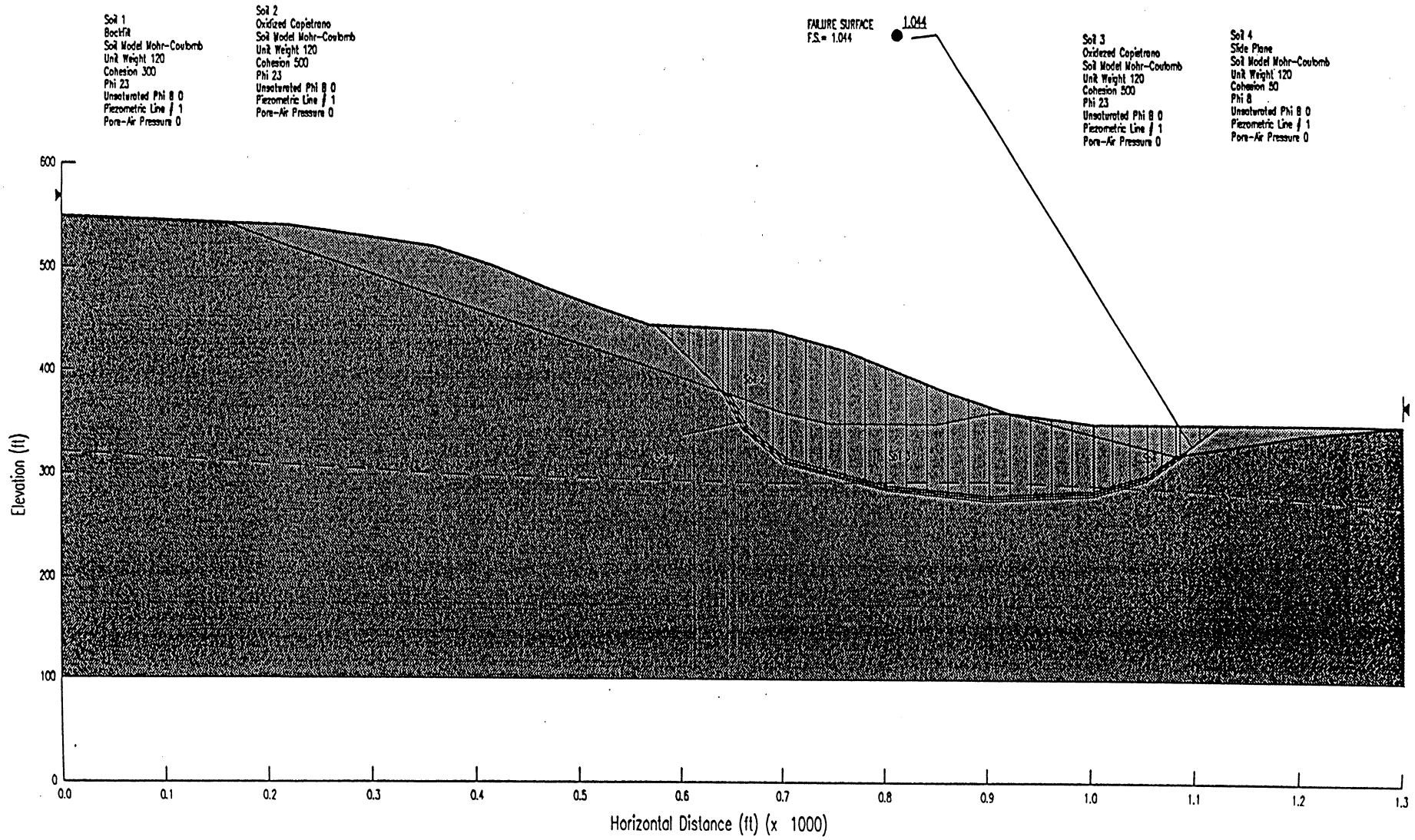
FIGURE 13(c)- PRIMA DESHECHA LANDFILL ZONE 1
SECTION 6-6' WITH BUTTRESS FILL AND REFUSE FILL OVER BUTTRESS FILL
FILE: B-B1R1S.SLP



ATTACHMENT G
NORTH-FACING SUBGRADE SLOPE STABILITY ANALYSIS – PROPOSED GRADE

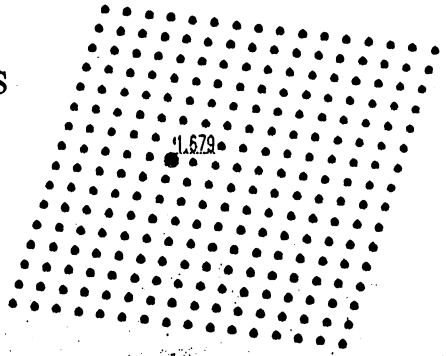
PRIMA DESHECHA LANDFILL – ZONE 1
NORTH-FACING SUBGRADE SLOPE STABILITY ANALYSIS
EXISTING CONDITION

CROSS SECTION 7-7'



:IMA DESHECHA LANDFILL – ZONE 1
)RTH-FACING SUBGRADE SLOPE STABILITY ANALYSIS
:OPOSED GRADE

:OSS SECTION 7-7'



Soil 1
Backfill
Soil Model Mohr–Coulomb
Unit Weight 120
Cohesion 300
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore–Air Pressure 0

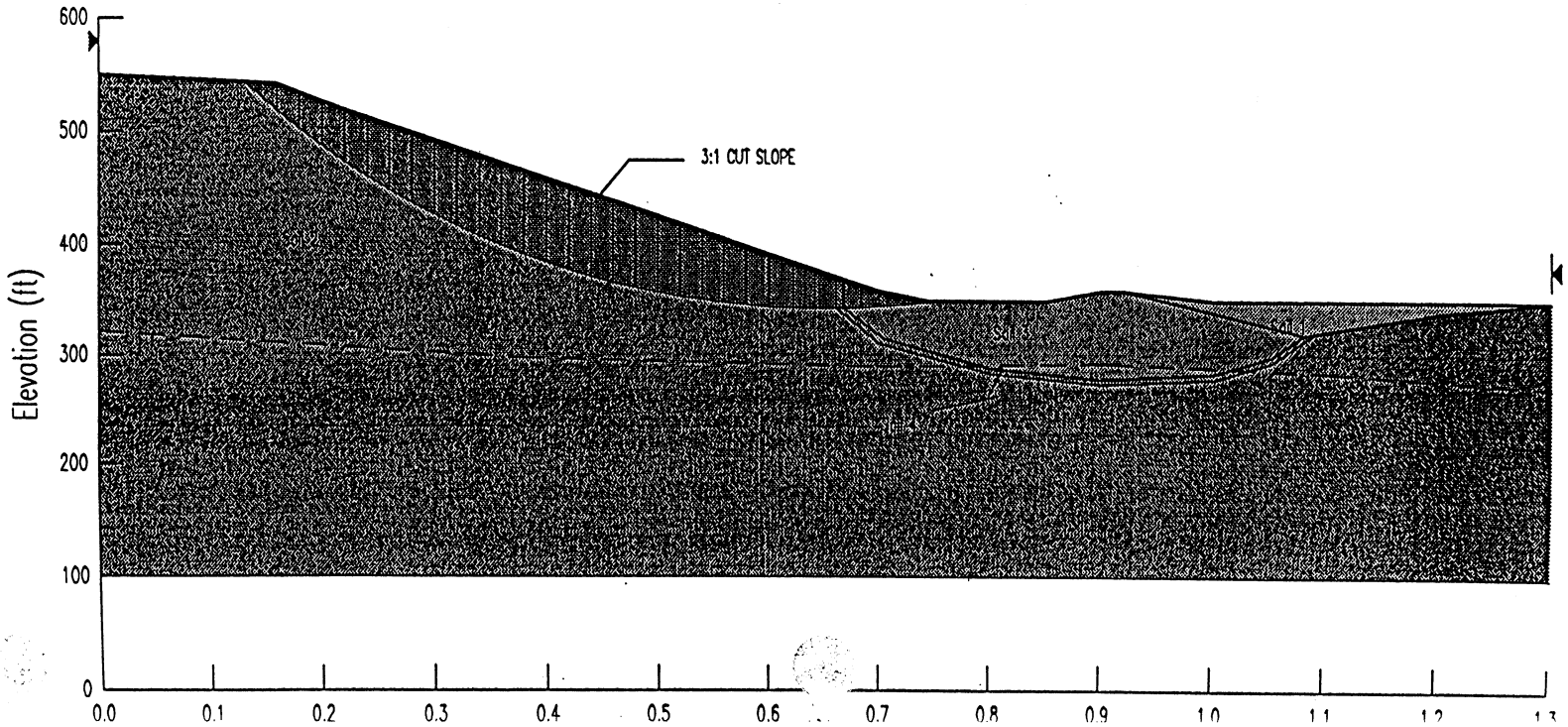
Soil 2
Oxidized Capistrano
Soil Model Mohr–Coulomb
Unit Weight 120
Cohesion 500
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore–Air Pressure 0

Soil 3
Oxidezed Capistrano
Soil Model Mohr–Coulomb
Unit Weight 120
Cohesion 500
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore–Air Pressure 0

Soil 4
Slide Plane
Soil Model Mohr–Coulomb
Unit Weight 120
Cohesion 50
Phi 8
Unsaturated Phi B 0
Piezometric Line # 1
Pore–Air Pressure 0

D

D'



PR[illegible]A DESHECHA LANDFILL – ZONE 1
NO[illegible]H-FACING SUBGRADE SLOPE STABILITY ANALY[illegible]
PROPOSED GRADE

CROSS SECTION 7-7'

Soil 1
Backfill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 300
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore-Air Pressure 0

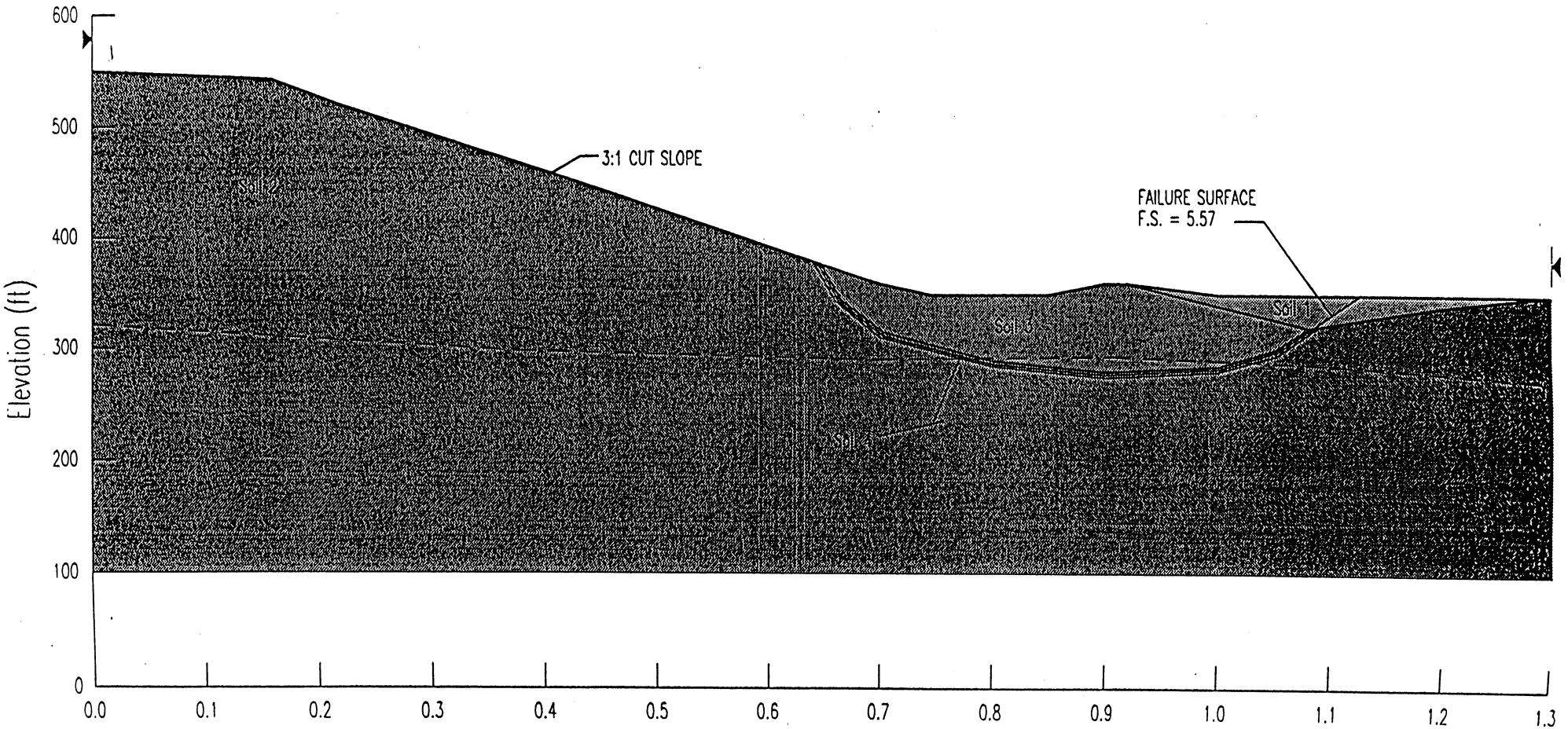
Soil 2
Oxidized Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore-Air Pressure 0

Soil 3
Oxidezed Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23
Unsaturated Phi B 0
Piezometric Line # 1
Pore-Air Pressure 0

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8
Unsaturated Phi B 0
Piezometric Line # 1
Pore-Air Pressure 0

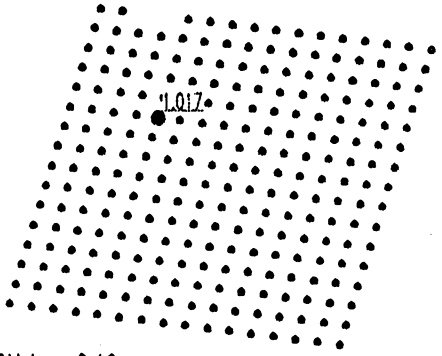
D

D'

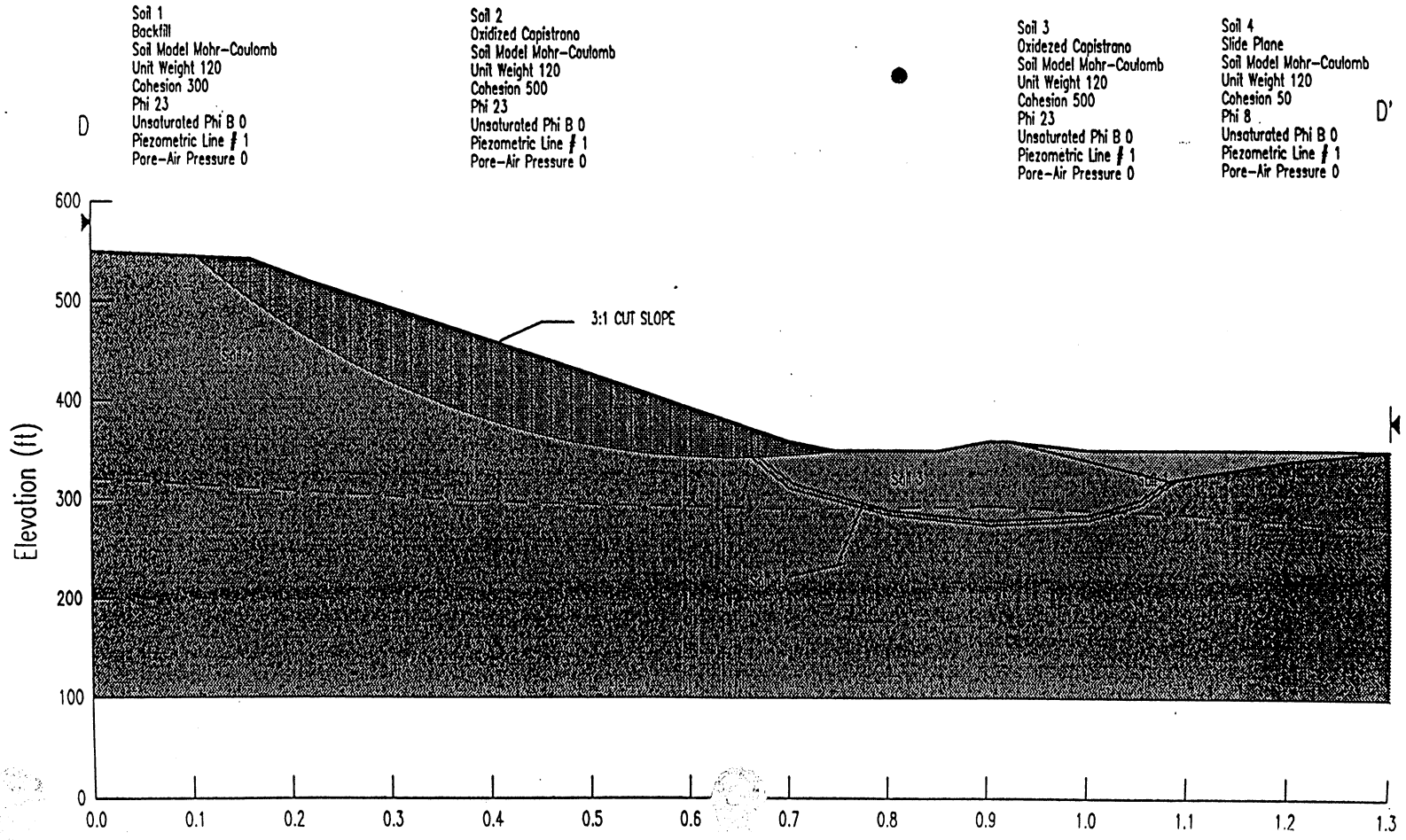


IMA DESHE .A LANDFILL – ZONE 1
RTH-FACING SUBGRADE SLOPE STABILITY ANALYSIS
OPOSED GRADE

OSS SECTION 7-7'



SEISMIC STABILITY OF CUT SLOPE- YIELD ACCELERATION ky= 0.19
FILE: D-D1CAXE.SLP



WMU1

WMU2

PROPERTY LINE

PERIPHERAL DRAIN

CURRENT DISPOSAL AREA

LIMITS OF EXISTING WASTE FILL

LIMIT OF EXISTING WASTE FILL

SOIL FILL

LIMIT OF SOIL FILL

PROPOSED ZONE 1 EXPANSION AREA

LIMIT OF REQUIRED FILL PLACED PRIOR TO PROCESS CONSTRUCTION

LIMIT OF PROPOSED PHASE 1C PROCESS

PROPOSED BRIDGE LOCATION

EXISTING DESILTING BASIN

FUTURE SOIL STOCKPILE

3 1/2:1

LEGEND

- EXISTING GROUND CONTOUR
- 400 FINISHED CONTOUR
- TOP OR TOE OF SLOPE
- LIMIT OF EXISTING WASTE
- LANDFILL PROPERTY LINE
- APPROXIMATE ZONE BOUNDARY
- ZONE 1 EXPANSION PHASE LIMITS
- LIMITS OF FUTURE SOIL STOCKPILE
- COMPACTED EARTH FILL
- A A' CROSS-SECTION LOCATION

N

GRAPHIC SCALE

200 0 100 200 400

(IN FEET)

1 inch = 200 ft.

PLATE 3

CROSS-SECTIONS LOCATION

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	AUGUST 1997	9637

ATTACHMENT H
REQUEST FOR CITY OF SAN JUAN CAPISTRANO AUTHORIZATION TO ESTABLISH AND MAINTAIN A LANDFILL COVER STOCKPILE ON WASTE MANAGEMENT UNIT NO. 1

Integrated Waste Management Department

John W. Sibley, Director
320 North Flower Street • Suite 400 • Santa Ana California 92703 • (714) 834-4000
www.oc.ca.gov/iwmd

March 27, 2000

Mr. George Scarborough, City Manager
City of San Juan Capistrano
32400 Paseo Adelanto
San Juan Capistrano, CA 92675

SUBJECT: Prima Deshecha Landfill Landslide Remediation Re: 404(b)(1) Permit Application – Request for Change in MOU

Dear Mr. Scarborough:

As you may recall, in May 1998, following the El Niño rains, Integrated Waste Management Department (IWMD) staff at the Prima Deshecha Landfill identified a landslide which had occurred underneath an on-site soil stockpile. We initiated an evaluation of possible solutions to best mitigate the effects of this slope failure, stabilize the soil and allow landfill operations to safely continue. The study evaluated the effects on a natural drainage channel immediately adjacent to the stockpile and on planned operations affecting landfill capacity and life. This evaluation resulted in the design of a preferred alternative that involves realignment of the Prima Deshecha Cañada streambed and placement of fill and refuse. Therefore, to implement the preferred plan we are required under the federal Clean Water Act to obtain a permit pursuant to Section 404 (b)(1) from the U.S. Army Corps of Engineers (ACOE). The ACOE circulated a Public Notice describing the preferred plan and alternatives for review and comment on September 20, 1999.

In order to issue a permit, the ACOE must identify the "least environmentally damaging practicable alternative." Our permit application materials must therefore contain sufficient information about the landfill site and the various methods of stabilizing the landslide.

The preferred alternative involves placing fill over the existing natural channel in order to buttress the landslide and to provide a stable area for future landfill operations. The existing channel would be aligned east and south of its current position in the form of a natural open channel around the perimeter of the current soil stockpile area. To achieve grades required to establish this new stream alignment, compacted fill would need to be placed upstream of the stockpile to provide a minimum one percent grade. This preferred alternative allows for additional area for stockpiling as well as for additional refuse capacity. It also reduces the buttressing requirements for a future phase of landfill development. The realigned channel would be wide enough to meet 100-year, 24-hour storm flows, as required by State landfill regulations and will provide the opportunity to create more riparian habitat than currently exists in the channel.

Since the spring of 1998 IWMD has been working cooperatively with all of the agencies that have jurisdiction over the resources affected by the project, including the United States Environmental Protection Agency, United States Fish and Wildlife Service, California Department of Fish and Game and the Regional Water Quality Control Board – San Diego Office.

Another alternative identified in the Public Notice would involve removal of the stockpile material and placement of the material on Waste Management Unit 1 (WMU-1), the existing filled waste area, and the use of this area for future stockpiling. The WMU-1 stockpile would be temporary, until such time that the material can be used as landfill cover.

Our analysis of this option shows that the stockpile would be in place for over ten years and the height of the stockpile would violate the limits established by our MOUs. IWMD indicated in the Public Notice that this alternative was infeasible due to the ridgeline restrictions that are imposed by entitlement and formal agreements that are imposed by the cities of San Juan Capistrano and San Clemente. We made this fact clear to the resource agencies, but they have insisted that we make a formal request to you and the City of San Clemente. Per the resource agencies requirements, we are requesting that you consider making an exception to the MOU Ridgeline Preservation conditions to allow IWMD to stockpile soil on the surface of WMU-1.

Attached for your review is a copy of the Public Notice circulated in September 1999, as well as exhibits showing the elevations of the stockpile if placed on top of WMU-1 and a line of site from the vantage point from Ortega Highway used in the 1999 Prima Deshecha General Development Plan Environmental Impact Report. (IWMD staff and our consultant have briefed your staff on this issue.)

We request your response in writing by Monday, April 10 so that we can submit it expeditiously to the resource agencies. If you have any questions or wish additional information regarding this matter, please contact me at (714) 834-4122, or Suzanne McClanahan at (714) 834-4114.

Sincerely,

Suzanne McClanahan for

John W. Sibley, Director

Enclosures

cc: Douglas D. Dumhart, San Juan Capistrano
Dick Harabedian, IWMD
Kevin Kondru, IWMD
Suzanne McClanahan, IWMD

bcc: Bob Richmond
Christine Arbogast

PUBLIC NOTICE

US Army Corps of Engineers®

APPLICATION FOR PERMIT

LOS ANGELES DISTRICT

Public Notice/Application No.: 9800652-VAW
Comment Period: September 20, 1999 through October 20, 1999
Project Manager: Vicki A. White (213) 452-3414 vwhite@spl.usace.army.mil

Applicant
County of Orange
Integrated Waste Management Department
Attn: Mr. Kevin Kondru, P.E.
320 North Flower Street, Suite 400
Santa Ana, California 92703-5000

Contact
County of Orange
Integrated Waste Management Department
Attn: Mr. Bob Richmond
(714) 834-4337

Location
The Prima Deshecha Landfill (PDL) is located in south Orange County, California (see vicinity map attached).

Activity
To place fill in approximately 2.7 acres of jurisdictional waters and wetlands within the Prima Deshecha Canada stream in order to expand landfill operations on the PDL property, which includes the stabilization of a stockpile area. The applicant proposes to mitigate for impacts to waters of the U.S., including wetlands, by re-routing the stream to the south of the current alignment around the perimeter of the stockpile area (see Figure 3 attached). For more information see page 3 of this notice.

Interested parties are hereby notified that an application has been received for a Department of the Army permit for the activity described herein and shown on the attached drawing(s). Interested parties are invited to provide their views on the proposed work, which will become a part of the record and will be considered in the decision. This permit will be issued or denied under Section 404 of the Clean Water Act of 1972 (33 U.S.C. 1344). Comments should be mailed to:

U.S. Army Corps of Engineers, Los Angeles District
Regulatory Branch
ATTN: CESPL-CO-R-980065200-VAW
P.O. Box 532711
Los Angeles, California 90053-2325

Alternatively, comments can be sent electronically to: vwhite@spl.usace.army.mil

Evaluation Factors

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof. Factors that will be considered include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, if the proposal would discharge dredged or fill material, the evaluation of the activity will include application of the EPA Guidelines (40 CFR 230) as required by Section 404 (b)(1) of the Clean Water Act.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Preliminary Review of Selected Factors

EIS Determination- A preliminary determination has been made that an environmental impact statement is not required for the proposed work.

Water Quality- The applicant is required to obtain water quality certification, under Section 401 of the Clean Water Act, from the California Regional Water Quality Control Board. Section 401 requires that any applicant for an individual Section 404 permit provide proof of water quality certification to the Corps of Engineers prior to permit issuance. For any proposed activity on Tribal land that is subject to Section 404 jurisdiction, the applicant will be required to obtain water quality certification from the U.S. Environmental Protection Agency.

Coastal Zone Management- This project is located outside of the coastal zone and will not affect coastal zone resources.

Cultural Resources- The latest version of the National Register of Historic Places has been consulted and this site is not listed. This review constitutes the extent of cultural resources investigations by the District Engineer, and he is otherwise unaware of the presence of such resources.

Endangered Species- The Corps of Engineers has determined that the proposed activity may adversely affect a federally-listed endangered species, least Bell's vireo (*Vireo bellii pusillus*), known to utilize habitat in the project area. According to the Biological Assessment, a total of three pairs and a single individual least Bell's vireo (LBV) occupy territories within the project area and would be

directly impacted by the proposed project. There is also the potential for indirectly affecting a fourth pair of LBV and a single individual LBV found within 500 feet southwest of the project area. Based on this information, the Corps of Engineers requested initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act on June 16, 1999. The Service responded with a request for additional information on July 22, 1999. The applicant provided additional information to the Corps of Engineers and the Service on August 17, 1999. As of the date of this Public Notice, the Service is waiting for additional information concerning the alternatives analysis before the biological assessment is determined to be adequate.

