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GEOTECHNICAL INVESTIGATION REPORT

INTERSTATES 5 AND 805 INGERCHANGE, PROPOSED RETAINING WALLS

11-SD-5/805
KP 48.9 – 51.2 / 43.9 – 46.5

11-0301U1

April 12, 2001

Prepared for:

District 11
Office of Design

By:

ENGINEERING SERVICES
Office of Geotechnical Services
Geotechnical Section 11

1643

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design
MS 35

Date: April 12, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICES
Office of Geotechnical Services, MS#63

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Walls.

INTRODUCTION

Following your request, we conducted a geotechnical investigation for the design of several retaining walls proposed along the subject Interchange of Interstates 5and 805. This interchange is to be improved. According to your request, the improvement will involve several auxiliary lanes and new ramps and bridges that will require the construction of several retaining walls. Our investigation consisted of a site reconnaissance, office review of the existing as built plans and geologic maps, geologic mapping, subsurface investigation, engineering analysis, and the writing of this report. Along with your request, we have received from you the proposed structures layout sheets (in scale of 1:500) and cross sections that were used in our fieldwork, engineering analyses, and for report purposes.

PROJECT LOCATION

For the project location and its limits, reference is directed to Figure 1, Project Location. The project site is located in San Diego County, San Diego, California. Along Interstate 805 (I-805) it starts from about 0.9 km north of the Sorrento Valley Boulevard Undercrossing (Station 456+30) and continues north to the merge with Interstate 5 (I-5). Along I-5 it begins at about 0.5 km north of the Genesee Avenue Overcrossing (Station 512+20), continues through the merge with I-805, and ends about 0.7 km south of the Del Mar Heights Road Overcrossing (Station 574+14).

GENERAL

Table 1 on the following page lists the proposed Type 1 retaining walls and indicates their stations limits and maximum heights. For detailed locations of the proposed structures,

reference is directed to Figures 2-3A through 2-569.

Table 1

WALL NUMBER	BEGIN STATION	END STATION	STATION LINE	MAXIMUM HEIGHT (m)
3A	2+38.5	2+71.3	CMR	4.42
6	2+00.1	2+09	CMR	1.84
456	456+33	465+22.8	A	5.45
466	466+34	466+89	NT805	3.05
470	470+47	471+68.5	NT805	9.73
512	512+20	514+07	SD	6.91
516	515+13.5	493+37	R-2M	3.35
527	526+91.6	529+60	SB	4.33
543B	540+85	544+02.1	SB	4.20
543A	10+00	12+23.4	Begin: CM3 End: CMR	4.31
544	543+00	545+00	NB	2.77
545A	544+61	546+60	CM4	4.05
545B	10+00	546+38.6	Begin:545B End: CM4	5.62
545C	544+66.1	457+18	SB	4.80
546	545+56.1	546+50	NB	2.79
565	564+10	566+36.9	SD	1.75
569	567+20	574+13.6	SD	6.46

GEOLOGY

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The coastal plain generally consists of subdued landforms underlain by Cenozoic sedimentary formations.

The project area is generally underlain by two principal rock units: a Mesozoic igneous and metamorphic rock basement and superjacent late Cretaceous, Eocene, Pliocene, Pleistocene, and Holocene sedimentary succession of strata. The basement is composed of Upper Jurassic Santiago Peak Volcanics and mid-Cretaceous granitic rocks of the Southern California Batholith. The post-batholith superjacent sedimentary succession includes Upper Cretaceous Rosario Group, Eocene La Jolla and Poway Groups, Pliocene and Pleistocene San Diego, Lindavista, and Bay Point Formations. Holocene is represented by alluvium, slope wash, landslide, and stream, terrace, and beach deposits. In addition, artificially compacted fill was placed in some areas (Kennedy and Peterson, 1975).

The project alignment lies predominately within Soledad Valley, a tidal marsh with a shallow estuary of Penasquitos Lagoon. To the southeast it extends into the Carroll Canyon valley and to the south it ascends into La Jolla mesa. The project area is underlain by the sedimentary succession of strata. The sediments include Delmar Formation, Torrey Sandstone, Ardath Shale, and Scripps Formation of the La Jolla Group. The post-Eocene deposits include Bay Point Formation, alluvium, and artificially compacted fill. The Delmar Formation typically comprises yellowish-green sandy claystone interbedded with gray coarse-grained sandstone. The Torrey Sandstone is composed of arkosic sandstone, which is white to light brown, medium to coarse grained, subangular, and moderately well indurated. The Ardath Shale comprises predominantly of weakly fissile, olive-gray shale with concretion beds. Bedding of the unit dips generally east to southeast at a shallow angle of 3 to 5 degrees. Expansive claystone locally comprises 25 percent of the Ardath Shale and landslides are commonly associated with these areas. The Scripps Formation typically consists of pale yellowish-brown, medium grained sandstone, often silty or clayey, and occasional cobble-conglomerate interbeds. The Bay Point Formation is composed mostly of marine and nonmarine, poorly consolidated, fine and medium grained, pale brown sand and/or sandstone. The marine part of the formation is fossiliferous and consolidated. It interfingers with unfossiliferous sandstone that lies generally above it, more than 30 m but less than 60 m above the sea level. This part of the Bay Point Formation is considered a nonmarine slope wash. Alluvium consists primarily of poorly consolidated stream deposits of silt (often clayey), sand, and cobble-sized particles derived from bedrock sources that lie within or near the area. These materials were derived as slope wash or were transported and deposited by Penasquitos Creek and its tributaries of Carroll Canyon and Carmel Valley drainages. Alluvium soils are generally considered moderately to highly compressible, and, where granular, subject to liquefaction during a major seismic event. Artificial fill consists of compacted earth materials derived from local sources.

SEISMICITY

No known Holocene fault exists within the project area. However, several secondary faults related to the active Rose Canyon Fault Zone were mapped along the project alignment. These faults, Carmel Valley, Torrey Pines, Salk and a few more unnamed, are currently believed to be pre-Holocene, though no direct evidence supports this fact (Kennedy and Peterson, 1975). The Carmel Valley Fault, the largest of them, offsets Pleistocene sediments of the Bay Point Formation and, therefore, is considered potentially active. Thus, a probability of minor surface rupture along this fault exists.

The nearest known active fault is the Rose Canyon Fault Zone believed to be capable of producing an earthquake with a Maximum Credible Magnitude of 7.0 on the Richter scale. It is located about 5.5 km south and west from the project site. The La Nacion Fault is located about 20 kilometers southeast from the southern end of the project limits, and it is capable of producing an earthquake with a Maximum Credible Magnitude of 6.75 on the Richter scale. In addition, the Elsinore Fault lies about 41 km northeast from the project limits; it is capable of producing an earthquake with a Maximum Credible Magnitude of 7.5 on the Richter scale. All three aforementioned faults are believed to be capable of generating a Peak Ground Acceleration of about 0.5 g at the project site (Mulchin and Jones, 1990).

LIQUEFACTION

Liquefaction, a sudden large decrease of shearing resistance of a cohesionless soil, can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose granular soils that are saturated by a relatively shallow groundwater table are most susceptible to liquefaction and dynamic settlement. Liquefaction is generally known to occur in saturated or near-saturated cohesionless materials at depth shallower than about 30 m. Dynamic settlement, however, can occur in both dry and wet sands at greater depths.

Liquefaction potential during a seismic event on the Rose Canyon Fault is the greatest seismic-related threat to the project. It could initiate settlement of fill embankments especially if these embankments were placed on alluvial soils. Liquefaction could also trigger structural failure. Our evaluation of subsurface conditions along the project alignment indicates that at three proposed retaining wall locations, namely 466, 470, and 527 liquefaction could potentially occur. This is because the Holocene and older Quaternary alluvial soils at those sites are predominantly composed of loose to medium dense sand and silty sand. In addition, the ground water table at those locations is relatively shallow. The liquefaction potential along the alignment of Retaining Wall 470 was evaluated by our office in 1997 and determined to be high (Yazdani, 1997). It was then mitigated by a private developer who installed vibro-replacement stone columns (Hoobs and Askew, 2000). The liquefaction potential along the alignment of Retaining Wall 527, was evaluated using the computer program Liquefy2, and was determined to be moderate. The liquefaction potential along the alignment of Retaining Wall 466, which was based on our subsurface investigation data (borings 466-B1, and 466-B2),

was determined to be low due to the predominately clayey nature of the subsurface soils at this location.

FIELD INVESTIGATION

Our field surface investigations consisted of, several site inspections, photo-documentation, and limited geologic 1:500-scale mapping at the locations of the proposed retaining walls. It was conducted mainly in conjunction with the subsurface investigation program that was implemented in 1999. The results of field mapping are presented on Figures 2-3A through 2-569. For photographs of the locations of the proposed structures, reference is directed to Attachment 4, Photos.

The subsurface investigation program consisted of advancing several borings, utilizing Mud Rotary and Coring drilling methods, to depths ranging from 2.4 m to 26.0 m below the ground surface. Boring locations are shown on Figures 2-3A through 2-569. In addition, for this project, we utilized several borings from our 1996 exploration program related to the planed improvements along the project alignment. During the drilling, Standard Penetration Tests (SPT) were performed at selected depth intervals. The SPT tests were performed by dropping a 63.5 kg hammer from a height of 0.762 m on the split-spoon sampler. The 36 mm inside diameter sampler was driven a maximum of 45.7 cm into the soils and the number of blows recorded for each 0.152 m consecutive interval. The value of blows per 0.305 m interval recorded in the boring logs represents the accumulated number of blows that were required to drive the sampler through the last 0.305 m interval into the soils. The recorded SPT values are field values and have not been corrected for overburden pressure. Based on correlation relating SPT blow counts to the relative density of cohesionless soil and the consistency of cohesive soil, the appropriate descriptions of relative density and consistency are indicated on the boring logs presented in Attachment 1, Logs of Borings.

Groundwater was encountered in borings 466-B1 and 466-B2 and its level was recorded on the boring logs. In addition, groundwater conditions exists at the locations of the proposed Walls 470 and 527. Seepage and perched water conditions could have existed in some of our borings, but they could not be detected due to the 'wet' drilling method used. However, seepage water was detected in borings 543-B1 and 543-B2. Groundwater conditions where encountered are discussed further as appropriate in later sections of this report.

For the boring locations, reference is directed to Figures 2-3A through 2-569. Our borings were drilled as close as possible to the alignments of the walls. It should be noted, however, that factors such as drill rig accessibility, job safety, and the presence of underground utilities have often precluded us from locating borings at the desired locations along the alignment of the proposed structures.

At locations where the overall stability of the slope to be retained was of concern, we performed slope stability analyses using the STEDwin 2.5 computer program utilizing cross

sections of the proposed slope configurations provided by your office. The slope stability analyses are presented in Attachments 2 and 3.

SITE CONSIDERATIONS, SUBSURFACE SOIL CONDITIONS, AND FOUNDATION RECOMENDATIONS

During the construction of the subject freeway intervals in the mid 60's, the native soils above the freeway grade were cut as either a through cut or side (hill) cut, and the areas below the grade were built up as fill embankments. Also, depending on topography, offramps, onramps, approach, and departure embankments were either cut into the existing native soils or built up as fills. Fill materials generally originated from the nearby native soils cuts. During the grading of the freeway, fill materials were placed and compacted to 90 % Relative Compaction in accordance with CTM 216. In addition, at locations where creeks or drainage courses crossed the freeway alignment, culverts were installed, running typically from east to west.

During our geotechnical investigation, we generally encountered five geotechnical units that underlay the alignment of the proposed retaining walls: artificial fill materials, alluvium, Bay Point Formation, Ardath Shale, and Torrey Sandstone. In addition, in Borings 543-896-6, 543-896-7, and 543-896-8 the Delmar Formation was encountered during the exploration conducted in 1996. However, this formation was encountered at a depth of about 22 m below the elevation of the footing of the proposed Wall 543. Thus, the Delmar Formation, from a geotechnical engineering standpoint, is deemed to be irrelevant.

Based on our subsurface and surface investigation, and the review of previous investigation reports that were performed by Caltrans and various consultants (Yazdani, 1995; Woodward-Clyde, 1993; Leighton & Associates, 1992; Ninyo & Moore, 1996 and 1990), we have established generalized soils parameters that were used in our foundation analyses. The foundation analyses were based on procedures outlined in the FHWA manual (Cheney and Chassie, 1993). Table 2 below lists the pertinent geologic units and their geotechnical parameters.Since alluvial soils were deemed to be unsuitable for foundation support, their parameters were not included in Table 2.

Table 2

GEOTECHNICAL UNIT	COHESION (Kpa)	ANGLE OF INTERNAL FRICTION (degree)	MAXIMUM DRY DENSITY (KN/m^3)
Ardath Shale	14.3	28	18.9
Torrey Sandstone	9.6	33	18.9
Bay Point Formation	24.0	38	19.6
Existing Fill	9.6	32	18.9
Structural Fill/Backfill	9.6	36	18.9

It should be noted that the Ardath Shale, at some locations has been mapped as a bedded unit. Its bedding dips generally east and southeast at a shallow angle ranging from 3 to 5 degrees (Kennedy and Peterson, 1975).

Geotechnical parameters for fill materials were arrived at based on the strength tests on remolded samples of the native formations that were most likely used during the construction of the freeway embankments. The relationship of fill materials to those native soils was confirmed by field index tests performed during our subsurface investigating program.

Several culverts cross under the alignment of the proposed retaining walls. The Caltrans Hydraulics unit should evaluate whether the proposed retaining walls will have any impact on these drainage structures.

Retaining Wall 456

Site Considerations

For the location of the proposed Retaining Wall 456 (Table 1) reference is directed to Figure 2-456. Wall 456 will be about 900 m long and 5.45 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 456+33 to 465+22.8, it will parallel northward the eastern shoulder of the northbound I-805. Along this interval the existing cut slope is southwest-facing, about 9.0 m high (maximum), and inclined at 1:2 vertical to horizontal (V:H) (Attachment 4, Photos 1 through 3). It is our understanding that the proposed wall is to retain planned cuts in the aforementioned slope in order to widen the northbound I-805. Several CMP culverts, running from northeast to southwest, cross under the freeway at Stations: 457+10, 459+52, 461+15, 462+85, and 464+60. A high-voltage electrical overhead line crosses the freeway at about Station 457+52.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 456-B1 through 456-B8) revealed that the proposed wall alignment is underlain by native soils of the Ardath Shale. This section of northbound I-805 was constructed as a side cut of the southwest-facing slope. The cut resulted in the exposing of the Ardath Shale on the face of a cut slope and roadway section of the freeway. The Ardath Shale unit consists of a laminated, often fissile, siltstone that locally is gravelly or grades to silty sand, claystone, or sandstone. Their relative consistency, based on SPT blow counts, was determined to be hard. In all eight borings, the Ardath Shale soils were encountered to the maximum depth of exploration. The lowest elevation (about 17.0 m) at which native soils were encountered was at Boring 456-B7. At the time of our investigations, no seepage or spring were observed on the face of the cuts.

Foundation Recommendations

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of Wall 456 are suitable for the design and construction of the proposed maximum 5.45 m high Type 1 retaining wall supported on a spread footing. Based on layouts and cross sections of the proposed wall supplied by your office, and the results of our subsurface investigations, it is our recommendation that the Standard Plan Retaining Wall Type 1 design be used for Wall 456.

Retaining Wall 466

Site Considerations

For the location of the proposed Retaining Wall 466, (Table 1) reference is directed to Figure 2-466. Wall 466 will be about 55 m long and 3.05 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 456+34 to 466+89, it will parallel to the northwest the eastern shoulder of northbound I-805. This interval represents an approach embankment to the Sorrento Valley Boulevard undercrossing. The maximum height of the embankment (fill) of about 7.0 m is at the bridge abutment. Along this interval, the northeast-facing embankment slope descends at a general inclination of 1:3 (V:H) (Attachment 4, Photos 4 and 5). It is our understanding that the subject approach embankment is to be widened to accommodate additional lanes. The widening will involve placing of fill on the existing embankment slope and retaining it with the proposed Wall 466. The footing of the new wall is to be embedded in new fill materials. Two CMP culverts cross under the freeway at Stations 466+38 and 466+70.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 466-B1 and 466-B2) revealed that the approach embankment consists of fill materials that are underlain by native alluvial soils. It is estimated that along the proposed wall alignment the fill and alluvial interface is at an elevation of about 11.0 m. We did not explore the fill materials. Our surface mapping and a review of pertinent archived data, however, suggest that the approach embankment was built using materials from cuts in the nearby native formations. The alluvium consists of silty and clayey sand, sand, and sandy clay. Based on SPT blow counts, the relative density of granular soils was determined to range from very loose to loose. The relative consistency of cohesive soils was found to range from very soft to stiff. In both borings, alluvium was encountered to the maximum depth of exploration. The lowest elevation (about –5.0 m) at which alluvial soils were encountered was at Boring 466-B2. Groundwater was encountered at an elevation of about 8.9 m. It should be noted that the proposed wall footing will be supported on fill materials that have not yet been placed. Fill materials should be selected such that the shear strength parameters of the compacted fill will conform to the strength parameters indicated in Table 2.

As indicated above, the underlying alluvial soils are partially comprised of silty and clayey sands. Some of these materials are of low relative density and are present below the groundwater table. During a seismic event these materials could potentially liquefy and cause damage to the wall. The risk level of liquefaction, however, is no greater than that for the existing freeway facilities and any improvements located outside the State Right of Way. Extreme liquefaction mitigation measures such as the use of vibro-compaction or selection of an alternate foundation system such as a deep pile foundation are probably unwarranted given the high costs associated with such measures. For example, if vibro-compaction were used to mitigate liquefaction, the costs associated with this technique would be on the order of about seven hundred thousand dollars. An additional consideration is the relatively low height of the wall (3.05 m maximum). In view of these factors, it is our recommendation that the wall be supported on spread footings bearing on well-compacted embankment fill.

Foundation Recommendations

The subject retaining wall site is underlain by fill over highly compressible sandy and clayey alluvial soils. These materials will be subjected to both elastic and time dependant settlements upon application of fill loads. If the wall were constructed before these time dependant settlements were allowed to occur, the wall could be potentially subjected to large total and differential settlements. Total settlements are estimated to be on the order of about 200 mm. Accordingly, we recommend that the embankment fills be placed and the alluvial soils and existing embankment fill be allowed to consolidate prior to the construction of the wall. The placement of fill should be conducted in accordance with the Standard Specifications and include benching into the existing fill slope. This recommendation is depicted in Figure 19, Wall 466: Typical Surcharge Section. We estimate a time interval of 6 to 9 months for 90% consolidation to be completed. This time interval may be expedited by the use of wick drains. If wick drains are installed at 2 m spacing, the time interval could be reduced to about 60 days.

A settlement monitoring program should be implemented in order to determine whether settlements of the embankment have stabilized prior to wall construction. Settlement platforms should be monitored on a weekly basis after installation and discontinued after at least four consecutive readings indicate that settlements have stabilized.

From a geotechnical engineering standpoint, based on the cross sections of the proposed wall supplied by your office, the results of our subsurface investigations, and on the assumption that the embankment fills will be placed prior to wall construction as recommended above, the Standard Plan Retaining Wall Type 1 design may be used for Wall 466. In addition, Caltrans Hydraulics unit should be contacted to evaluate whether our proposed surcharge recommendations and construction of the new embankment slope will have any impact on the existing culverts.

Retaining Wall 470

Site Considerations

For the location of the proposed Retaining Wall 470, (Table 1) reference is directed to Figure 2-470. Wall 470 will be about 121.5 m long and 9.73 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 470+47 to 471+68.5, it will parallel to the north the base of the east-facing fill embankment of the northbound I-5. This interval represents a departure embankment from the Los Penasquitos Creek Bridge. The maximum height of the embankment (fill), of about 13.5 m is at the bridge abutment. The east-facing embankment slope descends at an general inclination of 1:2 vertical to horizontal (V:H) (Attachment 2, Photo 6 and 25). It is our understanding that the subject departure embankment is to be widened to accommodate additional lanes. The widening will involve placing of fill on the existing embankment slope and retaining it with the proposed Wall 470.

In addition, Wall 470 alignment will be located on the western perimeter of Vista Sorrento Parkway that is a part of the Torrey Reserve Heights development. Following an agreement between Caltrans and the private developer, an island of stone columns was placed at the base of the embankment slope towards the east. This measure, along with a surcharge program to be implemented by the developer, was to mitigate liquefaction and preclude excessive settlements of Wall 470 and the road improvements planned by the developer. Originally, Wall 470 was to be supported on a spread footing embedded in well-compacted fill placed over the island of stone columns. While the wall will still be located west of the proposed Vista Sorrento Parkway, its location has been moved to the west such that it will no longer be within the footprint of the stone column grid. This change has made it necessary to support the wall on a pile foundation.

Subsurface Soil Conditions

Our recent surface mapping and subsurface investigations conducted in 1996 (Borings 470-6101, 470-6102, 470-6103, and 470-6104) revealed that the existing embankment consists of fill materials that are underlain by native alluvial soils of Soledad Valley. It is estimated that along the proposed wall alignment the fill and alluvium interface is at an elevation of about 9.0 m. We did not explore the fill materials. Our surface mapping and a review of pertinent archived data, however, suggest that the embankment was built using predominantly granular materials from cuts in the nearby native formations. The alluvium consists of sand, silty and clayey sand, sandy silt, and silty and sandy clay. Based on SPT blow counts, the relative density of granular soils was determined to range from loose to medium dense. The relative consistency of cohesive soils was found to range from firm to stiff. Based on SPT blow counts, the alluvium is underlain by very dense gravels and cobbles within a sandy matrix that, in turn, are underlain by the sedimentary Ardath Shale Formation. Both, the dense gravels and Ardath Shale geologic unit are, from the geotechnical standpoint, considered to be competent bedrock.

The alluvium and bedrock interface, based on logs of borings, slopes gently south along the Wall 470 alignment. At the location of Boring 470-6104 (Station 471+54.5), it was logged at an elevation of about –6.0 m. At the location of Boring 470-6102 (Station 471+27), it was logged at an elevation of about –7.2 m. At the location of Boring 470-6101 (Station 470+70), it was logged at an elevation of about -9.0 m. Groundwater was encountered at an elevation of 7.2 m.

Foundation Recommendations

The proposed retaining wall should be supported on a CIDH pile foundation extending into competent bedrock. Approximate elevations of the bedrock are shown on Figure 21, Wall 470: Cross Section A—A'.

Construction considerations for installation of the CIDH piles include the presence of shallow groundwater and the possibility of caving loose soils. Casing may be required during installation of the piles. Additionally, due to the proximity of the island of stone columns to the wall, some drilling difficulties may be encountered in gravel backfill.

The retaining wall foundation will be subjected to negligible settlements as a result of it being supported on competent bedrock. The embankment behind the wall will, however, be subjected to large settlements (200 mm to 300 mm). Therefore, it is imperative that after construction of the embankment, a waiting period of 6 to 9 months be incorporated into the plans and specifications to allow for the settlements to occur prior to construction of the pavement section, drainage facilities and any other improvements. The embankment should be constructed prior to installation of the pile foundation in order to minimize any downdrag effect on the piles.

Retaining Wall 512

Site Considerations

For the location of the proposed Retaining Wall 512 (Table 1) reference is directed to Figure 2-512. Wall 512 will be about 187 m long and 6.91 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 512+20 to 514+07, it will parallel northward the eastern shoulder of the northbound I-5. Along this interval the existing cut slope is west-facing, about 31.0 m high (maximum), and inclined at 1:1.5 (V:H) (Attachment 2, Photos 7 and 8). It is our understanding that the proposed wall will retain planned cuts in the aforementioned slope in order to widen the northbound I-5.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 512-B1 and 512-B2)

revealed that the proposed wall alignment is underlain by native soils of the Ardath Shale. This section of the northbound I-805 was constructed as a side cut of the west-facing slope. The cut resulted in the exposing of the Ardath Shale formation on the face of a slope and roadway section of the freeway. The Ardath Shale unit consists of a laminated, often fissile, siltstone, that locally is gravelly, indurated, or grades to claystone. Their relative consistency, based on SPT blow counts, was determined to be hard. In both borings, the Ardath Shale soils were encountered to the maximum depth of exploration. The lowest elevation (about 49.4 m) at which native soils were encountered was at boring 512-B2. At the time of our investigations, no seepage or spring was observed on the face of the cuts.

Foundation Recommendations

From a geotechnical standpoint, the subsurface conditions along the alignment of Wall 512 are suitable for the design and construction of the proposed maximum 6.9 m high Type 1 retaining wall supported on a spread footing. Based on layouts and cross sections of the proposed wall supplied by your office, and the results of our subsurface investigations, it is our recommendation that the Standard Plan Retaining Wall Type 1 design be used for Wall 512.

Retaining Wall 516

Site Considerations

For the location of the proposed Retaining Wall 516 (Table 1) reference is directed to Figure 2-516. Wall 516 will be about 110 m long and 3.35 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 515+13.5 to 493+37 (R-2M Line), it will parallel northward the eastern shoulder of the northbound I-5. Along this interval the existing cut slope is west-facing, about 30.0 m high (maximum), and inclined at 1:1.5 (V:H) (Attachment 2, Photos 9 and 10). It is our understanding that the proposed wall is to retain planned cuts in the aforementioned slope in order to widen northbound I-5.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 516-B1 and 516-B2) revealed that the proposed wall alignment is underlain by native soils of the Ardath Shale. This section of the northbound I-5 was constructed as a side cut of the west-facing slope. The cut resulted in the exposing of the Ardath Shale formation on the slope face and roadway section of the freeway. The Ardath Shale unit consists of laminated siltstone that locally grades to claystone. Its relative consistency, based on SPT blow counts, was determined to be hard. In both borings, the Ardath Shale soils were encountered to the maximum depth of exploration. The lowest elevation (about 42.5 m) at which native soils were encountered was at Boring 516-B2. At the time of our investigations, no seepage or spring was observed on the face of the cuts.

Foundation Recommendations

From a geotechnical standpoint, the subsurface conditions along the alignment of Wall 516 are suitable for the design and construction of the proposed maximum 3.35 m high Type 1 retaining wall supported on a spread footing. Based on layouts and cross sections of the proposed wall supplied by your office, and the results of our subsurface investigations, it is our recommendation that the Standard Plan Retaining Wall Type 1 design be used for Wall 516.

Retaining Wall 527

Site Considerations

For the location of the proposed Retaining Wall 527, (Table 1) reference is directed to Figure 2-527. Wall 527 will be about 268.4 m long and 4.33 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 529+60 to 526+91.6, it will parallel to the south the western shoulder of southbound I-5. This interval represents an approach embankment to the Los Penasquitos Creek Bridge. The maximum height of the embankment (fill), of about 9.0 m is at the bridge northern abutment. The west-facing embankment slope descends at an general inclination of 1:2 (V:H) (Attachment 2, Photos 11 and 12). It is our understanding that the subject approach embankment is to be widened to accommodate additional lanes. The widening will involve the placement of fill on the existing embankment slope and alluvial soils to the west of the embankment toe and retaining the fills with the proposed Wall 527. The footing of the new wall is to be embedded in new fill materials. The alignment of the proposed wall lies at about the base of the approach embankment, along the existing concrete brow ditch. A RCP culvert crosses under the freeway at Station 529+10.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 527-B1 through 527-B3, drilled in 1999, and Borings 527-61015, 527-6109, and 527-6108 drilled in 1996) revealed that the approach embankment consists of fill materials that are underlain by native alluvial soils. The alluvial soils extend west and south from the base of the embankment and are underlain by the Bay Point Formation. The fill and alluvium interface was mapped at about Station 529+80 where it dips south at a low angle. In addition, at about the same station, the interface between the Bay Point Formation and alluvium was also mapped. This interface dips south at a low angle as well. The fill and alluvium interface was estimated to be at an elevation of about 8.5 m. Fill consists of layers of siltstone, sandy and silty clay, sandy gravel, and sand. The relative density of its granular components, based on SPT blow counts was estimated to be medium dense. The relative consistency of the fill cohesive components, based on the same criterion, was estimated to be firm to hard. The alluvium consists of sandy and silty clay (locally

organic), silt, and clayey and silty sand. Based on SPT blow counts, the relative consistency of its cohesive soils was found to range from firm to very stiff. The relative density of granular soils was determined to range from loose to medium dense. In Borings 527-6109 and 527-6108, alluvium was encountered to an elevation of about –11.0 m. Groundwater was encountered at an elevation of about 0.6 m. It should be noted that the proposed wall footing will be supported on fill materials that have not yet been placed. Fill materials (structural backfill) should be selected such that the shear strength parameters of the compacted fill will conform to the strength parameters indicated in Table 2.

As indicated above, the underlying alluvial soils are partially comprised of silty and clayey sands. Some of these materials are of low relative density and are present below the groundwater table. During a seismic event these materials could potentially liquefy and cause damage to the wall. The risk level of liquefaction, however, is no greater that that for the existing freeway facilities and any improvements located outside the State Right of Way. Extreme liquefaction mitigation measures such as the use of vibro-compaction or selection of an alternate foundation system such as a deep pile foundation are probably unwarranted given the high costs associated with such measures. For example, if vibro-compaction were used to mitigate liquefaction, the costs associated with this technique would be on the order of about one million dollars. An additional consideration is the relatively low height of the wall (4.33 m maximum). In view of these factors, it is our recommendation that the wall be supported on spread footings bearing on well-compacted embankment fill.

Foundation Recommendations

The subject retaining wall site is underlain by fill over highly compressible clayey and silty alluvial soils. These materials will be subjected to both elastic and time dependant settlements upon application of fill loads. Total settlements are estimated to be on the order of about 300 mm. If the wall were constructed before these time dependant settlements were allowed to occur, the wall could be potentially subjected to large total and differential settlements. Accordingly, we recommend that the embankment fills be placed and the alluvial soils and existing embankment fill be allowed to consolidate prior to the construction of the wall. The placement of fill should be conducted in accordance with the Standard Specifications and include benching into the existing fill slope. This recommendation is depicted in Figure 20, Wall 527: Typical Surcharge Section. We estimate a time interval of 6 to 9 months for 90% consolidation to be completed. This time interval may be expedited by the use of wick drains. If wick drains are installed at 2 m spacing, the time interval could be reduced to about 60 days.

A settlement monitoring program should be implemented in order to determine whether settlements of the embankment have stabilized prior to wall construction. Settlement platforms should be monitored on a weekly basis after installation and discontinued after at least four consecutive readings indicate that settlements have stabilized.

From the geotechnical engineering standpoint, based on the cross sections of the

proposed wall supplied by your office, the results of our subsurface investigations, and the assumption that the embankment fills will be placed prior to wall construction as recommended above, the Standard Plan Retaining Wall Type 1 design may be used for Wall 527. In addition, Caltrans Hydraulics unit should evaluate whether our proposed surcharge recommendations and construction of the new embankment slope will have any impact on the existing culvert.

Retaining Walls 543A and 543B

Site Considerations

For the location of the proposed Retaining Walls 543A and 543B, (Table 1) reference is directed to Figure 2-543. Wall 543B will be about 317 m long and 4.20 m in maximum height. Wall 534A will be about 223.4 m long and 4.31 m in maximum height. Both are proposed to be Type1 standard retaining walls supported on a spread footing foundation. From Station 544+02.1 to 540+85, Wall 543B will parallel southward the west-facing embankment slope of southbound I-5. From Station 544+03 to 541+96 "SD" Line, Wall 543A will parallel southward the aforementioned embankment slope. From Station 544+03 "SD" Line through Station 12+23.4 CMR Line, Wall 543A will run eastward, parallel to Carmel Mountain Road. Along the entire interval, the existing embankment fill slope is about 26.0 m in maximum height, and inclined at 1:2 (V:H) (see Attachment 2, Photos 13 and 14). The alignment of the Wall 543B footing lies at about two-thirds of the height of the existing slope. The alignment of Wall 543A footing lies at about half-height of the slope.

It is our understanding that the existing embankment is to be widened to accommodate additional lanes. The widening will involve placement of fill on the existing embankment slope and retaining it with the proposed Walls 543A and 543B. The footings of the new walls are to be embedded in newly compacted fill materials. Between the walls, a new fill slope is planned, and it will descend at an inclination of 1:2 (V:H) westward from the bottom of the Wall 543B. Two CMP culverts cross laterally under the freeway along the walls alignment: at Stations 543+83 and 540+84.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation was conducted in 1999 (Borings 543-B1 and 543-B2) and 1996 (Borings 543-896-6, 543-896-7, 543-896-8, and 543-996-10). They revealed that the subject section of the road embankment consists of a top layer of fill materials that is underlain by native soils of the Bay Point Formation. This section of southbound I-5 was constructed during side cut-and-fill grading of the west-facing slope. Fill materials underlie the alignments of the proposed Walls 543A and 543B. The fill consists of sand, locally clayey, with gravel and chunks of siltstone. Its relative density, based on SPT blow counts was estimated to be medium dense to dense. Fill materials are underlain by native soils of the Bay Point Formation. They comprise of dense to very dense sands. Their geotechnical engineering strength parameters are presented in Table 2. The thickness of the fill layer along

the wall alignment is variable. At Station 543+80, based on Borings 543-B1 and 543-B996-10, the fill and bedrock interface is estimated to be at about elevation 20.6 m. At Station 543+20, based on Borings 543-B2 and 543-896-6, it is estimated to be at about elevation 15.8 m, and at Station 542+70, based on Borings 543-B2 and 543-896-7, at about elevation 13.4 m.

For boring locations, reference is directed to Figure 2-543. It should be noted that the actual locations of the proposed alignments of Walls 543A and 543B were not accessible to conventional subsurface exploration equipment with the exception of Boring 543-896-10. Our borings were drilled as close as possible to both wall alignments: at the crest of the embankment slope and at its toe. Therefore, the subsurface soil conditions presented above were interpolated, based on the referenced borings. Variations from our estimated soil conditions could exist at the alignment of both walls. In particular, the depth to the Bay Point Formation could vary significantly along the actual alignment of the wall. For example, at about Station 542+20, we expect it to be deeper. Seepage was encountered in Borings 543-B1 and 543-B2. It was detected along the fill and native soils interface: in Boring 543-B1 at an elevation of 26.8 m, and in Boring 543-B2 at elevation of 28.8 m.

Foundation Recommendations

We recommend that along the entire length of the alignment of both walls, from the toe to the crest of the slope, the top 1.2 m layer of fill materials be removed and replaced with structural backfill. This structural backfill should be benched into the existing slope in accordance with Caltrans Standard Specifications and compacted to 95% Relative Compaction in accordance with CTM 216. In addition, new foundation fill and wall backfill should be compacted in accordance with the Standard Specifications to 95 % Relative Compaction. The Structural Backfill material, when compacted to 95 % of Relative Compaction should yield strength parameters no less than those shown for fill/structural fill in the attached Table 2.

From a geotechnical engineering standpoint, based on cross sections and layouts of the proposed walls supplied by your office, the results of our subsurface investigations, and the assumption that the upper 1.2 m of the slope face will be replaced with structural backfill prior to construction of the walls, the Standard Plan Design may be used for Walls 543A and 543B.

Slope stability analysis using the STEDwin computer program was performed on the cross section of the proposed embankment that includes both walls. This cross section was provided by your office. The analysis was performed to determine the stability of the new fill slope. For the analysis, we utilized the soil strength parameters presented in Table 2. The calculated Modified Bishop Safety Factor for the proposed new embankment slope is 1.7, which is considered to be acceptable. The slope stability computer output data are presented in Attachment 2, Walls 543A and 543B: Slope Stability Analysis.

Retaining Wall 544

Site Considerations

For the location of the proposed Retaining Wall 544, (Table 1) reference is directed to Figure 2-544. Wall 544 will be about 200 m long and 2.77 in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 543+00 to 545+00, it will parallel to the north the eastern shoulder of the northbound I-5. This interval, from the southern end of the wall to about Station 544+40, was constructed as a side cut. The cut slope ascends at a general inclination of 1:4 (V:H), and its maximum height is about 13.0 m (Attachment 2, Photo 15). From about Station 545+40 to the northern end of the wall, the interval represents an approach embankment to the Carmel Mountain Road Undercrossing. The east-facing embankment (fill) slope descends at a general inclination of 1:2 (V:H) (Attachment 2, Photo 16). It is our understanding that the subject freeway section is to be widened to accommodate widening of the Carmel Mountain Road Undercrossing. The widening will involve undercutting of the existing slope, placement of fill to the east of the proposed wall alignment, and retaining it with Wall 544. A large diameter underground storm water pipe bounds the southern end of the wall.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 544B-B1, 544-B2, and 545B-B3) revealed that the alignment of Wall 544 is underlain by fill materials and native soils of the Torrey Sandstone Formation. Starting from about Station 544+40, the fill and native soils interface dips north at an approximate inclination of 1:4 (V:H). In Boring 544-B3 fill was logged to the lowest elevation of about 21.2 m. Fill materials consist of sands mixed with gravel and chunks of siltstone. Their relative density, based on SPT blow counts, was found to be medium dense. From about Station 544+40 to the north, the native soils of the Torrey Sandstone Formation underlie the wall alignment. This formation consists of sands and sandstone that are locally comprised of thin layers of silty clay. The relative density of native soils, based on SPT blow counts, was found to be medium dense. From a geotechnical engineering standpoint, the Torrey Sandstone is considered to be competent bedrock.

Foundation Recommendations

From a geotechnical engineering standpoint, based on layouts and cross sections of the proposed maximum 2.77 m high wall supplied by your office, the results of our subsurface investigations, and the assumption that the wall foundation will be supported on native soils, the Standard Plan Design Type 1 may be used for Wall 546. At Station 544+40, a construction joint should be incorporated into the wall design in order to mitigate the potential for differential settlement at the fill and native soils interface.

Retaining Wall 545A

Site Considerations

For the location of the proposed Retaining Wall 545A, (Table 1) reference is directed to Figure 2-545A. Wall 545A will be about 99 m long and 4.00 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 546+60 to 544+61, it will parallel to the south the western shoulder of the southbound I-5. The Wall 545A alignment lies at about the base of a slope that descends to the west at a general inclination of 1:2 vertical to horizontal (V:H). The maximum height of the slope is about 8.0 m (Attachment 2, Photos 17 and 18). It is our understanding that the subject freeway section is to be widened to accommodate an offramp to Carmel Mountain Road. The widening will involve undercutting of the existing slope and retaining it with Wall 545A.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 545A-B1 through 545A-B3) revealed that the alignment of Wall 545A is underlain by native soils of the Bay Point Formation that in turn are underlain by the Ardath Shale Formation. In Boring 545A-B2, about a 2.3 m thick layer/pocket of compacted fill was encountered. The presence of fill is most likely related to the recent (1999) development project that was completed just west of the State Right of Way. Fill materials consist of sands mixed with gravel and occasional cobbles. The native soils of the Bay Point Formation consist predominantly of sands and sandstone that locally could be silty, clayey, or indurated. From a geotechnical engineering standpoint, both the Bay Point and Ardath Shale geologic units are considered to be competent bedrock. However, during our drilling program we found that the top layer of the Bay Point Formation was intensely weathered, and thus not meeting the competency criterion for bedrock.

Foundation Recommendations

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of Wall 545A are suitable for the design and construction of the proposed maximum 4.05 m high Type 1 wall supported on a spread footing. Based on layouts and cross sections of the proposed wall supplied by your office, and the results of our subsurface investigations, it is our recommendation that the Standard Plan Retaining Wall Type 1 design be used for Wall 545A.

Retaining Wall 3A

For the location of the proposed Retaining Wall 3A, (Table 1) reference is directed to Figure 2-3A. Wall 3A will be about 32.7 m long and 4.43 m in maximum height. It is

proposed to be a Type 1 standard retaining wall supported on a spread footing foundation. From Station 2+71.3 to 2+38.6, it will parallel Carmel Mountain Road to the west. It will retain a cut in fill materials and native soils of the approach embankment of the Carmel Mountain Undercrossing. Based on Borings 3A-B1, 3A-B2, and 545B-B5 (Attachment 1), we anticipate that the alignment of Wall 3A is underlain by native soils of the Bay Point Formation. Subsurface conditions along the alignment of Wall 3A are essentially similar to those encountered at the location of Wall 545B. Therefore, based on layouts and cross sections of the proposed wall supplied by your office and the results of our geotechnical investigations, it is our recommendation that the Standard Plan Retaining Wall design be used for Wall 3A.

Retaining Wall 6

For the location of the proposed Retaining Wall 6, (Table 1) reference is directed to Figure 2-6. Wall 6 will be about 10 m long and 1.84 m in maximum height. It is proposed to be a masonry wall. From Station 544+28.3 "CM4" Line to 2+00.2 "CMR" Line, it will generally parallel to the west Carmel Mountain Road. Subsurface conditions along the alignment of Wall 6 are essentially similar to those encountered at the location of Wall 545B (Attachment 1, Boring 6-B1). Therefore, based on layouts and cross sections of the proposed wall supplied by your office and the results of our geotechnical investigations, it is our recommendation that the Standard Plan Retaining Wall design be used for Wall 6.

Retaining Walls 545B and 545C

Site Considerations

For the location of the proposed Retaining Walls 545B and 545C (Table 1), reference is directed to Figure 2-545B. Wall 545B will be about 226.6 m long and 4.7 m in maximum height. Wall 545C will be about 254.4m long and 4.8 m in maximum height. Both walls are proposed to be Type1 standard retaining walls supported on spread footing foundations. From Station 10+00 RW "545B" to about 544+53 "CM4", Wall 545B will run at the base of the embankment slope paralleling Carmel Mountain Road to the west. From about Station 544+53 through 546+38.6, Wall 545B will parallel southbound I-5 in a southward direction. From Station 544+66.1 through 547+18, Wall 545C will parallel the western shoulder of the southbound I-5 in a southward direction. This interval of the freeway, from the northern end of Wall 545C to about Station 545+65, was constructed as a side cut. The cut slope ascends at a general inclination of 1:2 vertical to horizontal (V:H), and its maximum height is about 6.0 m (Attachment 2, Photo 19). From about Station 545+65 to the southern end of Wall 545B, the interval represents an approach embankment to the Carmel Mountain Road Undercrossing. The west-facing embankment (fill) slope descends at a general inclination of 1:2 (V:H) (Attachment 2, Photo 20). It is our understanding that the subject section is to be widened to accommodate an offramp to Carmel Mountain Road and the future widening of the Carmel Mountain Road Undercrossing. From the northern end of Wall 545C to about Station 545+65, the widening will involve undercutting of the existing slope and retaining it with the sections of both walls.

From about Station 545+65 to the southern limit of Wall 545B, the widening will involve placement of fill on the existing embankment slope and retaining it with the section of the proposed upper Wall 545C. Also, throughout this interval a cut at the base of the embankment is to be retained with the proposed lower Wall 545B (see cross section in Attachment 2, Walls 545B and 545C: Slope Stability Analyses).

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 545B-B1 through 545B-B5) revealed that the alignments of the proposed walls, from their southern limits to Station 545+65, will be underlain by fill materials overlying the native soils of the Bay Point Formation that in turn are underlain by the Ardath Shale Formation. The remaining section of the walls alignments, from about Station 545+65 to their northern ends, is underlain by the Bay Point Formation. Starting from about Station 545+65, the fill and native soils interface dips south at an approximate inclination of 1:7 (V:H). At the location of Boring 545B-B5 the interface was logged at its lowest elevation of about 21 m. Fill materials consist of sands mixed with gravel and occasional cobbles. Their relative density, based on SPT blow counts, ranged from medium dense to dense. The native soils of the Bay Point Formation consist predominantly of sands and sandstone that locally could be silty or indurated. From a geotechnical engineering standpoint, both the Bay Point and Ardath Shale geologic units are considered to be competent bedrock. During our drilling program, however, we found that the top layer of the Bay Point Formation was intensely weathered, and thus not meeting the competency criterion for bedrock.

Foundation Recommendations

We recommend that along the proposed Wall 545C alignment, from Station 545+ 60 to its southern limit, the layer of fill materials be removed and replaced with structural backfill as shown on the sketches designated as Wall 545C: Typical Foundation Improvement Section (Figures 22, and 22A). Since the existing embankment fill wedge under the alignment of the proposed Wall 545C is not uniform, the volume of material to be removed gradually increases from Station 545 +60 (where minimal removal is required) through the southern end of the wall. The structural backfill should be benched into the existing slope in accordance with Caltrans Standard Specifications and compacted to 95% Relative Compaction in accordance with CTM 216. In addition, wall backfill should be compacted in accordance with the Standard Specifications to 95 % Relative Compaction. The Structural Backfill material, when compacted to 95 % of Relative Compaction should yield strength parameters no less than those shown for fill/backfill in the attached Table 2. To mitigate the potential for differential settlement at the fill and native soils interface, a construction joint should be incorporated into the design of Wall 545C.

From a geotechnical engineering standpoint, based on cross sections and layouts of the proposed walls supplied by your office, the results of our subsurface investigations, and the

assumption that the removal and replacement of fill materials under the section of the Wall 545C foundation will be implemented prior to construction of Wall 545C, the Standard Plan Design may be used for Walls 545B and 545C.

Slope stability analysis using the STEDwin computer program was performed on the cross section of the proposed embankment that includes both walls. This cross section was provided by your office. The analysis was performed to determine the stability of the new fill slope. For the analysis, we utilized the soil strength parameters presented in Table 2. In addition we assumed that the slope will descend from the base of the Wall 545C to the top of the Wall 545B at an inclination no steeper than 1:1.75 (H:V). The calculated Modified Bishop Safety Factor for the proposed new embankment slope is 2.0, which is considered to be acceptable. The slope stability computer output data are presented in Attachment 2, Walls 545B and 545C: Slope Stability Analysis.

Retaining Wall 546

Site Considerations

For the location of the proposed Retaining Wall 546, (Table 1) reference is directed to Figure 2-546. Wall 546 will be about 93.9 m long and 2.8 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a spread footing foundation. From Station 545+56.1 to 546+50, it will parallel to the north the eastern shoulder of the northbound I-5. This freeway interval was constructed as a side cut. Recently, this interval was widened to include a 6.0 m wide asphalt concrete paved zone that is flanked to the east by a cut slope inclined at 1:1.5 (V:H). To the east this slope transitions into a 6.0 m wide horizontal (cut) bench that is flanked to the east by a cut slope inclined at 1:2 (V:H) (Attachment 2, Photos 21 and 22). It is our understanding that the subject freeway section is to be widened to accommodate additional lanes.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 546-B1 and 546-B2) revealed that the alignment of the proposed Wall 546 is underlain by native soils of the Torrey Sandstone Formation. This formation consist predominantly of sands and sandstone that locally could be silty or/and indurated. Based on SPT blow counts, the relative density of those sands was determined to be very dense. From a geotechnical engineering standpoint, this geologic unit is considered to be competent bedrock.

Foundation Recommendations

It is our understanding that the footing of the proposed Wall 546 will be constructed on a fill layer to be built to raise freeway grade. Therefore, the wall foundation fill pad should

consist of structural backfill materials compacted to 95 % Relative Compaction in accordance with CTM 216. The minimum thickness of the foundation pad should be 1.5 m, and its horizontal limits should extend a minimum 1.5 m beyond the edges of the proposed wall footing.

From a geotechnical engineering standpoint, based on layouts and cross sections of the proposed maximum 2.8 m high wall supplied by your office, the results of our subsurface investigations, and the assumption that the wall foundation pad will be constructed as recommended above, the Standard Plan Design Type 1 may be used for Wall 546.

Retaining Wall 565

Site Considerations

For the location of the proposed retaining wall 565, (Table 1) reference is directed to Figure 2-565. Wall 565 will be about 226.9 m long and 1.8 m in maximum height. It is proposed to be a Type 1 standard retaining wall. From Station 566+36.9 to 564+10, it will parallel southward the western shoulder of the southbound I-5. Along this interval the existing cut slope is east-facing, about 12.0 m high (maximum), and inclined at 1:2 vertical to horizontal. A brow ditch parallels the toe of the slope. It is our understanding that the proposed wall is to retain planned cuts in the aforementioned slope in order to widen southbound I-5.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 565-B1 and 569-B2) revealed that the proposed wall alignment is underlain by a shallow uncontrolled fill layer that in turn is underlain by native soils of the Bay Point Formation. The interface between fill materials and native soils was mapped at about an elevation of 24.9 m in Boring 565-B1 and 19.8 m in Boring 565-B2. This segment of northbound I-5 was constructed as a cut and fill of the east-facing slope. Uncontrolled fill materials are essentially composed of disturbed Bay Point native soils and consist of sands. Their relative density, based on SPT blow counts, was determined to be very loose to medium dense. The Bay Point Formation consists of locally slightly silty, fine to medium grained sand. The relative density of the Bay Point Formation, based on SPT blow counts, was determined to be loose to medium dense. This lower section of the Bay Point Formation could be considered as slope wash. The lowest elevation (about 15.8 m) at which native soils were encountered was at Boring 565-B2. At the time of our investigations, no seepage or springs were observed on the surface of the cut. It should be noted, however, that landscaped privately owned lots are located at the top of the slope and could contribute to seepage. In addition, the configuration of the cut slope is such that it could create a potential for seepage. We anticipate, however, that the standard drainage detail behind the proposed wall should mitigate the potential for a seepage condition.

Foundation Recommendations

We recommend that along the alignment of Wall 565, the existing undocumented fill materials be removed and recompacted to 95% Relative Compaction in accordance with CTM 216. The anticipated depth of removal is about 1.2 m below the bottom elevation of the footing. The horizontal limits of the removal and recompaction should extend a minimum 1.2 m beyond the edges of the proposed wall footing.

From a geotechnical engineering standpoint, based on layouts and cross sections of the proposed maximum 1.8 m high wall supplied by your office, the results of our subsurface investigations, and the assumption that the subsurface materials along the wall alignment will be recompacted as recommended above, the Standard Plan Design Type 1 may be used for Wall 565.

Retaining Wall 569

Site Considerations

For the location of the proposed Retaining Wall 569 (Table 1) reference is directed to Figure 2-569. Wall 569 will be about 693.6 m long and 6.46 m in maximum height. It is proposed to be a Type1 standard retaining wall. From Station 567+20 to 574+13.6, it will parallel southward the western shoulder of the southbound I-5. Along this interval the existing cut slope is east-facing, about 17.0 m high (maximum), and inclined at 1:2 (V:H) (Attachment 2, Photos 23 and 24). It is our understanding that the proposed wall is to retain planned cuts in the aforementioned slope in order to widen the southbound I-5.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 569-B1 through 569-B6) revealed that the proposed wall alignment is underlain predominately by native soils of the Torrey Sandstone and Bay Point Formation. In addition, about a 75 m long southern end of the wall alignment is approximately located at the base of the relatively shallow (about 2.0 m thick) fill embankment. The interface between embankment fill and native soils was mapped at about Station 566+00, where it dips south at a low angle. This segment of the northbound I-5 was constructed as a side cut of the east-facing slope. The cut resulted in the exposing of both formations on the cut slope and roadway section of the freeway. The contact between the Torrey Sandstone and Bay Point Formation, based on the available geologic map, was estimated to be at about Station 570+50 (Kennedy and Peterson, 1975). The Bay Point Formation was encountered in Borings 569-B6 and 569-B1. It consists of locally slightly silty fine to medium grained sand. The relative density of the Bay Point Formation, based on SPT blow counts in Boring 569 –B1, was determined to be dense to very dense. The relative density

of the lower section of the Bay Point Formation (below the elevation of 30 m), encountered in Boring 569-B6, based on SPT blow counts, was determined to be loose to medium dense. This lower section of the Bay Point Formation could be considered as slope wash. The Torrey Sandstone was encountered in Borings 569-B2 through 569-B5. It consists of medium grained sandstone or sand with traces of fine gravel. Its relative density, based on SPT blow counts, was determined to be very dense. In all borings, the native soils were encountered to the maximum depth of exploration. The lowest elevation (about 23.5 m) at which native soils were encountered was at Boring 569-B6. At the time of our investigations, no seepage or spring was observed on the surface of the cut. However, it should be noted that landscaped private-owned lots are located at the top of the slope. In addition, the configuration of the cut slope, in conjunction with the variably permeable nature of the native soils exposed in the cuts creates a potential for seepage conditions. In the past, our office provided recommendations to mitigate the seepage water condition that occurred north from the northern limit of the proposed Wall 569. The standard drainage detail behind the proposed wall should, however, alleviate the potential for a seepage condition.

Foundation Recommendations

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of Wall 569 are suitable for the design and construction of the proposed maximum 6.46 m high Type 1 retaining wall supported on a spread footing. Based on layouts and cross sections of the proposed wall supplied by your office, and the results of our geotechnical investigations, it is our recommendation that the Standard Plan Retaining Wall Type 1 design be used for Wall 569.

If you have any questions or comments regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-4062) or Zia Yazdani at (858) 467-4054 (Calnet 734-4054).

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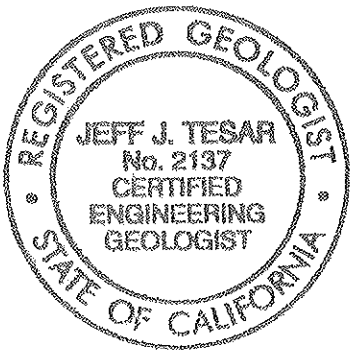
Geotechnical Section 11



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FIGURES

INDEX OF SHEETS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

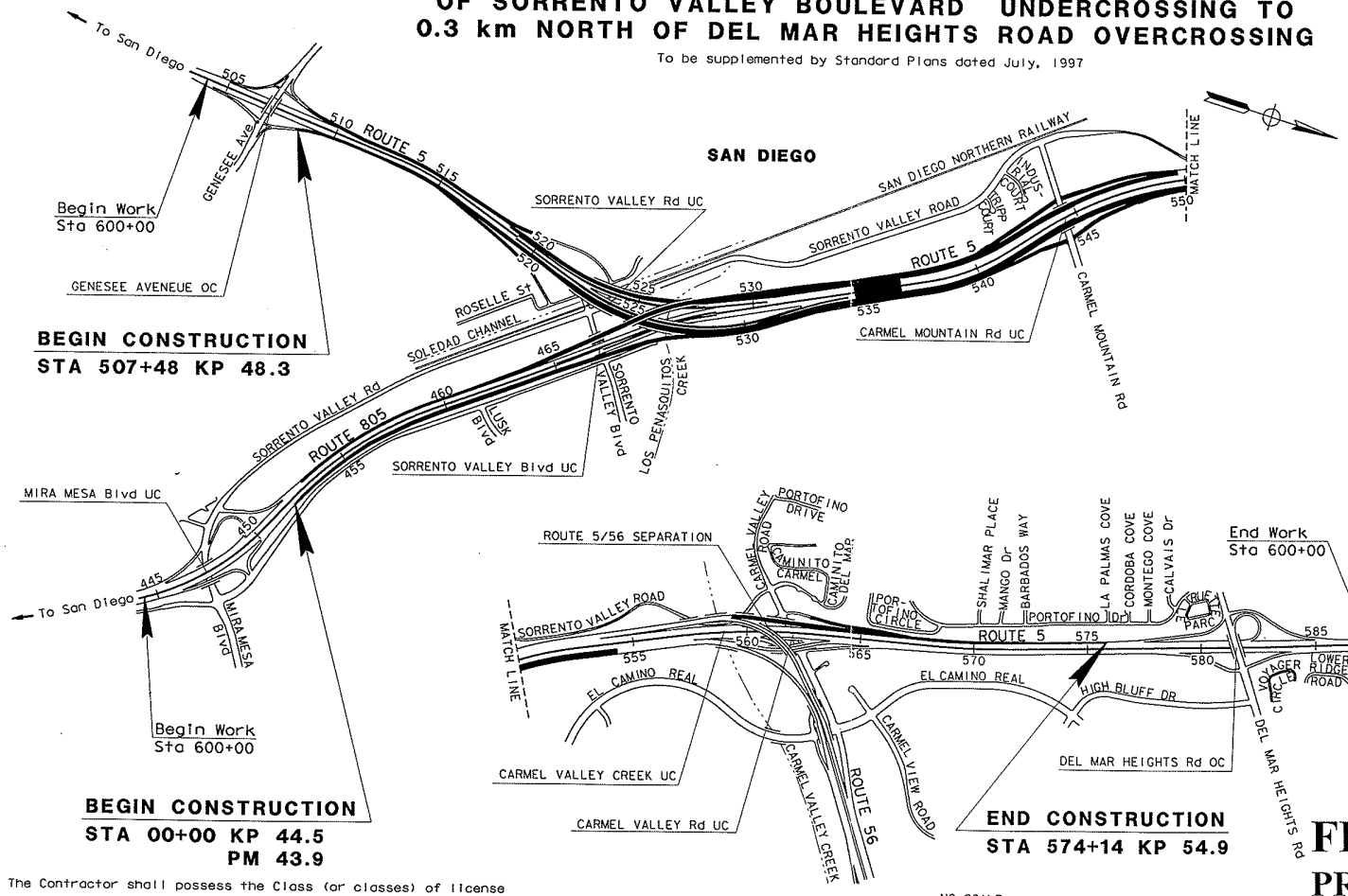
IN SAN DIEGO COUNTY IN SAN DIEGO ON ROUTE 5 FROM 0.3 km NORTH OF GENESEE AVENUE OVERCROSSING AND ON ROUTE 805 FROM 0.3 km NORTH OF SORRENTO VALLEY BOULEVARD UNDERCROSSING TO 0.3 km NORTH OF DEL MAR HEIGHTS ROAD OVERCROSSING

To be supplemented by Standard Plans dated July, 1997

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	5/805	KP48.9-51.2/ KP43.9-46.5		

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Caltrans Metric



The Contractor shall possess the Class (or classes) of license as specified in the ''Notice to Contractors''.

Project Engineer Date
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
A GAYON
No. 54149
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

FIGURE 1
PROJECT LOCATION

PROJECT ENGINEER	DATE	PROJECT MANAGER	DATE
A. GAYON		T. ALLISON	

LAST REVISED: 00-00-00

TIME PLOTTED => $$$$$$$SYTIME$$$$$$$

Contract No.	11-0301U4

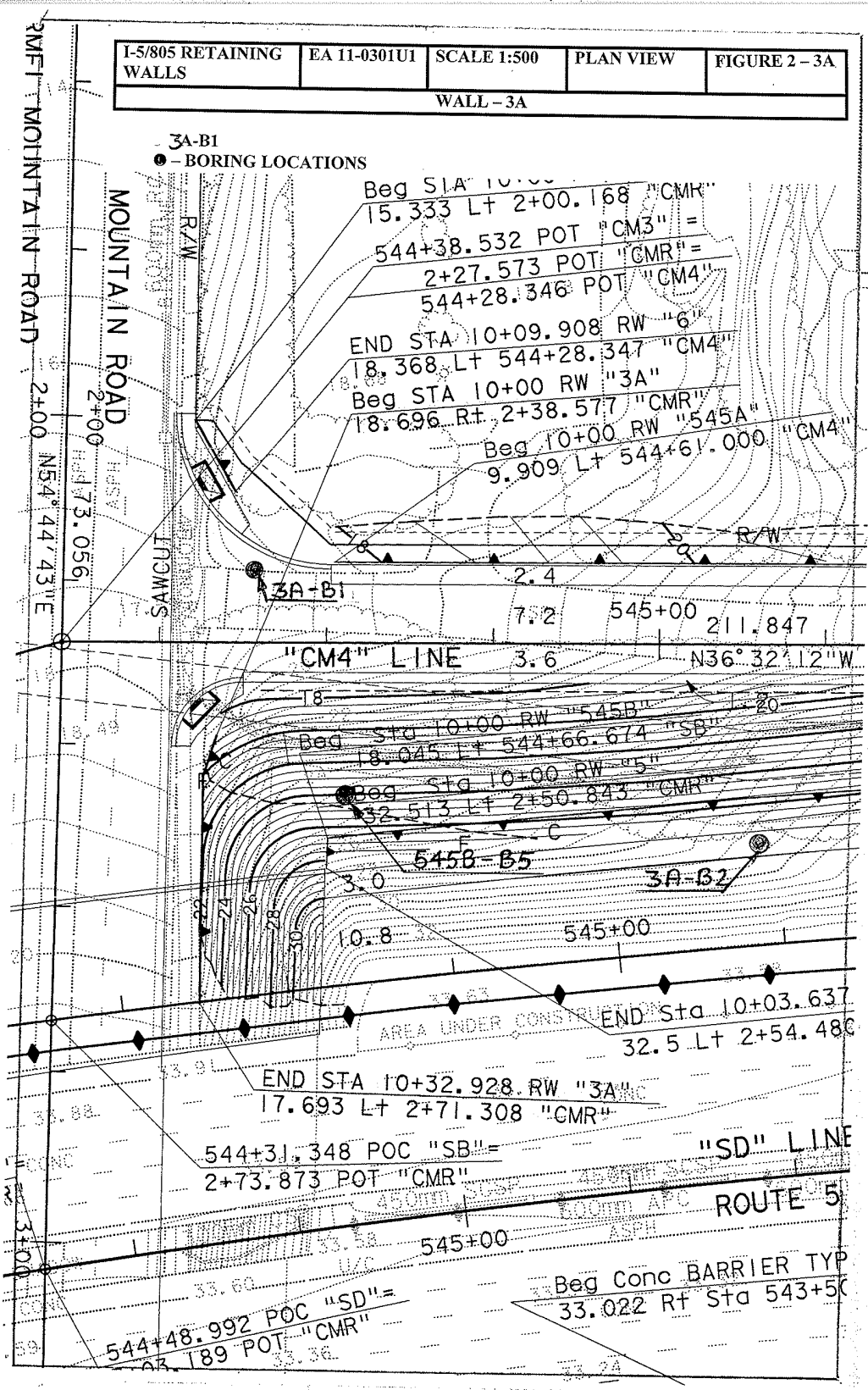
FORM DC-OE-93-PF (REV. 3/88)

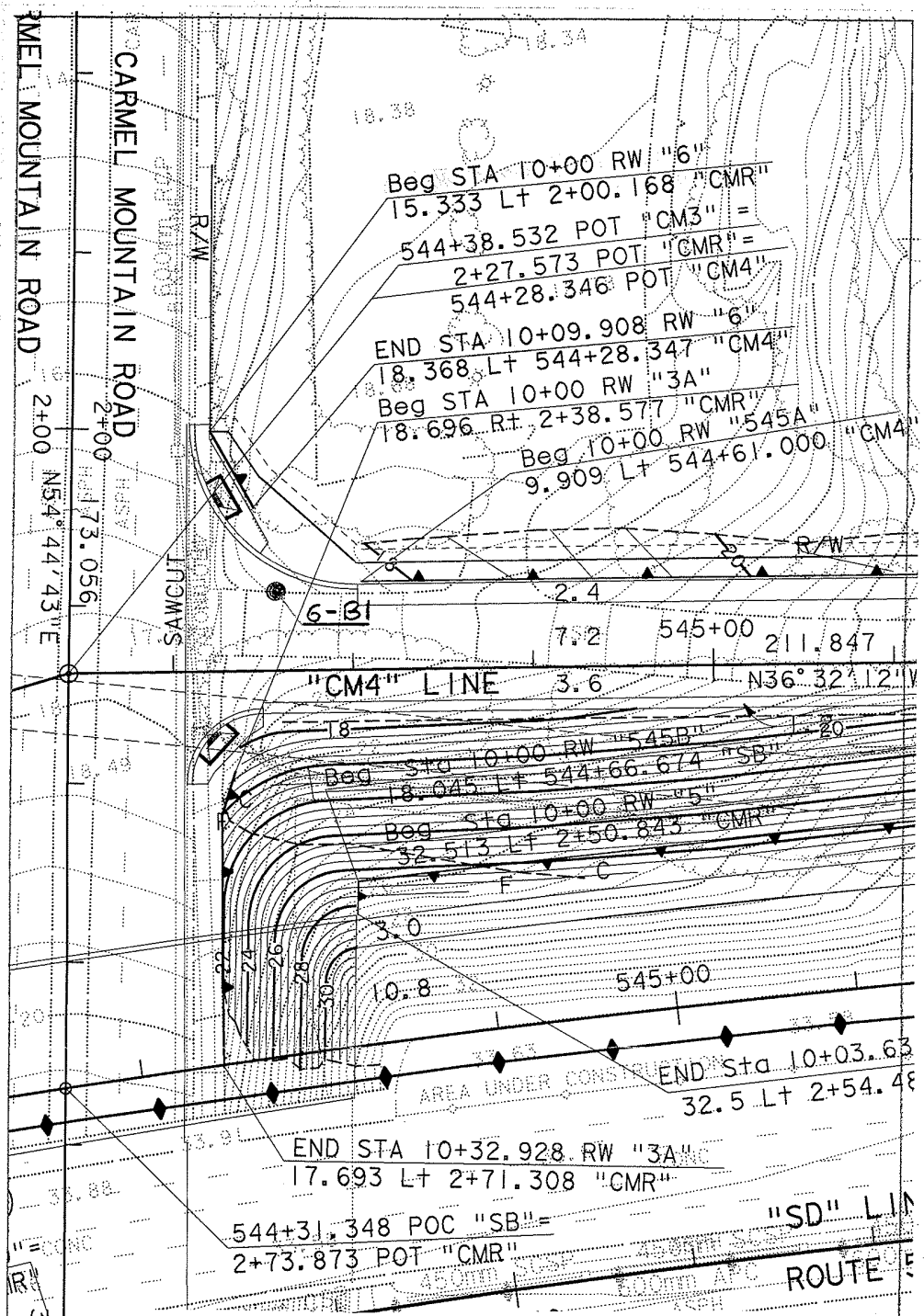
FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => $$$$$$$USER$$$$$$$
DGN FILE => $$$$$$$$$$DGNSPEC$$$$$$$$$$

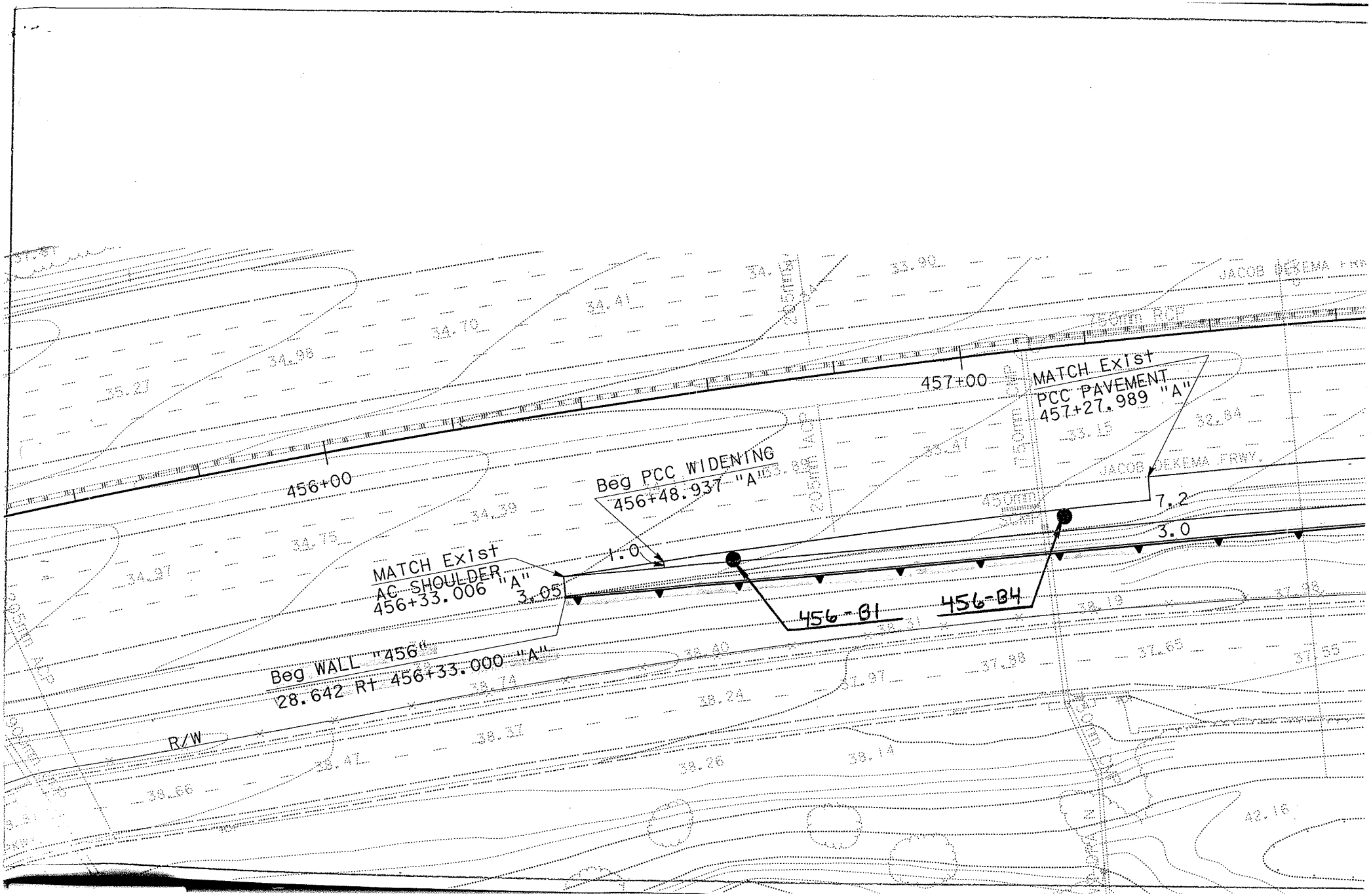
CU 11275 EA 0301U1

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2 – 3A
WALL – 3A				

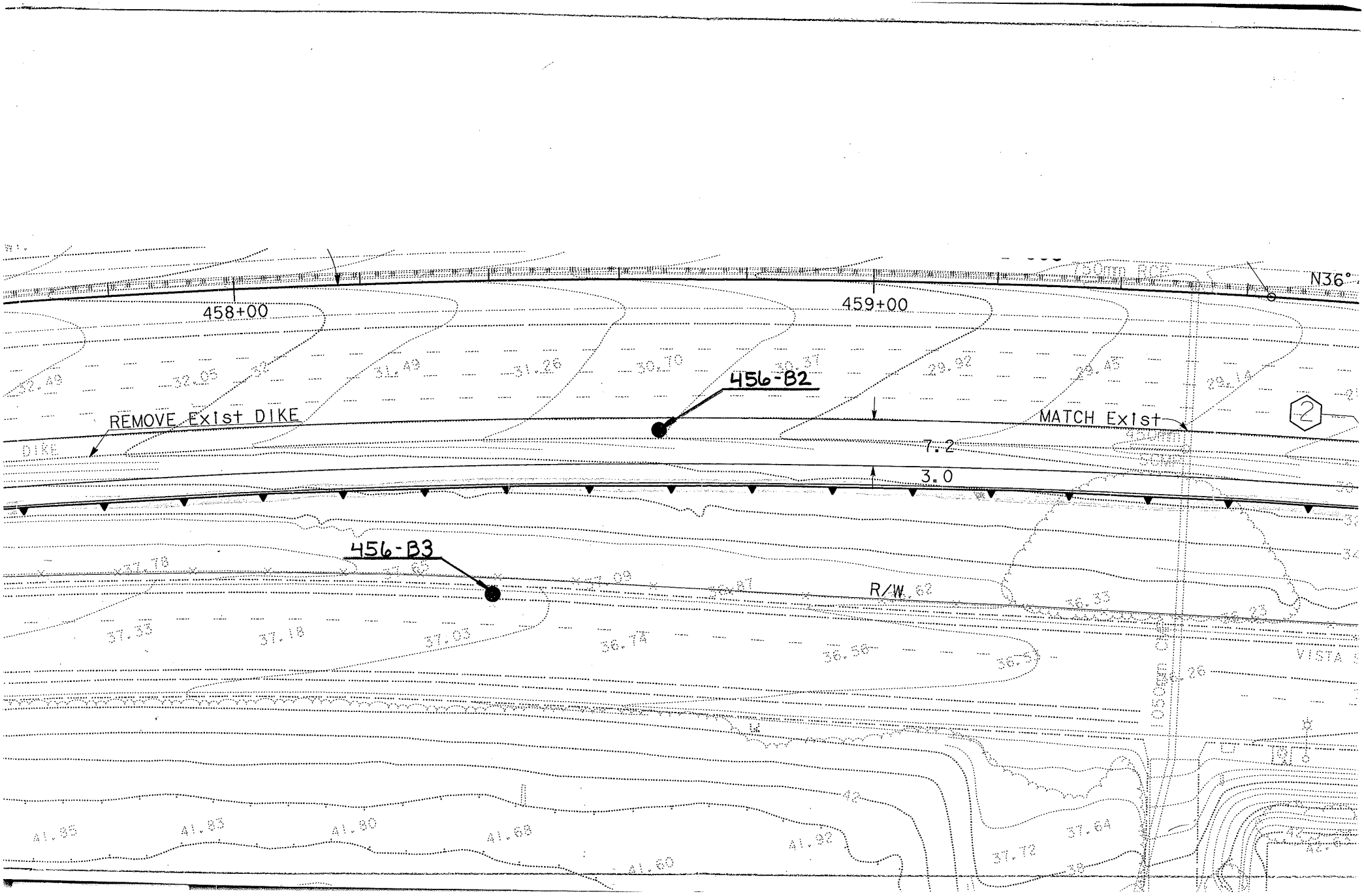




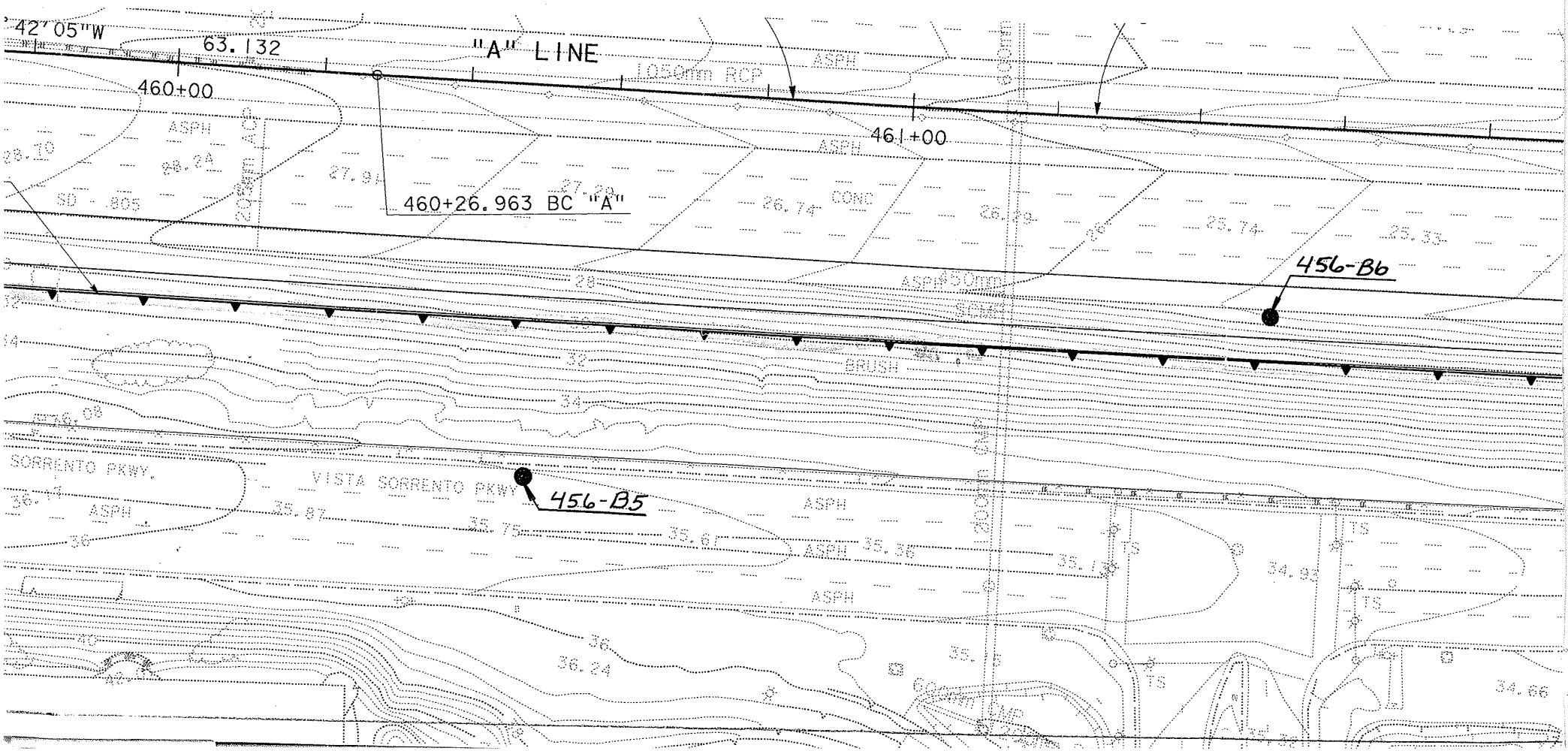
I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2 – 6
WALL – 6				

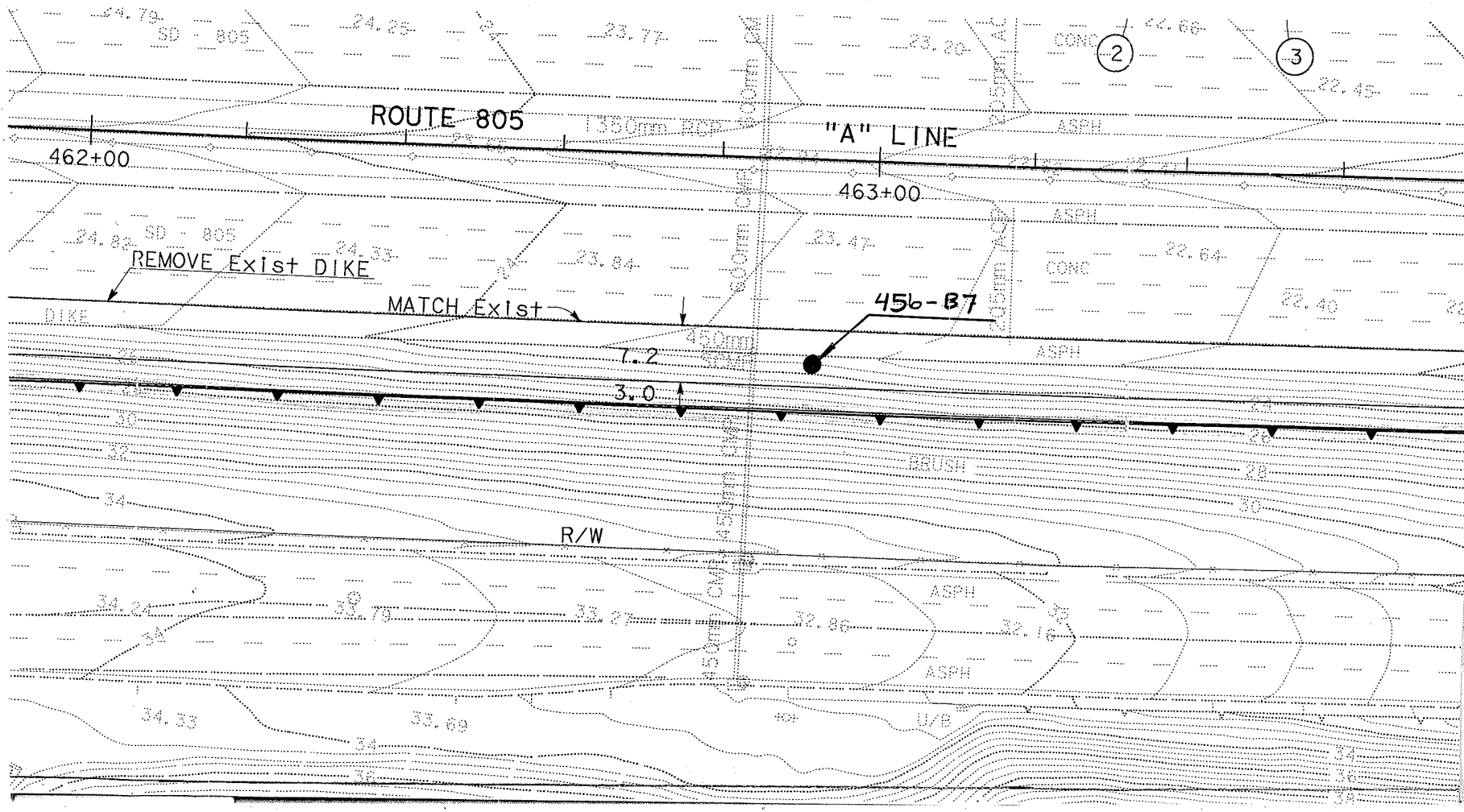


456+00
457+00
MATCH Exist
PCC PAVEMENT
457+27.989 "A"
Beg PCC WIDENING
456+48.937 "A"
MATCH Exist
AC SHOULDER
456+33.006 "A"
Beg WALL "456"
28.642 Rt 456+33.000 "A"
1.0
3.05
7.2
3.0
456-B1
456-B4
R/W
JACOB DEKEMA FRWY.
750mm RCP



N36°
458+00
459+00
750mm RCP
456-B2
REMOVE Exist DIKE
MATCH Exist
DIKE
7.2
3.0
456-B3
R/W
VISTA
1050mm CMP
32.49
32.05
31.49
31.26
30.70
30.37
29.92
29.45
29.14
37.78
37.65
37.09
36.87
36.62
36.33
37.33
37.18
37.03
36.74
36.56
36.26
41.85
41.83
41.80
41.68
41.60
41.92
37.72
37.64

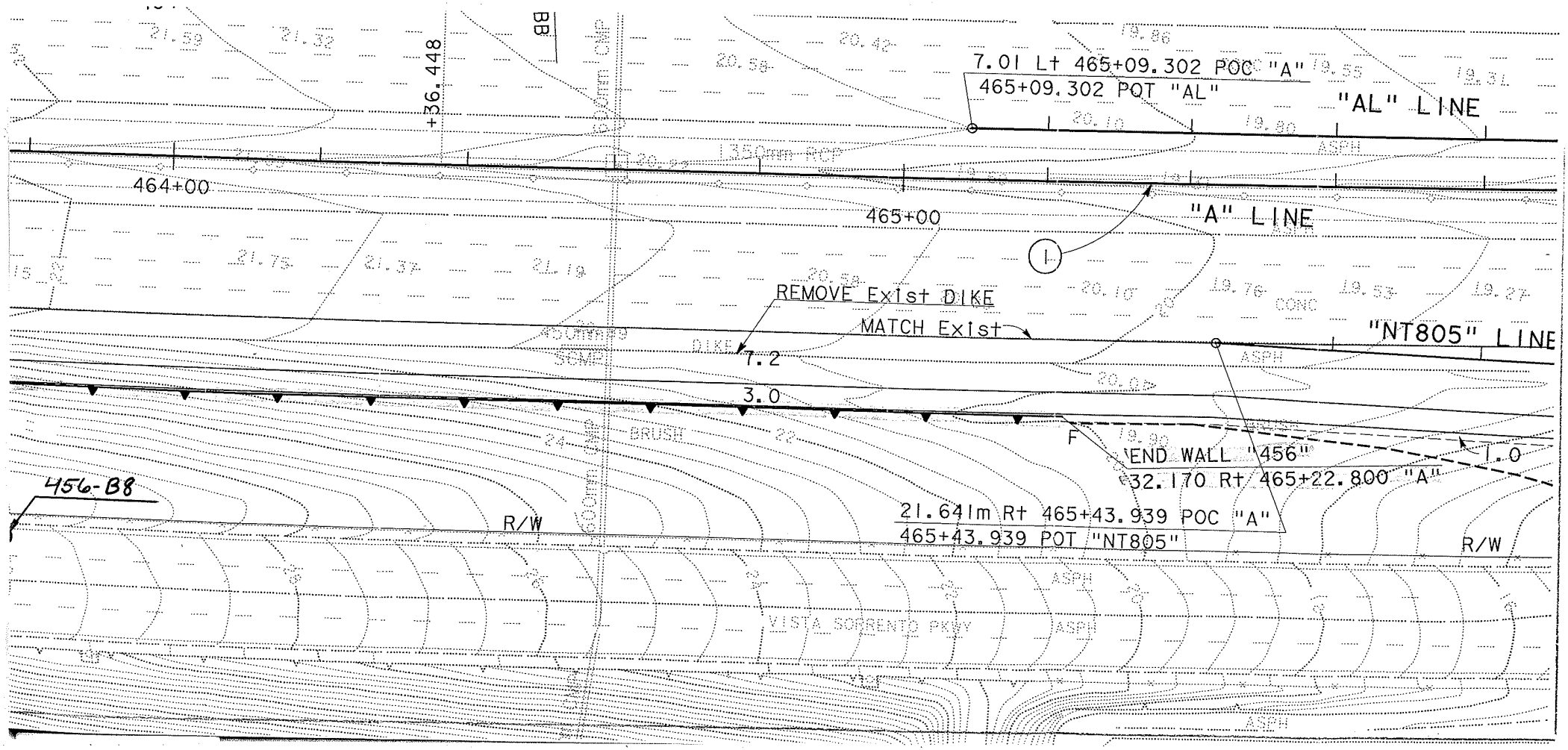

42° 05"W
63.132
"A" LINE
1050mm RCP
460+00
461+00
460+26.963 BC "A"
456-B6
456-B5
VISTA SORRENTO PKWY.
SORRENTO PKWY.
ASPH
CONC
BRUSH
SD - 805


ROUTE 805
"A" LINE
462+00
463+00
REMOVE Exist DIKE
MATCH Exist
456-B7
7.2
3.0
R/W
SD - 805
DIKE
ASPH
CONC
BRUSH
U/B
1350mm RCP
600mm CMP
450mm CMP
205mm ACP
2
3

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-456
WALL- 456				

456-B1

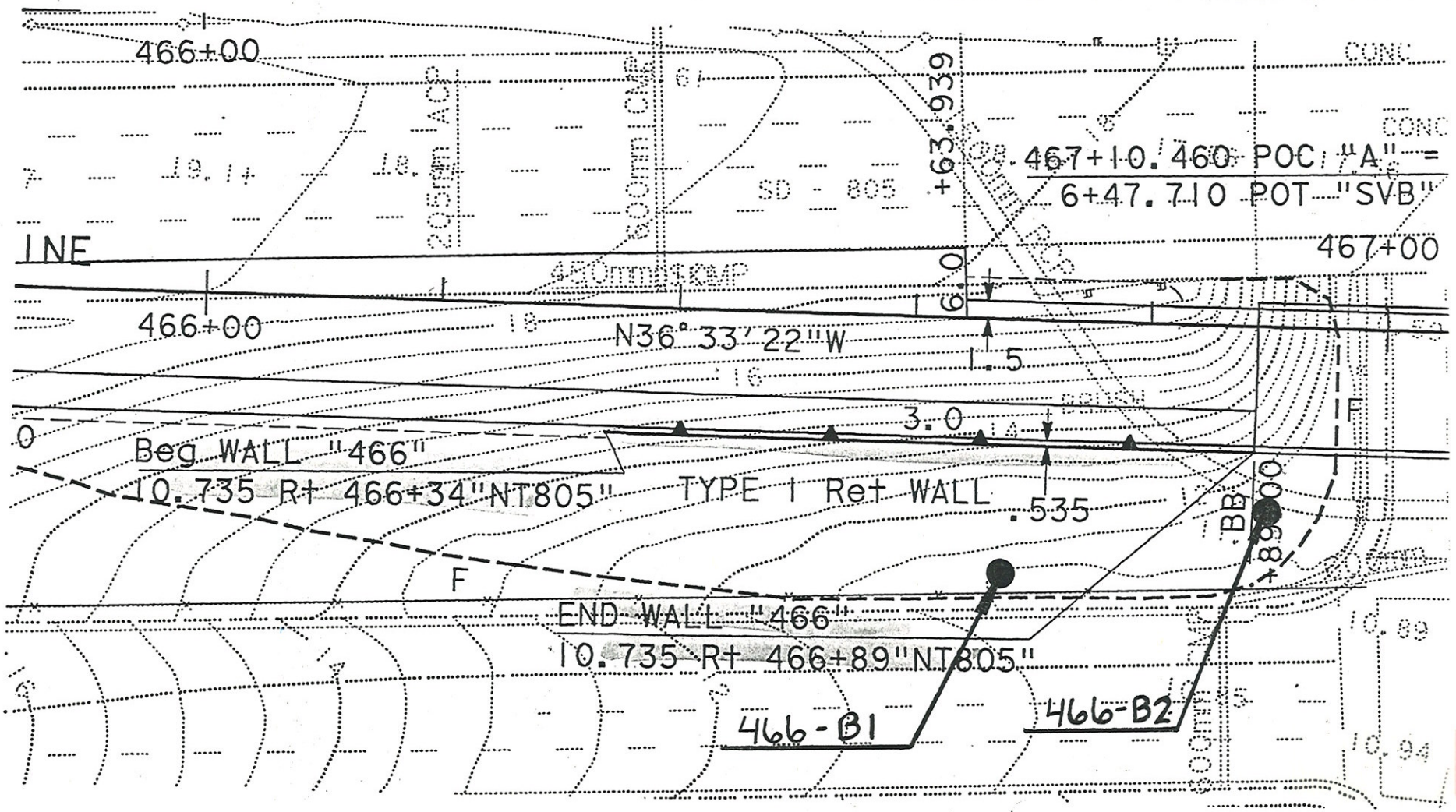
● -- BORING LOCATIONS



I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-466
WALL- 466				

466-B1

● -- BORING LOCATIONS

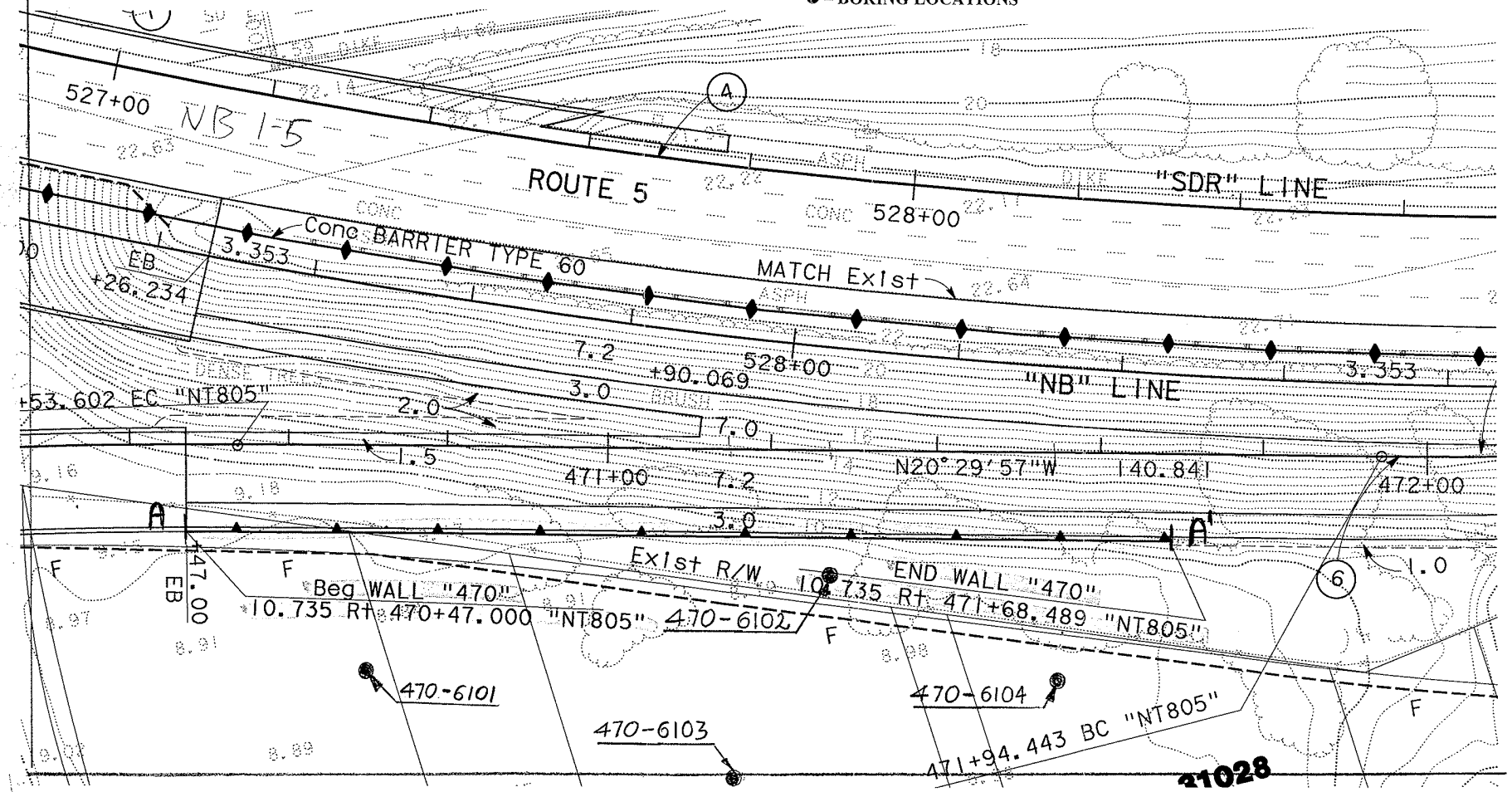


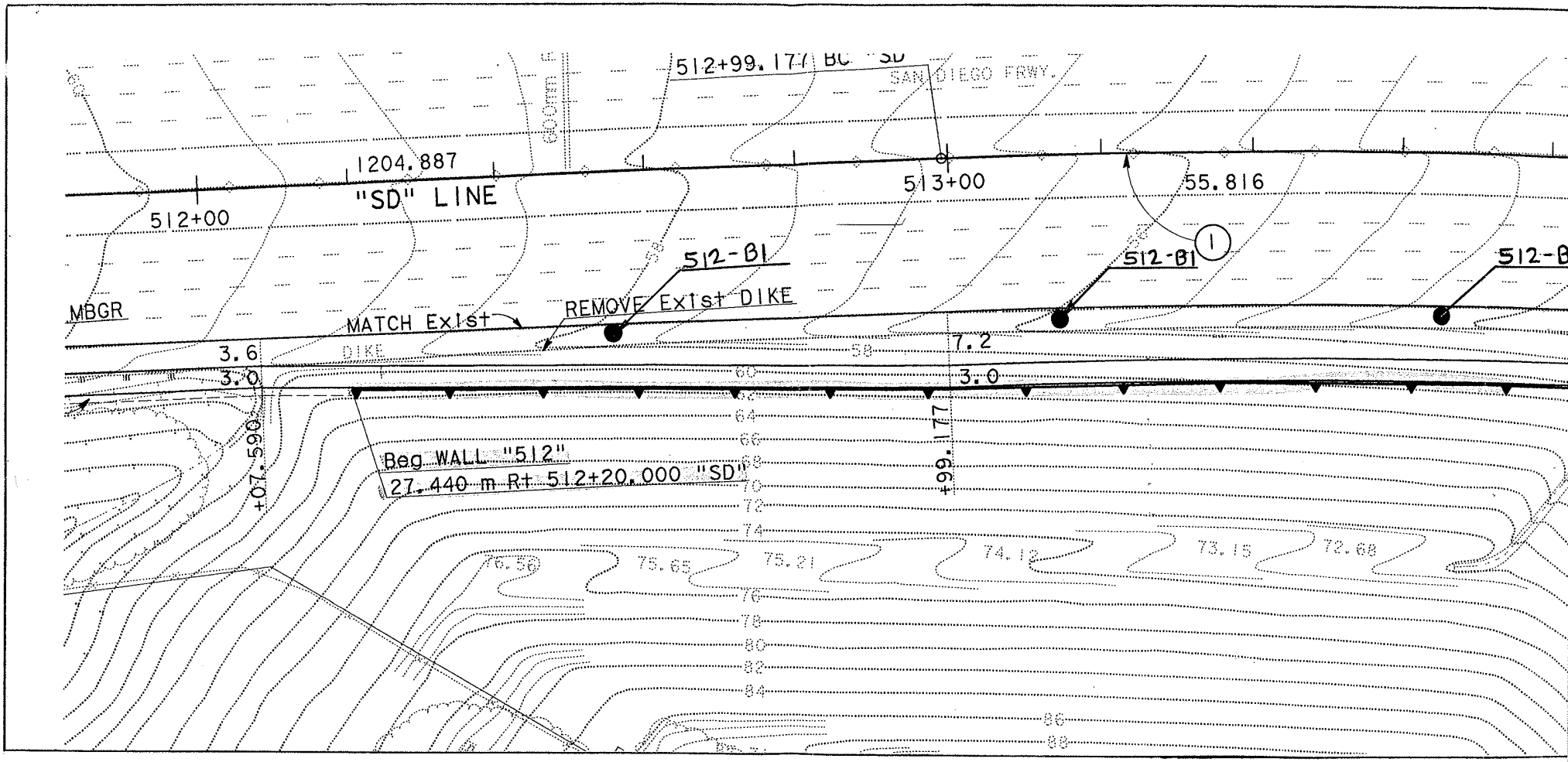
I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2 – 470
WALL - 470				

A A' – CROSS SECTION

470-6101

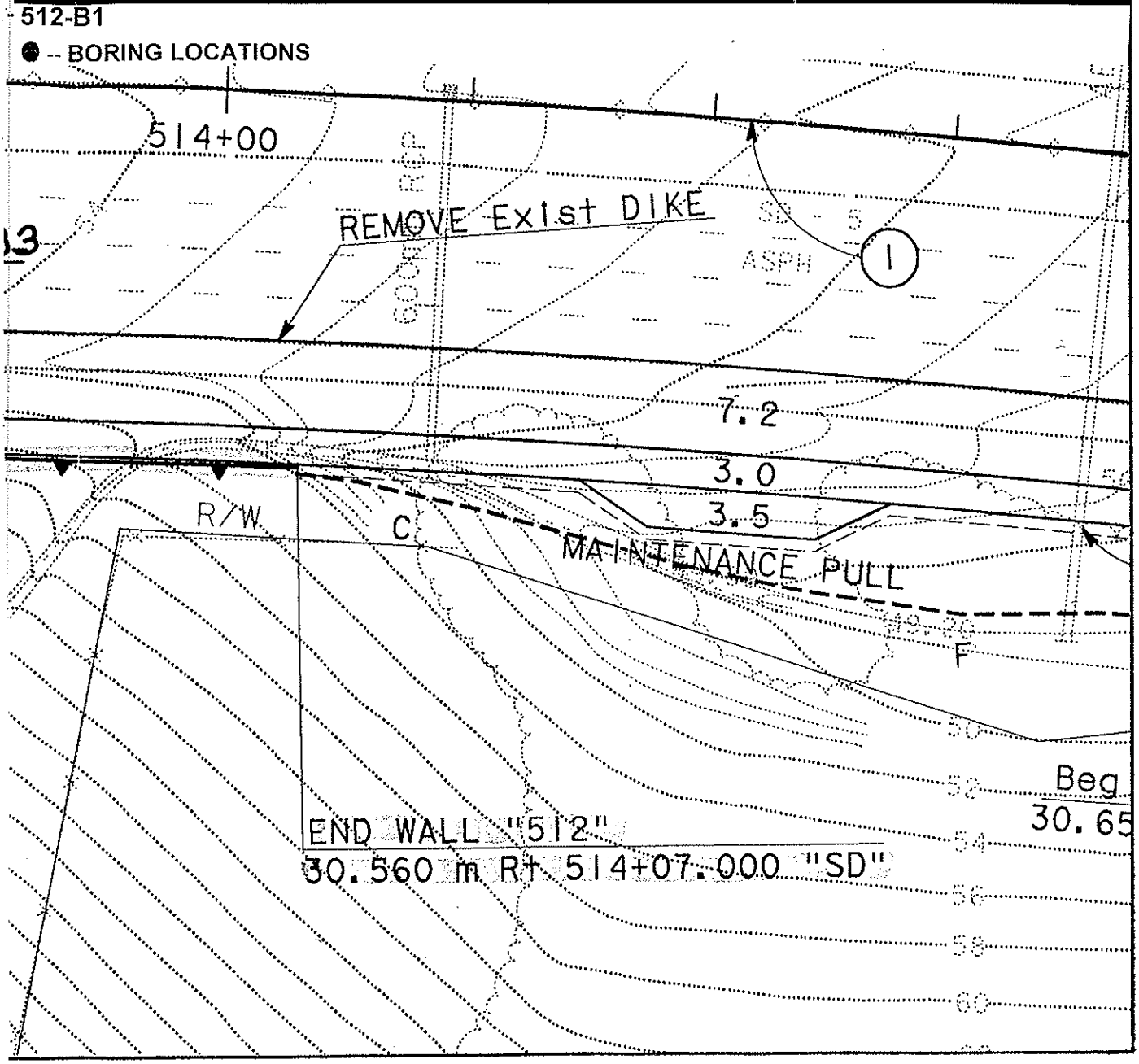
● – BORING LOCATIONS

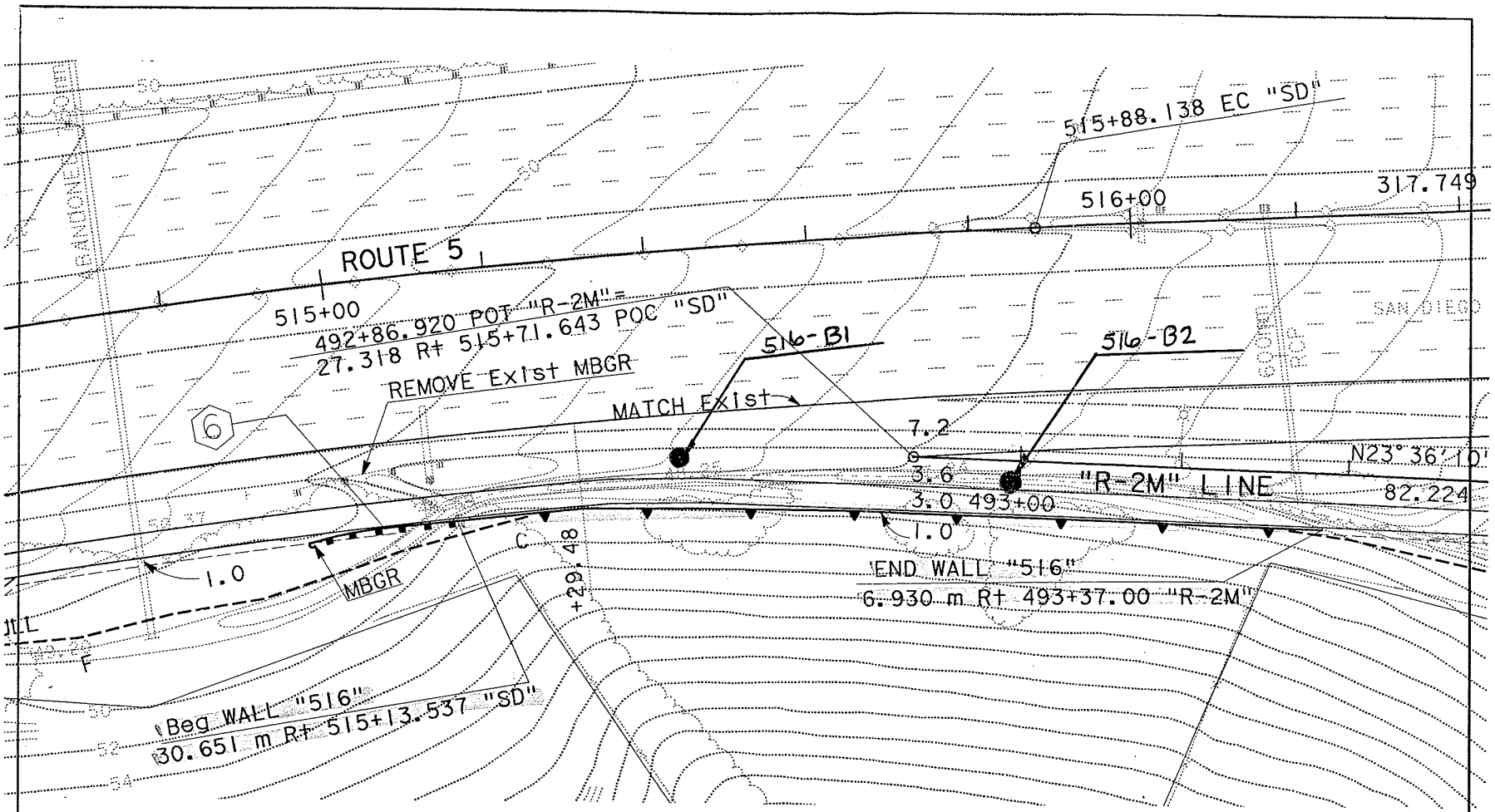




512+99.177 BC "SD"
SAN DIEGO FRWY.
1204.887
"SD" LINE
512+00
513+00
55.816
512-B1
512-B1
512-B
MBGR
MATCH Exist
REMOVE Exist DIKE
DIKE
3.6
3.0
7.2
3.0
+07.590
+99.177
Beg WALL "512"
27.440 m Rt 512+20.000 "SD"
76.56
75.65
75.21
74.12
73.15
72.68

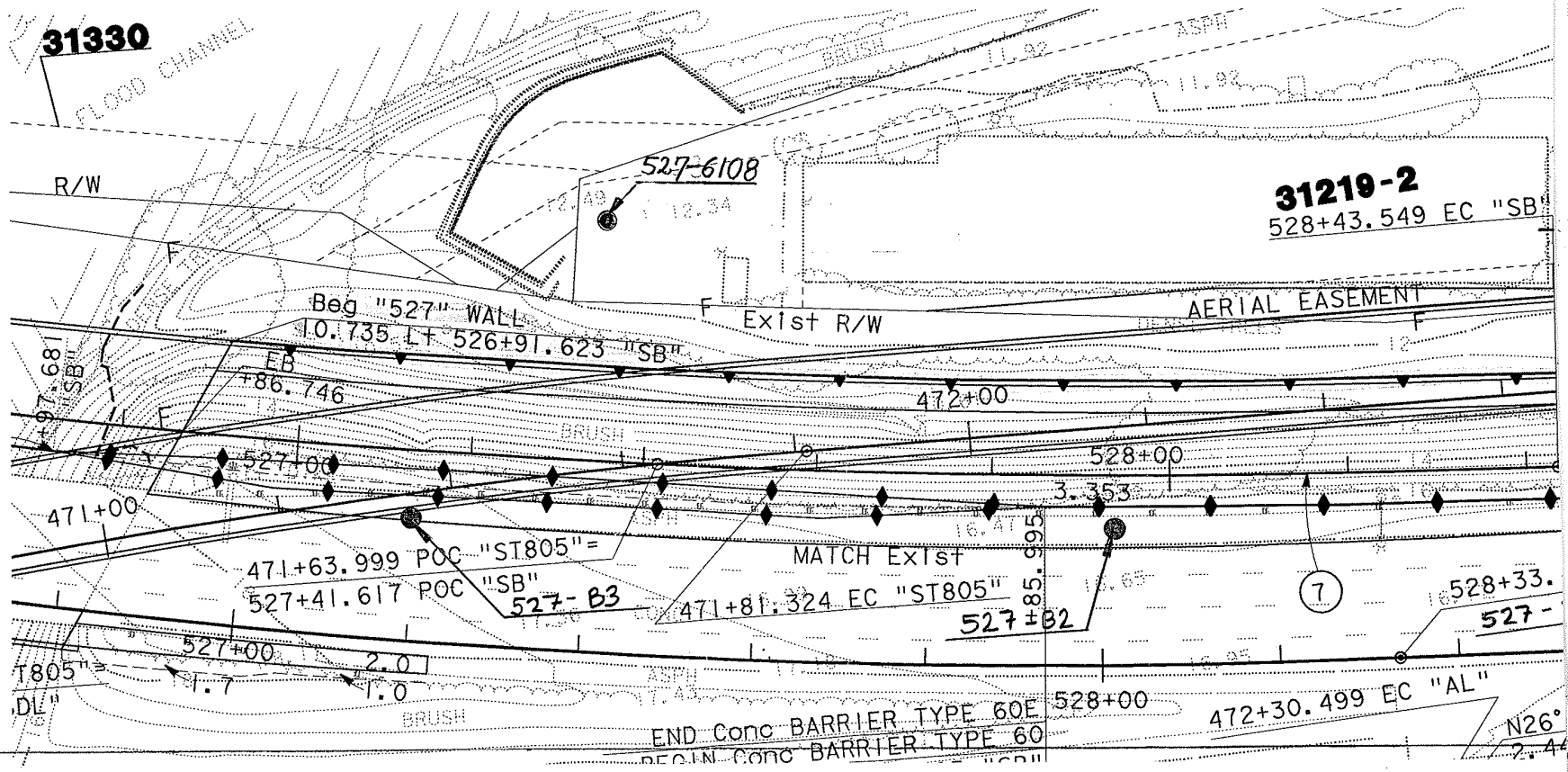
I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-512
WALL- 512				





I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-516
WALL- 516				

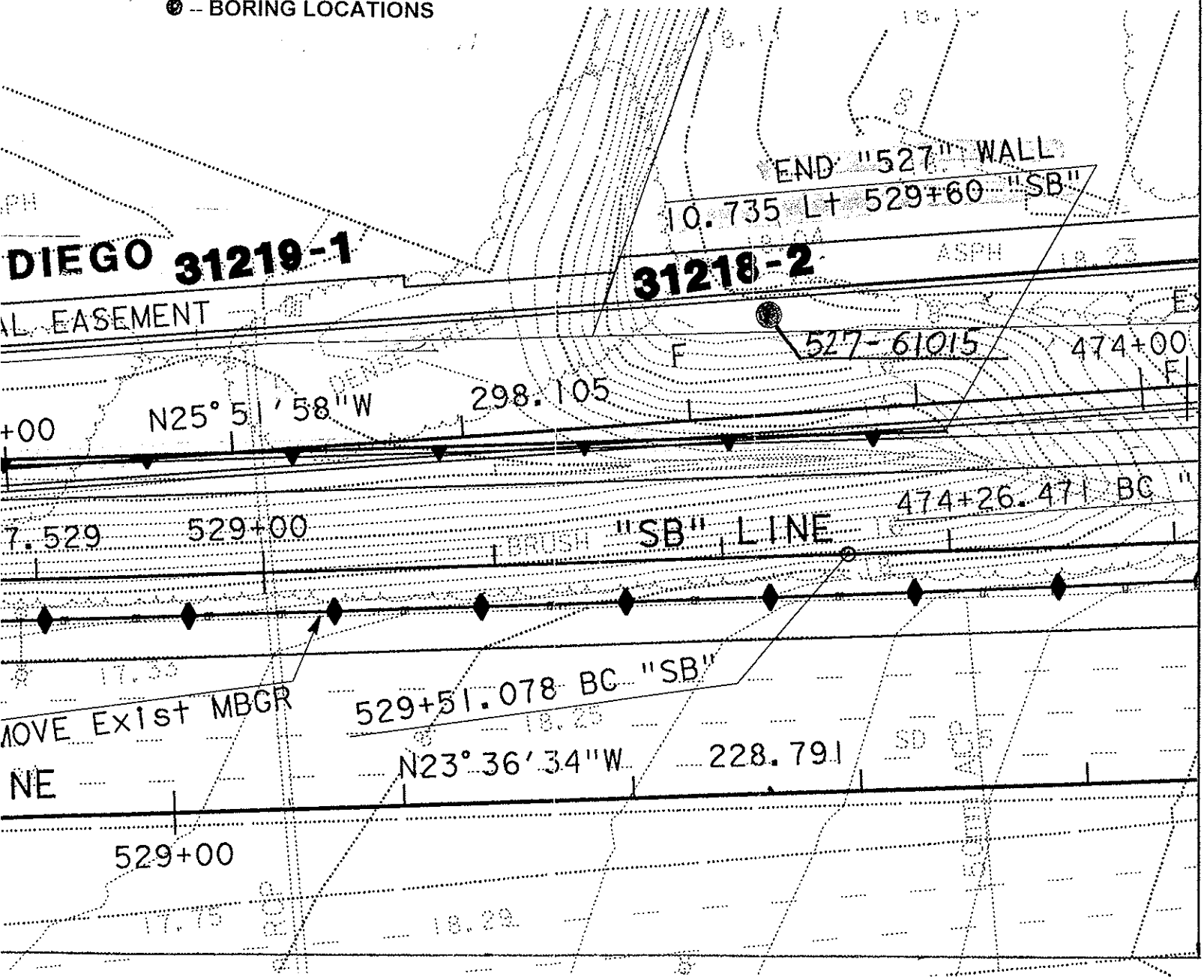
516-B1
● -- BORING LOCATIONS

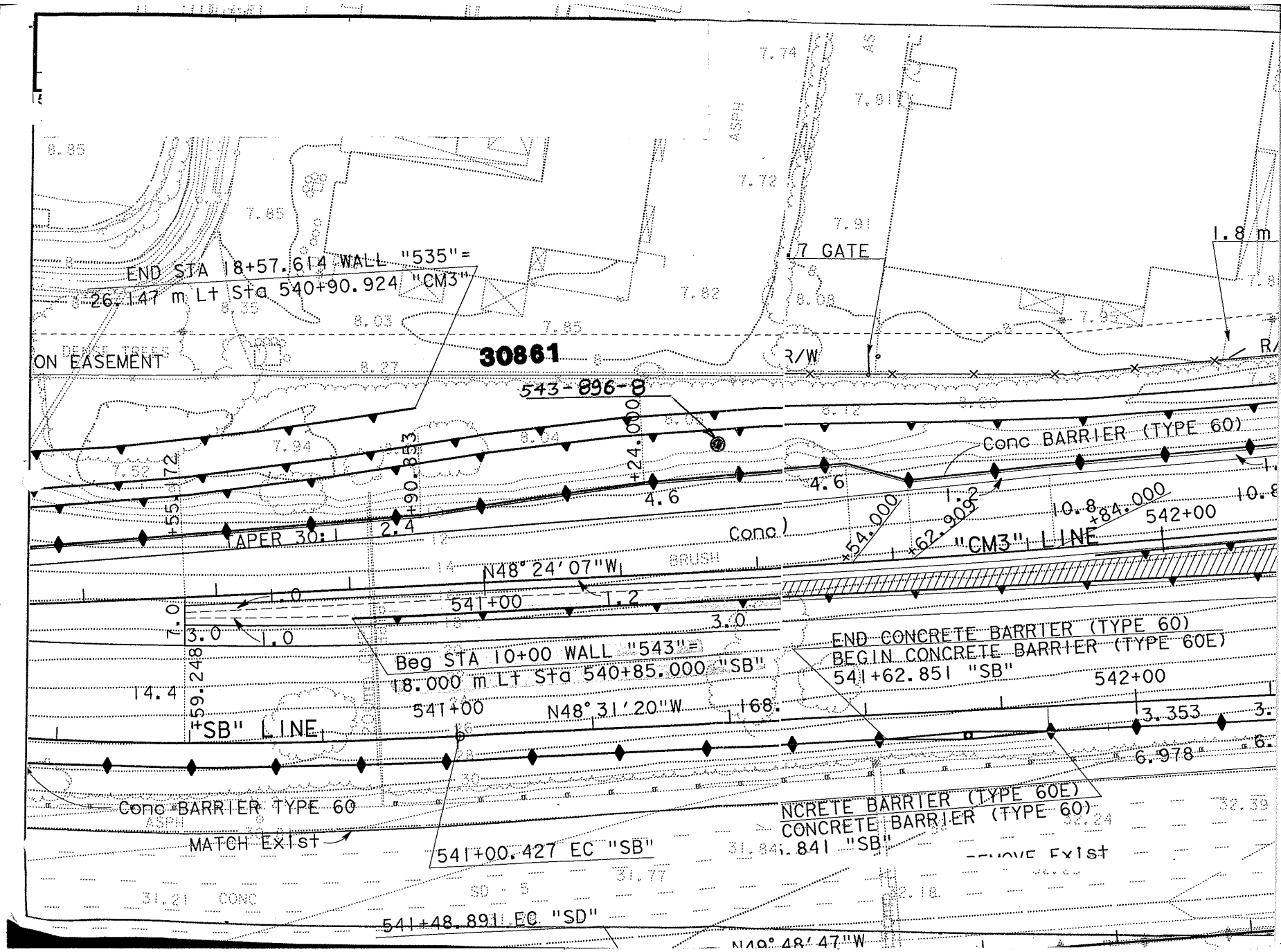

31330
FLOOD CHANNEL
R/W
527-6108
31219-2
528+43.549 EC "SB"
Beg "527" WALL
10.735 Lt 526+91.623 "SB"
F Exist R/W
AERIAL EASEMENT
EB
+86.746
472+00
527+00
528+00
3.353
471+00
471+63.999 POC "ST805"=
527+41.617 POC "SB"
527-B3
471+81.324 EC "ST805"
MATCH Exist
527±B2
7
528+33.
527-
527+00
2.0
1.7
1.0
528+00
END Conc BARRIER TYPE 60E
BEGIN Conc BARRIER TYPE 60
472+30.499 EC "AL"
N26°
BRUSH
ASPH

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-527
WALL- 527				

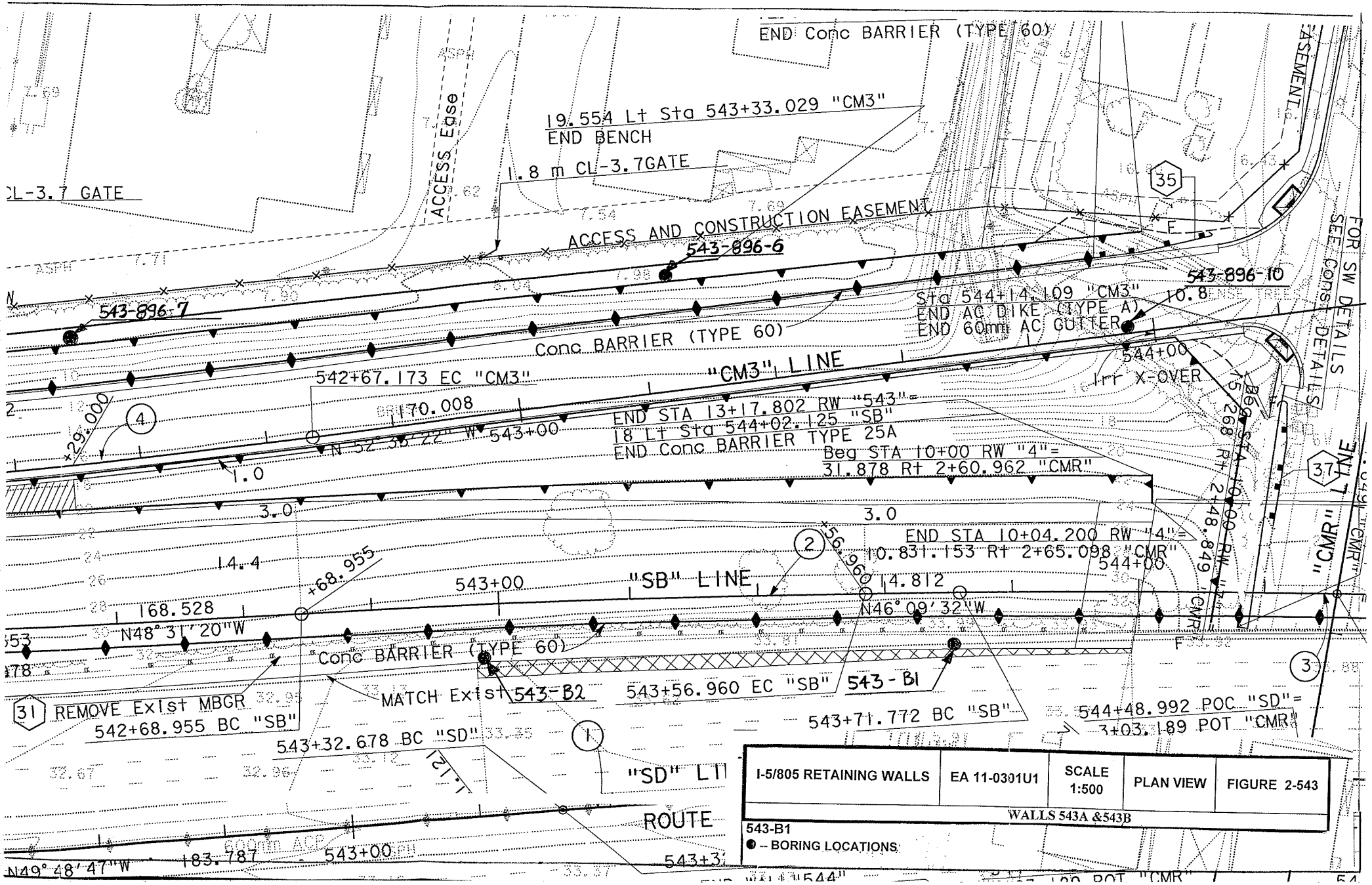
527-B1

● -- BORING LOCATIONS



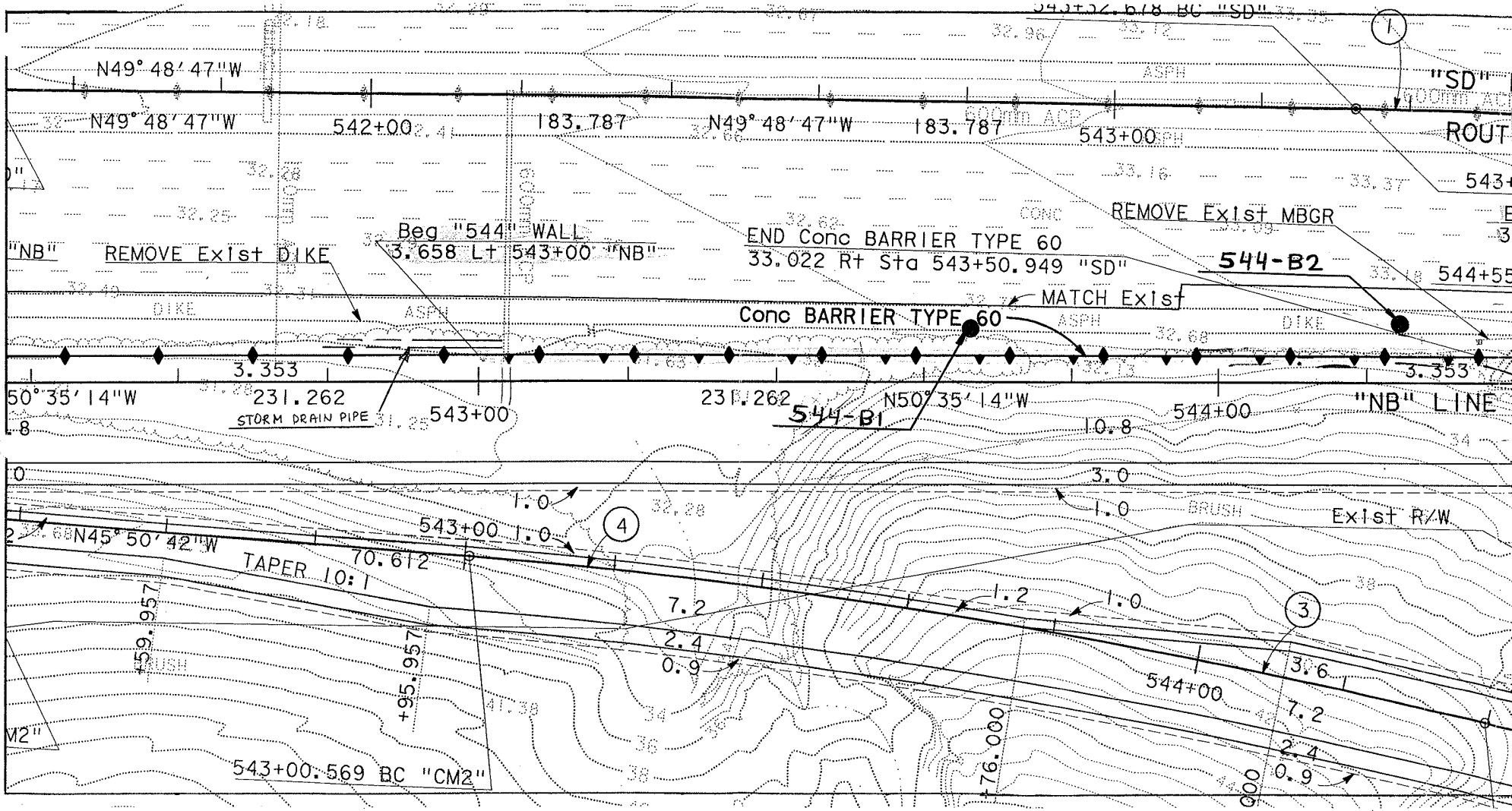


END STA 18+57.614 WALL "535"=
26.147 m Lt Sta 540+90.924 "CM3"
ON EASEMENT
30861
543-896-8
.7 GATE
1.8 m
R/W
Conc BARRIER (TYPE 60)
+55.172
+90.853
+24.000
4.6
2.4
TAPER 30:1
Conc)
+54.000
+62.909
10.8
+84.000
542+00
"CM3" LINE
N48°24'07"W
541+00
1.0
1.2
3.0
7.0
+59.248
14.4
Beg STA 10+00 WALL "543"=
18.000 m Lt Sta 540+85.000 "SB"
END CONCRETE BARRIER (TYPE 60)
BEGIN CONCRETE BARRIER (TYPE 60E)
541+62.851 "SB"
542+00
3.353
6.978
"SB" LINE
541+00
N48°31'20"W
Conc BARRIER TYPE 60
MATCH Exist
541+00.427 EC "SB"
NCRETE BARRIER (TYPE 60E)
CONCRETE BARRIER (TYPE 60)
.841 "SB"
Exist
541+48.891 EC "SD"
N49°48'47"W

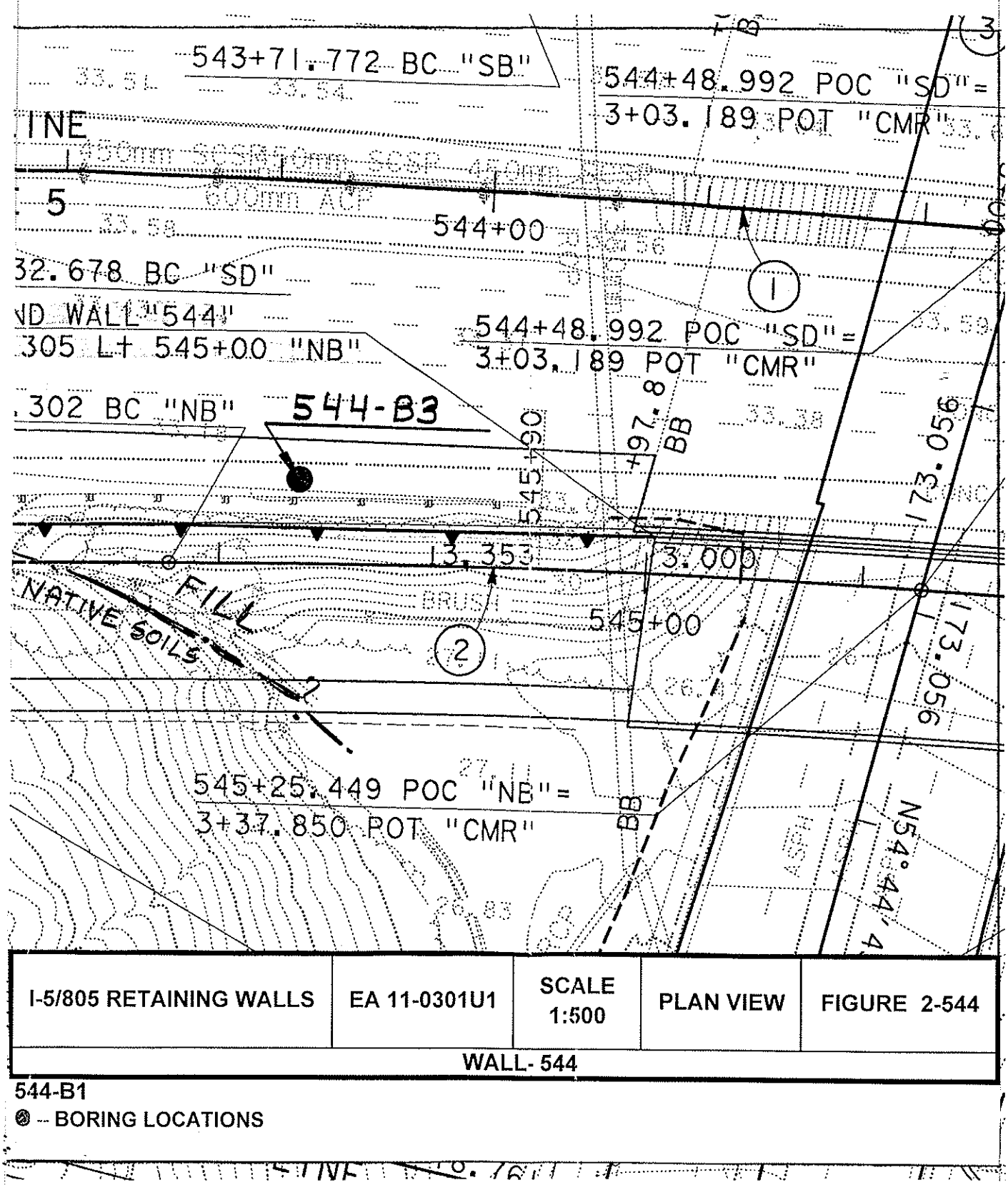


I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-543
WALLS 543A &543B				

543-B1
● -- BORING LOCATIONS



N49° 48' 47"W
N49° 48' 47"W
542+00
183.787
N49° 48' 47"W
183.787
543+00
"SD"
ROUT
REMOVE Exist MBGR
Beg "544" WALL
3.658 Lt 543+00 "NB"
END Conc BARRIER TYPE 60
33.022 Rt Sta 543+50.949 "SD"
544-B2
"NB"
REMOVE Exist DIKE
MATCH Exist
Conc BARRIER TYPE 60
3.353
3.353
50° 35' 14"W
231.262
STORM DRAIN PIPE
543+00
231.262
544-B1
N50° 35' 14"W
544+00
"NB" LINE
10.8
3.0
1.0
1.0
Exist R/W
543+00 1.0
N45° 50' 42"W
70.612
TAPER 10:1
7.2
1.2
1.0
2.4
0.9
3.6
544+00
7.2
2.4
0.9
+59.957
+95.957
+76.000
543+00.569 BC "CM2"

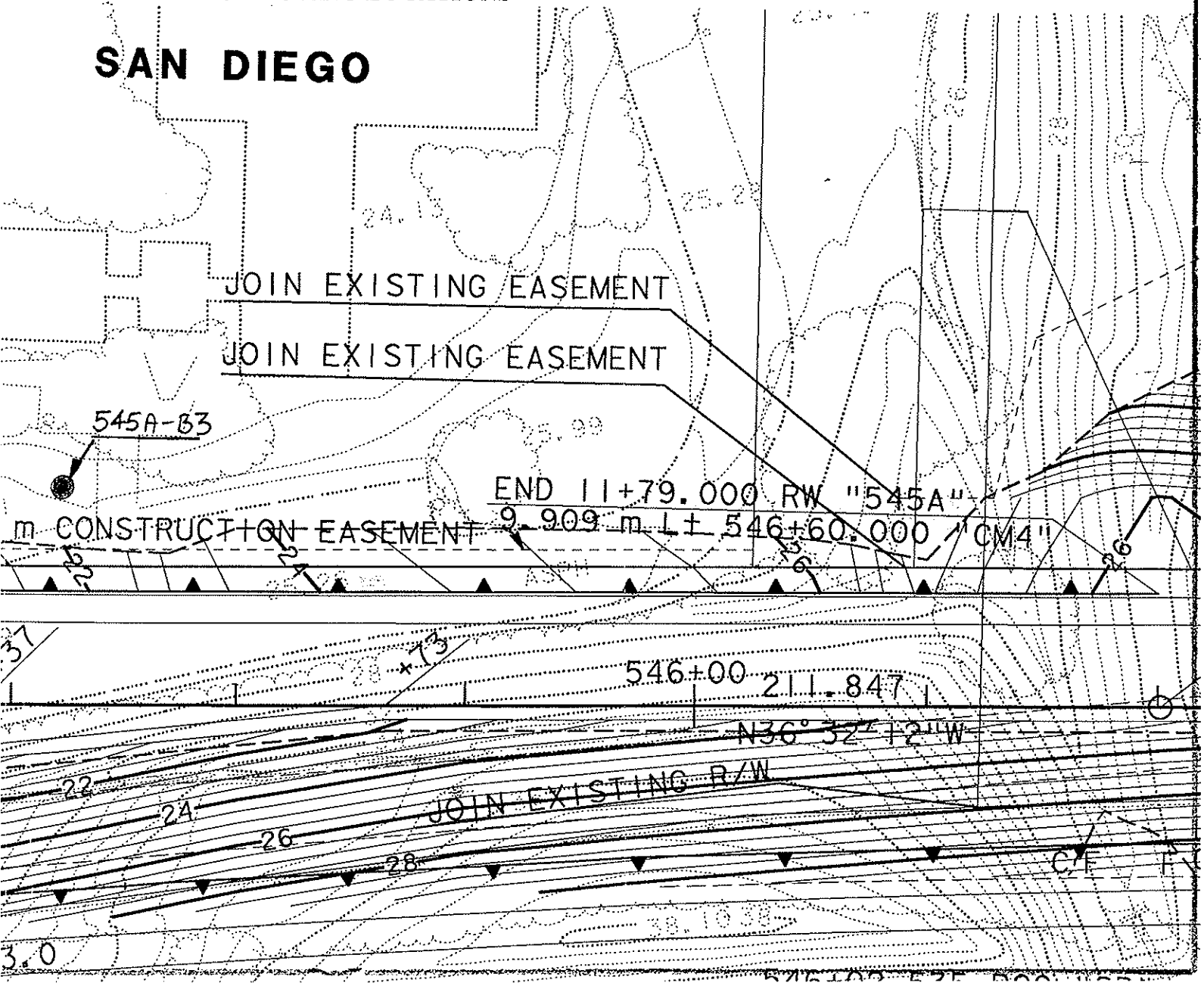


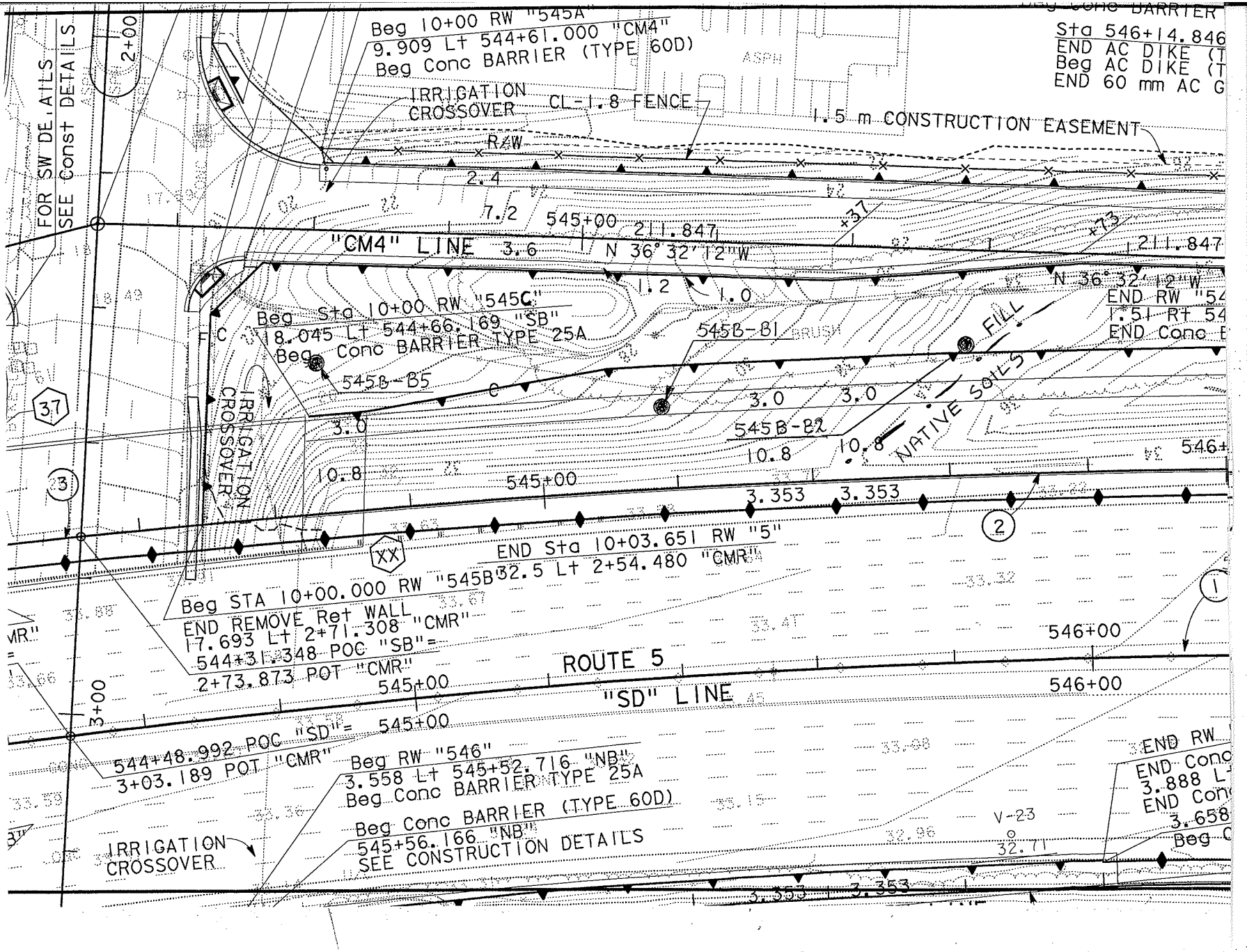
I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-544
WALL- 544				

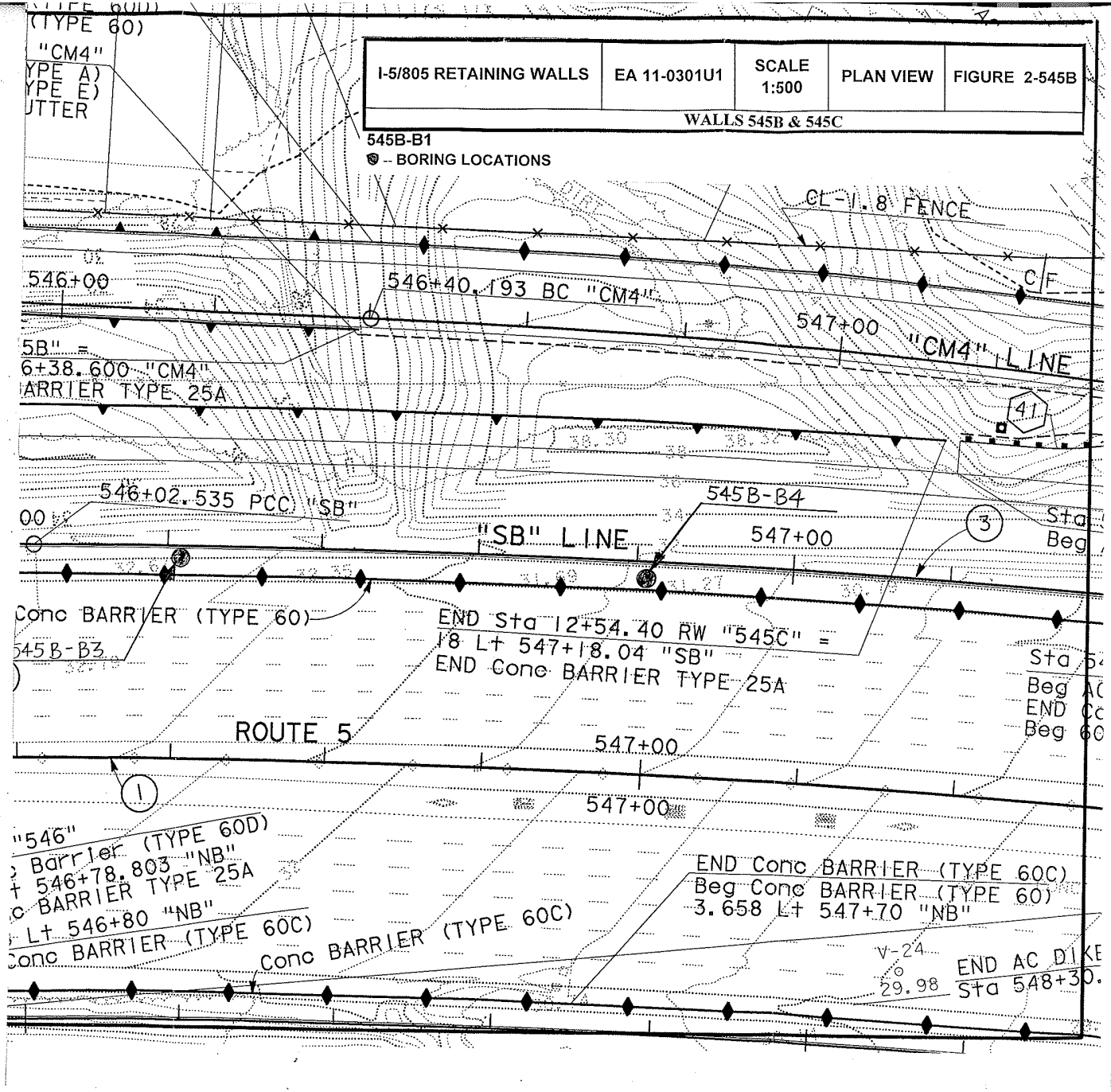
544-B1
⊕ -- BORING LOCATIONS

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2 – 545A
WALL – 545A				

545A-B1
● – BORING LOCATIONS



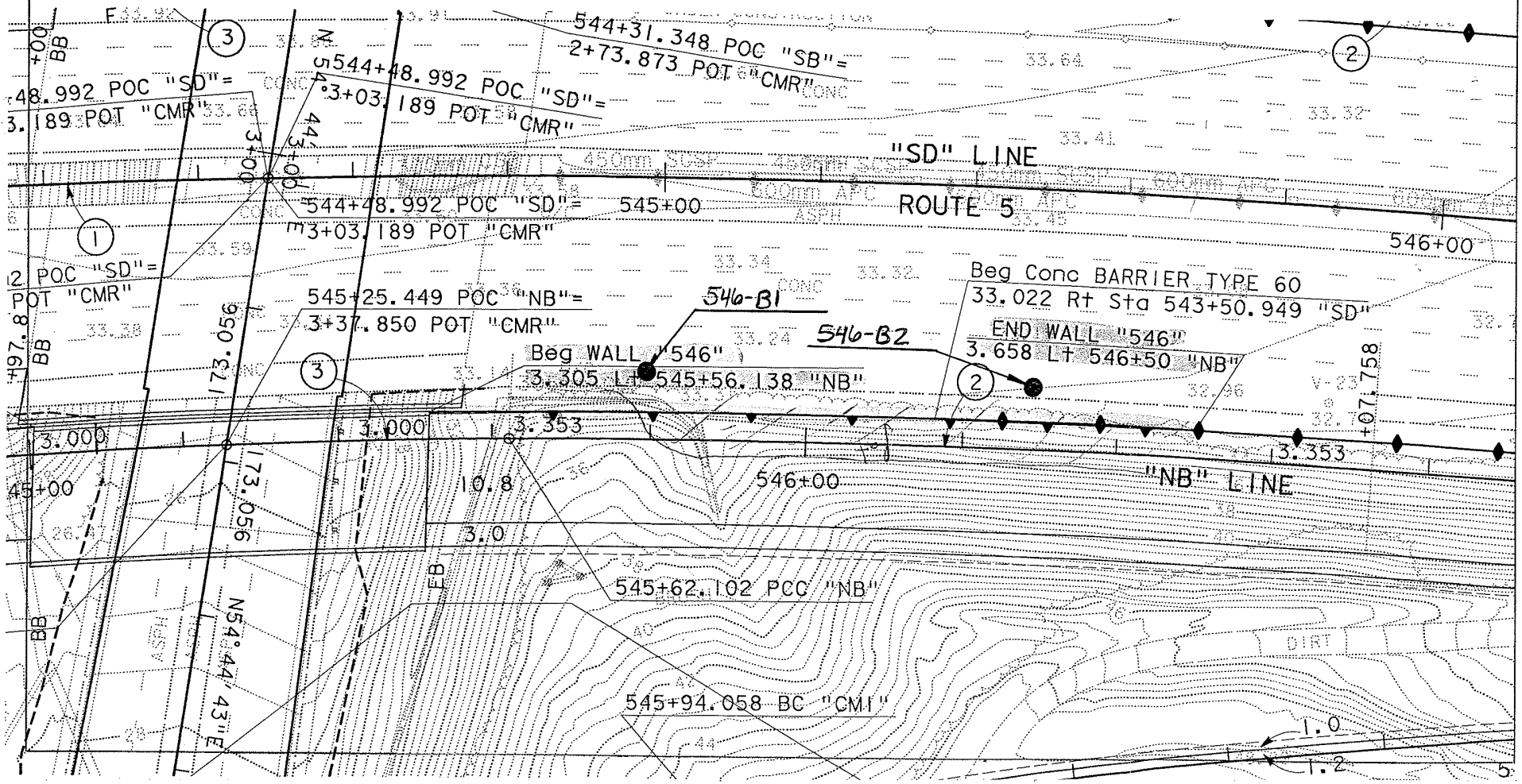

Beg 10+00 RW "545A"
9.909 Lt 544+61.000 "CM4"
Beg Conc BARRIER (TYPE 60D)
IRRIGATION CROSSOVER
CL-1.8 FENCE
R/W
1.5 m CONSTRUCTION EASEMENT
2.4
7.2
545+00 211.847
"CM4" LINE
3.6
N 36° 32' 12"W
1.2
1.0
Beg Sta 10+00 RW "545C"
18.045 Lt 544+66.169 "SB"
Beg Conc BARRIER TYPE 25A
545B-B5
545B-B1
545B-B2
FILL
NATIVE SOILS
3.0
3.0
10.8
10.8
545+00
3.353
3.353
END Sta 10+03.651 RW "5"
32.5 Lt 2+54.480 "CMR"
Beg STA 10+00.000 RW "545B"
END REMOVE Ret WALL
17.693 Lt 2+71.308 "CMR"
544+31.348 POC "SB"=
2+73.873 POT "CMR"
ROUTE 5
"SD" LINE
545+00
546+00
544+48.992 POC "SD"=
3+03.189 POT "CMR"
Beg RW "546"
3.558 Lt 545+52.716 "NB"
Beg Conc BARRIER TYPE 25A
Beg Conc BARRIER (TYPE 60D)
545+56.166 "NB"
SEE CONSTRUCTION DETAILS
IRRIGATION CROSSOVER
V-23
32.71
FOR SW DETAILS
SEE Const DETAILS
2+00
3+00
37
3
2
1
XX
Sta 546+14.846
END AC DIKE (T
Beg AC DIKE (T
END 60 mm AC G
END RW "54
1.51 Rt 54
END Conc B
END RW
END Conc
3.888 L
END Conc
3.658
Beg C

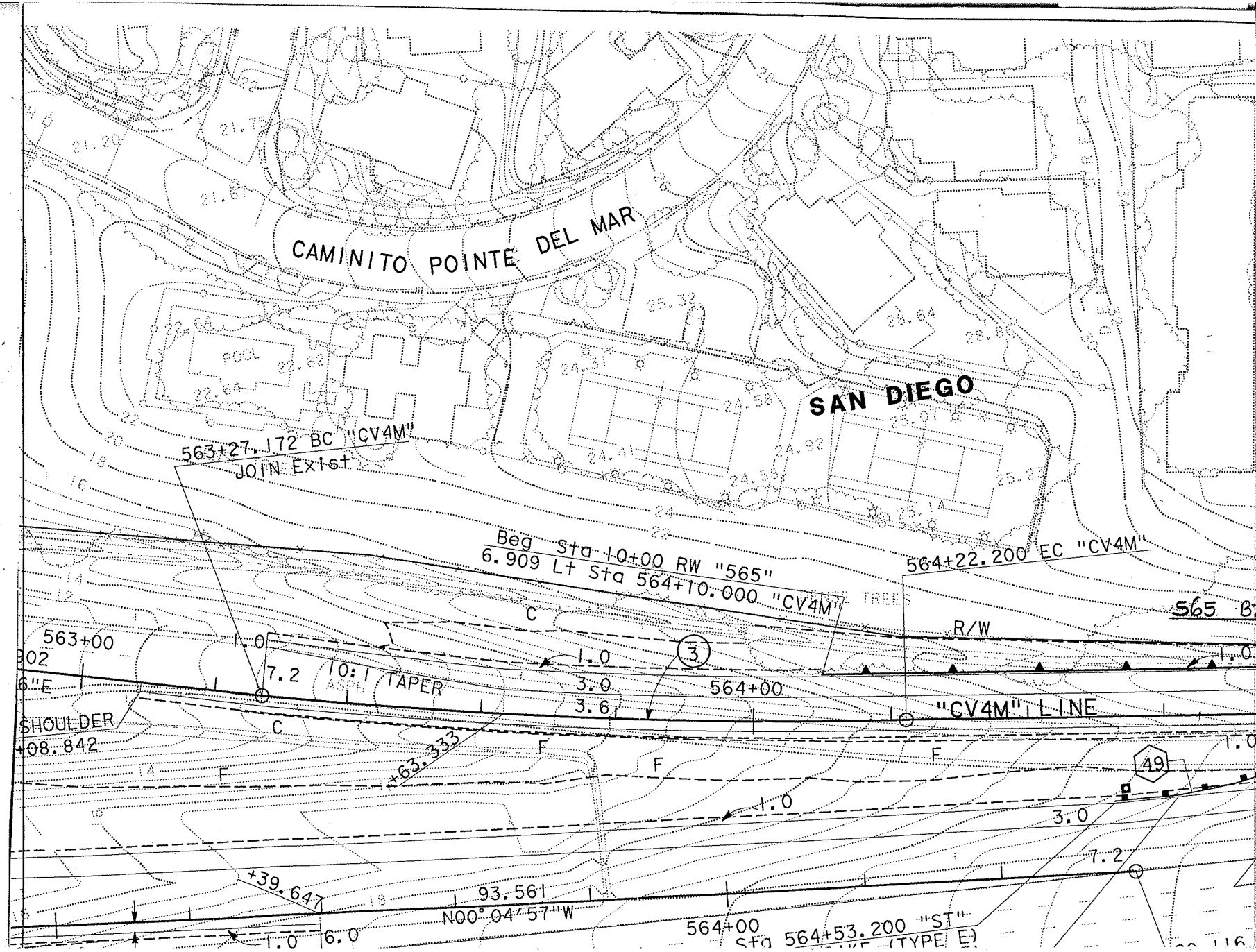

I-5/805 RETAINING WALLS
EA 11-0301U1
SCALE 1:500
PLAN VIEW
FIGURE 2-545B
WALLS 545B & 545C
545B-B1
-- BORING LOCATIONS
CL-1.8 FENCE
546+00
546+40.193 BC "CM4"
547+00 "CM4" LINE
546+02.535 PCC "SB"
"SB" LINE
545B-B4
547+00
Conc BARRIER (TYPE 60)
545B-B3
END Sta 12+54.40 RW "545C" =
18 Lt 547+18.04 "SB"
END Conc BARRIER TYPE 25A
ROUTE 5
547+00
547+00
Conc BARRIER (TYPE 60C)
END Conc BARRIER (TYPE 60C)
Beg Conc BARRIER (TYPE 60)
3.658 Lt 547+70 "NB"
END AC DIKE
Sta 548+30.