Public Hearing- Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearing shall state with particularity the reasons for holding a public hearing.

Proposed Activity for Which a Permit is Required

Background: The Prima Deshecha Landfill (PDL) property encompasses a total of 1,530 acres in south Orange County. The site has been used for the disposal of non-hazardous municipal solid waste and biosolids since 1976. Two areas of the site have been used for solid waste disposal (see Figure 2-4 attached). The current active fill area, defined as Waste Management Unit 1 (WMU1), overlies 160 acres of the southwest corner of the property and is located within the limits of the City of San Juan Capistrano. The former landfill area includes a 25-acre portion of the site, defined as Waste Management Unit 2 (WMU2), located to the east of the current entrance facilities and in an unincorporated portion of Orange County. Based on the Solid Waste Facility Permit (approved in 1979) for the PDL, the total refuse capacity for the site is 81 mcy. As of June 1993, approximately 9 mcy of refuse capacity was used at the site.

In 1995, a draft General Development Plan (GDP) was prepared for the PDL site. This 1995 GDP called for an additional 91 mcy of refuse capacity (for a total site refuse capacity of 100 mcy). On November 21, 1995, the Orange County Board of Supervisors approved and certified the Proposed Final Environmental Impact Report (EIR 548) for the 1995 GDP, but did not approve the 1995 GDP due to the City of San Clemente's proposed revisions to the plan. The Orange County Board of Supervisors directed staff to work with the City of San Clemente to amend the plan for their consideration at a later time. The County of Orange and City of San Clemente subsequently agreed to revisions to the 1995 GDP which included an enlarged footprint for Zone 1 (also referred to as the current active landfill area or WMU1) to offset the capacity lost by the agreement to reduce the height of Zone 1, and an enlarged footprint for Zone 4 (WMU2) due to slope instability. A Memorandum of Understanding (MOU) with the City of San Clemente was approved by the Orange County Board of Supervisors on July 1, 1997. The County of Orange Integrated Waste Management Department (IWMD) is now preparing an updated GDP (also referred to as the 1999 GDP). The currently proposed 1999 GDP includes an increased footprint for Zone 1, which includes an additional 34 acres of landfill footprint that would be gained by the proposed work. The proposed expansion of Zone 1 remains within the height limitations of the MOU with the City of San Clemente. The proposed refuse capacity for the landfill site under the 1999 GDP is 126 mcy.

As part of the continuing development of PDL and implementation of the GDP, liner construction for a future phase (Phase A) of landfill operations began in July 1997. The mass excavation required for Phase A involved the removal of approximately 3.5 mcy of soil from the landfill footprint. Approximately 1.7 mcy of soil was stockpiled adjacent to Prima Deshecha Canada, an intermittent stream that runs through the PDL property. The location of the stockpiled fill is referred to as Stockpile Area 1. According to IWMD, Stockpile Area 1 was previously analyzed for

slope stability and was found to have an adequate factor of safety.

Following El Nino rains, surficial cracking was first noted within Stockpile Area 1 on May 21, 1998. A series of measurements were taken to determine the extent of the failure, and rate of movement of the slide mass. These measurements revealed a landslide with a volume of approximately 2.2 mcy (including the 1.7 mcy of stockpiled material), extending along the Prima Deshecha Canada stream for a distance of more than 1,500 feet (see Figure 2 attached). The stockpile landslide was found to be moving in the northerly direction at a rate of between 0.2 inch to 3.0 inches per day during the time of the investigation (June 1998). At the present time, flows through the stream have not been blocked, although indications of distress to the stream from the movement of the slide mass have been observed.

On June 15, 1998, IWMD submitted a formal request for an emergency permit under Regional General Permit (RGP) No. 52 to place approximately 1,700 lineal feet of existing streambed in an 84-inch diameter corrugated steel pipe with fill placed over the pipe. On June 29, 1998, the Corps of Engineers determined that the proposed activity did not qualify for authorization under RGP No. 52 since the proposed activity did not constitute the minimum work necessary to alleviate the immediate emergency. In addition, the Corps of Engineers determined that the proposed activity would result in more than minimal individual and cumulative adverse impacts to aquatic resources and may be contrary to public interest. The Corps of Engineers requested that the applicant submit an application for an individual permit for the proposed pipe installation and associated fill material. However, in response to the emergency situation, the Corps of Engineers issued an emergency permit (under RGP No. 52) to IWMD for the removal of debris and sediment from the channel as needed to maintain the flow in the existing riverplain. The emergency permit (File No. 98-00536-VAW) authorized IWMD to remove sediment from the channel using a clamshell or other construction equipment provided the temporary fills are removed in their entirety and the affected areas are returned to their pre-existing elevation and revegetated with appropriate native riparian and wetland vegetation common to the area. It is the Corps' understanding that no work was conducted under the emergency permit. The emergency permit expired on July 31, 1998.

Applicant's Preferred Alternative: Following expiration of the emergency permit, IWMD held several meetings with the regulatory agencies (Corps, Service, and the California Department of Fish and Game) to discuss the various alternatives to avoid and/or minimize impacts to the stream. As a result of the agency coordination, IWMD revised the project to eliminate the corrugated steel pipe design. The applicant is now proposing to fill in the existing stream and, as mitigation for such impacts, reroute the channel to the south around the perimeter of the stockpile landslide area (see Figure 3 attached). This alternative was selected by the applicant and is known as the applicant's preferred alternative.

Proposed Work: The proposed work involves the placement of fill within the Prima Deshecha Canada stream to provide additional capacity for future landfill operations, including the stabilization of a stockpile area. The proposed work would impact approximately 2.7 acres (4,320 lineal feet) of waters of the U.S., including wetlands, along the Prima Deshecha Canada stream. Included in this acreage assessment is the presence of a 0.9 acre cattail marsh with the remaining acreage (1.8 acres) best described as willow wetland habitat. In the area of the cattail marsh, alkali soils were observed; however, the habitat was identified as a freshwater marsh, even though it contains some plant species that are tolerant of saline conditions (such as *Distichlis spicata, Scirpus maritimus, Slicornia virginica,* and *Anemopsis californica*). According to the applicant's consultant, the marsh is appropriately classified as a freshwater marsh with a coastal brackish marsh influence.

The construction period is estimated to be 12 months. Construction activities would include: 1) removal of the 1.7 mcy of stockpiled material, 2) recompaction of about 1 mcy of soil in the existing stream and surrounding area, and 3) excavation of an additional 1.4 mcy of native hillside to establish the grades required for the realigned channel as mitigation for the proposed work. The long-term plan for this canyon involves expanding the footprint of the landfill to include an additional 34 acres of refuse capacity.

Additional Project Information

404(b)(1) Alternatives Analysis: The applicant has prepared a 404(b)(1) alternatives analysis (dated July 1, 1999). Based on this information, the Corps has determined that the basic project purpose is to dispose of municipal solid waste generated by residential, commercial and industrial uses throughout Orange County. Since the basic project purpose (i.e., operation of the landfill) is not a water-dependent activity, the applicant is required to rebut the presumption that there is a less damaging alternative that does not affect wetlands.

The Corps has also determined that the overall project purpose is to provide additional capacity for future landfill operations for Orange County. The applicant has considered a total of twelve (12) alternatives. Eight of these alternatives were determined by the applicant to be infeasible and the remaining four alternatives were selected by the applicant for a more detailed evaluation. The four alternatives that were selected by the applicant for a more detailed evaluation include:

1) Applicant's Preferred Alternative – This alternative is described herein as the proposed work.

2) No Action Alternative – This alternative would involve no direct action taken by IWMD to fill in the stream, stabilize the stockpile area, and create additional capacity for future landfill operations in the vicinity of the proposed work. According to the applicant, this alternative would result in the eventual failure of the landslide into Prima Deshecha Canada, if the stockpiled material cannot be taken to an offsite location. The applicant anticipates that fill from the landslide failure would create an impoundment of water behind the channel constriction, and force additional stormwaters to flow over portions of the landfill site before reentering the channel. This alternative would directly impact one pair of least Bell's vireo and indirectly impact another. The applicant indicates that such a failure would also place portions of the City of San Clemente at flood risk due to the possibility that the dam formed by the landslide failure could breach during a severe storm event and cause flooding of the downstream areas.

3) Install a 96-inch Pipe – This alternative proposes to place approximately 2,600 lineal feet of the existing streambed in a 96-inch reinforced concrete pipe (RCP). The RCP would be located underground and approximately 300 feet to the west and north of the existing alignment. This alternative would also involve the placement of about 1 mcy of fill in the existing streambed and surrounding area to stabilize the stockpile area and provide for additional landfill capacity. This alternative would directly impact one pair of least Bell's vireo and indirectly impact another. Although this alternative affects a shorter length of stream than the proposed project, this alternative would result in the complete destruction (permanent loss) of the stream without any channel replacement.

4) Re-route Stream Over Existing Alignment On Top of Buttress Fill – This alternative involves the placement of about 1.4 mcy of compacted fill in the stream and surrounding area and reconstruction of the channel over the fill material. This alternative would result in impacts

similar to the proposed work on jurisdictional waters of the U.S. and endangered species habitat; however, the applicant indicates that this alternative, without any stream crossings, would not provide the capacity for future stockpiling needs at the landfill.

The eight (8) alternatives that were determined to be infeasible by the applicant are summarized below:

1) Realign Stream North of the Existing Alignment – This alternative would involve realignment of the stream to the north as an open earthen channel. The applicant indicates that this alternative would involve a similar amount of fill in the existing stream and surrounding area as the proposed project in order to stabilize the stockpile area, establish the grades necessary to realign the channel, and provide additional capacity for future landfill operations. However, the applicant asserts that realigning the channel to the north would impact a future refuse fill area at the landfill. Furthermore, the applicant explains that a 2 mcy buttress would need to be constructed on the north side of the realigned channel to stabilize a large landslide complex located beneath the future refuse fill area. Due to the additional fill requirement associated with this alternative and the potential for impacting future landfill operations, the applicant states that this alternative would not be feasible.

2) Remove and Transport Stockpiled Material – This alternative would require the removal of about 2 mcy of stockpiled material to an on- or off-site location. The applicant estimates that about 450,000 truck trips would be required to transport 2 mcy of soil to another location and to bring the soil back to the landfill at a later date for use in daily cover operations. Furthermore, transporting the material to an offsite location would result in additional adverse environmental effects, such as impacts to traffic and air quality. The applicant indicates that this alternative would also limit the capacity for future stockpiling needs over the long term and result in the transport and hauling back for daily cover of an additional 5.7 mcy of soil associated with a future phase (Phase B) of the landfill development. This would result in an additional 1.3 million truck trips. IWMD states that they have found no suitable on-site areas for stockpiling daily cover.

3) Load Toe of Stockpile Landslide – This alternative would involve the placement of soil at the toe of the stockpile area and in the stream. The applicant states that a substantial amount of fill would be needed to make a significant impact on the stability of the stockpile landslide. As a result, this alternative would involve the permanent loss of streambed due to extent of fill that would be needed to stabilize the stockpile area. The option of relocating the stream to the north away from the buttress fill was also evaluated under this alternative. The applicant indicates that realigning the stream to the north would de-stabilize a different landslide complex on the north side of the stream causing a new landslide problem that would have to be addressed. Also, the applicant states that this alternative would impact future landfill capacity in this area.

4) Dewatering – This alternative involves stabilizing the stockpile area in its current configuration and location by dewatering. Due to the generally low hydraulic conductivity associated with the soils (Capistrano Formation) at the project site, the applicant indicates that a dewatering system would be inefficient and ineffective.

5) Conventional Buttressing Along the Streambed – This alternative would use conventional buttressing to stabilize the stockpile area. Based on a conceptual design study that was prepared for a similar stabilization effort on the northern embankment of the Prima Deshecha Canada stream, the applicant indicates that a very deep excavation (including depths up to 50 feet below the bottom of the existing streambed) would be required to

construct a conventional buttress to stabilize the stockpile area. This would be difficult and dangerous since the excavation would extend below the groundwater table and below the toe of the stockpile landslide. Furthermore, such an excavation would likely adversely affect the stability of the existing slide and result in substantial adverse impacts to the stream. The applicant asserts that this alternative would result in the permanent loss of the stream and would be too costly to implement.

6) Other Stabilization Methods Along the Streambed – This alternative considers other stabilization methods, including shear walls made of steel and concrete. Both of these methods would require very deep excavations similar to that needed for conventional buttressing. As a result, this alternative was determined by the applicant to be very difficult and dangerous to construct, and too costly.

7) Remove Stockpile Material and Place On Top of Existing Refuse Fill – This alternative would involve the removal of the stockpile material and placement of the material on top of the refuse fill area located in WMU1 (see Figure 2-4 attached). This alternative would avoid permanent impacts to the streambed. However, the streambed may experience temporary and minor discharges of fill during the removal efforts but would remain intact upon completion of the removal activities. The applicant indicates that this alternative was determined infeasible due to the ridgeline elevation restrictions that are imposed by entitlement and formal agreement with the adjacent cities.

8) Re-route Stream to the South of the Current Alignment and Install 96-inch Pipe – This alternative is a variation of the proposed work and would have the benefit of avoiding the upper portion of the stream which contains the higher quality wetlands, including a 0.9 acre cattail marsh (see Figure 13 attached). This alternative involves the placement of fill in approximately 2,800 lineal feet of the streambed and surrounding area to stabilize the stockpile area and create additional capacity for future landfill operations. The upper 1,520 lineal feet of streambed, including the 0.9 acre catttail marsh, would be avoided. The portion of the stream to be impacted would be re-routed to the south around the perimeter of the stockpile area. This alternative would require the removal of the stockpiled material as with the proposed work; however, this alternative would require the recompaction of about 20% less soil and the excavation of about 71.5% less of native hillside. According to the applicant, the proposed location of the realigned channel would be at a higher elevation than the existing stream due to the proposed stabilization. As a result, an underground pipe is proposed (in the same alignment as the realigned "surface" channel) to continue to carry the intermittent flows from the existing stream. The surface channel would be limited to capturing only stomwater flows (high flows) coming off the western portion of the site (Zone 1).

Mitigation: The applicant is proposing to mitigate for impacts to jurisdictional waters, including wetlands, by realigning the existing stream to the east and south around the perimeter of the current stockpile area. The realigned channel would be located at a higher elevation than the existing stream (approximately 40 feet higher), extending approximately 50-feet wide along a 1,220-foot long stretch and about 70-feet wide along a 3,100-foot long stretch (see Figures 3 and 4). A cross sectional drawing of the proposed realignment is provided in Figure 4. In order to create the new channel in the proposed alignment, approximately 1.4 mcy of native hillside would need to be excavated, recompacted and placed upstream of the stockpile area to establish the grades (i.e., a minimum of one percent) necessary for the realignment. The realigned channel would be vegetated with native riparian plant species and the upland slopes with coastal sage scrub. The applicant indicates that the placement of such fill would provide landslide stability, create an additional area for stockpiling,

increase the landfill footprint, and result in additional refuse capacity.

Proposed Special Conditions

None at this time.

For additional information please call Vicki A. White of my staff at (213) 452-3414. This public notice is issued by the Chief, Regulatory Branch.

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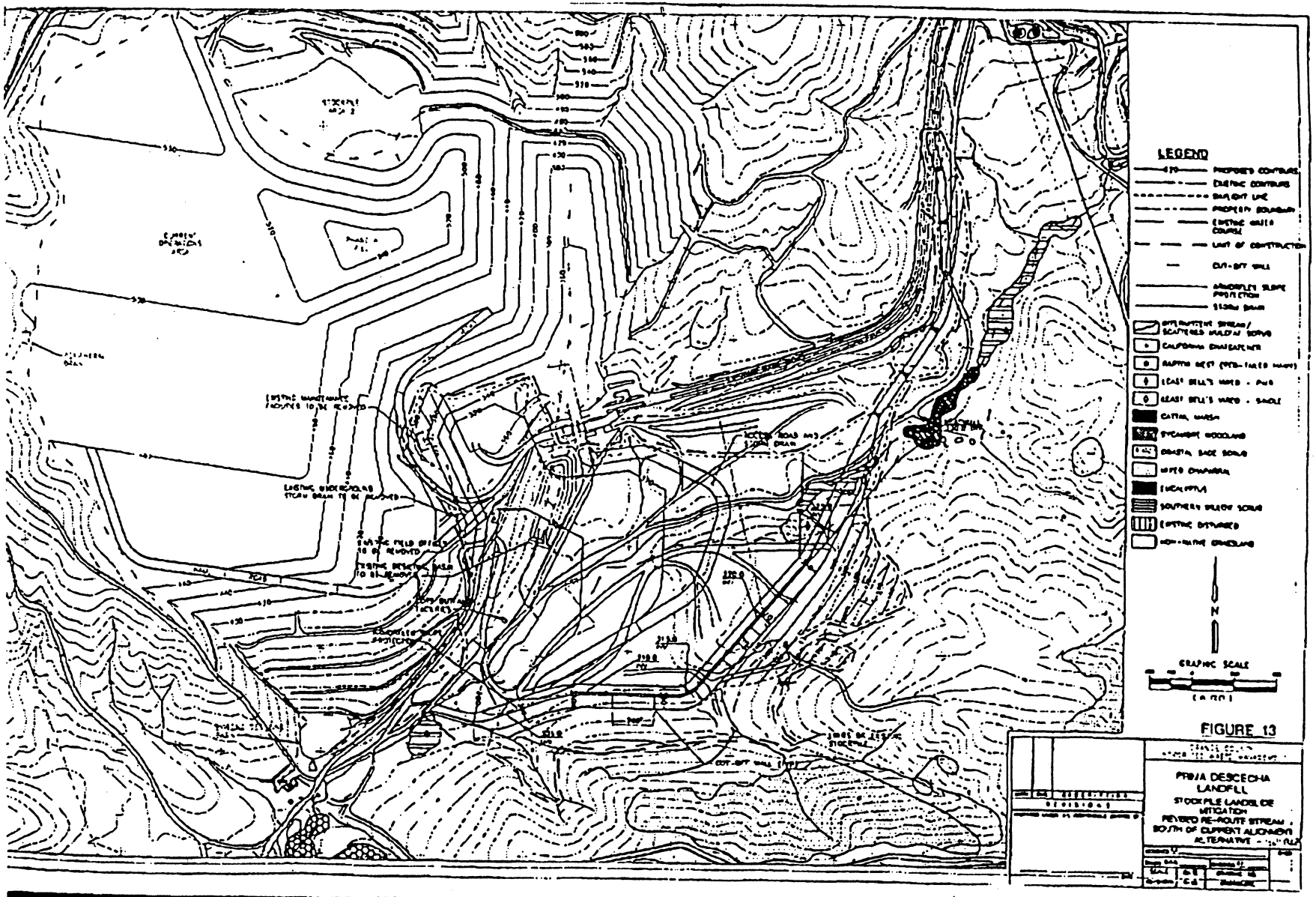
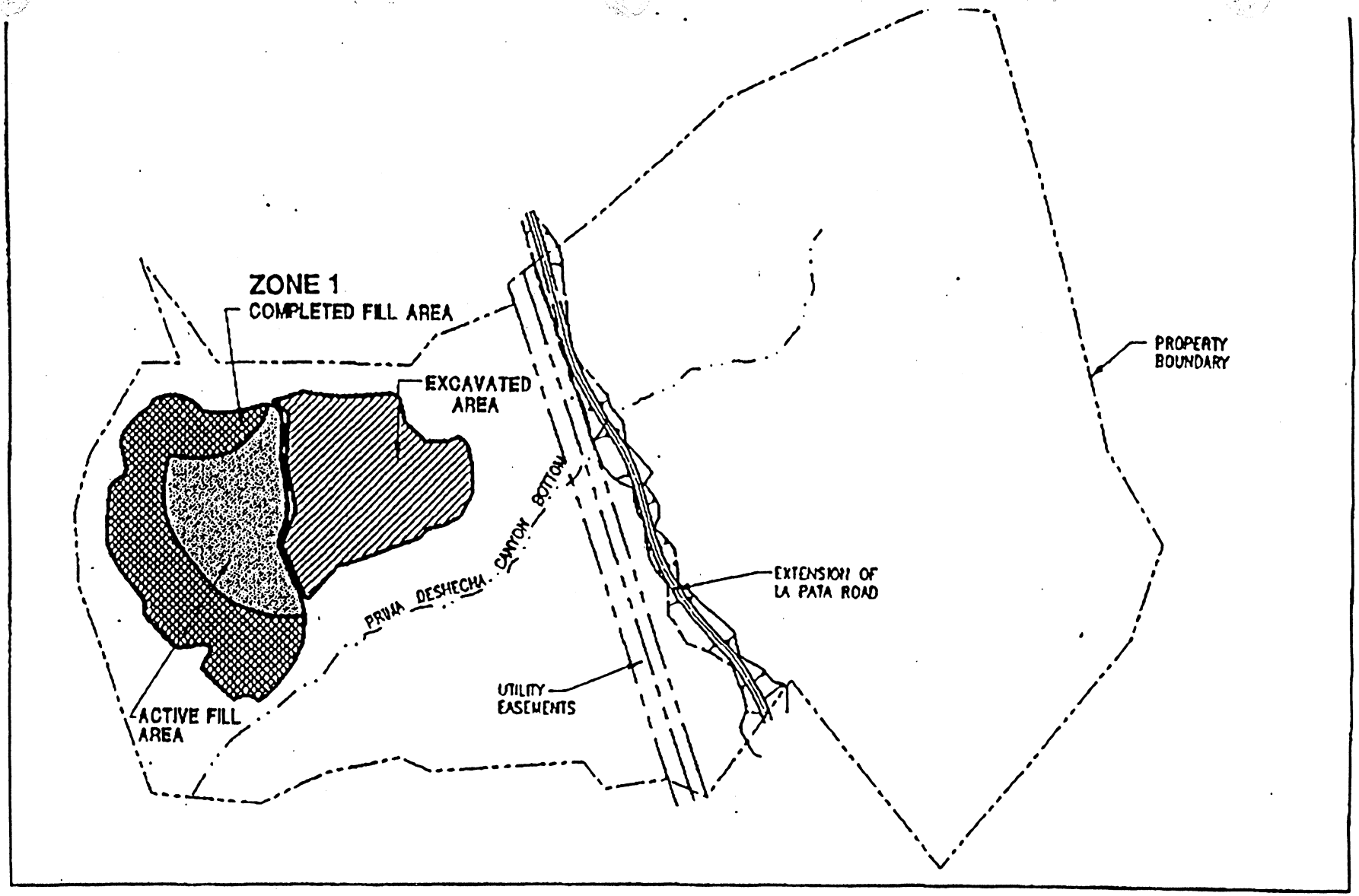

LEGEND
GRAPHIC SCALE
N
PEÑA DESECHA
LANDFILL
STOCKPILE LANDFILL DE
MITIGATION
REVISED RE-ROUTE STREAM
SOUTH OF CURRENT ALIGNMENT
ALTERNATIVE

FIGURE 13



Landfill Progress Stage 1

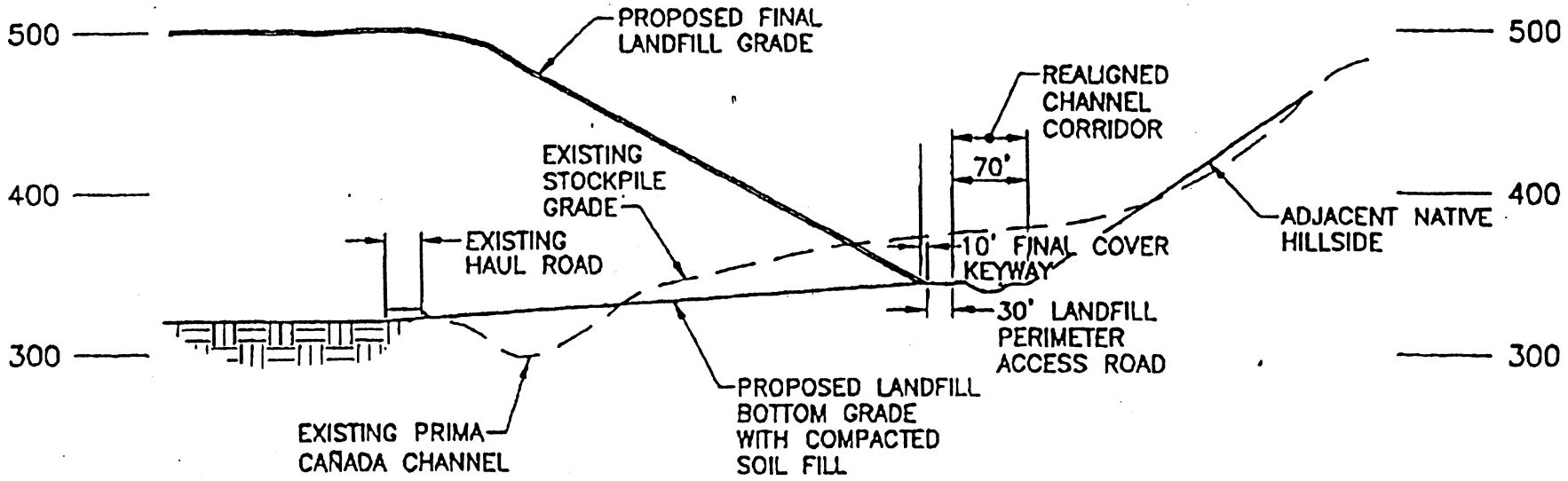
FIGURE 2-5

General Development Plan EIR

Not to Scale

P&P

PRIMA DESHECHA LANDFILL



SCALES – HORIZ.: 1"=200'
VERT. : 1"=100'

FIGURE 4

BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

PRIMA DESHECHA LANDFILL

LANDSLIDE REMEDIATION ALTERNATIVES ANALYSIS
TYPICAL CROSS-SECTION
RE-ROUTE STREAM SOUTH OF CURRENT ALIGNMENT

JOB NO.	9615
DATE	9-98
DRAWN BY	B.A.S.
CHECKED BY	T.T.