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-546
WALL- 546				

546-B1

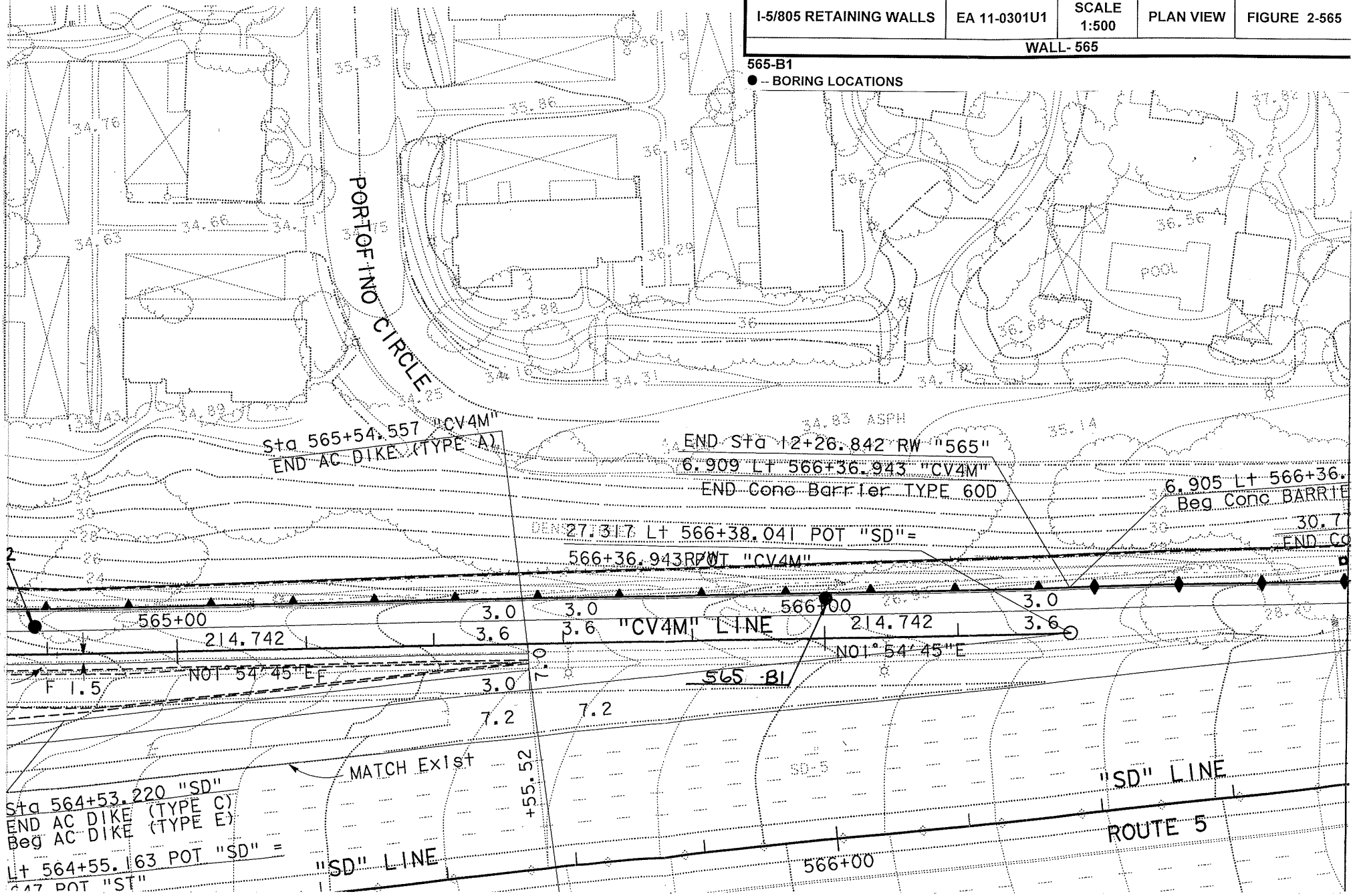
● -- BORING LOCATIONS

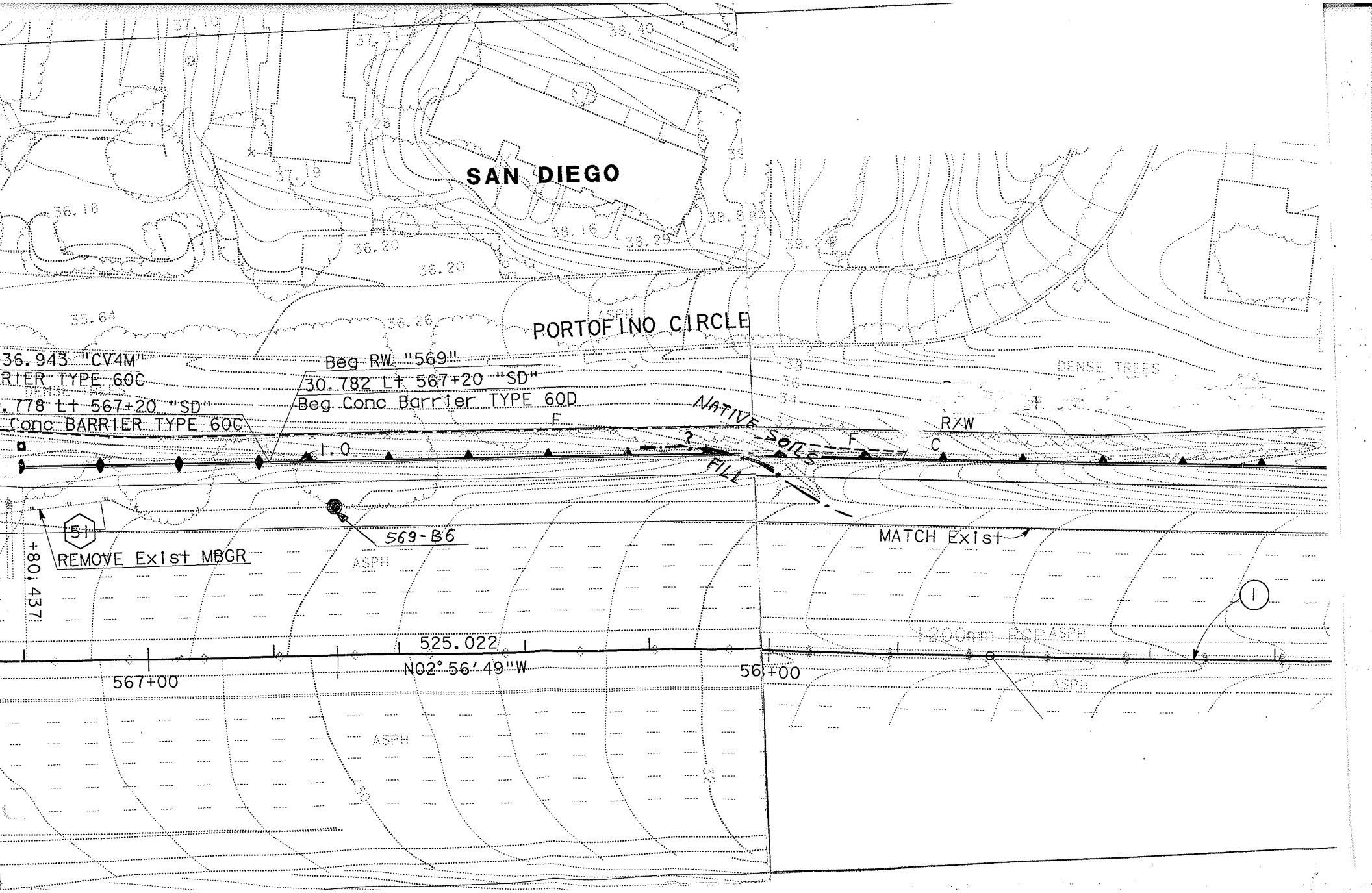


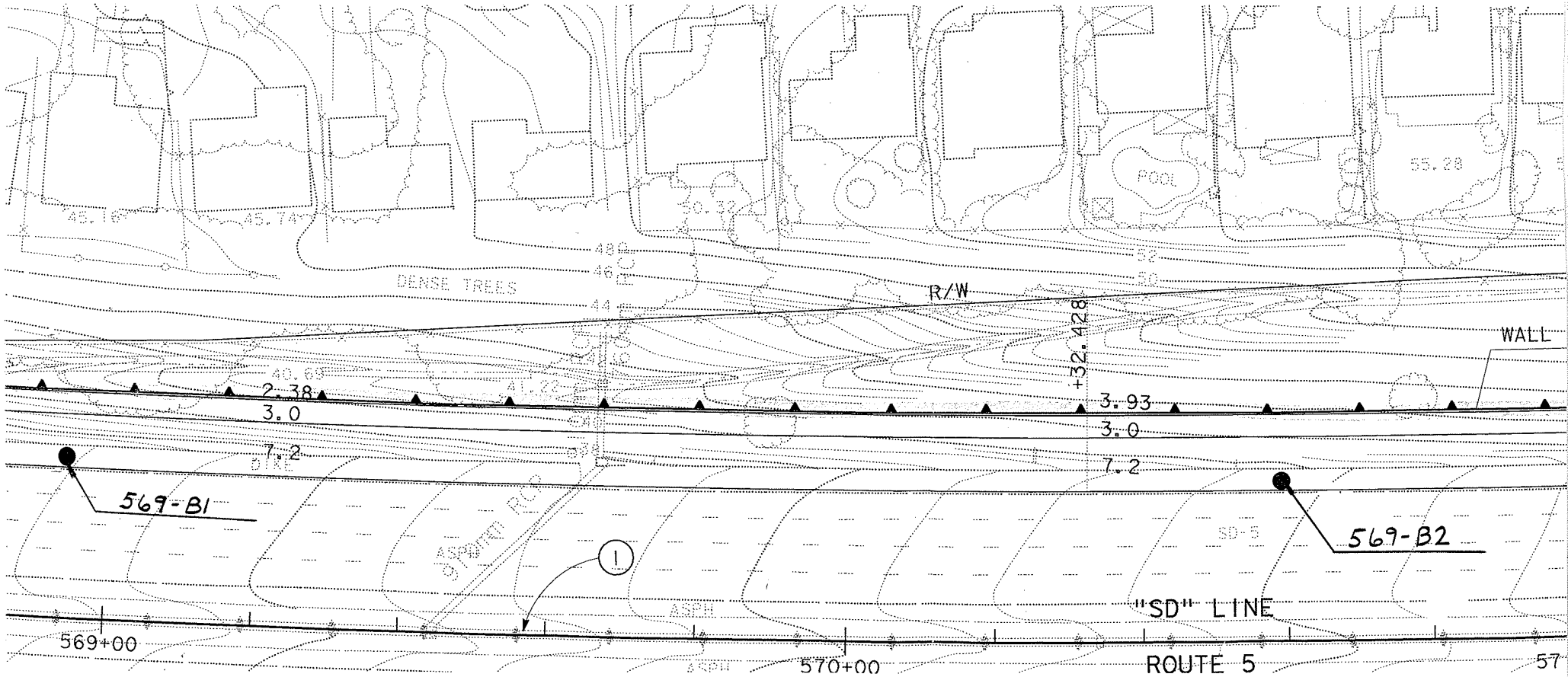

CAMINITO POINTE DEL MAR
SAN DIEGO
POOL
563+27.172 BC "CV4M"
JOIN Exist
Beg Sta 10+00 RW "565"
6.909 Lt Sta 564+10.000 "CV4M"
564+22.200 EC "CV4M"
565 B
R/W
563+00
1.0
7.2
10:1 TAPER
1.0
3.0
3.6
564+00
"CV4M" LINE
SHOULDER
+08.842
+63.333
49
1.0
3.0
7.2
+39.647
93.561
N00°04'57"W
564+00
Sta 564+53.200 "ST"
(TYPE E)
1.0
6.0

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-565
WALL- 565				

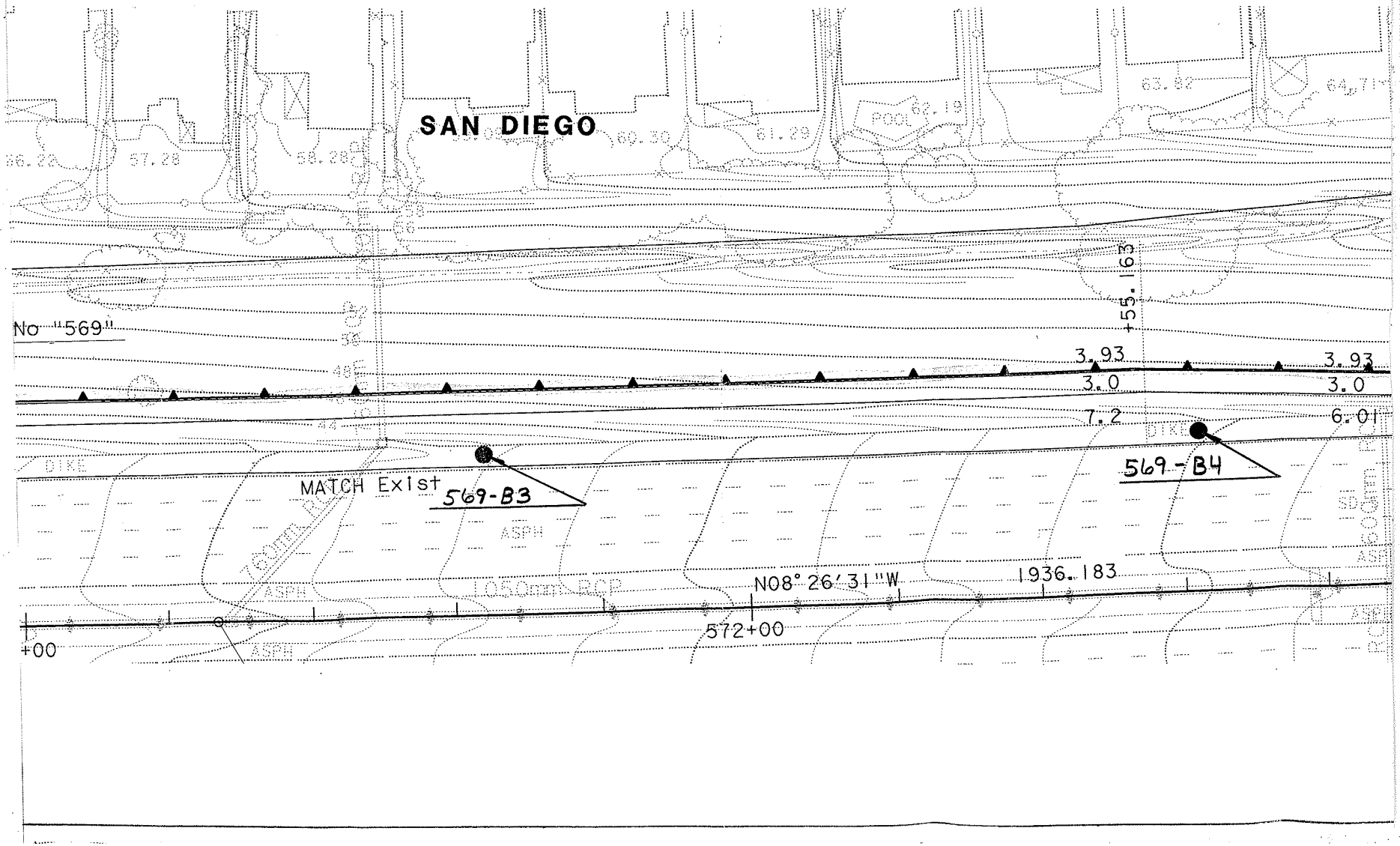
565-B1
● -- BORING LOCATIONS

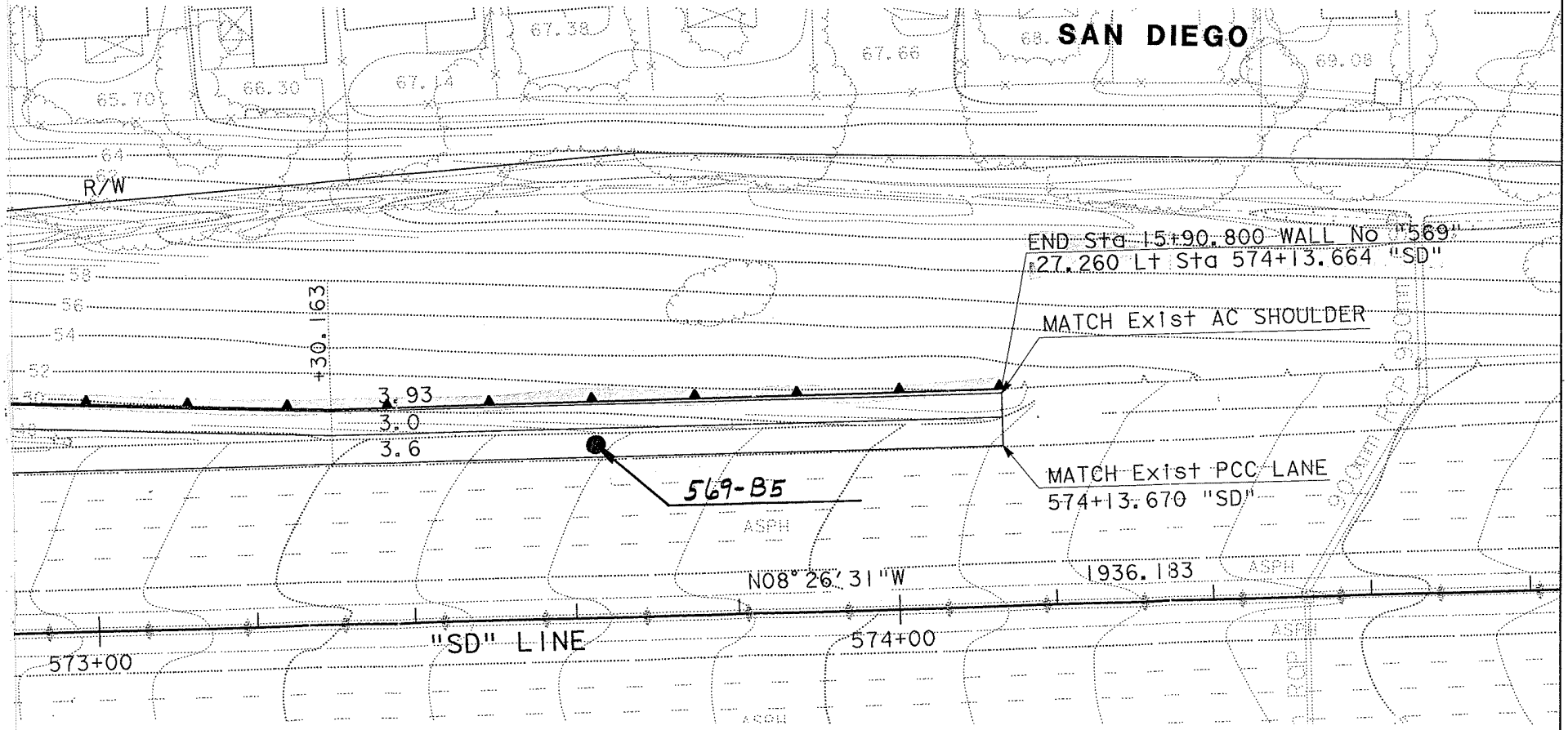



SAN DIEGO
PORTOFINO CIRCLE
36.943 "CV4M"
RIER TYPE 60C
.778 Lt 567+20 "SD"
Conc BARRIER TYPE 60C
Beg RW "569"
30.782 Lt 567+20 "SD"
Beg Conc Barrier TYPE 60D
NATIVE SOILS
FILL
R/W
DENSE TREES
51
REMOVE Exist MBGR
569-B6
MATCH Exist
+80.437
525.022
N02°56'49"W
567+00
561+00
ASPH
200mm RCP



DENSE TREES
R/W
WALL
POOL
+32.428
2.38
3.0
7.2
3.93
3.0
7.2
569-B1
569-B2
1
"SD" LINE
ROUTE 5
569+00
570+00

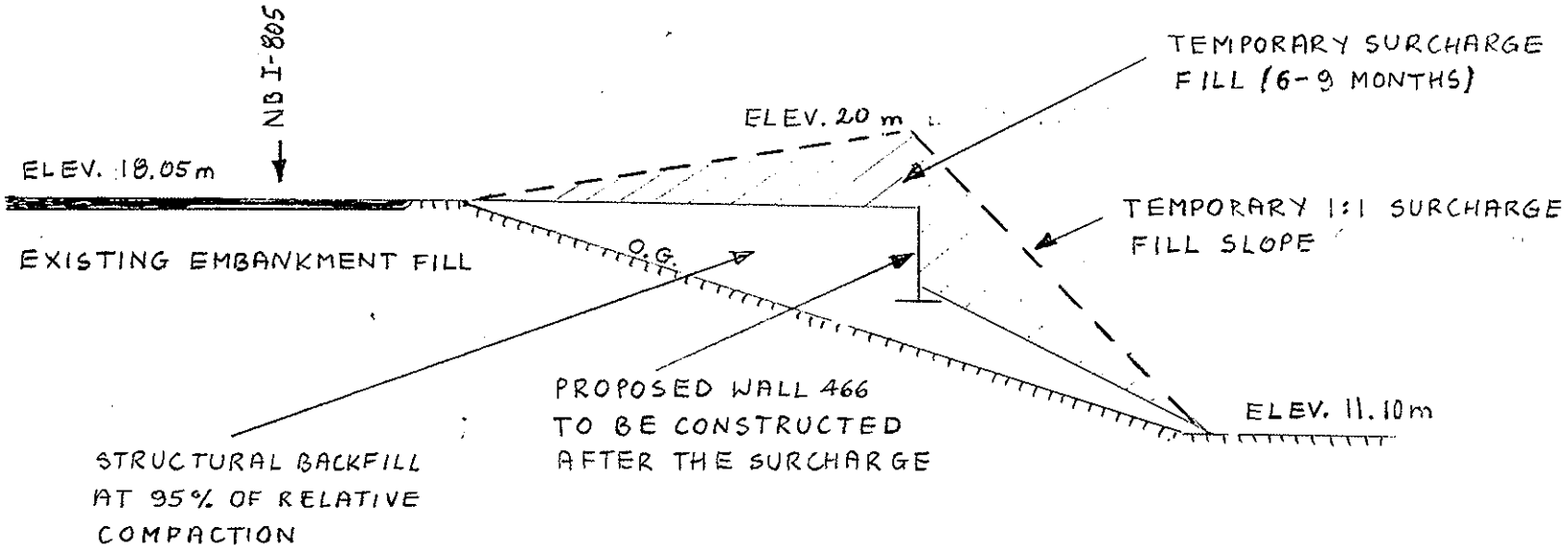

SAN DIEGO
No "569"
3.93
3.0
7.2
3.93
3.0
6.01
DIKE
MATCH Exist
569-B3
569-B4
ASPH
1050mm RCP
N08° 26' 31" W
1936.183
572+00
+00
55.63



I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-569
WALL- 569				

569-B1
● -- BORING LOCATIONS

WALL 466, STATION 466+80



WALL 466: TYPICAL SURCHARGE SECTION

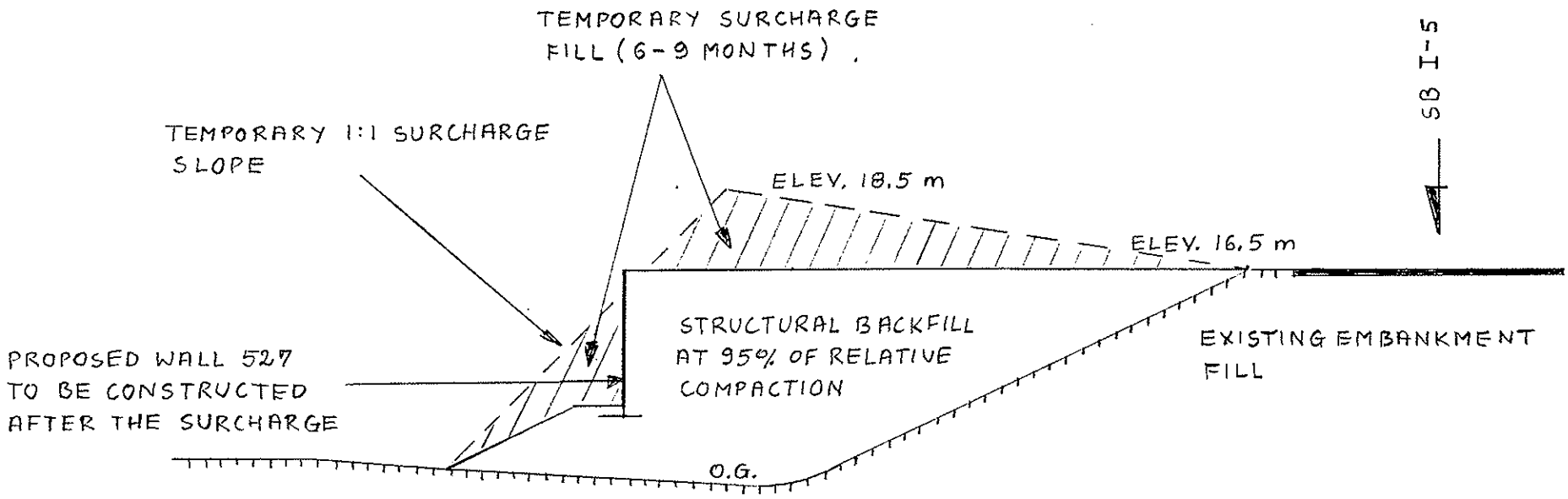
0 2 4 6 8 m

FIGURE 3

EA 0301U1

J.T.

WALL 527, STATION 527+40



WALL 527: TYPICAL SURCHARGE SECTION

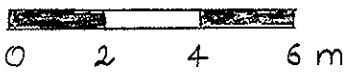
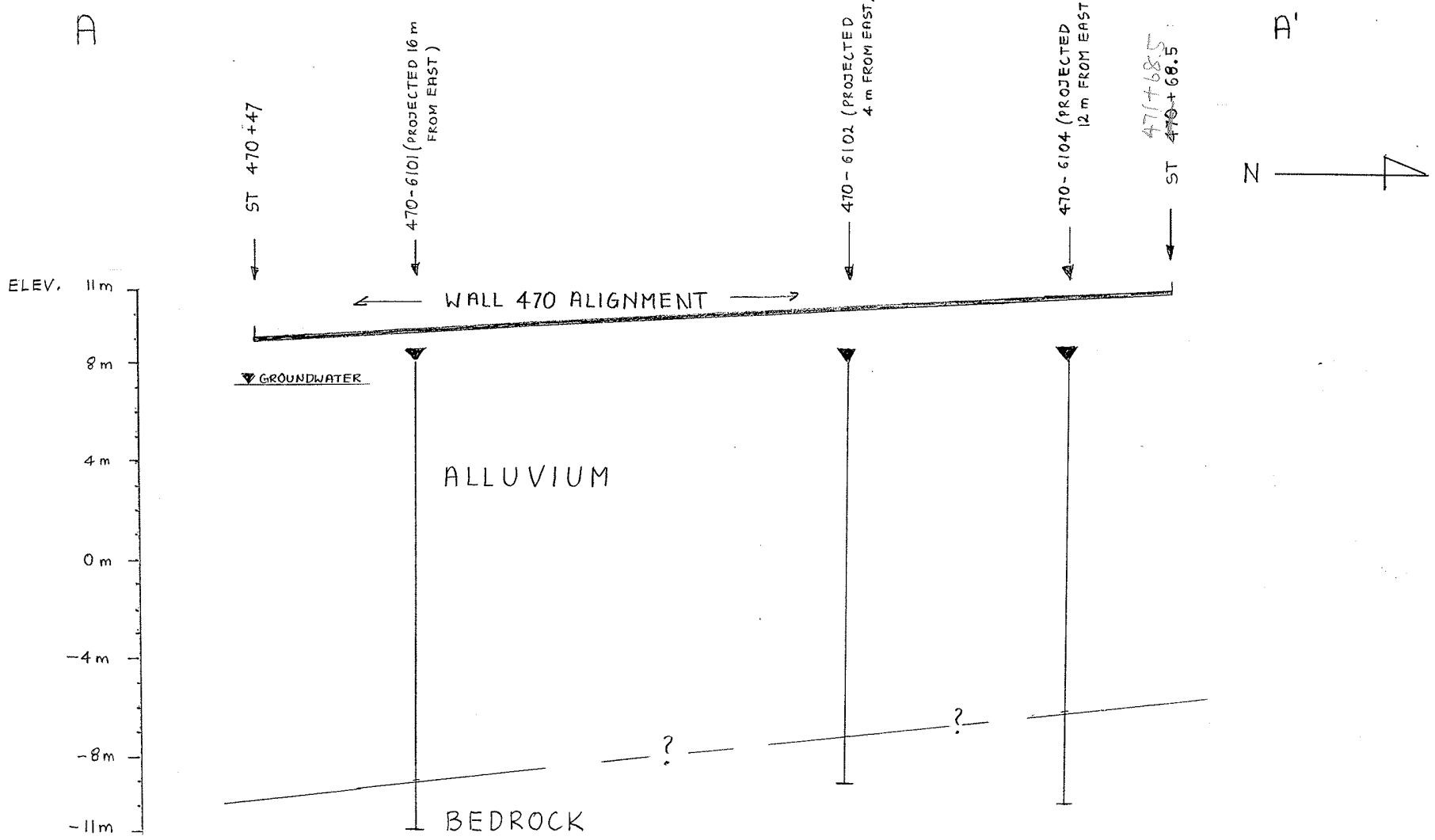


FIGURE 4

EA 03010U1

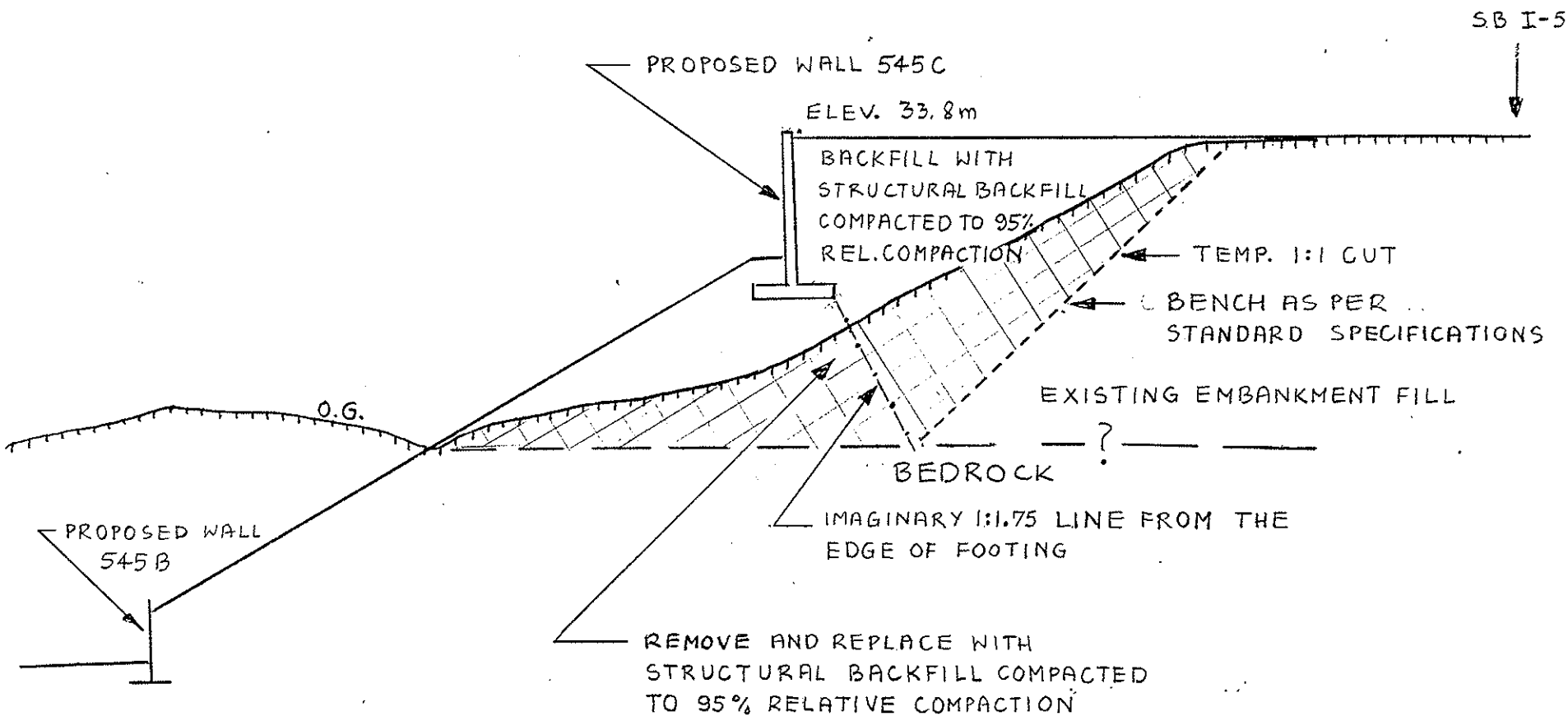
J.T.



WALL 470; SECTION A-A'

FIGURE 5

EA 030101 (J.T.)



STATION 544+80

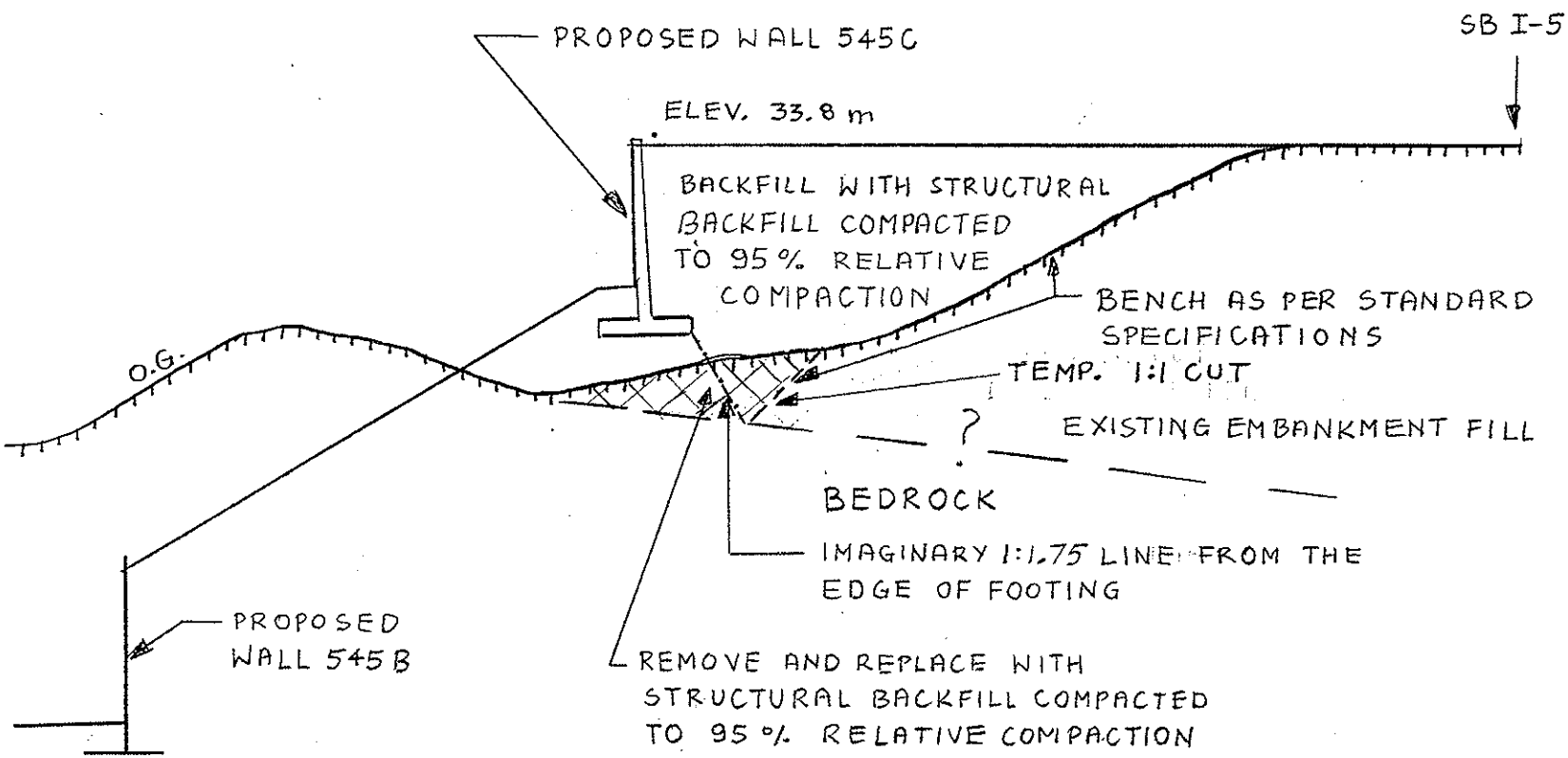
WALL 545C : TYPICAL FOUNDATION IMPROVEMENT SECTION

0 3 6 m

FIGURE 6

EA 0301U1

J.T.



STATION 545+10

WALL 545C: TYPICAL FOUNDATION IMPROVEMENT SECTION

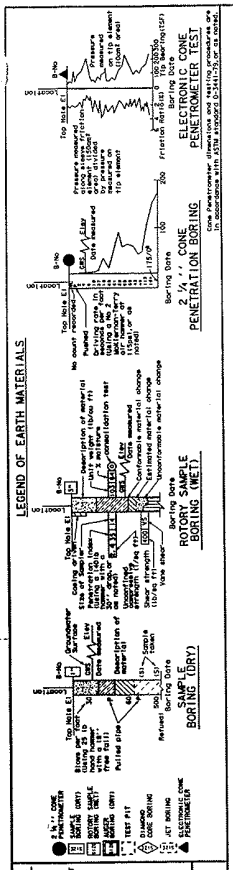
0 3 6 m

FIGURE 6A

EA 030101

J.T.

ATTACHMENTS



CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test			
Penetration Index (Blows/ft)	Granular	Cohesive	
0-4	Very loose	Very soft	
5-9	Loose	Soft	
10-19	Slightly compact	Stiff	
20-34	Compact	Very stiff	
35-59	Dense	Hard	
60+	Very dense	Very hard	

LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SILT, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 3A-B1

Date Drilled: 06/24/99
Project Name : I-5/805 Retaining Walls
Location : 8 m Lt; 544+52 "CM" Line
Drilling Method : Mud Rotary

Top of hole elevation : 20.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00	1	SPT	>50		Clayey Silty SAND (SC-SM) : Brown, moist, medium rusty with cobbles, very dense (N-blow counts affected by subrounded and rounded cobbles and coarse gravel).
-2.00					-at 2.1 m : grades to sand with occasional cobbles and gravel grains
-3.00	2	SPT	86		
-4.00					SAND (SP) : Slightly silty, red brown (rusty) medium grained, moist, very dense, sporadic fine gravel.
-5.00	3	SPT	91		
-6.00	4	SPT	>50		-at 6.0 m : inclusions of gravel-size chunks of gray siltstone.

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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BORING: 3A-B1 R-50

LOG OF TEST BORINGS (of)

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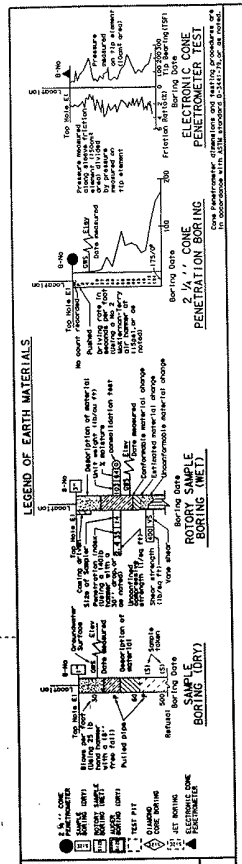
FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 3A-B2

Date Drilled: 06/29/99
Project Name : I-5/805 Retaining Walls
Location : 11L; 545+18 "SB" Line
Drilling Method : Mud Rotary

Top of hole elevation : 29.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					FILL: Sand mixed with silty sand and coarse gravel
-2.00	1	SPT	>50		SAND (SP): Brown to reddish-brown, moist, slightly clayey and silty, medium grained, very dense, with traces of fine gravel and cobbles.
-3.00	2	SPT	>50		
-4.00					
-5.00	3	SPT	>50		-at 4.5 m : grades to slightly silty and medium grained, brown, moist -at 5.3 m - 5.7 m: from the response of drill rig, grades to less dense.
-6.00	4	SPT	>50		-at 6.0 m: locally rusty laminae



CONSISTENCY CLASSIFICATION FOR SOILS
Adaptation to the Standard Penetration Test

Penetration (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-18	Slightly compact	Stiff
20-34	Compact	Very stiff
35-49	Dense	Hard
50+	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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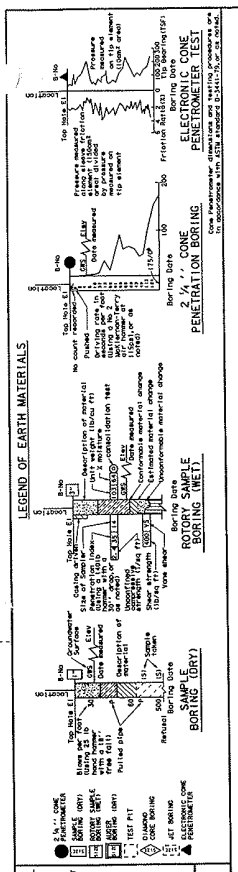

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed as laboratory material analysis.

BORING No. : 6-B1

Date Drilled: 06/24/99

Project Name : I-5/805 Retaining Walls

Location : 8L;544+52 "CM" Line

Drilling Method : Mud Rotary

Top of hole elevation : 20.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00	1	SPT	>50		Clayey Silty SAND (SC-SM): Brown, moist, rusty, with cobbles, very dense (N- blow counts affected by subrounded and rounded cobbles and coarse gravel). -at 2.1 m : grades to sand with occasional cobbles and gravel grains.
-2.00					
-3.00	2	SPT	86		SAND (SP) : Slightly silty, red brown (rusty) medium grained, moist, very dense, sporadic fine gravel.
-4.00					
-5.00	3	SPT	91		
-6.00	4	SPT	>50		-at 6.0 m : inclusions of gravel-size chunks of gray siltstone

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805,56	R45.5/R59.5, 41.4/46.3,T0.7/2.0	XX	XXX

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BORING: 6-B1 R-52

LOG OF TEST BORINGS (of)

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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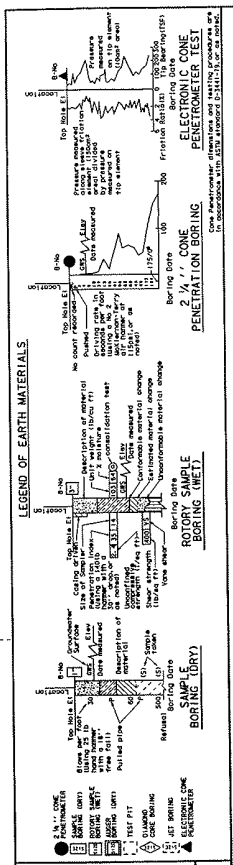

BORING No. : 456-B1

Date Drilled: 08/3/99

Project Name : I-5/805 Retaining Walls

Location : 22R; 456+62 "A" Line

Drilling Method : Mud Rotary

Top of hole elevation : 33.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					
	1	SPT	88		SILTSTONE (Ardath Shale): Gray and brown, mottled/laminated at about 90 degrees to boring axis, moist, grades to claystone, micaceous; locally gravelly, with caliche stringers at about 70 degrees to boring axis locally.
-2.00					
-3.00	2	SPT	>50		
-4.00					
	3	SPT	102		at 4.5 m : locally layers/lenses of dark gray siltstone.

LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING:456-B1 R-53

LOG OF TEST BORINGS (of)

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FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 456-B2

Date Drilled: 08/3/99

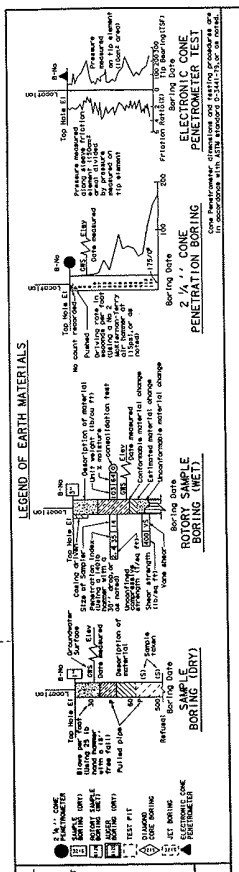
Project Name : I-5/805 Retaining Walls

Location : 24R;458+66 "A" Line

Drilling Method : Mud Rotary

Top of hole elevation : 30.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SILTSTONE (Logged from cuttings): sandy, with gravel and cobbles; hard drilling.
-2.00					- at 2.4 m : fluid loss led to hole termination.



LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, GRAVEL, SILTSTONE, SILT, BEDROCK, SANDY CLAY, CLAYEY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO 7/2.0	XX	XXX

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BORING: 456-B2 R-54

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FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 456-B3

Date Drilled: 08/2/99
Project Name : I-5/805 Retaining Walls
Location : 49R; 458+39 "A" Line
Drilling Method : Coring

Top of hole elevation : 37.0 m

SAMPLE					PROFILE	
DEPTH M	NUMBER	RECOVERY %	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0						Ground Surface
						ASPHALT PAVEMENT
						FILL (base and subbase)
-1.00						SILTSTONE: (Ardath Shale Formation) Gray brown, moist, traces of gravel, locally grades to claystone and/or sandstone: weakly cemented (breaks easily when squeezed by hand).
-2.00	1		CORING			
-3.00	2		CORING			
-4.00						- at 3.6 m : grades to gravelly, with some cobbles.
-5.00	3		CORING			

LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST
2 1/4 " CONE PENETRATION BORING
ROTARY SAMPLE BORING (WET)
SAMPLE BORING (DRY)

LEGEND OF EARTH MATERIALS: CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SILT, SANDY SILT, SILTY SAND, BEDROCK, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-49	Dense	Hard
Y10	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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BORING: 456-B3 R-55
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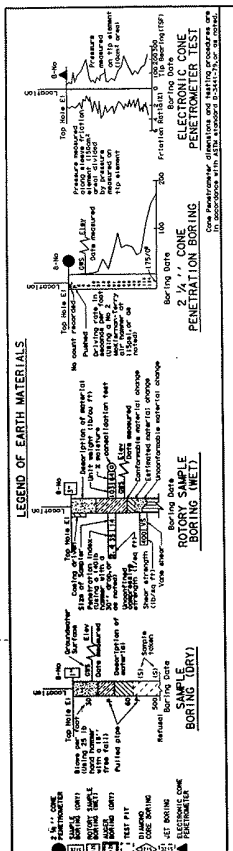

BORING No. : 456-B4

Date Drilled: 08/4/99

Project Name : I-5/805 Retaining Walls

Location : 27R;457+15 "A" Line

Drilling Method : Mud Rotary

Top of hole elevation : 32.90 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SILTSTONE: (Ardath Shale Formation) Gray and brown, damp, laminated, laminas at 90 degrees to the boring axis, locally rusty and clayey, sporadic caliche stringers.
-2.00	1	SPT	90		
-3.00	2	SPT	100		-at 3.0 m : locally layers contain lenses of SAND-rusty (up to 0.1 m thick), medium grained.
-4.00	3	SPT	75		-at 4.5 m : locally gravel and cobbles

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test		
Penetration (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Medium stiff
20-34	Compact	Very stiff
35-50	Dense	Hard
>50	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO 7/2.0	XX	XXX

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BORING: 456-B4 **R-56**

LOG OF TEST BORINGS (of)

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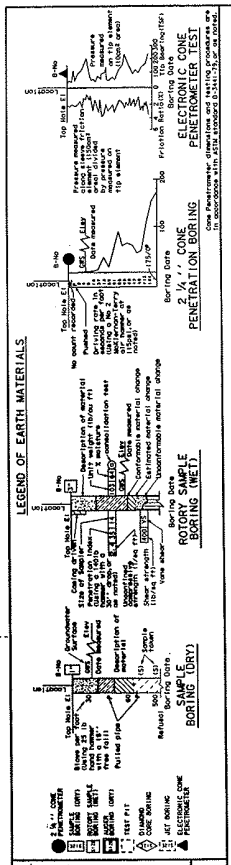

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 456-B5

Date Drilled: 07/1/99
Project Name : I-5/805 Retaining Walls
Location : 52R; 460+51 "A" Line
Drilling Method : Coring

Top of hole elevation : 35.50 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	RECOVERY %	TYPE	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00	1		CORING		SAND/Silty SAND (SP/SM): (Bay Point Formation) Brown, moist, fine to medium grained, locally fine gravel, locally grades to sandy silt.
-2.00	2		CORING		
-3.00	3		CORING		SILTY SAND (SM) With gravel and cobbles, brown, moist, gravel subrounded and rounded.
-4.00	4		CORING		
-5.00	5		CORING		- at 4.2-6.0 m: loss of drilling fluid; gravel and cobbles within silty sand matrix
	6		CORING		
-6.00	7		CORING		SANDY SILT (ML): locally clayey, brown, nonplastic, moist (locally plastic clayey layers).
-7.00	8		CORING		- at 6.6-8.1 m : only cobbles and gravel revovered
-8.00	9		CORING		- at 8.1-9.0 m : heavy loss of drilling fluid
-9.00	10		CORING		SILTSTONE: Brown, moist, locally laminated, locally endurated, nonplastic.
-10.00					

CONSISTENCY CLASSIFICATION FOR SOILS — Approximate to the Standard Penetration Test

Penetration (blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-48	Dense	Hard
49+	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, BEDROCK, SANDY CLAY, SANDY SILT, SILTY SAND, SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

BORING: 456-B5 R-57

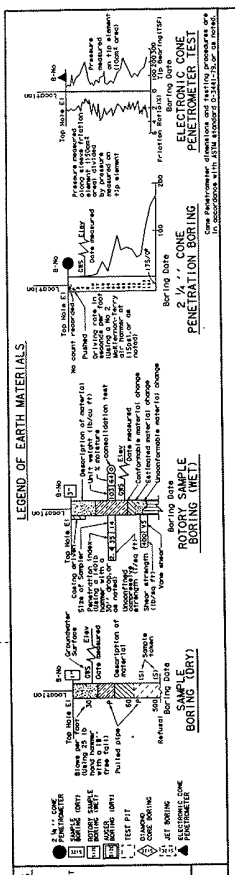
LOG OF TEST BORINGS (of)

CU 11275 EA 0301U1

USERNAME => tbdjoc
DGN FILE => b0301ug57.dgn

PLOTTED => 06-APR-2001 14:57

FORM OC-OE-92-PF (REV. 3/88)



BORING No. : 456-B6

Date Drilled: 06/28/99

Project Name : I-5/805 Retaining Walls

Location : 26R; 461+52 "A" Line

Drilling Method : Mud Rotary

Top of hole elevation : 25.30 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					SILTSTONE : (Ardath Shale Formation) Gray, moist, nonplastic, slightly sandy, hard, slightly laminated, with rusty laminas.
-1.00					
-2.00	1	SPT	85		
-3.00	2	SPT	87		
-4.00					
	3	SPT	Refusal		- at 4.5-5.1 m : logged from cuttings;crystalline rock (boulder) stong resistance to drilling
-5.00					- at 5.1 m : grades to brown in color
-6.00	4	SPT	>50		
-7.00					

LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK, SANDY CLAY, SILTY CLAY, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration test

Penetration (blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTES: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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BORING: 456-B6 **R-58**

LOG OF TEST BORINGS (of)

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CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ug58.dgn

DATE PLOTTED => 06-APR-2001
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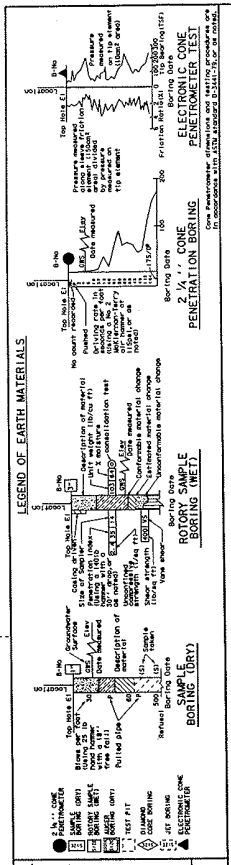
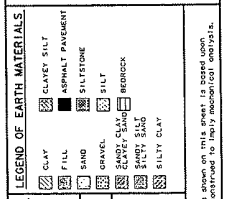
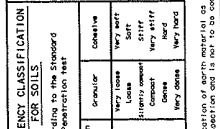
FORM DC-OE-92-PF (REV. 3/88)







NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 456-B7

Date Drilled: 06/28/99
Project Name : I-5/805 Retaining Walls
Location : 26R; 462+94 "A" Line
Drilling Method : Mud Rotary

Top of hole elevation : 23.30 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					SILTSTONE: (Ardath Shale Formation) Gray, moist, nonplastic, slightly sandy, hard, locally rusty.
-2.00	1	SPT	100		
-3.00	2	SPT	85		
-4.00					
-5.00	3	SPT	>50		- at 6.0 m : grades to dark gray in color

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.9	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST
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No. 2137
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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BORING: 456-B7 R-59

LOG OF TEST BORINGS (of)

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CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ug59.dgn

PLOTTED => 06-APR-2001
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FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 456-B8

Date Drilled: 06/11/99

Project Name : I-5/805 Retaining Walls

Location : 53R; 463+79 "A" Line

Drilling Method : Mud Rotary

Top of hole elevation : 30.00 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METERS (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SILTSTONE: (Ardath Shale Formation) Gray brown, moist, locally laminated (splits horizontally), with oxidated laminas. Caliche coatings and stringers.
-2.00	1	SPT	72		
-3.00					- at 2.1-2.4 m : from faster drilling advance: clayey layer
-4.00					
-5.00	2	SPT	92		- at 4.6m : lamination (about horizontal to the boring axis) is more pronounced
-6.00					
	3	SPT	117		
-7.00					
-8.00	4	SPT	120		
-9.00					
-10.00					
	5	SPT	>50		- at 10.7 m : grade to bluish gray, slightly laminated, moist, hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK, SANDY CLAY, SILTY SAND, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Firm
20-34	Compact	Very stiff
35-59	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mountain analysis.

LEGEND OF EARTH MATERIALS

Cone Penetrometer: dimensions and testing procedures are in accordance with the latest applicable ASTM standards.

ELECTRONIC CONE PENETROMETER TEST

2 1/4 " CONE PENETRATION BORING

ROTARY SAMPLE BORING (WET)

SAMPLE BORING (DRY)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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BRIDGE NO

POST MILE

BORING:456-B8 **R-60**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

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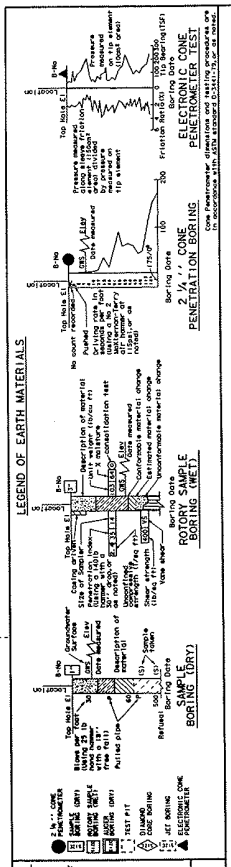
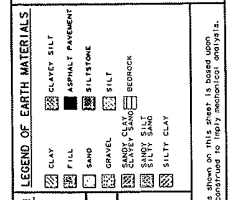
CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301va60.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 14:59

FORM DC-OE-92-PF (REV. 3/88)





NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply laboratory analysis.

BORING No. : 466-B1

Date Drilled: 08/3/99
Project Name : I-5/805 Retaining Walls
Location : 21R+466+68 "NT805" Line
Drilling Method : Mud Rotary

Top of hole elevation : 11.00 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					TOPSOIL Silty SAND (SM) : Dark brown, moist, with organics.
-1.00	1	CA Mod	0		ALLUVIUM: Silty SAND (SM): Slightly clayey, brown, moist, very loose, slightly plastic. Groundwater encountered at the depth of 2.1m.
-2.00	2	SPT	2		
-3.00	3	SPT	Refusal		SAND with gravel (SP) : logged from cuttings: brown, moist, loose (cave-ins during drilling), gravel is sub-angular, sand is fine to medium grained.
-4.00					
-5.00	4	SPT	13		Sandy CLAY (CL) : brown, moist, plastic, stiff, interbedded with sandy layers, traces of gravel.
-6.00	5	SPT	24		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3.T0.7/2.9	XX	XXX

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BRIDGE NO.

POST MILE

BORING: R-61

LOG OF TEST BORINGS (of)

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CU 11275 | EA 0301U1

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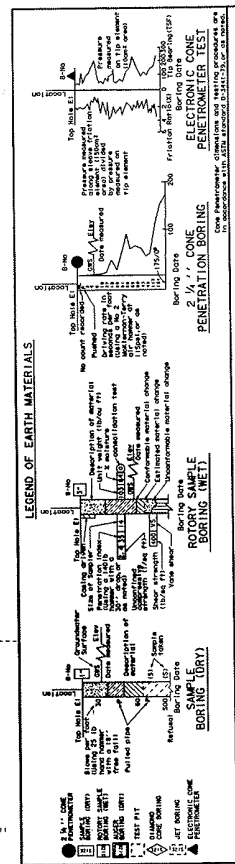
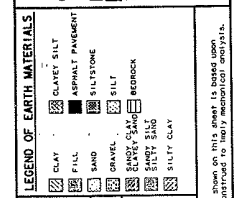
FORM DC-OE-92-PF (REV. 3/88)





NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed as implying results of laboratory analysis.

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					ALLUVIUM: Clayey SAND/Sandy CLAY (SC/CL): with traces of gravel, brown, damp, very loose/very soft.
-2.00	1	SPT	2		Sandy CLAY (CL) : with coarse gravel, olive gray, moist, soft, medium plastic. Ground water at the depth of 2.3m.
-3.00	2	SPT	1		Sandy CLAY (CL) : Brown, moist, very soft, medium plastic, qu=0.5 Tsf, Su=0.2 Tsf
-4.00	3	SPT	2		Clayey SAND (SC) : Brown, wet, fine grained, very loose to loose, plastic, qu=0.75 Tsf, Su=0.6 Tsf
-5.00	4	SPT	5		
-6.00					
-7.00	5	SPT	3		Sandy CLAY (CL) : Brown, moist, soft, qu=1.2 Tsf, Su=0.9 Tsf
-8.00					Clayey SAND (SC) : Brown, wet, very loose, plastic
-9.00	6	SPT	6		Sandy CLAY (CL) : Olive brown, moist, very soft to firm, medium plastic, average qu=0.7 Tsf, average Su=0.3 Tsf
-10.00					
-11.00	7	SPT	0		
-12.00	8	SPT	2		Clayey SAND (SC) : interlaminated with sandy CLAY: olive brown, moist, medium plastic, very loose qu=0.5 Tsf, Su=0.1 Tsf
-13.00					Clayey SAND (SC) : With traces of gravel, olive gray, moist, very loose, plastic.
-14.00	9	SPT	0		Sandy CLAY (CL) : (with 5% coarse Gravel and ocassionally small cobble) Dark brown, moist, medium plastic, very soft (qu=0.5 T/sf; Su=0.1 T/sf)
-15.00	10	SPT	10		Clayey SAND (SC) : Olive brown, moist, olatic, loose.

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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BORING No. : 466-B2

Date Drilled: 07/14/99

Project Name : I-5/805 Retaining Walls

Location : 16R; 466+91 "NT805" Line

Drilling Method : Mud Rotary

Logged by Joe Pratt

Top of hole elevation : 11.3 m

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BRIDGE NO

POST MILE

BORING: 466-B2 **R-62**

LOG OF TEST BORINGS (of)

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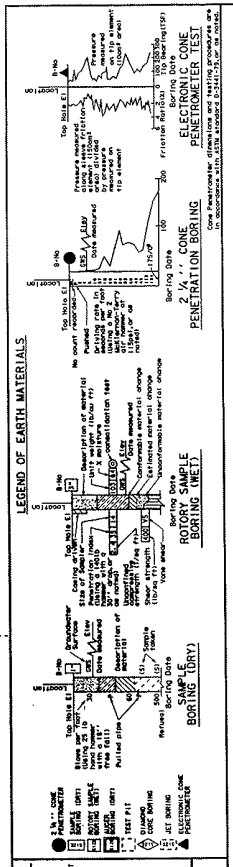
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

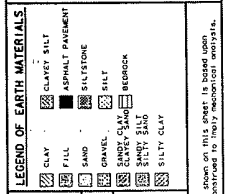
CU 11275 EA 0301U1

USERNAME => tbdjoc
DGN FILE => b0301ug62.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:30

FORM DC-OE-92-PF (REV. 3/88)





NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 512-B1

Date Drilled: 08/09/99

Project Name : I-5/805 Retaining Walls

Location : 21R;512+55 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 57.8 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
-1.00					FILL (base and subbase)
					(Ardath Shale Fm): Logged from cuttings: concretion zone: indurated siltstone
-2.00	1	SPT	52		Silty,Gravelly SAND: brown, moist with fine gravel grains
-3.00	2	SPT	60		SILTSTONE: brown to gray, moist, locally laminated, locally rusty bands and caliche stringers (2 cm thick, and at 60 degrees to the boring axis), locally grades to claystone.
-4.00					-at 3.96 m-4.27 m: concretion zone: hard drilling
-5.00	3	SPT	90		
-6.00	4	SPT	90		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

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REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

BORING: 512-B1 **R-63**

LOG OF TEST BORINGS (of)

CU 11275 | EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ug63.dgn

PLOTTED => 06-APR-2001
TIME PLOTTED => 15:00

FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 512-B2

Date Drilled: 08/09/99

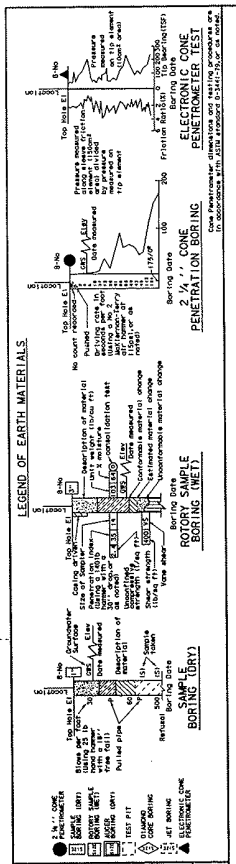
Project Name : I-5/805 Retaining Walls

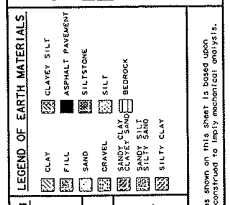
Location : 21R;513 +14 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 55.90 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
-1.00					FILL (base and subbase)
	1	SPT	78		SILTSTONE: (Ardath Shale Formation) Brown, moist, slightly laminated, locally rusty bands, locally grades to claystone.
-2.00					
-3.00	2	SPT	93		
-4.00					- at 4.57 m: grades to gray in color, massive texture, but splits easily at about 90 degrees to the boring axis.
-5.00	3	SPT	91		
-6.00					
	4	SPT	>50		





CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration (blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, KI. 4/46.3, TO. 7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST
JEFF J. TESAR
No. 2137
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

BORING: 512-B2 R-64

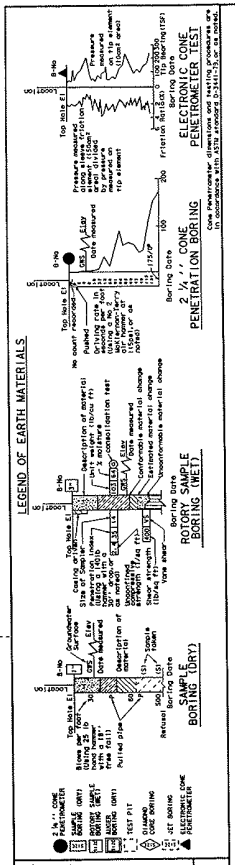
LOG OF TEST BORINGS (of)

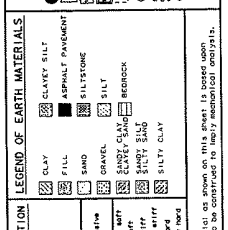
CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ug64.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:02

FORM DC-OE-92-PF (REV. 3/88)





NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 512-B3

Date Drilled: 08/09/99
Project Name : I-5/805 Retaining Walls
Location : 21R;513 +65 "SD" Line
Drilling Method : Mud Rotary

Top of hole elevation : 54.3 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METERS (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					
	1	SPT	53		
-2.00					SILTSTONE: (Ardath Shale Formation) Brown, moist to damp, laminated with 1-2 cm laminas at about 90 degrees to the boring axis, rusty, sporadic caliche stringers, locally concretion zones, locally grades to claystone.
-3.00	2	SPT	48		
-4.00					
	3	SPT	Refusal		- at 4.57 m - 5.33 m: concretion zone/builder
-5.00					
-6.00	4	SPT	75		

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805,56	R45.5/R59.5, KI. 4/46.3, T0. 7/2.9	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST
JEFF J. TESAR
No. 2137
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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BORING: 512-B3 **R-65**

LOG OF TEST BORINGS (of)

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CU 11275 | EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 516-B1

Date Drilled: 08/4/99

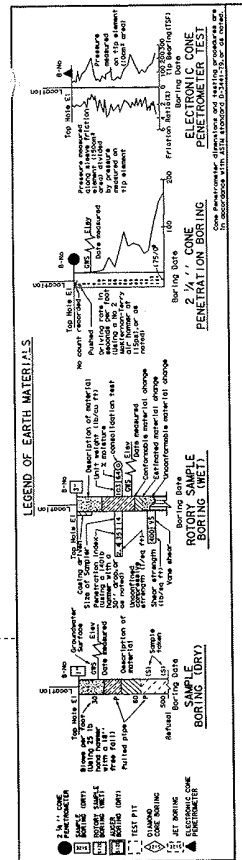
Project Name : I-5/805 Retaining Walls

Location : 25R;515+42 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 49.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Silty Sand (SM), brown, moist, traces of fine gravel.
	1	SPT	54		SILTSTONE: (Ardath Shale Formation): Graybrown, moist, laminated (laminas are 7 mm thick) at about 90 degrees to the boring axis, locally caliche stringers, locally slightly clayey, rusty laminas.
-2.00					
-3.00	2	SPT	59		- at 3.0 m: grades to dark gray and blue (layers).
-4.00					
	3	SPT	60		- at 4.6 m : becomes less laminated and massive.



CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test		
Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, BEDROCK, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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DISREGARD PRINTS BEARING EARLIER REVISION DATES →

BORING: 516-B1 **R-66**

LOG OF TEST BORINGS (of)

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 | EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ua66.dgn

DATE PLOTTED => 06-APR-2001
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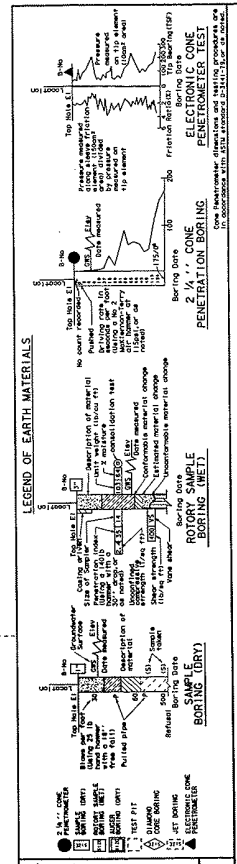
FORM OC-OE-92-PF (REV. 3/88)



BORING No. : 516-B2

Date Drilled: 08/4/99

Project Name : I-5/805 Retaining Walls

Location : 31R;515+84 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 47.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Silty Sand /Sandy Silt (SM/ML), brown, moist.
	1	SPT	20		SILTSTONE: (Ardath Shale Fm.): Graybrown, moist, locally laminated at about 90 degrees to the boring axis, locally caliche stringers, locally slightly clayey, rusty bands.
-2.00					
-3.00	2	SPT	33		
					at 3.0 m : grades to more massive and brittle, damp.
-4.00					
	3	SPT	39		

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test

Penetration (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.9	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST *J. Tesar*

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REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

BORING: 516-B2 **R-67**

LOG OF TEST BORINGS (of)

CU 11275 EA 0301U1

USERNAME => tbdjac
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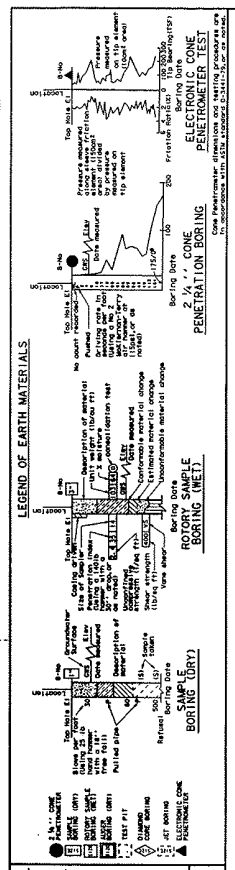

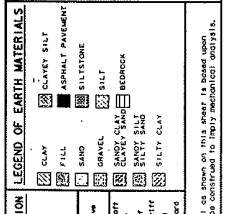

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 527-B1

Date Drilled: 08/16/99
Project Name : I-5/805 Retaining Walls
Location : 5R;528+51 "SB" Line
Drilling Method : Mud Rotary

Top of hole elevation : 16.7 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Lifts of gray SILTSTONE and brown Sandy CLAY. Brown, moist, slightly plastic, traces of gravel, hard.
	1	SPT	34		
-2.00					
-3.00					
-4.00					
-5.00					
-6.00					- at 6.1 m: grades to Silty CLAY (CL): Brown , with dark gray lumps, moist, plastic, firm.
	2	SPT	8		
-7.00					- at 7.6 m : grades to SILT (ML): Brown, moist, nonplastic, stiff.
-8.00	3	SPT	14		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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BORING: 527-B1 **R-68**

LOG OF TEST BORINGS (of)

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CU 11275 | EA 0301U1

FORM DC-OE-92-PP (REV. 3/88)

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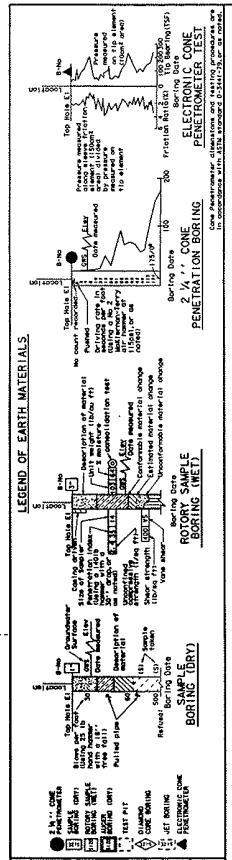

BORING No. : 527-B2

Date Drilled: 08/16/99

Project Name : I-5/805 Retaining Walls

Location : 5R;527+99 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 16.5 m

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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Caltrans Metric

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Logged from cuttings: Sandy GRAVEL/Gravelly Silty SAND (SP,GP): Brown
-2.00					- at 1.8 m logged from cuttings FILL: Silty CLAY with coarse Sand (CL) : Brown, moist, plastic.
-3.00					
-4.00					
-5.00					
-6.00	1	SPT	30		- at 6.0 m: FILL: Silty CLAY (CL) : Brown and gray, with traces of fine gravel and sand, moist very stiff.
-7.00					
-8.00	2	SPT	15		
-9.00	3	SPT	10		ALLUVIUM : Sandy CLAY (CL): With traces of gravel, locally grades to clayey sand, brown, moist, plastic, firm.
-10.00					Sandy CLAY/Clayey SAND (CL/SC): Dark brown (traces of organics), moist, medium grained, plastic, firm.
-11.00	4	SPT	8		
-12.00					

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY CLAYEY SAND, SANDY SILT SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING: 527-B2 R-69

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FORM DC-OE-92-PF (REV. 3/88)

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DGN FILE => b0301ug69.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:26

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

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Caltrans Metric

BORING No. : 527-B3

Date Drilled: 08/16/99

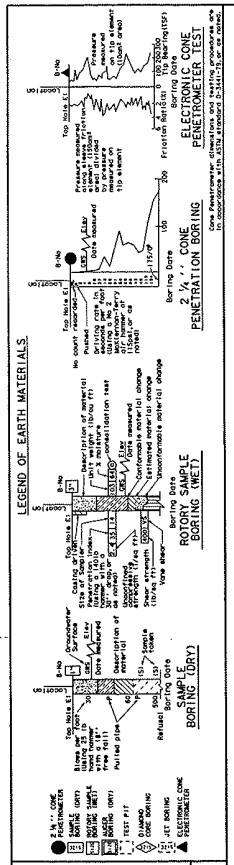
Project Name : I-5/805 Retaining Walls

Location : 5R+527+11 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 17.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Logged from cuttings: Layers of brown Sandy CLAY and gray SILTSTONE, with traces of Gravel. Brown and gray, moist.
-2.00					
-3.00					
-4.00					
-5.00					
-6.00					
-7.00					
-8.00	1	SPT	11		- at 7.5 m: FILL Lifts of brown and gray Sandy CLAY and SAND with some fine gravel, brown, medium dense.
-9.00	2	SPT	18		ALLUVIUM : Silty Clayey SAND (SM/SC): Brown, moist to wet, medium grained, medium dense.
-10.00					
-11.00	3	SPT	15		Silty SAND (SM) : Slightly clayey, dark brown, medium grained, wet, medium dense.



LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO

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BORING: 527-B3 **R-70**

LOG OF TEST BORINGS (of)

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REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

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DGN FILE => b0301ug70.dgn

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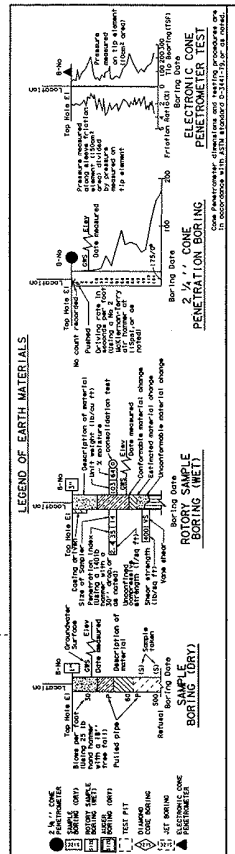
TIME PLOTTED => 15:27

FORM DC-OE-92-PF (REV. 3/88)



BORING No. : 543-B1

Date Drilled: 09/02/99

Project Name : I-5/805 Retaining Walls

Location : 8R;543+70 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 33.8 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL: SAND (SP) Brown to red brown, moist, very dense, medium to coarse grained, often rusty, locally indurated, slightly silty.
-2.00	1	SPT	53*		- at 3.0 m : a mixture of Sand and some Gravel with Siltstone chunks
-3.00	2	SPT	81*		
-4.00					- at 4.5 m : grades to Sand with traces of Gravel, medium grained, moist, dense
-5.00	3	SPT	36		
-6.00					- at 6.0 m : changes to Sand interlayered with Clayey Silty Sand with traces of Gravel, very dense
	4	SPT	85*		- at 7.0 m: Seepage water encountered
-7.00					SAND (SP): (Bay Point Fm?) Light Brown, moist, very dense, medium grained, locally silty and clayey.
-8.00	5	SPT	>50		
-9.00	6	SPT	60		

Comments: * -- affected by gravel

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

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REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING: 543-B1 **R-71**

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REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ug71.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:27

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, 70.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

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Caltrans Metric

BORING No. : 543-B2

Date Drilled: 08/03/99

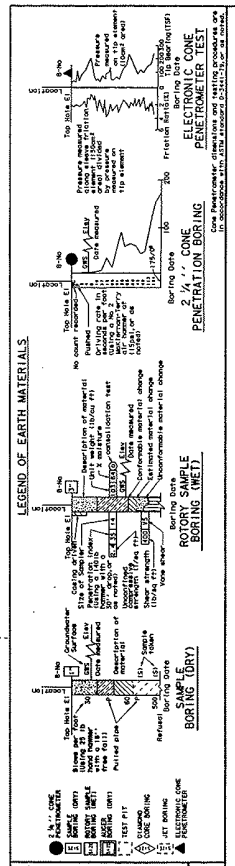
Project Name : I-5/805 Retaining Walls

Location : 8R; 542+98 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 33.4 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL: SAND with Gravel (SP): Brown, moist, dense, medium grained, slightly silty and clayey.
-2.00	1	SPT	45		- at 1.8-2.7 m : becomes gravelly
-3.00	2	SPT	35		- at 3.0 m : with lumps of Siltstone - at 3.3-3.6 m : becomes gravelly - at 4.5 m: seepage water encountered
-4.00					
-5.00	3	SPT	>50		SAND (SP): (Bay Point Fm?) Brown, moist, very dense, medium grained, slightly indurated, locally small chunks of gray Silstone within sandy matrix, traces of Gravel.
-6.00	4	SPT	63		
-7.00					
-8.00	5	SPT	120		- at 6.0 m : grades to slightly cemented (Sandstone)
-9.00	6	SPT	70		



LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO.

POST MILE

BORING: 543-B2 R-72

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:27

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ua72.dgn

CU 11275

EA 0301U1

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR — No. 2137 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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Caltrans Metric

BORING No. : 544-B1

Date Drilled: 08/13/99

Project Name : I-5/805 Retaining Walls

Location : 8L; 543+63 "NB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 32.4 m

DEPTH (M)	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 0.30 METER (N)	PROFILE: SYMBOL	PROFILE: DESCRIPTION OF MATERIALS
0.0					Ground Surface ASPHALT PAVEMENT FILL (base and subbase)
-1.00					FILL : SAND (SP) : Brown, moist, medium grained, medium dense, with thin layers of silty Sand (brown), sporadically fine gravel grains.
	1	SPT	26		
-2.00					SANDSTONE : (Torrey Sandstone Fm:) Brown, moist, medium grained, with thin layers of brown silty Clay, sporadically fine gravel grains.
-3.00	2	SPT	70		- at 3.0 m : grades to fine grained and very dense
-4.00					
	3	SPT	52		

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 544-B1 R-73

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

USERNAME => tbdjac
DGN FILE => b0301uq73.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:28

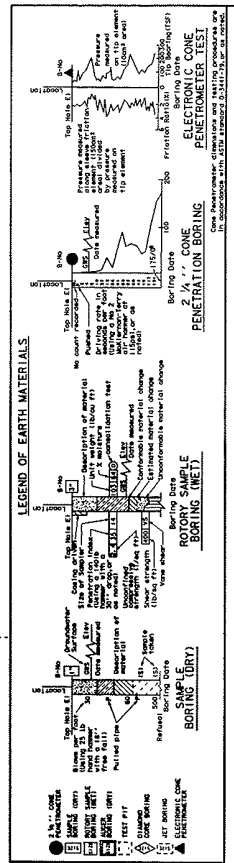
FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 544-B2

Date Drilled: 08/13/99
Project Name : I-5/805 Retaining Walls
Location : 8L;544+26 "NB" Line
Drilling Method : Mud Rotary

Top of hole elevation : 32.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Logged from cuttings: SAND with Gravel (SP): Brown.
-2.00					- at 1.8 m a mixture of SAND and SILTSTONE with some gravel.
	1	SPT	13		- at 2.4 m SAND: Brown, moist, medium grained, often rusty.
-3.00	2	SPT	>50		- at 3.2 m SILTSTONE: Gray, firm.
-4.00					SANDSTONE: (Torrey Sandstone Fm): Gravelly, with clayey Sand interbeds, brown, damp, medium grained.
	3	SPT	49		
-5.00					- at 5.2m : grades to less gravelly
-6.00					- at 6.1m : grades to SILTSTONE/Silty SANDSTONE: Brown, damp, very rusty (caliche stringers at various angles to the boring axis).
	4	SPT	70		



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

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BRIDGE NO.
POST MILE

BORING: 544-B2 **R-74**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301ug74.dgn

CU 11275 | EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:28

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 544-B3

Date Drilled: 08/13/99

Project Name : I-5/805 Retaining Walls

Location : 8L;544+68 "NB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 32.8 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : SAND with some fine gravel (SP) Brown, moist, medium grained, dense.
-2.00	1	SPT	47		
-3.00	2	SPT	37		
-4.00					
-5.00	3	SPT	23		
-6.00	4	SPT	30		- at 4.6m : grades to medium dense, with chunks of gray hard Siltstone.
-7.00					
-8.00	5	SPT	24		- at 6.1 m: grades to damp to moist
-9.00	6	SPT	37		

LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST

2 1/4" CONE PENETRATION BORING

ROTORY SAMPLE BORING (WET)

SAMPLE BORING (DRY)

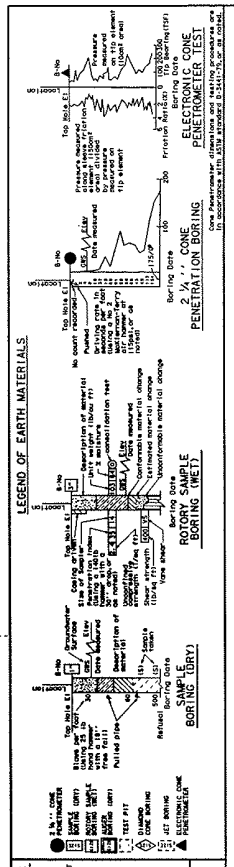
LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard



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BRIDGE NO

POST MILE

BORING: 544-B3 **R-75**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ug75.dgn

CU 11275

EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:28

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 545A-B1

Date Drilled: 06/24/99

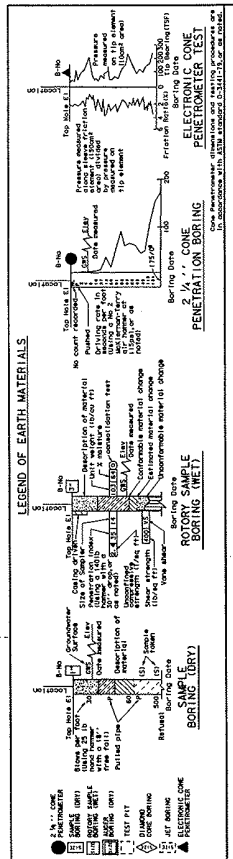
Project Name : I-5/805 Retaining Walls

Location : 8L; 544 + 52 "CM" Line

Drilling Method : Mud Rotary

Top of hole elevation : 20.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					Clayey Silty SAND (SC-SM): Brown, moist, rusty, with cobbles, very dense (however N-blow counts affected by subrounded and rounded cobbles and coarse gravel.
	1	SPT	>50		- at 2.1 m : grades to sand with ocassional cobbles and gravel grains.
-2.00					
-3.00	2	SPT	86		SAND (SP) : Slightly silty, red brown (rusty) medium grained, moist, very dense, sporadic fine gravel.
-4.00					
-5.00	3	SPT	91		
-6.00	4	SPT	>50		- at 6.0 m : inclusions of gravel-size chunks of gray siltstone



LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO.

POST MILE

BORING: 545A-B1 R-76

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:29

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ug76.dgn

BORING No. : 545A-B2

Date Drilled: 06/23/99

Project Name : I-5/805 Retaining Walls

Location : 2 R;545 + 05 "CM4" Line

Drilling Method : Coring

Top of hole elevation : 26.3 m

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41, 4/46.3, T0.7/2.0	XX	XXX

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REGISTERED GEOLOGIST — JEFF J. TESAR — No. 2137 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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SAMPLE				PROFILE	
DEPTH M	NUMBER	RECOVERY %	TYPE	SYMBOL	DESCRIPTION OF MATERIALS
					Ground Surface
0.0	1		CORING		FILL: Silty, Sandy CLAY (CL), with gravel and cobbles, lifts of variable color locally organic, plastic to nonplastic, moist; locally lifts of clayey, gravelly SAND.
-1.00					
-2.00	2		CORING		
-3.00	3		CORING		- at 2.5 m: Clayey Sand (SC); gray and brown, moist, with gravel and cobbles.
-4.00					
-5.00	4		CORING		Clayey SAND (SC): (Bay Point Fm.) Brown, medium to coarse grained, rusty, occasionally gravel and cobbles with lenses or layers of siltstone, locally cemented.
-6.00	5		CORING		
-7.00					Clayey SAND (SC) Brown, moist, medium grained, slightly plastic.
-8.00	6		CORING		SILTSTONE: Gray, moist, hard.
					SAND (SP): Brown, moist, medium grained, rusty.
					SILTSTONE: Yellow, moist, hard.
					SAND (SP): Rusty and brown, moist.
					Gravel and cobbles within sandy matrix (GP)
-9.00	7		CORING		SILTSTONE: Gray, moist, hard, with lenses of sand up to 0.15 m thick and sandy laminae, often rusty. Layers/laminae are at 40 degrees to the boring axis. Sandy layer/lenses are coarse grained slightly silty.
-10.00					
-11.00	8		CORING		- at 10.2 m : grades to sandier and gravelly

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, SANDY CLAY, SILTY SAND, SILTY CLAY, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration Test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-49	Dense	Hard
>50	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed as imply warranted analysis.

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BRIDGE NO

POST MILE

BORING: 545A-B2 R-77

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 | EA 0301U1

USERNAME => tbdpok
DGN FILE => ...\b0301uq77.dgn

DATE PLOTTED => 06 APR 2001
TIME PLOTTED => 15:42:30

FORM DC-OE-92-PF (REV. 3/88)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 545A-B3

Date Drilled: 06/23/99

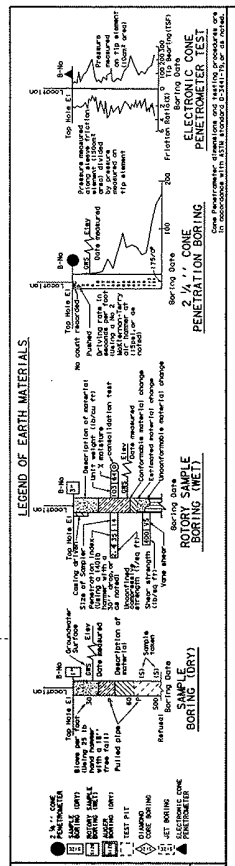
Project Name : I-5/805 Retaining Walls

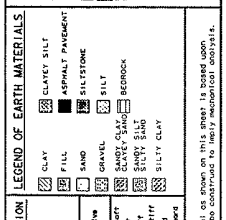
Location : I8L; 545+45 "CM" Line

Drilling Method : Mud Rotary

Top of hole elevation : 23.0

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00	1	SPT	>50		SAND (SP) : Brown, moist, medium grained, rusty, locally moderately cemented, with chunks of gray siltstone (siltstone is laminated) and cobbles (surrounded and rounded), very dense.
-2.00					
-3.00	2	SPT	>50		
-4.00					- at 3.0 m : refusal to CA Modified Sampler : cobbles and gravel (up to 0.1 m in diameter)
-5.00					SAND (SP) : Gray, moist, medium grained, locally cemented, very dense.
-6.00					- at 6.0 m : coarse gravel and chunks of siltstone
-7.00					- at 6.6 m : grades to gravelly, with cobbles.
-8.00	3	SPT	>50		SAND (SP) : Brown, moist, with some coarse gravel and cobbles.





CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/Ft.)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon interpretation and is not to be construed to imply responsibility.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.

POST MILE

BORING: 545A-B3 R-78

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

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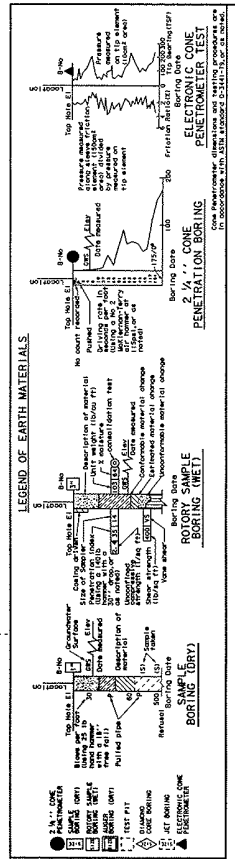
CU 11275 | EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdlac
DGN FILE => b0301ua78.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:29



BORING No. : 545B-B1

Date Drilled: 06/29/99

Project Name : I-5/805 Retaining Walls

Location : 11L; 545+18 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 29.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					FILL: Sand mixed with silty sand and coarse gravel.
-2.00	1	SPT	>50		SAND (SP): (Bay Point Fm.) Brown to reddish-brown, moist, slightly clayey and silty, medium grained, very dense, with traces of fine gravel and cobbles.
-3.00	2	SPT	>50		
-4.00					
-5.00	3	SPT	>50		- at 4.5 m : grades to slightly silty medium grained, brown, moist
-6.00	4	SPT	>50		- at 5.3 m - 5.7 m: from the response of drill rig, grades to less dense.
-7.00					- at 6.0 m: locally rusty laminas

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 545B-B1 **R-79**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:31

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ua79.dgn

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

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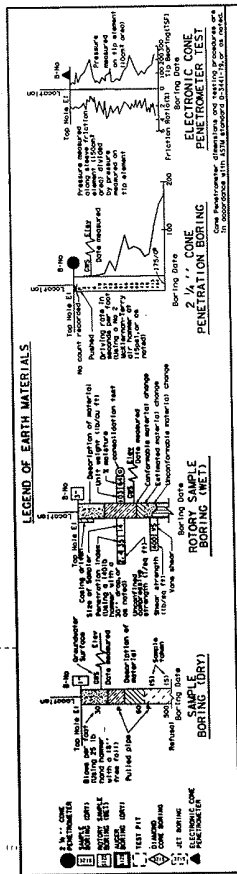
Caltrans Metric

BORING No. : 545B-B2

Date Drilled: 06/29/99
Project Name : I-5/805 Retaining Walls
Location : 15L;545+63 "SB" Line
Drilling Method : Coring

Top of hole elevation : 34.8 m

DEPTH (M)	SAMPLE NUMBER	RECOVERY %	TYPE	PROFILE SYMBOL	DESCRIPTION OF MATERIALS
					Ground Surface
0.0	1		CORING		FILL: Silty SAND, dark brown, moist, medium grained, with coarse gravel and traces of cobbles; occasionally rootlets.
-1.00	2		CORING		Silty SAND (SM): Reddish brown, medium grained, moist.
-2.00					SILTSTONE: Gray, with rusty laminas, up to 0.8 cm thick and at about 90 degree angle to the boring axis.
-3.00	3		CORING		
-4.00	4		CORING		
-5.00	5		CORING		SAND (SP): Gray and brown, medium grained, moist, slightly silty, locally weakly cemented.
-6.00	6		CORING		
-7.00					
-8.00	7		CORING		- at 8.23 m: inclusions of gray siltstone, angular clasts
-9.00	8		CORING		
-10.00					-at 8.7 m: SAND (SP): Gray, moist, zones of gravel and with cobbles and layers of gray siltstone.
-11.00	9		CORING		



LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, SANDY CLAY, SANDY SILT, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.
POST MILE

BORING:545B-B2 **R-80**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

USERNAME => $(USER)
DGN FILE => ...\b0301ug80.dgn

DATE PLOTTED => 06 APR 2001
TIME PLOTTED => 16:55:09

FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 545B-B3

Date Drilled: 06/30/99
Project Name : I-5/805 Retaining Walls
Location : IR;546+21 "SB" Line
Drilling Method : Mud Rotary

Top of hole elevation : 32.7 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP) : (Bay Point Fm.) Gray and brown (alternating laminas), medium grained, moist, very dense.
	1	SPT	>50		
-2.00					
-3.00	2	SPT	>50		
-4.00					
	3	SPT	>50		
-5.00					
-6.00					
	4	SPT	>50		- at 6.0 m : locally silty, with the inclusions of siltstone (gray, firm).
-7.00					
	5	SPT	>50		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR — No. 2137 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index Blows/ft	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-49	Dense	Hard
50	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO
POST MILE

BORING: 545B-B3 **R-81**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ug81.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:32

BORING No. : 545B-B4

Date Drilled: 06/30/99

Project Name : I-5/805 Retaining Walls

Location : 3R; 546+82 "SB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 31.4 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP) : (Bay Point Fm.) Brown, moist, medium grained, very dense.
	1	SPT	>50		
-2.00					
-3.00					
	2	SPT	>50		
-4.00					
	3	SPT	>50		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST

2 1/4 " CONE PENETRATION BORING

ROTARY SAMPLE BORING (WET)

BORING (DRY)

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration Resistance (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-59	Dense	Hard
60+	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 545B-B4 **R-82**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 030101

FORM OC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301u82.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:32

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

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Caltrans Metric

BORING No. : 546-B1

Date Drilled: 08/27/99

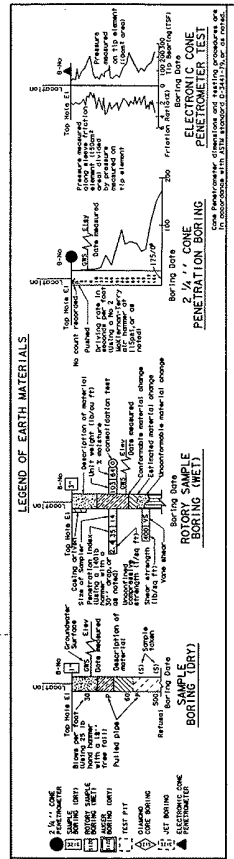
Project Name : I-5/805 Retaining Walls

Location : 8L; 545+80 "NB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 33.10 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP)/SANDSTONE: (Torrey Sandstone Fm.): Brown, moist, fine grained, very dense, micaceous, mottled, locally weakly cemented.
	1	SPT	>50		
-2.00					
-3.00	2	SPT	>50		- at 3.6m : gravelly zone
-4.00					
	3	SPT	>50		



LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 546-B1 **R-83**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FORM DC-DE-92-PF (REV. 3/89)

USERNAME => tbdjoc
DGN FILE => b0301ug83.dgn

CU 11275

EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:32

BORING No. : 546-B2

Date Drilled: 08/27/99

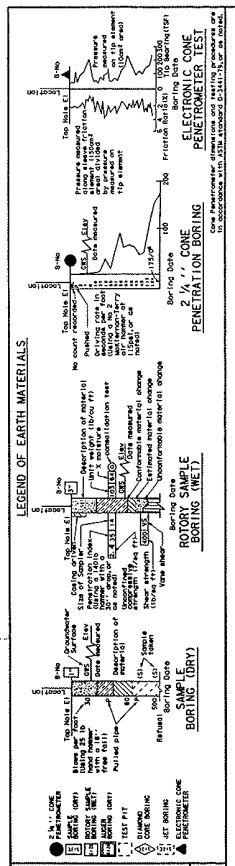
Project Name : I-5/805 Retaining Walls

Location : 9L; 545+30 "NB" Line

Drilling Method : Mud Rotary

Top of hole elevation : 33.20 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP)/SANDSTONE: (Torrey Sandstone Fm.): Brown, moist, fine to medium grained, micaceous, very dense, locally lumps of Silt/Siltstone within sandy matrix.
	1	SPT	>50		
-2.00					
-3.00	2	SPT	>50		
-4.00					



CONSISTENCY CLASSIFICATION FOR SOILS (According to the Standard Penetration Test)		
Penetration (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-59	Dense	Hard
60+	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, SANDY CLAY/CLAYEY SAND, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, To.7/2.0	XX	XXX

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BRIDGE NO

POST MILE

BORING: 546-B2 **R-84**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301ug84.dgn

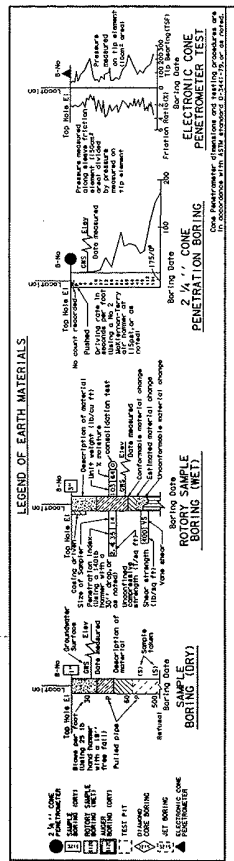
DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:33

BORING No. : 569-B1

Date Drilled: 08/30/99
Project Name : I-5/805 Retaining Walls
Location : 21L;568+97 "SD" Line
Drilling Method : Mud Rotary

Top of hole elevation : 34.9 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP) : (Bay Point Fm.) Brown, moist, fine to medium grained, dense.
	1	SPT	35		
-2.00					
-3.00					- at 3.0 m: grades to very dense
	2	SPT	66		
-4.00					
	3	SPT	58		- at 4.5 m : grades to gray color, fine grained, slightly silty



Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

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BRIDGE NO
POST MILE

BORING: 569-B1 **R-85**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

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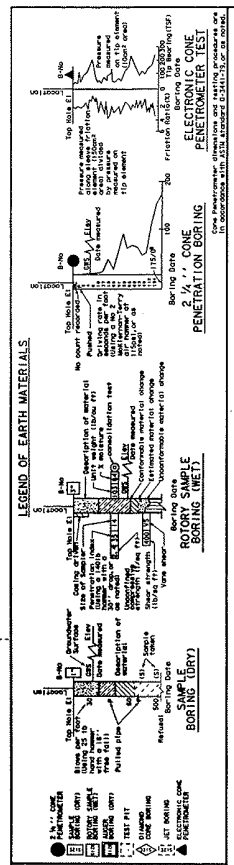
DGN FILE => b0301u085.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:36



CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-59	Dense	Hard
270	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BORING No. : 569-B2

Date Drilled: 08/30/99

Project Name : I-5/805 Retaining Walls

Location : 21L;570+60 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 39.8 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
-1.00					FILL (base and subbase)
	1	SPT	>50		SAND (SP)/SANDSTONE : (Torrey Sandstone Fm.) Brown, moist, medium grained, slightly micaceous, traces of fine gravel, very dense.
-2.00					
-3.00	2	SPT	>50		
-4.00					
	3	SPT	>50		- at 4.5 m : with some coarse grained sand

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41. 4/46.3, TO. 7/2.0	XX	XXX

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BRIDGE NO

POST MILE

BORING: 569-B2 **R-86**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

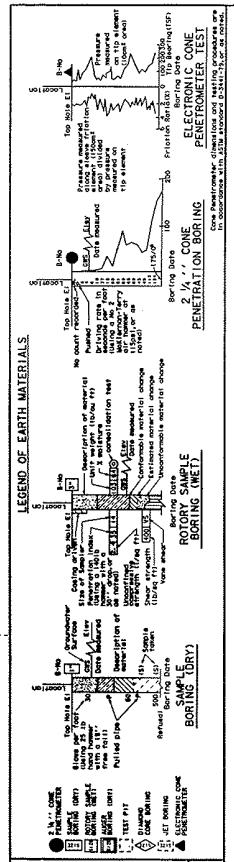
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdioc
DGN FILE => b0301ug86.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:36



BORING No. : 569-B3

Date Drilled: 08/30/99
Project Name : I-5/805 Retaining Walls
Location : 21L;571+61 "SD" Line
Drilling Method : Mud Rotary

Top of hole elevation : 42.9 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SAND (SP) : (Torrey Sandstone Fm.) Brown, moist, medium grained, medium dense, traces of gravel.
-2.00	1	SPT	23		
-3.00	2	SPT	>50		- at 3.0 m : grades to very dense and weakly cemented (Sandstone)
-4.00					- at 4.0 - 4.6 m : grades to gravelly
	3	SPT	REFUSAL		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO
POST MILE

BORING:569-B3 **R-87**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

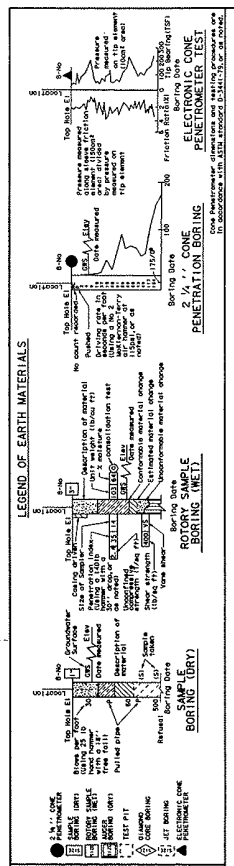
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ug87.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:37



BORING No. : 569-B4

Date Drilled: 08/30/99

Project Name : I-5/805 Retaining Walls

Location : 21L;572+61 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 46.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SANDSTONE : (Torrey Sandstone Fm.)
	1	SPT	>50		Brown, moist to damp, laminated, micaceous, locally rusty, with lumps/lenses/layers of gray firm Siltstone, traces of fine gravel.
-2.00					
-3.00	2	SPT	>50		
-4.00					- at 4.5 m : cave-in occured

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 569-B4 **R-88**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:37

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ug88.dgn

CU 11275 EA 0301U1

BORING No. : 569-B5

Date Drilled: 08/30/99

Project Name : I-5/805 Retaining Walls

Location : 21L;573+61 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 49.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					SANDSTONE : (Torrey Sandstone Fm.)
	1	SPT	>50		Brown, moist to damp, slightly laminated (mottled), fine to medium grained, micaceous, locally rusty bands/laminas, weakly to moderately cemented.
-2.00					
-3.00	2	SPT	>50		
-4.00					
	3	SPT	>50		

LEGEND OF EARTH MATERIALS

2 1/4'' CONE PENETROMETER
ROTARY SAMPLE BORING (DRY)
ROTARY SAMPLE BORING (WET)
AUGER BORING (DRY)
TEST PIT
DIAMOND CORE BORING
JET MIXING
ELECTRONIC CONE PENETROMETER

2 1/4'' CONE PENETRATION BORING

ELECTRONIC CONE PENETROMETER TEST

ROTARY SAMPLE BORING (WET)

CORE BORING (DRY)

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SILTY SAND, SANDY SILT, SILTY CLAY

NOTE:
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST
JEFF J. TESAR
No. 2137
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING:569-B5 **R-89**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301uq89.dgn

CU 11275

EA 0301U1

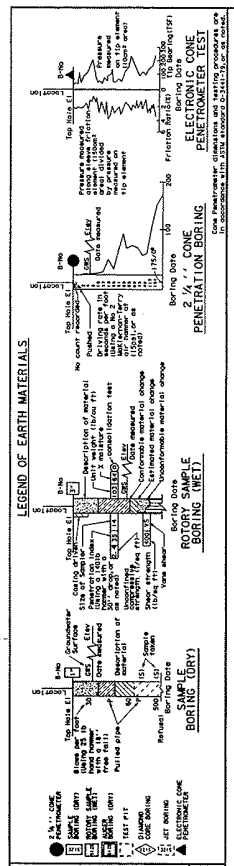
DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:37

BORING No. : 4-996-10

Date Drilled: 09/04/96
Project Name : I-5/805 Widening
Location : 41L; 543+99 "SB" Line
Drilling Method : Mud Rotary
Loged by : Ramiro Oquita

Top of hole elevation : 15.24 m

DEPTH M	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 0.30 METER (N)	PROFILE SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					Bedrock (Torrey Sand Formation): Clayey SAND (SC) dense, fine to medium grained, yellow brown, poorly indurated.
-2.00	1	SPT	50		Bedrock Clayey SILT (ML) with lesser amounts of silty CLAY; hard pale olive gray
-3.00	2	SPT	93		Silty SAND (SM): very dense, fine to coarse, yellow brown, poorly indurated.
-4.00	3	SPT	47		Bedrock: Clayey SAND (SC): dense, fine to coarse, yellow brown, grades down into clayey sandy SILT(Siltstone), poorly indurated.



CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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BRIDGE NO.
POST MILE

BORING: 4-996-10 **R-90**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ug90.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:37

BORING No. : 470-6101 (Sheet 1 of 2)

Date Drilled: 10/22/96
Project Name : I-5/805 Widening
Location :27R; 470+70 "NT 805" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 8.07 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					SAND (SP): medium dense, light gray, mostly fine grained ocasionally very fine to medium, with trace of pebbles.
-2.00	1	SPT	13		
-3.00	2	SPT	21		- at 3.0 m: SAND (SP): medium dense, light gray, mostly fine as above but mixed with more pebbles
-4.00	3	SPT	20		
-5.00					- at 5.2 m: Thin layer of gravel.
-6.00	4	SPT	23		- at 6.0 m: SAND (SP): medium dense, pale yellow brown, fine to medium grained, subangular to subrounded quartz
-7.00	5	SPT	28		
-8.00					Silty SAND (SM): medium dense, pale yellow brown, mostly fine to medium grained.
-9.00					
-10.00	6	SPT	28		
-11.00	7	SPT	34		- at 11.73 m Black clay (Paleosol)
-12.00					Silty CLAY (CL): stiff, dark yellow brown to black, grades to slighly sandy at the base of sample.
	8	SPT	13		

LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST
2 1/4 '' CONE PENETRATION BORING
ROTARY SAMPLE BORING (WET)
SAMPLE BORING (DRY)

LEGEND OF EARTH MATERIALS
CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, SILTY SAND, SANDY SILT, SILTY CLAY, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon visual observation and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.
POST MILE

BORING: 470-6101 **R-91**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, KI. 4/46.3, T0. 7/2.9	XX	XXX

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FORM DC-OE-92-PF (REV. 3/88)

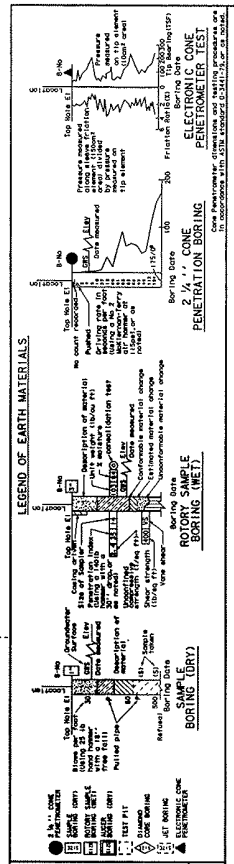
USERNAME => tbdlac
DGN FILE => b030tug91.dgn

CU 11275 EA 030101

BORING No. : 470-6101 (Sheet 2 of 2)

Date Drilled: 10/22/96-10/23/96
Project Name : I-5/805 Widening
Location : 27R; 470+70 "NT 805" Line
Drilling Method: Mud Rotary
Logged by: Ramiro Oquita
Top of hole elevation : 8.07 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-14.00	9	SPT	41		Sandy SILT (ML): dense, pale yellow brown, very fine to fine grained.
-15.00	10	SPT	13		Silty CLAY (CL): stiff, light olive gray, locally very silty.
-16.00	11	SPT	85		Gravelly SAND (SP)/Sandy Gravel: very dense, light olive gray to gray olive (slope wash and alluvium below lagoonal deposits).
-17.00					
-18.00	12	SPT	69		Sandy GRAVEL (GP), very dense light olive gray, angular volcanic rock chips.



CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70	Very dense	Very hard

LEGEND OF EARTH MATERIALS
CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY / CLAYEY SAND, BEDROCK, SANDY SILT / SILTY SAND, SILTY CLAY

NOTE: Classification of earth materials as shown on this sheet is based upon field inspection and is not to be construed to imply uniform subsoil conditions.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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BORING: 470-6101 **R-92**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

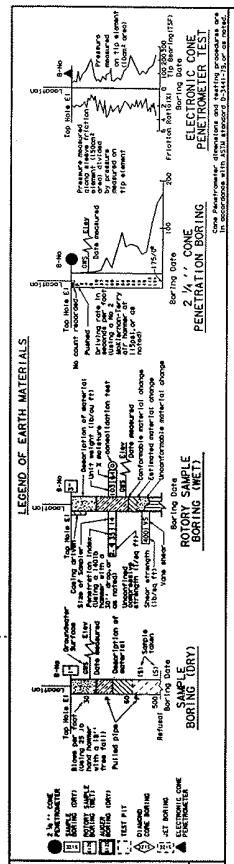
DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:38

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301ug92.dgn

CU 11275

EA 0301U1



BORING No. : 527-61015

Date Drilled: 11/8/96
Project Name : I-5/805 Retaining Walls
Location : 41L: 529+52 "SDL" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 18.30 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					FILL : Clayey SILT/Silty CLAY (CM/ML) pale yellow brown.
-2.00					
-3.00	1	SPT	24		
-4.00					
-5.00	2	SPT	80		Sediments are either slope wash or weathered Conglomerate- GRAVEL (GM): very dense, very sandy, Pebbles comprised of multi colored volcanic material.
-6.00					
-7.00	3	SPT	30		Bedrock : (Bay Point Formation): Silty CLAYSTONE: very stiff, dusky yellow with bown and gray streaks, dry. - at 9.0 m: Bedrock : (Bay Point Formation) Silty Sandstone very dense, pale yellow orange and yellow brown, poorly cemented, interbedded with silty Claystone, medium dark gray
-8.00					
-9.00					

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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BRIDGE NO
POST MILE

BORING: 527-61015 **R-93**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ug93.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:38

BORING No. : 470-6102 (Sheet 1 of 2)

Date Drilled: 10/23/96
Project Name : I-5/805 Widening
Location : 15R; 471+27 "NT 805" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 8.07 m

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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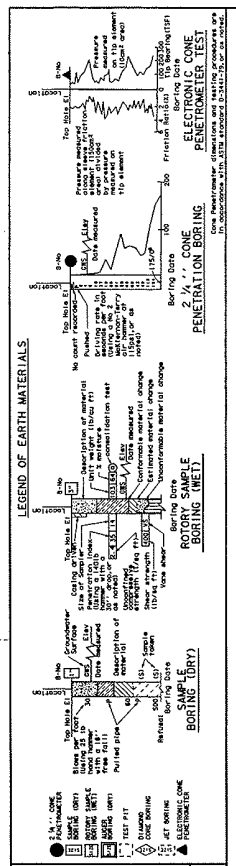
Caltrans Metric

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					
-2.00	1	SPT	13		Silty SAND (SM) medium dense, light gray, very fine to medium grained, with traces of scattered pebbles.
-3.00	2	SPT	19		
-4.00					
-5.00	3	SPT	16		
-6.00	4	SPT	7		- at 6.0 m: Silty SAND (SM)/ sandy SILT loose, moderate brown.
-7.00					
-8.00	5	SPT	8		Silty CLAY (CL): firm, medium plastic when wet, olive black, grades into clayey silt and very fine sand.
-9.00					Clayey SILT (ML): firm, olive black grades down to silty SAND (SM) medium dense, olive black, very silty and clayey.
-10.00	6	SPT	14		
-11.00	7	SPT	14		Silty SAND (SM): medium dense to loose, olive black, fine grained, locally clayey with trace of pebbles.
-12.00	8	SPT	7		



CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS
CLAY, FILL, SAND, GRAVEL, SANDY CLAY CLAYEY SAND, SANDY SILT SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING:470-6102 **R-94**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:40

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301uq94.dgn

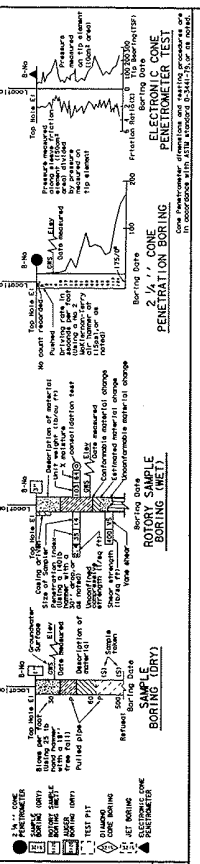
CU 11275 EA 0301U1

BORING No. : 470-6102 (Sheet 2 of 2)

Date Drilled: 10/24/96
Project Name : I-5/805 Widening
Location : 15R; 471+27 "NT 805" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 8.07 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-14.00	9	SPT	16		Clayey SAND (SC): medium dense, gray olive green, very fine to fine grained.
-15.00	10	SPT	51		- at 15 m: Silty SAND (SM) very dense, medium to dark gray, fine to medium grained with pebbles, toward base thin interlayered lenses of silt.
-16.00					
-17.00	11	SPT	72		Sandy GRAVEL (GP) very dense grades into gravelly SAND locally pebbles comprised of dark gray volcanic rocks.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO 7.2/0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST
JEFF J. TESAR
No. 2137
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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BORING: 470-6102 **R-95**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ug95.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:41

BORING No. : 470-6103 (Sheet 1 of 2)

Date Drilled: 10/23/96

Project Name : I-5/805 Widening

Location : 41R; 471+15 "NT 805" Line

Logged by: Ramiro Oquita

Top of hole elevation : 8.07 m

Drilling Method : Mud Rotary

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					Clayey SILT (ML): dark olive gray, very silty.
-2.00	1	SPT	6		Silty CLAY (CL): firm, dark olive gray, locally very silty or sandy.
-3.00					
-4.00	2	SPT	6		- at 4.5 m: Silty CLAY (CL): firm, black, lenticular concentrations including fat clays
-5.00	3	SPT	16		Silty SAND (SM): medium dense, gray brown, very fine to fine grained
-6.00					
-7.00	4	SPT	7		- at 6.7 m: grades to loose
-8.00	5	SPT	7		Clayey SILT/Silty CLAY (ML/CL): firm, olive black, very sandy, organic.
-9.00					
-10.00	6	SPT	25		Silty SAND (SM): medium dense, olive gray to olive black, partly organic, very fine to medium grained.
-11.00	7	SPT	13		Sandy SILT (ML): stiff, interlayered with silty sand and clayey silt, olive black.
-12.00	8	SPT	17		Silty SAND (SM):medium dense,olive gray to olive black, organic.
					Sandy SILT (ML): stiff to very stiff, olive gray.

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.

POST MILE

BORING: 470-6103 **R-96**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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Caltrans Metric

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ua96.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:41

BORING No. : 470-6103 (Sheet 2 of 2)

Date Drilled: 10/23/96
Project Name : I-5/805 Widening
Location : 41R; 471+15 "NT 805" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 8.07 m

SAMPLE				PROFILE	
DEPTH m	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTIO OF MATERIALS
-14.00					- at 13.5 m: Sand as above with more medium grains and color change to olive gray
	9	SPT	16		
-15.00					- at 15.0 m: Silty SAND (SM): very dense, light gray with dusky yellow lenses, very fine to fine grained
	10	SPT	57		
-16.00					- at 16.5 m: Silty SAND (SM): loose, with lenses of clayey silt, olive gray quartz sand with firm silt lenses and scattered pebbles
	11	SPT	8		
-17.00					
-18.00					- at 18.0 m: Silty SAND (SM): very dense, light olive gray, fine to medium grained, scattered coarse pebbles
	12	SPT	52		
-19.00					Sandy GRAVEL (GP): with pockets of gravelly SAND; Pebbles derived from volcanic rock clasts.
-20.00					
-21.00					
-22.00	13	SPT	75		BEDROCK: ARDATH SHALE very dense, black gray, dry.

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, BEDROCK, SANDY CLAY, CLAYEY SAND, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-49	Dense	Hard
50+	Very dense	Very hard

LEGEND OF EARTH MATERIALS

2 1/4" CONE PENETROMETER (DRY); ROTARY SAMPLE BORING (WET); ROTARY SAMPLE BORING (DRY); 2 1/4" CONE PENETRATION BORING; ELECTRONIC CONE PENETROMETER TEST; TEST PIT; CORE BORING; JET BORING; ELECTRONIC CONE PENETROMETER

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO
POST MILE

BORING: 470-6103 R-97

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:42

USERNAME => tbdjac
DGN FILE => b0301ug97.dgn

FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 470-6104 (Sheet 1 of 2)

Date Drilled: 10/24/96
Project Name : I-5/805 Widening
Location : 28R;471+54 "NT 805" Line
Logged by: Ramiro Oquita
Drilling Method : Mud rotary

Top of hole elevation : 8.07 m

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

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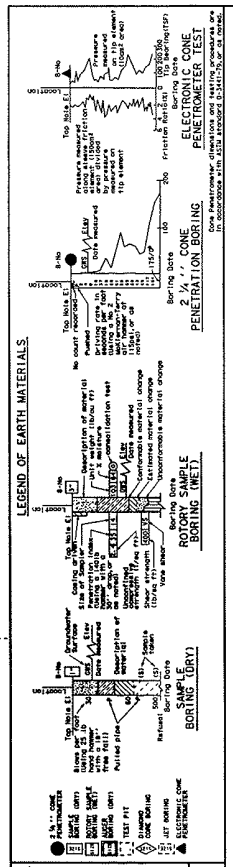
Caltrans Metric

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					Silty CLAY (CL): stiff, dark yellow brown
-1.00					
	1	SPT	12		Silty SAND (SM): medium dense, light olive gray, fine to medium grained.
-2.00					- at 2.5 m: Clayey SILT (ML): firm, dark olive gray locally sandy
-3.00	2	SPT	12		- at 3.0 m: Grades to firm, black, lenticular concentrations including fat clays.
-4.00					- at 4.5 m: Grades to Silty SAND (SM): medium dense, gray brown, very fine to fine grained, loose.
-5.00	3	SPT	6		
-6.00					
					Silty CLAY (CL): firm, olive gray.
	4	SPT	6		Silty SAND (SM): loose, very fine grained, olive green.
-7.00					
					Clayey SILT/Silty CLAY (ML-CL): very organic, firm, dark yellow brown to black.
-8.00	5	SPT	5		
-9.00					Silty CLAY (CL): firm, dark to medium yellow brown, locally grades into clayey silt.
	6	SPT	2		- at 9.7 m: Grades to soft
-10.00					
	7	SPT	40		Silty SAND (SM): dense, light gray, very fine to fine grained.
-11.00					
-12.00	8	SPT	25		- at 12.0 m: Grades to medium dense.



LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO
POST MILE

BORING: 470-6104 R-98

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:42

FORM DC-OE-92-PF (REV. 3/88)

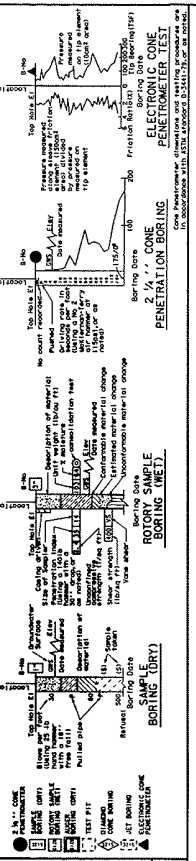
USERNAME => tbdjac
DGN FILE => b0301ug98.dgn

BORING No. : 470-6104 (Sheet 2 of 2)

Date Drilled: 10/24/96
Project Name : I-5/805 Widening
Location : 28R;47I+54 "NT 805" Line
Logged by: Ramiro Oquita
Drilling Method : Mud rotary

Top of hole elevation : 8.07 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-14.00	9	SPT	35		Silty SAND (SM): dense, light gray very fine to medium grained.
-15.00	10	SPT	15		- at 15 m: Grades to medium dense, gray, with black coal fragments at base where it is very organic.
-16.00	11	SPT	38		- at 16.5 m: Gravelly SAND (SP): dense, gray with vocanic rock pebbles.
-17.00					Sandy GRAVEL (GP): dense to very dense, with multi-colored volcanic rock pebbles.
-18.00	12	SPT	52		
-19.00					
-20.00	13	SPT	>50		Bedrock-Sandstone (SM): very dense, olive brown, (Torrey Sandstone?).
-21.00					



CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test		
Penetration Index (N) blows/ft	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, SANDY CLAY/CLAYEY SAND, SANDY SILT/SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Description of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO
POST MILE

BORING: 470-6104 **R- 99**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 | EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301uq99.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:43

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR — No. 2137 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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Caltrans Metric

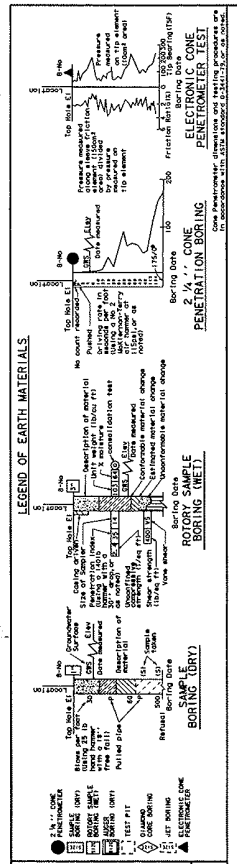
BORING No. : 527-6108 (Sheet 1 of 2)

Date Drilled: 11/4/96
Project Name : I-5/805 Retaining Walls
Location : 48L;527+41 "SDL" Line
Logged by: Ramiro Oquita
Drilling Method : Mud rotary

Top of hole elevation : 11.60 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					0.4 m thick Asphalt Pavement
-1.00					FILL - Silty SAND (SM): medium dense, moderate yellow brown, very fine quartz grains.
	1	SPT	22		
-2.00					
-3.00	2	SPT	10		- at 3.0 m: FILL - Clayey to Silty SAND (SC/SM) loose, moderate to dark yellow brown, very fine grained
-4.00					TOPSOIL: CLAY (OL): firm, black gray, appears like old topsoil zone with abundance of organic material and silty to sandy, with some very fine quartz sand.
-5.00	3	SPT	5		
-6.00					
	4	SPT	7		
-7.00					Silty SAND (SM): loose dark yellow brown very fine to fine
-8.00	5	SPT	9		- at 8.1 m: Silty CLAY (CH): stiff, black gray.
-9.00					Silty SAND (SM): medium dense, locally clayey, pale to dark brown, very fine to fine grained.
	6	SPT	27		
-10.00					
	7	SPT	16		
-11.00					
-12.00	8	SPT	17		
-13.00					

LEGEND OF EARTH MATERIALS



LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY CLAYEY SAND, SANDY SILT SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING: 527-6108 **R-100**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:43

FORM DC-DE-92-PF (REV. 3/88)

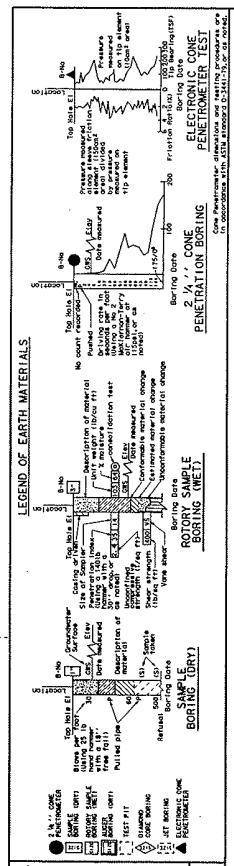
USERNAME => tbdjoc
DGN FILE => b0301uga0.dgn

BORING No. : 527-6108 (Sheet 2 of 2)

Date Drilled: 11/4/96
Project Name : I-5/805 Retaining Walls
Location : 48L; 527+41 "SDL" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 11.60 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-13.00					
	9	SPT	19		SAND (SM): medium dense , pale light olive gray Sand is mostly very fine to fine grades into clayey SILT (CL) bed at 46. Silt is light olive gray
-14.00					
-15.00					Silty SAND (SM): interbedded with Clayey SILT, medium dense to stiff, olive gray
	10	SPT	14		
-16.00					Silty SAND (SM/ML): medium dense, olive gray' very fine to medium grained.
-17.00					
	11	SPT	10		
-18.00					Silty SAND (SM): medium dense, olive gray with beds of sandy SILT, stiff, olive gray.
	12	SPT	12		
-19.00					Clayey SILT (CL/ML): very stiff, olive gray, with thin interbeds of Silty SAND, medium dense , olive gray.
-20.00					
	13	SPT	17		
-21.00					
	14	SPT	60		Sandy GRAVEL to gravelly SAND (GP/GS): very dense, pale yellow brown, pebbles formed of volcanic rock.
-22.00					
-23.00					
-24.00					
-25.00					
-26.00	15	SPT	>50		Weathered Bedrock (Ardath Shale Fm.): grades rapidly into very hard black gray dry shale



CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70	Very dense	Very hard

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Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO 7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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BRIDGE NO.
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BORING: 527-6108 **R-101**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301ugal.dgn

CU 11275 EA 0301U1

DATED => 06-APR-2001
DATED => 15:44

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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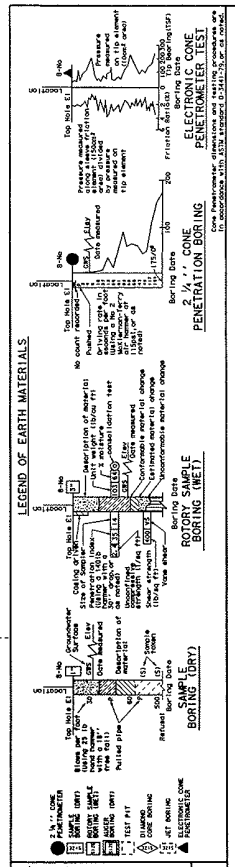
Caltrans Metric

BORING No. : 527-6109 (Sheet 1 of 2)

Date Drilled: 11/5/96
Project Name : I-5/805 Retaining Walls
Location : 44L;528+73 "SDL" Line
Drilling Method : Mud Rotary
Logged by: Ramiro Oquita

Top of hole elevation : 11.60 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					Asphalt pavement over gravel and sand base material.
-1.00					FILL : Silty sandy Clay (CL): very stiff, light yellow brown.
-2.00	1	SPT	16		
-3.00					- at 3.0 m: Silty SAND (SM) medium dense, dark to moderate yellow brown, fine grained, locally clayey.
	2	SPT	23		
-4.00					- at 3.65 m trace of black gray soil, clayey, organic (Topsoil?).
-5.00	3	SPT	7		Silty to clayey SAND (SM/SC): loose, olive black, very fine to medium grained, organic, pliable matrix.
-6.00					
-7.00	4	SPT	10		
					Silty CLAY (CL): firm, dark yellow brown.
-8.00	5	SPT	7		Clayey SAND (SC): loose, dark yellow brown, fine to medium grained.
-9.00					- at 9.5 m: Grades to Silty SAND (SM): medium dense, pale to dark yellow brown, slightly clayey, very fine to medium grained.
-10.00	6	SPT	20		
-11.00	7	SPT	17		
-12.00	8	SPT	31		SAND (SM): med dense pale yellow brown mostly medium grained.
-13.00					



CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO
POST MILE

BORING: 527-6109 **R-102**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

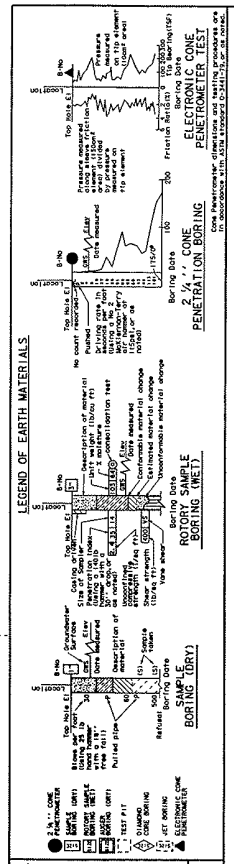
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

USERNAME => tbdjac
DGN FILE => b0301uaa2.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:54

FORM DC-OE-92-PF (REV. 3/88)



BORING No. : 527-6109 (Sheet 2 of 2)

Date Drilled: 11/5/96
Project Name : I-5/805 Retaining Walls
Location : 44L;528+73 "SDL" Line
Logged by: Ramiro Oquita
Drilling Method : Mud Rotary

Top of hole elevation : 11.60 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-13.00					
	9	SPT	33		- at 13.5 m: Grades to dense
-14.00					
-15.00	10	SPT	7		Silty CLAY (CH): Firm, fat, olive gray, traces of sand.
-16.00					
-17.00	11	SPT	11		- at 17.0 m: Grades to stiff
-18.00					
	12	SPT	8		
-19.00					Silty CLAY (CL): Firm, gray olive with clayey SILT, locally sandy.
-20.00	13	SPT	7		
-21.00					
	14	SPT	20		
-22.00					Gravelly SAND (SP): Intermixed with Sandy GRAVEL (GP) lenses very dense, gray quartz sand and volcanic rock pebbles.
-23.00					
-24.00					
-25.00					
	9	SPT	>50		Bedrock - Sandstone: very dense, light olive gray, fine to medium grained

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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LEGEND OF EARTH MATERIALS

CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, CLAYEY SAND, BEDROCK, SANDY SILT, SILTY SAND, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO
POST MILE

BORING: 527-6109 **R-103**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjoc
DGN FILE => b0301ugg3.dgn

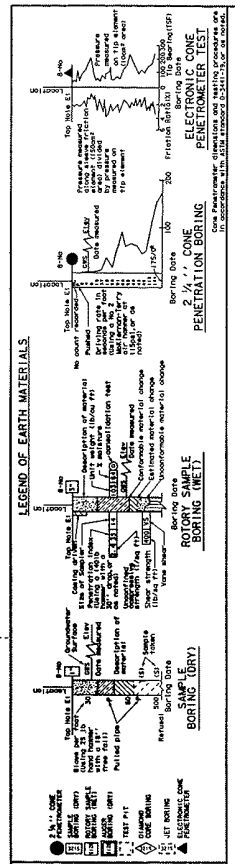
DATE TTED => 06-APR-2001
TIM TTED => 15:54

BORING No. : 543-896-6

Date Drilled: 08/28/96
Project Name : I-5/805 Widening
Location : 50L;543+28 "SB" Line
LOgged by: Romiro Oquita
Drilling Method : Mud rotary

Top of hole elevation : 7.31 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					Sandy CLAY (CL): olive gray, stiff.
-1.00					Silty SAND (SM): med dense, olive gray to yellow brown, fine to medium grained.
	1	SPT	19		Clayey SAND (SC): medium dense, olive gray.
-2.00					- at 3.6 m: Grades to Silty Sand
-3.00					
	2	SPT	24		
-4.00					
	3	SPT	27		
-5.00					SAND and GRAVEL (GP): fine to coarse sand, volcanic rock pebble fragments.
-6.00					
	4	SPT	41		Bedrock (Del Mar Fm.): Claystone, hard, green gray.



Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO
POST MILE

BORING: 543-896-6 **R-104**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FORM DC-0E-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ugg4.dgn

CU 11275 EA 0301U1

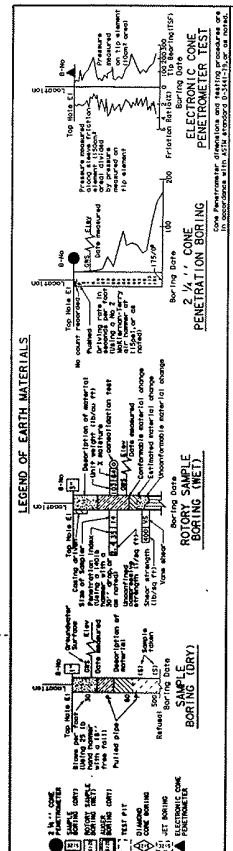
DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:55

BORING No. : 543-896-7

Date Drilled: 08/29/96
Project Name : I-5/805 Widening
Location : 45L;542+35 "SB" Line
Logged by: Ramiro Oquita
Drilling Method : Mud rotary

Top of hole elevation : 7.31 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00	1	SPT	1		Clayey SAND (SC): very loose, yellow brown, fine to medium, wet.
-2.00					
-3.00	2	SPT	36		Gravelly SAND (SP): dense, brown, pebbles to 2.54 cm in diameter.
-4.00					Silty to Clayey SAND (SM/SC): medium dense, moderate brown.
-5.00	3	SPT	16		
-6.00					
-7.00					
-8.00	4	SPT	11		Clean to clayey SAND (SC/SP): medium dense, pale brown, gravel lenses at 8.08 m
-9.00	5	SPT	39		- at 9.0 m: Gravelly SAND (SP): dense pale brown.
-10.00					Sandy GRAVEL (GP): very dense, volcanic rock pebbles and cobbles.
-11.00					
-12.00	6	SPT	>50		Bedrock: DELMAR FORMATION - Claystone (CL): hard, pale olive.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO. 7/2.0	XX	XXX

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BRIDGE NO
POST MILE

BORING: 543-896-7 **R-105**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 | EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b0301uqa05.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 13:55

BORING No. : 543-896-8

Date Drilled: 08/28/96
Project Name : I-5/805 Widening
Location : 40L;541+40 "SB" Line
Logged by: Ramiro Oquita
Drilling Method : Mud Rotary

Top of hole elevation : 7.62 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00	1	SPT	18		Silty SAND (SM): clayey, yellow brown, fine to medium grained, medium dense.
-2.00					
-3.00	2	SPT	36		SAND (SW): dense, yellow-brown, medium to coarse grained, with trace of pebbles.
-4.00	3	SPT	27		
-5.00					
-6.00	4	SPT	34		
-7.00	5	SPT	29		Silty SAND (SM): medium dense, pale yellow-brown, medium to coarse grained, with gravel lenses.
-8.00					
-9.00					Sandy SILT (ML): very stiff, yellow brown, grades downward into interlayered silty SAND and SILT (ML).
-10.00	6	SPT	21		
-11.00	7	SPT	64		GRAVEL (GP) very dense, comprise of volcanic rock clasts, Silty to sandy.
-12.00					Bedrock: DELMAR FORMATION - Claystone (CL): hard, pale green gray to gray green.

LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST
2 1/4'' CONE PENETRATION BORING
ROTARY SAMPLE BORING (WET)
SAMPLE BORING (DRY)

LEGEND OF EARTH MATERIALS: CLAY, CLAYEY SILT, FILL, ASPHALT PAVEMENT, SAND, SILTSTONE, GRAVEL, SILT, SANDY CLAY, BEDROCK, CLAYEY SAND, SANDY SILT, SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index (Blows/ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply geotechnical analysis.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO
POST MILE

BORING: 543-896-8 R-106

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

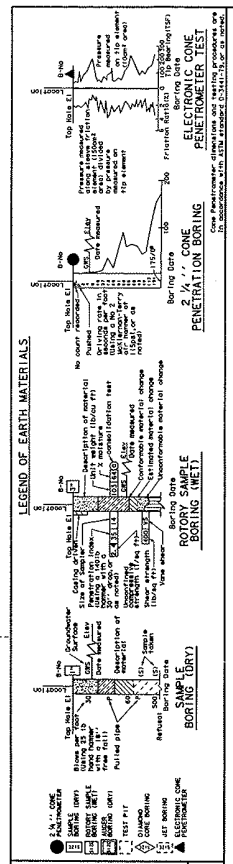
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

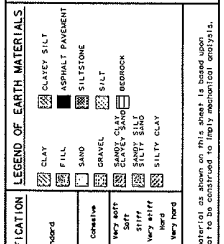
FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ugg6.dgn

CU 11275 EA 0301U1

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:56





NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply exploration analysis.

BORING No. : 543-996-10

Date Drilled: 09/04/96
Project Name : I-5/805 Widening
Location : 41L;543+99 "SB" Line
Drilling Method : Mud Rotary

Top of hole elevation : 15.24 m

SAMPLE				PROFILE	
DEPTH FT / M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
-1.00					Bedrock (Torrey Sand Fm): Clayey SAND (SC): dense, fine to medium grained, yellow brown, poorly indurated.
	1	SPT	50		Clayey SILT (ML): with lesser amounts of silty CLAY, hard, pale olive gray.
-2.00					
-3.00	2	SPT	93		Silty SAND (SM): very dense, fine to coarse grained, yellow brown, poorly indurated.
-4.00					Clayey SAND (SC): dense fine to coarse grained, yellow brown, grades down into clayey, sandy siltstone, poorly indurated.
	3	SPT	47		

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41. 4/46.3, TO. 7/2.9	XX	XXX

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BRIDGE NO
POST MILE

BORING: 543-996-10 **R-107**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 030101

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdloc
DGN FILE => b030101a001.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:57

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 565-B1

Date Drilled: 02/09/2001

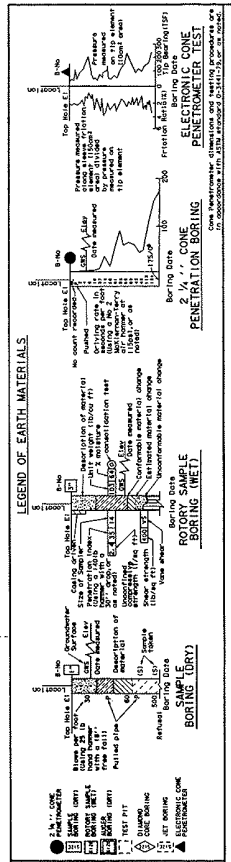
Project Name : I-5/805 Retaining Walls

Location : 36L;566+02 "SD" Line

Drilling Method : Flight Auger

Top of hole elevation : 26.40 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METERS (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					FILL: SAND (SP): Brown, moist, medium dense, medium to fine grained, locally slightly clayey.
-1.00	1	SPT	14		
	2	SPT	14		BAY POINT FORMATION: SAND (SP): Brown, moist, medium dense, medium to fine grained.
-2.00					
-3.00	3	SPT	14		
-4.00					- at 3.7 m: Grades to fine grained and light brown in color
-5.00	4	SPT	16		
-6.00	5	SPT	15		
					No water encountered



CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BRIDGE NO

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BORING:569A-B1 **R-108**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:57

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301uga8.dgn

CU 11275

EA 0301U1

BORING No. : 565-B2

Date Drilled: 02/09/2001

Project Name : I-5/805 Retaining Walls

Location : 44L;564+82 "SD" Line

Drilling Method : Flight Auger

Top of hole elevation : 22.30 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					FILL: Disturbed Native Soils of the BAY POINT FORMATION - SAND (SP): Brown, moist, very loose, medium to fine grained.
-1.00	1	SPT	3		
	2	SPT	5		at 1.5 m: Grades to loose
-2.00					
-3.00					BAY POINT FORMATION: Sand (SP): Light brown, moist, loose, medium to fine grained
	3	SPT	7		
-4.00					-at 3.4 m: Locally clayey bands, presence of shells
-5.00	4	SPT	7		
-6.00					- at 6.0 m: Grades to medium dense
	5	SPT	13		
					No water encountered

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration test

Penetration Index (Blows/Ft.)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY; FILL; SAND; GRAVEL; CLAYEY SILT; ASPHALT PAVEMENT; SILTSTONE; SILT; CLAYEY SAND; SANDY CLAY; SANDY SILT; SILTY SAND; BEDROCK; SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon interpretation and is not to be construed to imply responsible analysis.

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ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 565-B2 **R-109**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 0301U1

FORM DC-0E-92-PF (REV. 3/88)

USERNAME => tbdlac
DGN FILE => b030ug09.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:58

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, T0.7/2.0	XX	XXX

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Caltrans Metric

BORING No. : 569-B6

Date Drilled: 02/09/2001

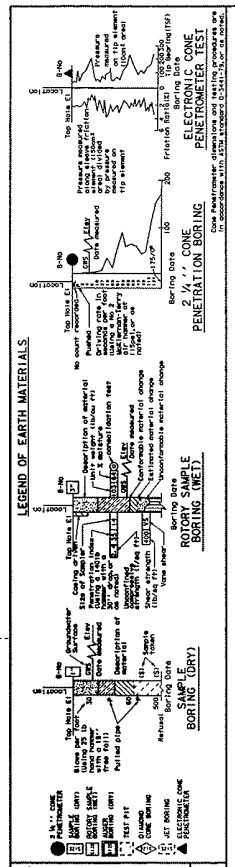
Project Name : I-5/805 Retaining Walls

Location : 23L;567+30 "SD" Line

Drilling Method : Flight Auger

Top of hole elevation : 29.8 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00	1	SPT	30		FILL: Sand (SP): Brown, moist, medium dense, medium grained.
-2.00	2	SPT	25		
-3.00	3	SPT	10		BAY POINT FORMATION: Sand (SP): Light brown, moist, loose, medium grained, traces of fine gravel. -at 2.7 m: Grades to medium to coarse grained.
-4.00	4	SPT	10		
-5.00	5	SPT	12		- at 4.6 m: Grades to medium dense
-6.00	6	SPT	11		
					No water encountered



CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY, CLAYEY SAND, SANDY SILT, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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BORING: 569-B6 **R-110**

LOG OF TEST BORINGS (of)

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

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REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

USERNAME => tbdjoc
DGN FILE => b0301ugal0.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:59

FORM DC-OE-92-PF (REV. 3/88)

BORING No. : 545B-B5 (Sheet 1 of 2)

Date Drilled: 06/29/99

Project Name : I-5/805 Retaining Walls

Location : 22.2L: 544+68.5 "SB" Line

Logged by: Joe Pratt

Drilling Method : Mud Rotary and Coring

Top of hole elevation : 24.4 m

Caltrans Metric

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

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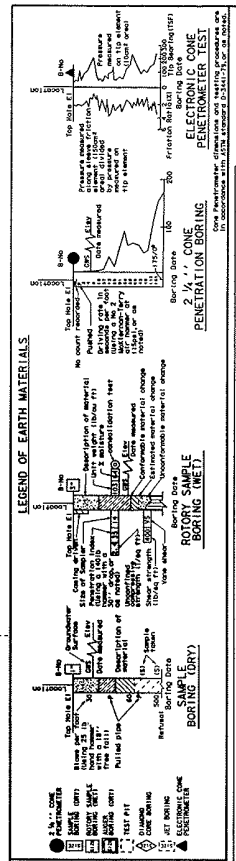
SAMPLE / PROFILE

DEPTH M	NUMBER	RECOVERY %	ROD	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0							Ground Surface
	1			SPT	21		FILL: SILTY fine SAND (SM), contains scattered roots, wood fragments, minor GRAVEL and COBBLES (up to 5%, up to 150 mm dia.), artificial embankment fill, medium dense, yellowish brown, dry.
-1.00							
	2			SPT	>50		MUDSTONE/CLAYSTONE interbedded with minor medium SANDSTONE: (probable Eocene Torrey Sandstone), dominantly soil-like, light brownish gray to light olive and strong brown, mottled (MUDSTONE) & yellowish brown (SANDSTONE), intensely to moderately weathered, soft to very soft, moderately to thinly bedded, unfractured, exhibits moderate to slow slaking, dry.
-2.00							
-3.00	3			SPT	>50		
	4	70	38	CORING			Very fine SANDSTONE interbedded with minor SILTSTONE (30%): dominantly soil-like, light olive gray & strong brown mottled, intensely weathered, soft to moderately soft, moderately thickly bedded, moderately fractured (9) to 300 mm spacing), fractures dip from 50° to 80° and show iron and magnesium oxide(?) staining and dendritic patterns on surfaces, unit is partially cemented (50%) to uncemented, gradational contacts. MUDSTONE (70%) interbedded with very fine SANDSTONE (30%): dominantly soil-like, light olive gray to yellowish brown and strong brown, mottled, soft, dominantly uncemented, gradational contacts,
-4.00							
-5.00	5	84	24	CORING			
-6.00	6	94	30	CORING			MUDSTONE interbedded with very fine to medium SANDSTONE and rare conglomerate: light olive gray and yellowish brown, strong brown mottled, intensely weathered, soft to minor moderately soft, moderately to thinly bedded (300 mm to 60 mm thick), bedding dips from 0 to approx. 20°, mostly uncemented (60% with soil-like properties) and cemented (40% with rock-like properties), conglomerate lense (approx. 0.6 m thick) above elev. +17.0 m.
-7.00							
-8.00	7	92	50	CORING			
-9.00	8	14	0	CORING			Medium to fine SANDSTONE interbedded with CLAYSTONE: contains minor scattered coarse GRAVEL and COBBLES (hard metavolcanic rock fragments), light gray to yellowish brown and strong brown mottled, intensely weathered, soft (rock-like) CLAYSTONE to uncemented (soil-like) SANDSTONE, moderately to thinly bedded, unfractured, slow slaking.
-10.00							
-11.00	9	22	0	CORING			
-12.00	10	0	0	CORING			



CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration Test

Penetration Index (Blows/Ft.)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
70+	Very Dense	Very hard

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, SANDY CLAY/CLAYEY SAND, BEDROCK, SANDY SILT/SILTY SAND, SILTY CLAY

NOTE: Classification of earth materials as shown on this sheet is based upon interpretation of data in accordance with key presented on this sheet.

DRAWN BY

CHECKED BY

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BRIDGE NO.

POST MILE

BORING: 545B-B5 R-111

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

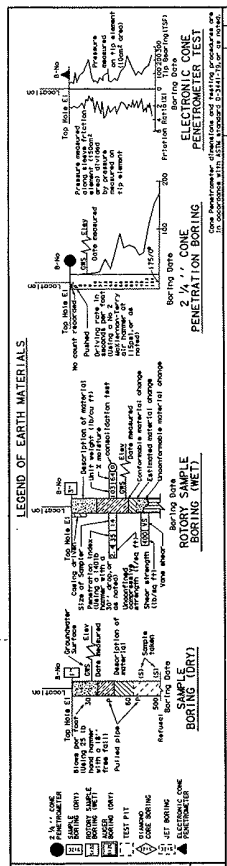
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

CU 11275 EA 0301U1

FORM DC-OE-92-PF (REV. 3/88)

USERNAME => tbdjac
DGN FILE => b0301ugall.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:59



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

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Caltrans Metric

BORING No. : 545B-B5 (Sheet 2 of 2)

Date Drilled: 06/29/99

Project Name : I-5/805 Retaining Walls

Location : 22.2L; 544+68.5 "SB" Line

Logged by: Joe Pratt

Drilling Method : Mud Rotary and Coring

Top of hole elevation : 24.4 m

SAMPLE						PROFILE	
DEPTH (M)	NUMBER	RECOVERY %	RQD	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
-14.00	11	38	0	CORING			Medium to fine SANDSTONE with scattered GRAVEL and minor COBBLES (up to 150 mm dia.: hard, metavocanic), interbedded with CLAYSTONE and SILTSTONE, yellowish brown to light gray to black, moderately to intensely weathered, dominantly uncemented (soil-like) SANDSTONE and minor soft (rock-like) SILTSTONE/CLAYSTONE with CLAY matrix and/or cement, thinly to moderately bedded, unfractured, some hard drilling in GRAVEL/COBBLE zones.
-15.00							
-16.00	12	24	0	CORING			
-17.00	13	66	16	CORING			
-18.00							
-19.00	14	80	0	CORING			Conglomerate composed of coarse GRAVEL and small COBBLES (up to 150 mm dia.) with fine SAND (SP) matrix (30 -35%): varicolored rock fragments and brownish gray matrix, matrix is soil-like and uncemented, subangular to subrounded metavolcanic rock clasts are very hard (very hard drilling).
-20.00	16	73	0	CORING			SILTSTONE interbedded with minor CLAYSTONE and fine SANDSTONE (interbedded rock-like/soil-like units): olive gray, contains zones with pelecypod debris (source for calcite cement), moderately weathered, moderately soft, moderately fractured, rare fractures dip 80° in cemented zones.
-21.00							
-22.00	17	100	74	CORING			Fine SANDSTONE interbedded with SILTSTONE and minor CLAYSTONE (dominantly rock-like): contains zones with pelecypod and gastropod debris, light to dark gray, olive gray, and greenish gray, intensely to moderately weathered, moderately hard (some cemented SANDSTONE and SILTSTONE) to soft (CLAYSTONE/SILTSTONE), some zones uncemented and soil-like, moderately to thinly bedded (beds dip 10°), unfractured to moderately fractured (cemented SANDSTONE), minor subvertical (80° dip) fractures partially infilled with calcite cement, burrow mottled SILTSTONE, slow slaking.
-23.00	18	100	40	CORING			
-24.00							
-25.00	19	94	14	CORING			
-26.00	20	92	52	CORING			
-27.00							
-28.00	21	100		CORING			
-29.00							

LEGEND OF EARTH MATERIALS

ELECTRONIC CONE PENETROMETER TEST

2 1/4" CONE PENETRATION BORING

ROTARY SAMPLE BORING (WET)

SAMPLE BORING (DRY)

LEGEND OF EARTH MATERIALS

CLAY, FILL, SAND, GRAVEL, SANDY CLAY CLAYEY SAND, SILTY SAND, SILTY CLAY, CLAYEY SILT, ASPHALT PAVEMENT, SILTSTONE, SILT, BEDROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration test

Penetration Index (Blows/Ft)	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DRAWN BY

CHECKED BY

CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.