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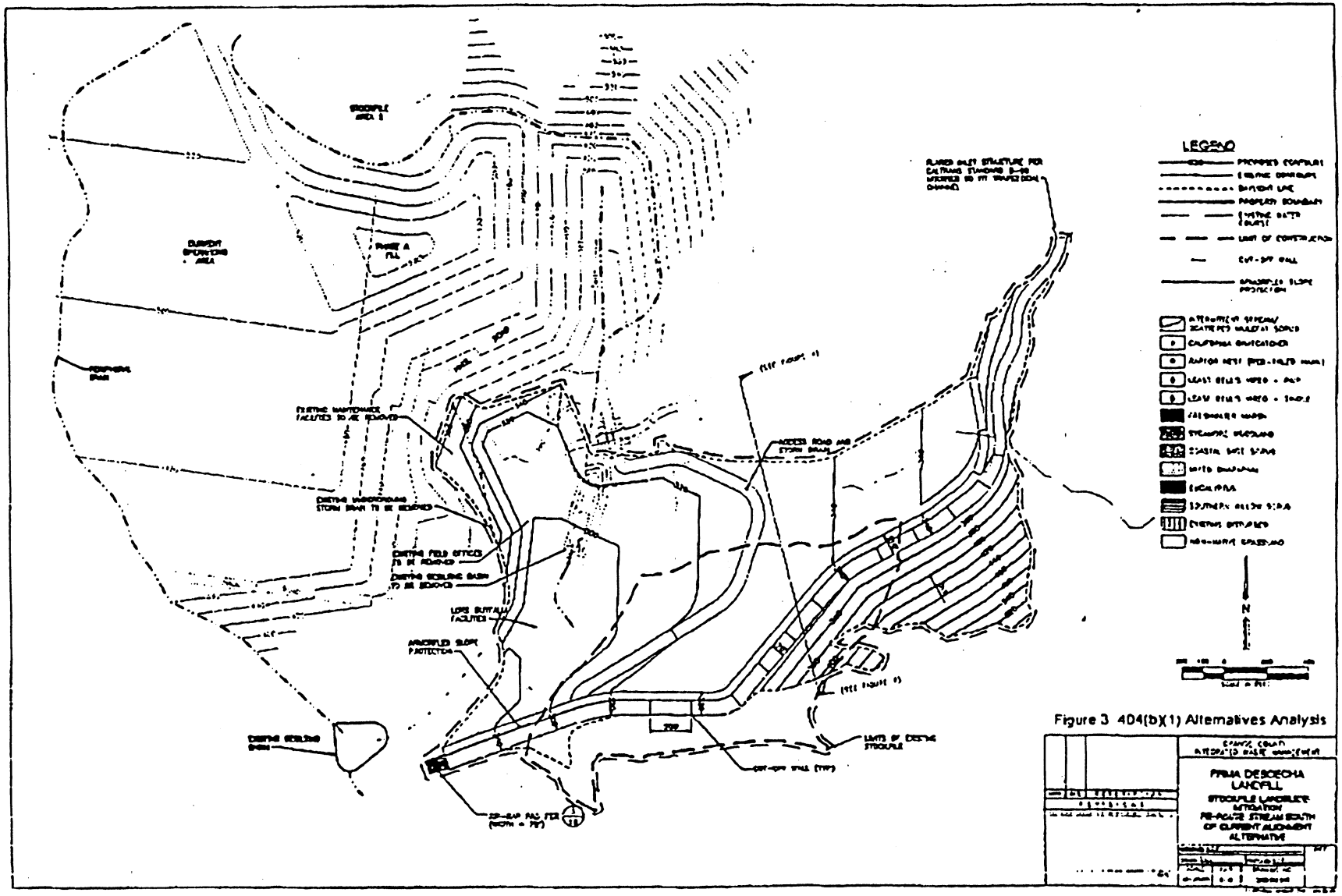


Figure 3 404(b)(1) Alternatives Analysis

EXPLANATION:

- LANDSLIDE RELATED CRACKING (HEADSCARP) WITH TEETH ON DOWN-DROPPED SIDE, DOTTED WHERE QUERIED
- LANDSLIDE RELATED CRACKING (TOE) WITH TEETH ON OUTTHRUST SIDE, DOTTED WHERE QUERIED
- APPROXIMATE LOCATION OF CREEK BED
- LBV LEAST BELL'S VIREO TERRITORY LOCATION (APRIL - JUNE 1998)

N

GRAPHIC SCALE

200 0 100 200 400

(in feet)

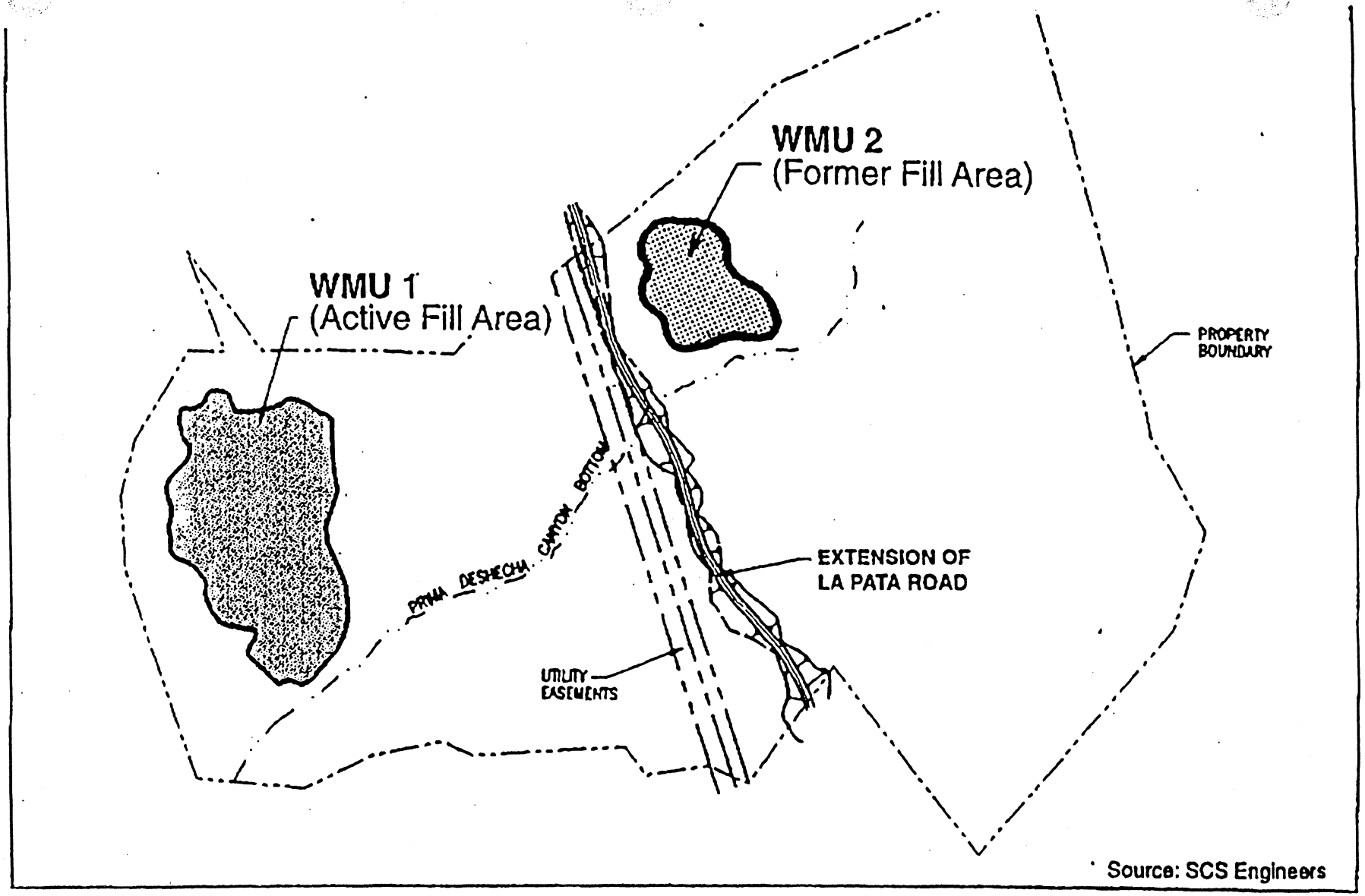
1 inch = 400 ft.

FIGURE 2

LANDSLIDE MAP

ZONE 1 STOCKPILE 1
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates



Landfill Progress-Existing Condition (Year 1992)

FIGURE 2-4

General Development Plan EIR

Not to Scale

P&D

PRIMA DESHECHA LANDFILL

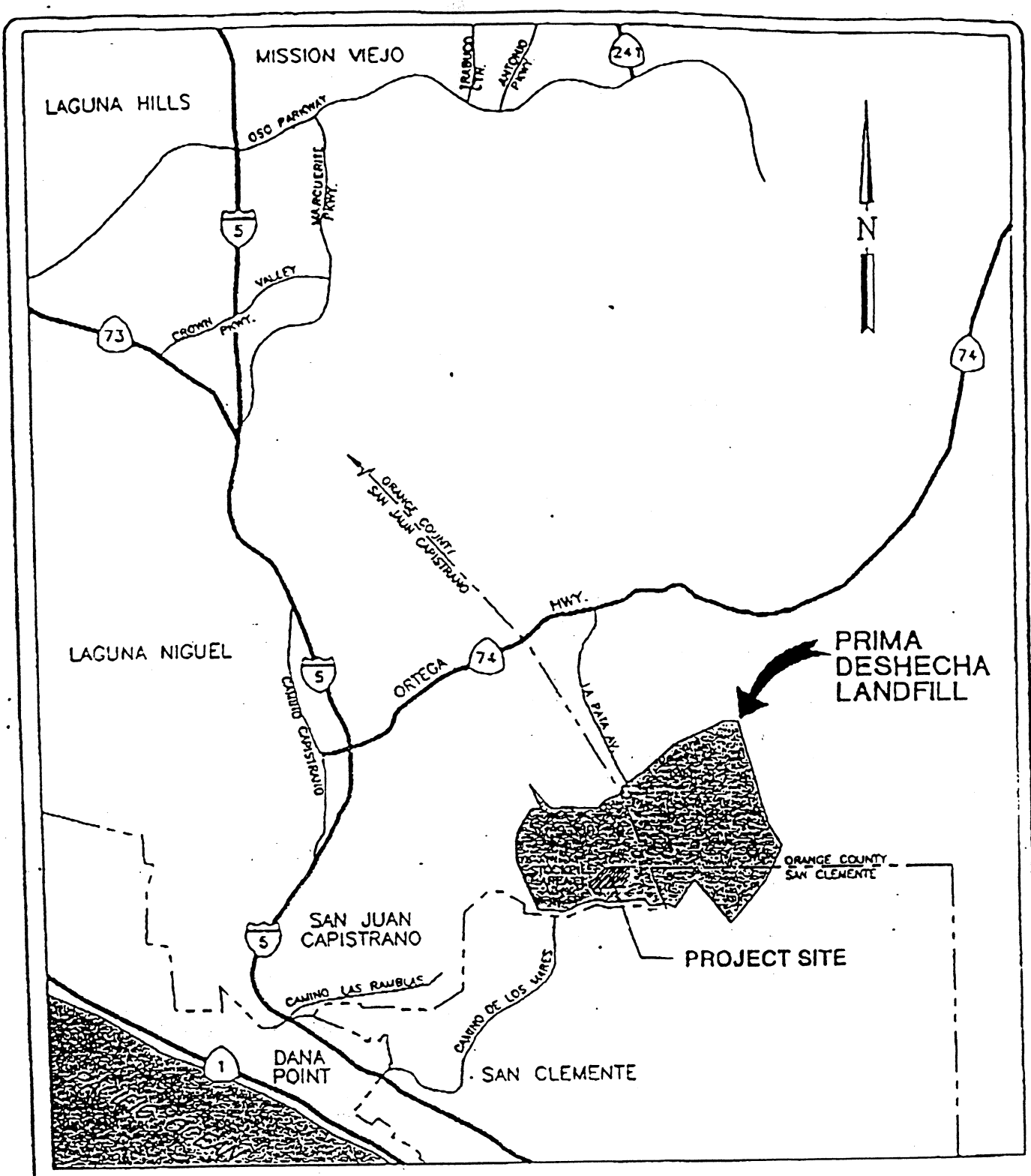


FIGURE 1-1

BAS BRYAN A. STIRRAT & ASSOCIATES	PRIMA DESHECHA LANDFILL	JOB NO. 9645-01
		DATE 5-98
	VICINITY MAP	DRAWN BY T.J.S
		DRAWING NO. 1752JC8

32400 Paseo Adelanto
San Juan Capistrano, CA 92675
(949) 493-1171
(949) 493-1053 (FAX)

April 6, 2000

John W. Sibley, Director
Integrated Waste Management Department
County of Orange
320 N. Flower Street, Suite 400
Santa Ana, California 92701

Subject: Request for City Authorization to Establish and Maintain a Landfill Cover Stockpile on Waste Management Unit #1 (our file: Conditional Use Permit (CUP) 95-04, Prima Deshecha Cañada Landfill).

Dear Mr. Sibley:

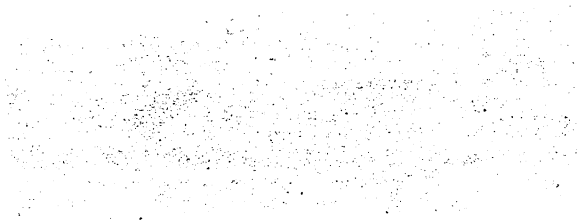
We have received a County of Orange request for approval to establish and maintain an interim (approximately ten years) Landfill Cover Stockpile on Waste Management Unit #1 of the Prima Deshecha Cañada Landfill. The project area is situated within the City's jurisdiction and therefore must comply with the City's Land Use Code. Furthermore, the landfill is subject to an executed Memorandum of Understanding (MOU) between the County of Orange and the City.

As we understand the circumstances, the County's existing stockpile area was the site of landslide which became active following the extremely wet winter (El Niño condition) of 1997-1998. The stockpile area directly adjoins the Prima Deshecha Cañada and impacts the stream. Further, landslide remediation, depending on the specific alternative, would also result in impacts to that intermittent stream. The County of Orange has filed a Section 404 Permit with the U.S. Army Corps of Engineers (ACOE) requesting approval to fill about 1,700 lineal feet of the stream and re-route the filled segment to the south of the stockpile. As a result of the alternatives analysis, the Corps has identified their preferred alternative as that which involves creating a stockpile on top of Waste Management Unit #1.

However, as the County of Orange has recognized, the executed Memorandum of Understanding (MOU) precludes Waste Management Unit #1 from extending above the ridgeline and the maximum extent of fill reaches to the 540 foot elevation. The Corps alternative would establish a 120 foot high stockpile with an elevation of 660 feet.

As the County of Orange is aware, the City's General Plan has a long-established policy of ridgeline protection first instituted in the 1974 General Plan. Ridgelines have remained a character-defining feature of the City of San Juan Capistrano and we have invested

ATTACHMENT NO. 3



GeoLogic Associates
Geologists, Hydrogeologists and Engineers

December 28, 2000
Job No. 9759

County of Orange, Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, California 92703

Attention: Mr. Bob Richmond

EVALUATION OF THE EFFECT OF THE EXPANDED STOCKPILE AREA 1 LANDSLIDE PRIMA DESHECHA LANDFILL, ORANGE COUNTY, CALIFORNIA

The letter provides the County of Orange, Integrated Waste Management Department (IWMD) with the results of a supplemental field investigation and additional engineering analyses undertaken to evaluate the impacts that enlargement of the Stockpile Area 1 landslide at the Prima Deshecha Landfill in southern California. Specifically, the analyses focused on the modified preferred and 96-inch pipeline landslide mitigation alternatives that are under consideration by the United States Army Corps of Engineers (ACOE) as the Least Environmentally Damaging Practicable Alternative (LEDPA) for stabilization.

Background

In the Spring of 1998, a large landslide developed beneath Stockpile area 1 of the Prima Deshecha Landfill (PDLF). This landslide significantly impacted the Prima Canada stream channel as well as the original design of the Zone 1 area of the PDLF Master Development Plan. In order to continue future landfill development, a revised Master Development Plan was prepared which presented a "preferred alternative" for mitigation of the landslide hazard. The preferred alternative included the removal of most of the stockpiled soils and landslide debris, relocation of the Prima Deshecha Canada stream to the south of its existing location, and expansion of the landfill to provide stability for both the Stockpile Area 1 landslide and potentially unstable areas north of the historic creek. The preferred alternative was anticipated to impact riparian habitat including Southern Willow Scrub and Freshwater Marsh communities as well as an endangered bird species (least Bell's vireo) and as a result of these potential impacts, a modified preferred alternative (MPA) was subsequently developed (Figure 1). The MPA reduces the volume of soil fill proposed in the creek and creates ponded water conditions upstream in Prima Canada Creek in order to re-create a freshwater marsh and associated habitats.

Another alternative was also developed to reduce impacts on upstream Freshwater Marsh and Southern Willow Scrub areas. The Pipeline Alternative included the placement of a 96-inch pipeline that would collect water upstream of the landslide, convey it beneath the project area and outlet it into the natural drainage southwest of the landslide (Figure 2). This alternative did not require that the landslide stabilization fill "daylight" upstream in Prima Deshecha Creek and, in this way, it was believed to result in lesser impact to sensitive habitats and species. The original design generally avoided the Freshwater Marsh and side channel Southern Willow Scrub habitats.

The Stockpile 1 landslide was last mapped in October 1999. As expected, this landslide has continued to move since that time and the lateral limits of movement have continued to expand. In fact, since October 1999 the landslide footprint has enlarged approximately 50 percent. This dramatic expansion has generally occurred to the east of the initial mapped limits (Figure 3), and there is clear evidence that movement is continuing unabated. The obvious expansion of the Stockpile 1 landslide prompted further investigation of the landslide's geometry and rate of movement and analysis of the impacts that this might have on the various mitigation alternatives being considered.

In November 2000, **G**eo**L**ogic **A**ssociates mapped the expanded landslide limits and installed four slope inclinometers (PDI-1 through PDI-4; Figure 3) in the eastern half (expanded portion) of the landslide mass. Surface mapping of landslide geomorphology indicates displacements of up to four feet over a period of about one year, and each of the four inclinometers recorded significant movement in a period of less than two weeks. Slope inclinometer data are included herein as Appendix A.

Supplemental Analyses

Given the rapidly developing en echelon nature of the Stockpile 1 landslide, it is concluded that without stabilization, it could continue to expand at least an additional 200 to 400 feet to the east (Figure 3). Since continued easterly expansion of the Stockpile 1 landslide can be anticipated if not mitigated and the original mitigation scenarios considered stabilization only to the limits of the original failure, it is likely that neither the MPA nor the Pipeline Alternative as currently designed, will provide adequate stability.

In order to evaluate the impact of the expanded landslide on the MPA and Pipeline Alternative, both were reanalyzed within the area of the expanded landslide using the information obtained from the supplemental fieldwork. For comparative purposes the same two cross-section locations (A-A' and B-B'; Figures 1, 2, 3 and 4) were subsequently analyzed for both alternatives. Strength parameters for this re-analysis were selected from previous data and/or derived by "back-calculating" strengths for the existing failure (Figure 5). Slope stability was analyzed in two dimensions using the computer program SLOPE/W.

Modified Preferred Alternative (MPA)

As shown on Figures 1 and 3, the current MPA includes a channel inlet located within the mapped limits of the Stockpile 1 landslide. Stability analyses indicate that the current MPA design not does yield an adequate factor of safety for the main body of the channel itself (Section A-A', Figure 6) nor does it yield an adequate factor of safety near the channel inlet (Section B-B', Figure 7).Since no stabilization is proposed east of the inlet, instability in this area should be anticipated.

As shown on Figures 8 and 9, adequate stability for the channel can be obtained by placing a deeper fill over the toe of the existing landslide (over the historic canyon) but leaving the perimeter channel at the current design location and elevation. While potentially unstable conditions would still be anticipated east of the channel inlet ,this is not considered problematic since the open channel would ultimately drain the area to the east and prevent ponding of water to elevations that could threaten the landfill's environmental control systems.

While an additional 50 vertical feet of fill might be required in some areas to achieve an adequate factor of safety, the location of the channel inlet can be preserved and no additional native areas need to be disturbed under this scenario.

Pipeline Alternative

As shown on Figures 2 and 3, the current Pipeline Alternative includes a 96-inch pipe inlet located within the mapped limits of the Stockpile 1 landslide. For this alternative, the stability analyses indicate that the inlet area (Section A-A', Figure 10) and areas to the east of the pipe inlet (Section B-B', Figure 11) will not have an adequate factors of safety.

Unlike the MPA, the Pipeline Alternative cannot be modified to create a stable condition by adding additional fill over the existing canyon alignment while leaving the proposed perimeter channel at its currently proposed grades (Section A-A'; Figure 12). In fact, in order to generate a stable condition the perimeter drain would have to be eliminated altogether and up to 60 feet of fill would be required across Prima Deshecha Creek (Figure 13). Under this scenario, should the pipe inlet become clogged or damaged, ponding of water over waste becomes a distinct possibility. Since ponding of surface water over waste is precluded by state and federal regulations (CCR Title 27 and 40 CFR), the continued stability and function of the pipe and inlet is critical and this alternative is not considered compatible with any significant upstream instability.

Since the expanded landslide appears to be moving independent of the original landslide mass (i.e., large displacements are not presently noted in the western reaches of the landslide), similar development of more easterly landsliding is expected even if the western portion of the landslide complex is stabilized. It is therefore recommended that the pipe inlet be moved to a location outside the limit of potential instability (Figure 3) and that the extended pipe alignment also be stabilized. This would require a relocation of the inlet (then inlets) to areas at least 450 upstream

of the current location (Figure 3) and the placement of a fill wedge that tapers from 60 feet deep at the location of the current inlet to as little as 10 feet at Section B-B' (Figure 14). The substantial relocation of the pipe inlet and necessity for placement of up to 60 feet of fill in the canyon indicate that expansion of the active landslide has had a dramatic effect on the viability of the Pipeline Alternative. This is particularly true in light of the substantial increase in the area of impact for this alternative.

Summary

The growth of the Stockpile 1 landslide has necessitated additional field investigation and engineering analyses. The results of these supplemental studies indicate that the MPA can be readily modified to accommodate stabilization of the expanded landslide without changing the impacted footprint. The results further suggest, however, that the Pipeline Alternative will require substantial modification including relocation of the pipe inlet up to 450 feet upstream; substantially increasing the area of impact.

Under either alternative, additional engineered fill heights will be required along the creek to provide stability for expanded portion of the landslide.

Closure

We hope that this letter is adequate for your purposes. Should you have any questions regarding our field investigation, engineering analyses, or the letter, please do not hesitate to call Mr. Gary Lass at (909) 860-3448.

GeoLogic Associates

for Mathur

John M. Hower, RG, CEG
Project Geologist

Mathur

Jagdish N. Mathur, Ph.D., PE, GE
Supervising Geotechnical Engineer

Gary L. Lass, RG, CEG, CHG
President

Attachments:
Figures 1-14
Appendix A

cc: Christine Arbogast, BAS

FIGURES

LEGEND

- 620 — PROPOSED CONTOURS
- 620 — EXISTING CONTOURS
- LIMITS OF GRADING
- PRE-STOCKPILE CONTOURS
- PROPERTY BOUNDARY
- EXISTING WATER COURSE
- LIMIT OF CONSTRUCTION
- GABION CHANNEL DIVERTER
- SPLASH WALL
- GABION DROP STRUCTURE/PAD
- FRESHWATER MARSH
- SOUTHERN WILLOW SCRUB
- EUCALYPTUS
- COASTAL SAGE SCRUB
- INTERMITTENT STREAM/SCATTERED MULEFAT SCRUB
- ARMY CORPS OF ENGINEERS
- CALIFORNIA DEPARTMENT OF FISH AND GAME
- CORPS/CDFG SHARED JURISDICTION
- LEAST BELLS VIREO JUVENILE
- LEAST BELLS VIREO PAIR
- COASTAL CALIFORNIA GNATCATCHER (FEMALE)
- CROSS-SECTION LOCATION

REFERENCE:

FIGURE 3-4, "LANDSLIDE REMEDIATION PLAN", PRIMA DESHECHA LANDFILL GENERAL DEVELOPMENT PLAN, BAS, SEPTEMBER 2000

N

200 100 0 200 400

SCALE IN FEET

FIGURE 1

MODIFIED PREFERRED ALTERNATIVE

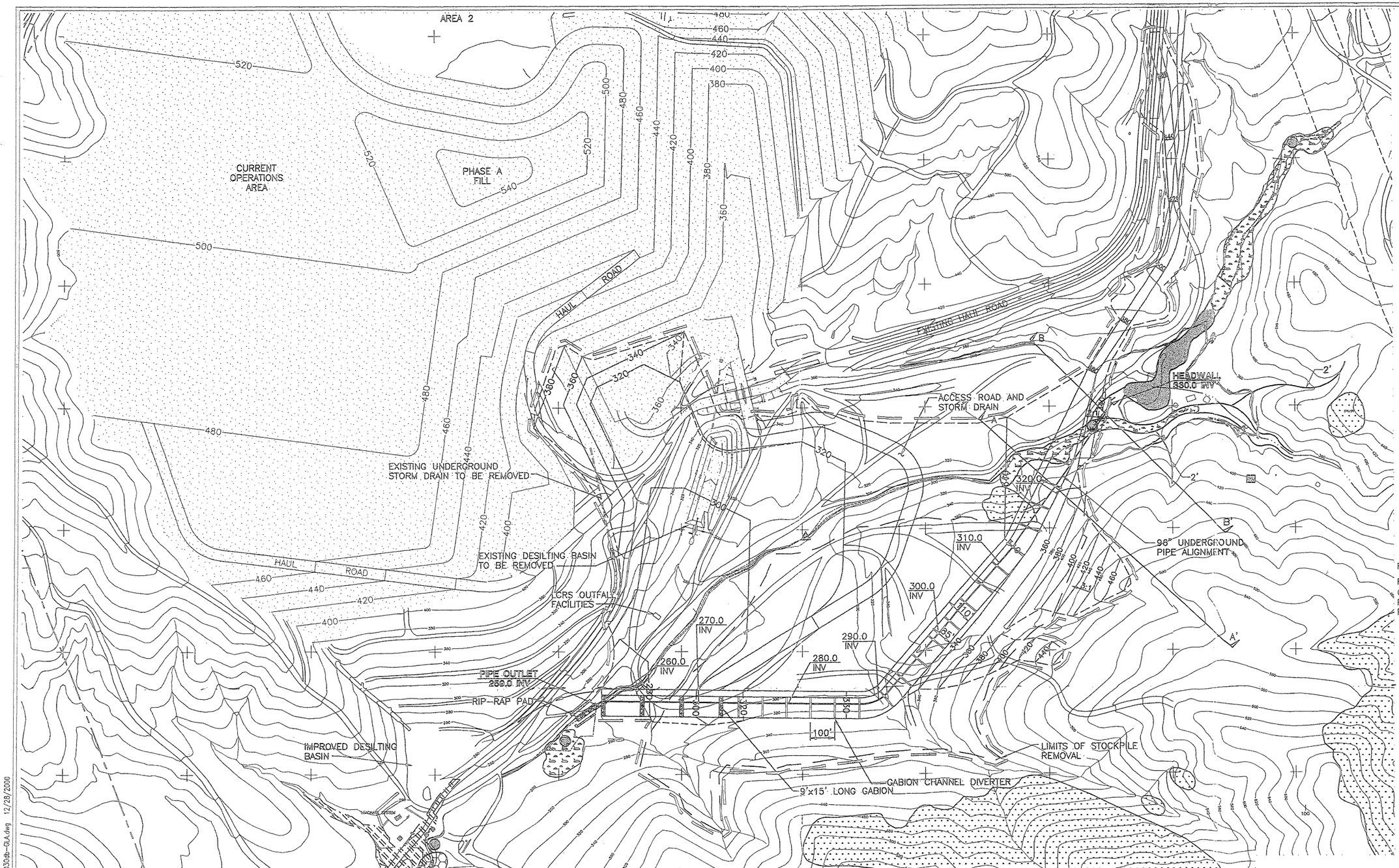
ZONE 1 GEOTECHNICAL INVESTIGATION PRIMA DESHECHA LANDFILL ORANGE COUNTY, CALIFORNIA