POST MILE

BORING: 545B-B5 R-112

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ugol2.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 16:00

FORM DC-OE-92-PF (REV. 3/88)

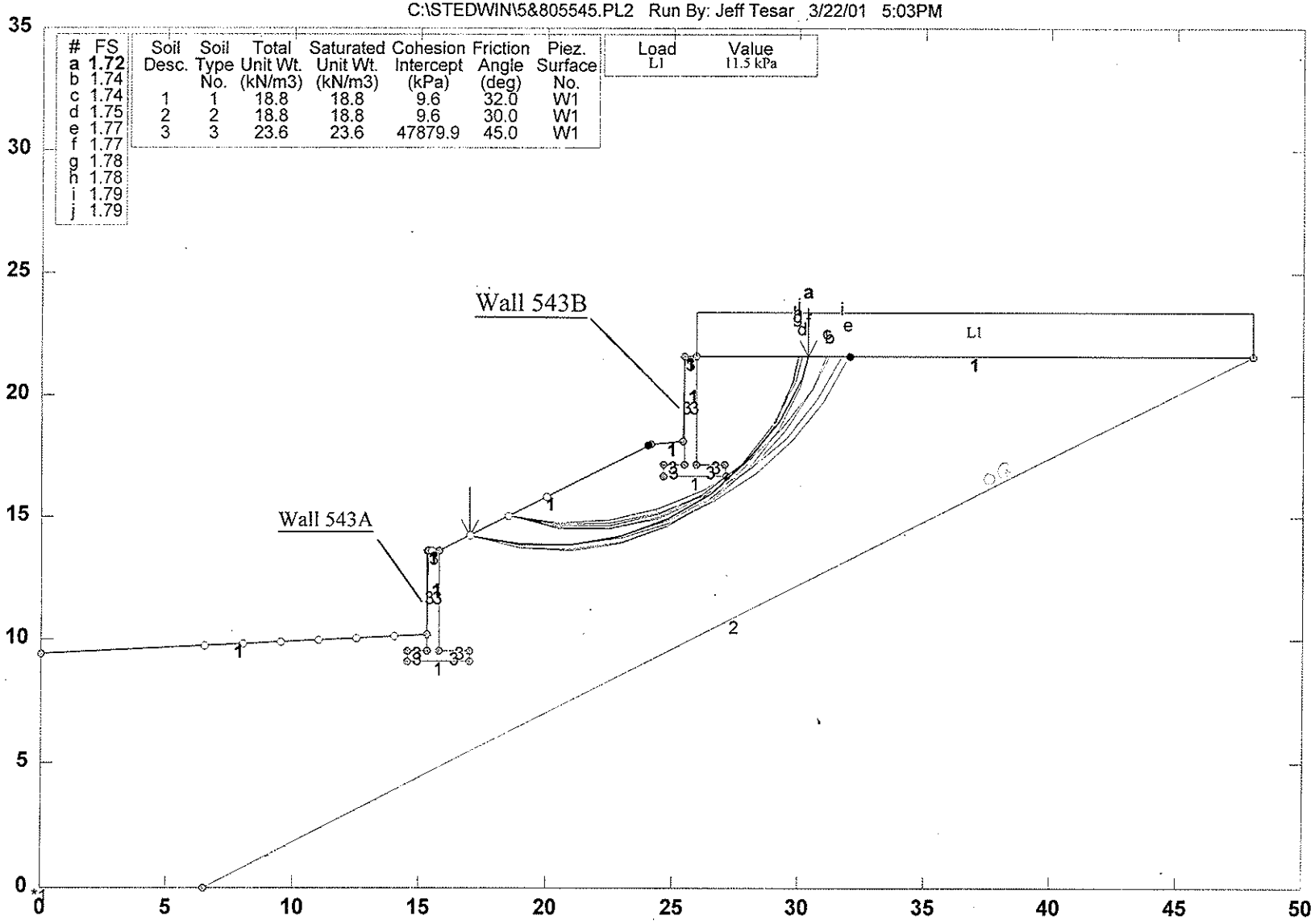
Interstates 5&805, Retaining Walls, Walls 545A and 543B

C:\STEDWIN\5&805545.PL2 Run By: Jeff Tesar 3/22/01 5:03PM

#	FS
a	1.72
b	1.74
c	1.74
d	1.75
e	1.77
f	1.77
g	1.78
h	1.78
i	1.79
j	1.79

Soil Desc.	Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Piez. Surface No.
1	1	18.8	18.8	9.6	32.0	W1
2	2	18.8	18.8	9.6	30.0	W1
3	3	23.6	23.6	47879.9	45.0	W1

Load	Value
L1	11.5 kPa



GSTABL7 FSmin=1.72

Safety Factors Are Calculated By The Modified Bishop Method

STED

*** GSTABL7 ***
** GSTABL7 by Garry H. Gregory, P.E. **
** Version 1.0, January 1996; Version 1.16, May 2000 **
--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 3/22/01
Time of Run: 5:03PM
Run By: Jeff Tesar
Input Data Filename: C:5&805545.PRP
Output Filename: C:5&805545.OUT
Unit System: SI
Plotted Output Filename: C:5&805545.PLT
PROBLEM DESCRIPTION Interstates 5&805, Retaining Walls, Walls 543A and 543B

BOUNDARY COORDINATES
8 Top Boundaries
25 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	9.40	15.30	10.20	1
2	15.30	10.20	15.31	13.60	1
3	15.31	13.60	15.79	13.60	1
4	15.79	13.60	24.10	18.00	1
5	24.10	18.00	25.40	18.10	1
6	25.40	18.10	25.45	21.60	1
7	25.45	21.60	25.90	21.60	1
8	25.90	21.60	48.00	21.60	1
9	14.50	9.10	14.51	9.55	3
10	14.51	9.55	15.32	9.55	3
11	15.32	9.55	15.33	13.59	3
12	15.33	13.59	15.80	13.59	3
13	15.80	13.59	15.81	9.55	3
14	15.81	9.55	16.99	9.55	3
15	16.99	9.55	17.00	9.10	3
16	14.50	9.10	17.00	9.10	1
17	24.60	16.70	24.62	17.15	3
18	24.62	17.15	25.42	17.15	3
19	25.42	17.15	25.44	21.60	3
20	25.44	21.60	25.89	21.60	3
21	25.89	21.60	25.91	17.15	3
22	25.91	17.15	27.09	17.15	3
23	27.09	17.15	27.10	16.70	3
24	24.60	16.70	27.10	16.70	1
25	6.50	0.00	48.00	21.60	2

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	18.8	18.8	9.6	32.0	0.00	0.0	1
2	18.8	18.8	9.6	30.0	0.00	0.0	1
3	23.6	23.6	47879.9	45.0	0.00	0.0	1

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (m)	X-Right (m)	Intensity (kPa)	Deflection (deg)
1	25.90	48.00	11.5	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Searching Routine Will Be Limited To An Area Defined By 1 Boundaries
Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)
1	0.00	0.00	0.00	0.00

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
40 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 6.50(m)
and X = 20.00(m)
Each Surface Terminates Between X = 24.00(m)
and X = 32.00(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
2.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -15.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.00	14.24
2	18.97	13.87
3	20.97	13.86
4	22.93	14.22
5	24.80	14.94
6	26.51	15.98
7	27.99	17.32
8	29.20	18.91
9	30.10	20.70
10	30.36	21.60

Circle Center At X = 20.0 ; Y = 24.6 and Radius, 10.8
*** 1.721 ***
Individual data on the 21 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	2.0	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.0	73.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.0	104.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.2	71.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.5	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.2	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.6	34.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.4	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1
15	0.6	66.3	0.0	0.0	0.0	0.0	0.0	0.0	6.8
16	0.6	60.2	0.0	0.0	0.0	0.0	0.0	0.0	6.7
17	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
18	0.9	78.4	0.0	0.0	0.0	0.0	0.0	0.0	10.2
19	1.2	79.6	0.0	0.0	0.0	0.0	0.0	0.0	13.9
20	0.9	30.5	0.0	0.0	0.0	0.0	0.0	0.0	10.4
21	0.3	2.2	0.0	0.0	0.0	0.0	0.0	0.0	3.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	18.50	15.04
2	20.48	14.78
3	22.48	14.88
4	24.43	15.34

5	26.26	16.14
6	27.93	17.25
7	29.37	18.63
8	30.54	20.26
9	31.18	21.60

Circle Center At X = 20.9 ; Y = 26.0 and Radius, 11.2

*** 1.736 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.00	14.24
2	18.97	13.89
3	20.97	13.88
4	22.94	14.20
5	24.83	14.85
6	26.59	15.82
7	28.15	17.06
8	29.48	18.56
9	30.54	20.25
10	31.09	21.60

Circle Center At X = 20.1 ; Y = 25.6 and Radius, 11.7

*** 1.738 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	18.50	15.04
2	20.46	14.61
3	22.46	14.63
4	24.40	15.09
5	26.20	15.97
6	27.76	17.22
7	29.01	18.78
8	29.88	20.58
9	30.12	21.60

Circle Center At X = 21.4 ; Y = 23.6 and Radius, 9.0

*** 1.755 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.00	14.24
2	18.97	13.91
3	20.97	13.89
4	22.95	14.17
5	24.86	14.76
6	26.66	15.64
7	28.30	16.78
8	29.75	18.17
9	30.96	19.76
10	31.92	21.51
11	31.95	21.60

Circle Center At X = 20.1 ; Y = 26.8 and Radius, 12.9

*** 1.771 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.00	14.24
2	18.94	13.76
3	20.94	13.67
4	22.92	13.96
5	24.80	14.63
6	26.52	15.66
7	28.00	17.00
8	29.20	18.61
9	30.06	20.41
10	30.36	21.60

Circle Center At X = 20.4 ; Y = 23.8 and Radius, 10.2

*** 1.773 ***
Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.00	14.24
2	18.94	13.74
3	20.93	13.64
4	22.91	13.95
5	24.78	14.66
6	26.47	15.73
7	27.90	17.13
8	29.02	18.78
9	29.77	20.64
10	29.95	21.60

Circle Center At X = 20.4 ; Y = 23.3 and Radius, 9.7

*** 1.777 ***
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	18.50	15.04
2	20.44	14.56
3	22.44	14.55
4	24.39	15.00
5	26.19	15.88
6	27.73	17.15
7	28.94	18.74
8	29.76	20.57
9	29.95	21.60

Circle Center At X = 21.5 ; Y = 23.1 and Radius, 8.7

*** 1.777 ***
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	18.50	15.04
2	20.48	14.72
3	22.48	14.76
4	24.44	15.15
5	26.30	15.89
6	28.00	16.94
7	29.49	18.27
8	30.72	19.84
9	31.65	21.60

Circle Center At X = 21.3 ; Y = 26.0 and Radius, 11.3

*** 1.787 ***
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	18.50	15.04
2	20.44	14.55
3	22.44	14.52
4	24.39	14.96
5	26.19	15.83
6	27.74	17.09
7	28.96	18.68
8	29.78	20.51
9	29.99	21.60

Circle Center At X = 21.6 ; Y = 23.1 and Radius, 8.6

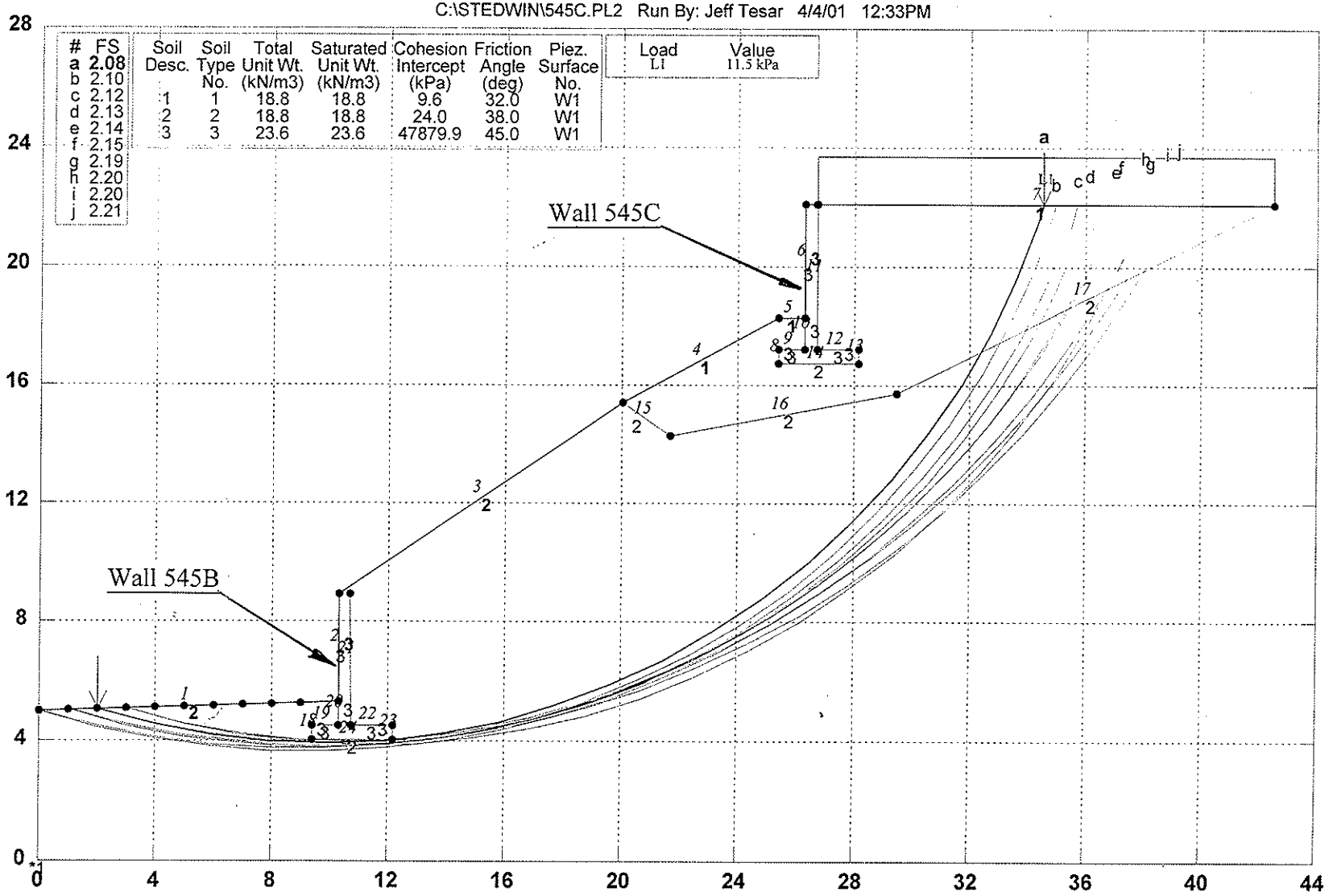
*** 1.789 ***

Interstates 5&805, Retaining Walls, Walls 545B and 545C

C:\STEDWIN\545C.PL2 Run By: Jeff Tesar 4/4/01 12:33PM

#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Piez. Surface No.
a	2.08							
b	2.10							
c	2.12	1	1	18.8	18.8	9.6	32.0	W1
d	2.13	2	2	18.8	18.8	24.0	38.0	W1
e	2.14	3	3	23.6	23.6	47879.9	45.0	W1
f	2.15							
g	2.19							
h	2.20							
i	2.20							
j	2.21							

Load	Value
L1	11.5 kPa



GSTABL7 FSmin=2.08

Safety Factors Are Calculated By The Modified Bishop Method

STED

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Version 1.0, January 1996; Version 1.16, May 2000 **
--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/4/01
Time of Run: 12:33PM
Run By: Jeff Tesar
Input Data Filename: C:545C.PRP
Output Filename: C:545C.OUT
Unit System: SI
Plotted Output Filename: C:545C.PLT
PROBLEM DESCRIPTION Interstates 5&805, Retaining Walls, Walls 545B and 545C

BOUNDARY COORDINATES
7 Top Boundaries
24 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	5.00	10.30	5.30	2
2	10.30	5.30	10.31	8.90	3
3	10.31	8.90	20.05	15.40	2
4	20.05	15.40	25.40	18.30	1
5	25.40	18.30	26.30	18.30	1
6	26.30	18.30	26.32	22.10	3
7	26.32	22.10	42.50	22.10	1
8	25.40	16.75	25.41	17.20	3
9	25.41	17.20	26.29	17.20	3
10	26.29	17.20	26.30	18.30	3
11	26.70	22.10	26.71	17.20	3
12	26.71	17.20	28.15	17.20	3
13	28.15	17.20	28.16	16.75	3
14	25.40	16.75	28.16	16.75	2
15	20.05	15.40	21.70	14.30	2
16	21.70	14.30	29.50	15.75	2
17	29.50	15.75	42.50	22.10	2
18	9.40	4.04	9.41	4.50	3
19	9.41	4.50	10.29	4.50	3
20	10.29	4.50	10.30	5.30	3
21	10.70	8.90	10.71	4.50	3
22	10.71	4.50	12.15	4.50	3
23	12.15	4.50	12.16	4.05	3
24	9.40	4.05	12.16	4.05	2

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	18.8	18.8	9.6	32.0	0.00	0.0	1
2	18.8	18.8	24.0	38.0	0.00	0.0	1
3	23.6	23.6	47879.9	45.0	0.00	0.0	1

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (m)	X-Right (m)	Intensity (kPa)	Deflection (deg)
1	26.70	42.50	11.5	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Searching Routine Will Be Limited To An Area Defined By 1 Boundaries
Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)
1	0.00	0.00	0.00	0.00

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
40 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00(m)
and X = 9.00(m)
Each Surface Terminates Between X = 26.70(m)
and X = 42.50(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
2.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -15.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	2.00	5.06
2	3.93	4.54
3	5.90	4.18
4	7.89	3.97
5	9.89	3.91
6	11.89	4.00
7	13.87	4.24
8	15.83	4.64
9	17.75	5.19
10	19.63	5.88
11	21.45	6.71
12	23.20	7.68
13	24.87	8.78
14	26.45	10.00
15	27.93	11.35
16	29.31	12.80
17	30.57	14.35
18	31.70	16.00
19	32.71	17.72
20	33.59	19.52
21	34.32	21.39
22	34.54	22.10

Circle Center At X = 9.7 ; Y = 30.0 and Radius, 26.1
*** 2.083 ***
Individual data on the 43 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	1.9	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.0	42.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.5	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.5	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.4	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.4	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	1.2	126.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.3	30.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	1.7	211.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.0	276.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.9	301.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

18	1.9	317.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.4	73.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	1.4	247.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.3	44.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	1.5	266.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	1.7	293.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.5	91.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.9	147.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.1	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.3	56.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1
32	1.2	263.0	0.0	0.0	0.0	0.0	0.0	0.0	14.1
33	0.2	44.2	0.0	0.0	0.0	0.0	0.0	0.0	2.5
34	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
35	1.1	214.2	0.0	0.0	0.0	0.0	0.0	0.0	13.2
36	0.2	33.4	0.0	0.0	0.0	0.0	0.0	0.0	2.2
37	1.1	169.1	0.0	0.0	0.0	0.0	0.0	0.0	12.3
38	1.1	148.5	0.0	0.0	0.0	0.0	0.0	0.0	13.1
39	0.7	70.5	0.0	0.0	0.0	0.0	0.0	0.0	7.8
40	0.3	29.1	0.0	0.0	0.0	0.0	0.0	0.0	3.8
41	0.9	57.2	0.0	0.0	0.0	0.0	0.0	0.0	10.0
42	0.7	22.7	0.0	0.0	0.0	0.0	0.0	0.0	8.4
43	0.2	1.5	0.0	0.0	0.0	0.0	0.0	0.0	2.5

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.93	4.58
3	6.90	4.22
4	8.89	4.02
5	10.89	3.97
6	12.89	4.08
7	14.87	4.34
8	16.83	4.76
9	18.74	5.33
10	20.61	6.05
11	22.42	6.91
12	24.15	7.91
13	25.80	9.04
14	27.35	10.30
15	28.81	11.67
16	30.15	13.16
17	31.37	14.74
18	32.46	16.41
19	33.42	18.17
20	34.24	19.99
21	34.92	21.88
22	34.98	22.10

Circle Center At X = 10.5 ; Y = 29.6 and Radius, 25.6

*** 2.098 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.94	4.58
3	6.90	4.23
4	8.89	4.02
5	10.89	3.96
6	12.89	4.06
7	14.87	4.30
8	16.84	4.70
9	18.76	5.24
10	20.64	5.93

11	22.46	6.75
12	24.21	7.72
13	25.89	8.81
14	27.48	10.02
15	28.97	11.35
16	30.36	12.79
17	31.63	14.34
18	32.79	15.97
19	33.82	17.68
20	34.71	19.47
21	35.47	21.32
22	35.72	22.10

Circle Center At X = 10.6 ; Y = 30.4 and Radius, 26.4

*** 2.116 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.94	4.59
3	6.91	4.24
4	8.90	4.03
5	10.89	3.97
6	12.89	4.06
7	14.88	4.30
8	16.84	4.68
9	18.77	5.21
10	20.65	5.88
11	22.48	6.69
12	24.25	7.63
13	25.94	8.70
14	27.54	9.89
15	29.06	11.20
16	30.47	12.62
17	31.77	14.13
18	32.96	15.74
19	34.03	17.43
20	34.96	19.20
21	35.77	21.03
22	36.14	22.10

Circle Center At X = 10.7 ; Y = 30.9 and Radius, 26.9

*** 2.125 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	2.00	5.06
2	3.94	4.58
3	5.91	4.23
4	7.90	4.01
5	9.90	3.94
6	11.90	4.00
7	13.89	4.20
8	15.86	4.53
9	17.80	5.00
10	19.71	5.60
11	21.58	6.32
12	23.38	7.18
13	25.13	8.15
14	26.80	9.25
15	28.40	10.45
16	29.91	11.76
17	31.33	13.17
18	32.65	14.68
19	33.86	16.27
20	34.96	17.94
21	35.94	19.68
22	36.80	21.49

```
   23          37.04        22.10
Circle Center At X =    10.0 ; Y =    33.2  and Radius,    29.2
      ***      2.139    ***
Failure Surface Specified By 23 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (m)          (m)
    1          1.00         5.03
    2          2.94         4.52
    3          4.90         4.15
    4          6.89         3.90
    5          8.88         3.79
    6         10.88         3.82
    7         12.88         3.97
    8         14.86         4.26
    9         16.81         4.68
   10         18.73         5.23
   11         20.62         5.90
   12         22.45         6.70
   13         24.23         7.62
   14         25.94         8.66
   15         27.58         9.80
   16         29.13        11.06
   17         30.60        12.41
   18         31.98        13.86
   19         33.26        15.40
   20         34.43        17.02
   21         35.50        18.72
   22         36.44        20.48
   23         37.18        22.10
Circle Center At X =     9.5 ; Y =    33.8  and Radius,    30.0
      ***      2.152    ***
Failure Surface Specified By 24 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (m)          (m)
    1          0.00         5.00
    2          1.93         4.49
    3          3.90         4.10
    4          5.88         3.83
    5          7.87         3.69
    6          9.87         3.67
    7         11.87         3.77
    8         13.86         4.00
    9         15.82         4.36
   10         17.77         4.83
   11         19.68         5.43
   12         21.55         6.14
   13         23.37         6.97
   14         25.13         7.91
   15         26.84         8.95
   16         28.47        10.11
   17         30.03        11.36
   18         31.51        12.70
   19         32.90        14.14
   20         34.20        15.66
   21         35.40        17.26
   22         36.51        18.93
   23         37.50        20.66
   24         38.21        22.10
Circle Center At X =     9.2 ; Y =    35.7  and Radius,    32.1
      ***      2.192    ***
Failure Surface Specified By 23 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (m)          (m)
    1          3.00         5.09
    2          4.93         4.58
    3          6.90         4.20
```

4	8.88	3.96
5	10.88	3.86
6	12.88	3.90
7	14.87	4.08
8	16.85	4.40
9	18.80	4.85
10	20.71	5.44
11	22.57	6.16
12	24.38	7.01
13	26.13	7.98
14	27.81	9.07
15	29.41	10.28
16	30.91	11.59
17	32.33	13.01
18	33.64	14.51
19	34.84	16.11
20	35.93	17.79
21	36.90	19.54
22	37.75	21.35
23	38.04	22.10

Circle Center At X = 11.3 ; Y = 32.6 and Radius, 28.7

*** 2.197 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	0.00	5.00
2	1.94	4.52
3	3.91	4.15
4	5.89	3.90
5	7.89	3.77
6	9.89	3.76
7	11.88	3.87
8	13.87	4.11
9	15.84	4.46
10	17.78	4.93
11	19.70	5.51
12	21.57	6.21
13	23.40	7.02
14	25.18	7.93
15	26.90	8.96
16	28.55	10.08
17	30.13	11.30
18	31.64	12.62
19	33.07	14.02
20	34.40	15.51
21	35.65	17.07
22	36.80	18.71
23	37.85	20.41
24	38.76	22.10

Circle Center At X = 9.0 ; Y = 37.0 and Radius, 33.3

*** 2.201 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	1.00	5.03
2	2.94	4.55
3	4.91	4.20
4	6.90	3.96
5	8.89	3.85
6	10.89	3.86
7	12.89	3.98
8	14.87	4.23
9	16.84	4.61
10	18.78	5.10
11	20.68	5.70
12	22.55	6.42

13	24.37	7.26
14	26.13	8.20
15	27.83	9.25
16	29.47	10.40
17	31.03	11.65
18	32.52	12.99
19	33.92	14.42
20	35.23	15.93
21	36.44	17.52
22	37.56	19.18
23	38.57	20.90
24	39.18	22.10

Circle Center At X = 9.8 ; Y = 36.6 and Radius, 32.8

*** 2.212 ***

Interstates 5&805, Retaining Walls, Walls 545B and 545C

C:\STEDWIN\545C.PL2 Run By: Jeff Tesar 4/4/01 12:29PM

#	FS
a	2.03
b	2.03
c	2.06
d	2.07
e	2.08
f	2.08
g	2.09
h	2.09
i	2.11
j	2.11

Soil Desc.	Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Piez. Surface No.
1	1	18.8	18.8	9.6	32.0	W1
2	2	18.8	18.8	24.0	38.0	W1
3	3	23.6	23.6	47879.9	45.0	W1

Load	Value
L1	11.5 kPa

Wall 545C

Wall 545B

GSTABL7 FSmin=2.03

Safety Factors Are Calculated By The Modified Bishop Method

STED

*** GSTABL7 ***
** GSTABL7 by Garry H. Gregory, P.E. **
** Version 1.0, January 1996; Version 1.16, May 2000 **
--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/4/01
Time of Run: 12:29PM
Run By: Jeff Tesar
Input Data Filename: C:545C.PRP
Output Filename: C:545C.OUT
Unit System: SI
Plotted Output Filename: C:545C.PLT
PROBLEM DESCRIPTION Interstates 5&805, Retaining Walls,
Walls 545B and 545C

BOUNDARY COORDINATES
7 Top Boundaries
24 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	5.00	10.30	5.30	2
2	10.30	5.30	10.31	8.90	3
3	10.31	8.90	20.05	15.40	2
4	20.05	15.40	25.40	18.30	1
5	25.40	18.30	26.30	18.30	1
6	26.30	18.30	26.32	22.10	3
7	26.32	22.10	42.50	22.10	1
8	25.40	16.75	25.41	17.20	3
9	25.41	17.20	26.29	17.20	3
10	26.29	17.20	26.30	18.30	3
11	26.70	22.10	26.71	17.20	3
12	26.71	17.20	28.15	17.20	3
13	28.15	17.20	28.16	16.75	3
14	25.40	16.75	28.16	16.75	2
15	20.05	15.40	21.70	14.30	2
16	21.70	14.30	29.50	15.75	2
17	29.50	15.75	42.50	22.10	2
18	9.40	4.04	9.41	4.50	3
19	9.41	4.50	10.29	4.50	3
20	10.29	4.50	10.30	5.30	3
21	10.70	8.90	10.71	4.50	3
22	10.71	4.50	12.15	4.50	3
23	12.15	4.50	12.16	4.05	3
24	9.40	4.05	12.16	4.05	2

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	18.8	18.8	9.6	32.0	0.00	0.0	1
2	18.8	18.8	24.0	38.0	0.00	0.0	1
3	23.6	23.6	47879.9	45.0	0.00	0.0	1

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (m)	X-Right (m)	Intensity (kPa)	Deflection (deg)
1	26.70	42.50	11.5	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
Searching Routine Will Be Limited To An Area Defined By 1 Boundaries
Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)
1	0.00	0.00	0.00	0.00

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
40 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 10.75(m)
and X = 20.00(m)
Each Surface Terminates Between X = 26.70(m)
and X = 42.50(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
2.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -15.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.00	15.37
2	21.94	14.88
3	23.94	14.83
4	25.90	15.22
5	27.73	16.04
6	29.33	17.23
7	30.63	18.75
8	31.57	20.52
9	31.99	22.10

Circle Center At X = 23.2 ; Y = 23.8 and Radius, 9.0
*** 2.026 ***
Individual data on the 19 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.8	28.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.0	79.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.5	80.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.5	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.4	22.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.4	47.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13	1.0	122.8	0.0	0.0	0.0	0.0	0.0	0.0	11.7
14	0.4	47.9	0.0	0.0	0.0	0.0	0.0	0.0	4.9
15	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
16	1.2	117.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5
17	1.3	100.6	0.0	0.0	0.0	0.0	0.0	0.0	15.0
18	0.9	43.4	0.0	0.0	0.0	0.0	0.0	0.0	10.7
19	0.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0	4.9

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.00	15.37
2	21.93	14.86
3	23.93	14.80
4	25.89	15.20
5	27.71	16.03
6	29.30	17.25
7	30.57	18.79
8	31.46	20.58

```
    9          31.81        22.10
Circle Center At X =    23.2 ; Y =    23.6  and Radius,     8.8
      ***      2.033    ***
Failure Surface Specified By 14 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (m)          (m)
    1          11.78         9.88
    2          13.76        10.15
    3          15.72        10.55
    4          17.65        11.06
    5          19.55        11.70
    6          21.40        12.45
    7          23.20        13.32
    8          24.95        14.29
    9          26.63        15.38
   10          28.24        16.56
   11          29.78        17.85
   12          31.23        19.22
   13          32.59        20.69
   14          33.75        22.10
Circle Center At X =     8.4 ; Y =    41.8  and Radius,    32.1
      ***      2.061    ***
Failure Surface Specified By 15 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (m)          (m)
    1          11.78         9.88
    2          13.78         9.81
    3          15.77         9.93
    4          17.75        10.22
    5          19.70        10.69
    6          21.59        11.33
    7          23.42        12.13
    8          25.17        13.10
    9          26.83        14.22
   10          28.38        15.49
   11          29.81        16.89
   12          31.11        18.41
   13          32.27        20.04
   14          33.27        21.76
   15          33.43        22.10
Circle Center At X =    13.5 ; Y =    32.1  and Radius,    22.3
      ***      2.071    ***
Failure Surface Specified By 15 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (m)          (m)
    1          12.81        10.57
    2          14.80        10.73
    3          16.78        11.02
    4          18.73        11.44
    5          20.66        11.98
    6          22.55        12.64
    7          24.39        13.42
    8          26.18        14.32
    9          27.90        15.33
   10          29.56        16.45
   11          31.14        17.67
   12          32.65        18.99
   13          34.06        20.40
   14          35.38        21.90
   15          35.54        22.10
Circle Center At X =    11.2 ; Y =    41.8  and Radius,    31.3
      ***      2.080    ***
Failure Surface Specified By 14 Coordinate Points
  Point       X-Surf       Y-Surf
   No.          (m)          (m)
    1          12.81        10.57
```

2	14.79	10.83
3	16.75	11.21
4	18.69	11.71
5	20.59	12.32
6	22.45	13.06
7	24.27	13.90
8	26.02	14.85
9	27.72	15.91
10	29.35	17.07
11	30.90	18.33
12	32.38	19.68
13	33.77	21.12
14	34.61	22.10

Circle Center At X = 9.6 ; Y = 43.1 and Radius, 32.7

*** 2.082 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.94	14.00
2	19.94	14.00
3	21.93	14.24
4	23.87	14.71
5	25.75	15.41
6	27.53	16.32
7	29.19	17.43
8	30.71	18.73
9	32.07	20.19
10	33.25	21.81
11	33.41	22.10

Circle Center At X = 18.9 ; Y = 31.0 and Radius, 17.1

*** 2.093 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.78	9.94
3	15.77	10.14
4	17.74	10.47
5	19.68	10.95
6	21.59	11.56
7	23.44	12.30
8	25.24	13.17
9	26.98	14.17
10	28.64	15.28
11	30.22	16.51
12	31.71	17.85
13	33.10	19.28
14	34.38	20.81
15	35.32	22.10

Circle Center At X = 12.0 ; Y = 38.4 and Radius, 28.5

*** 2.093 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.77	9.70
3	15.77	9.73
4	17.75	9.98
5	19.70	10.44
6	21.59	11.10
7	23.40	11.95
8	25.10	13.00
9	26.69	14.22
10	28.13	15.60
11	29.42	17.13
12	30.55	18.78

13	31.49	20.55
14	32.11	22.10

Circle Center At X = 14.5 ; Y = 28.4 and Radius, 18.8

*** 2.111 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.77	9.71
3	15.77	9.74
4	17.76	9.97
5	19.71	10.38
6	21.62	10.99
7	23.46	11.78
8	25.21	12.74
9	26.86	13.87
10	28.39	15.16
11	29.79	16.59
12	31.05	18.14
13	32.14	19.82
14	33.07	21.59
15	33.28	22.10

Circle Center At X = 14.5 ; Y = 30.2 and Radius, 20.5

*** 2.113 ***

Photo 1: Wall 456 Location; looking north from about Station 456+00

Photo 2: Wall 456 Location; looking north from about Station 458+80

Photo 3: Wall 456 Location; looking north from about Station 460+30

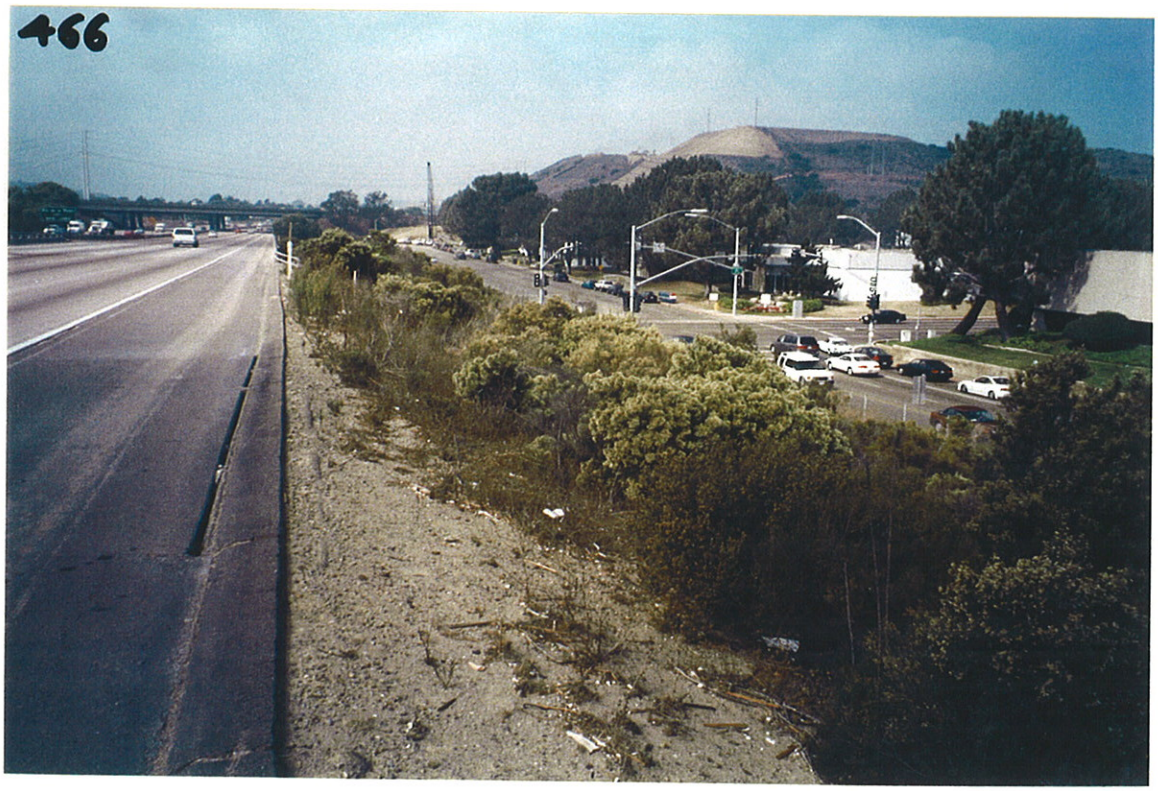


Photo 4: Wall 466 Location; looking north from about Station 465+80

Photo 5: Wall 466 Location; looking south from Sorrento Valley Blvd undercrossing

Photo 6: Wall 470 Location; looking north from about Station 470+50

Photo 7: Wall 512 Location; looking north form about Station 512+10

Photo 8: Wall 512 Location; looking south from about Station 513+90

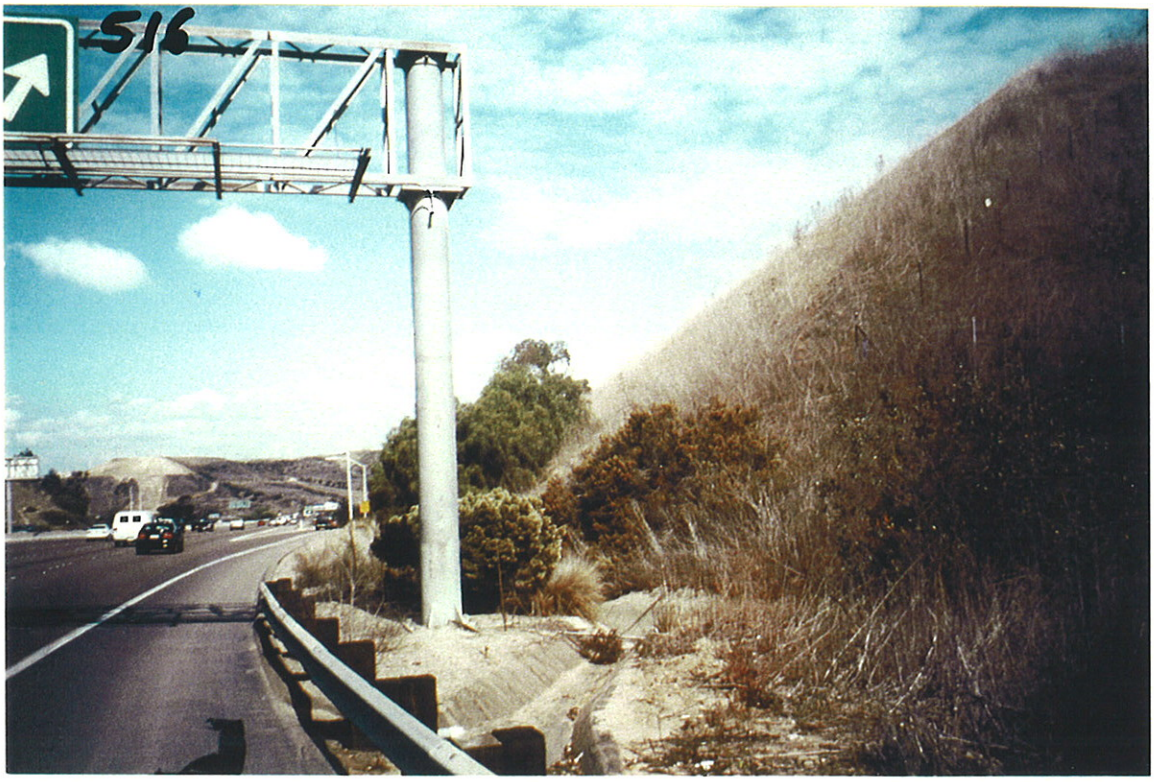


Photo 9: Wall 516 Location; looking north form about Station 515+00

Photo 10: Wall 516 Location; looking north from about Station 515+80

Photo 11: Wall 527 Location; looking south form about Station 529+60

Photo 12: Wall 527 Location; looking south from about Station 528+10

Photo 13: Wall 543 Location; looking south form about Station 544+0

Photo 14: Walls 543 & 4 Location; looking south from Carmel Mountain Rd undercrossing

Photo 15: Wall 544 Location; looking north form about Station 543+10

Photo 16: Wall 544 Location; looking north from about Station 544+20

Photo 17: Wall 545A Location; looking south form about Station 546+00

Photo 18: Walls 545A, 3A, & 6 Location; looking north from Carmel Mountain Rd undercrossing

Photo 19: Wall 545B Location; looking north form about Station 545+20

Photo 20: Walls 545B & 5 Location; looking south from about Station 545+50

Photo 21: Wall 546 Location; looking north form Carmel Mountain Rd undercrossing

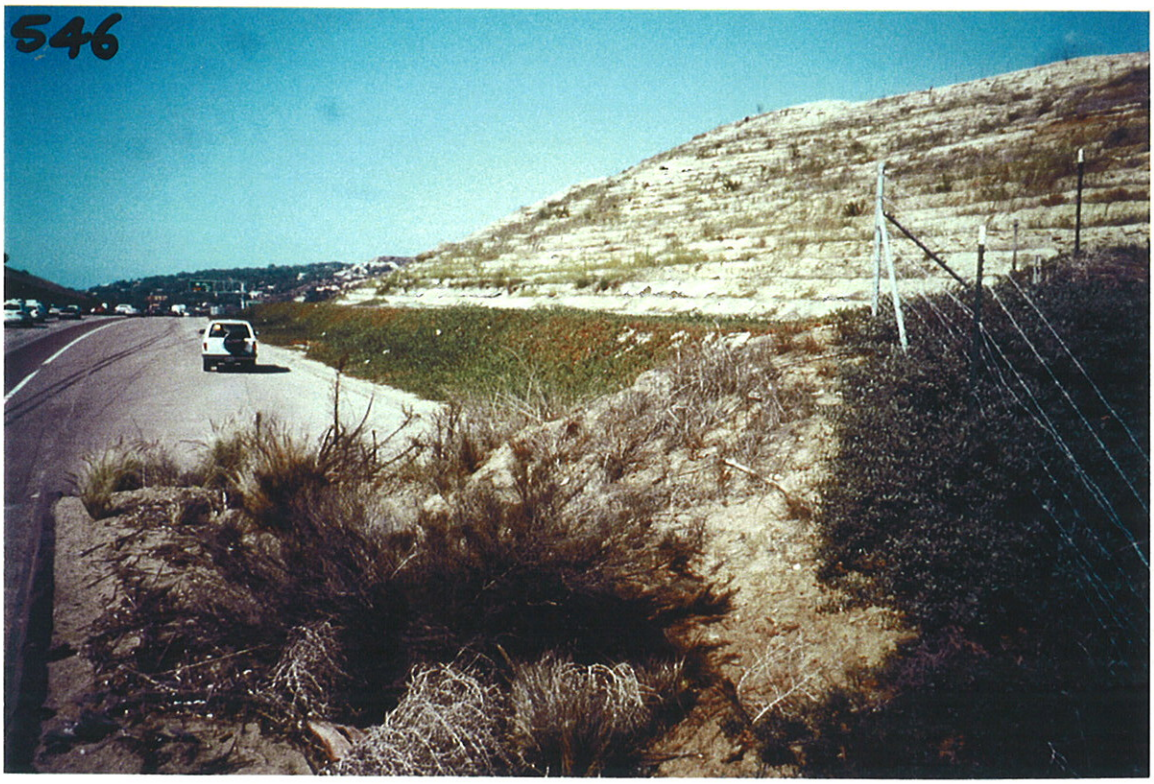


Photo 22: Wall 546 Location; looking north from about Station 545+60

Photo 23: Wall 569 Location; looking south form about Station 574+40

Photo 24: Wall 569 Location; looking south from about Station 569+20

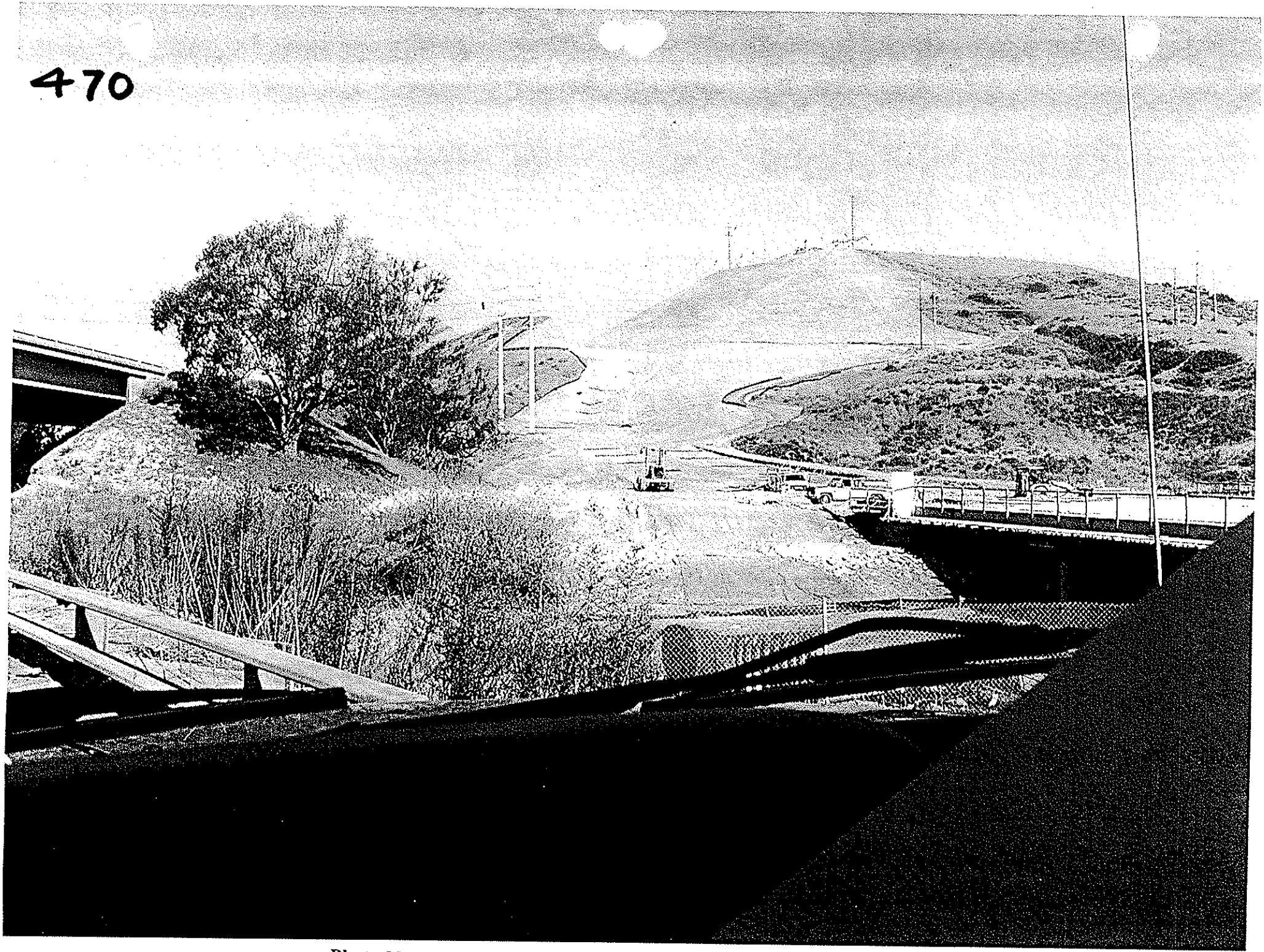


Photo 25: Wall 470 Location; Looking north from the NB I-805

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design 5
MS 35

Date: April 12, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICES
Office of Geotechnical Services, MS #63

Subject: Interstates 5 and 805 Interchange, Proposed Traffic Signs.

INTRODUCTION

Following your request, we conducted a foundation review for the traffic signs proposed along the subject Interchange of Interstates 5 and 805 (I-5 and I-805). This interchange is to be improved. According to your request, the improvement will involve several auxiliary lanes, new ramps, and bridges that will require the construction of several traffic signs. Our review consisted of site inspections that included limited geologic mapping, review of geologic literature, photo-documentation, and the writing of this report. Along with your request, we have received from you the layout sheets of the proposed signs in a scale of 1:500 that were used in our fieldwork and for report purposes.

PROJECT LOCATION

For the project location and its limits, reference is directed to Figure 1, Project Location. The project site is located in San Diego County, San Diego, California. Along Interstate 805 it starts from about 0.9 km north of the Sorrento Valley Boulevard Undercrossing (Station 456+30) and continues north to the merge with Interstate 5. Along I-5 it begins at about 0.5 km north of the Genesee Avenue Overcrossing (Station 512+20), continues through the merge with I-805, and ends about 0.7 km south of the Del Mar Heights Road Overcrossing (Station 574+14). In addition, the project site comprises the western limits of State Route 56.

GENERAL

Table 1 on the following pages lists the proposed traffic signs, their approximate locations, anticipated subsurface conditions, and foundation considerations. The locations of the proposed signs are shown on Figures 2-1 through 2-51. At some of the locations, the topographic configuration and/or the presence of soft surface materials could have an adverse impact on the stability of the proposed signs. Sections of the report that relate to these sites discuss these issues further. In addition, it should be noted that this project site will involve significant grading and construction of several freeway improvements such as retaining walls, bridges, viaducts, off and onramps, etc. Layouts provided by your office sometimes do not show the proposed changes, thus our recommendations are based mainly on the existing topography as depicted on your layout sheets.

Table 1

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
1	I-5 534+40 "SB"	Embankment fill	Western post located at the face of 1:2. Slope is 10 m high. Grading likely in the area. See section: "Traffic Sign 1".
2	I-5 537+90 "SB"	Embankment fill	Eastern post located at the crest of 1:2 slope, western post located at the face of 1:2 slope. Slope is 20 m high. Grading likely in the area. See section: "Traffic Sign 2".
3	I-5 549+66 "CM4"	Embankment fill	Western post located at the crest of 1:2 slope that is 15 m high. See section: Traffic Sign 3".
4	I-5 554+60 "WS"	Embankment fill	Post located at the crest of 1:2 slope that is 7.5 m high. See section: "Traffic Sign 4".
5	I-5 557+00 "WS"	Embankment fill	Post located at the crest of 1:2 slope that is 5 m high. See section: "Traffic Sign 5".
6	I-5 564+55 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 1.7 m high. See section: "Traffic Sign 6".
7	I-5 566+80 "SD"	Native soils	None
8	I-5 569+80 "SD"	Native soils	None
9	I-5 572+20	Native soils	None
11	I-5 591+00	Native soils	None
14	I-5 542+00 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 24 m high. See section: "Traffic Sign 14".
15	I-5 536+40 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 26.5 m high. See section: "Traffic Sign 15".
16	I-5 530+40 "SDL"	Embankment fill	None

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
17	I-5 to SR 56 558+43 "SD"	Embankment fill	Groundwater expected at about an elevation of 4.5 m.
19	I-5 553+40 "SD"	Embankment fill	None
20	I-5 541+50 "SD"	Native soils under shallow fill	Upper 0.9 m layer is weathered. See section: "Traffic Sign 20".
21	I-5 540+60	Embankment fill	Eastern post located at the crest of 1:1.5 slope that is 5 m high. See section: "Traffic Sign 21".
22	I-5 533+40 "NB"	Native soils	None
23	I-5 531+00 "NB"	Native soils	None
24	I-805 465+44 "A"	Native soils	None
25	I-805 457+60 "A"	Native soils	None
26	Carmel Mountain Road 1+20 "CMR"	Fill materials	None
29	Carmel Mountain Road 5+00 "CMR"	Native soils	None
30	I-805 425+00 "A"	Native soils	None
31	I-5 520+70 "SDR"	Embankment fill	Eastern post located at the crest of 1:2 slope that is 6 m high. See section: "Traffic Sign 31".
32	I-5 519+10 "SDR"	Native soils under fill wedge	None
33	I-5 515+75 "SDR"	Native soils under fill wedge	None
35	I-5 503+20 "SD"	Native soils	None
37	I-5 627+15 "SD"	Native soils	None
38	I-5 487+35 "SD"	Native soils	None
39	I-5 584+10 "SD"	Embankment fill	None
40	I-5 593+71 "SD"	Embankment fill	Eastern post located at the crest of 1:1.5 slope that is 6 m high. See section: "Traffic Sign 40".

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
41	I-5 543+60 "NB"	Native soils under fill wedge	None
42	I-5 575+00 "SD"	Native soils	None
50	SR 56 22+30 "SR56"	Native soils	None
51	SR 56 25+45 "SR56"	Native soils	None

Traffic Sign 1

For the location of proposed Traffic Sign 1, (Table 1) reference is directed to Figure 2-1. Based on the layouts provided by you, Traffic Sign 1 will be located about 1000 m south of the Carmel Mountain Road Undercrossing, at Station 534+40 "SB" Line. The sign's eastern post will be located just to the west of the western shoulder of the southbound I-5. The sign's western post will be located at the face of the existing west-facing embankment fill slope that is about 10.0 m high and descends at an inclination of 1:2 vertical to horizontal (V:H). This post will be located in about mid height of the slope. This section of freeway was built as a fill embankment. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 1 will be supported on two 5.2 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile foundation of the sign's western post will be installed at the face of about a 10.5 m high 1:2 (V:H) inclined embankment fill slope. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 1 appears to be located within an area where the topography is to be altered by grading and construction of freeway improvements including new retaining walls. Layouts provided by your office do not show the proposed changes, thus our recommendations are based on the existing topography as depicted on your layout sheets. Any new fill to be placed should be compacted to minimum 90 % Relative Compaction in order to satisfy the minimum design requirements for the pile foundation. If, due to grading and construction of the improvements either post will be located at the crest or face of the embankment fill slope inclined at 1:2 (V:H) or steeper, the pile design should be adjusted for the site sloping configuration, as stated in the previous paragraph.

Traffic Sign 2

For the location of proposed Traffic Sign 2, (Table 1) reference is directed to Figure 2-2. Based on the layouts provided by you, Traffic Sign 2 will be located about 650 m south of the Carmel Mountain Road Undercrossing, at Station 537+90 "SB" Line. The sign's eastern post will be constructed just to the west of the western shoulder of southbound I-5, at about the crest of the embankment fill slope which is inclined at 1:2 (V:H) and is about 20.0 m high. The sign's western post will be located at the face of the existing west-facing embankment slope that is about 10.0 m high and descends at an inclination of 1:2 (V:H). This post will be located in about mid height of the slope. This section of freeway was built as a fill embankment. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 2 will be supported on two 5.2 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile of the sign's western post will be installed at the face of about a 10.5 m high 1:2 (V:H) inclined embankment fill slope, and the sign's eastern post will be installed at the crest of this slope. Therefore, it is our recommendation that both pile designs be adjusted to account for the sites sloping configuration.

Traffic Sign 2 appears to be located within an area where the topography is to be altered by grading and construction of freeway improvements including new retaining walls. Layouts provided by your office do not show the proposed changes, thus our recommendations are based on the existing topography as depicted on your layout sheets. Any new fill to be placed should be compacted to minimum 90 % Relative Compaction in order to satisfy the minimum design requirements for the pile foundation. If, due to grading and construction of the improvements either post will be located at the crest or face of the slope inclined at 1:2 (V:H) or steeper, the pile design should be adjusted for the site sloping configuration, as stated in the previous paragraph.

Traffic Sign 3

For the location of proposed Traffic Sign 3, (Table 1) reference is directed to Figure 2-3. Based on the layouts provided by you, Traffic Sign 3 will be located about 500 m north of the Carmel Mountain Road Undercrossing, at Station 549+66 "CM4" Line. At this location, the southbound I-5 will be widened to accommodate an offramp to Carmel Mountain Road. The sign's eastern post will be constructed just west of the western shoulder of the freeway. The sign's western post will be located about 24 m west of the western shoulder of southbound I-5, at the crest of the west-facing embankment slope that is about 15.0 m high and descends at an inclination of 1:2 (V:H). This section of freeway was built as a fill embankment. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance

with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 3 will be supported on two 5.2 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile of the sign's western post will be installed at the crest of about a 15.0 m high 1:2 (V:H) inclined embankment slope. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 4

For the location of proposed Traffic Sign 4, (Table 1) reference is directed to Figure 2-4. Based on the layouts provided by you, Traffic Sign 4 will be located about 740 m south of the Carmel Valley Road Undercrossing, at Station 554+60 "WS" Line. It will be located about 4 m west of the western shoulder of the southbound ramp/connector that connects westbound State Route 56 (SR 56) to southbound I-5. It will be located at the crest of the west-facing embankment slope that is about 7.5 m high and descends at an inclination of 1:2 (V:H). This section of freeway was built as a fill embankment of the aforementioned connector. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 4 will be supported on a 6.7 m long CIDH Pile Foundation. It is our understanding that the pile foundation was designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile will be installed at the crest of about a 7.5 m high, 1:2 m (V:H) inclined embankment slope that consists of fill materials. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 5

For the location of proposed Traffic Sign 5, (Table 1) reference is directed to Figure 2-5. Based on the layouts provided by you, Traffic Sign 5 will be located about 500 m south of the Carmel Valley Road Undercrossing, at Station 557+00 "WS" Line. It will be located about 3 m west of the western shoulder of the southbound ramp/connector that connects westbound State Route 56 (SR 56) to southbound I-5. It will be located at the crest of the west-facing embankment slope that is about 5.0 m high and descends at an inclination of 1:2 (V:H). This section of freeway was built as a fill departure embankment of the aforementioned connector. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 5 will be supported on a 6.7 m long CIDH Pile Foundation. It is our understanding that the pile foundation was designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative

Compaction. However, the CIDH pile will be installed at the crest of about a 5.0 m high, 1:2 (V:H) inclined embankment fill slope. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 6

For the location of proposed Traffic Sign 6, (Table 1) reference is directed to Figure 2-6. Based on the layouts provided by you, Traffic Sign 6 will be located about 245 m north of the Carmel Valley Road Undercrossing, at Station 564+55 "SD" Line. The sign's eastern post will be constructed in the median of the freeway. The sign's western post will be located about 8 m east of the eastern shoulder of southbound I-5, at the crest of the fill slope to be built in the future. The widening of this section of the freeway will involve the construction of a new fill embankment placed on the section of the existing embankment fill that descends to the west at a slight inclination. This section of I-5 was built as a fill approach embankment to the Carmel Valley Road Undercrossing. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. The new fill slope will descend at an inclination of about 1:2 (V:H) and will be about 1.7 m high.

Based on the information provided by your office, Traffic Sign 6 will be supported on two 6.7 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. At the location of the sign's western post, however, the CIDH pile will be installed at the crest of about a 1.7 m high 1:2 (V:H) inclined embankment slope that will consist of fill materials compacted to 90 % Relative Compaction. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 14

For the location of proposed Traffic Sign 14, (Table 1) reference is directed to Figure 2-14. Based on the layouts provided by you, Traffic Sign 14 will be located about 250 m south of the Carmel Mountain Road Undercrossing, at Station 542+00 "SD" Line. The sign's eastern post will be constructed in the median of I-5. The sign's western post will be constructed just west of the western shoulder of southbound I-5, at the crest of the west-facing embankment slope that is about 24.0 m high and descends at an inclination of 1:2 (V:H). This section of freeway was built as a fill embankment. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 14 will be supported on two 6.7 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile of the sign's western post will be installed at the crest of about a 24.0 m high 1:2 (V:H) inclined embankment fill slope. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 15

For the location of proposed Traffic Sign 15, (Table 1) reference is directed to Figure 2-15. Based on the layouts provided by you, Traffic Sign 15 will be located about 810 m south of the Carmel Mountain Road Undercrossing, at Station 536+40 "SD" Line. The sign's eastern post will be located in the median of I-5. The sign's western post will be constructed just to the west of the western shoulder of southbound I-5, at the crest of the west-facing embankment slope that is about 26.5 m high and descends at an inclination of 1:2 (V:H). This section of freeway was built as a fill embankment. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216.

Based on the information provided by your office, Traffic Sign 15 will be supported on two 6.7 m long CIDH Pile Foundations. It is our understanding that both pile foundations were designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, the CIDH pile of the sign's western post will be installed at the crest of about a 26.5 m high 1:2 (V:H) inclined embankment fill slope. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 20

For the location of proposed Traffic Sign 20, (Table 1) reference is directed to Figure 2-20. Based on the layouts provided by you, Traffic Sign 20 will be located about 190 m south of the Carmel Mountain Road Undercrossing, at Station 541+50 "SD" Line. The sign will be located about 5 m east of the eastern shoulder of northbound I-5. It will be constructed, at about the crest of the east-facing embankment slope that descends at an inclination of about 1:4 vertical to horizontal (V:H). This section of I-5 was built as cut and fill with the native soils of the Torrey Sandstone Formation. A shallow fill layer comprised of granular materials is believed to be present at the proposed Sign 20 location. It is our understanding that this fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. However, during our site inspection, the top 0.9 m layer was found to be loose due to weathering. Fill is expected to be underlain by native sandy soils of the Torrey Sandstone Formation (Kennedy, 1975). From a geotechnical engineering standpoint, the Torrey Sandstone is considered to be competent bedrock. No groundwater is anticipated at the location of Sign 20.

Based on the information provided by your office, Traffic Sign 20 will be supported on 6.7 m long CIDH Pile Foundation. It is our understanding that the pile foundation was designed for soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. However, at the location of the pile foundation the upper 0.9 m layer of the subsurface materials does not meet this strength criterion. Therefore, it is our recommendation that the pile design be adjusted to account for the low strength of the aforementioned upper layer.

Traffic Sign 21

For the location of proposed Traffic Sign 21, (Table 1) reference is directed to Figure 2-21. Based on the layouts provided by you, Traffic Sign 21 will be located about 280 m south of the Carmel Mountain Road Undercrossing, at Station 540+60 "SD" Line. The sign's western post will be located in the median of the freeway. The sign's eastern post will be located about 7 m east of the eastern shoulder of northbound I-5. This post will be constructed, at about the crest of the east-facing embankment slope that is about 5.0 m in height and descends at an inclination of about 1:1.5 (V:H) (Attachment 2, Photo 1). This section of I-5 was built as cut and fill with the native soils of the Torrey Sandstone Formation. A shallow fill layer comprised of granular materials is believed to be present at the proposed Traffic Sign 21 location. It is our understanding that this fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. However, during our site inspection, the top 0.9 m layer of the slope face was found to be loose due to weathering. Fill is expected to be underlain by native sandy soils of the Torrey Sandstone Formation (Kennedy, 1975). From a geotechnical engineering standpoint, the Torrey Sandstone is considered to be competent bedrock. No groundwater is anticipated at the location of Sign 20. Seepage conditions could, however, be encountered below an elevation of about 27 m during the excavation for the pile foundation.

Based on the information provided by your office, Traffic Sign 21 will be supported on two 5.8 m long CIDH Pile Foundations. In addition, it is our understanding that both pile foundations were designed for subsurface materials comparable at a minimum to a freeway fill compacted to 90% Relative Compaction. However, the eastern pile foundation of Sign 21 will be constructed at about the crest of a 5.0 m high embankment fill slope inclined at 1:1.5 (V:H). Therefore, it is our recommendation that the pile design be adjusted for the site sloping configuration.

Traffic Sign 31

For the location of proposed Traffic Sign 31, (Table 1) reference is directed to Figure 2-31. Based on the layouts provided by you, Traffic Sign 31 will be located on I-5, about 170 m south of the Los Penasquitos Channel Bridge, at Station 520+70 "SDR" Line. The sign's western post will be constructed in the median of the freeway. The sign's eastern post will be located about 9 m east of the eastern shoulder of the northbound I-5. This section of the freeway is to be widened. The widening will involve the construction of a new fill embankment to be placed on the section of the existing embankment fill that descends east at an inclination of about 1:3.5 (V:H). This section of I-5 was built as a fill approach embankment to the Los Penasquitos Channel Bridge. It is our understanding that the existing fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. The new fill slope will descend at an inclination of about 1:2 (V:H) and will be about 6 m high.

Based on the information provided by your office, Traffic Sign 31 will be supported on two 6.7 m long CIDH Pile Foundations. It is our understanding that they were designed for

soils comparable at a minimum to a freeway fill compacted to 90 % Relative Compaction. At the location of the sign's eastern post, however, the CIDH pile will be installed at the crest of the a 6.0 m high 1:2 (V:H) inclined embankment slope that will consist of fill materials compacted to 90 % Relative Compaction. Therefore, it is our recommendation that the pile design be adjusted to account for the site sloping configuration.

Traffic Sign 40

For the location of proposed Traffic Sign 40, (Table 1) reference is directed to Figure 2-40. Based on the plans and layouts provided by you, Traffic Sign 40 will be located just east of the eastern shoulder of northbound I-5, at Station 593+71"SD" Line. At this location embankment fill is present. It is about 6.0 m high, and it was placed over the native soils of the Bay Point Formation (Attachment 2, Photo 2). The sign's western post will be constructed in the median of the freeway. The sign's eastern post will be constructed at about the crest of the east-facing embankment slope that descends at an inclination of 1:1.5 (V:H). Based on our field inspection, review of pertinent literature, and geologic experience in the area, it appears that the embankment fill was constructed with predominantly granular materials compacted to 90 % Relative Compaction in accordance with CTM 216. During the excavation for the pile foundation, seepage conditions could be encountered at about an elevation of 37 m. This seepage represents an approximate elevation of the interface of the embankment fill and Bay Point Formation anticipated at the location of the eastern post of Traffic Sign 40.

Based on the information provided by your office, Traffic Sign 40 will be supported on two CIDH Pile Foundations. In addition, it is our understanding that both foundations were designed for subsurface materials comparable at minimum to a freeway fill compacted to 90% Relative Compaction. However, the 4.6 m long eastern pile foundation will be installed at about the crest of a 6.0 m high embankment fill slope inclined at 1:1.5 (V:H). Therefore, it is our recommendation that the eastern pile design be adjusted for the site sloping configuration.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

J. Tesar

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Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
Associate Materials and Research Engineer

Geotechnical Section 11

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ZIAULLAH YAZDANI
No. 2119
Exp. 3-31-05
GEOTECHNICAL
STATE OF CALIFORNIA

C:/Caltrans/5&805Signs.doc

Attachments:

1. Figure 1, Project Location-
2. Figure 2-1, Traffic Sign 1
3. Figure 2-2, Traffic Sign 2
4. Figure 2-3, Traffic Sign 3
5. Figure 2-4, Traffic Sign 4
6. Figure 2-5, Traffic Sign 5
7. Figure 2-6, Traffic Sign 6
8. Figure 2-7, Traffic Sign 7
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34. Figure 2-40, Traffic Sign 40
35. Figure 2-41, Traffic Sign 41
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37. Figure 2-50, Traffic Sign 50
38. Figure 2-51, Traffic Sign 51
39. Photos

cc:
GPearce
JEgan
RGES 02

JT

INDEX OF SHEETS

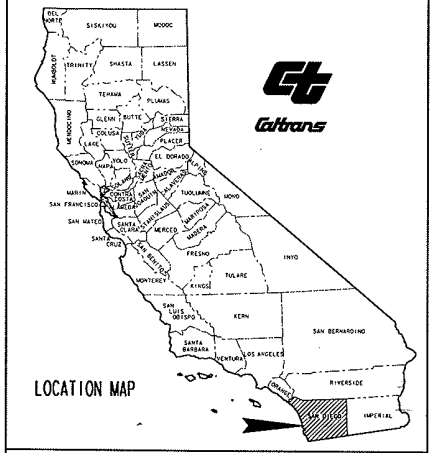
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

IN SAN DIEGO COUNTY IN SAN DIEGO ON ROUTE 5 FROM 0.3 km NORTH OF GENESEE AVENUE OVERCROSSING AND ON ROUTE 805 FROM 0.3 km NORTH OF SORRENTO VALLEY BOULEVARD UNDERCROSSING TO 0.3 km NORTH OF DEL MAR HEIGHTS ROAD OVERCROSSING

To be supplemented by Standard Plans dated July, 1997

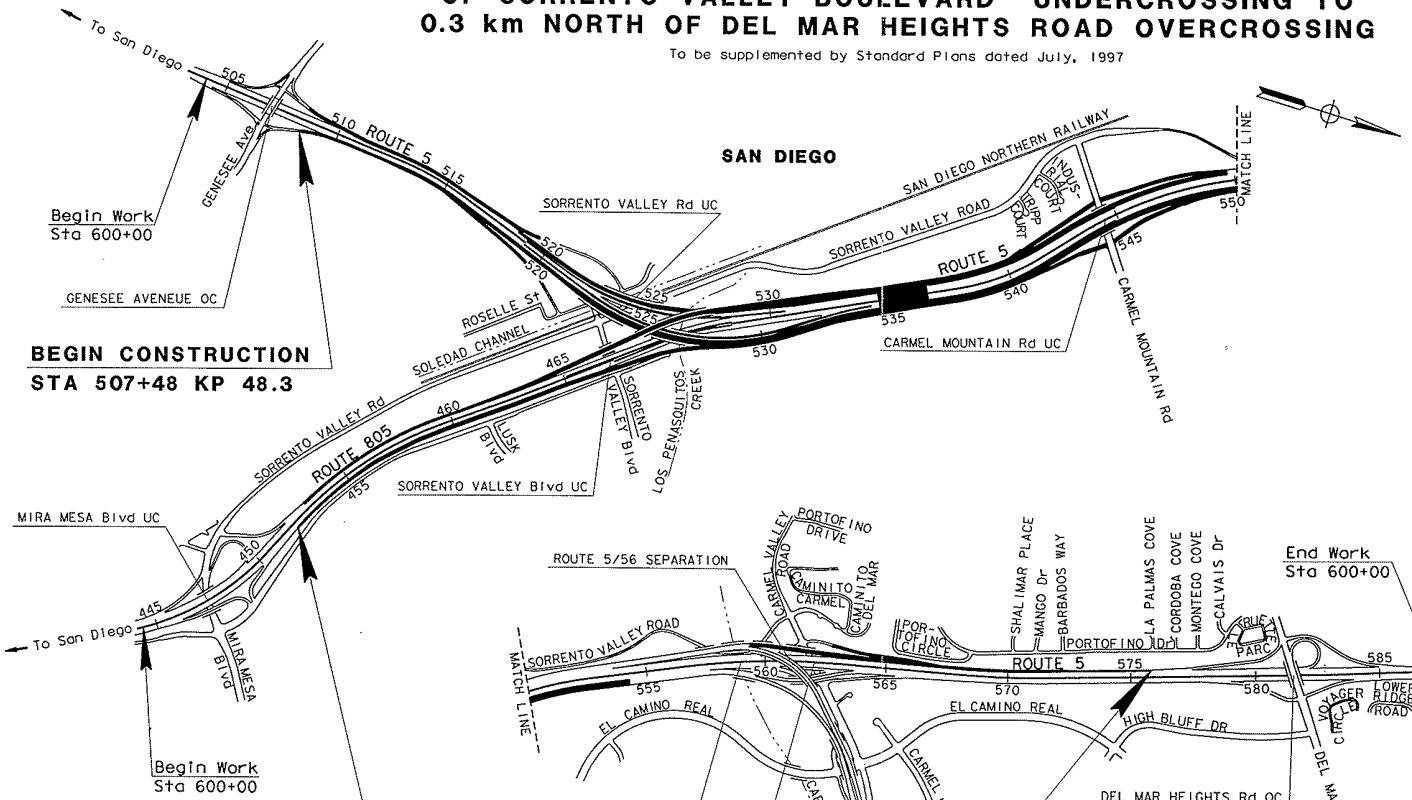
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5/805	KP48.9-51.2/ KP43.9-46.5		



Caltrans

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Caltrans Metric



The Contractor shall possess the Class (or classes) of license as specified in the "Notice to Contractors".

Project Engineer Date
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
A GAYON
No. 54149
Exp. 12-31-99
CIVIL
STATE OF CALIFORNIA

FIGURE 1
PROJECT LOCATION

PROJECT ENGINEER	DATE	PROJECT MANAGER	DATE
A. GAYON		T. ALLISON	

Contract No. 11-0301U4

LAST REVISION 00-00-00

TIME PLOTTED => $$$$$$$SYSTIME$$$$$$$

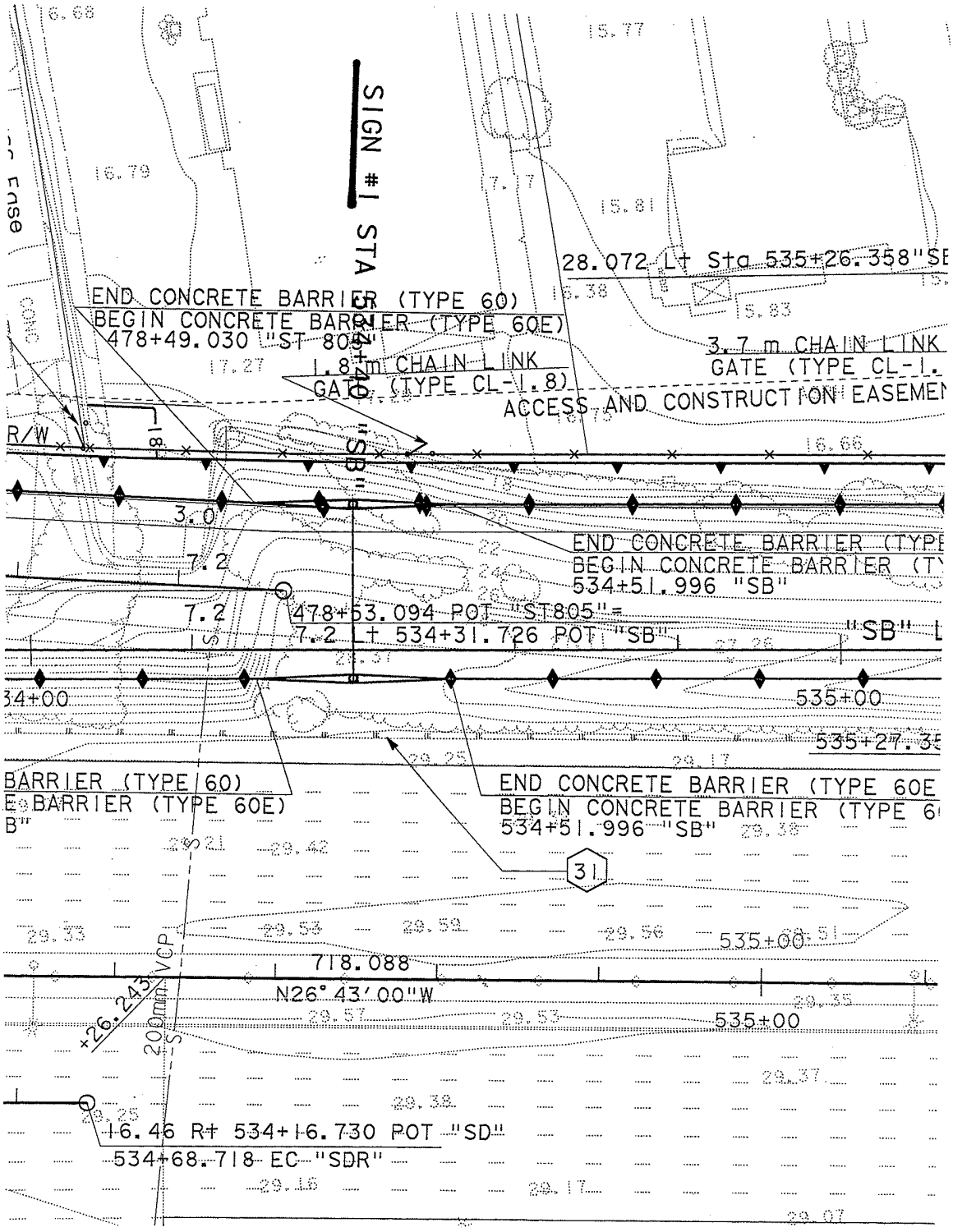
FORM DC-OE-93-PF (REV. 3/88)

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => $$$$$$USER$$$$$$
DGN FILE => $$$$$$$$$$DGNSPEC$$$$$$$$$$

CU 11275

EA 0301U1



I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-1**
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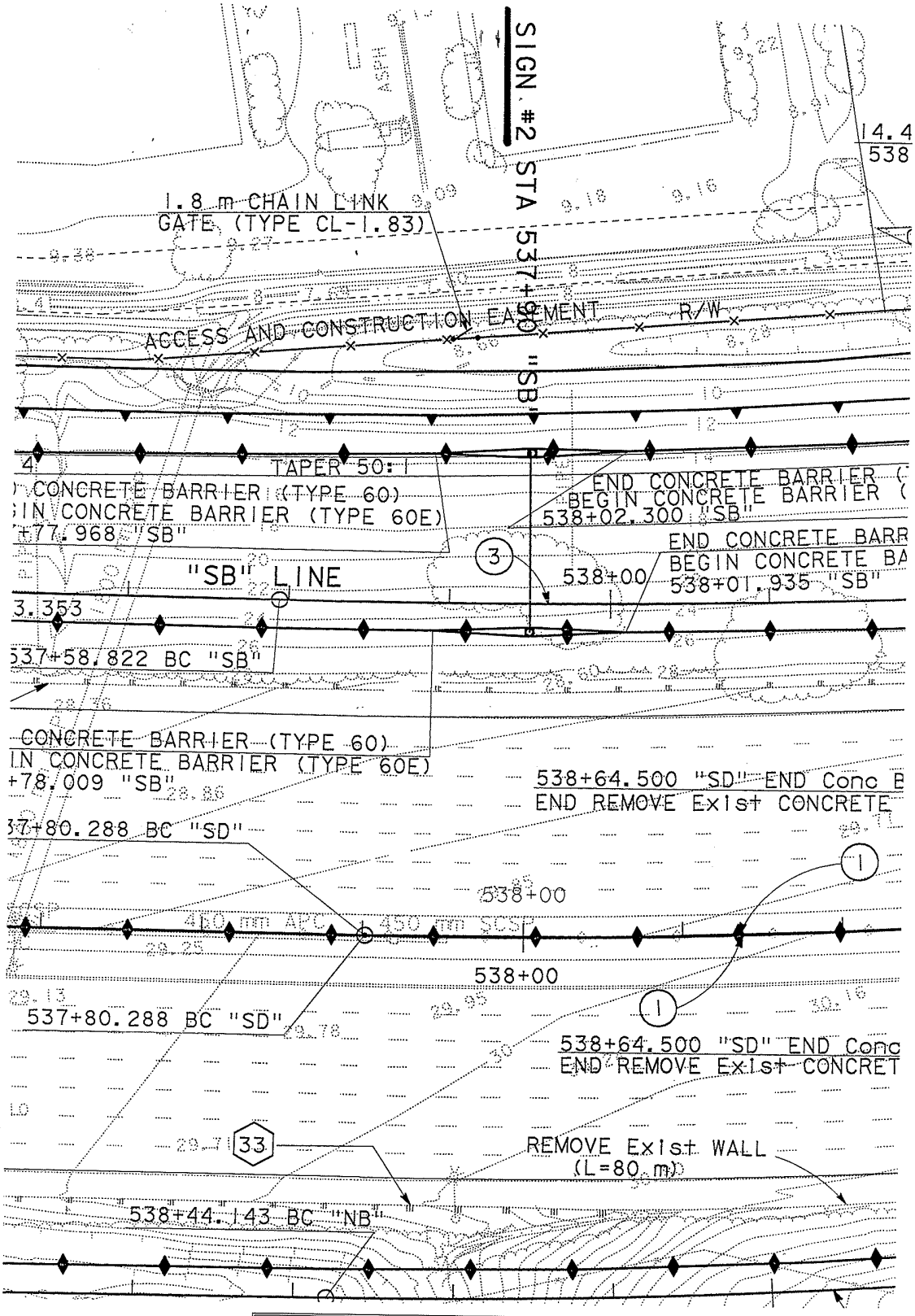

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-2
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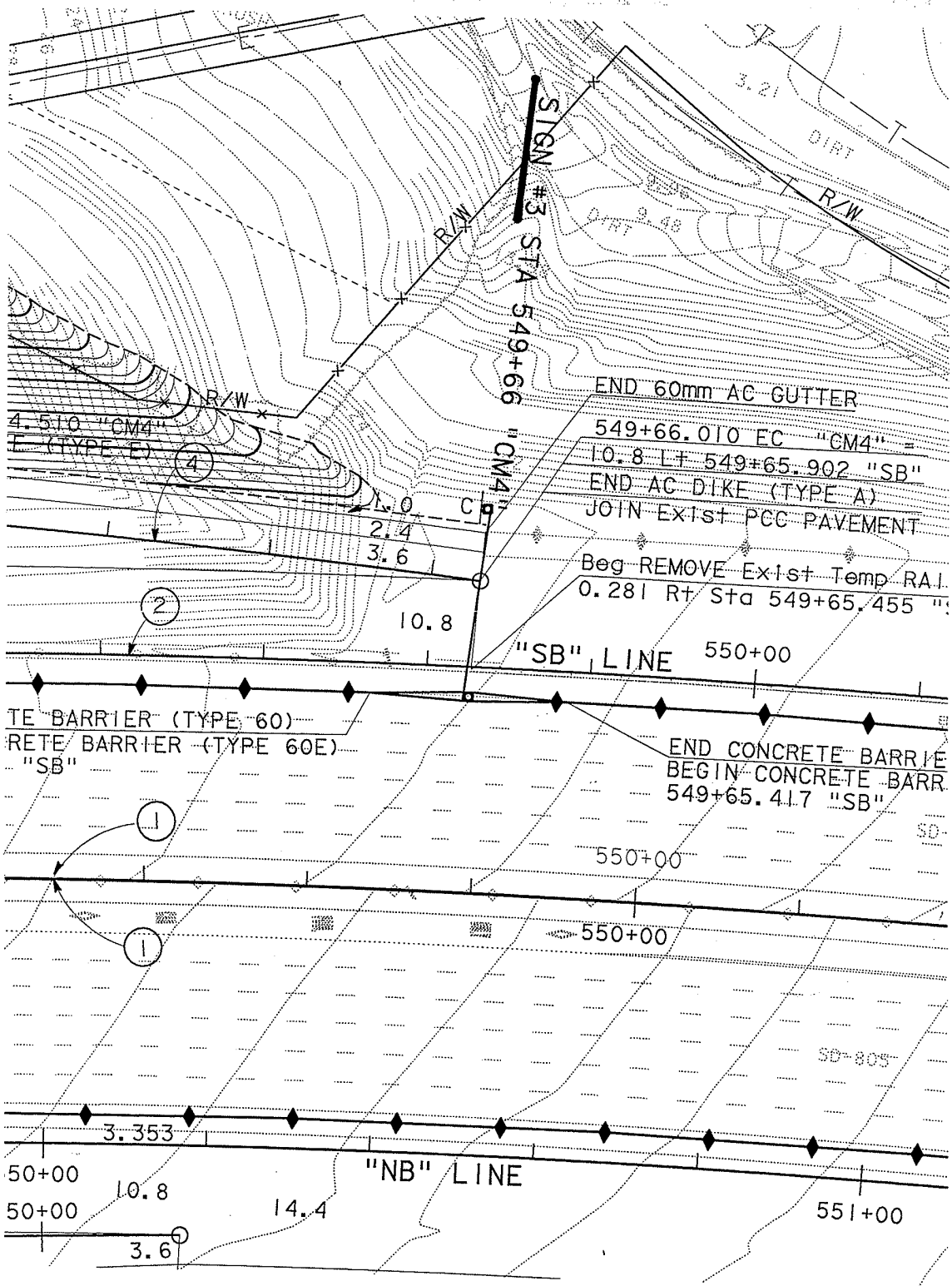
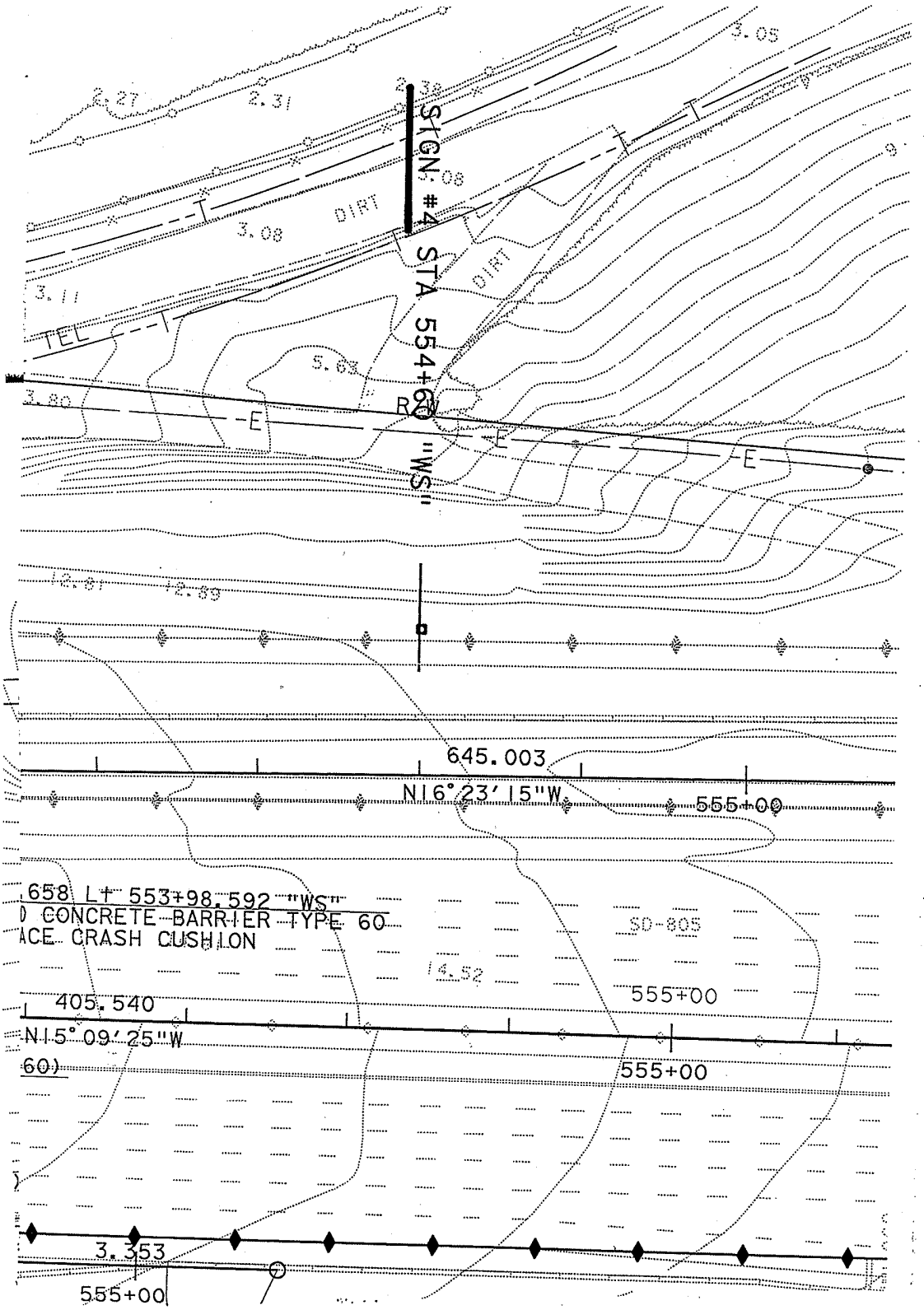
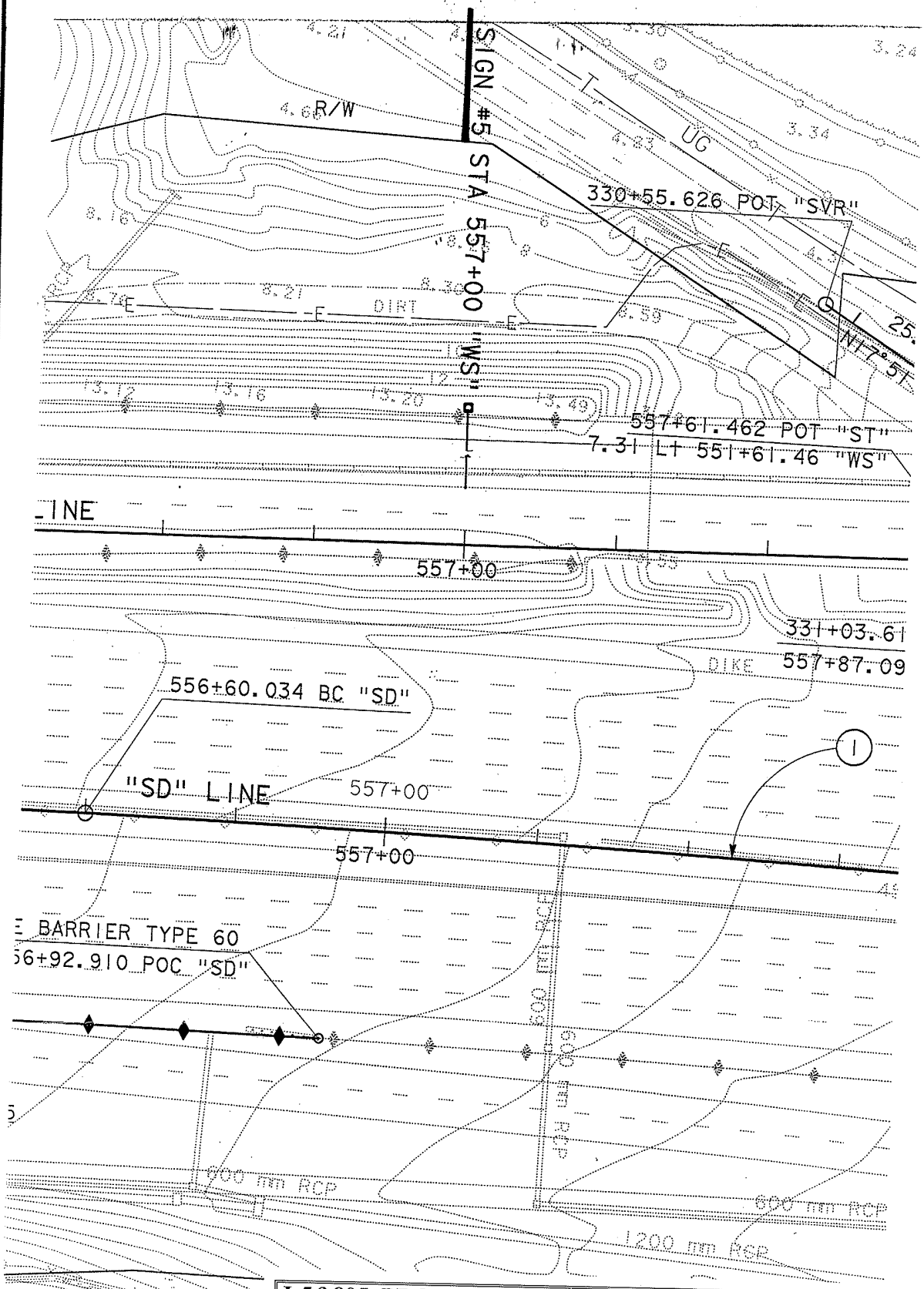


I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-3**
	TRAFFIC SIGN 3	**EA 11-0301U1**



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-4
	TRAFFIC SIGN 4	EA 11-0301U1



I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-5**
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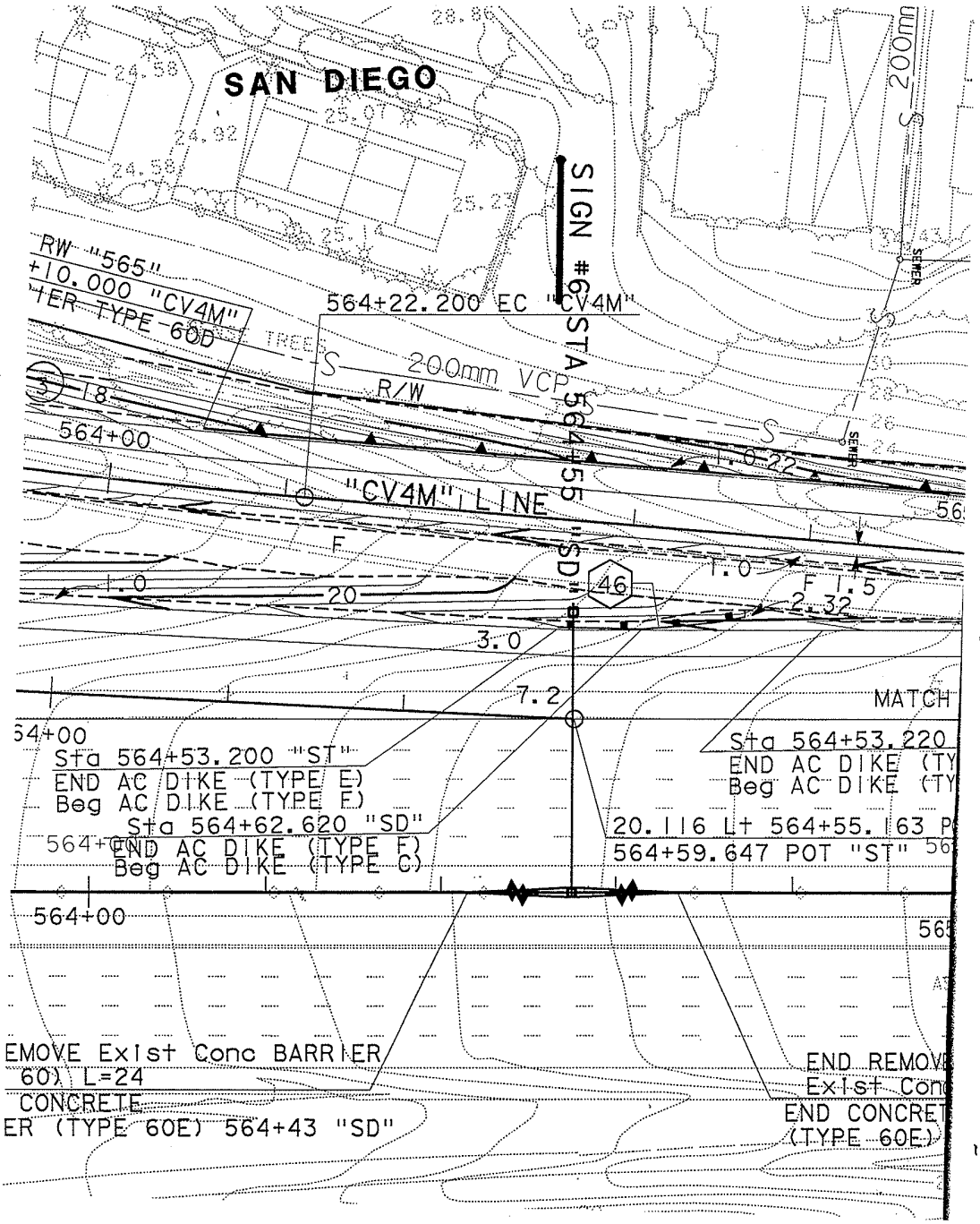

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-6
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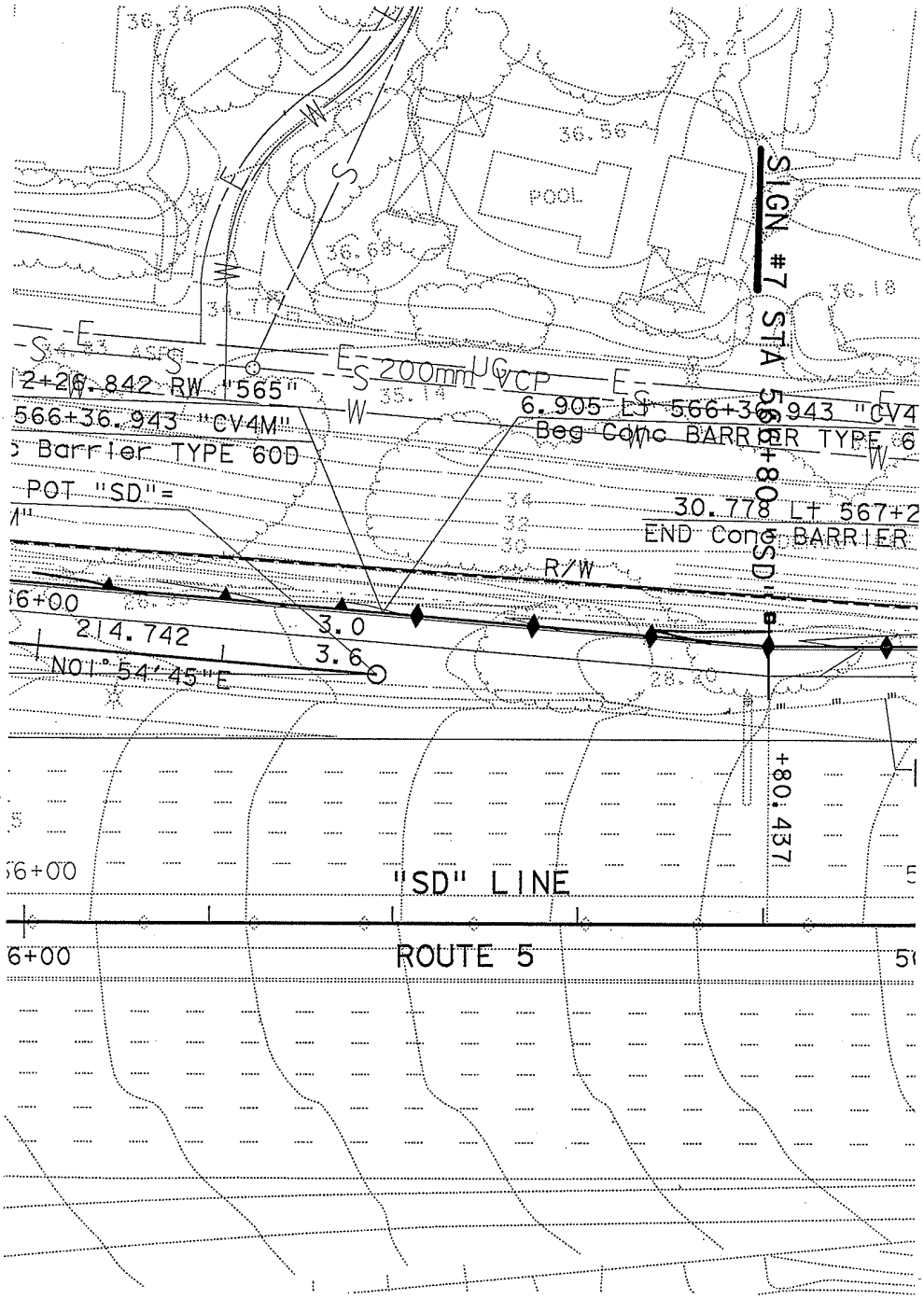

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-7
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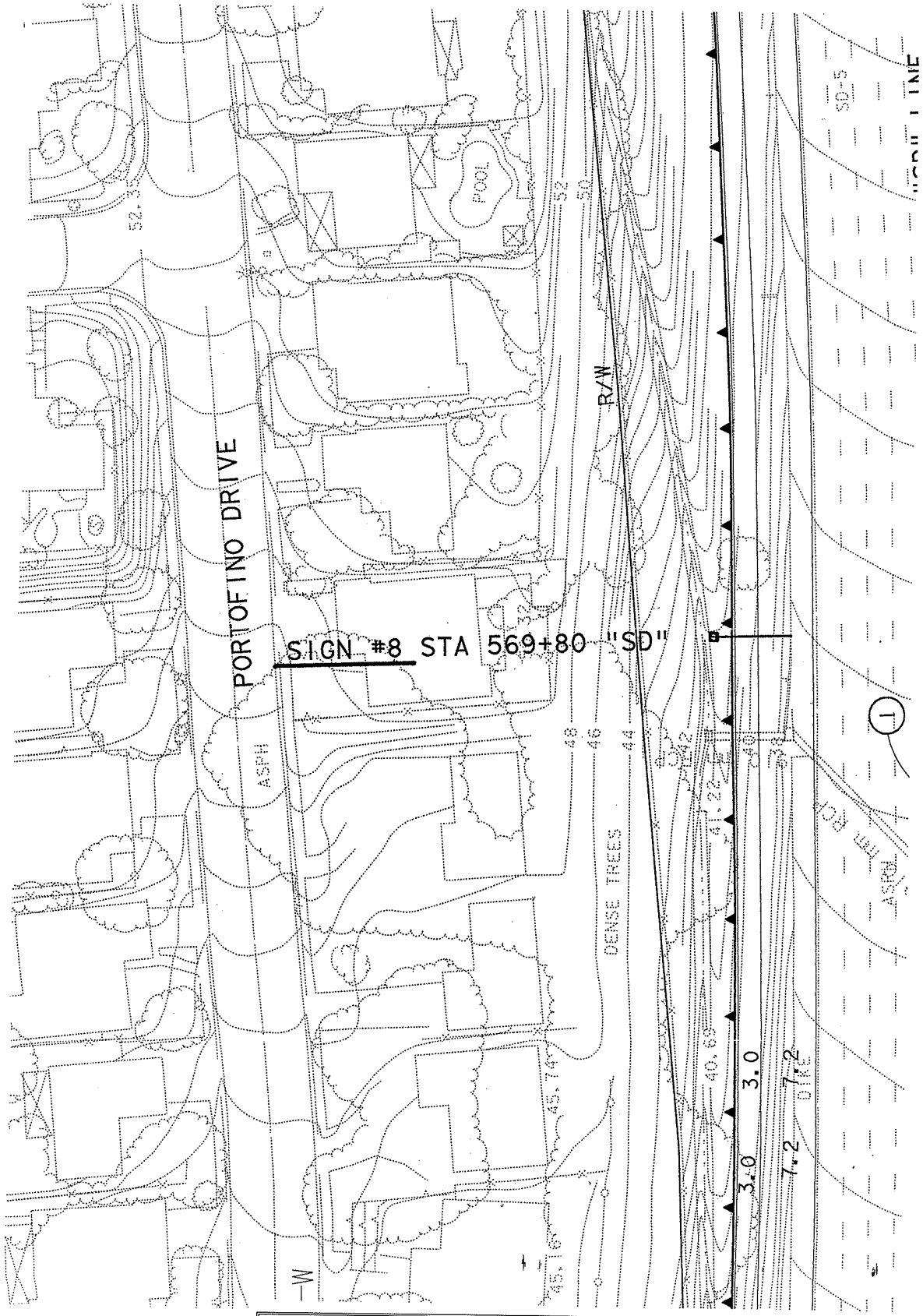

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-8
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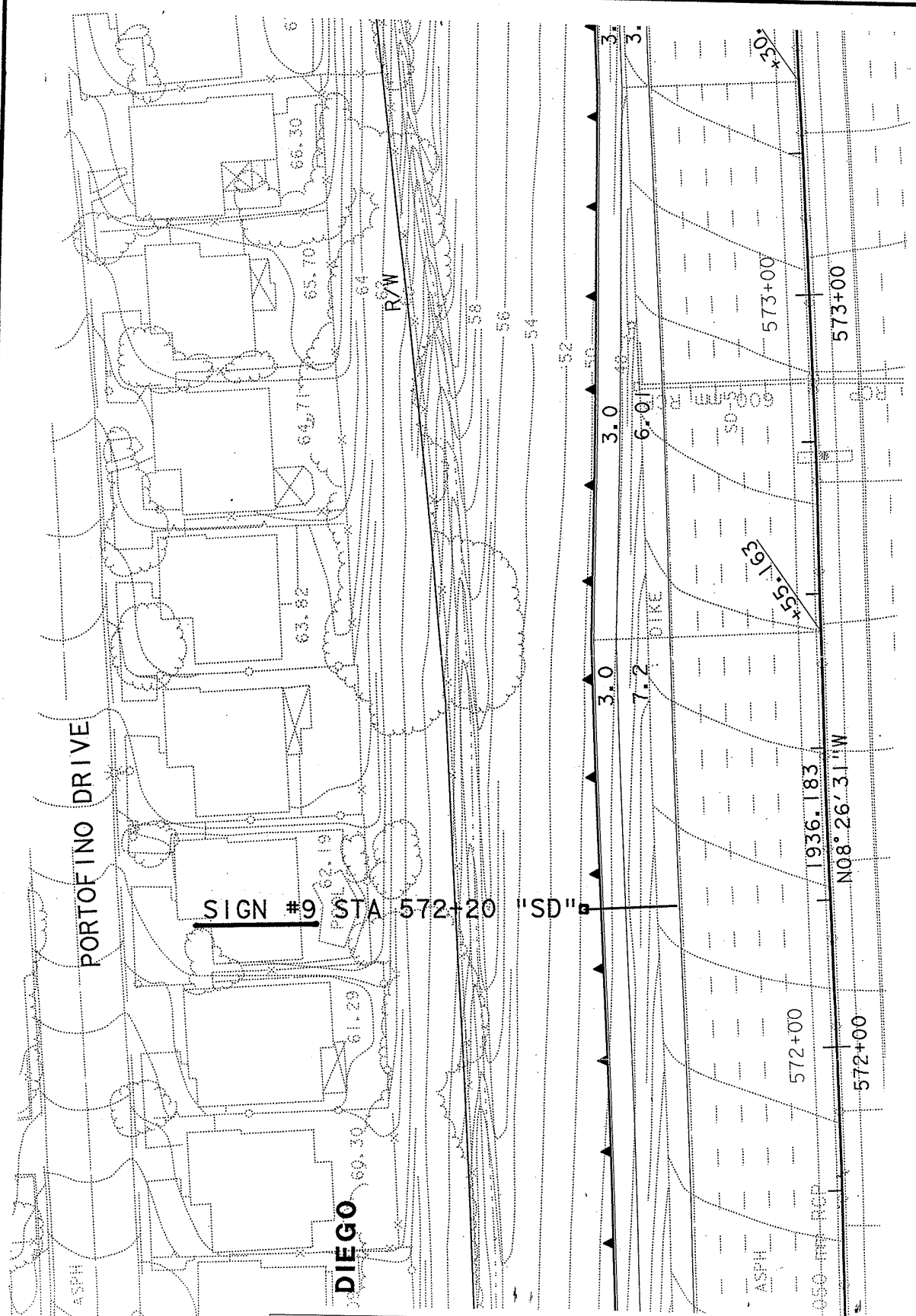
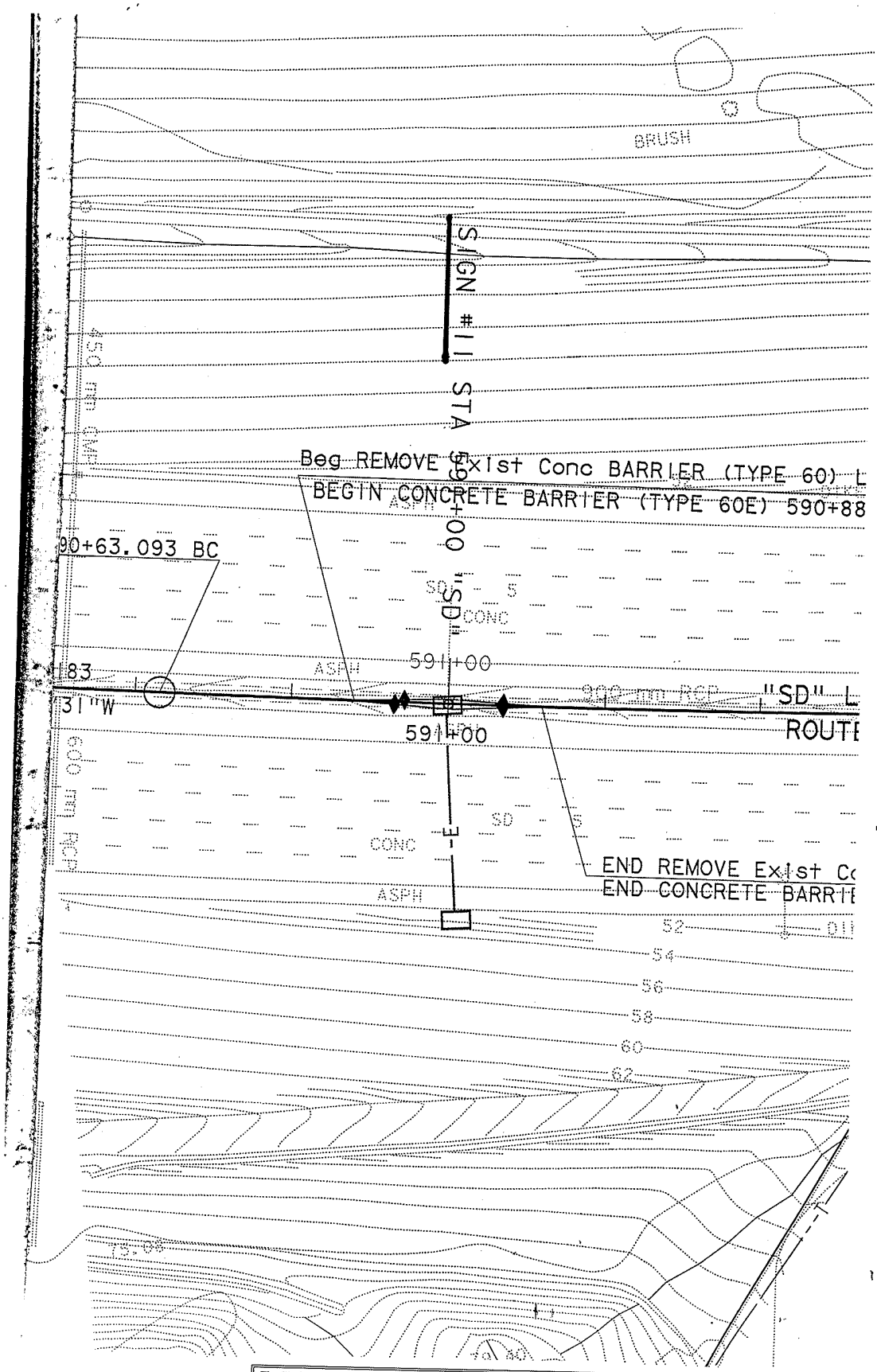


I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-9
	TRAFFIC SIGN 9	EA 11-O301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-11
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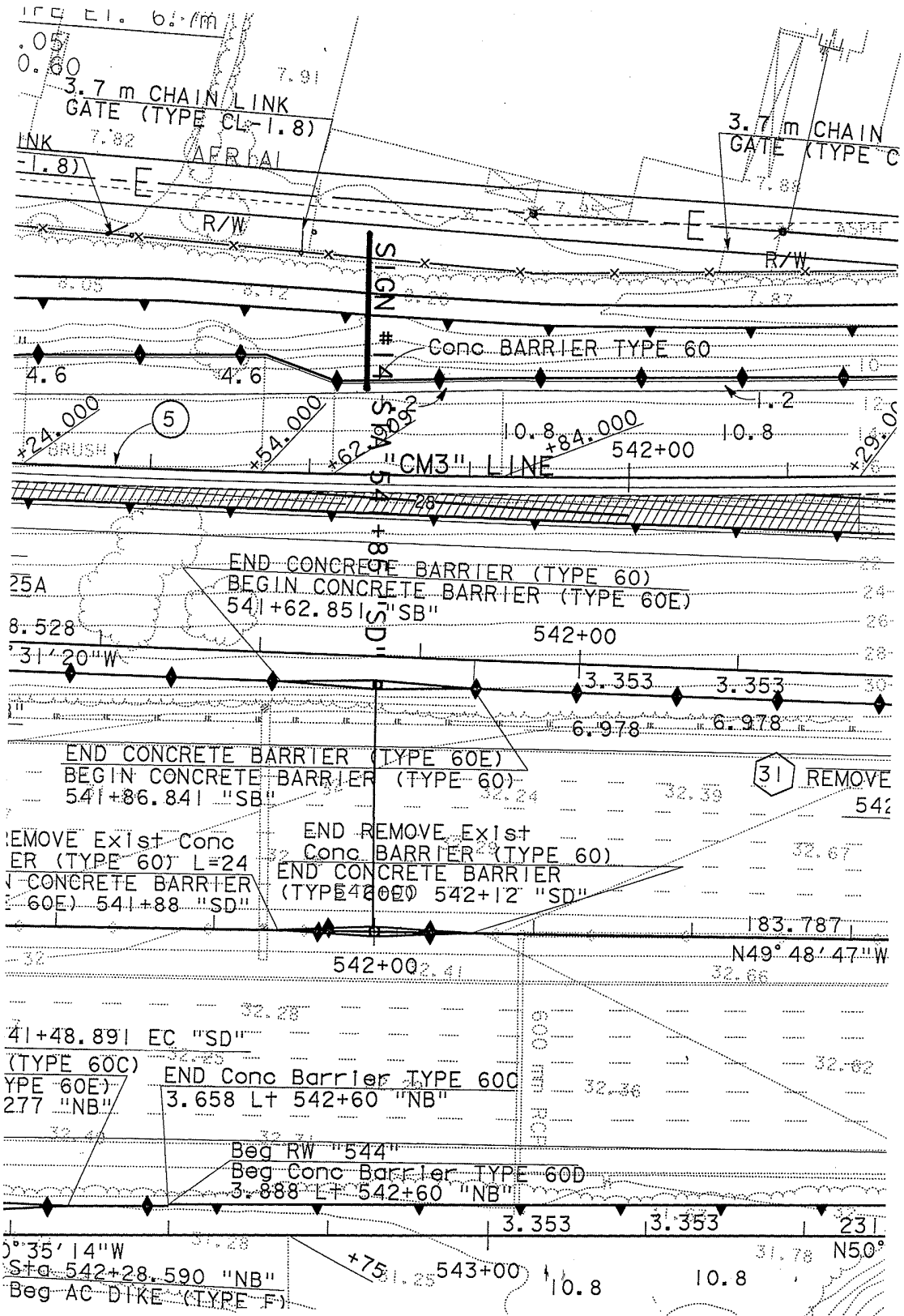

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-14
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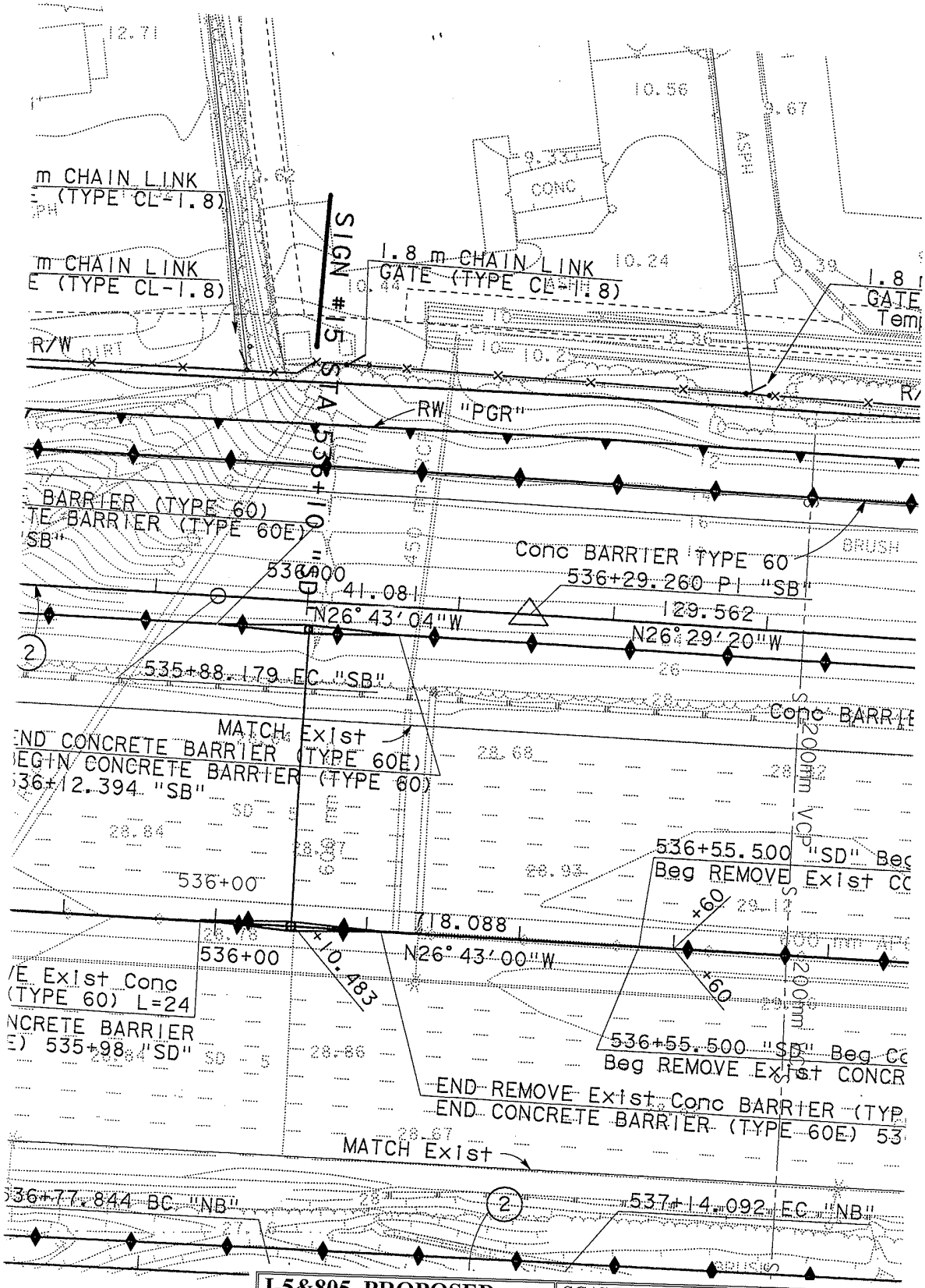
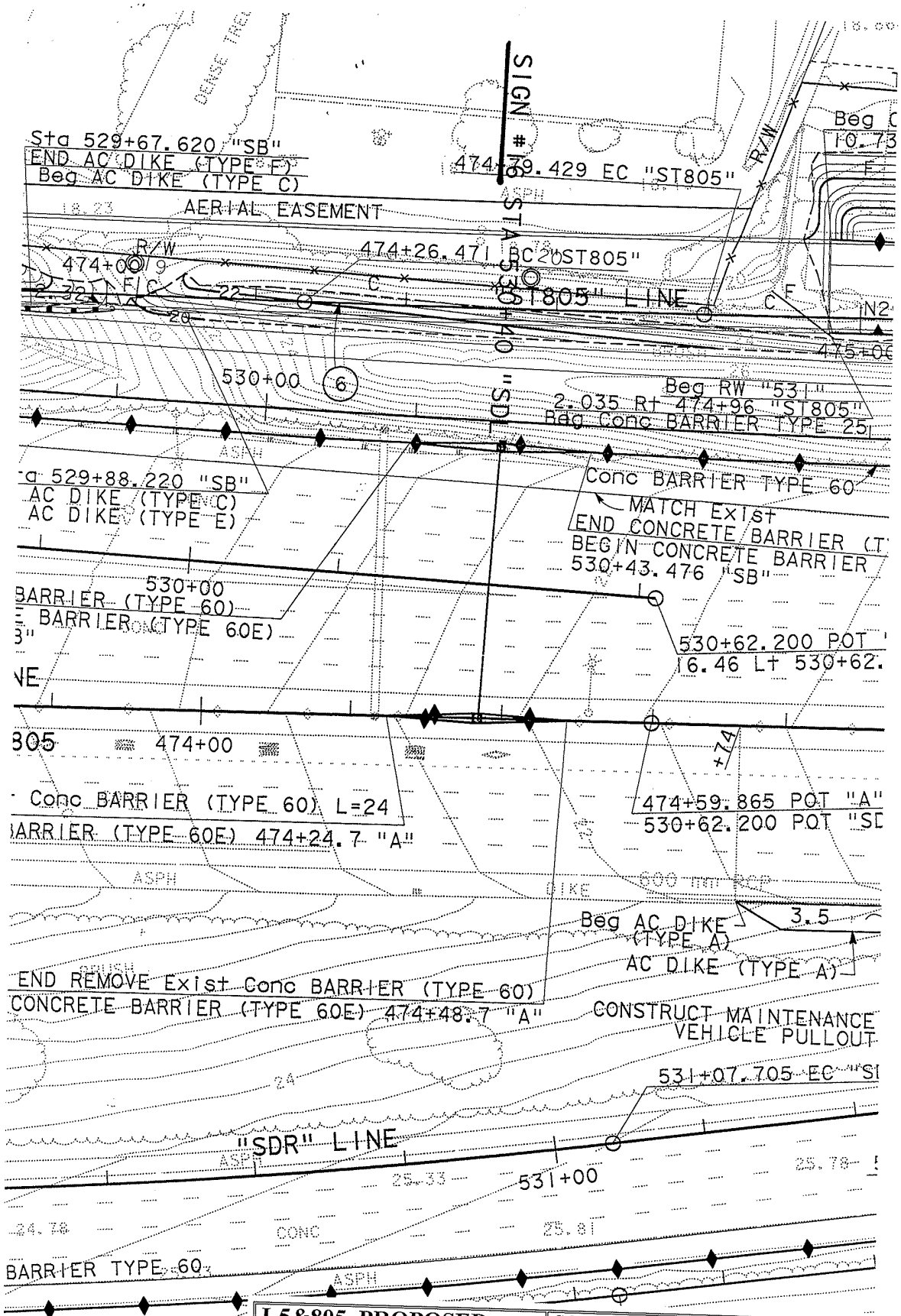


I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-15
	TRAFFIC SIGN 15	EA 11-O301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-16
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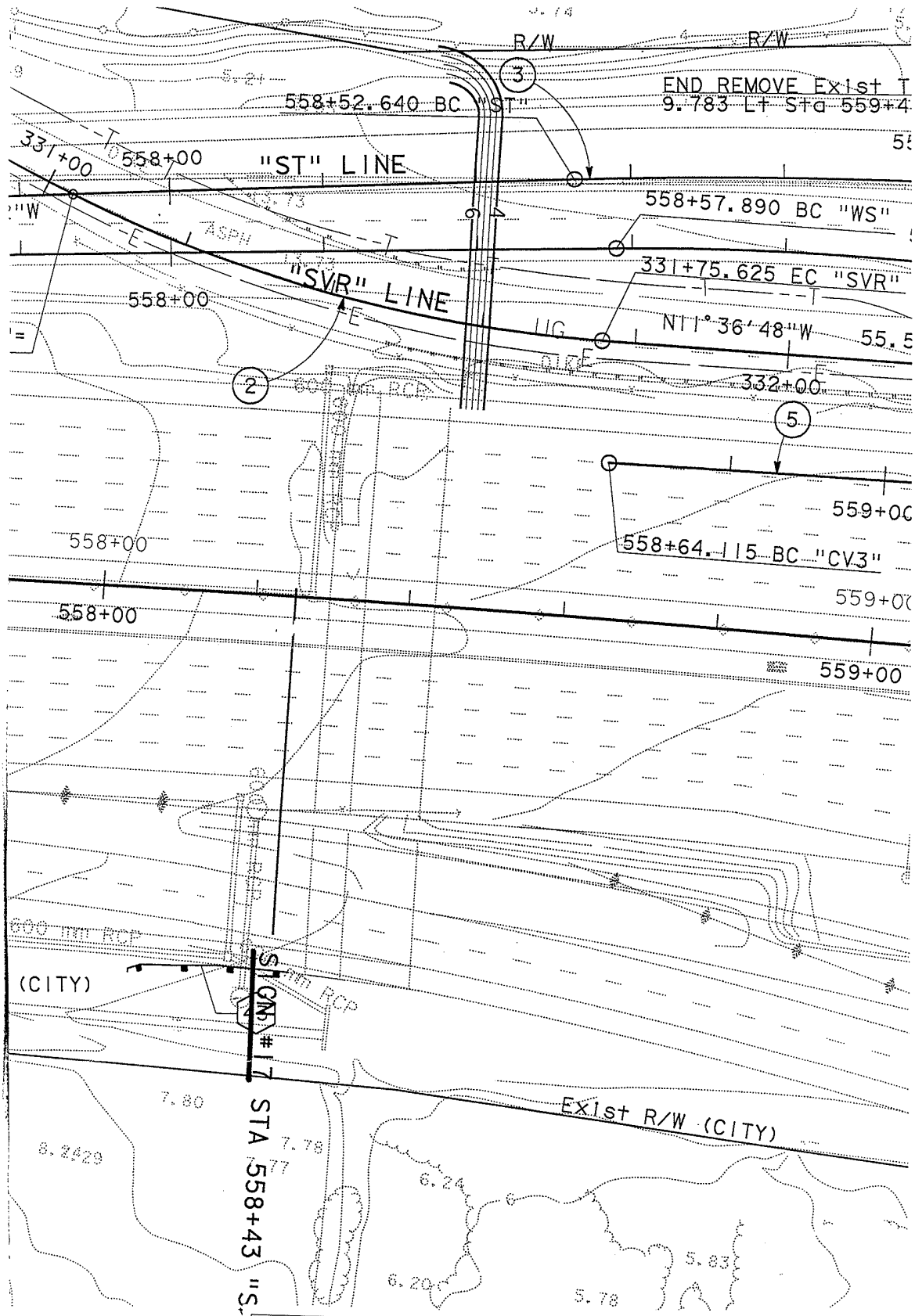
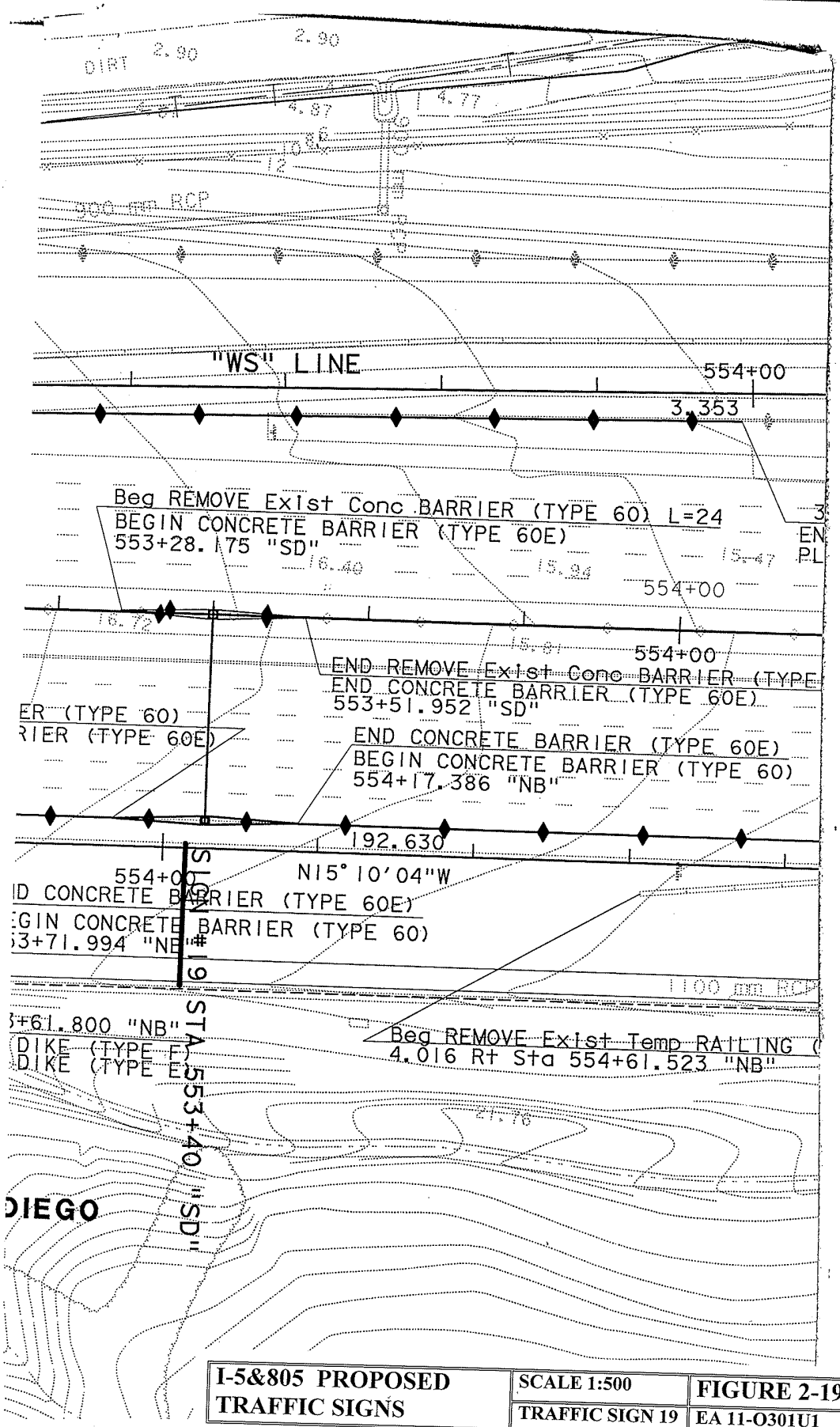


I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-17
	TRAFFIC SIGN 17	EA 11-0301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-19
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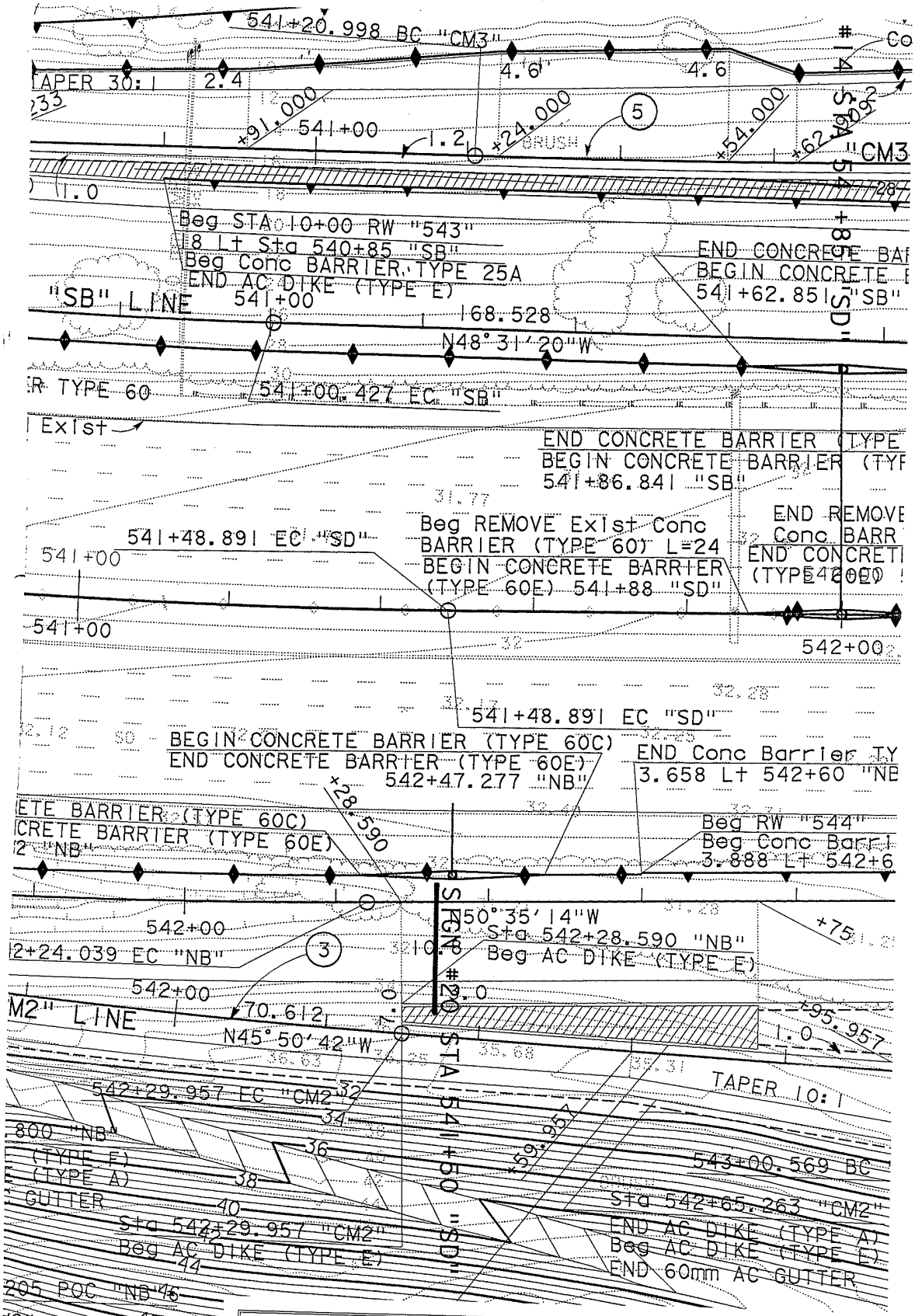

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-20
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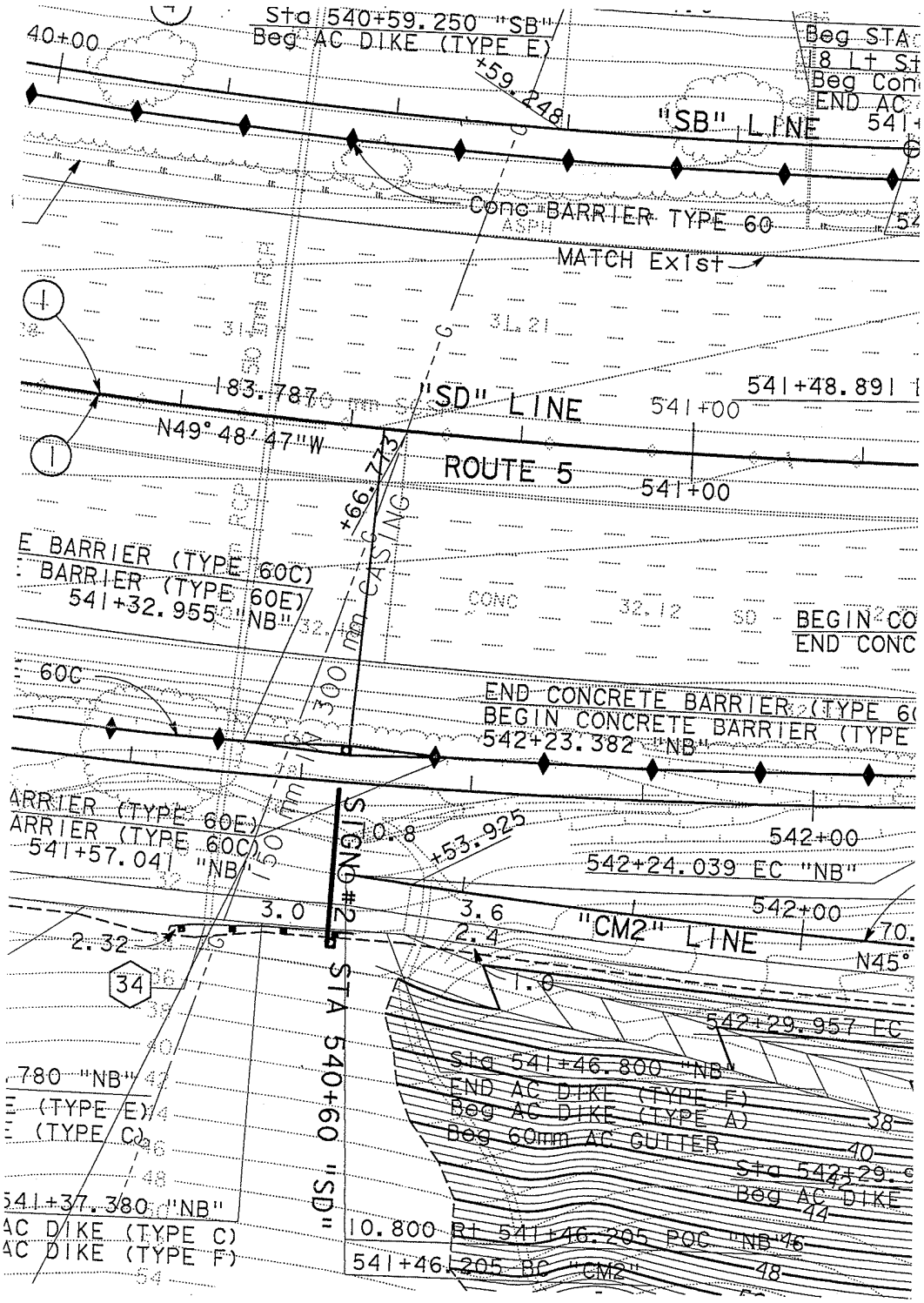
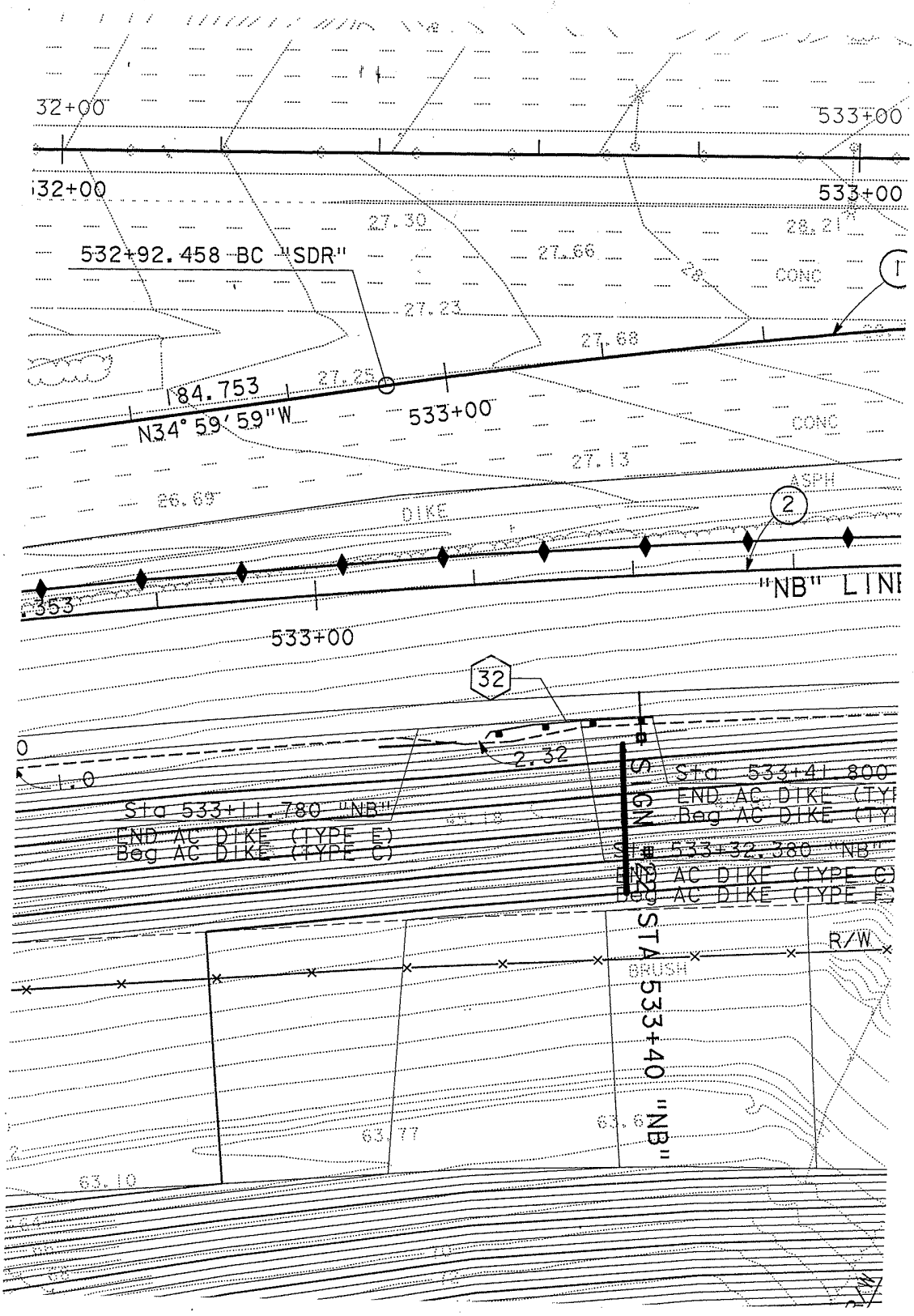


I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-21**
	TRAFFIC SIGN 21	**EA 11-O301U1**



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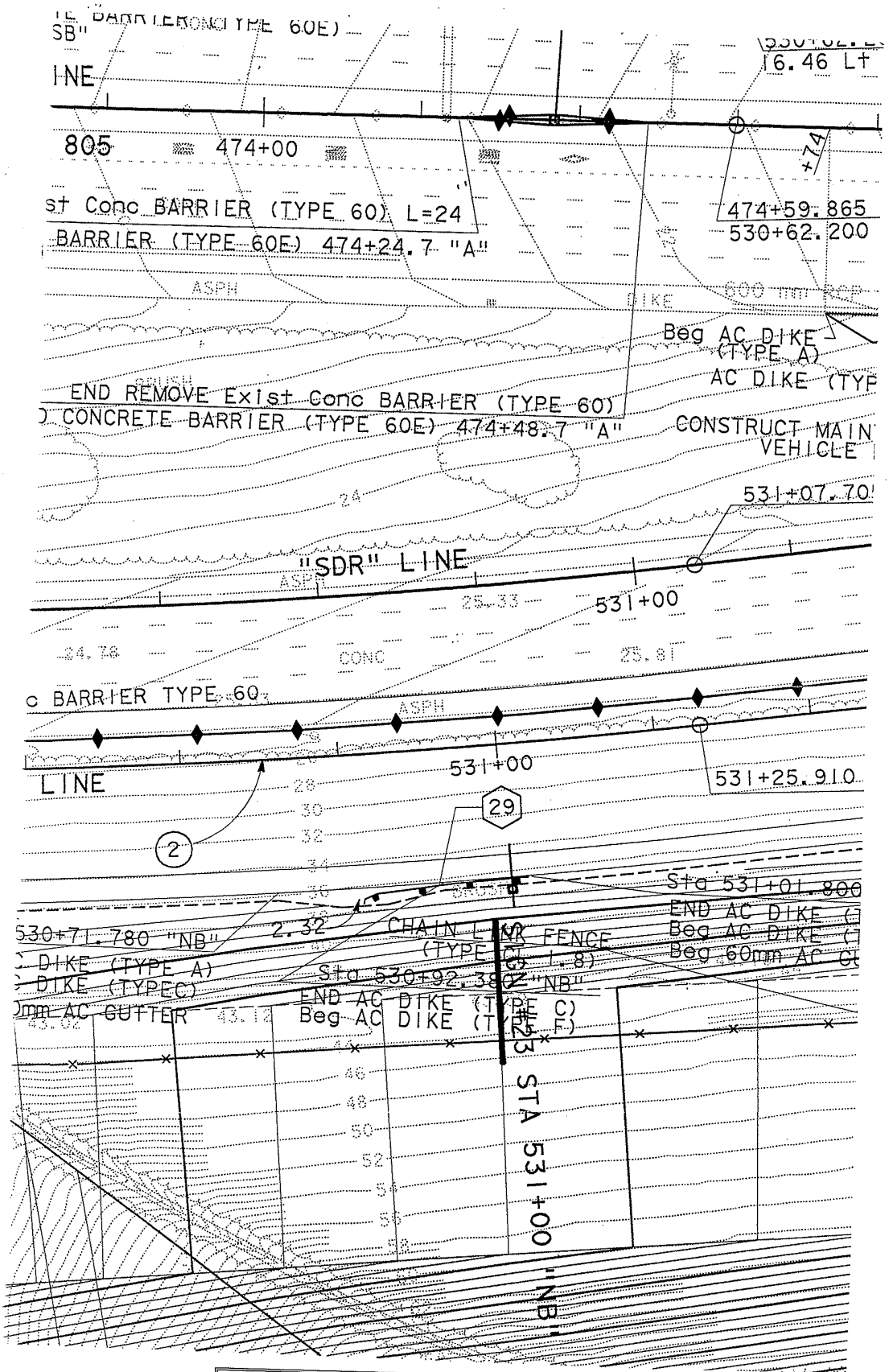

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-23
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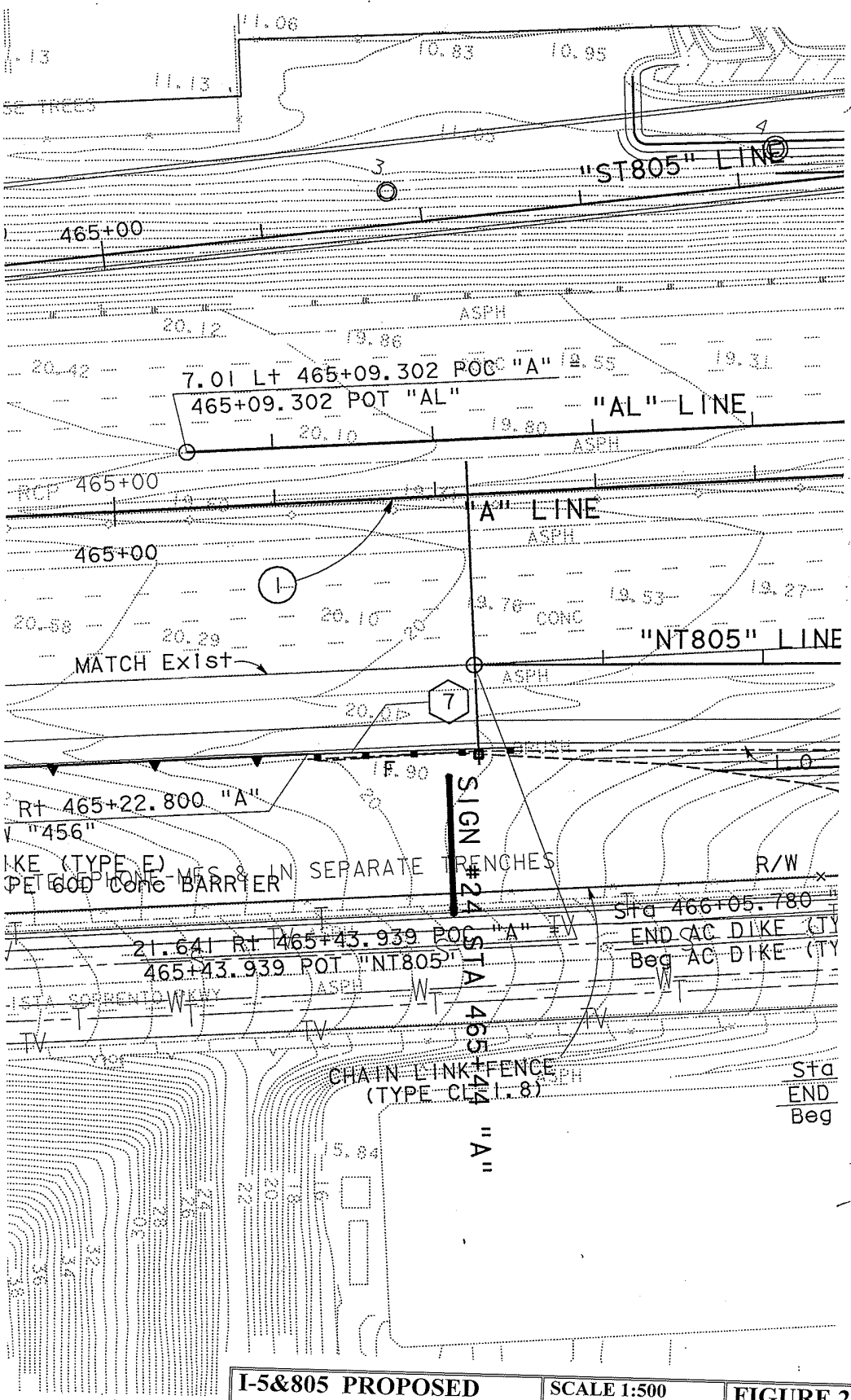

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-24
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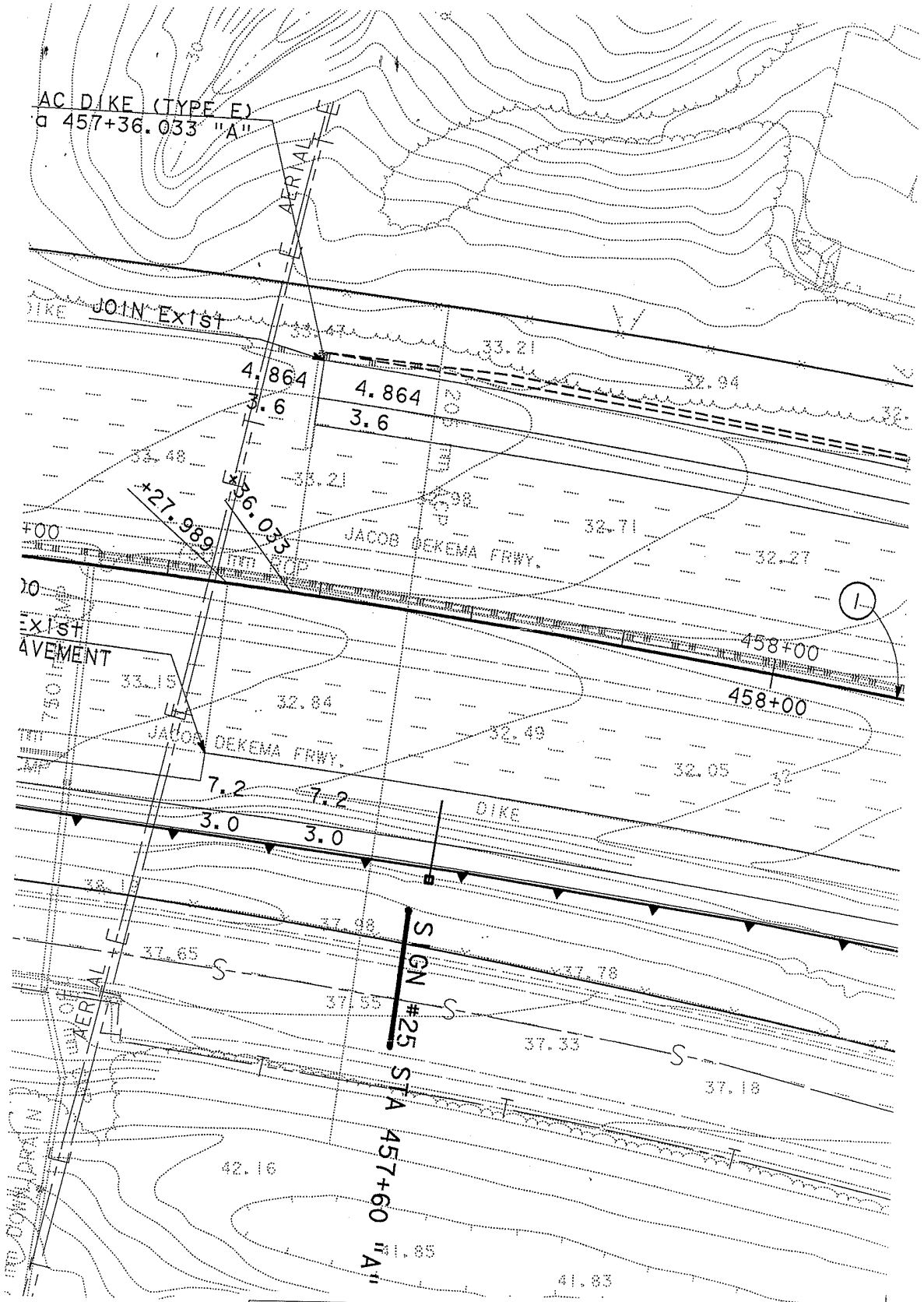

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-25
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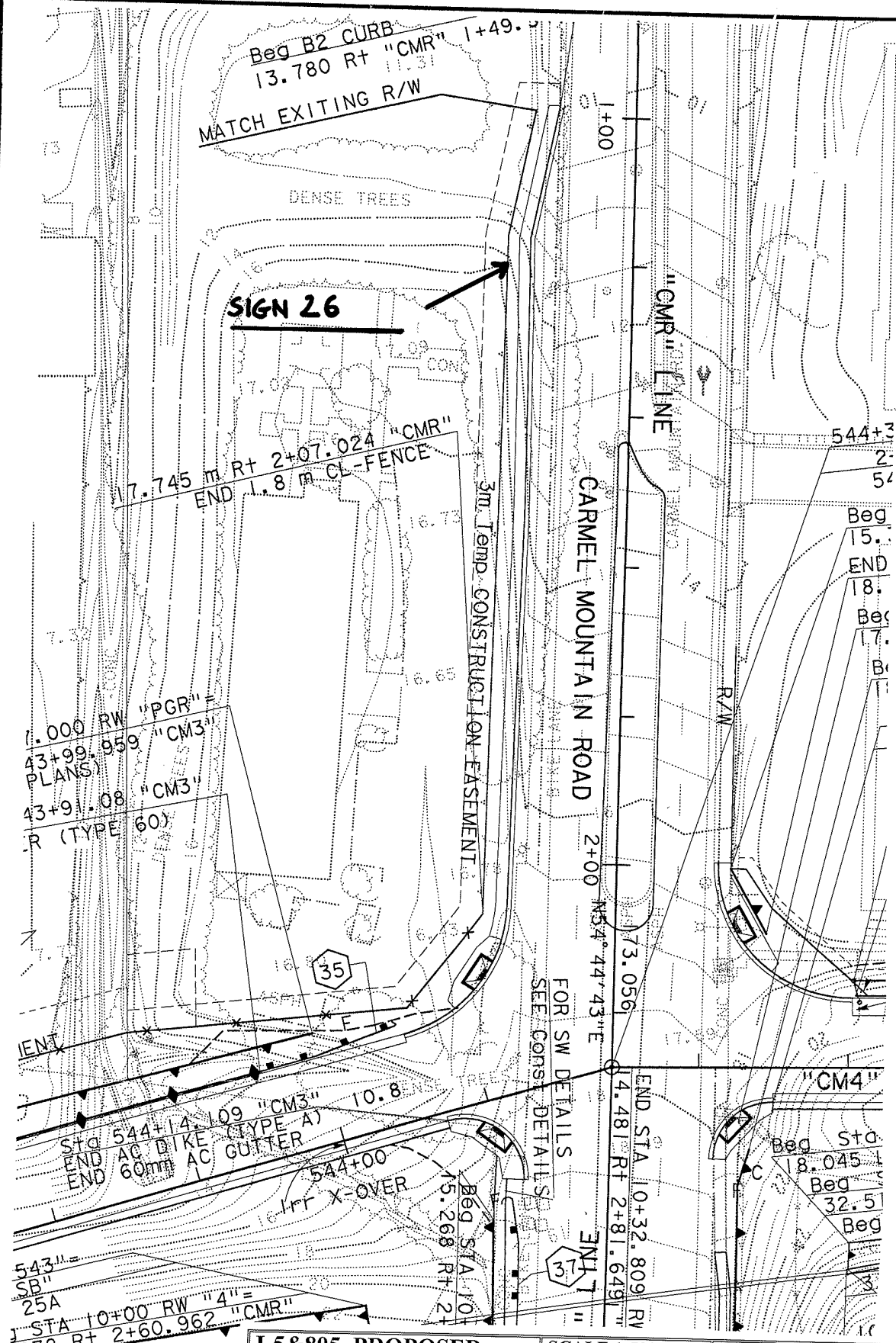

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-26
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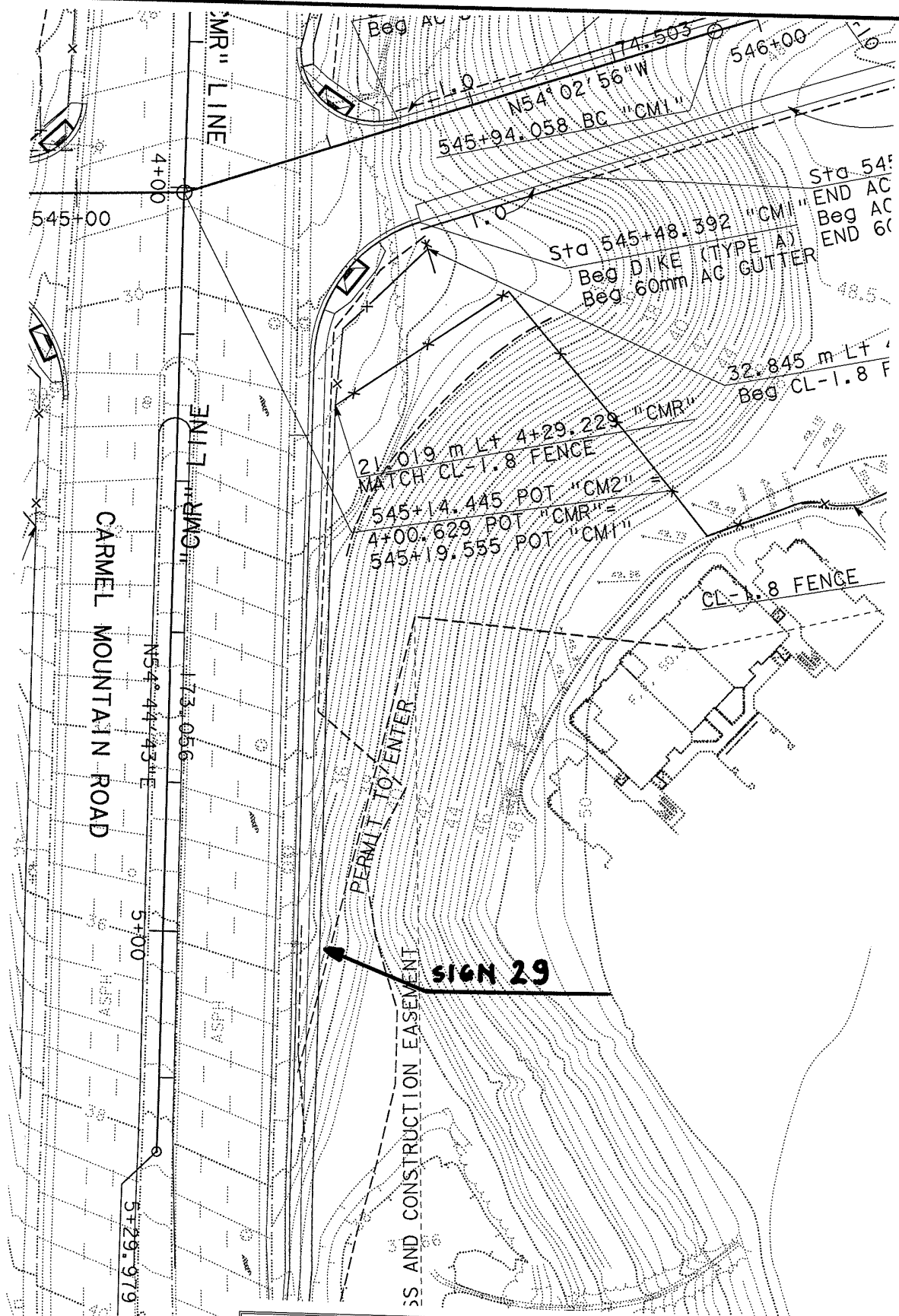

I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-29**
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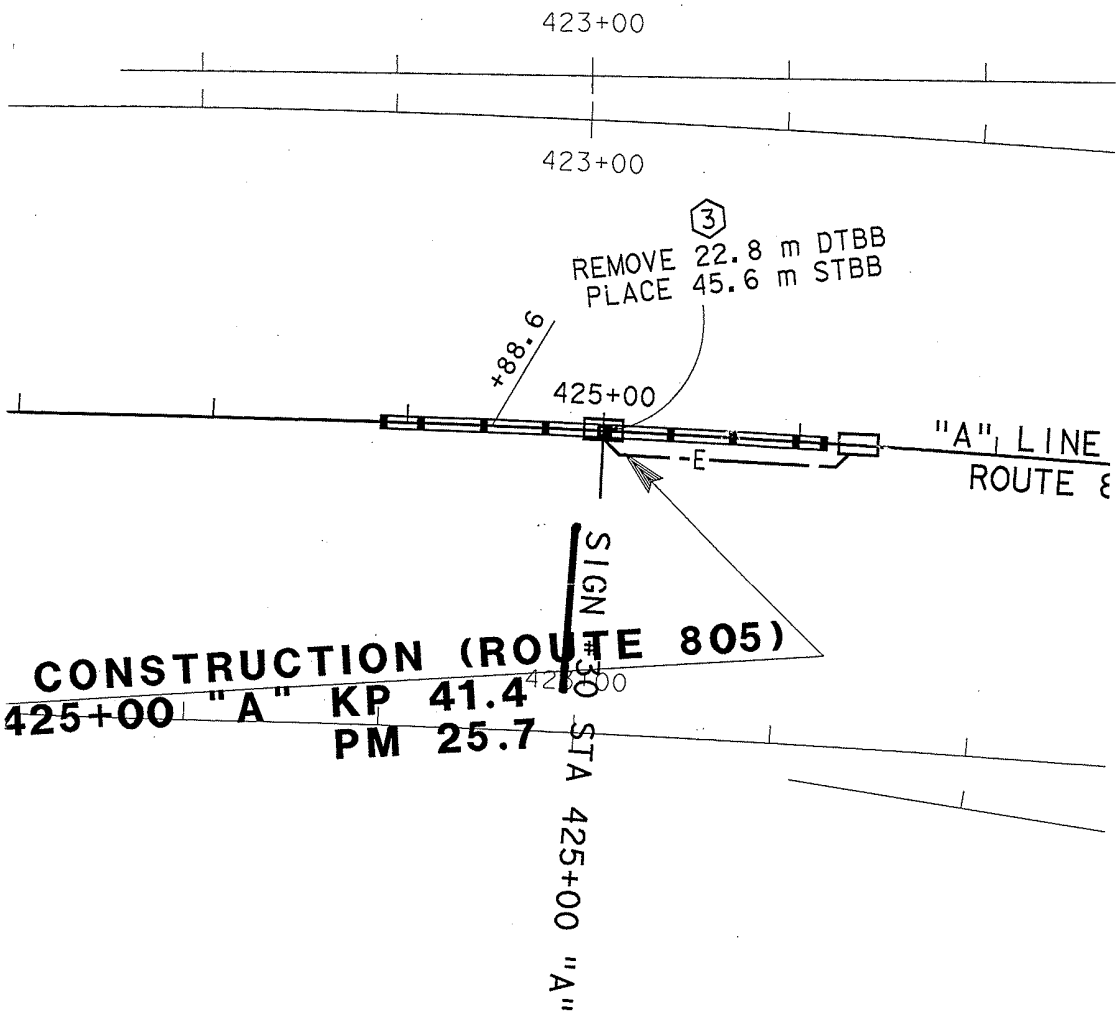

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-30
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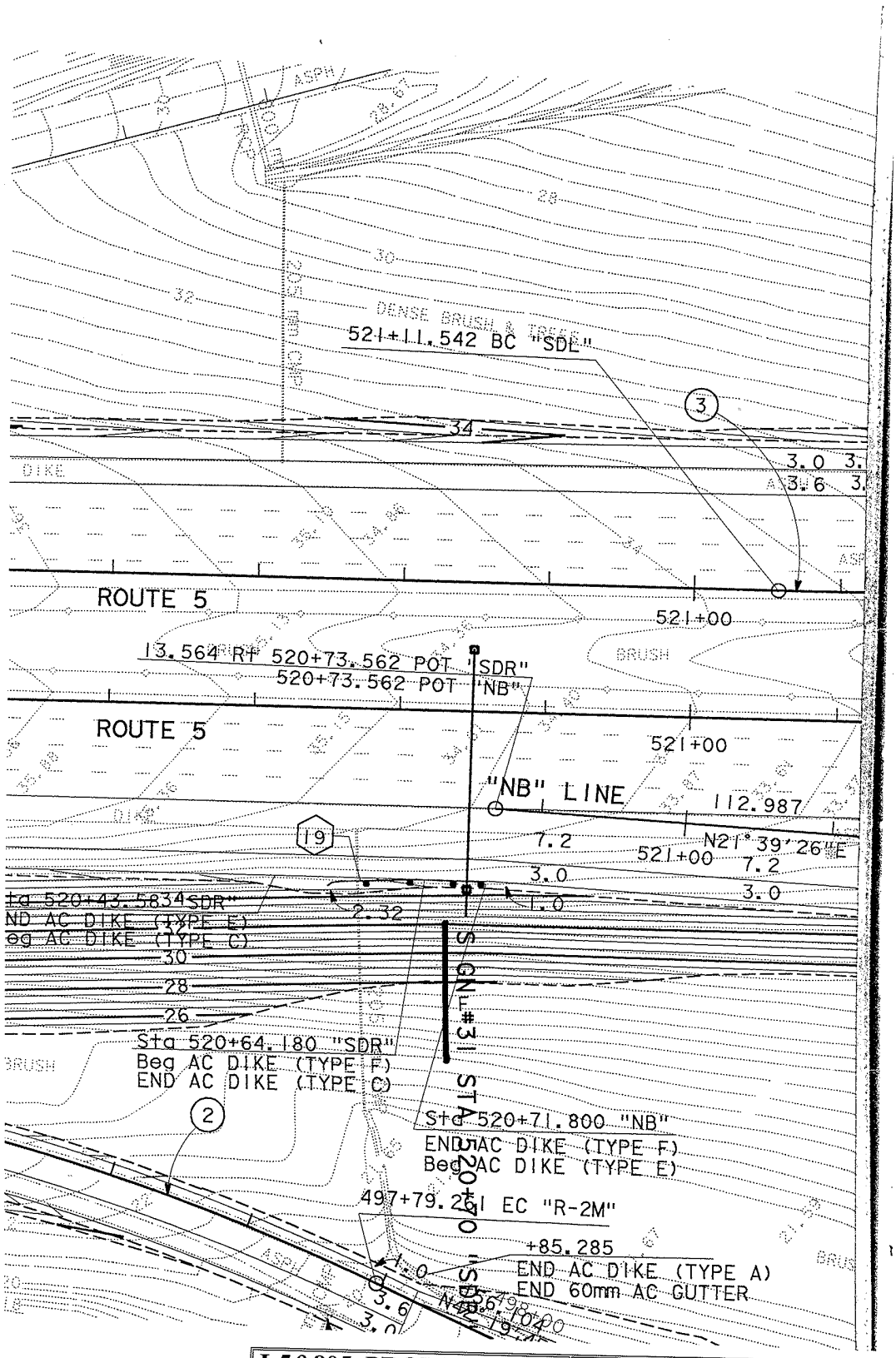