GeoLogic Associates

Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	DECEMBER 2000	9759

C:\~w\DWGS\1997\9759-Pr...Jhecha\Stockpile\280536-GA.dwg 12/28/2000



LEGEND

- 620 PROPOSED CONTOURS
- EXISTING CONTOURS
- DAYLIGHT LINE
- PROPERTY BOUNDARY
- EXISTING WATER COURSE
- LIMIT OF CONSTRUCTION
- GABION CHANNEL DIVERTER
- 96" RCP PIPE
- STOCKPILE LIMIT
- RIP-RAP PAD
- GABION DROP STRUCTURE
- POTENTIAL RIPARIAN HABITAT MITIGATION AREA
- FRESHWATER MARSH
- SOUTHERN WILLOW SCRUB
- EUCALYPTUS
- COASTAL SAGE SCRUB
- INTERMITTENT STREAM/SCATTERED MULEFAT SCRUB
- ARMY CORPS OF ENGINEERS
- CALIFORNIA DEPARTMENT OF FISH AND GAME
- CORPS/CDFG SHARED JURISDICTION
- LEAST BELLS VIREO JUVENILE
- LEAST BELLS VIREO PAIR
- COASTAL CALIFORNIA GNATCATCHER (FEMALE)
- CROSS-SECTION LOCATION

REFERENCE:

FIGURE 5-2, "REVISED RE-ROUTE STREAM SOUTH OF CURRENT ALIGNMENT AND 96" RCP ALTERNATIVE", PRIMA DESHECHA LANDFILL GENERAL DEVELOPMENT PLAN, BAS, SEPTEMBER 2000

N

GRAPHIC SCALE

200 100 0 200 400

(IN FEET)

FIGURE 2

PIPELINE ALTERNATIVE

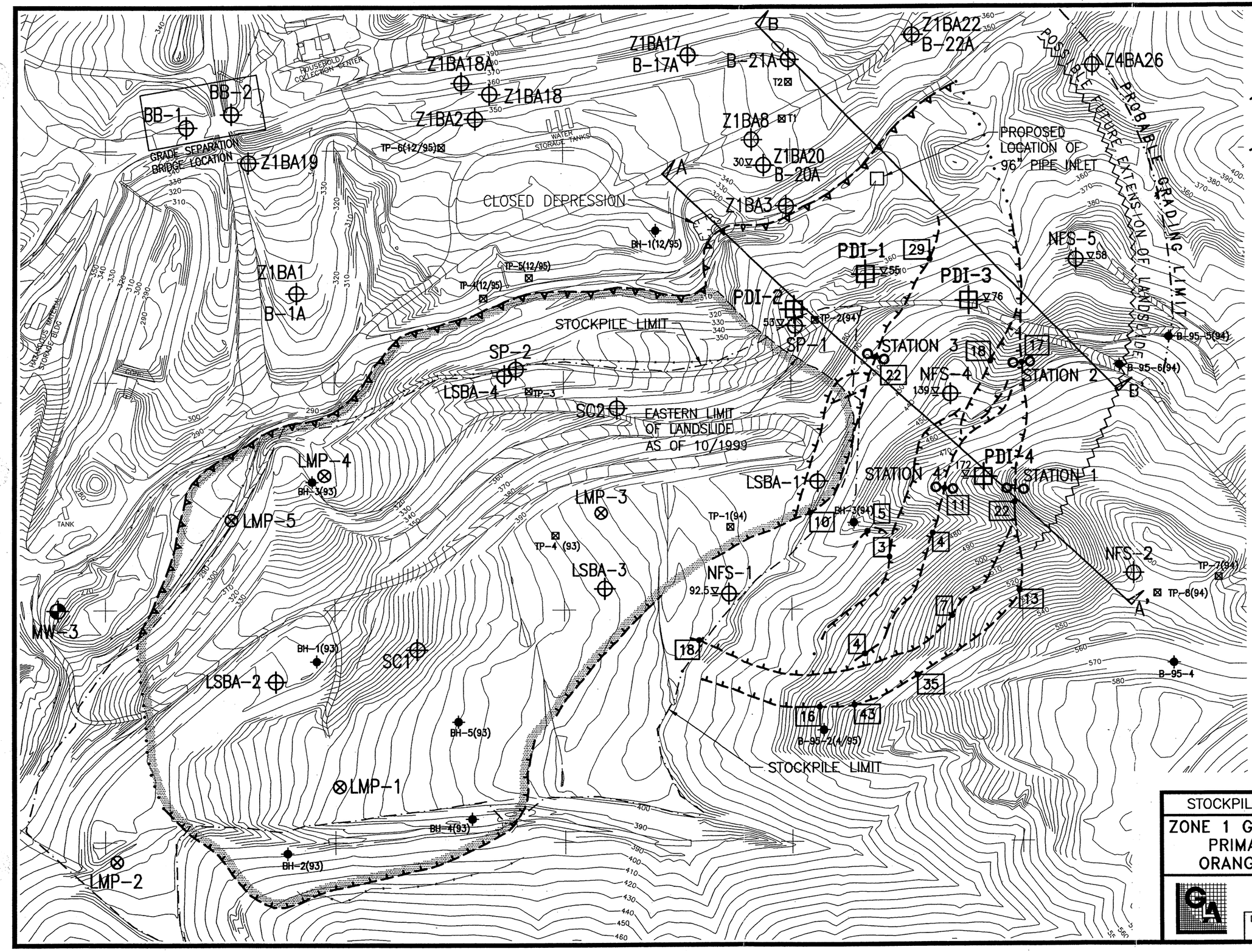
ZONE 1 GEOTECHNICAL INVESTIGATION PRIMA DESHECHA LANDFILL ORANGE COUNTY, CALIFORNIA

GeoLogic Associates

Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	DECEMBER 2000	9759

C:\~vl\DWGS\1997\9759-Prim..cho\Stockpile\090300b-GLA.dwg 12/28/2000



LEGEND:

- ACTIVE LANDSLIDE RELATED CRACKING (SCARPS) WITH TEETH ON DOWN-DROPPED SIDE, DOTTED WHERE OBSCURED
- LANDSLIDE TOE WITH TEETH ON OVERTHRUST SIDE, DOTTED WHERE OBSCURED
- OUTLINE OF ORIGINAL SLIDEMASS
- POSSIBLE FUTURE EXTENSION OF LANDSLIDE
- PROBABLE GRADING LIMIT
- LIMIT OF STOCKPILE
- CROSS-SECTION LOCATION
- ▽55 DEPTH TO GROUNDWATER IN FEET
- [17] VERTICAL OFFSET OF SCARP IN INCHES
- FIELD MEASUREMENT STATION
- INCLINOMETER (12/2000)
- EXPLORATORY BORING, THIS INVESTIGATION (10/1999)
- MONITORING WELL, THIS INVESTIGATION (10/1999)
- LANDSLIDE MONITORING PROBE (10/1999)
- EXPLORATORY BORING (EarthTech, 1994/1995)
- TEST PIT (EarthTech, 1994)

REFERENCE:

TOPOGRAPHIC MAP (as of 10/1/99) PROVIDED BY THE ORANGE COUNTY

GRAPHIC SCALE

100 0 50 100 200

(in feet)

1 inch = 200 ft.

N

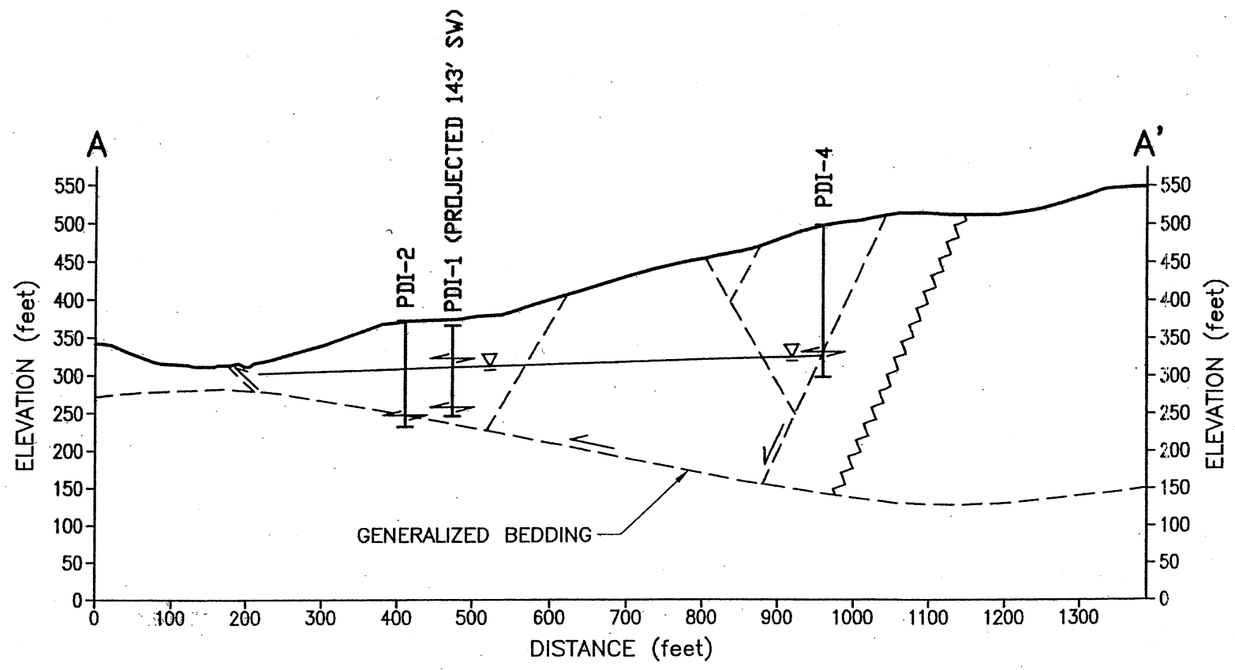
FIGURE 3

STOCKPILE LANDSLIDE EXPANSION MAP

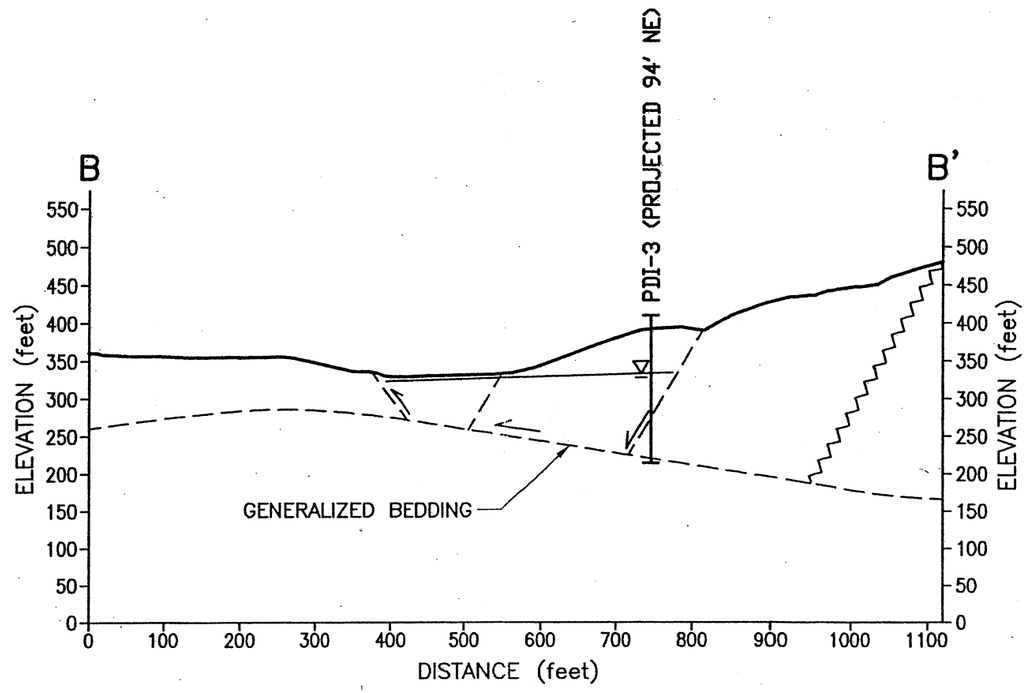
ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	DECEMBER 2000	9759



CROSS-SECTION A-A'



CROSS-SECTION B-B'

LEGEND:

- GROUNDWATER OR PIEZOMETRIC LEVEL
- INCLINOMETER SHEAR DISPLACEMENT
- MOVEMENT ON LANDSLIDE SLIP SURFACE
- SIMPLIFIED GEOLOGIC CONTACT
- POSSIBLE FUTURE EXTENSION OF LANDSLIDE
- INCLINOMETER

GRAPHIC SCALE
100 0 50 100 200
(in feet)
1 inch = 200 ft.

FIGURE 4

CROSS-SECTIONS A-A' AND B-B'

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	DECEMBER 2000	9759

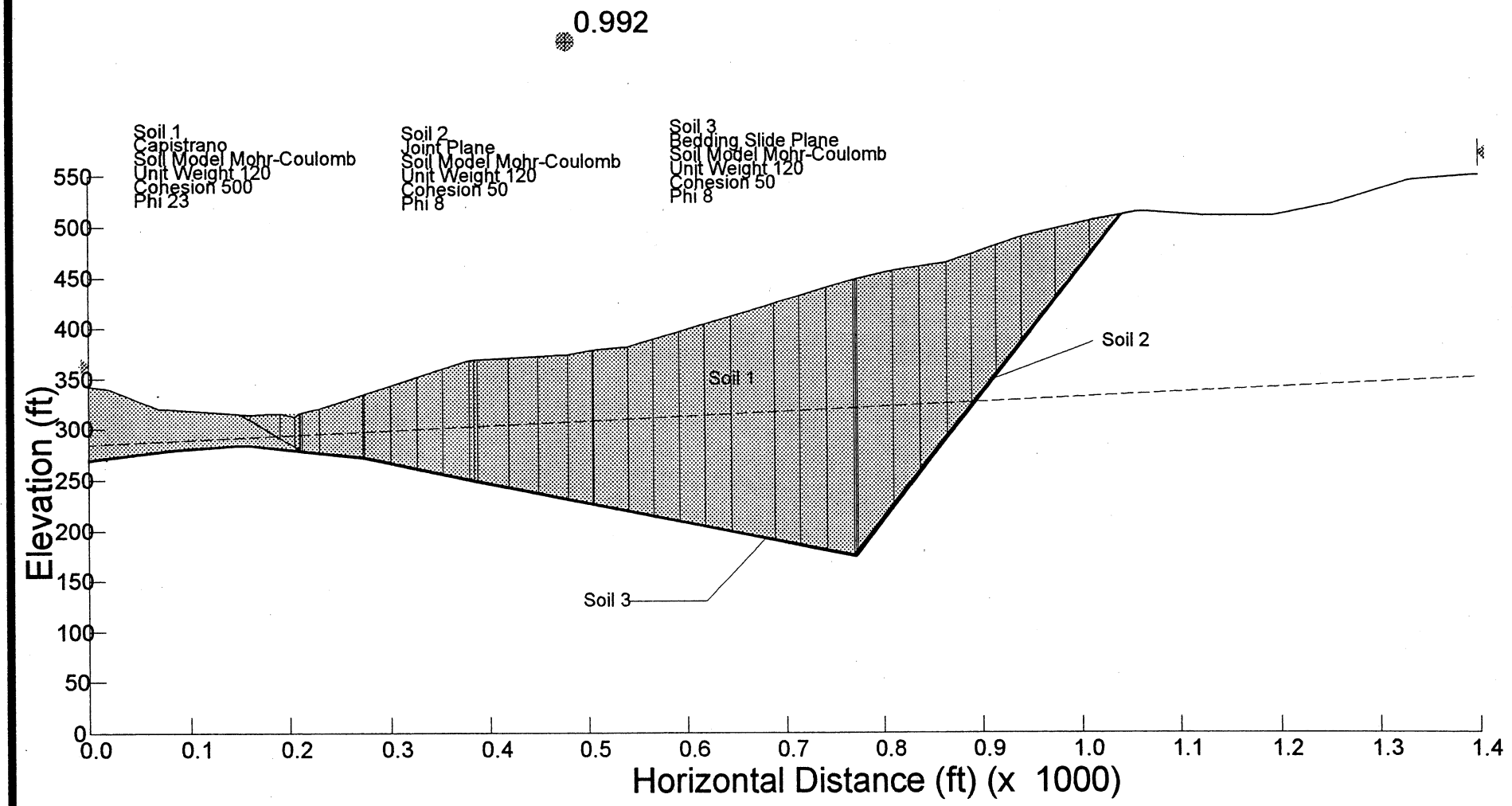


FIGURE 5

BACK CALCULATION

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

1.074

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

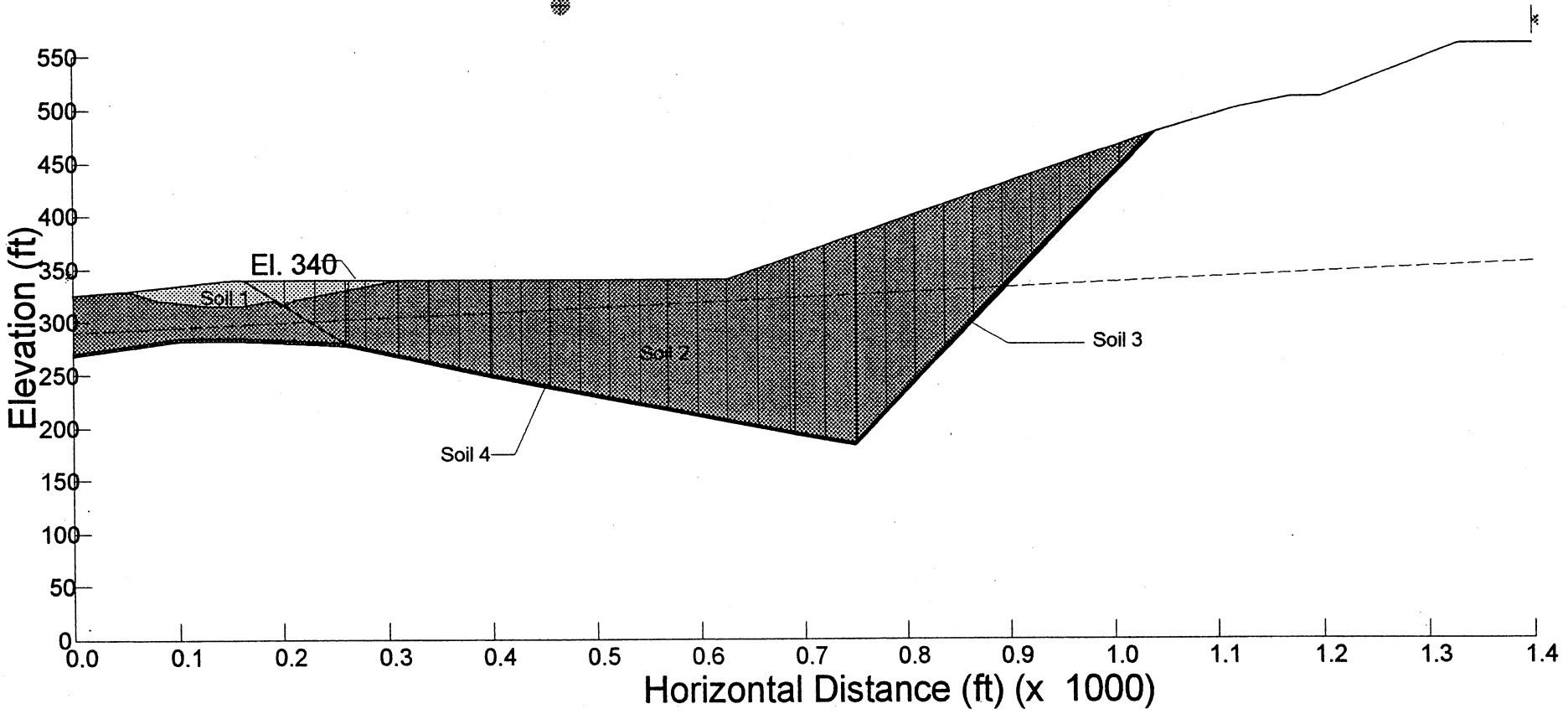


FIGURE 6

SECTION A-A' - MODIFIED PREFERRED ALTERNATIVE

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 2
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 3
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

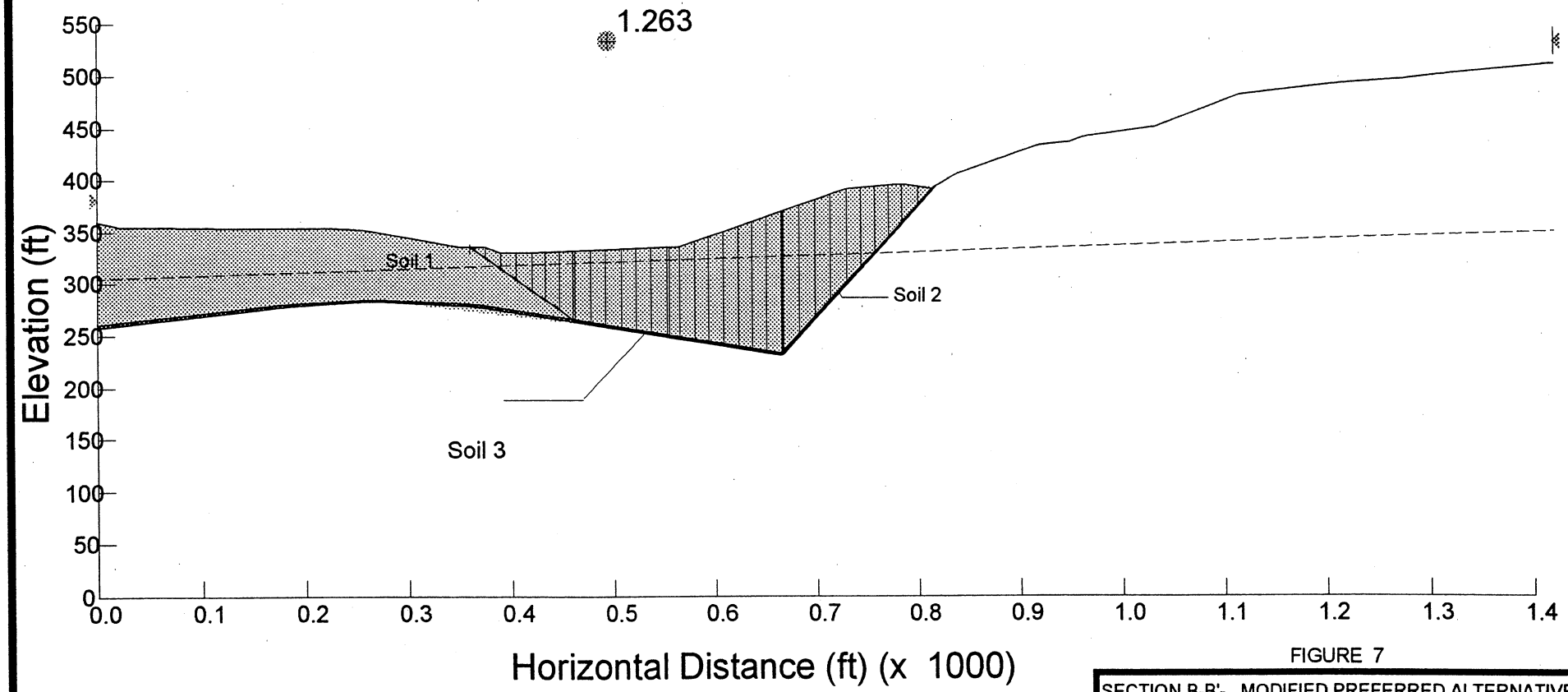


FIGURE 7

SECTION B-B'- MODIFIED PREFERRED ALTERNATIVE

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

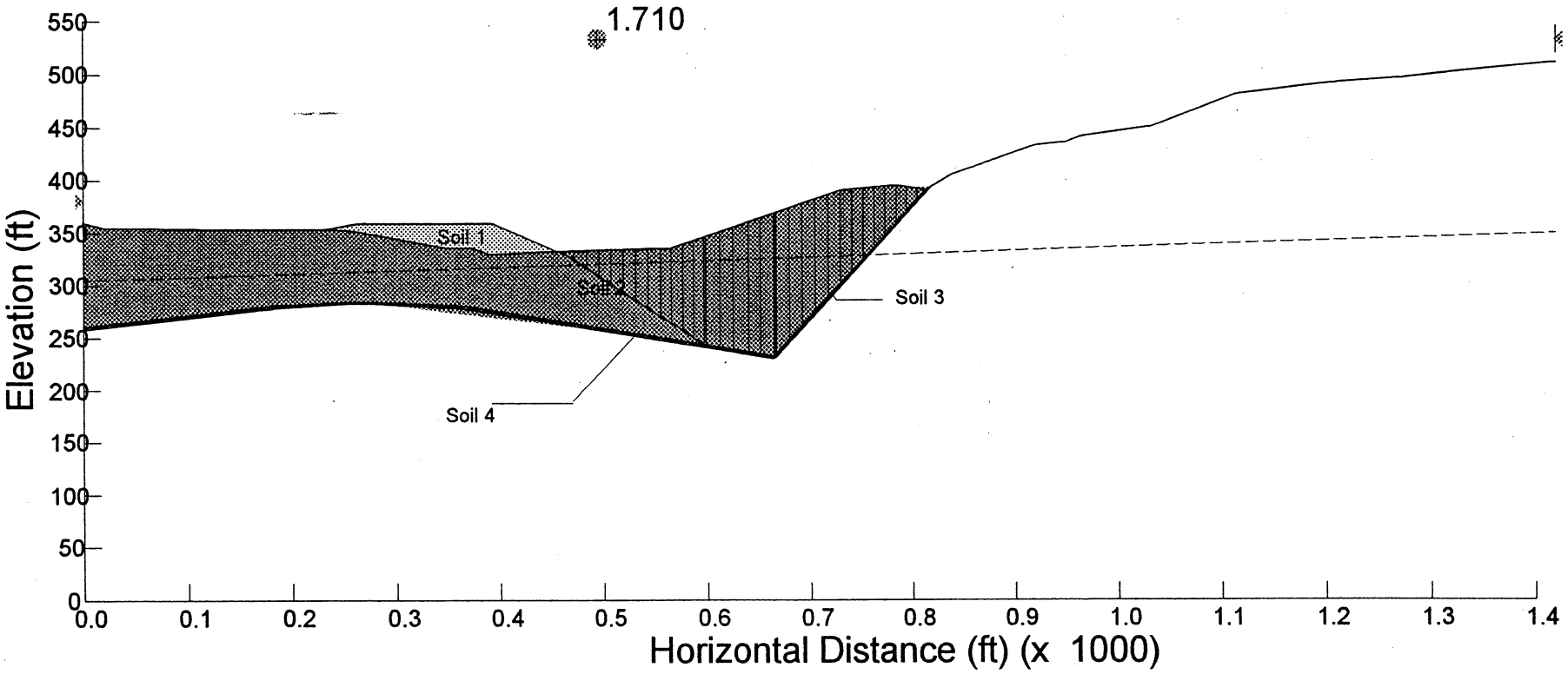


FIGURE 8

SECTION B-B'- WITH EXTRA STABILITY FILL (F.S. >1.5)

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

1.517

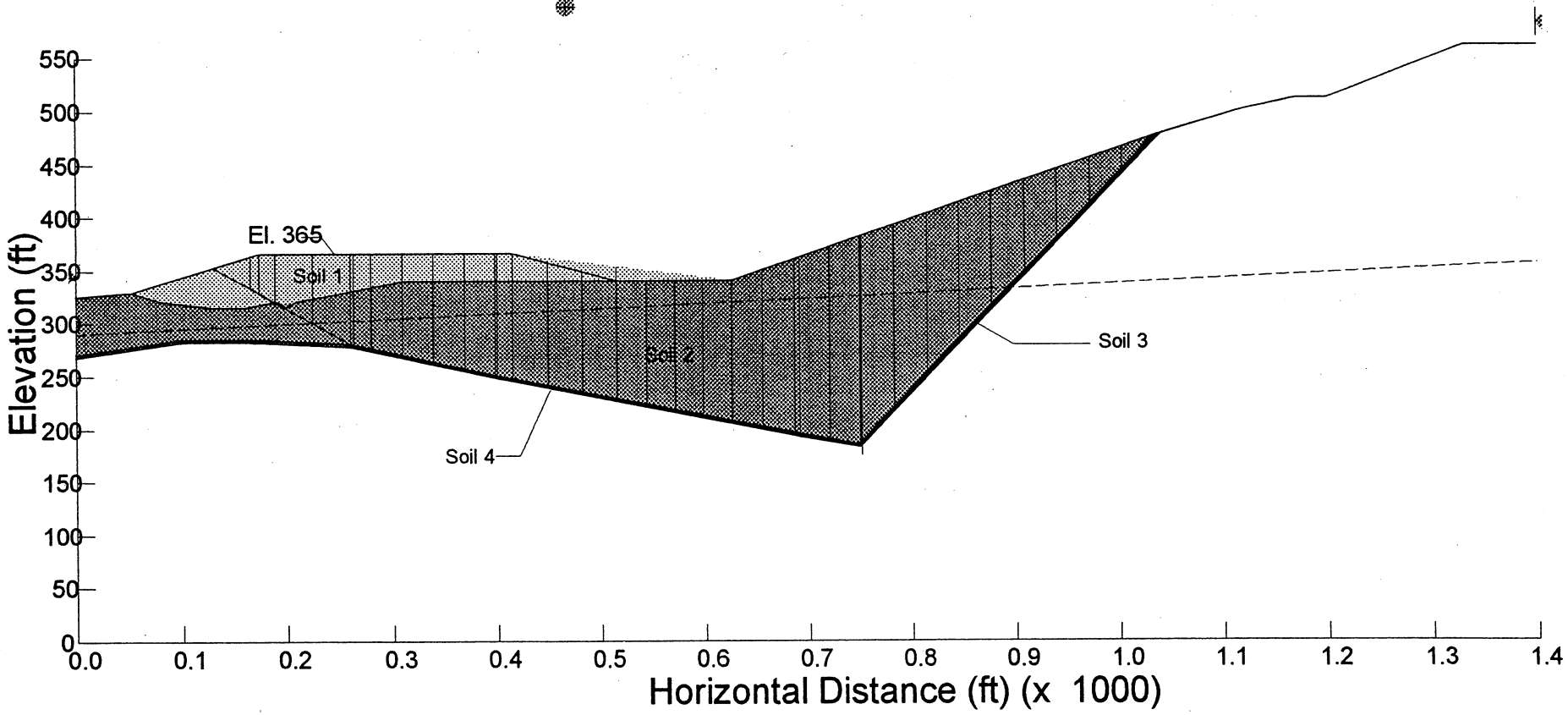


FIGURE 9

SECTION A-A'- WITH EXTRA STABILITY FILL (F.S. >1.5)

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 400
Phi 13

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

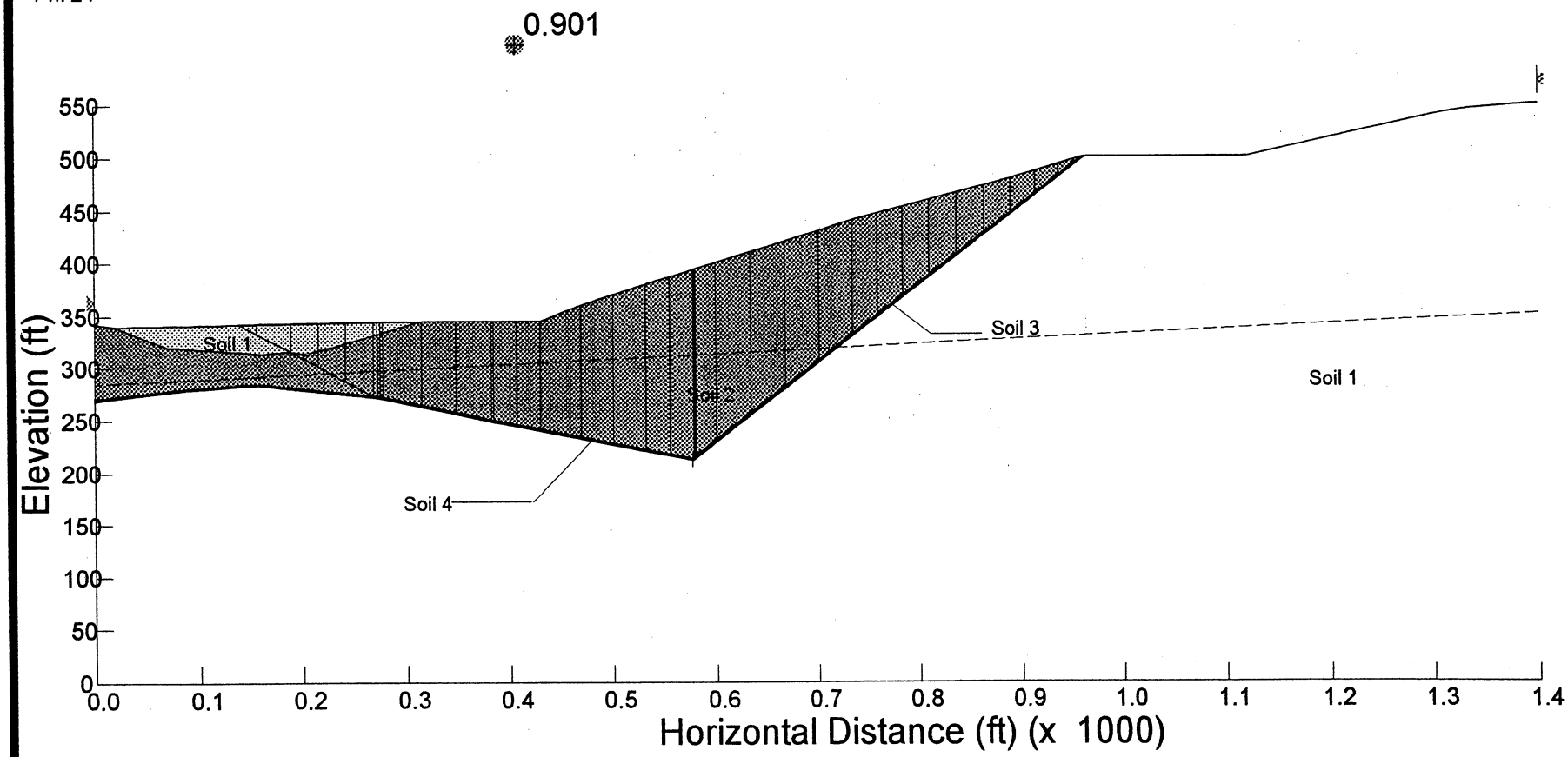


FIGURE 10

SECTION A-A'- PIPE ALTERNATIVE

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

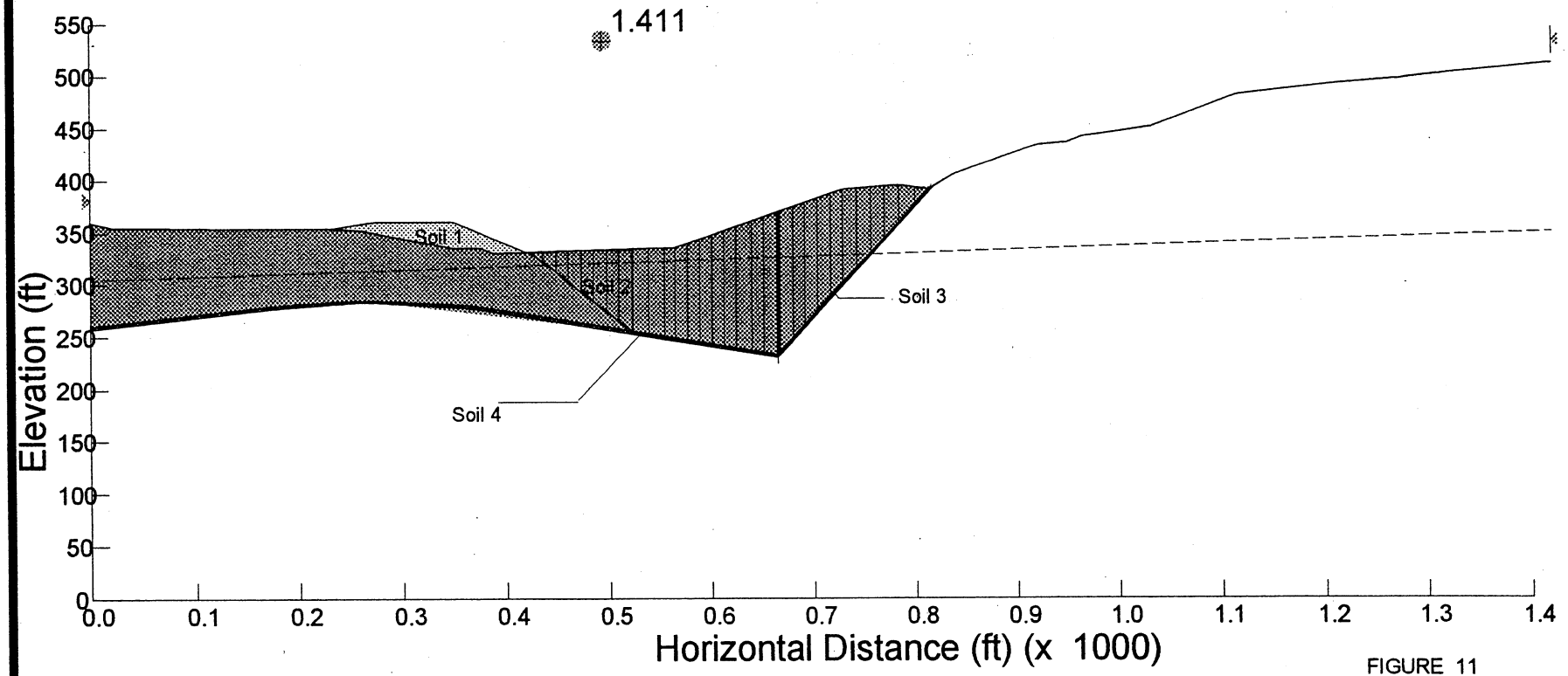


FIGURE 11

SECTION B-B'- PIPE ALTERNATIVE

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 400
Phi 13

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

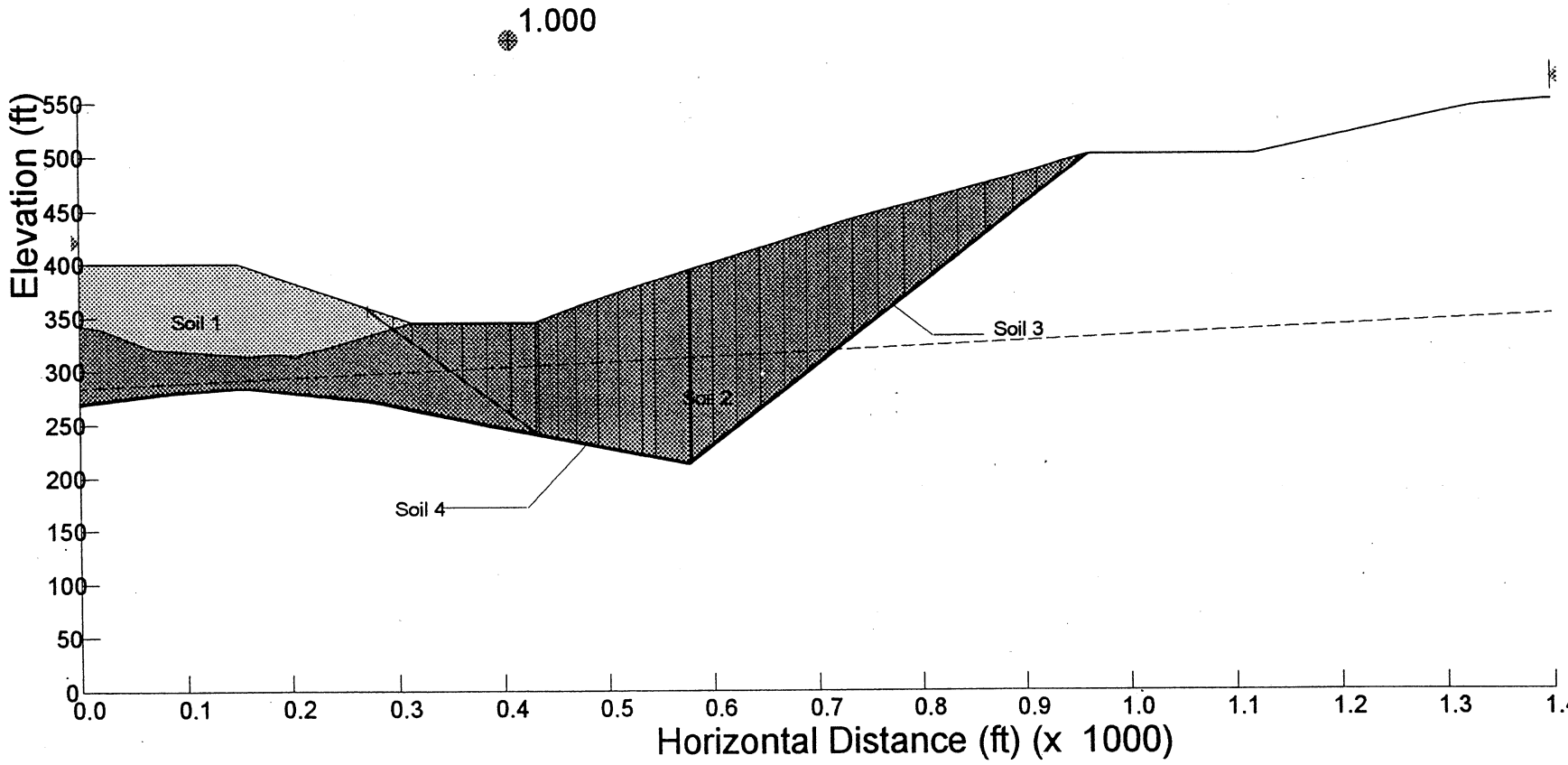


FIGURE 12

SECTION A-A'- ADDITIONAL FILL OVER PIPE ALTERNATIVE WITH OPEN CHANNEL

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 400
Phi 13

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

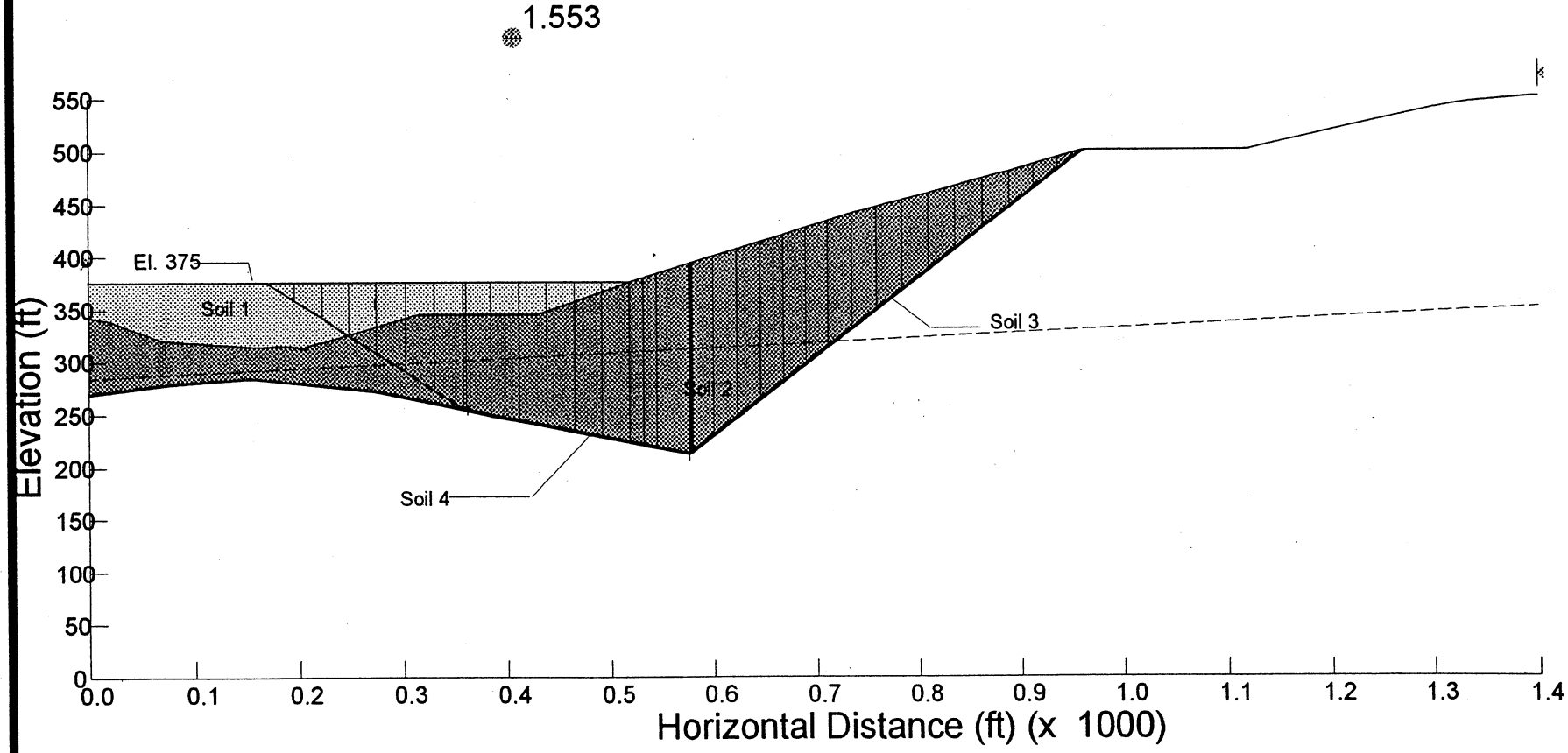


FIGURE 13

SECTION A-A'- ADDITIONAL FILL OVER PIPE ALTERNATIVE- NO CHANNEL

ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

Soil 1
Back Fill
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 350
Phi 24

Soil 2
Weathered Capistrano
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 500
Phi 23

Soil 3
Joint Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

Soil 4
Slide Plane
Soil Model Mohr-Coulomb
Unit Weight 120
Cohesion 50
Phi 8

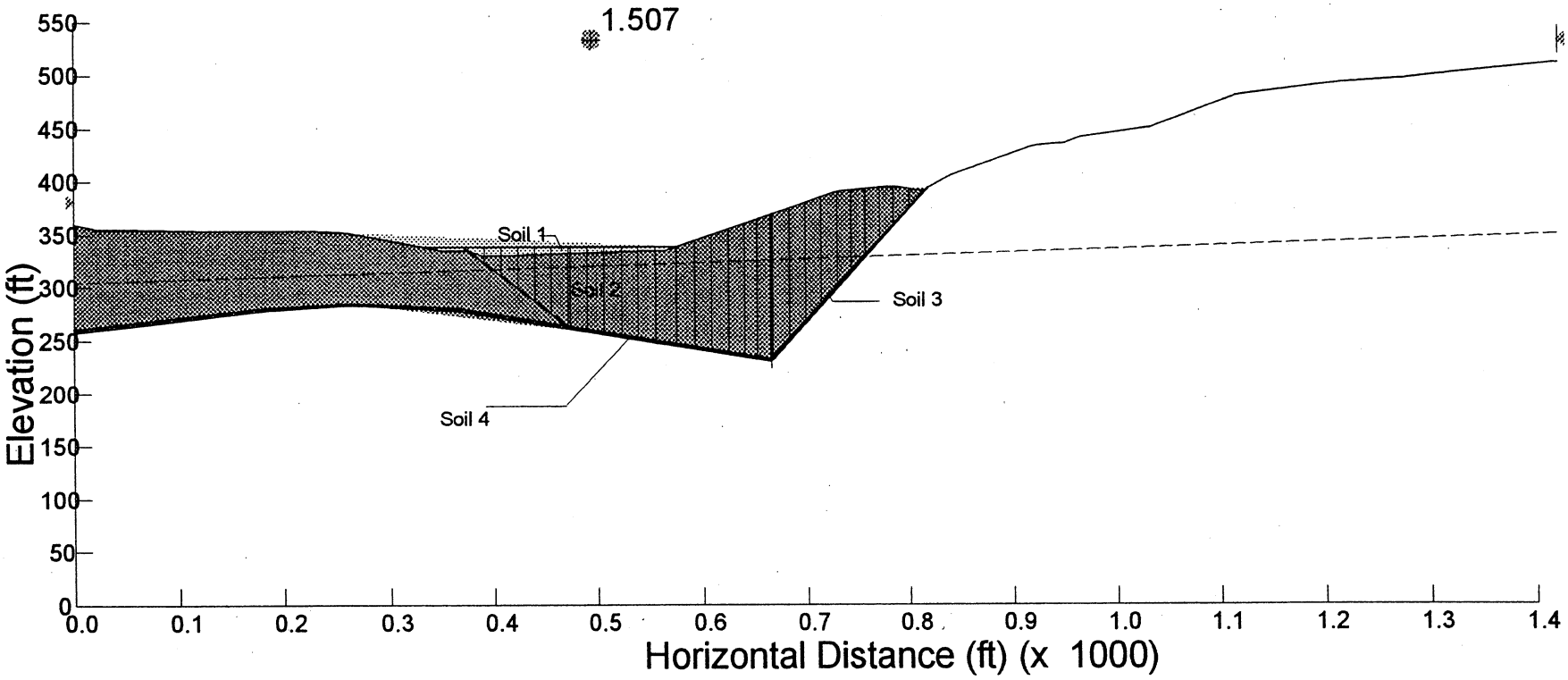


FIGURE 14

SECTION B-B'- ADDITIONAL FILL OVER PIPE LINE ALTERNATIVE - NO CHANNEL

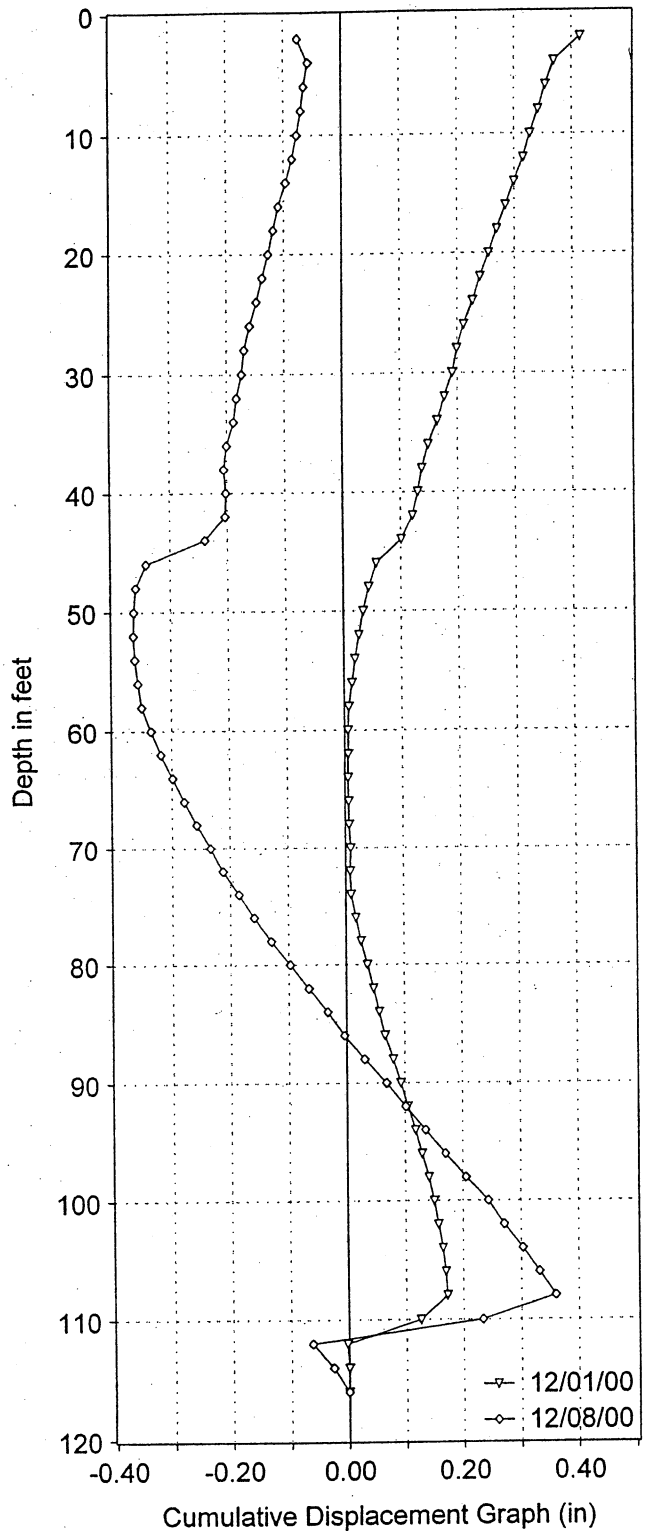
ZONE 1 GEOTECHNICAL INVESTIGATION
PRIMA DESHECHA LANDFILL
ORANGE COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