I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-31
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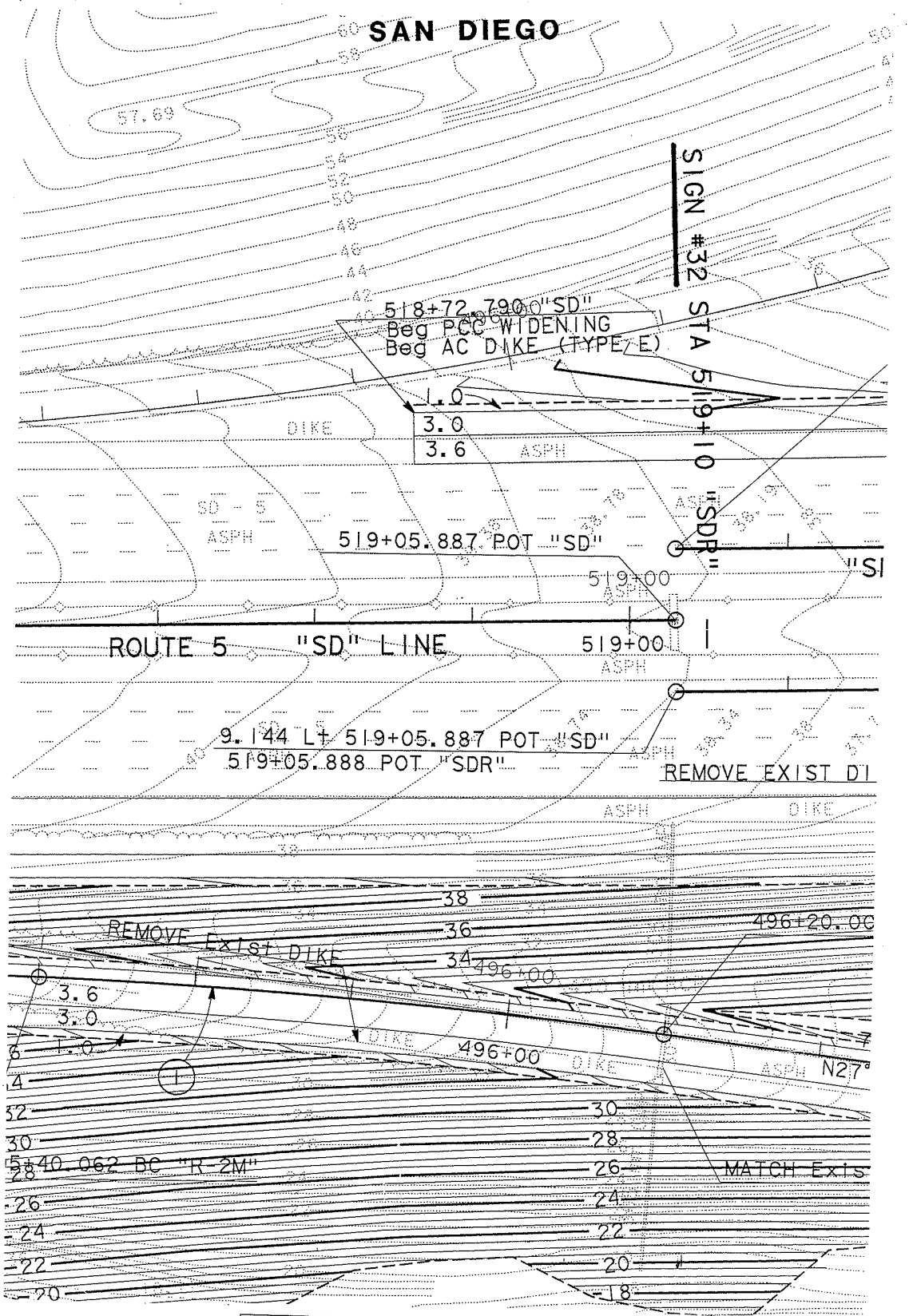

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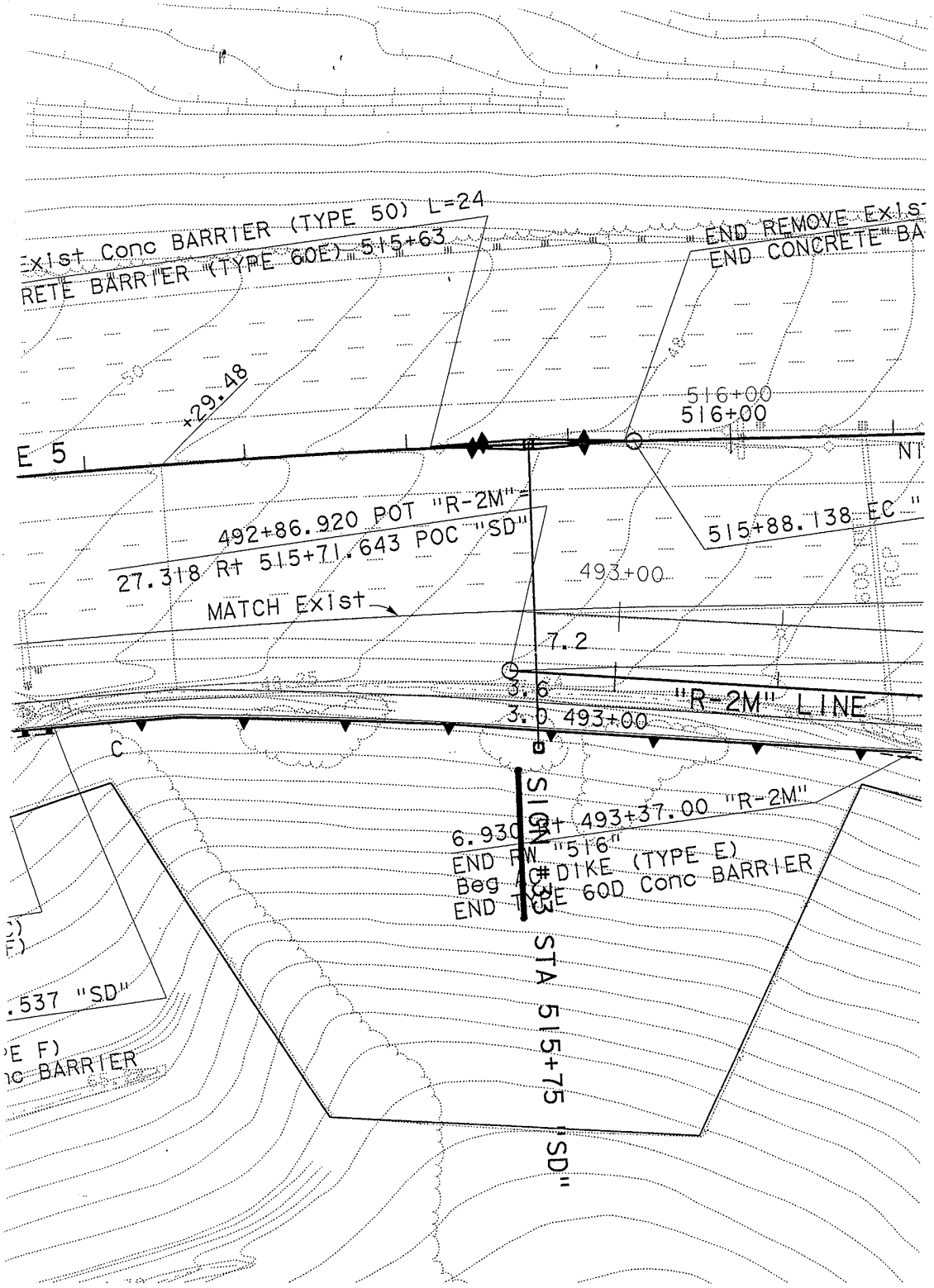

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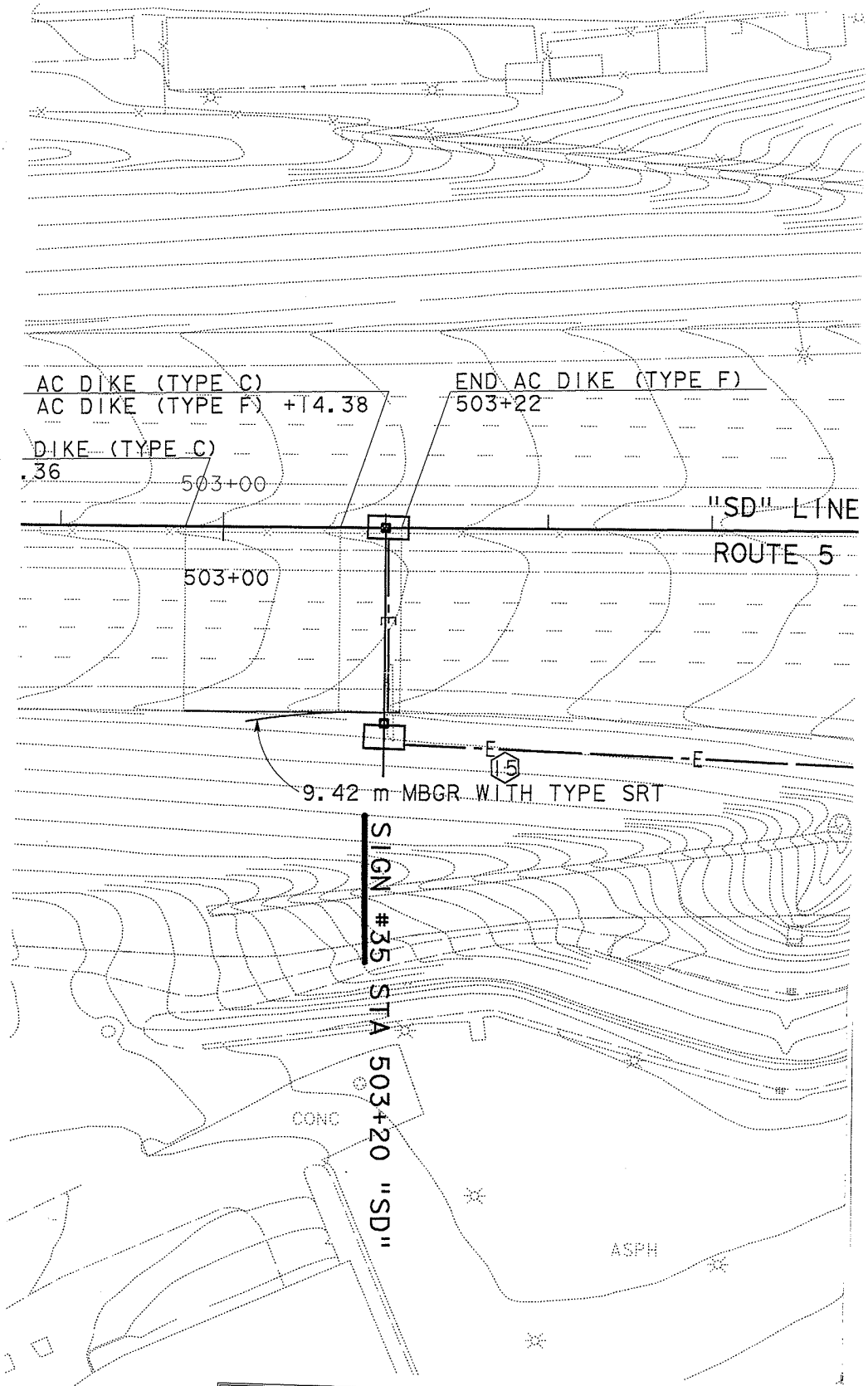
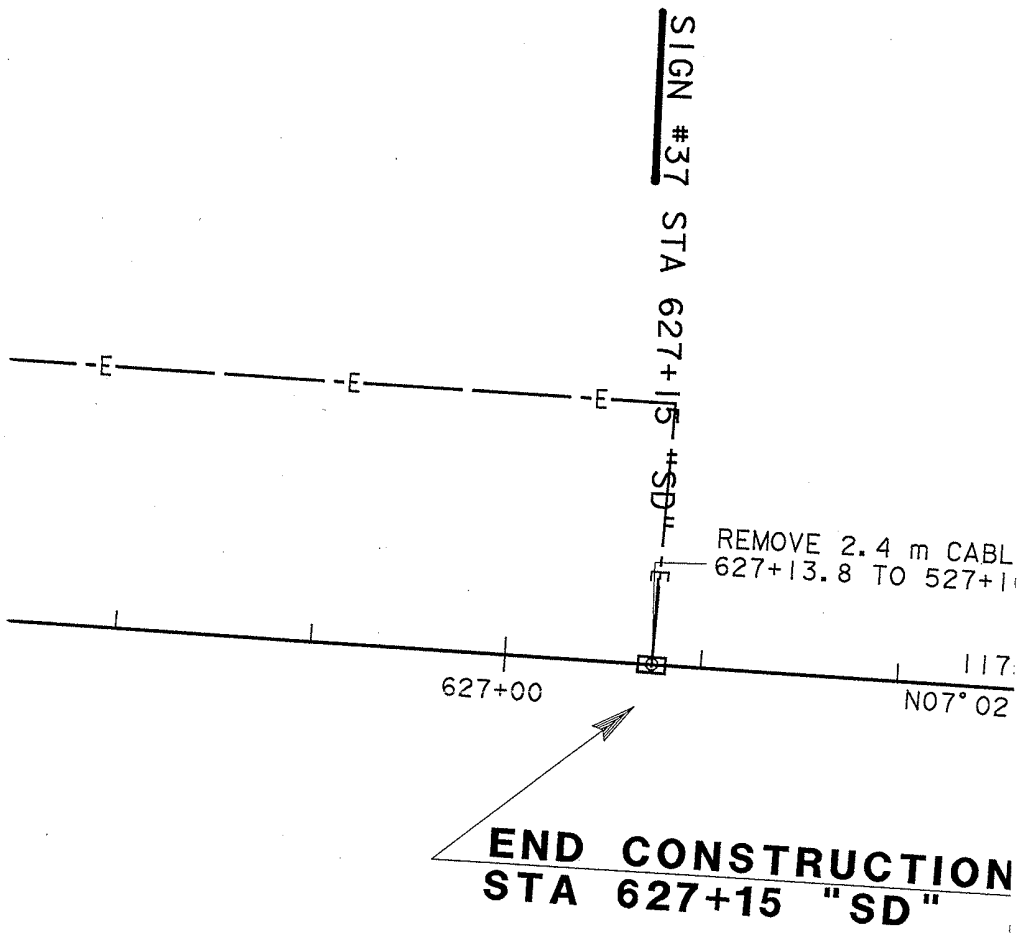
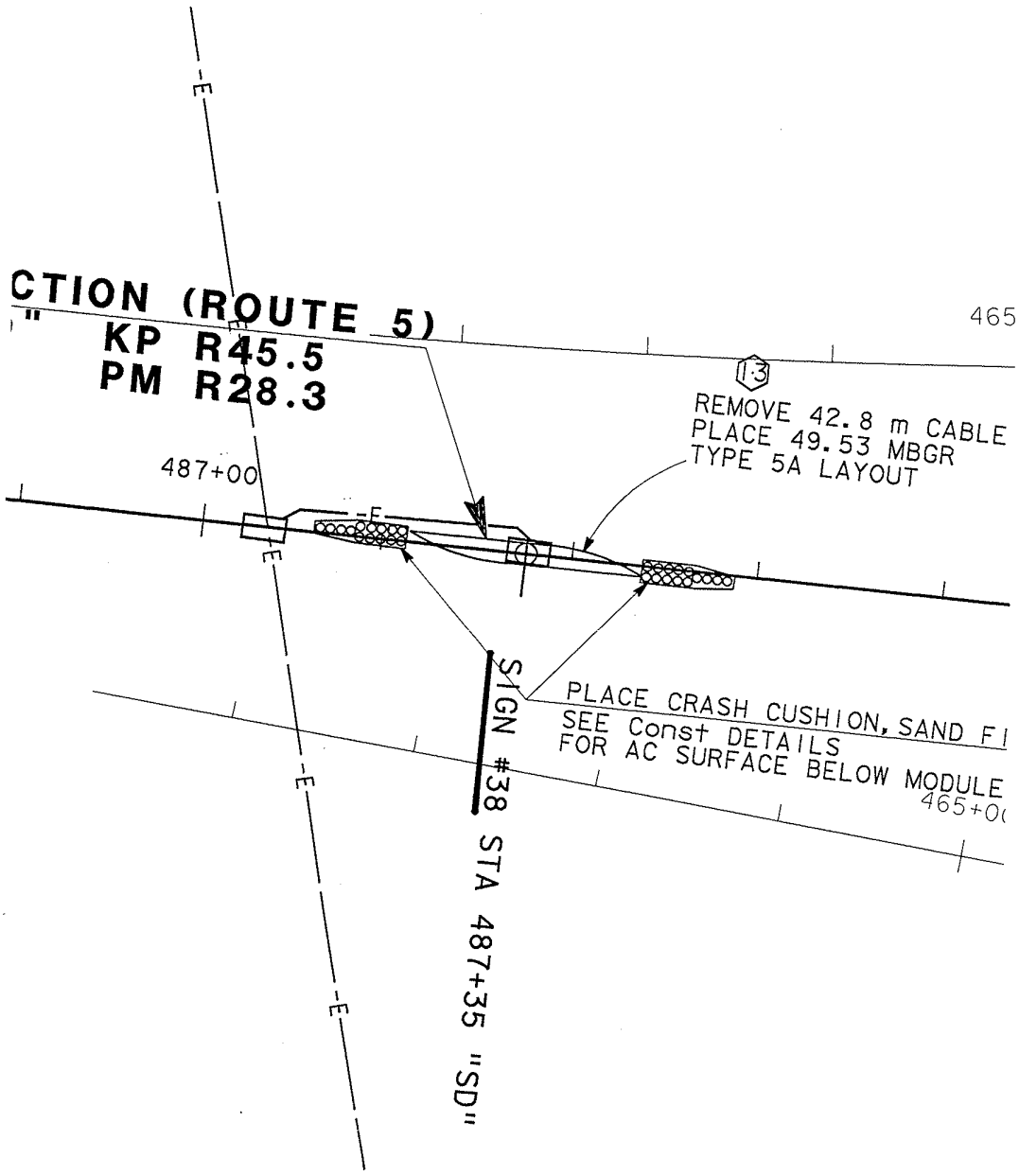


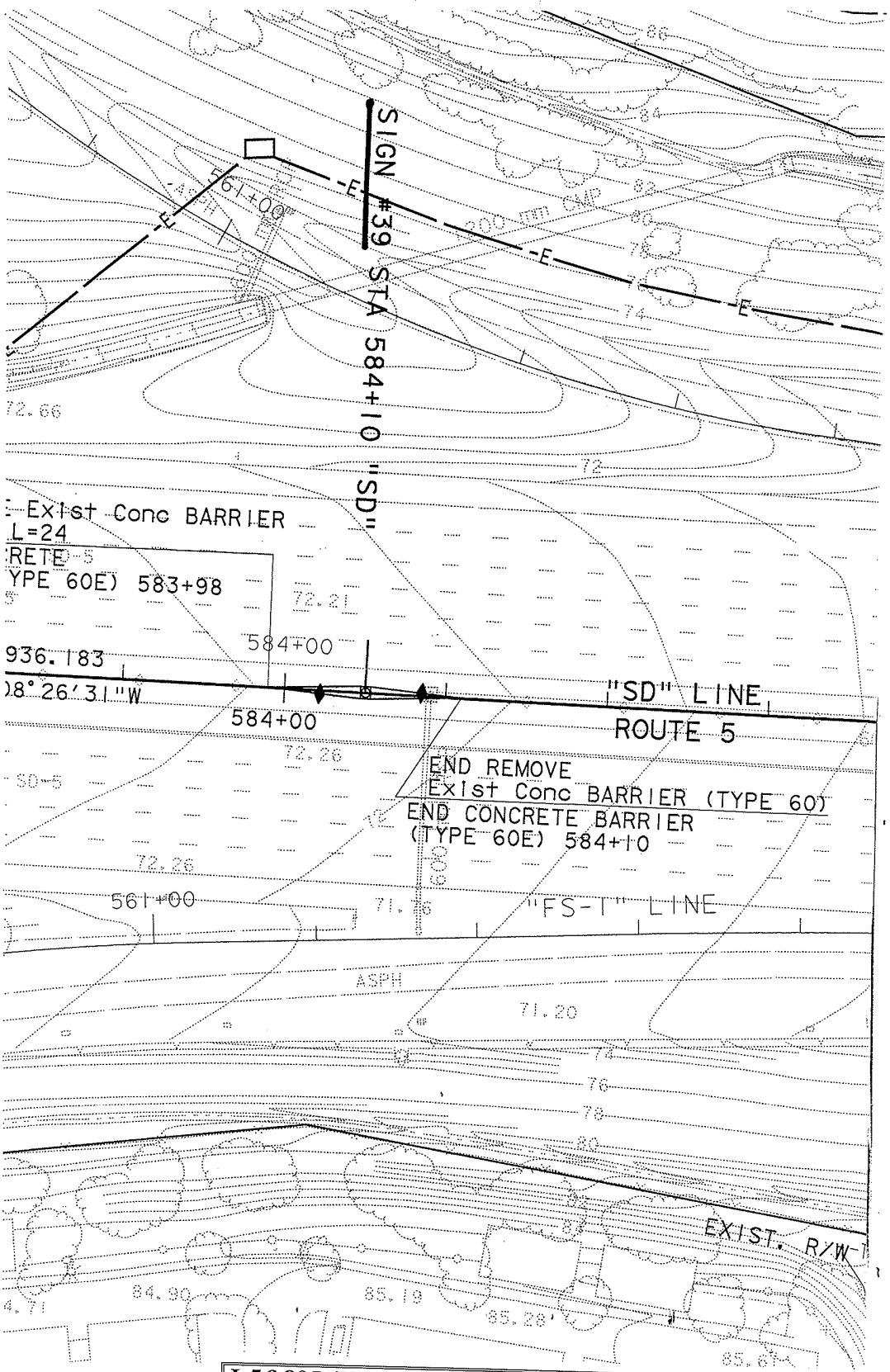
I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-35
	TRAFFIC SIGN 35	EA 11-0301U1



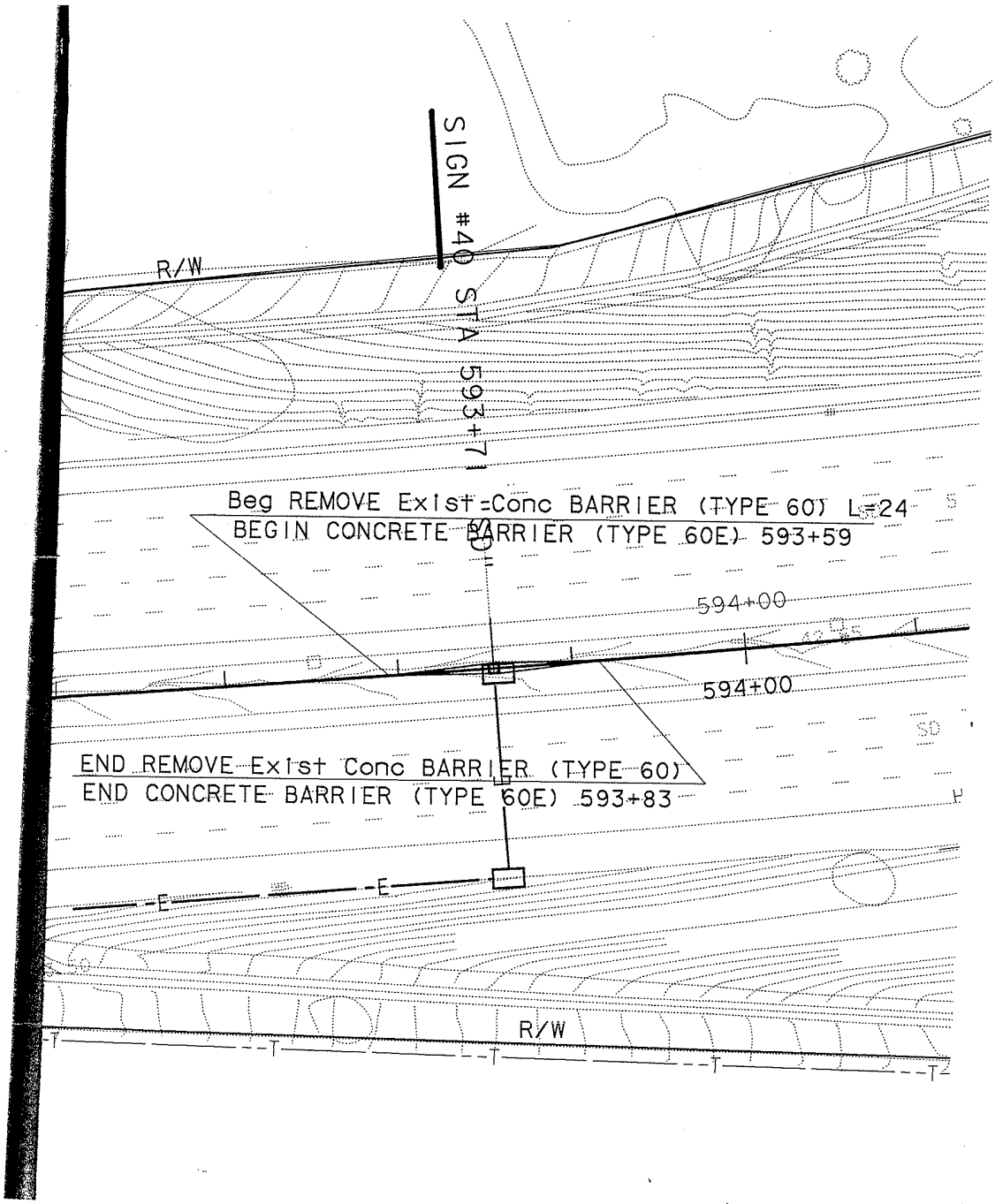
I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-37
	TRAFFIC SIGN 37	EA 11-O301U1



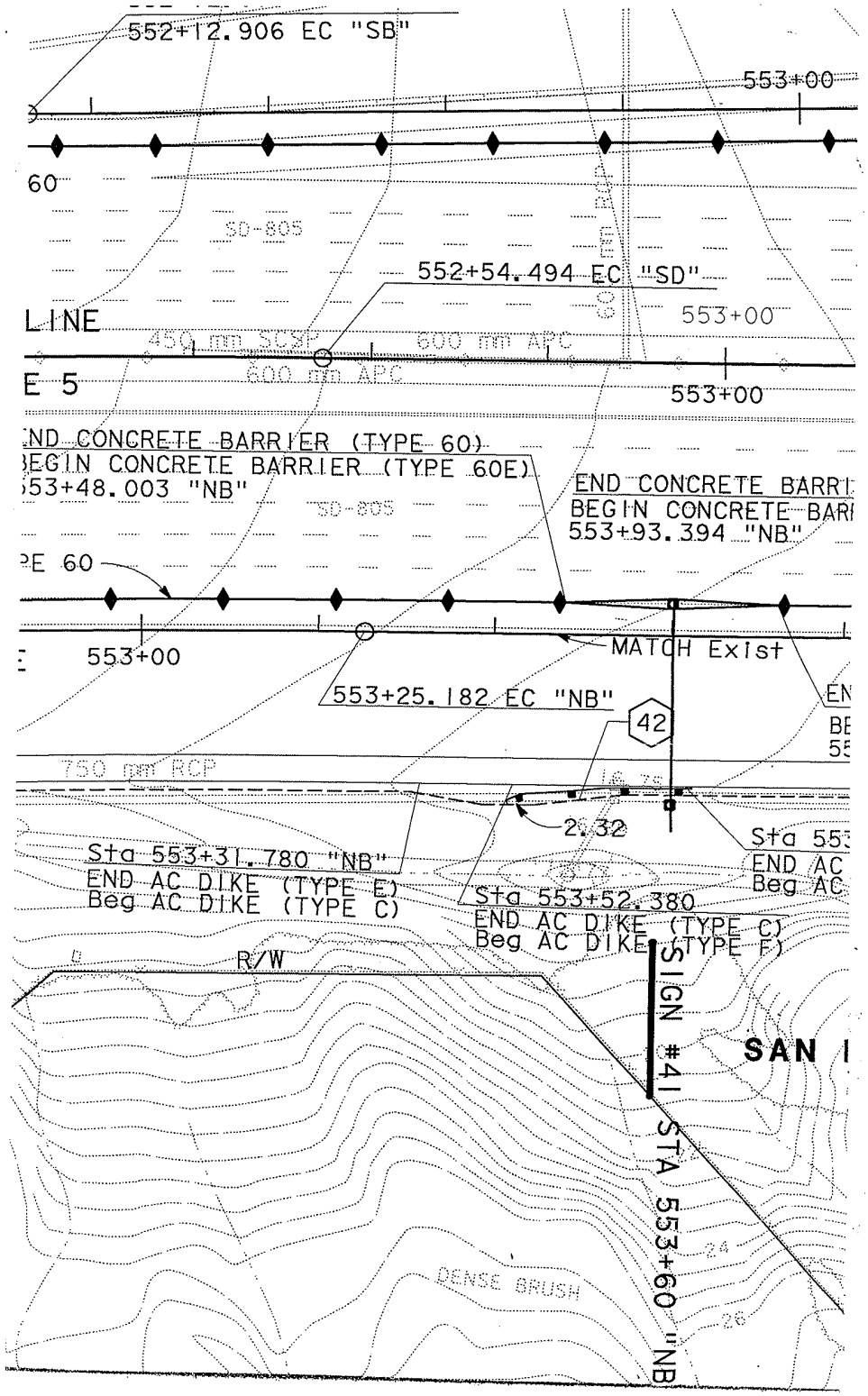
I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-38
	TRAFFIC SIGN 38	EA 11-O301U1



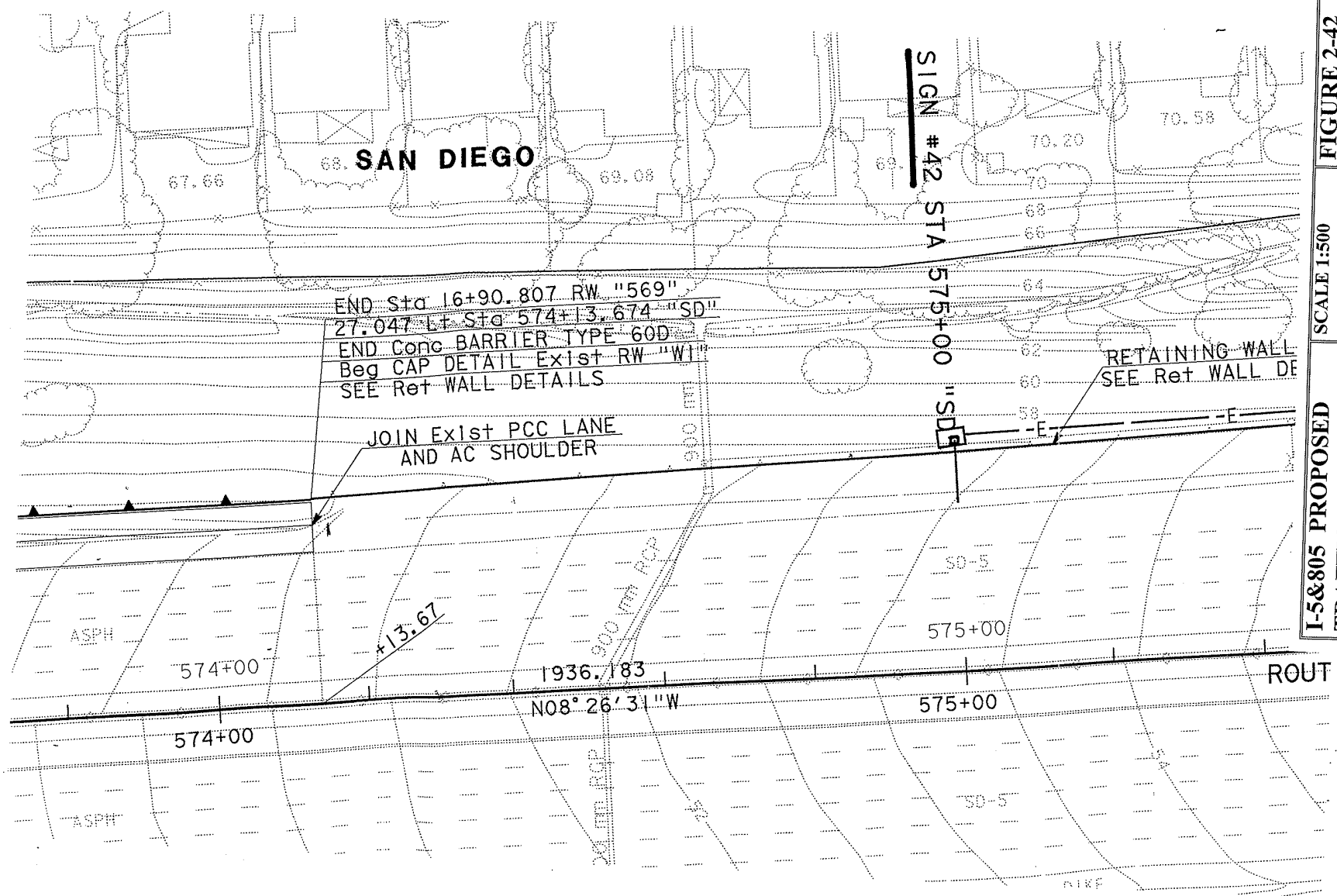
I-5&805 PROPOSED TRAFFIC SIGNS	**SCALE 1:500**	**FIGURE 2-39**
	TRAFFIC SIGN 39	**EA 11-O301U1**



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-40
	TRAFFIC SIGN 40	EA 11-0301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-41
	TRAFFIC SIGN 41	EA 11-O301U1



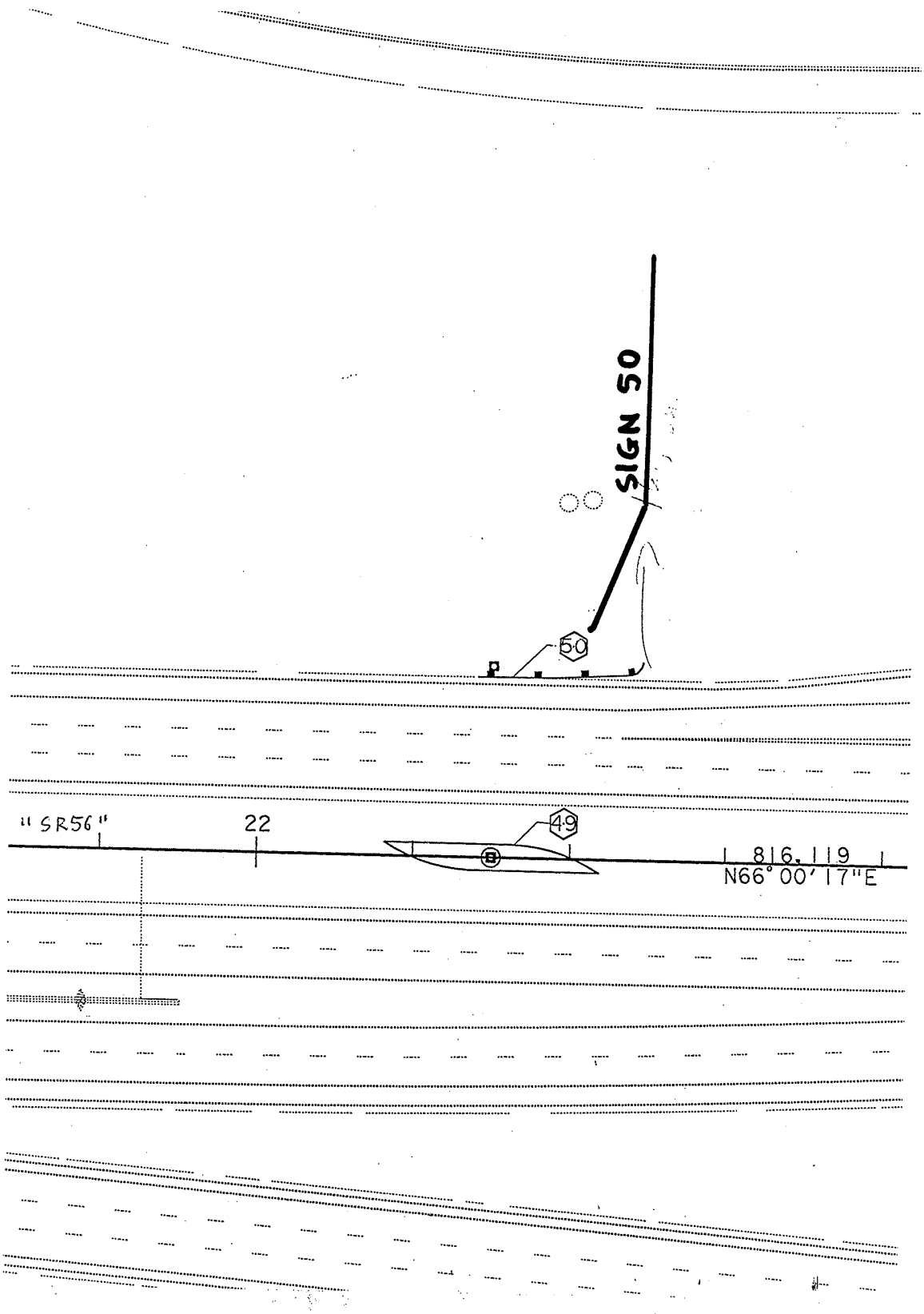
I-5&805 PROPOSED TRAFFIC SIGNS

SCALE 1:500

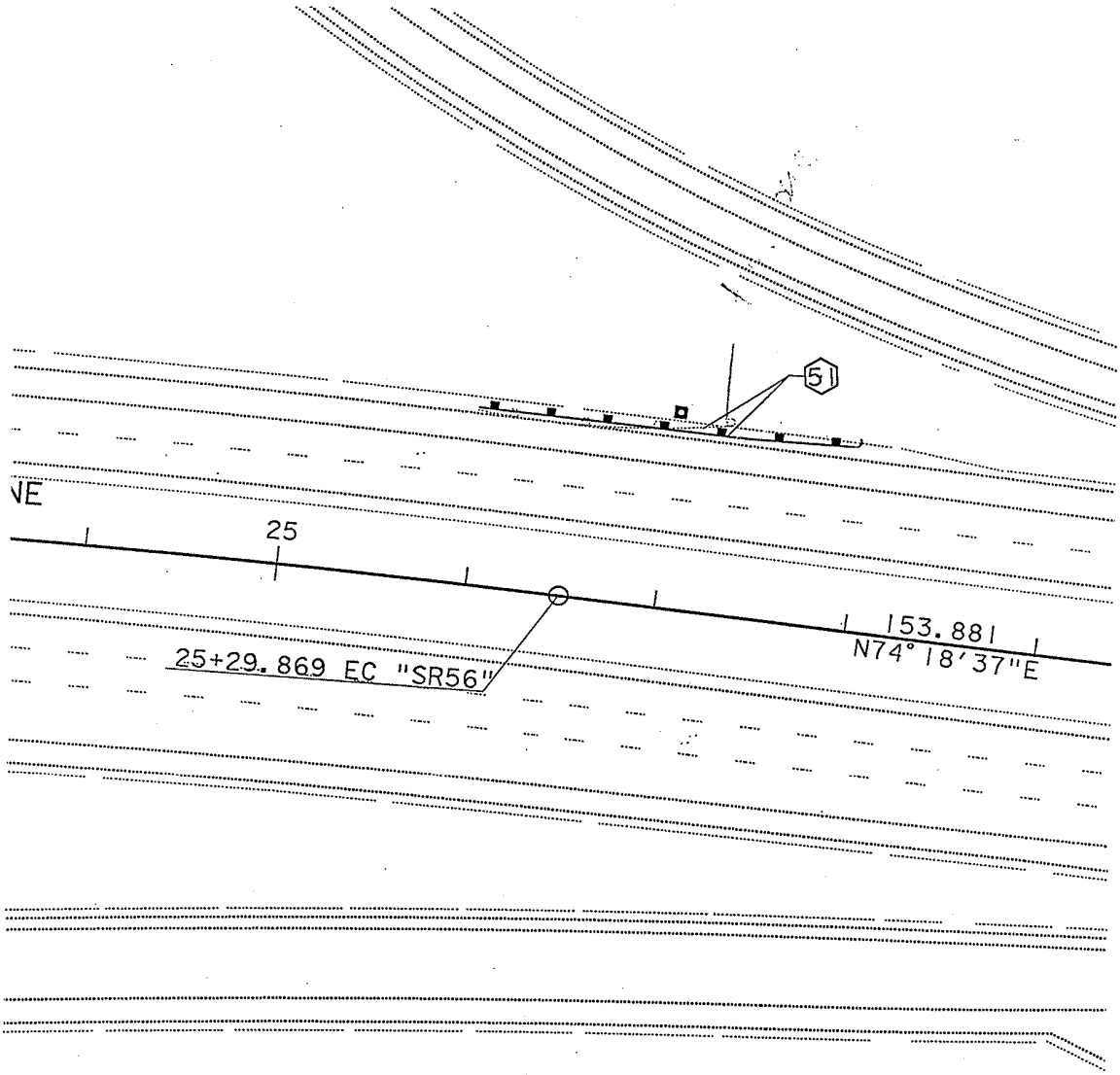
TRAFFIC SIGN 42

FIGURE 2-42

EA 11-O301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-50
	TRAFFIC SIGN 50	EA 11-0301U1



I-5&805 PROPOSED TRAFFIC SIGNS	SCALE 1:500	FIGURE 2-51
	TRAFFIC SIGN 51	EA 11-0301U1

Photo 1, Sign 21

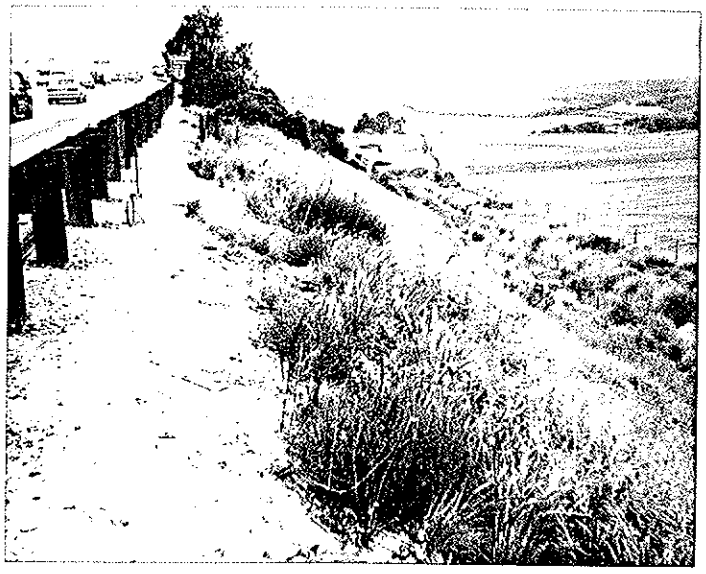


Photo 2, Sign 40

Jeff J Tesar
04/11/2001 11:45 AM

To: Arturo Jacobo/D11/Caltrans/CAGov@DOT
cc:
Subject: Traffic Signs

Arturo,
As per our conversation, please veryfy the numbers and location of the attached signs. Are all of them on my table?

5&805Table.doc

Table 1

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
1	I-5 534+40 "SB"	Embankment fill	Western post located at the face of 1:2. Slope is 10 m high. Grading likely in the area. See section: "Traffic Sign 1".
2	I-5 537+90 "SB"	Embankment fill	Eastern post located at the crest of 1:2 slope, western post located at the face of 1:2 slope. Slope is 20 m high. Grading likely in the area. See section: "Traffic Sign 2".
3	I-5 549+66 "CM4"	Embankment fill	Western post located at the crest of 1:2 slope that is 15 m high. See section: Traffic Sign 3".
4	I-5 554+60 "WS"	Embankment fill	Post located at the crest of 1:2 slope that is 7.5 m high. See section: "Traffic Sign 4".
5	I-5 557+00 "WS"	Embankment fill	Post located at the crest of 1:2 slope that is 5 m high. See section: "Traffic Sign 5".
6	I-5 564+55 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 1.7 m high. See section: "Traffic Sign 6".
7	I-5 566+80 "SD"	Native soils	None
8	I-5 569+80 "SD"	Native soils	None
9	I-5 572+20	Native soils	None
11	I-5 591+00	Native soils	None
14	I-5 542+00 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 24 m high. See section: "Traffic Sign 14".
15	I-5 536+40 "SD"	Embankment fill	Western post located at the crest of 1:2 slope that is 26.5 m high. See section: "Traffic Sign 15".
16	I-5 530+40 "SDL"	Embankment fill	None

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
17	I-5 to SR 56 558+43 "SD"	Embankment fill	Groundwater expected at about an elevation of 4.5 m.
19	I-5 553+40 "SD"	Embankment fill	None
20	I-5 541+50 "SD"	Native soils under shallow fill	Top 0.9 m layer is weathered. See section: "Traffic Sign 20".
21	I-5 540+60	Embankment fill	Eastern post located at the crest of 1:1.5 slope that is 5 m high. See section: "Traffic Sign 21".
22	I-5 533+40 "NB"	Native soils	None
23	I-5 531+00 "NB"	Native soils	None
24	I-805 465+44 "A"	Native soils	None
25	I-805 457+60 "A"	Native soils	None
26	Carmel Mountain Road 1+20 "CMR"	Fill materials	None
29	Carmel Mountain Road 5+00 "CMR"	Native soils	None
30	I-805 425+00 "A"	Native soils	None
31	I-5 520+70 "SDR"	Embankment fill	Eastern post located at the crest of 1:2 slope that is 6 m high. See section: "Traffic Sign 31".
32	I-5 519+10 "SDR"	Native soils under fill wedge	None
33	I-5 515+75 "SDR"	Native soils under fill wedge	None
35	I-5 503+20 "SD"	Native soils	None
37	I-5 627+15 "SD"	Native soils	None

SIGN No.	LOCATION (FREEWAY, STATION, AND LINE)	ANTICIPATED SUBSURFACE MATERIALS	FOUNDATION CONSIDERATIONS
38	I-5 487+35 "SD"	Native soils	None
39	I-5 584+10 "SD"	Embankment fill	None
40	I-5 593+71 "SD"	Embankment fill	Eastern post located at the crest of 1:1.5 slope that is 6 m high. See section: "Traffic Sign 40".
41	I-5 543+60 "NB"	Native soils under fill wedge	None
42	I-5 575+00 "SD"	Native soils	None
50	SR 56 22+30 "SR56"	Native soils	None
51	SR 56 25+45 "SR56"	Native soils	None

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design 5
MS 35

Date: March 13, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11275-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICE CENTER
Division of Structural Foundations

Subject: Interstates 5 and 805 Interchange, Proposed CMS Traffic Signs 43, 44, 45, and 46.

General

At your request, we are providing our foundation review for the proposed Traffic Signs 43, 44, 45, and 46. These signs are a part of several traffic signs that are proposed for the widening of the Interstates 5 and 805 (I-5 and I-805) Interchange project. The foundation review report for these signs is currently under preparation. Since the subject signs have high priority, we are submitting this report (a section of the aforementioned report) to help expedite the project.

~~Sign 43~~ > CMS # 1

For the location of the proposed Traffic Sign 43, (Table 1) reference is directed to Figure 2-43. Based on the plans and layouts provided by you, Traffic Sign 43 will be located on I-5, about 850 m north of La Jolla Village Drive. It will be constructed just east of the eastern shoulder of the northbound I-5, at Station 449+20 "SD" Line (about 25 m Right). This section of I-5 was built as cut and fill in the native soils of the Ardath Shale and Scripps Formation (Attachment 2. Photo 3). A shallow fill layer comprised of granular materials is believed to be present at the proposed Sign 43 location. It is our understanding that this fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. However, during our site inspection, the top 0.9 m section of the fill was found to be loose due to weathering. We expect that the fill is underlain by native soils of the Ardath Shale (Kennedy, 1975). No groundwater is anticipated at the location of Sign 44. Seepage conditions could, however, be encountered during the excavation for the pile foundation, especially at the

interface of the fill and native soils.

Based on the information provided by your office, Sign 43 will be supported on 5.5 m long CIDH Pile Foundation, designed for soils comparable to a freeway fill compacted to 90 % Relative Compaction. However, the top 0.9 m layer of the subsurface materials does not meet this strength criterion. Therefore, it is our recommendation that the pile design be adjusted to account for the low strength of the aforementioned layer.

~~Sign 44~~ > CMS #2

For the location of the proposed Traffic Sign 44, (Table 1) reference is directed to Figure 2-44. Based on the plans and layouts provided by you, Traffic Sign 44 will be located at approximately the interchange of Mira Mesa Boulevard and Interstate-805. It will be constructed just east of the eastern shoulder of northbound I-805, at Station 449+00 "A" Line (about 26 m Right). This section of I-805 was built as cut and fill in the native soils of the Bay Point Formation (Attachment 2. Photo 2). A shallow fill layer comprised of granular materials is believed to be present at the proposed Sign 44 location. It is our understanding that this fill was compacted to 90 % Relative Compaction in accordance with Caltrans CTM 216. Fill is underlain by native sandy soils of the Bay Point Formation (Kennedy, 1975). No groundwater is anticipated at the location of Sign 44. Seepage conditions could, however, be encountered during the excavation for the pile foundation.

Based on the information provided by your office, Sign 44 will be supported on 5.5 m long CIDH Pile Foundation, designed for soils comparable to a freeway fill compacted to 90 % Relative Compaction. Based on our field inspection, review of pertinent literature, and geologic experience in the area, the subsurface soils should meet if not exceed the minimum strength criterion established by the Signs Design Office.

~~Sign 45~~ > CMS #3

For the location of the proposed Traffic Sign 45, (Table 1) reference is directed to Figure 2-45. Based on the plans and layouts provided by you, Traffic Sign 45 will be located just west of the western shoulder of southbound I-5, at Station 610+50 (about 30 m Left). At this location embankment fill is present. It is about 6.0 m high, and was placed over the native alluvial soils of the San Dieguito Valley (Attachment 2, Photo 3). Sign 45 will be constructed at about the crest of the west-facing embankment slope that descends at an inclination of 1:2 vertical to horizontal (V:H). Based on our field inspection, review of pertinent literature, and geologic experience in the area, it appears that the embankment fill was constructed with predominantly granular materials compacted to 90 % Relative Compaction in accordance with CTM 216. In addition, ground water is expected to be encountered at an approximate elevation of 1.0 m.

Based on the information provided by your office, Sign 45 will be supported on CIDH

Pile foundation, 5.5 m long, and embedded in the embankment slope. In addition, based on your layouts, it is our understanding that the pile foundation was designed for subsurface materials comparable to a freeway fill compacted to 90% Relative Compaction. However, as previously stated, this pile foundation is to be embedded into the embankment slope. Therefore, it is our recommendation that the pile design be adjusted for the site sloping condition.

~~Sign 46~~ > CMS # 4

For the location of the proposed Traffic Sign 46, (Table 1) reference is directed to Figure 2-46. Based on the plans and layouts provided by you, Traffic Sign 46 will be located west of the western shoulder of southbound I-5, at Station 549+66 "SD" Line (about 20 m Right). This section of I-5 was built as cut and fill in the native soils of the Bay Point and Torrey Sandstone Formations (Attachment 2. Photo 4). The location of the proposed Sign 44 is underlain by native soils of the Torrey Sandstone (Kennedy, 1975). No ground water is anticipated at the location of Sign 46.

Based on the information provided by your office, Sign 46 will be supported on CIDH Pile Foundation, 5.5 m long, designed for soils comparable to a freeway fill compacted to 90 % Relative Compaction. Based on our field inspection, review of pertinent literature, and geologic experience in the area, the subsurface soils should exceed the minimum strength criterion established by the Signs Design Office. In addition, possible concretion zones within the Torrey Sandstone Formation could impact the rate of excavation of the foundation pile.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

J. Tesar

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
Associate Materials and Research Engineer

Office of Geotechnical Design - South -- MS#63

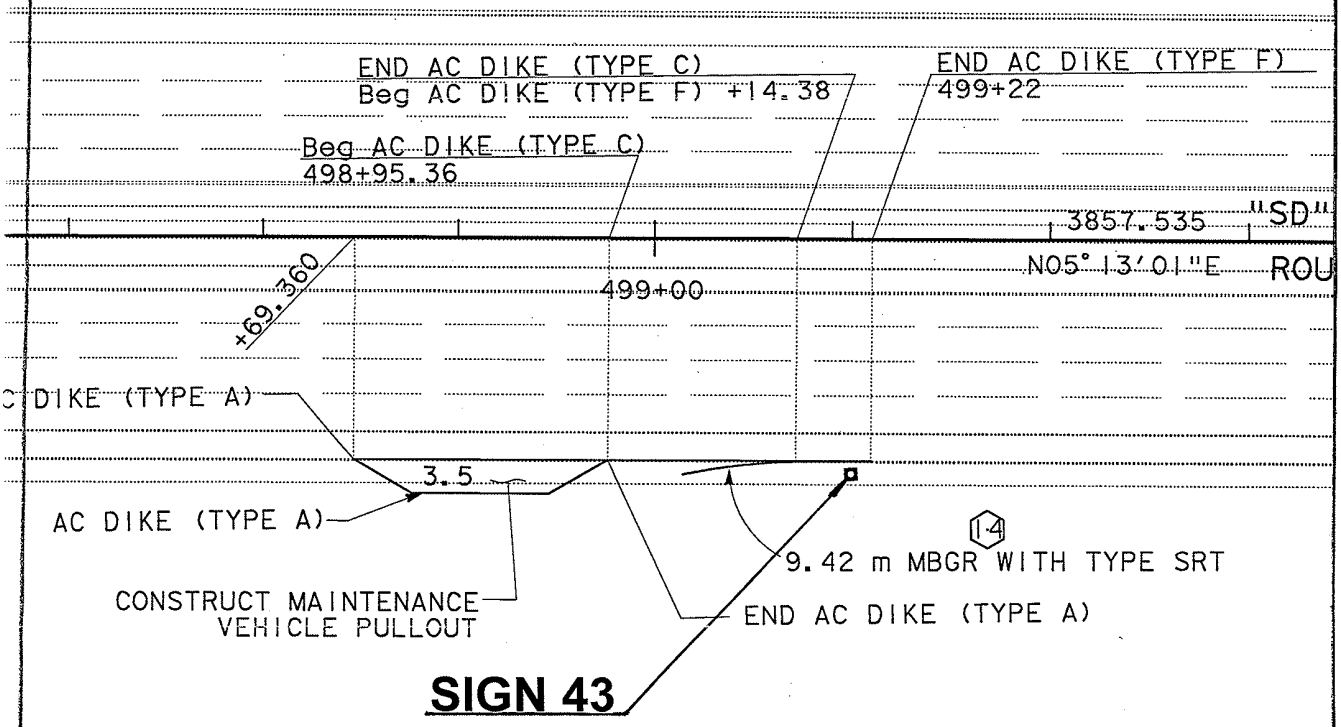
Attachments:

1. Figure 2-43
2. Figure 2-44
3. Figure 2-45
4. Figure 2-46
5. Photos

cc:
GPearce
JEgan
RGES 02

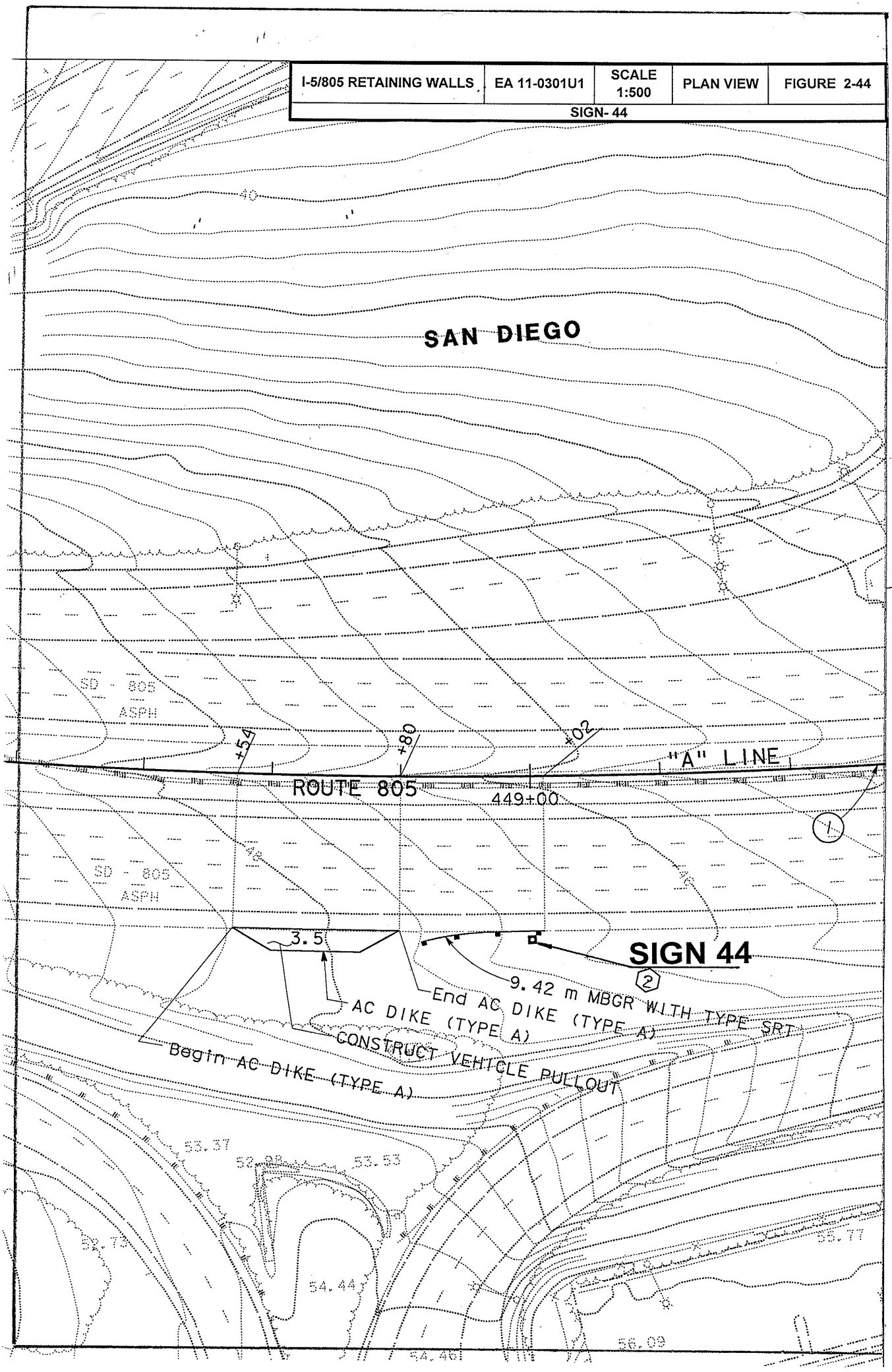
JT

I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-43
SIGN- 43				

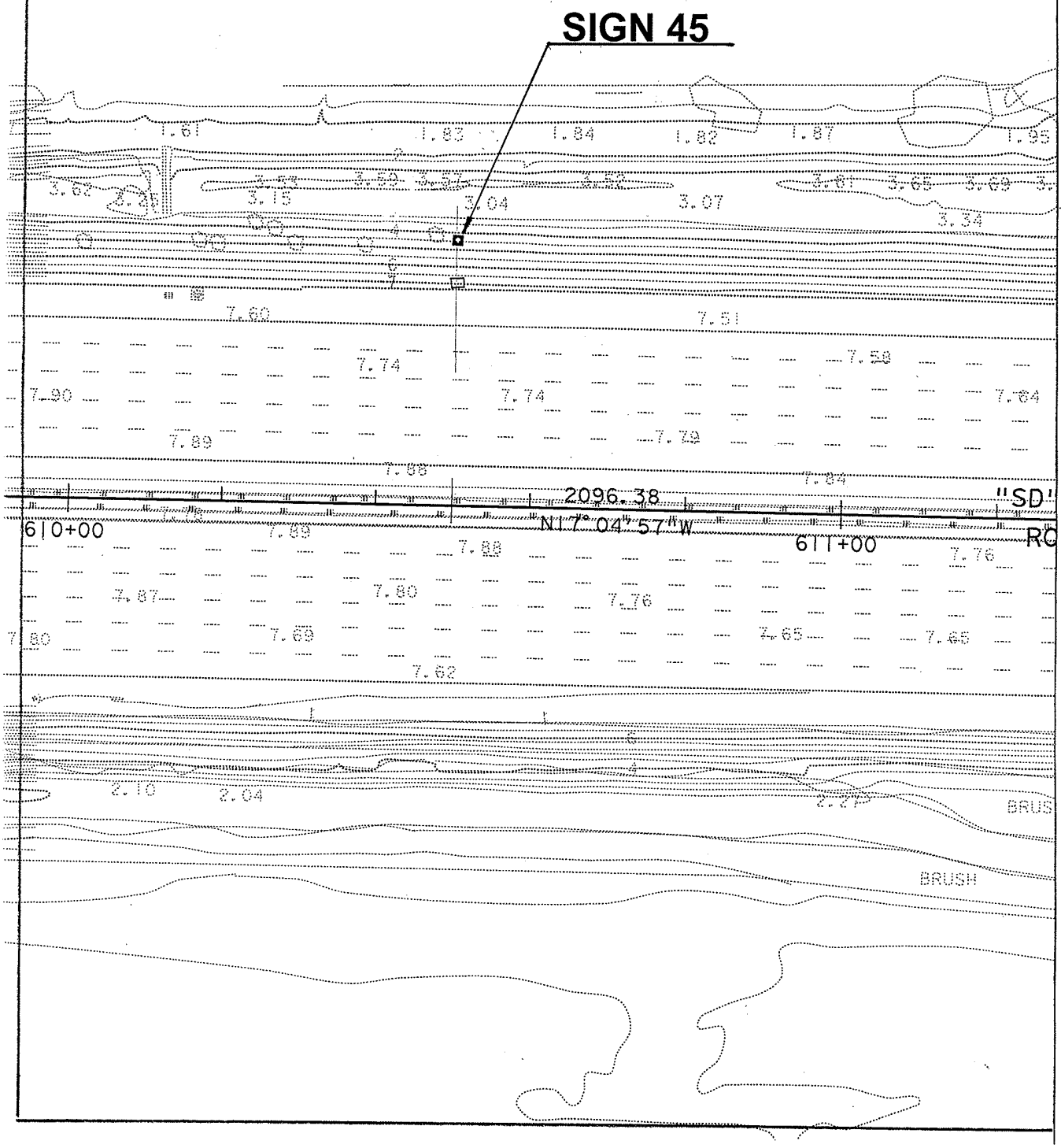


SIGN 43

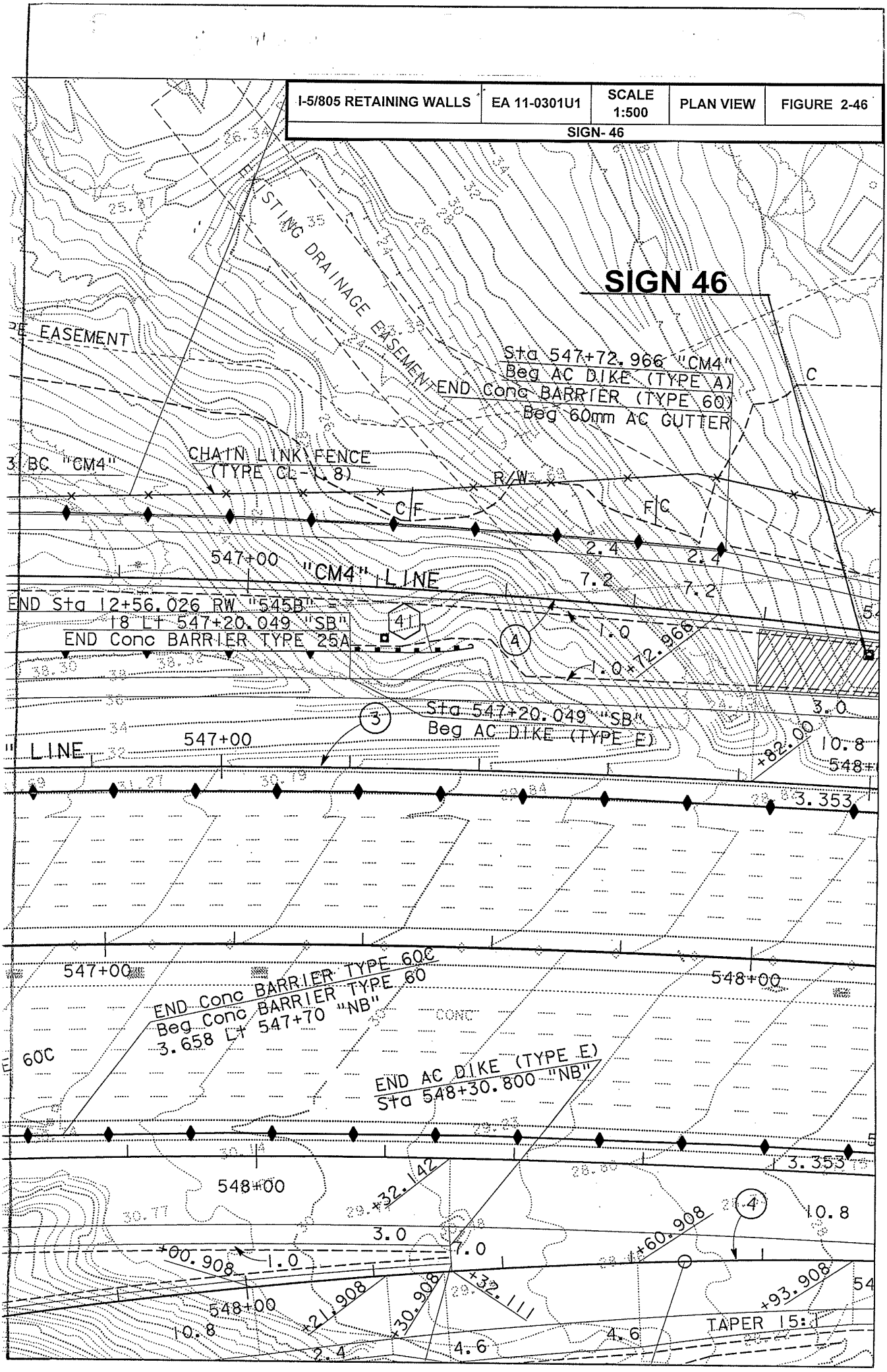
I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-44
SIGN- 44				



I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-45
SIGN- 45				



I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-46
SIGN- 46				



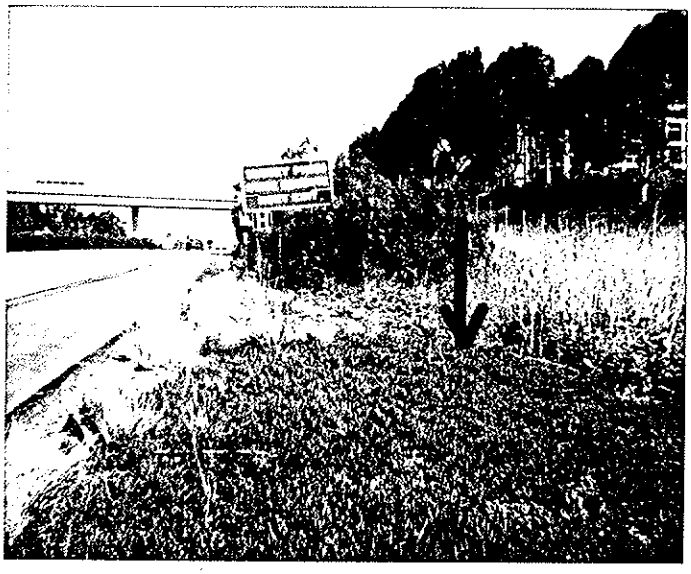


Photo 1; Sign 43, Looking North

Photo 2; Sign 44, Looking North

Photo 3; Sign 45, Looking South

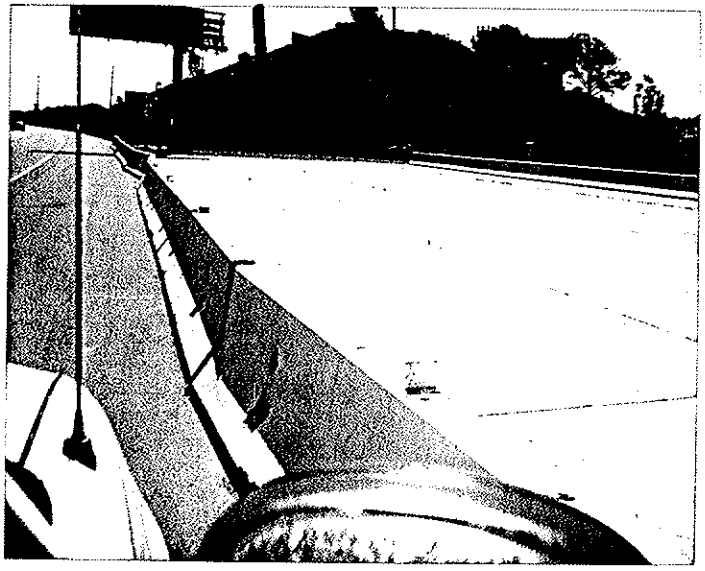


Photo 4; Sign 46, Looking South

Jeff J Tesar
04/10/2001 07:30 AM

To: Arturo Jacobo/D11/Caltrans/CAGov@DOT
cc: Yong Pak/D11/Caltrans/CAGov@DOT, Zia Yazdani/HQ/Caltrans/CAGov@DOT
Subject: 5&805 Retaining Walls Report

Gentlemen,
The subject report has been completed and is about ready for a submittal. We have already sent you our recommendations regarding the so called 'difficult' walls. The remaining walls will be a Type 1 Standard walls as your office planned. Please, find below our remaining recommendations pertaining to some Type 1 Standard walls.

Wall 544: at Station 544+40 a construction joint should be incorporated into the wall design to mitigate a potential for differential settlement at the fill and native soils interface.

Wall *546: Foundation Recommendations*

It is our understanding that the footing of the proposed Wall 546 will be constructed on a fill layer to be built to raise freeway grade. Therefore, the wall foundation fill pad should consist of structural backfill materials compacted to 95 % Relative Compaction in accordance with CTM 216. The minimum thickness of the foundation pad should be 1.5 m, and its horizontal limits should extend a minimum 1.5 m beyond the edges of the proposed wall footing.

From a geotechnical engineering standpoint, based on layouts and cross sections of the proposed maximum 2.8 m high wall supplied by your office, the results of our subsurface investigations and the assumption that the wall foundation pad will be constructed as recommended above, the Standard Plan Design Type 1 may be used for Wall 546.

Wall *565: Foundation Recommendations*

We recommend that along the alignment of Wall 565, the existing undocumented fill materials be removed and recompacted to 95% Relative Compaction in accordance with CTM 216. The anticipated depth of removal is about 1.2 m below the bottom elevation of the footing. The horizontal limits of the removal and recompaction should extend a minimum 1.2 m beyond the edges of the proposed wall footing.

From a geotechnical engineering standpoint, based on layouts and cross sections of the proposed maximum 1.8 m high wall supplied by your office, the results of our subsurface investigations, and the assumption that the subsurface materials along the wall alignment will be recompacted as recommended above, the Standard Plan Design Type 1 may be used for Wall 565.

Traffic Sings
The review of the traffic signs is well under way and will be completed at the end of this week. As per my discussion with Arturo, about eleven signs will require the adjustment of their CIDH

standard Pile Foundations to account for the steep sloping condition of the site or the soft top layer at the proposed sign location. In addition, there is some uncertainty regarding the location of the Sign 26. I have requested a new layout showing the topography at the location of the sign and in its vicinity; Arturo, where it is?? If I do not get this new layout for Sign 26 I will not be able to include it in my report.
- Jeff

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design 5
MS 35

Date: April 4, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICES
Office of Geotechnical Services, MS#63

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Walls 545B and 545C.

General

At your request, we are providing foundation recommendations for the proposed Retaining Walls 545B and 545C. These walls are a part of the retaining wall project that comprises several retaining structures. The foundation investigation report for these walls is currently under preparation and we are submitting this report now to help expedite the project.

Retaining Walls 545B and 545C

Site Considerations

For the location of the proposed Retaining Walls 545B and 545C (Table 1), reference is directed to Figure 2-545B. Wall 545B will be about 226.6 m long and 4.7 m in maximum height. Wall 545C will be about 254.4m long and 4.8 m in maximum height. Both walls are proposed to be Type1 standard retaining walls supported on spread footing foundations. From Station 10+00 RW "545B" to about 544+53 "CM4", Wall 545B will run at the base of the embankment slope paralleling Carmel Mountain Road to the west. From about Station 544+53 through 546+38.6, Wall 545B will parallel southbound I-5 in a southward direction. From Station 544+66.1 through 547+18, Wall 545C will parallel the western shoulder of the southbound I-5 in a southward direction. This interval of the freeway, from the northern end of Wall 545C to about Station 545+65, was constructed as a side cut. The cut slope ascends at a general inclination of 1:2 vertical to horizontal (V:H), and its maximum height is about 6.0 m (Attachment 2, Photo 19). From about Station 545+65 to the southern end of Wall 545B, the interval represents an approach embankment to the Carmel Mountain Road Undercrossing. The west-facing embankment (fill) slope descends at a general inclination of 1:2 (V:H) (Attachment

2, Photo 20). It is our understanding that the subject section is to be widened to accommodate an offramp to Carmel Mountain Road and the future widening of the Carmel Mountain Road Undercrossing. From the northern end of Wall 545C to about Station 545+65, the widening will involve undercutting of the existing slope and retaining it with the sections of both walls. From about Station 545+65 to the southern limit of Wall 545B, the widening will involve placement of fill on the existing embankment slope and retaining it with the section of the proposed upper Wall 545C. Also, throughout this interval a cut at the base of the embankment is to be retained with the proposed lower Wall 545B (see cross section in Attachment 2, Walls 545B and 545C: Slope Stability Analysis).

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 545B-B1 through 545B-B5) revealed that the alignments of the proposed walls, from their southern limits to Station 545+65, will be underlain by fill materials overlying the native soils of the Bay Point Formation that in turn are underlain by the Ardath Shale Formation. The remaining section of the walls alignments, from about Station 545+65 to their northern ends, is underlain by the Bay Point Formation. Starting from about Station 545+65, the fill and native soils interface dips south at an approximate inclination of 1:7 (V:H). At the location of Boring 545B-B5 the interface was logged at its lowest elevation of about 21 m. Fill materials consist of sands mixed with gravel and occasional cobbles. Their relative density, based on SPT blow counts, ranged from medium dense to dense. The native soils of the Bay Point Formation consist predominantly of sands and sandstone that locally could be silty or indurated. From a geotechnical engineering standpoint, both the Bay Point and Ardath Shale geologic units are considered to be competent bedrock. During our drilling program, however, we found that the top layer of the Bay Point Formation was intensely weathered, and thus not meeting the competency criterion for bedrock.

Foundation Recommendations

We recommend that along the proposed Wall 545C alignment, from Station 545+ 60 to its southern limit, the layer of fill materials be removed and replaced with structural backfill as shown on the sketches designated as Wall 545C: Typical Foundation Improvement Section (Figures 22, and 22A). Since the existing embankment fill wedge under the alignment of the proposed Wall 545C is not uniform, the volume of material to be removed gradually increases from Station 545 +60 (where minimal removal is required) through the southern end of the wall. The structural backfill should be benched into the existing slope in accordance with Caltrans Standard Specifications and compacted to 95% Relative Compaction in accordance with CTM 216. In addition, wall backfill should be compacted in accordance with the Standard Specifications to 95 % Relative Compaction. The Structural Backfill material, when compacted to 95 % of Relative Compaction should yield strength parameters no less than those shown for fill/backfill in the attached Table 2. To mitigate the potential for differential settlement at the fill and native soils interface, a construction joint should be incorporated into

the design of Wall 545C.

From a geotechnical engineering standpoint, based on cross sections and layouts of the proposed walls supplied by your office, the results of our subsurface investigations, and the assumption that the removal and replacement of fill materials under the section of the Wall 545C foundation will be implemented prior to construction of Wall 545C, the Standard Plan Design may be used for Walls 545B and 545C.