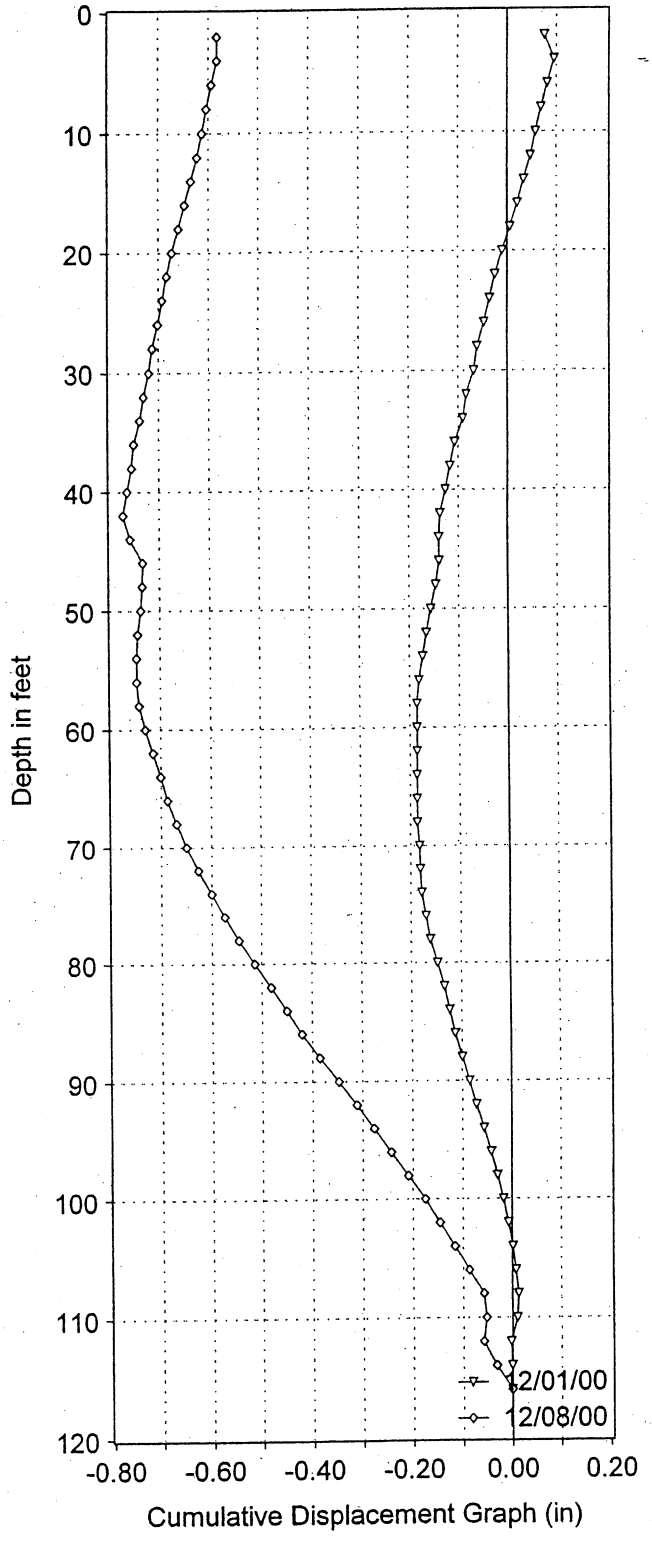
DRAWN BY:	DATE:	JOB NO.
JNM	DECEMBER 2000	9987

APPENDIX A

INSTALLATION PDI-1, A-Axis



INSTALLATION PDI-1, B-Axis

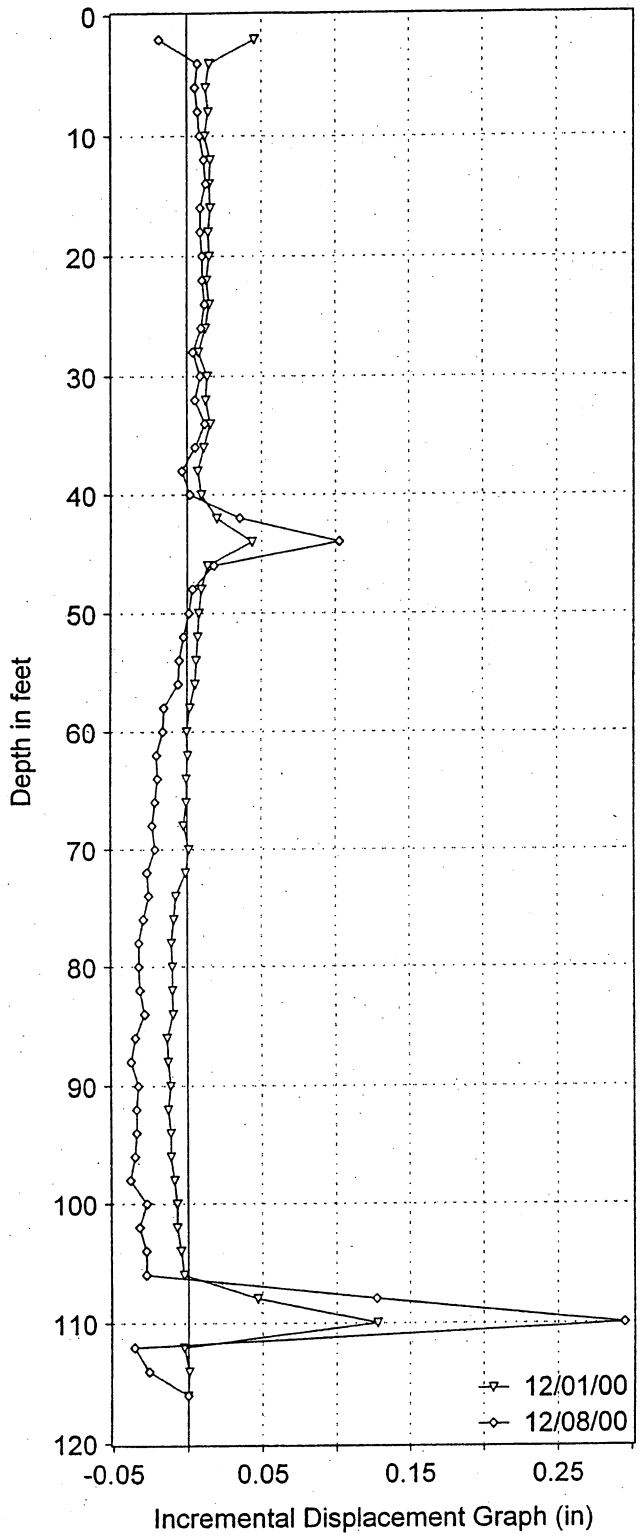


Bearing of +A Axis: 327

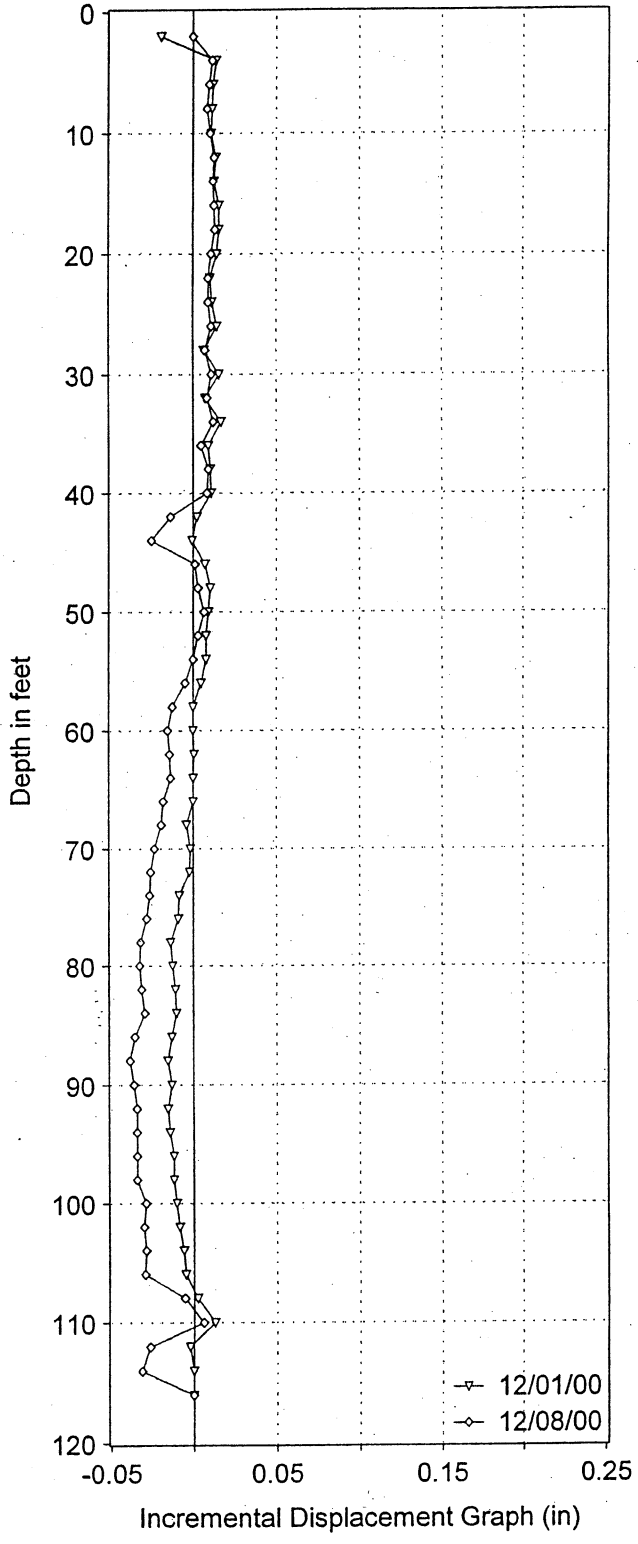
Date of Initial Data Set: 11/27/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-1, A-Axis



INSTALLATION PDI-1, B-Axis

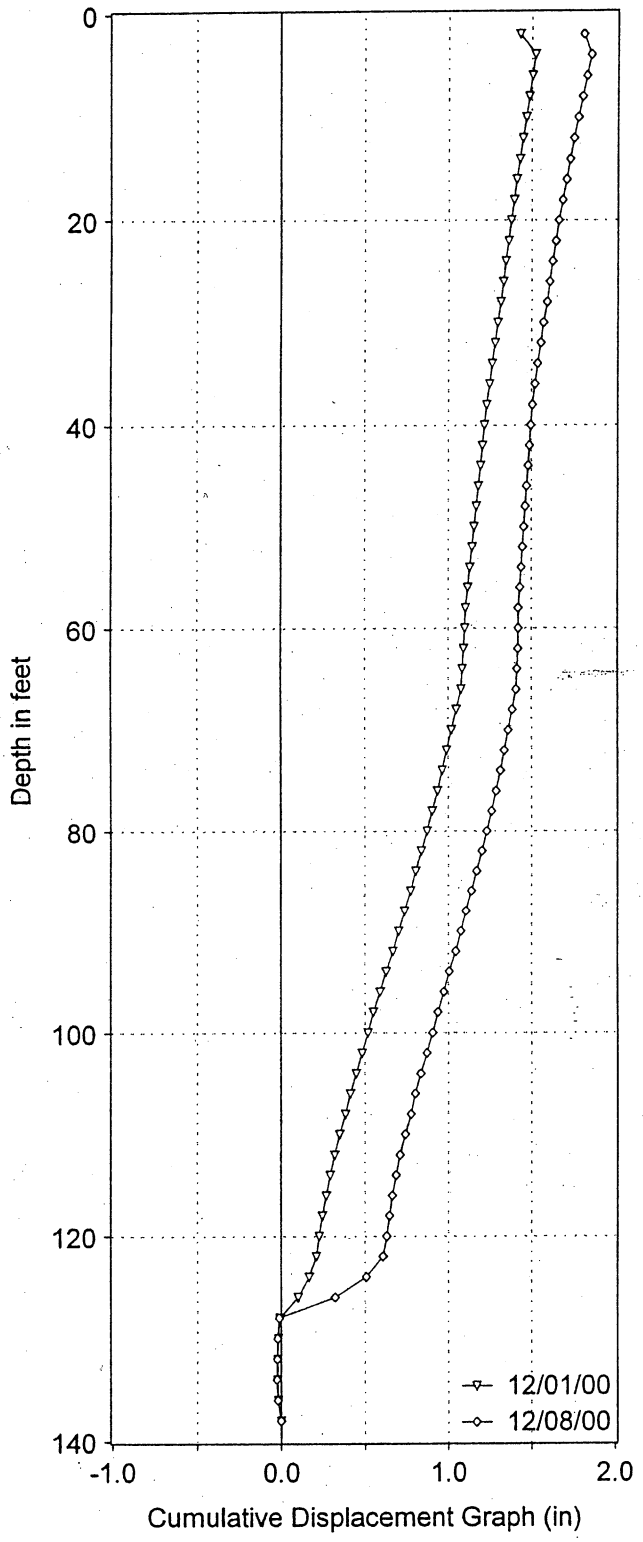


Bearing of +A Axis: 327

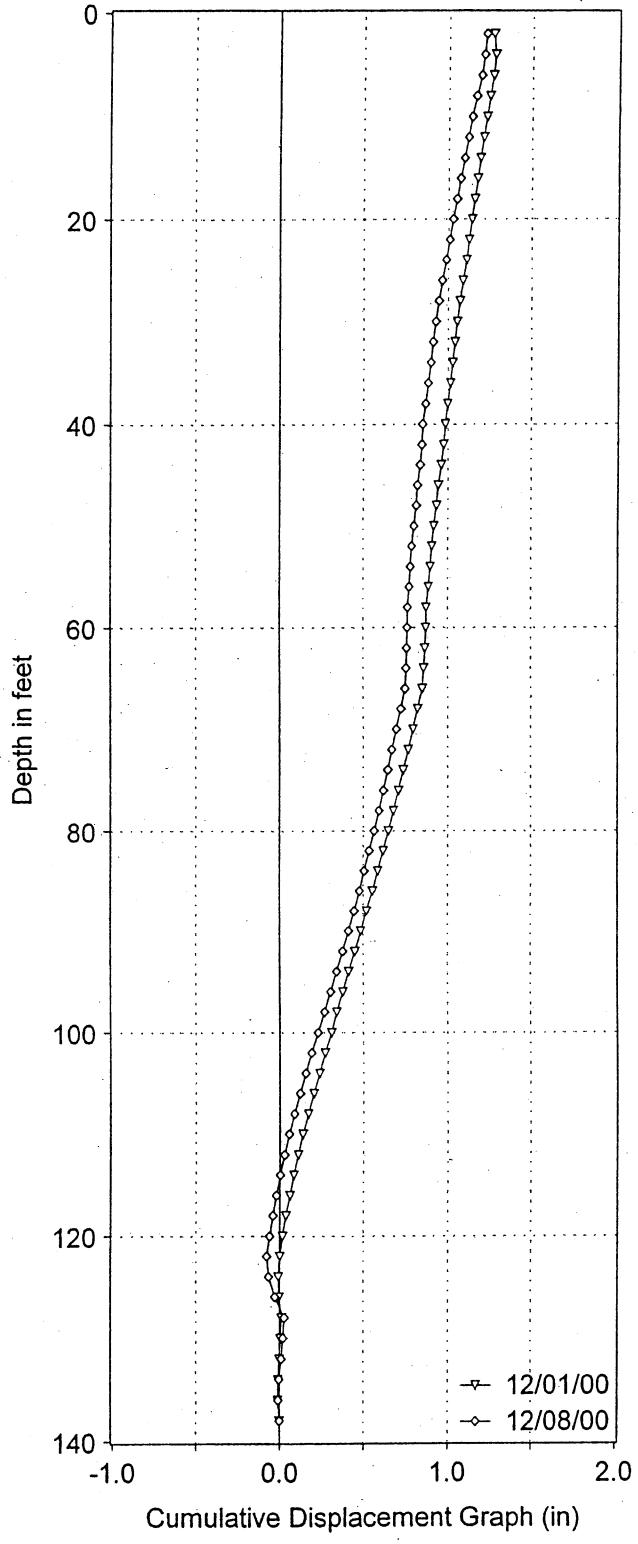
Date of Initial Data Set: 11/27/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-2, A-Axis



INSTALLATION PDI-2, B-Axis

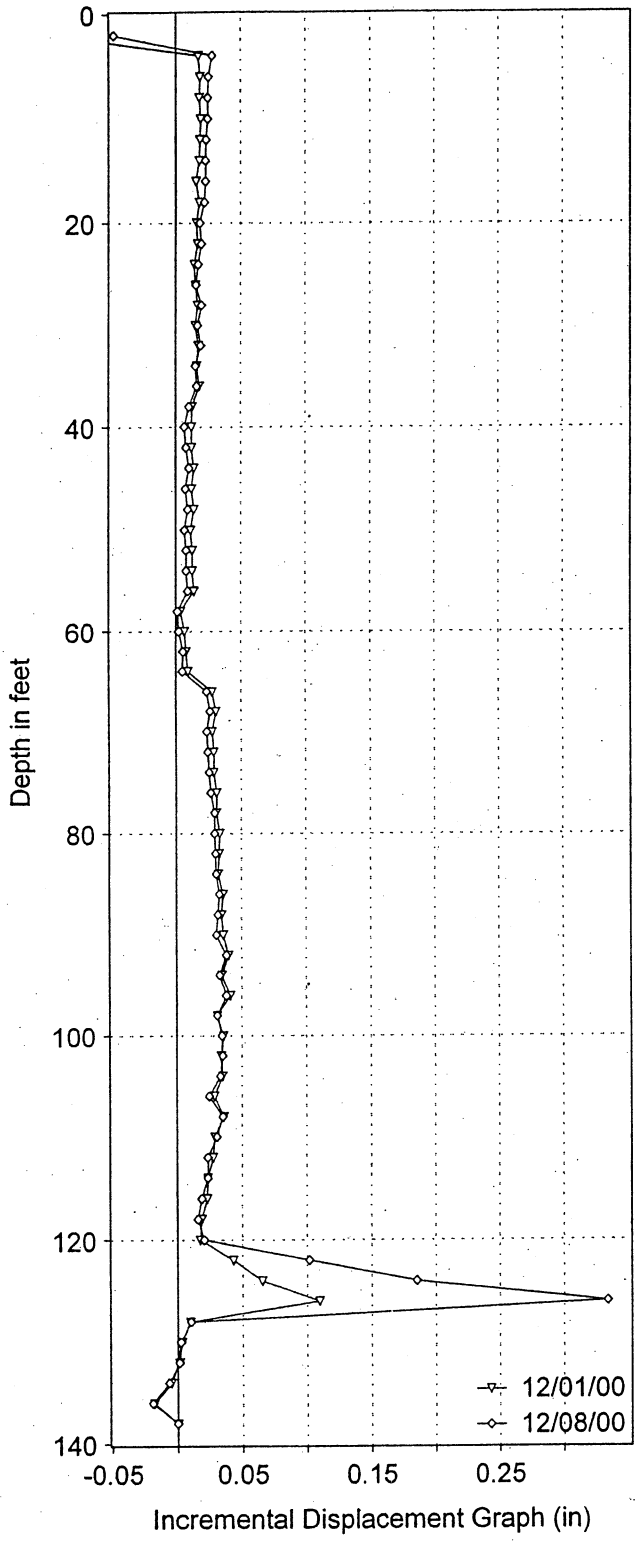


Bearing of +A Axis: 330

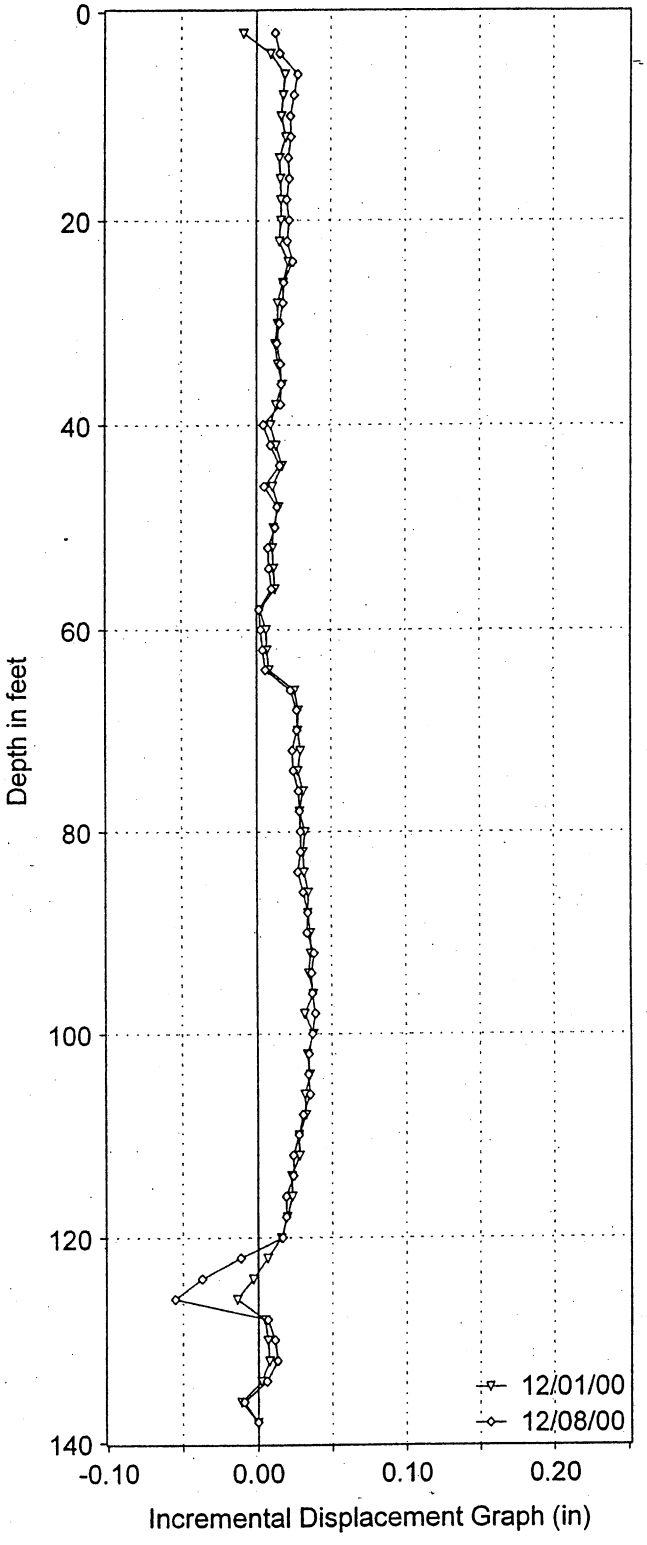
Date of Initial Data Set: 11/28/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-2, A-Axis



INSTALLATION PDI-2, B-Axis

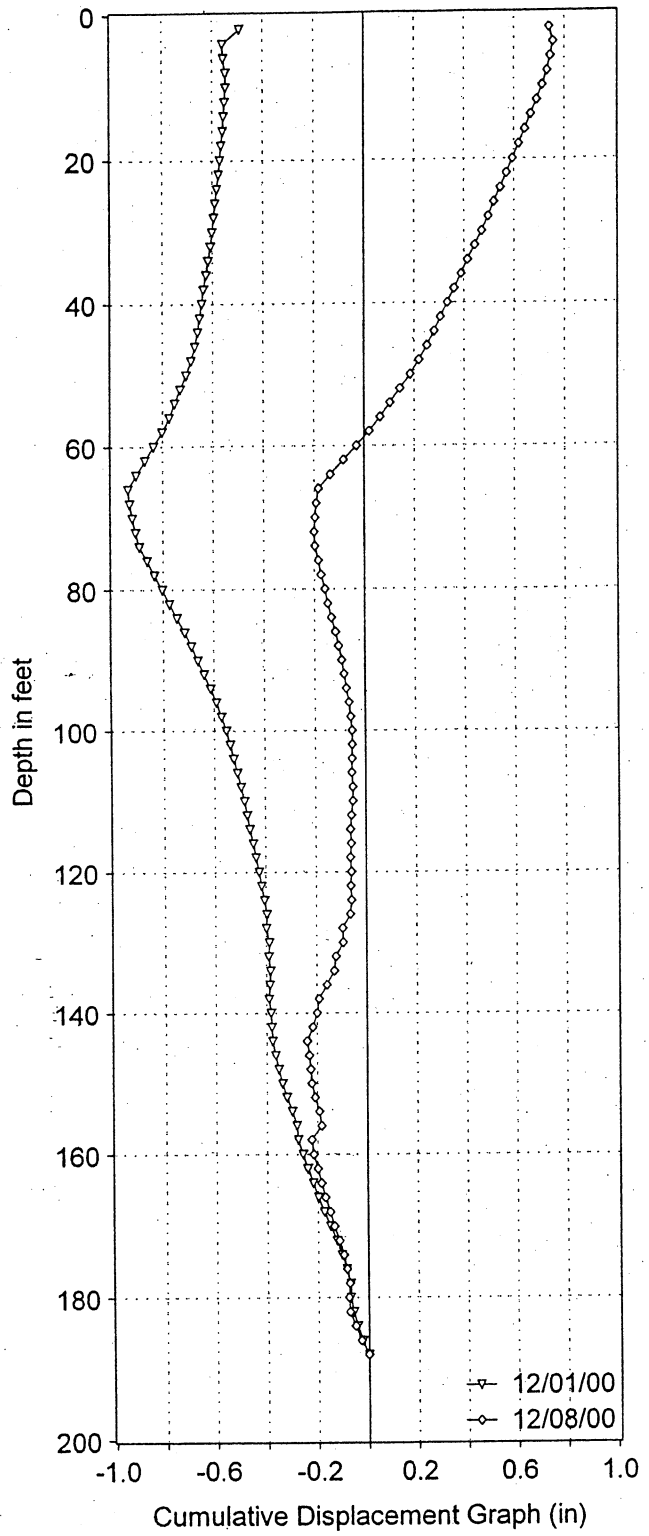


Bearing of +A Axis: 330

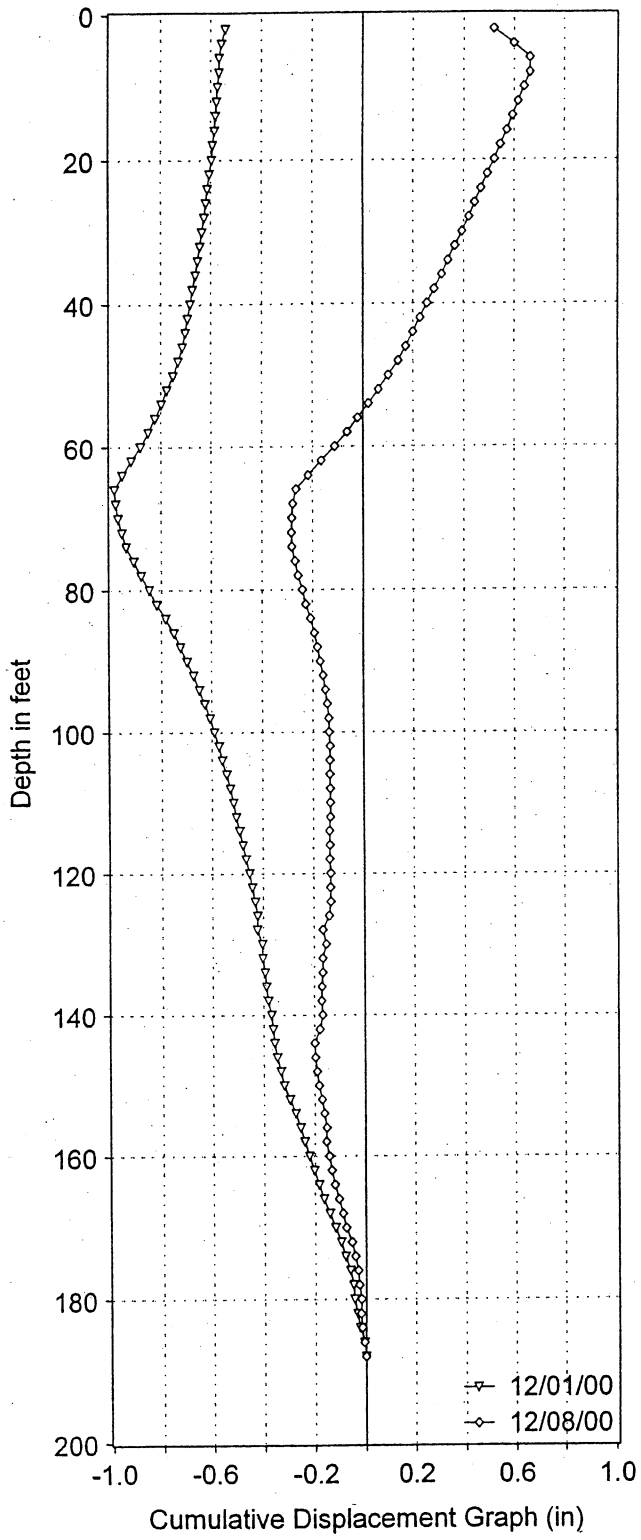
Date of Initial Data Set: 11/28/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-3, A-Axis



INSTALLATION PDI-3, B-Axis

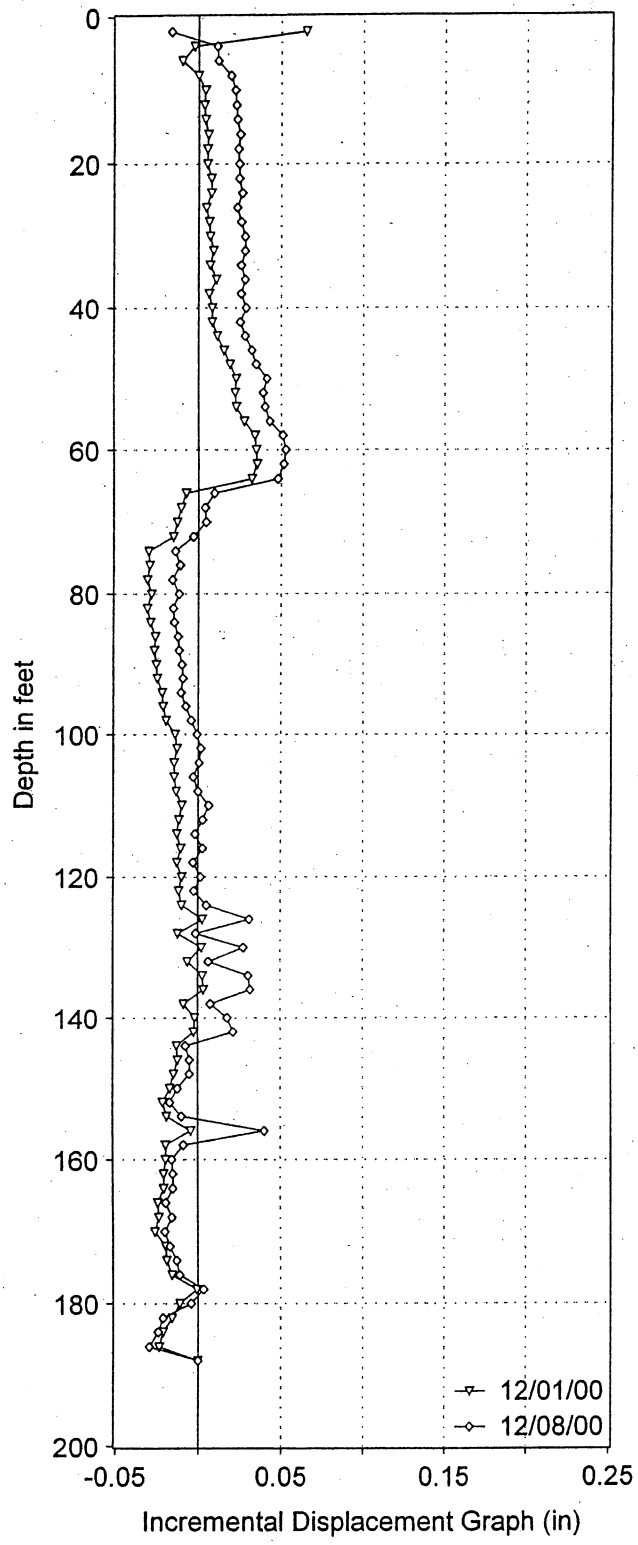


Bearing of +A Axis: 320

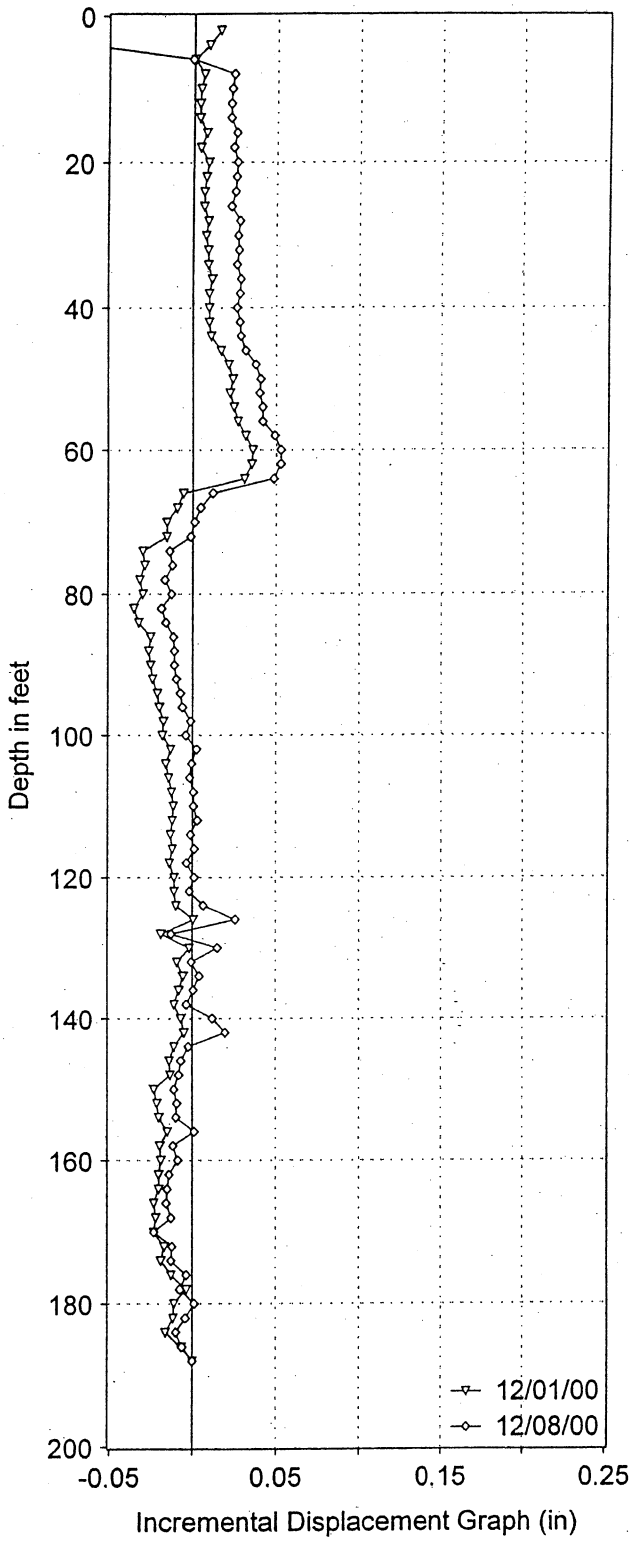
Date of Initial Data Set: 12/01/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-3, A-Axis



INSTALLATION PDI-3, B-Axis

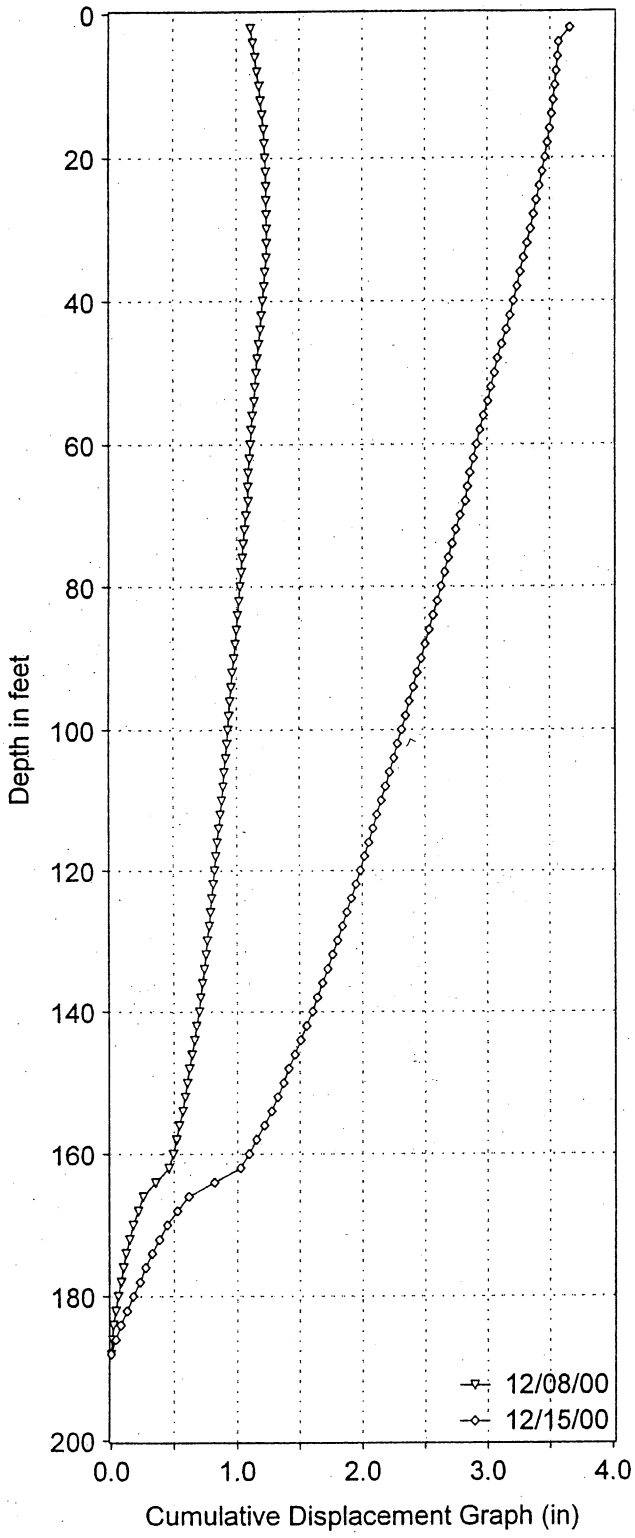


Bearing of +A Axis: 320

Date of Initial Data Set: 12/01/2000

PRIMA DESHECHA LANDFILL

INSTALLATION PDI-4, A-Axis



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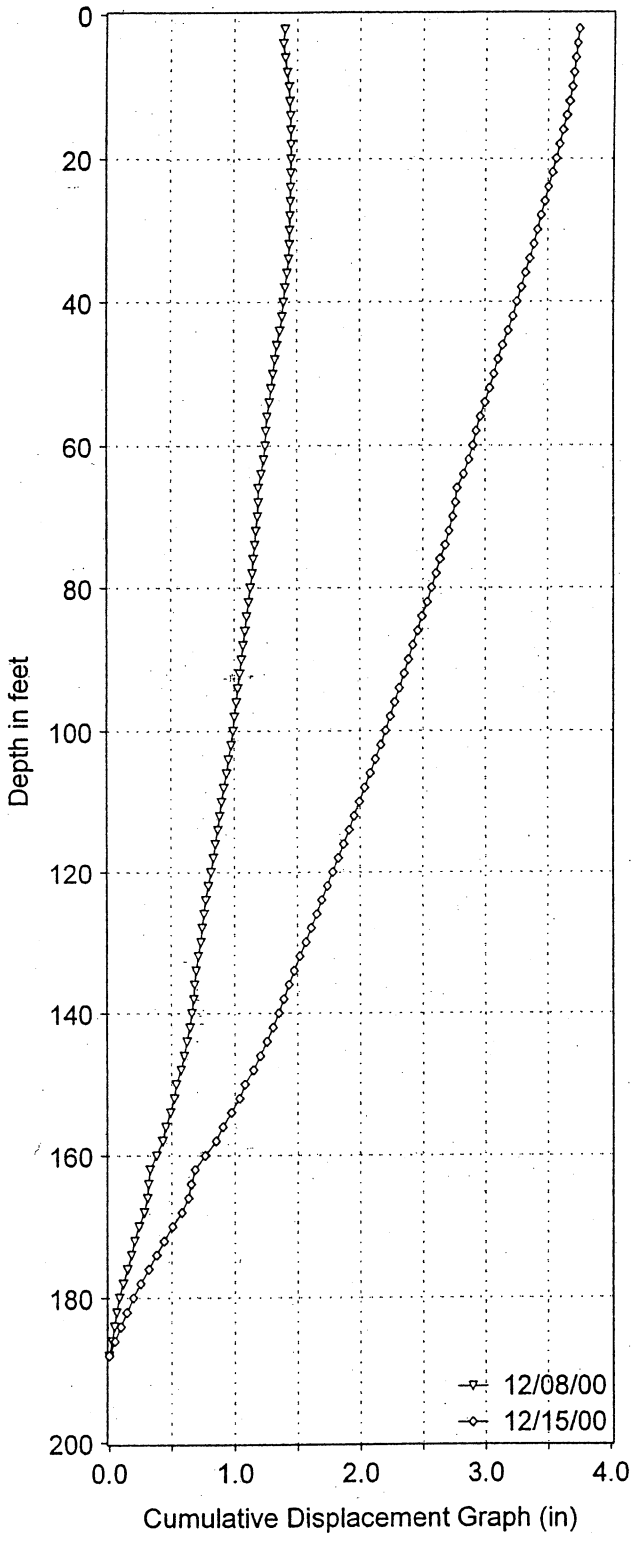

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Date of Initial Data Set: 12/01/2000

PRIMA DESHECHA LANDFILL

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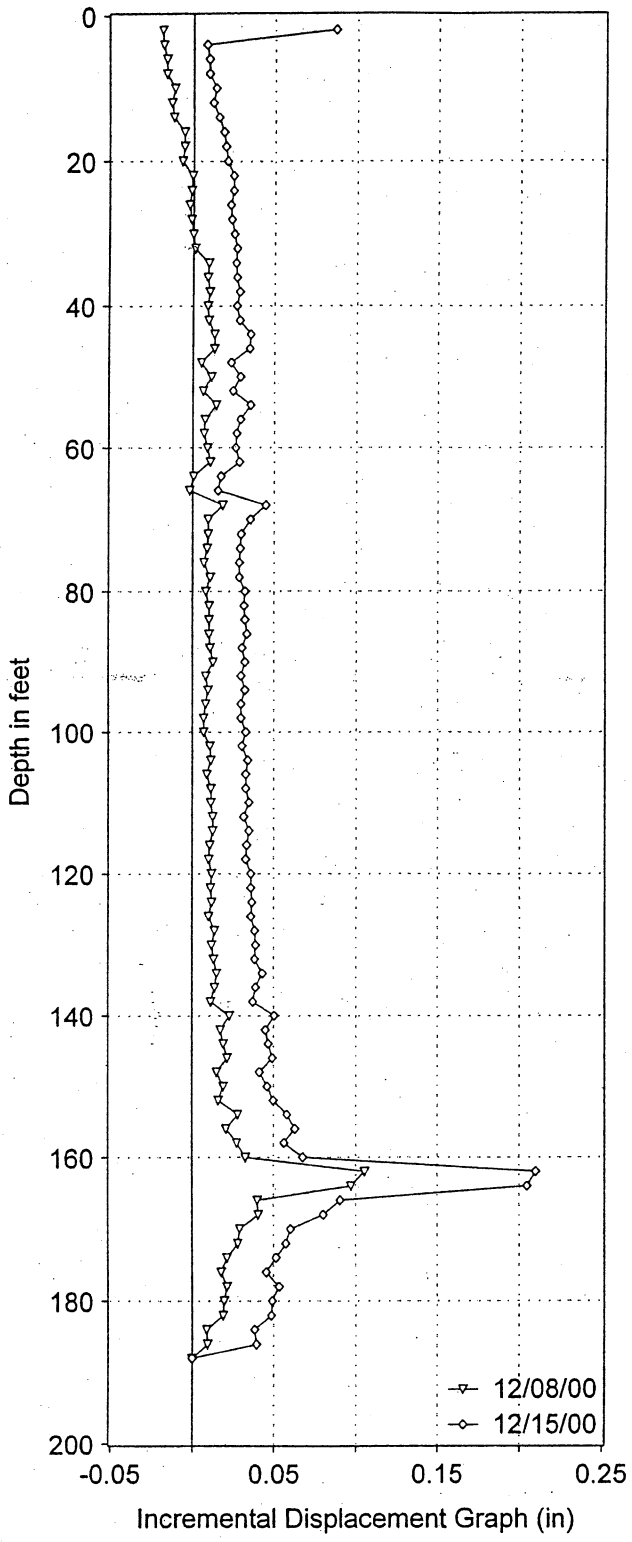

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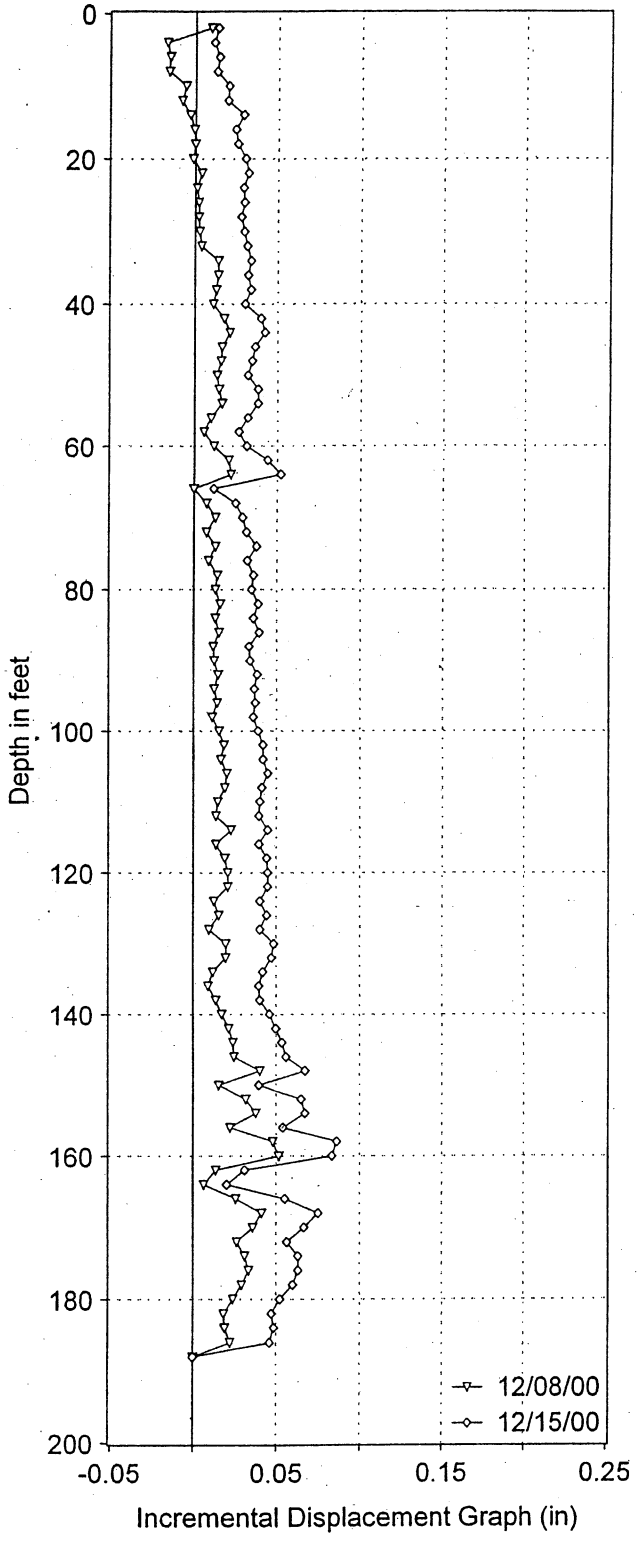


Bearing of +A Axis: 342

Date of Initial Data Set: 12/01/2000

PRIMA DESHECHA LANDFILL

ATTACHMENT NO. 4

GeoLogic Associates
Geologists, Hydrogeologists and Engineers

June 8, 2000
Job No. 9637

County of Orange, Environmental Management Agency
Integrated Waste Management Department
320 North Flower Street, Suite 400
Santa Ana, California 92703

Attention: Mr. George Ker

DISCUSSION OF GROUNDWATER ELEVATIONS ADJACENT TO PRIMA DESHECHA CAÑADA CREEK AT THE PRIMA DESHECHA LANDFILL, ORANGE COUNTY, CALIFORNIA

This letter report describes the differences in groundwater conditions observed in monitoring wells screened in alluvium and wells screened in the Capistrano Formation bedrock. Figures 1 through 4, attached to this letter, show differences in first encountered groundwater and static groundwater levels measured on July 15, 1999 in each of the wells. Figure 5 compares historical groundwater fluctuations in each of the subject wells, and these data are presented on Table 1. The groundwater conditions in alluvial wells MW-E and MW-J are not presented herein. Alluvial well MW-E is screened across both alluvium and bedrock, so groundwater conditions in this well do not yield conclusive information about either water-bearing zone. Alluvial well MW-J is located within the influence of the alluvial groundwater extraction system at the toe of WMU1. As a result, groundwater elevations measured in this well may not reflect natural conditions.

In 1986, wells (MW-A through MW-G) were installed to monitor groundwater within the Prima Deshecha Canada alluvial sediments. Empirically, alluvial groundwater exists under unconfined conditions; that is, there is no overlying low-permeability stratum to prevent the upward movement of groundwater. As a result, the first encountered alluvial groundwater level and the static groundwater level are usually very similar, with seasonal fluctuations occurring almost immediately in response to recharge from rainfall. As shown in Figure 1 which depicts the geologic conditions surrounding alluvial well MW-D, the first encountered alluvial groundwater elevation and the July 15, 1999 static groundwater elevation are within a few inches of each other. Inspection of the historical data provided on Table 1 and Figure 5 illustrates that seasonal fluctuations are fairly dramatic as a result of surface water infiltration. (Please note that while the screened interval for alluvial well MW-D does extend a few feet into the uppermost weathered bedrock, it is not screened in the unweathered bedrock like well MW-E or the bedrock monitoring wells.)

Three bedrock monitoring wells (MW-2, MW-3, and MW-4) were installed in 1997 to observe groundwater conditions in the unweathered Capistrano Formation bedrock beneath the alluvial

sediments. Bedrock groundwater typically occurs in bedrock fractures or sandstone beds. Locally, claystone strata and landslide slip surfaces that occur in the Capistrano Formation create low-permeability confining layers, beneath which groundwater is essentially trapped until penetrated by a well or a young fracture. Figure 2 depicts the geologic and groundwater conditions observed in well MW-2. Groundwater was first encountered at a depth of approximately 123 feet below ground surface, and a static level of approximately 127 feet below ground was measured on July 15, 1999. Comparison of the static water level with the adjacent creek elevation shows a difference of about 70 feet. As shown in Figure 5, the groundwater elevations in MW-2 show little response to seasonal rainfall in comparison with wells screened in alluvium.

Figure 3 depicts the geologic and groundwater conditions observed in well MW-3. This well penetrated Prima Deshecha Canada alluvium, and groundwater in these sediments was encountered at a depth of approximately 5 feet below ground surface. The alluvial sediments were cased off to allow drilling into the Capistrano Formation, and construction of a well that would not be influenced by alluvial groundwater. The bedrock below the alluvium was observed to be dry until groundwater was encountered at a depth of approximately 105 feet below the ground surface. Since April 1998, the static water level has been measured at the top of the well casing; however, the potentiometric surface is likely higher than the elevation of the well casing, but measurement is limited by the well casing height. Such artesian conditions are clear evidence that the bedrock groundwater is not in communication with the alluvial aquifer. If the two aquifers were in communication and the alluvial groundwater was supplying water to the bedrock, then the groundwater elevation in MW-3 would be equivalent to that in the alluvial aquifer. Conversely, if the two aquifers were in communication, and the confined bedrock groundwater was supplying water to the alluvium, then the sediments surrounding MW-3 would be completely saturated and the groundwater elevation in MW-3 could be no higher than the elevation of the creek (currently it is at least 8 to 10 feet higher than the creek elevation).

Figure 4 depicts the geologic and groundwater conditions observed in bedrock well MW-4. Groundwater was first encountered at a depth of approximately 90 feet below ground surface; approximately 40 feet below the deepest extent of alluvial sediments based on the geologic log for alluvial well MW-E. The static water level measured on July 15, 1999 was approximately 40 feet below ground surface, again indicating confined conditions at this location. Inspection of historical water levels in this well suggests that it responds more slowly than alluvial wells; however, the limited historical trend is similar to the alluvial wells, suggesting some communication between the two water-bearing zones may exist. The slower change in bedrock groundwater levels in response to seasonal fluctuations suggests that it is the alluvial aquifer that is recharging the bedrock groundwater.

In summary, groundwater elevation data from bedrock wells MW-2 and MW-3 provide strong evidence that the bedrock groundwater and alluvial aquifer are separate water-bearing zones; while the groundwater elevation data from well MW-4 suggest limited hydraulic connection between the two water-bearing zones. As a result, the surface water and alluvial aquifer along the Prima Deshecha Canada can be considered a "losing stream" environment where surface water is recharged primarily from seasonal precipitation. Surface water quickly infiltrates the

alluvium, and alluvial groundwater moves down the channel, gradually losing water to the underlying bedrock.

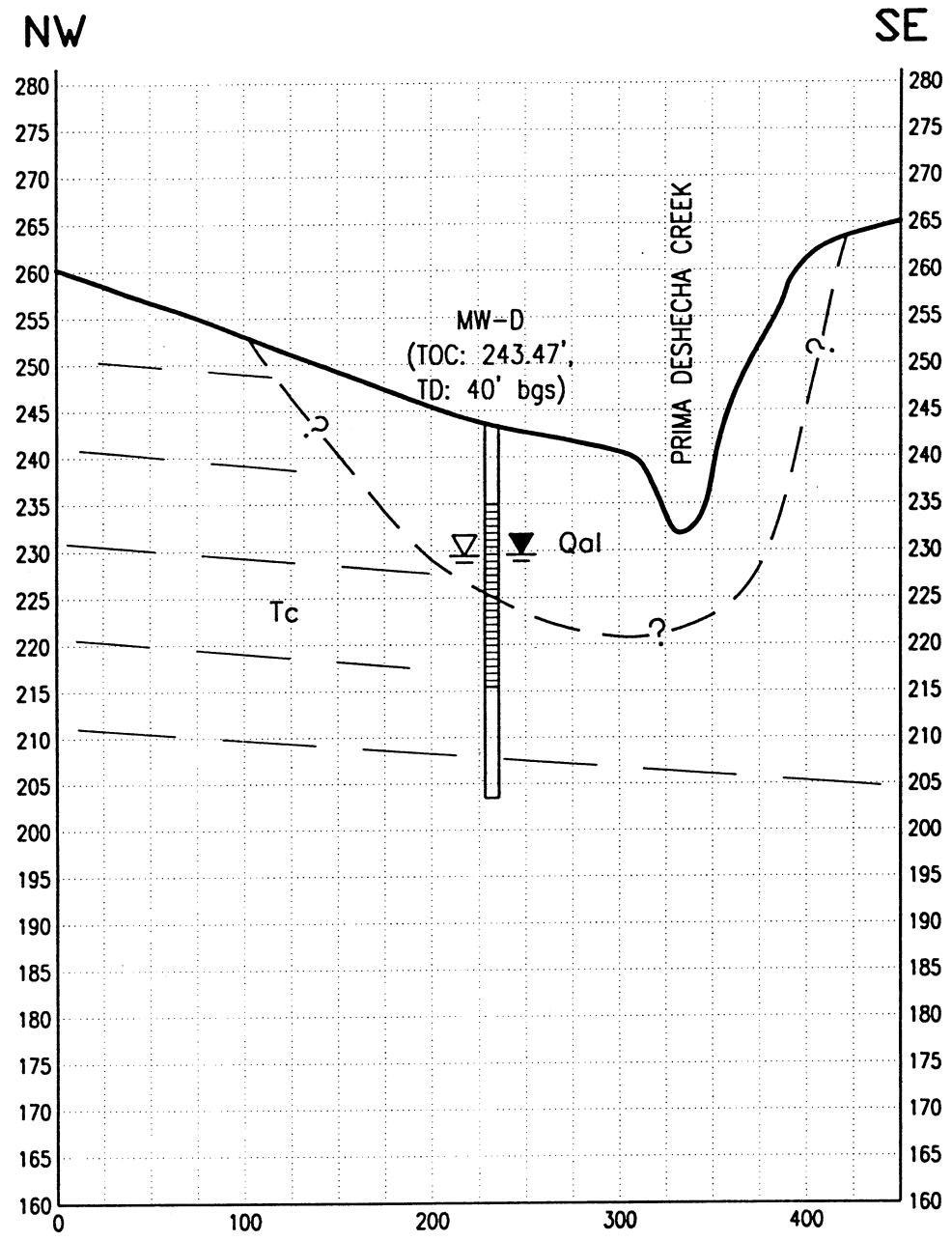
We hope that this letter is satisfactory for your purposes. Should you have any questions regarding this project or transmittal please do not hesitate to call me at (858) 451-1136 or Mr. Gary Lass at (909) 860-3448.

GeoLogic Associates

John M. Hower

John M. Hower, CEG
Project Geologist

cc: Gary Lass, GLA
Christine Arbogast, BAS



HORIZONTAL SCALE: 1"= 100'
VERTICAL SCALE: 1"= 20'

LEGEND:

Qal	ALLUVIUM
Tc	CAPISTRANO FORMATION
———	EXISTING GROUND SURFACE
– – –	GEOLOGIC CONTACT
— — —	BEDDING PLANE
▽	FIRST GROUNDWATER LEVEL (14' bgs on 3/25/86)
▼	STATIC GROUNDWATER LEVEL (13.86' bgs on 7/15/99)
▯	WELL SCREEN (8.5'-28' bgs)

FIGURE 1

REPRESENTATIVE CROSS-SECTION THROUGH MW-D AND PRIMA DESHECHA CREEK

COMPARISON OF ALLUVIAL AND BEDROCK GROUNDWATER LEVELS
PRIMA DESHECHA LANDFILL
SAN JUAN CAPISTRANO, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

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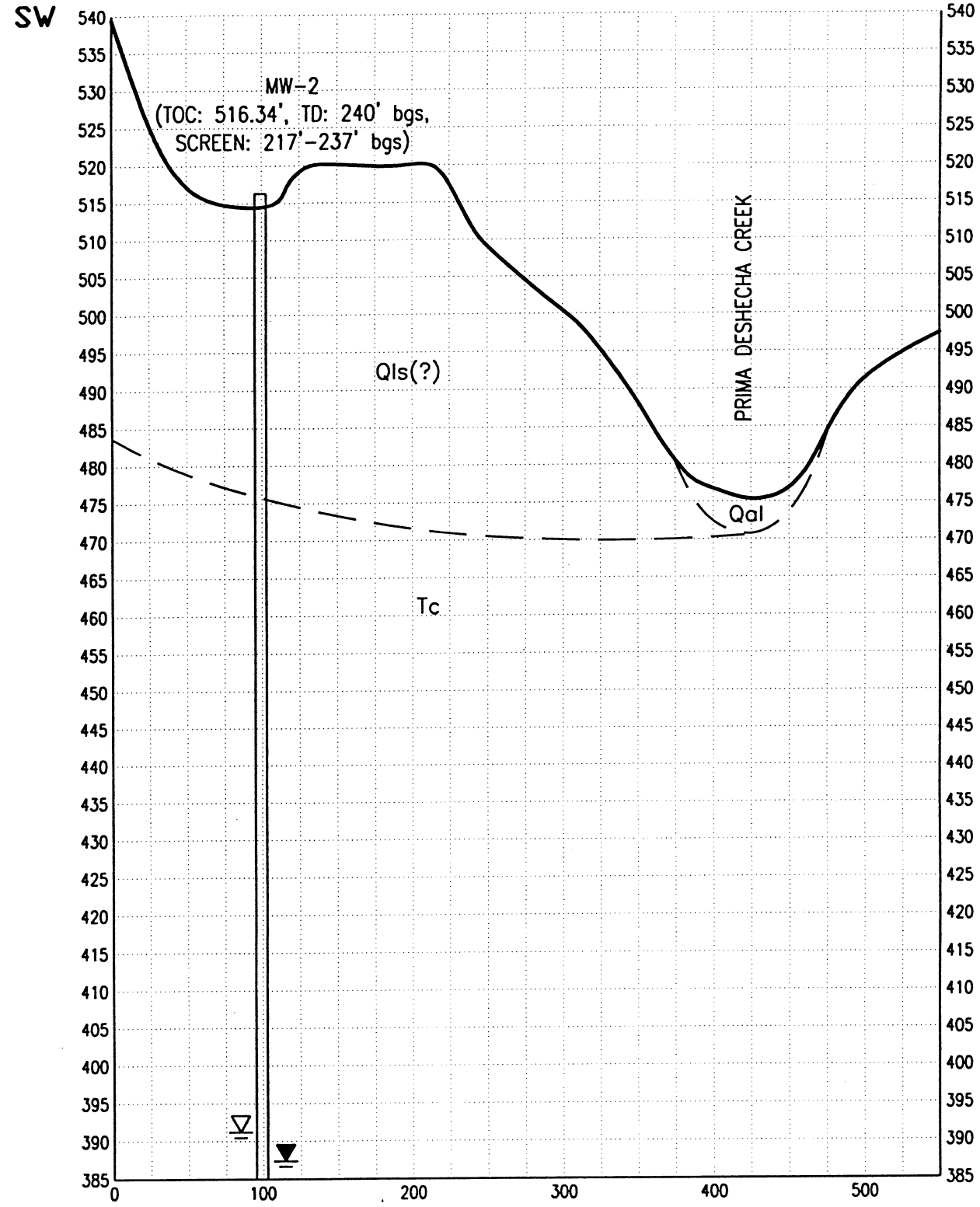

LEGEND:

Qal	ALLUVIUM
Qls	LANDSLIDE DEPOSITS
Tc	CAPISTRANO FORMATION
———	EXISTING GROUND SURFACE
— — —	GEOLOGIC CONTACT
▽	FIRST GROUNDWATER LEVEL (123.22' bgs on 4/21/97)
▼	STATIC GROUNDWATER LEVEL (127.03' bgs on 7/15/99)

HORIZONTAL SCALE: 1"= 100'
VERTICAL SCALE: 1"= 20'

FIGURE 2

REPRESENTATIVE CROSS-SECTION THROUGH MW-2 AND PRIMA DESHECHA CREEK

COMPARISON OF ALLUVIAL AND BEDROCK GROUNDWATER LEVELS
PRIMA DESHECHA LANDFILL
SAN JUAN CAPISTRANO, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

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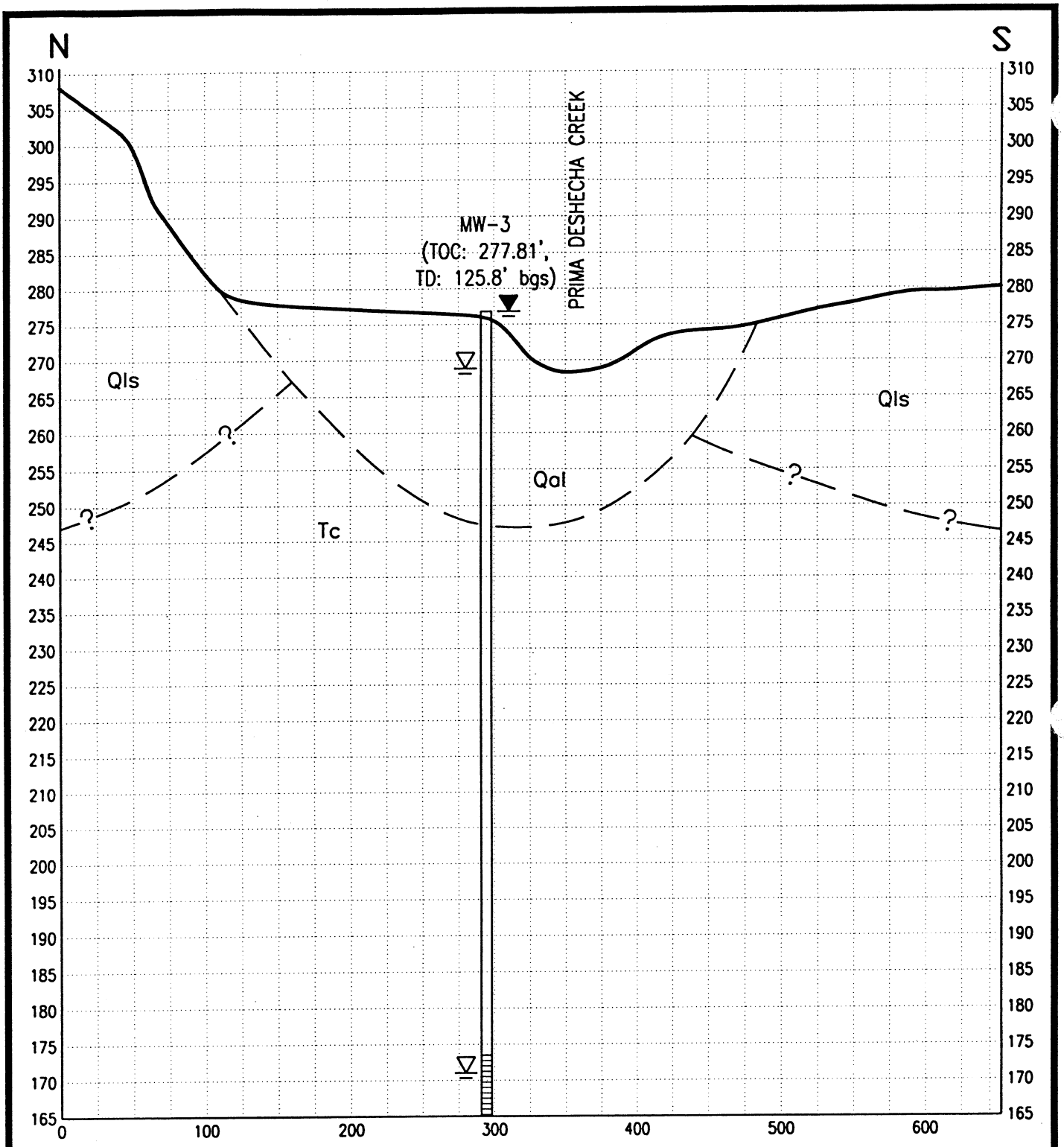

LEGEND:

HORIZONTAL SCALE: 1"= 100'
VERTICAL SCALE: 1"= 20'

Qal	ALLUVIUM
Qls	LANDSLIDE DEPOSITS
Tc	CAPISTRANO FORMATION
———	EXISTING GROUND SURFACE
— — —	GEOLOGIC CONTACT
▽	FIRST GROUNDWATER LEVEL (ALLUVIUM – 7' bgs, BEDROCK – 105' bgs on 4/24/97)
▼	STATIC GROUNDWATER LEVEL (277.81' on 7/15/99)
▯	WELL SCREEN (102.5'–125.8' bgs)

FIGURE 3

REPRESENTATIVE CROSS-SECTION THROUGH MW-3 AND PRIMA DESHECHA CREEK

COMPARISON OF ALLUVIAL AND BEDROCK GROUNDWATER LEVELS PRIMA DESHECHA LANDFILL SAN JUAN CAPISTRANO, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
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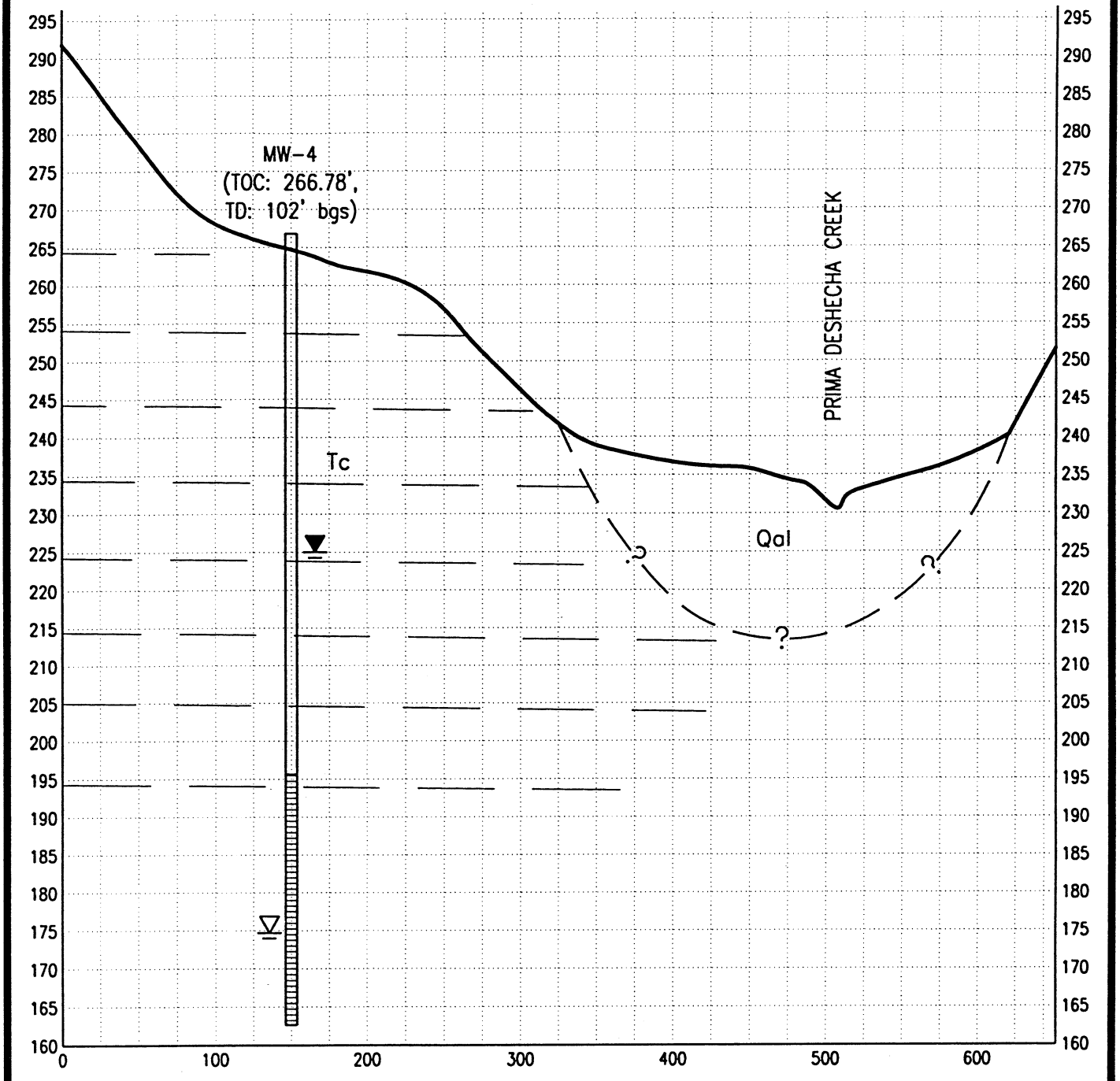

HORIZONTAL SCALE: 1"= 100'
VERTICAL SCALE: 1"= 20'

LEGEND:

Qal	ALLUVIUM
Tc	CAPISTRANO FORMATION
———	EXISTING GROUND SURFACE
– – –	GEOLOGIC CONTACT
———	BEDDING PLANE
▽	FIRST GROUNDWATER LEVEL (90' bgs on 5/23/97)
▼	STATIC GROUNDWATER LEVEL (40' bgs on 7/15/99)
▯	WELL SCREEN (67'-102' bgs)

FIGURE 4

REPRESENTATIVE CROSS-SECTION THROUGH MW-4 AND PRIMA DESHECHA CREEK

COMPARISON OF ALLUVIAL AND BEDROCK GROUNDWATER LEVELS
PRIMA DESHECHA LANDFILL
SAN JUAN CAPISTRANO, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
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FIGURE 5
HISTORICAL GROUNDWATER ELEVATIONS
GROUNDWATER MONITORING WELLS ALONG PRIMA DESHECHA CANADA

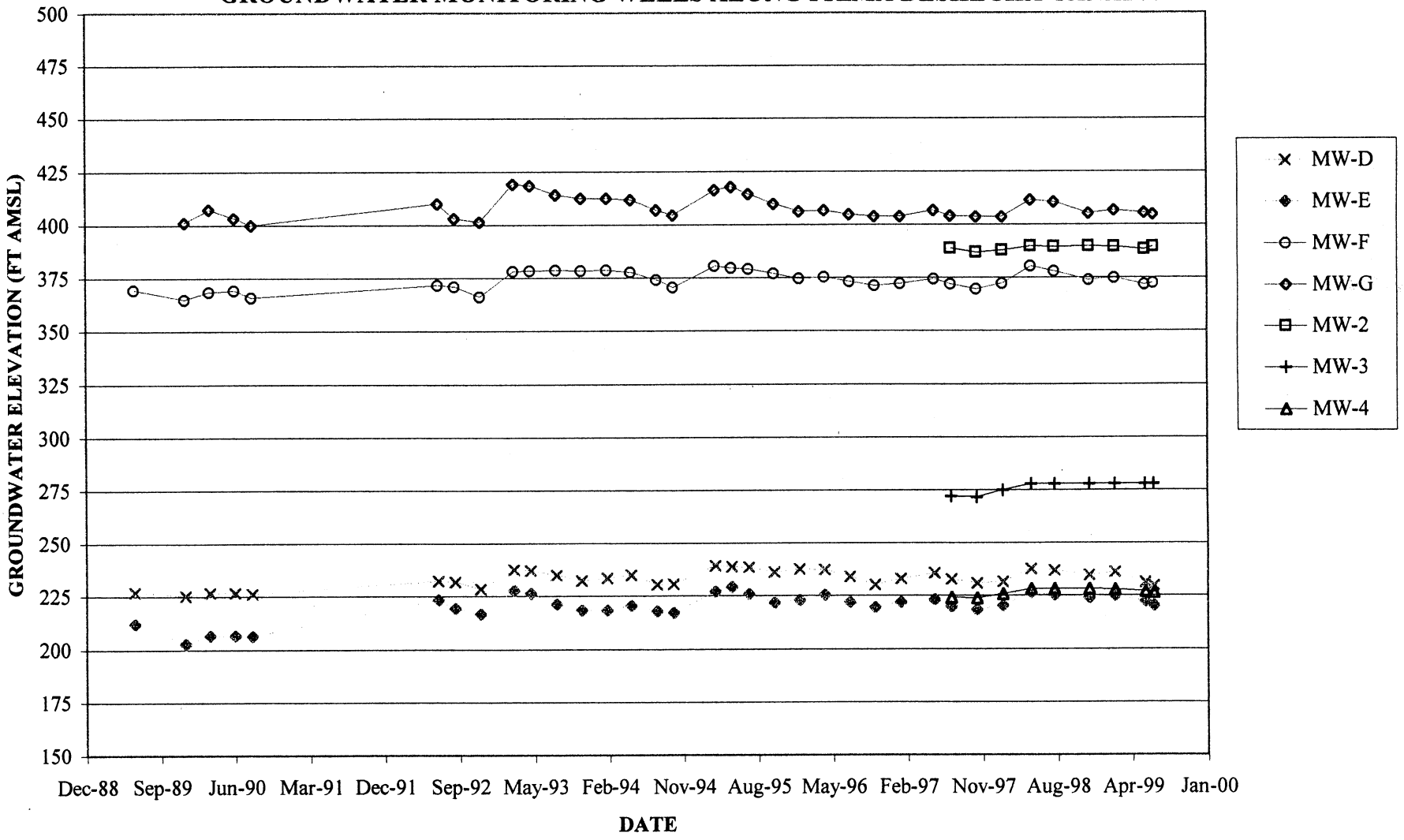

TABLE 1
SITE MONITORING WELL INFORMATION
PRIMA DESHECHA LANDFILL

WELL INFORMATION	WELL IDENTIFICATION						
	MW-D	MW-E	MW-F	MW-G	MW-2	MW-3	MW-4
Elevation of well (ft above msl):							
Top of well casing	243.47	235.32	385.86	425.30	516.34	277.81	266.78
Total depth of well (ft):	29.00	65.00	23.00	26.00	240.00	125.80	102.00
Depth of screened interval	5 - 29	10 - 65	5 - 23	4 - 26	217-237	105-125	70-100
Depth to water from top of well casing (ft):							
06/15/89	16.46	23.20	16.28	22.20	--	--	--
12/15/89	18.05	32.60	20.80	24.08	--	--	--
03/15/90	16.66	28.77	17.26	17.90	--	--	--
06/15/90	16.59	28.64	16.70	22.06	--	--	--
08/15/90	17.30	28.91	20.05	25.33	--	--	--
06/15/92	11.10	12.00	14.30	15.16	--	--	--
08/15/92	11.77	16.03	15.02	22.33	--	--	--
11/15/92	15.03	18.66	19.75	23.91	--	--	--
03/15/93	6.01	7.52	7.68	6.06	--	--	--
05/15/93	6.27	9.14	7.49	6.84	--	--	--
08/15/93	8.57	14.17	7.31	11.30	--	--	--
11/15/93	11.10	16.99	7.57	12.97	--	--	--
02/15/94	10.08	16.84	7.33	12.91	--	--	--
05/15/94	8.66	14.82	8.32	13.49	--	--	--
08/15/94	13.00	17.42	11.90	18.36	--	--	--
10/15/94	12.94	18.26	15.32	20.68	--	--	--
03/15/95	4.12	8.22	5.22	9.00	--	--	--
05/15/95	4.80	6.04	6.40	7.65	--	--	--
07/15/95	4.90	9.40	6.70	10.92	--	--	--
10/15/95	7.24	13.50	8.88	15.44	--	--	--
01/15/96	5.97	12.32	11.21	19.02	--	--	--
04/15/96	6.10	9.98	10.50	18.70	--	--	--
07/15/96	9.61	13.42	12.74	20.56	--	--	--
10/15/96	13.28	15.81	14.61	21.59	--	--	--
01/15/97	10.40	13.25	13.75	21.40	--	--	--
05/15/97	7.78	12.17	11.47	18.50	--	--	--
07/15/97	10.71	15.58	13.95	21.17	127.56	5.66	42.54
10/15/97	12.61	17.00	16.43	21.67	129.55	6.13	42.91
01/15/98	11.95	14.97	13.66	21.75	128.61	2.94	41.08
04/27/98	5.93	8.98	5.61	13.72	126.71	0.00	38.58
07/20/98	6.66	10.21	7.94	14.79	127.01	0.00	38.52
11/23/98	8.73	11.41	12.10	20.14	126.70	0.00	38.46
02/25/99	7.42	10.37	11.04	18.62	126.86	0.00	38.71
06/15/99	12.17	13.07	14.21	19.73	128.15	0.00	39.89
07/15/99	13.86	15.14	13.38	20.55	127.03	0.00	40.21

TABLE 1, Continued
SITE MONITORING WELL INFORMATION
PRIMA DESHECHA LANDFILL

WELL INFORMATION	WELL IDENTIFICATION						
	MW-D	MW-E	MW-F	MW-G	MW-2	MW-3	MW-4
Elevation of well (ft above msl):							
Top of well casing	243.47	235.32	385.86	425.30	516.34	277.81	266.78
Total depth of well (ft):	29.00	65.00	23.00	26.00	240.00	125.80	102.00
Depth of screened interval	5 - 29	10 - 65	5 - 23	4 - 26	217-237	105-125	70-100
Elevation of water surface (ft above msl):							
06/15/89	227.01	212.12	369.58	403.10	--	--	--
12/15/89	225.42	202.72	365.06	401.22	--	--	--
03/15/90	226.81	206.55	368.60	407.40	--	--	--
06/15/90	226.88	206.68	369.16	403.24	--	--	--
08/15/90	226.17	206.41	365.81	399.97	--	--	--
06/15/92	232.37	223.32	371.56	410.14	--	--	--
08/15/92	231.70	219.29	370.84	402.97	--	--	--
11/15/92	228.44	216.66	366.11	401.39	--	--	--
03/15/93	237.46	227.80	378.18	419.24	--	--	--
05/15/93	237.20	226.18	378.37	418.46	--	--	--
08/15/93	234.90	221.15	378.55	414.00	--	--	--
11/15/93	232.37	218.33	378.29	412.33	--	--	--
02/15/94	233.39	218.48	378.53	412.39	--	--	--
05/15/94	234.81	220.50	377.54	411.81	--	--	--
08/15/94	230.47	217.90	373.96	406.94	--	--	--
10/15/94	230.53	217.06	370.54	404.62	--	--	--
03/15/95	239.35	227.10	380.64	416.30	--	--	--
05/15/95	238.67	229.28	379.46	417.65	--	--	--
07/15/95	238.57	225.92	379.16	414.38	--	--	--
10/15/95	236.23	221.82	376.98	409.86	--	--	--
01/15/96	237.50	223.00	374.65	406.28	--	--	--
04/15/96	237.37	225.34	375.36	406.60	--	--	--
07/15/96	233.86	221.90	373.12	404.74	--	--	--
10/15/96	230.19	219.51	371.25	403.71	--	--	--
01/15/97	233.07	222.07	372.11	403.90	--	--	--
05/15/97	235.69	223.15	374.39	406.80	--	--	--
07/15/97	232.76	219.74	371.91	404.13	388.78	272.15	224.24
10/15/97	230.86	218.32	369.43	403.63	386.79	271.68	223.87
01/15/98	231.52	220.35	372.20	403.55	387.73	274.87	225.70
04/27/98	237.54	226.34	380.25	411.58	389.63	277.81	228.20
07/20/98	236.81	225.11	377.92	410.51	389.33	277.81	228.26
11/23/98	234.74	223.91	373.76	405.16	389.64	277.81	228.32
02/25/99	236.05	224.95	374.82	406.68	389.48	277.81	228.07
06/15/99	231.30	222.25	371.65	405.57	388.19	277.81	226.89
07/15/99	229.61	220.18	372.48	404.75	389.31	277.81	226.57
Mean Elevation	**233.07**	**220.04**	**373.78**	**407.86**	**388.76**	**276.17**	**226.68**

Notes:
-- Data not available