In addition, slope stability analysis using the STEDwin computer program was performed on the cross section of the proposed embankment that includes both walls. This cross section was provided by your office. The analysis was performed to determine the stability of the new fill slope. For the analysis, we utilized the soil strength parameters presented in Table 2. In addition we assumed that the slope will descend from the base of the Wall 545C to the top of the Wall 545B at an inclination no steeper than 1:1.75 (H:V). The calculated Modified Bishop Safety Factor for the proposed new embankment slope is 2.0, which is considered to be acceptable. The slope stability computer output data are presented in Attachment 2, Walls 545B and 545C: Slope Stability Analysis.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

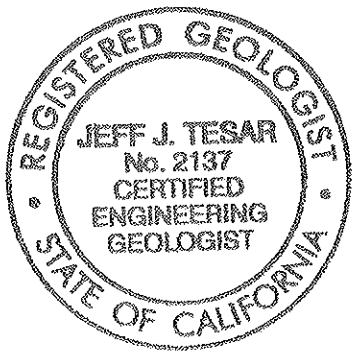
J. Tesar

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
Associate Materials and Research Engineer

Geotechnical Section 11



Attachments:

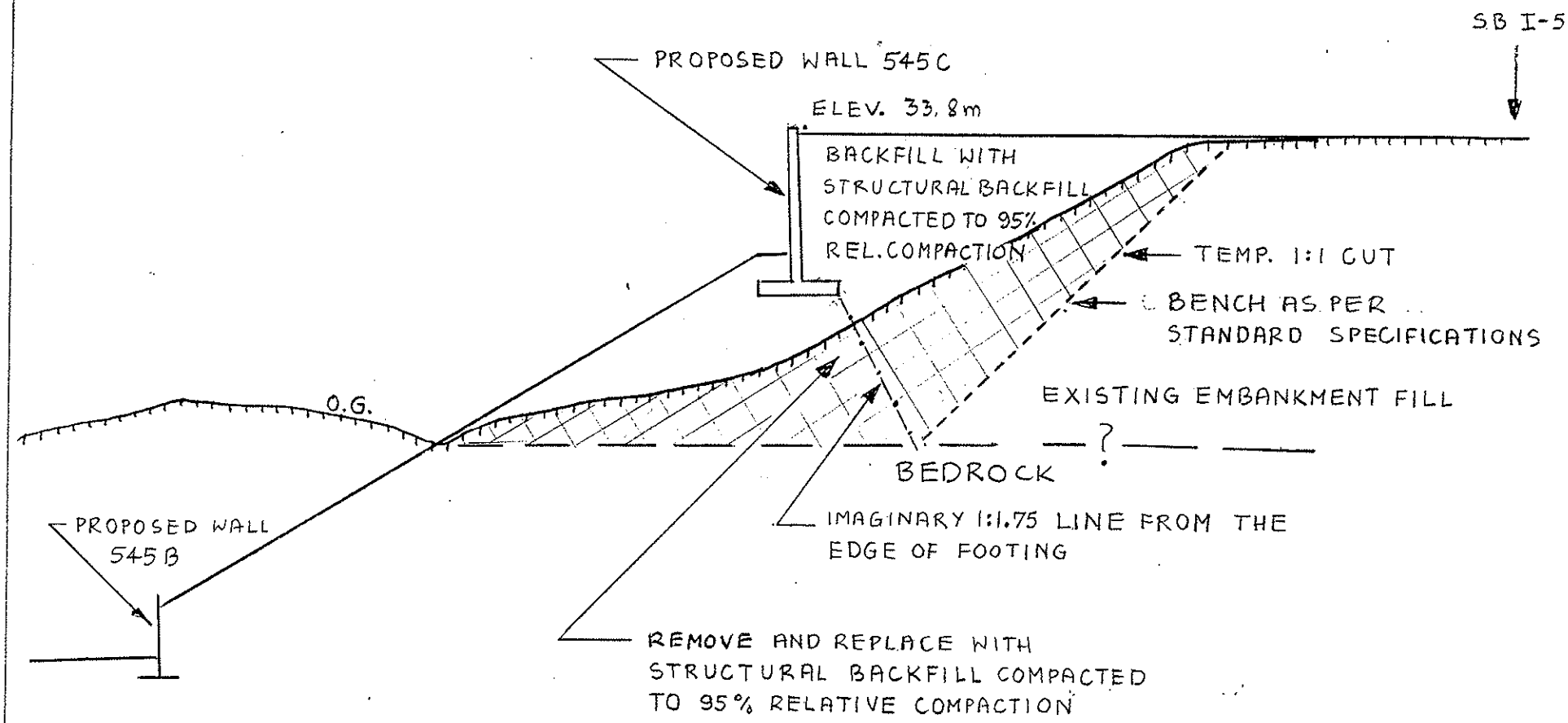
1. Figure 22, Wall 545C: Typical Foundation Improvement Section
2. Figure 22A, Wall 545C: Typical Foundation Improvement Section
3. Photos 19 and 20
4. Walls 545B and 545C, Slope Stability Analysis

cc:
GPearce
JEgan
OGSS 02

JT

Table 2

GEOTECHNICAL UNIT	COHESION (Kpa)	ANGLE OF INTERNAL FRICTION (degree)	MAXIMUM DRY DENSITY (KN/m^3)
Ardath Shale	14.3	28	18.9
Torrey Sandstone	9.6	33	18.9
Bay Point Formation	24.0	38	19.6
Existing Fill	9.6	32	18.9
Structural Fill/Backfill	9.6	36	18.9



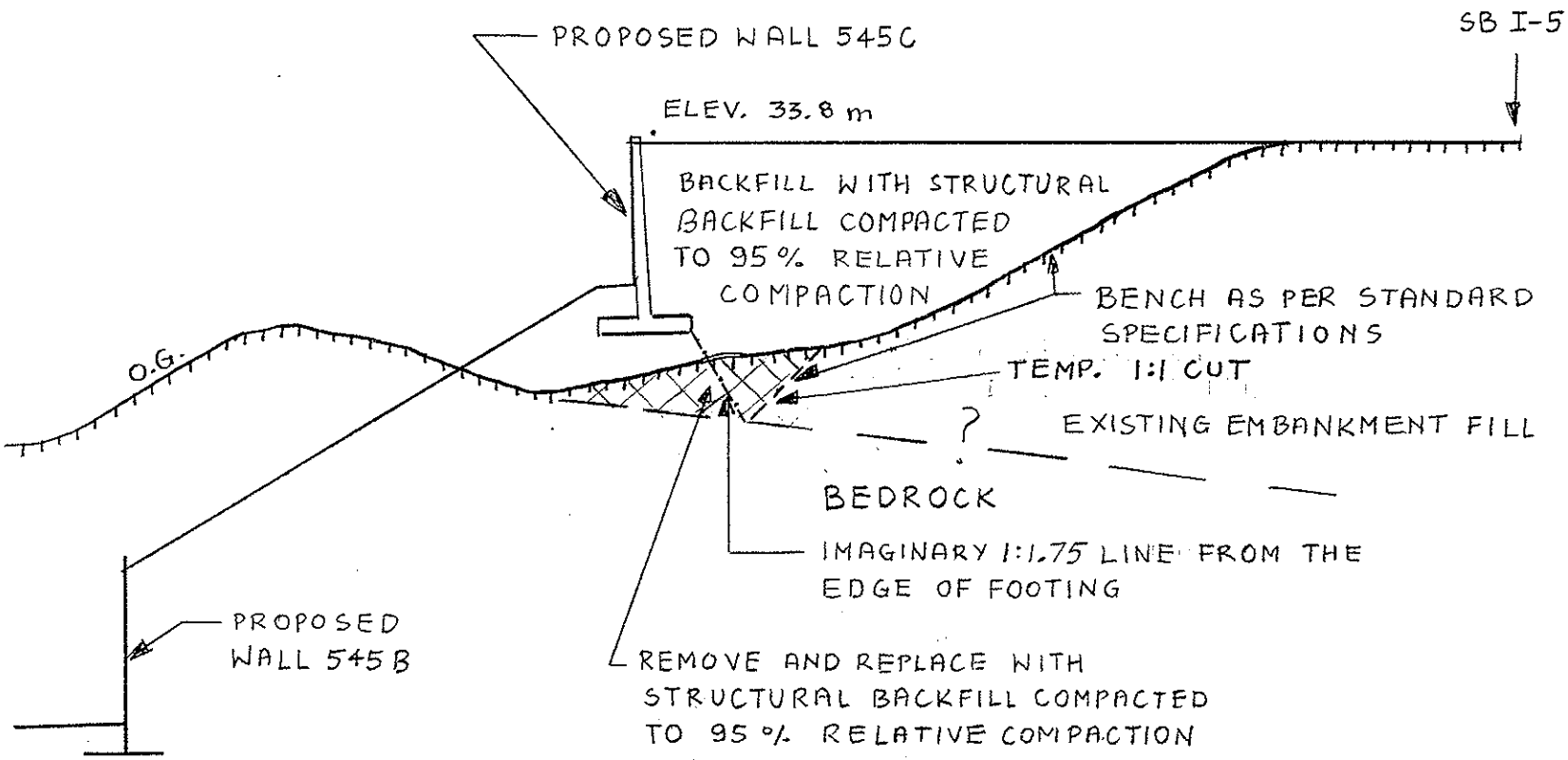
STATION 544+80

WALL 545C : TYPICAL FOUNDATION IMPROVEMENT SECTION

0 3 6 m

FIGURE 22

EA 0301U1



STATION 545+10

WALL 545C: TYPICAL FOUNDATION IMPROVEMENT SECTION

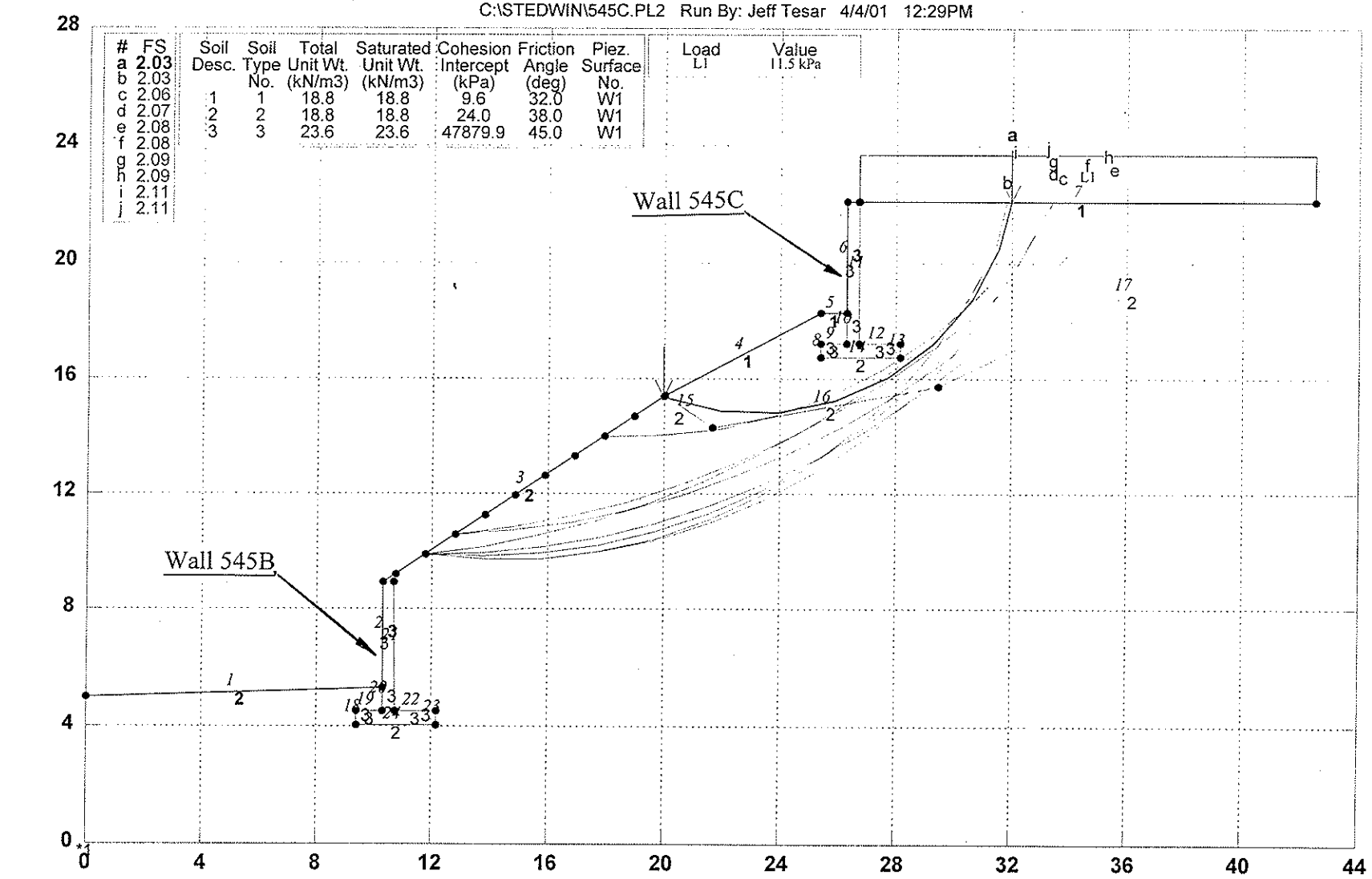
0 3 6 m

FIGURE 22A

EA 030101

Interstates 5&805, Retaining Walls, Walls 545B and 545C

C:\STEDWIN\545C.PL2 Run By: Jeff Tesar 4/4/01 12:29PM



GSTABL7 FSmin=2.03

Safety Factors Are Calculated By The Modified Bishop Method

STED

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Version 1.0, January 1996; Version 1.16, May 2000 **
--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/4/01
Time of Run: 12:29PM
Run By: Jeff Tesar
Input Data Filename: C:545C.PRP
Output Filename: C:545C.OUT
Unit System: SI
Plotted Output Filename: C:545C.PLT
PROBLEM DESCRIPTION Interstates 5&805, Retaining Walls, Walls 545B and 545C

BOUNDARY COORDINATES
7 Top Boundaries
24 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	5.00	10.30	5.30	2
2	10.30	5.30	10.31	8.90	3
3	10.31	8.90	20.05	15.40	2
4	20.05	15.40	25.40	18.30	1
5	25.40	18.30	26.30	18.30	1
6	26.30	18.30	26.32	22.10	3
7	26.32	22.10	42.50	22.10	1
8	25.40	16.75	25.41	17.20	3
9	25.41	17.20	26.29	17.20	3
10	26.29	17.20	26.30	18.30	3
11	26.70	22.10	26.71	17.20	3
12	26.71	17.20	28.15	17.20	3
13	28.15	17.20	28.16	16.75	3
14	25.40	16.75	28.16	16.75	2
15	20.05	15.40	21.70	14.30	2
16	21.70	14.30	29.50	15.75	2
17	29.50	15.75	42.50	22.10	2
18	9.40	4.04	9.41	4.50	3
19	9.41	4.50	10.29	4.50	3
20	10.29	4.50	10.30	5.30	3
21	10.70	8.90	10.71	4.50	3
22	10.71	4.50	12.15	4.50	3
23	12.15	4.50	12.16	4.05	3
24	9.40	4.05	12.16	4.05	2

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	18.8	18.8	9.6	32.0	0.00	0.0	1
2	18.8	18.8	24.0	38.0	0.00	0.0	1
3	23.6	23.6	47879.9	45.0	0.00	0.0	1

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (m)	X-Right (m)	Intensity (kPa)	Deflection (deg)
1	26.70	42.50	11.5	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Searching Routine Will Be Limited To An Area Defined By 1 Boundaries
Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)
1	0.00	0.00	0.00	0.00

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
40 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 10.75(m)
and X = 20.00(m)
Each Surface Terminates Between X = 26.70(m)
and X = 42.50(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
2.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -15.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.00	15.37
2	21.94	14.88
3	23.94	14.83
4	25.90	15.22
5	27.73	16.04
6	29.33	17.23
7	30.63	18.75
8	31.57	20.52
9	31.99	22.10

Circle Center At X = 23.2 ; Y = 23.8 and Radius, 9.0
*** 2.026 ***
Individual data on the 19 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.8	28.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2.0	79.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.5	80.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.5	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.4	22.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.4	47.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13	1.0	122.8	0.0	0.0	0.0	0.0	0.0	0.0	11.7
14	0.4	47.9	0.0	0.0	0.0	0.0	0.0	0.0	4.9
15	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
16	1.2	117.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5
17	1.3	100.6	0.0	0.0	0.0	0.0	0.0	0.0	15.0
18	0.9	43.4	0.0	0.0	0.0	0.0	0.0	0.0	10.7
19	0.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0	4.9

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.00	15.37
2	21.93	14.86
3	23.93	14.80
4	25.89	15.20
5	27.71	16.03
6	29.30	17.25
7	30.57	18.79
8	31.46	20.58

9	31.81	22.10

Circle Center At X = 23.2 ; Y = 23.6 and Radius, 8.8

*** 2.033 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.76	10.15
3	15.72	10.55
4	17.65	11.06
5	19.55	11.70
6	21.40	12.45
7	23.20	13.32
8	24.95	14.29
9	26.63	15.38
10	28.24	16.56
11	29.78	17.85
12	31.23	19.22
13	32.59	20.69
14	33.75	22.10

Circle Center At X = 8.4 ; Y = 41.8 and Radius, 32.1

*** 2.061 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.78	9.81
3	15.77	9.93
4	17.75	10.22
5	19.70	10.69
6	21.59	11.33
7	23.42	12.13
8	25.17	13.10
9	26.83	14.22
10	28.38	15.49
11	29.81	16.89
12	31.11	18.41
13	32.27	20.04
14	33.27	21.76
15	33.43	22.10

Circle Center At X = 13.5 ; Y = 32.1 and Radius, 22.3

*** 2.071 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	12.81	10.57
2	14.80	10.73
3	16.78	11.02
4	18.73	11.44
5	20.66	11.98
6	22.55	12.64
7	24.39	13.42
8	26.18	14.32
9	27.90	15.33
10	29.56	16.45
11	31.14	17.67
12	32.65	18.99
13	34.06	20.40
14	35.38	21.90
15	35.54	22.10

Circle Center At X = 11.2 ; Y = 41.8 and Radius, 31.3

*** 2.080 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	12.81	10.57

2	14.79	10.83
3	16.75	11.21
4	18.69	11.71
5	20.59	12.32
6	22.45	13.06
7	24.27	13.90
8	26.02	14.85
9	27.72	15.91
10	29.35	17.07
11	30.90	18.33
12	32.38	19.68
13	33.77	21.12
14	34.61	22.10

Circle Center At X = 9.6 ; Y = 43.1 and Radius, 32.7

*** 2.082 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	17.94	14.00
2	19.94	14.00
3	21.93	14.24
4	23.87	14.71
5	25.75	15.41
6	27.53	16.32
7	29.19	17.43
8	30.71	18.73
9	32.07	20.19
10	33.25	21.81
11	33.41	22.10

Circle Center At X = 18.9 ; Y = 31.0 and Radius, 17.1

*** 2.093 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.78	9.94
3	15.77	10.14
4	17.74	10.47
5	19.68	10.95
6	21.59	11.56
7	23.44	12.30
8	25.24	13.17
9	26.98	14.17
10	28.64	15.28
11	30.22	16.51
12	31.71	17.85
13	33.10	19.28
14	34.38	20.81
15	35.32	22.10

Circle Center At X = 12.0 ; Y = 38.4 and Radius, 28.5

*** 2.093 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.77	9.70
3	15.77	9.73
4	17.75	9.98
5	19.70	10.44
6	21.59	11.10
7	23.40	11.95
8	25.10	13.00
9	26.69	14.22
10	28.13	15.60
11	29.42	17.13
12	30.55	18.78

13	31.49	20.55
14	32.11	22.10

Circle Center At X = 14.5 ; Y = 28.4 and Radius, 18.8
*** 2.111 ***

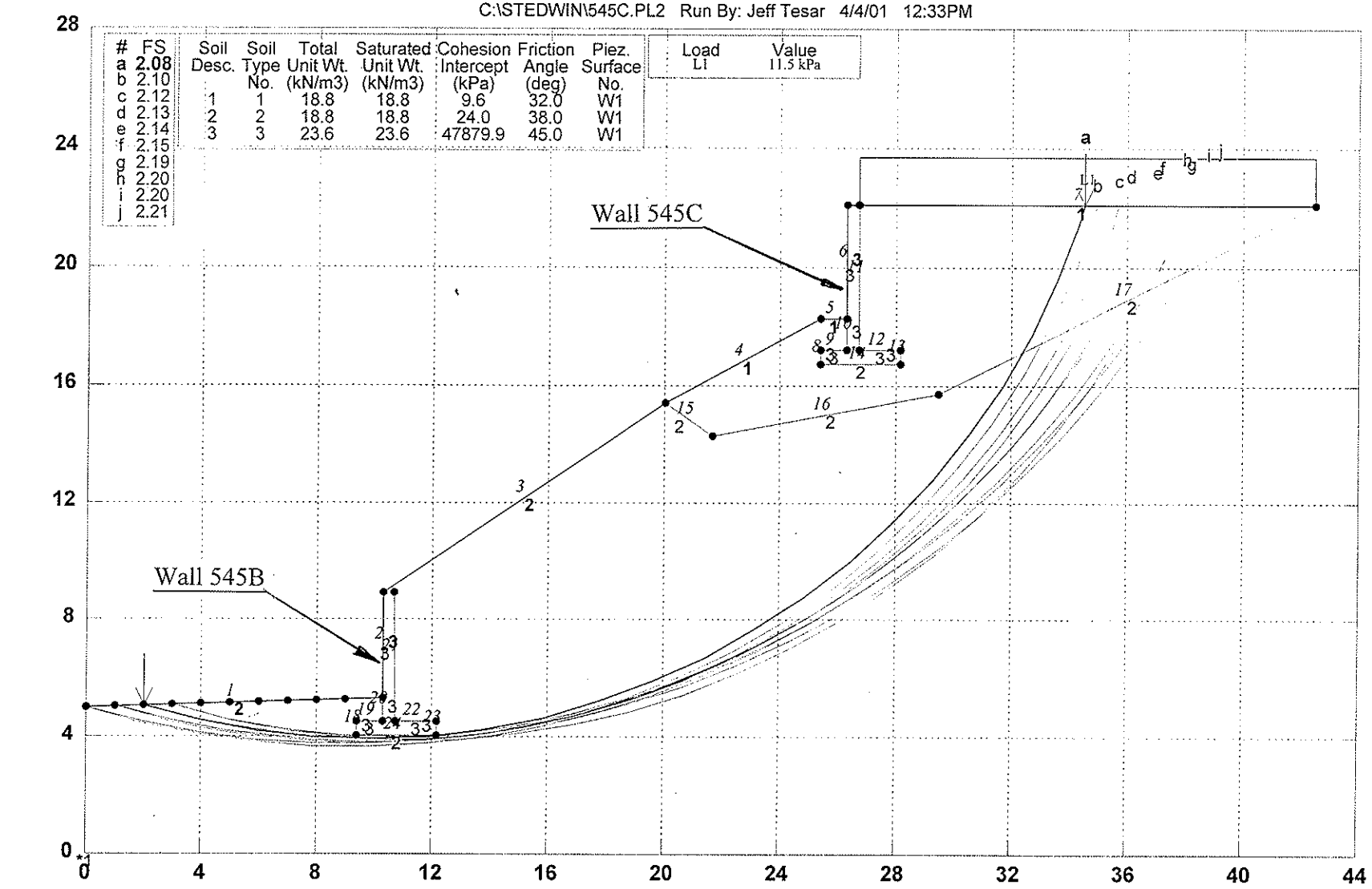
Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	11.78	9.88
2	13.77	9.71
3	15.77	9.74
4	17.76	9.97
5	19.71	10.38
6	21.62	10.99
7	23.46	11.78
8	25.21	12.74
9	26.86	13.87
10	28.39	15.16
11	29.79	16.59
12	31.05	18.14
13	32.14	19.82
14	33.07	21.59
15	33.28	22.10

Circle Center At X = 14.5 ; Y = 30.2 and Radius, 20.5
*** 2.113 ***

Interstates 5&805, Retaining Walls, Walls 545B and 545C

C:\STEDWIN\545C.PL2 Run By: Jeff Tesar 4/4/01 12:33PM



GSTABL7 FSmin=2.08

Safety Factors Are Calculated By The Modified Bishop Method

STED

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **
** Version 1.0, January 1996; Version 1.16, May 2000 **
--Slope Stability Analysis--
Simplified Janbu, Modified Bishop
or Spencer`s Method of Slices
(Based on STABL6-1986, by Purdue University)

Run Date: 4/4/01
Time of Run: 12:33PM
Run By: Jeff Tesar
Input Data Filename: C:545C.PRP
Output Filename: C:545C.OUT
Unit System: SI
Plotted Output Filename: C:545C.PLT
PROBLEM DESCRIPTION Interstates 5&805, Retaining Walls, Walls 545B and 545C

BOUNDARY COORDINATES
7 Top Boundaries
24 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	5.00	10.30	5.30	2
2	10.30	5.30	10.31	8.90	3
3	10.31	8.90	20.05	15.40	2
4	20.05	15.40	25.40	18.30	1
5	25.40	18.30	26.30	18.30	1
6	26.30	18.30	26.32	22.10	3
7	26.32	22.10	42.50	22.10	1
8	25.40	16.75	25.41	17.20	3
9	25.41	17.20	26.29	17.20	3
10	26.29	17.20	26.30	18.30	3
11	26.70	22.10	26.71	17.20	3
12	26.71	17.20	28.15	17.20	3
13	28.15	17.20	28.16	16.75	3
14	25.40	16.75	28.16	16.75	2
15	20.05	15.40	21.70	14.30	2
16	21.70	14.30	29.50	15.75	2
17	29.50	15.75	42.50	22.10	2
18	9.40	4.04	9.41	4.50	3
19	9.41	4.50	10.29	4.50	3
20	10.29	4.50	10.30	5.30	3
21	10.70	8.90	10.71	4.50	3
22	10.71	4.50	12.15	4.50	3
23	12.15	4.50	12.16	4.05	3
24	9.40	4.05	12.16	4.05	2

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	18.8	18.8	9.6	32.0	0.00	0.0	1
2	18.8	18.8	24.0	38.0	0.00	0.0	1
3	23.6	23.6	47879.9	45.0	0.00	0.0	1

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (m)	X-Right (m)	Intensity (kPa)	Deflection (deg)
1	26.70	42.50	11.5	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Searching Routine Will Be Limited To An Area Defined By 1 Boundaries
Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)
1	0.00	0.00	0.00	0.00

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
40 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00(m)
and X = 9.00(m)
Each Surface Terminates Between X = 26.70(m)
and X = 42.50(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
2.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -15.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	2.00	5.06
2	3.93	4.54
3	5.90	4.18
4	7.89	3.97
5	9.89	3.91
6	11.89	4.00
7	13.87	4.24
8	15.83	4.64
9	17.75	5.19
10	19.63	5.88
11	21.45	6.71
12	23.20	7.68
13	24.87	8.78
14	26.45	10.00
15	27.93	11.35
16	29.31	12.80
17	30.57	14.35
18	31.70	16.00
19	32.71	17.72
20	33.59	19.52
21	34.32	21.39
22	34.54	22.10

Circle Center At X = 9.7 ; Y = 30.0 and Radius, 26.1
*** 2.083 ***
Individual data on the 43 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	1.9	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.0	42.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.5	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.5	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.4	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.4	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	1.2	126.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.3	30.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	1.7	211.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.0	276.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.9	301.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

18	1.9	317.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.4	73.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	1.4	247.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.3	44.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	1.5	266.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	1.7	293.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.5	91.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.9	147.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.1	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.3	56.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1
32	1.2	263.0	0.0	0.0	0.0	0.0	0.0	0.0	14.1
33	0.2	44.2	0.0	0.0	0.0	0.0	0.0	0.0	2.5
34	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
35	1.1	214.2	0.0	0.0	0.0	0.0	0.0	0.0	13.2
36	0.2	33.4	0.0	0.0	0.0	0.0	0.0	0.0	2.2
37	1.1	169.1	0.0	0.0	0.0	0.0	0.0	0.0	12.3
38	1.1	148.5	0.0	0.0	0.0	0.0	0.0	0.0	13.1
39	0.7	70.5	0.0	0.0	0.0	0.0	0.0	0.0	7.8
40	0.3	29.1	0.0	0.0	0.0	0.0	0.0	0.0	3.8
41	0.9	57.2	0.0	0.0	0.0	0.0	0.0	0.0	10.0
42	0.7	22.7	0.0	0.0	0.0	0.0	0.0	0.0	8.4
43	0.2	1.5	0.0	0.0	0.0	0.0	0.0	0.0	2.5

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.93	4.58
3	6.90	4.22
4	8.89	4.02
5	10.89	3.97
6	12.89	4.08
7	14.87	4.34
8	16.83	4.76
9	18.74	5.33
10	20.61	6.05
11	22.42	6.91
12	24.15	7.91
13	25.80	9.04
14	27.35	10.30
15	28.81	11.67
16	30.15	13.16
17	31.37	14.74
18	32.46	16.41
19	33.42	18.17
20	34.24	19.99
21	34.92	21.88
22	34.98	22.10

Circle Center At X = 10.5 ; Y = 29.6 and Radius, 25.6

*** 2.098 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.94	4.58
3	6.90	4.23
4	8.89	4.02
5	10.89	3.96
6	12.89	4.06
7	14.87	4.30
8	16.84	4.70
9	18.76	5.24
10	20.64	5.93

11	22.46	6.75
12	24.21	7.72
13	25.89	8.81
14	27.48	10.02
15	28.97	11.35
16	30.36	12.79
17	31.63	14.34
18	32.79	15.97
19	33.82	17.68
20	34.71	19.47
21	35.47	21.32
22	35.72	22.10

Circle Center At X = 10.6 ; Y = 30.4 and Radius, 26.4

*** 2.116 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.94	4.59
3	6.91	4.24
4	8.90	4.03
5	10.89	3.97
6	12.89	4.06
7	14.88	4.30
8	16.84	4.68
9	18.77	5.21
10	20.65	5.88
11	22.48	6.69
12	24.25	7.63
13	25.94	8.70
14	27.54	9.89
15	29.06	11.20
16	30.47	12.62
17	31.77	14.13
18	32.96	15.74
19	34.03	17.43
20	34.96	19.20
21	35.77	21.03
22	36.14	22.10

Circle Center At X = 10.7 ; Y = 30.9 and Radius, 26.9

*** 2.125 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	2.00	5.06
2	3.94	4.58
3	5.91	4.23
4	7.90	4.01
5	9.90	3.94
6	11.90	4.00
7	13.89	4.20
8	15.86	4.53
9	17.80	5.00
10	19.71	5.60
11	21.58	6.32
12	23.38	7.18
13	25.13	8.15
14	26.80	9.25
15	28.40	10.45
16	29.91	11.76
17	31.33	13.17
18	32.65	14.68
19	33.86	16.27
20	34.96	17.94
21	35.94	19.68
22	36.80	21.49

23	37.04	22.10

Circle Center At X = 10.0 ; Y = 33.2 and Radius, 29.2

*** 2.139 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	1.00	5.03
2	2.94	4.52
3	4.90	4.15
4	6.89	3.90
5	8.88	3.79
6	10.88	3.82
7	12.88	3.97
8	14.86	4.26
9	16.81	4.68
10	18.73	5.23
11	20.62	5.90
12	22.45	6.70
13	24.23	7.62
14	25.94	8.66
15	27.58	9.80
16	29.13	11.06
17	30.60	12.41
18	31.98	13.86
19	33.26	15.40
20	34.43	17.02
21	35.50	18.72
22	36.44	20.48
23	37.18	22.10

Circle Center At X = 9.5 ; Y = 33.8 and Radius, 30.0

*** 2.152 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	0.00	5.00
2	1.93	4.49
3	3.90	4.10
4	5.88	3.83
5	7.87	3.69
6	9.87	3.67
7	11.87	3.77
8	13.86	4.00
9	15.82	4.36
10	17.77	4.83
11	19.68	5.43
12	21.55	6.14
13	23.37	6.97
14	25.13	7.91
15	26.84	8.95
16	28.47	10.11
17	30.03	11.36
18	31.51	12.70
19	32.90	14.14
20	34.20	15.66
21	35.40	17.26
22	36.51	18.93
23	37.50	20.66
24	38.21	22.10

Circle Center At X = 9.2 ; Y = 35.7 and Radius, 32.1

*** 2.192 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	3.00	5.09
2	4.93	4.58
3	6.90	4.20

4	8.88	3.96
5	10.88	3.86
6	12.88	3.90
7	14.87	4.08
8	16.85	4.40
9	18.80	4.85
10	20.71	5.44
11	22.57	6.16
12	24.38	7.01
13	26.13	7.98
14	27.81	9.07
15	29.41	10.28
16	30.91	11.59
17	32.33	13.01
18	33.64	14.51
19	34.84	16.11
20	35.93	17.79
21	36.90	19.54
22	37.75	21.35
23	38.04	22.10

Circle Center At X = 11.3 ; Y = 32.6 and Radius, 28.7

*** 2.197 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	0.00	5.00
2	1.94	4.52
3	3.91	4.15
4	5.89	3.90
5	7.89	3.77
6	9.89	3.76
7	11.88	3.87
8	13.87	4.11
9	15.84	4.46
10	17.78	4.93
11	19.70	5.51
12	21.57	6.21
13	23.40	7.02
14	25.18	7.93
15	26.90	8.96
16	28.55	10.08
17	30.13	11.30
18	31.64	12.62
19	33.07	14.02
20	34.40	15.51
21	35.65	17.07
22	36.80	18.71
23	37.85	20.41
24	38.76	22.10

Circle Center At X = 9.0 ; Y = 37.0 and Radius, 33.3

*** 2.201 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	1.00	5.03
2	2.94	4.55
3	4.91	4.20
4	6.90	3.96
5	8.89	3.85
6	10.89	3.86
7	12.89	3.98
8	14.87	4.23
9	16.84	4.61
10	18.78	5.10
11	20.68	5.70
12	22.55	6.42

13	24.37	7.26
14	26.13	8.20
15	27.83	9.25
16	29.47	10.40
17	31.03	11.65
18	32.52	12.99
19	33.92	14.42
20	35.23	15.93
21	36.44	17.52
22	37.56	19.18
23	38.57	20.90
24	39.18	22.10

Circle Center At X = 9.8 ; Y = 36.6 and Radius, 32.8

*** 2.212 ***

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design
MS 35

Date: March 23, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U4

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICE CENTER –
Division of Structural Foundations

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Walls 543A, 543B, and 4.

General

This memorandum supercedes our letter titled *"Interstates 5 and 805 Interchange, Proposed Retaining Walls 543 and 4"*, dated January 8, 2001. In that letter, we provided you with the foundation recommendations for two high retaining walls 543 and 4 that required a special design. Subsequent to our letter, we had a project meeting with you, which resulted in a decision to change the proposed fill slope configuration and retain it, instead of a high wall 543, with two relatively short walls: 543A and 543B. At your request, we are providing revised foundation recommendations for the proposed retaining Walls 543A, 543B, and 4.

Retaining Walls 543A and 543B

Site Considerations

For the location of the proposed Retaining Walls 543A and 543B, (Table 1) reference is directed to Figure 2-543. Wall 543B will be about 317 m long and 4.20 m in maximum height. Wall 534A will be about 223.4 m long and 4.31 m in maximum height. Both are proposed to be Type1 standard retaining walls. From Station 544+02.1 to 540+85, Wall 543B will parallel southward the west-facing embankment slope of southbound I-5. From Station 544+03 to 541+96 "SD" Line, Wall 543A will parallel southward the aforementioned embankment slope. From Station 544+03 "SD" Line through Station 12+23.4 CMR Line, Wall 543A will run eastward, parallel to Carmel Mountain Road. Along the entire interval, the existing embankment fill slope is about 26.0 m in maximum height, and inclined at 1:2 (V:H) (see Attachment 2, Photos 13 and 14). The alignment of the Wall 543B footing lies at about two-thirds of the height of the existing slope. The alignment of Wall 543A footing lies at about half-height of the slope.

It is our understanding that the existing embankment is to be widened to accommodate additional lanes. The widening will involve placement of fill on the existing embankment slope and retaining it with the proposed Walls 543A and 543B. The footings of the new walls are to be embedded in newly compacted fill materials. Between the walls, a new fill slope is planned, and it will descend at an inclination of 1:2 (V:H) westward from the bottom of the Wall 543B. Two CMP culverts cross laterally under the freeway along the walls alignment: at Stations 543+83 and 540+84.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation was conducted in 1999 (Borings 543-B1 and 543-B2) and 1996 (Borings 543-896-6, 543-896-7, 543-896-8, and 543-996-10). They revealed that the subject section of the road embankment consists of a top layer of fill materials that is underlain by native soils of the Bay Point Formation. This section of southbound I-5 was constructed during side cut-and-fill grading of the west-facing slope. Fill materials underlie the alignments of the proposed Walls 543A and 543B. The fill consists of sand, locally clayey, with gravel and chunks of siltstone. Its relative density, based on SPT blow counts was estimated to be medium dense to dense. Fill materials are underlain by native soils of the Bay Point Formation. They comprise of dense to very dense sands. Their geotechnical engineering strength parameters are presented in Table 2. The thickness of the fill layer along the wall alignment is variable. At Station 543+80, based on Borings 543-B1 and 543-B996-10, the fill and bedrock interface is estimated to be at about elevation 20.6 m. At Station 543+20, based on Borings 543-B2 and 543-896-6, it is estimated to be at about elevation 15.8 m, and at Station 542+70, based on Borings 543-B2 and 543-896-7, at about elevation 13.4 m.

For boring locations, reference is directed to Figure 2-543. It should be noted that the actual locations of the proposed Walls 543A and 543B alignments were not accessible to conventional subsurface exploration equipment with the exception of Boring 543-896-10. Our borings were drilled as close as possible to both wall alignments: at the crest of the embankment slope and at its toe. Therefore, the subsurface soil conditions presented above were interpolated, based on the referenced borings. Variations from our estimated soil conditions could exist at the alignment of both walls. In particular, the depth to the Bay Point Formation could vary significantly along the actual alignment of the wall. For example, at about Station 542+20, we expect it to be deeper. Seepage was encountered in Borings 543-B1 and 543-B2. It was detected along the fill and native soils interface: in Boring 543-B1 at an elevation of 26.8 m, and in Boring 543-B2 at elevation of 28.8 m.

Foundation Recommendations

We recommend that along the entire length of the alignment of both walls, from the toe to the crest of the slope, the top 1.2 m layer of fill materials be removed and replaced with structural backfill. This structural backfill should be benched into the existing slope in

accordance with Caltrans Standard Specifications and compacted to 95% Relative Compaction in accordance with CTM 216. In addition, new foundation fill and wall backfill should be compacted in accordance with the Standard Specifications to 95 % Relative Compaction. The Structural Backfill material, when compacted to 95 % of Relative Compaction should yield strength parameters no less than those shown for fill in the attached Table 2.

Based on cross sections and layouts of the proposed walls supplied by your office, and the assumption that the upper 1.2 m of the slope face will be replaced with structural backfill prior to construction of the walls, the Standard Plan Design may be used for Walls 543A and 543B. Slope stability analysis using the STEDwin computer application was performed on the cross section of the proposed embankment that includes both walls that was provided by your office. It was performed to determine the stability of the new fill slope. For the analysis, we utilized the soil strength parameters presented in Table 2. The calculated Modified Bishop Safety Factor for the proposed new embankment slope is 1.7, which is considered to be acceptable. The slope stability computer output data are presented in Attachment 2.

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani
Associate Materials and Research Engineer

Office of Geotechnical Design - South (ORGES) -- MS#63

ATTACHMENTS

1. Table 2
2. Walls 543A and 543B: Slope Stability Analysis
3. Photos 13 and 14

JT

cc:

GPearce
JEgan
OGDS.02

Jeff J Tesar
03/23/2001 07:39 AM

To: Arturo Jacobo/D11/Caltrans/CAGov@DOT
cc:
Subject: Re: WALL 470 and 543

---------- Forwarded by Jeff J Tesar/HQ/Caltrans/CAGov on 03/23/2001 07:38 AM ----------

Jeff J Tesar
03/22/2001 07:54 AM

To: Arturo Jacobo/D11/Caltrans/CAGov@DOT
cc: Zia Yazdani/HQ/Caltrans/CAGov@DOT, Joseph Egan/HQ/Caltrans/CAGov@DOT, Majid Kharrati/D11/Caltrans/CAGov@DOT
Subject: Re: WALL 470

Arturo,
Thanks for confirming that you have received our recommendations regarding walls 466, 527, and 470. As for Wall 470, Table 1 and Figure 2-470 will be attached to our final Geotechnical Report. At this stage they are insignificant, for Table 1 will show the list of all walls (with their limit stations and heights) and Figure 2-470 is a site plan/layout, as provided by you, with all our boring locations on it . Yes, Cross Section A-A' is very important, for the CIDH piles design and I am faxing it to you immediately.
Please let me know if you need any further information. At this point we feel that our work has been completed on this wall and that we have provided the information required for the actual CIDH foundation design work to be performed by Structures.
The foundation recommendations for **Wall 543 (yes, the new slope/walls configuration will work, and you can start designig it**), 545B, and 565 will be submitted to you on or before the due date (March 26, 2001). In addition, we will recommend that for all the remaining walls, the Standard Plan spreadfooting foundation design is appropriate.

Jeff J Tesar
03/22/2001 07:54 AM

To: Arturo Jacobo/D11/Caltrans/CAGov@DOT
cc: Zia Yazdani/HQ/Caltrans/CAGov@DOT, Joseph Egan/HQ/Caltrans/CAGov@DOT, Majid Kharrati/D11/Caltrans/CAGov@DOT
Subject: Re: WALL 470

Arturo,
Thanks for confirming that you have received our recommendations regarding walls 466, 527, and 470. As for Wall 470, Table 1 and Figure 2-470 will be attached to our final Geotechnical Report. At this stage they are insignificant, for Table 1 will show the list of all walls (with their limit stations and heights) and Figure 2-470 is a site plan/layout, as provided by you, with all our boring locations on it . Yes, Cross Section A-A' is very important, for the CIDH piles design and I am faxing it to you immediately.
Please let me know if you need any further information. At this point we feel that our work has been completed on this wall and that we have provided the information required for the actual CIDH foundation design work to be performed by Structures.
The foundation recommendations for Wall 543 (yes, the new slope/walls configuration will work), 545B, and 565 will be submitted to you on or before the due date (March 26, 2001). In addition, we will recommend that for all the remaining walls, the Standard Plan spreadfooting foundation design is appropriate.

CALIFORNIA DEPARTMENT OF TRANSPORTATION

FACSIMILIE TRANSMITTAL MEMO

To Arturo Jacobo

Pages (including cover): 3

Dept: 619-688-2587

Date: 3/22/01

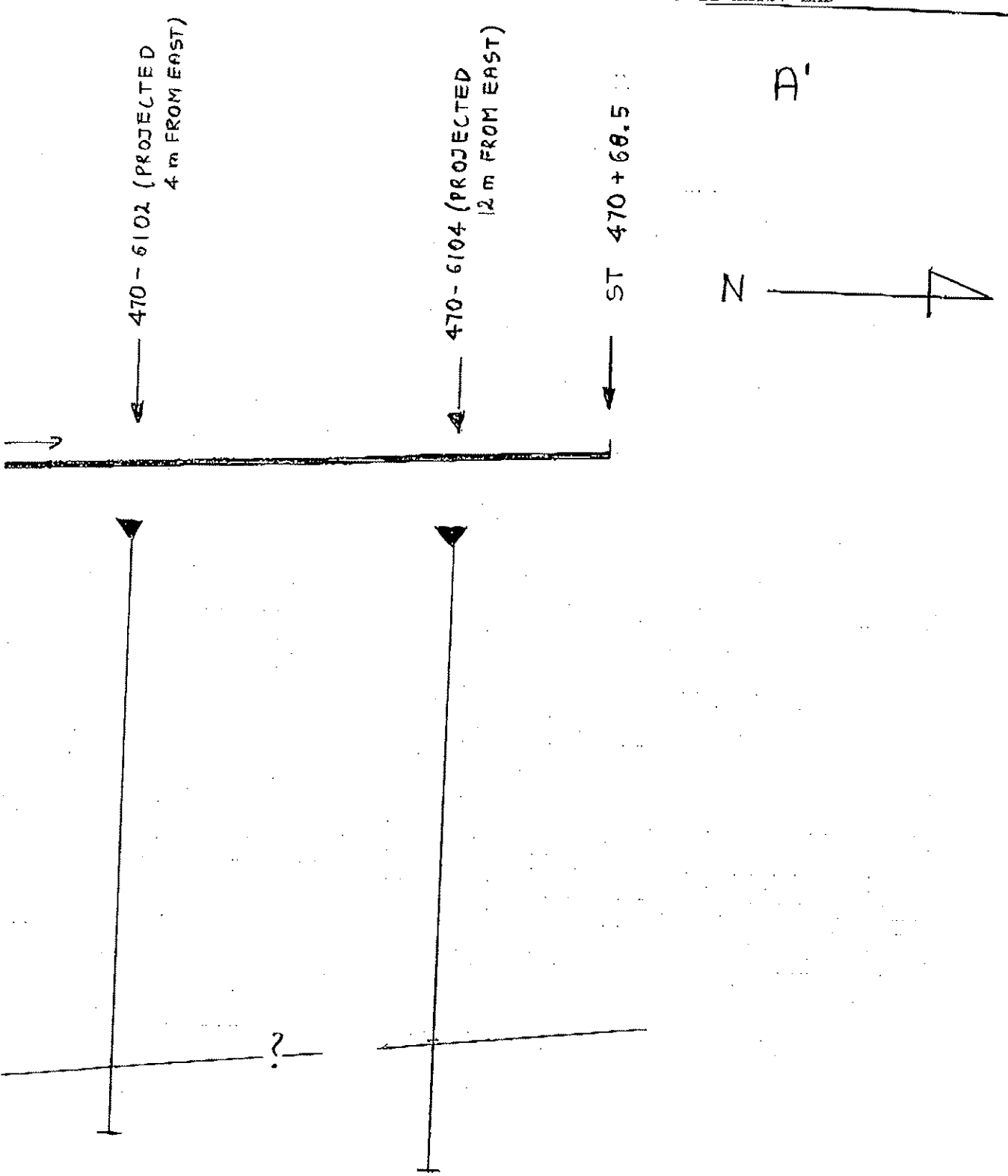
From: Jeff Tesar

CAL TRANS MATERIALS LAB - DISTRICT 11
7177 Opportunity Road
San Diego, CA 92111
(M.S.63)
FAX NO. (858) 467-4063 (*CALNET PREFIX: 734*)
TEL NO. (858) 467-2716

MESSAGE:

Signed: _____

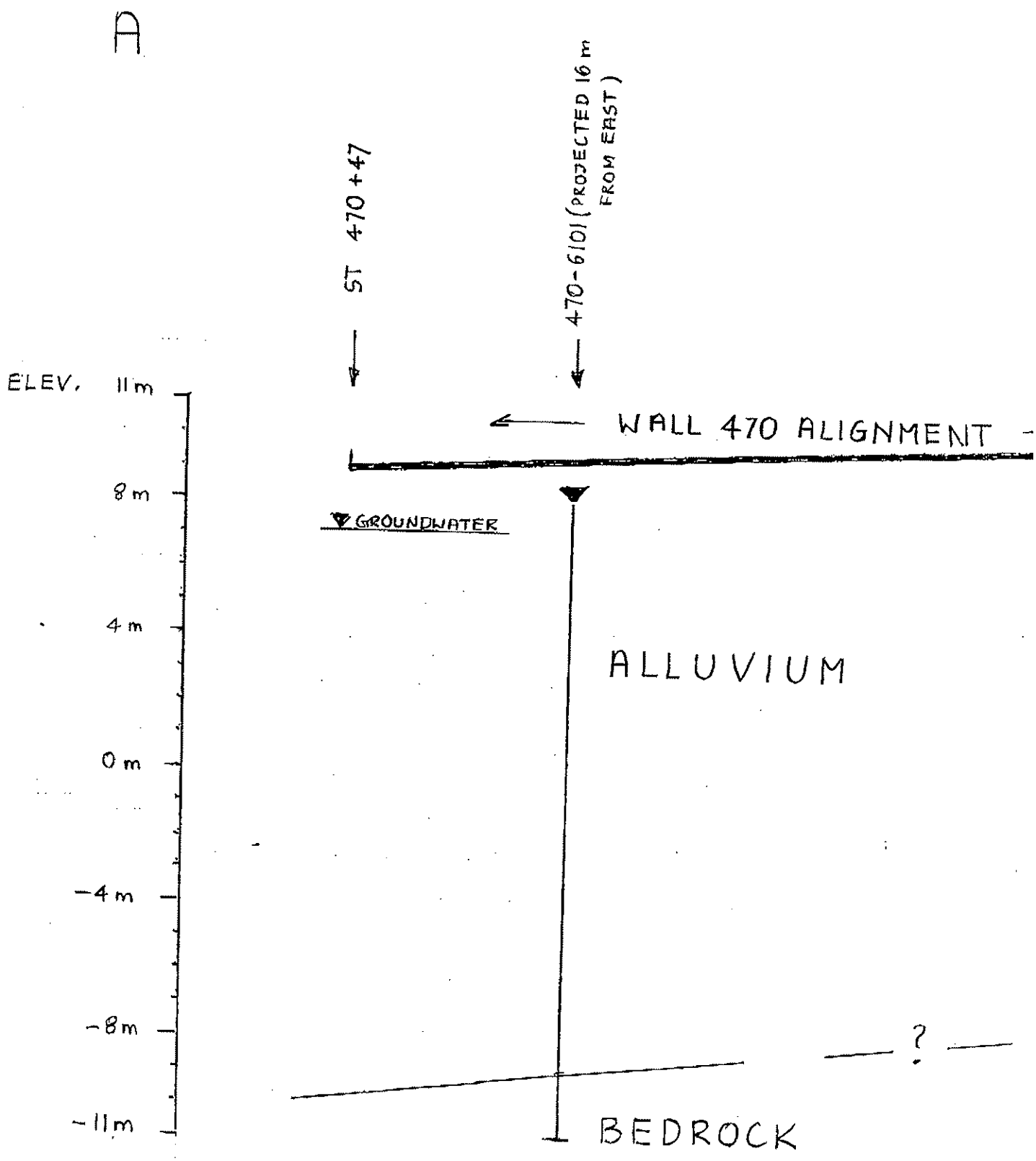
Confirming Request: Yes_____ No_____



A'

FIGURE 5

EA 030101 (J.T.)



WALL 470; SECTION A-

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design 5
MS 35

Date: March 14, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICE CENTER
Division of Structural Foundations

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Wall 470 and improvements.

General

This memorandum supercedes our letter titled *"Interstates 5 and 805 Interchange, Proposed Retaining Wall 470 and other Improvements"*, dated February 14, 2001. In that letter, we stated our concerns regarding the recent change in the location of the proposed wall alignment, and raised questions regarding the implementation of the surcharge recommendations made by the private developer's geotechnical consultant. Subsequent to our letter, we had a project meeting with you which resulted in a decision to support Wall 470 on a Standard Pile Foundation. At your request, we are providing revised foundation recommendations for the proposed Retaining Wall 470.

Wall 470

Site Considerations

For the location of the proposed Retaining Wall 470, (Table 1) reference is directed to Figure 2-470. Wall 470 will be about 121.5 m long and 9.73 m in maximum height. It is proposed to be a Type1 standard retaining wall supported on a pile foundation. From Station 470+47 to 471+68.5, it will parallel to the north the base of the east-facing fill embankment of the northbound I-5. This interval represents a departure embankment from the Los Penasquitos Creek Bridge. The maximum height of the embankment (fill), of about 13.5 m is at the bridge abutment. The east-facing embankment slope descends at an general inclination of 1:2 vertical to horizontal (V:H) (Attachment 2, Photo 6). It is our understanding that the subject departure embankment is to be widened to accommodate additional lanes. The widening will involve

placing of fill on the existing embankment slope and retaining it with the proposed Wall 470.

In addition, Wall 470 alignment will be located on the western perimeter of Vista Sorrento Parkway that is a part of the Torrey Reserve Heights development. Following an agreement between Caltrans and the private developer, an island of stone columns was placed at the base of the embankment slope towards the east. This measure, along with a surcharge program to be implemented by the developer, was to mitigate liquefaction and preclude excessive settlements of Wall 470 and the road improvements planned by the developer. Originally, Wall 470 was to be supported on a spread footing embedded in well-compacted fill placed over the island of stone columns. While the wall will still be located west of the proposed Vista Sorrento Parkway, its location has been moved to the west such that it will no longer be within the footprint of the stone column grid. This change has made it necessary to support the wall on a pile foundation.

Subsurface Soil Conditions

Our recent surface mapping and subsurface investigations conducted in 1996 (Borings 470-6101, 470-6102, 470-6103, and 470-6104) revealed that the existing embankment consists of fill materials that are underlain by native alluvial soils of Soledad Valley. It is estimated that along the proposed wall alignment the fill and alluvium interface is at an elevation of about 9.0 m. We did not explore the fill materials. Our surface mapping and a review of pertinent archived data, however, suggest that the embankment was built using predominantly granular materials from cuts in the nearby native formations. The alluvium consists of sand, silty and clayey sand, sandy silt, and silty and sandy clay. Based on SPT blow counts, the relative density of granular soils was determined to range from loose to medium dense. The relative consistency of cohesive soils was found to range from firm to stiff. Based on SPT blow counts, the alluvium is underlain by very dense gravels and cobbles within a sandy matrix that, in turn, are underlain by the sedimentary Ardath Shale Formation. Both, the dense gravels and Ardath Shale geologic unit are, from the geotechnical standpoint, considered to be competent bedrock. The alluvium and bedrock interface, based on logs of borings, slopes gently south along the Wall 470 alignment. At the location of Boring 470-6104 (Station 471+54.5), it was logged at an elevation of about –6.0 m. At the location of Boring 470-6102 (Station 471+27), it was logged at an elevation of about –7.2 m. At the location of Boring 470-6101 (Station 470+70), it was logged at an elevation of about -9.0 m. Groundwater was encountered at an elevation of 7.2 m.

Foundation Recommendations

The proposed retaining wall should be supported on a CIDH pile foundation extending into competent bedrock. Approximate elevations of the bedrock are shown on Figure 5, Wall 470 Cross Section A—A'. The Standard Plan pile design may be used for this wall.

Construction considerations for installation of the CIDH piles include the presence of

shallow groundwater and the possibility of caving loose soils. Casing may be required during installation of the piles. Additionally, due to the proximity of the island of stone columns to the wall, it is possible that some drilling difficulties may be encountered in gravel backfill.

The retaining wall foundation will be subjected to negligible settlements as a result of it being supported on competent bedrock. The embankment behind the wall will, however, be subjected to large settlements (200 mm to 300 mm). Therefore, it is imperative that after construction of the embankment, a waiting period of 6 to 9 months be incorporated into the plans and specifications to allow for the settlements to occur prior to construction of the pavement section, drainage facilities and any other improvements.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

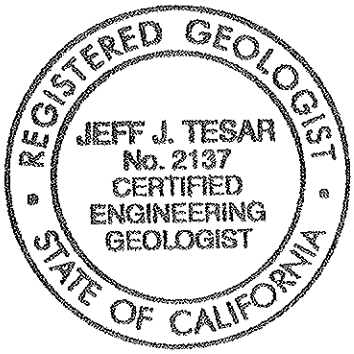
J. Tesar.

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
Associate Materials and Research Engineer

Office of Geotechnical Design - South -- MS#63



Attachments:

1. Wall 470; Cross Section A—A'
2. Photos

cc:
GPearce
JEgan
RGES 02

JT

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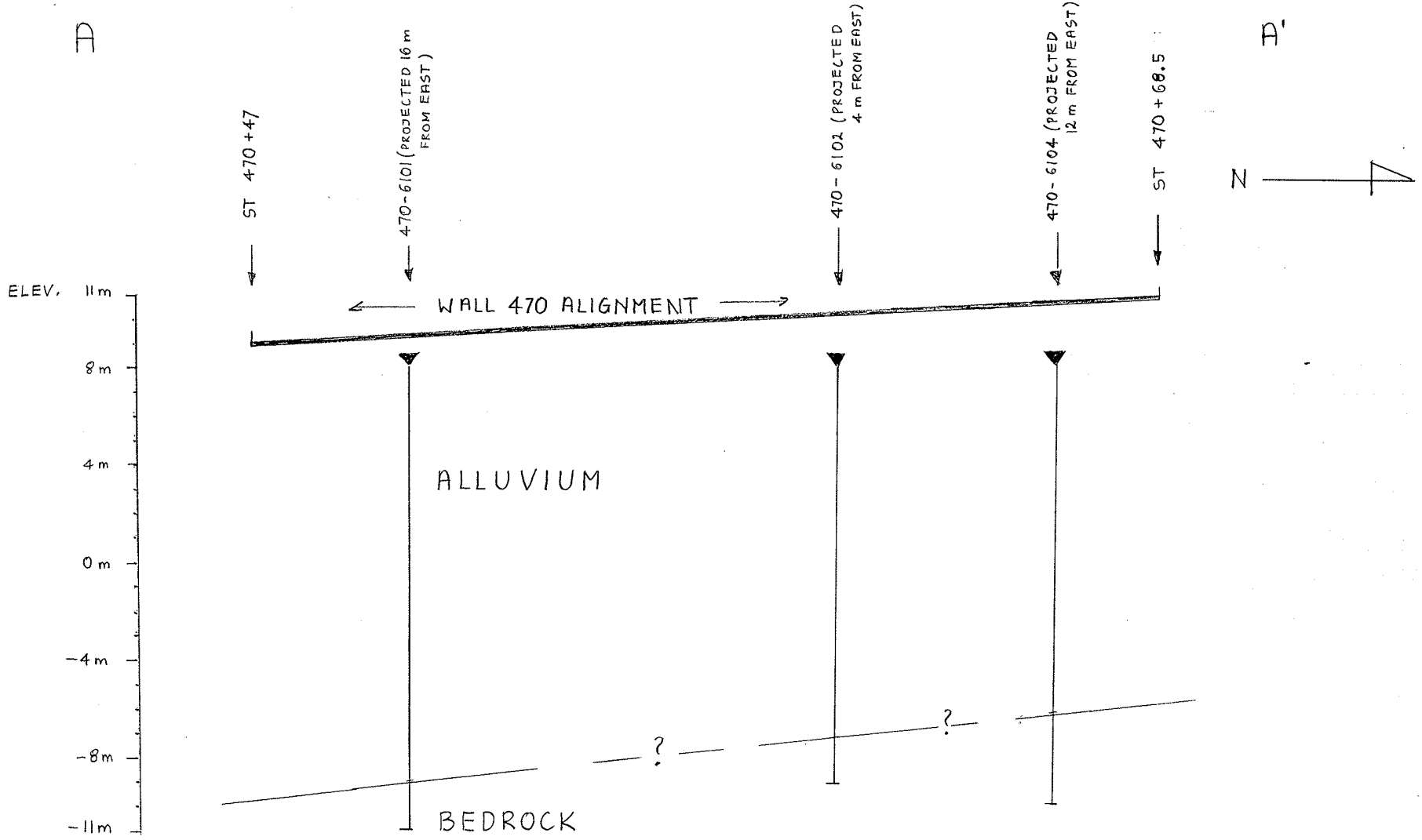
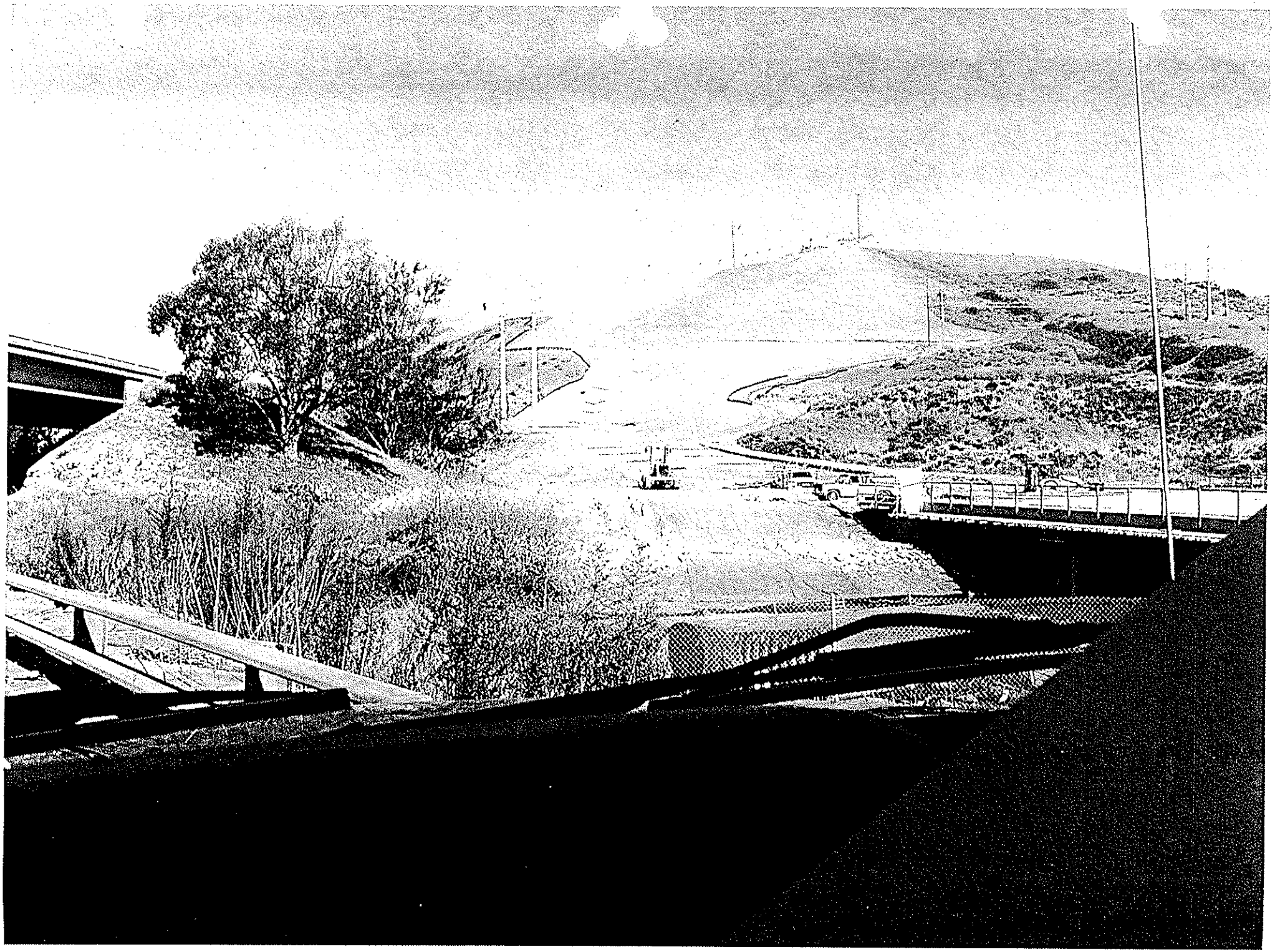


WALL 470; SECTION A-A'

FIGURE 5

EA 030101 (J.T.)



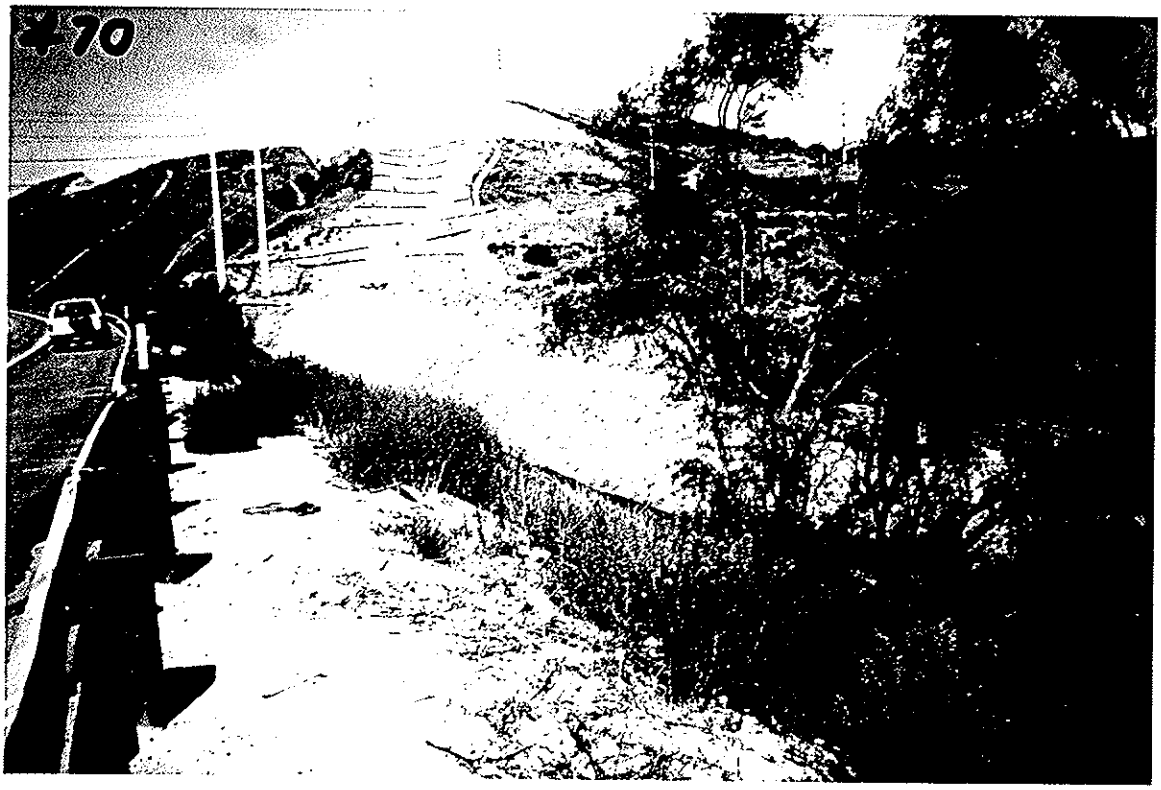


Photo 6: Wall 470 Location; looking north from about Station 470+50

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Majid Kharrati
Attention: Arturo Jacobo
Office of Design 5
MS 35

Date: March 13, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICE CENTER
Division of Structural Foundations

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Walls 466 and 527.

General

At your request, we are providing our foundation recommendations for the proposed Retaining Walls 466 and 527. These walls are a part of the retaining wall project that comprises several retaining structures. The foundation investigation report for these walls is currently under preparation. Since Walls 466 and 527 will require a surcharge program to be implemented prior to the construction of the structures, we are submitting this report (a section of the aforementioned report) to help expedite the project.

Wall 466

Site Considerations

For the location of the proposed Retaining Wall 466, (Table 1) reference is directed to Figure 2-466. Wall 466 will be about 55 m long and 3.05 m in maximum height. It is proposed to be a Type1 standard retaining wall. From Station 456+34 to 466+89, it will parallel to the northwest the northeastern shoulder of northbound I-805. This interval represents an approach embankment to the Sorrento Valley Boulevard undercrossing. The maximum height of the embankment (fill), of about 7.0 m is at the bridge abutment. The northeast-facing embankment slope descends at an general inclination of 1:3 (V:H) (Attachment 2, Photos 4 and 5). It is our understanding that the subject approach embankment is to be widened to accommodate additional lanes. The widening will involve placing of fill on the existing embankment slope and retaining it with the proposed Wall 466. The footing of the new wall is to be embedded in new fill materials. Two CMP culverts cross under the freeway at Stations 466+38 and 466+70.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation (Borings 466-B1 and 466-B2) revealed that the approach embankment consists of fill materials that are underlain by native alluvial soils. It is estimated that along the proposed wall alignment the fill and alluvial interface is at an elevation of about 11.0 m. We did not explore the fill materials. Our surface mapping and a review of pertinent archived data, however, suggest that the approach embankment was built using materials from cuts in the nearby native formations. The alluvium consists of silty and clayey sand, sand, and sandy clay. Based on SPT blow counts, the relative density of granular soils was determined to range from very loose to loose. The relative consistency of cohesive soils was found to range from very soft to stiff. In both borings, alluvium was encountered to the maximum depth of exploration. The lowest elevation (about –5.0 m) at which alluvial soils were encountered was at Boring 466-B2. Groundwater was encountered at an elevation of about 8.9 m. It should be noted that the proposed wall footing will be supported on fill materials that have not yet been placed. Fill materials should be selected such that the shear strength parameters of the compacted fill will conform to the strength parameters indicated in Table 2.

As indicated above, the underlying alluvial soils are partially comprised of silty and clayey sands. Some of these materials are of low relative density and are present below the groundwater table. During a seismic event these materials could potentially liquefy and cause damage to the wall. The risk level of liquefaction, however, is no greater than that for the existing freeway facilities and any improvements located outside the State Right of Way. Extreme liquefaction mitigation measures such as the use of vibro-compaction or selection of an alternate foundation system such as a deep pile foundation are probably unwarranted given the high costs associated with such measures. For example, if vibro-compaction were used to mitigate liquefaction, the costs associated with this technique would be on the order of about seven hundred thousand dollars. An additional consideration is the relatively low height of the wall (3.05 m maximum). In view of these factors, it is our recommendation that the wall be supported on spread footings bearing on well-compacted embankment fill.

Foundation Recommendations

The subject retaining wall site is underlain by fill over highly compressible sandy and clayey alluvial soils. These materials will be subjected to both elastic and time dependant settlements upon application of fill loads. If the wall were constructed before these time dependant settlements were allowed to occur, the wall could be potentially subjected to large total and differential settlements. Total settlements are estimated to be on the order of about 200 mm. Accordingly, we recommend that the embankment fills be placed and the alluvial soils and existing embankment fill be allowed to consolidate prior to the construction of the wall. The placement of fill should be conducted in accordance with the Standard Specifications and include benching into the existing fill slope. This recommendation is depicted in Figure 3,

Wall 466, Typical Surcharge Section. We estimate a time interval of 6 to 9 months for 90% consolidation to be completed. This time interval may be expedited by the use of wick drains. If wick drains are installed at 2 m spacing, the time interval could be reduced to about 60 days.

A settlement monitoring program should be implemented in order to determine whether settlements of the embankment have stabilized prior to wall construction. Settlement platforms should be monitored on a weekly basis after installation and discontinued after at least four consecutive readings indicate that settlements have stabilized.

Based on the cross sections of the proposed wall supplied by your office, and on the assumption that the embankment fills will be placed prior to wall construction as recommended above, the Standard Plan Retaining Wall design may be used for Wall 466. In addition, Caltrans Hydraulics should be contacted to determine whether our proposed surcharge recommendations and construction of the new embankment slope would affect the existing culverts.

Wall 527

Site Considerations

For the location of the proposed Retaining Wall 527, (Table 1) reference is directed to Figure 2-527. Wall 527 will be about 268.4 m long and 4.33 m in maximum height. It is proposed to be a Type1 standard retaining wall. From Station 529+60 to 526+91.6, it will parallel to the south the western shoulder of southbound I-5. This interval represents an approach embankment to the Los Penasquitos Creek Bridge. The maximum height of the embankment (fill), of about 9.0 m is at the bridge northern abutment. The west-facing embankment slope descends at an general inclination of 1:2 (V:H) (Attachment 2, Photos 11 and 12). It is our understanding that the subject approach embankment is to be widened to accommodate additional lanes. The widening will involve placing of fill on the existing embankment slope and alluvial soils to the west of the embankment toe and retaining the fills with the proposed Wall 527. The footing of the new wall is to be embedded in new fill materials. A RCP culvert crosses under the freeway at Station 529+10.

Subsurface Soil Conditions

Our surface mapping and subsurface investigations (Borings 527-B1 through 527-B3, drilled in 1999, and Borings 527-61015, 527-6109, and 527-6108 drilled in 1996) revealed that the approach embankment consists of fill materials that are underlain by native alluvial soils. The alluvial soils extend west and south from the base of the embankment and are underlain by the Bay Point Formation. The fill and alluvium interface was mapped at about Station 529+80 where it dips south at a low angle. In addition, at about the same station, the interface between the Bay Point Formation and alluvium was also mapped. This interface dips south at a low

angle as well. The fill and alluvium interface was estimated to be at an elevation of about 8.5 m. Fill consists of layers of siltstone, sandy and silty clay, sandy gravel, and sand. The relative density of its granular components, based on SPT blow counts was estimated to be medium dense. The relative consistency of the fill cohesive components, based on the same criterion, was estimated to be firm to hard. The alluvium consists of sandy and silty clay (locally organic), silt, and clayey and silty sand. Based on SPT blow counts, the relative consistency of its cohesive soils was found to range from firm to very stiff. The relative density of granular soils was determined to range from loose to medium dense. In Borings 527-6109 and 527-6108, alluvium was encountered to an elevation of about –11.0 m. Groundwater was encountered at an elevation of about 0.6 m. It should be noted that the proposed wall footing will be supported on fill materials that have not yet been placed. Fill materials (structural backfill) should be selected such that the shear strength parameters of the compacted fill will conform to the strength parameters indicated in Table 2.

As indicated above, the underlying alluvial soils are partially comprised of silty and clayey sands. Some of these materials are of low relative density and are present below the groundwater table. During a seismic event these materials could potentially liquefy and cause damage to the wall. The risk level of liquefaction, however, is no greater that that for the existing freeway facilities and any improvements located outside the State Right of Way. Extreme liquefaction mitigation measures such as the use of vibro-compaction or selection of an alternate foundation system such as a deep pile foundation are probably unwarranted given the high costs associated with such measures. For example, if vibro-compaction were used to mitigate liquefaction, the costs associated with this technique would be on the order of about one million dollars. An additional consideration is the relatively low height of the wall (4.33 m maximum). In view of these factors, it is our recommendation that the wall be supported on spread footings bearing on well-compacted embankment fill.

Foundation Recommendations

The subject retaining wall site is underlain by fill over highly compressible clayey and silty alluvial soils. These materials will be subjected to both elastic and time dependant settlements upon application of fill loads. Total settlements are estimated to be on the order of about 300 mm. If the wall were constructed before these time dependant settlements were allowed to occur, the wall could be potentially subjected to large total and differential settlements. Accordingly, we recommend that the embankment fills be placed and the alluvial soils and existing embankment fill be allowed to consolidate prior to the construction of the wall. The placement of fill should be conducted in accordance with the Standard Specifications and include benching into the existing fill slope. This recommendation is depicted in Figure 4, Wall 527, Typical Surcharge Section. We estimate a time interval of 6 to 9 months for 90% consolidation to be completed. This time interval may be expedited by the use of wick drains. If wick drains are installed at 2 m spacing, the time interval could be reduced to about 60 days.

A settlement monitoring program should be implemented in order to determine whether

settlements of the embankment have stabilized prior to wall construction. Settlement platforms should be monitored on a weekly basis after installation and discontinued after at least four consecutive readings indicate that settlements have stabilized.

Based on the cross sections of the proposed wall supplied by your office, and the assumption that the embankment fills will be placed prior to wall construction as recommended above, the Standard Plan Retaining Wall design may be used for Wall 527.
In addition, Caltrans Hydraulics should be contacted to determine whether our proposed surcharge recommendations and construction of the new embankment slope would affect the existing culvert.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

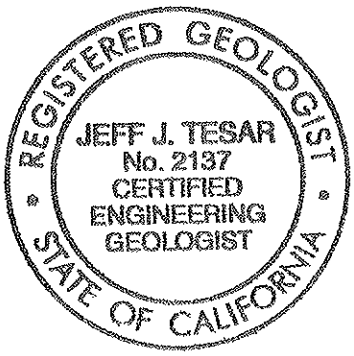
J. Tesar

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
Associate Materials and Research Engineer

Office of Geotechnical Design - South -- MS#63



Attachments:

1. Wall 466:Typical Surcharge Section
2. Wall 527: Typical Surcharge Section
3. Table 2
4. Photos

cc:
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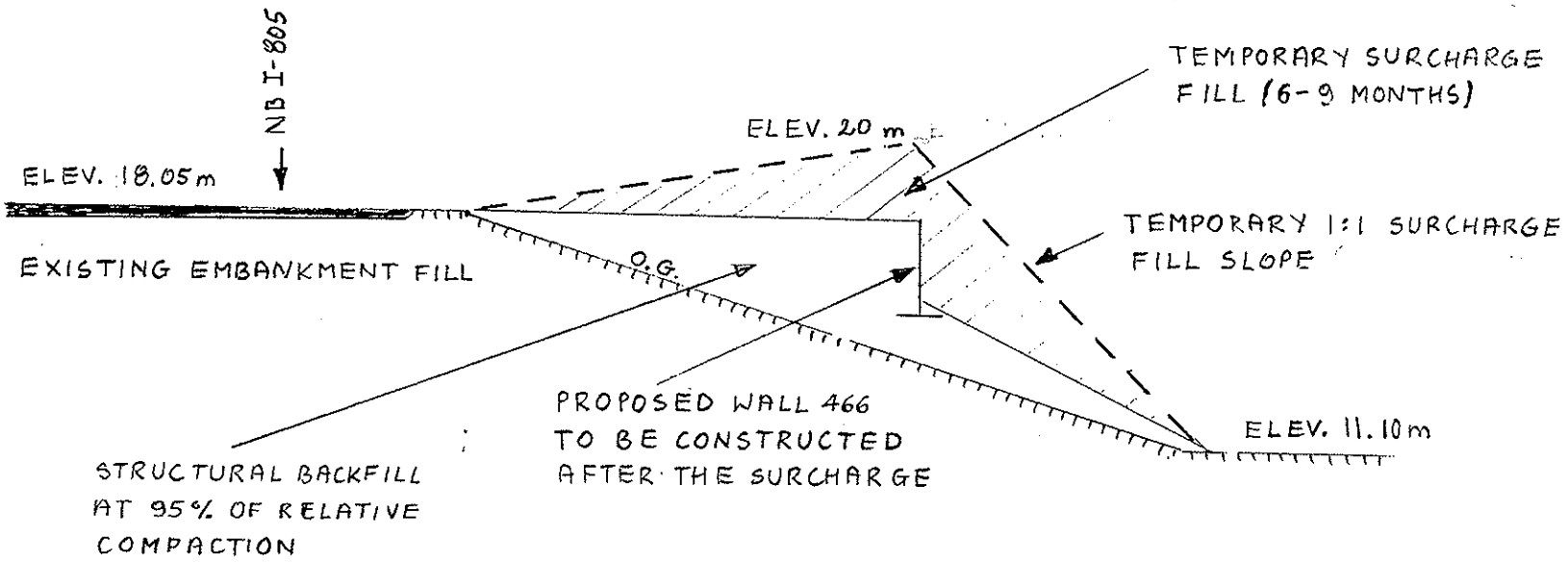
JEgan
RGES 02

JT

WALL 466, STATION 466+80

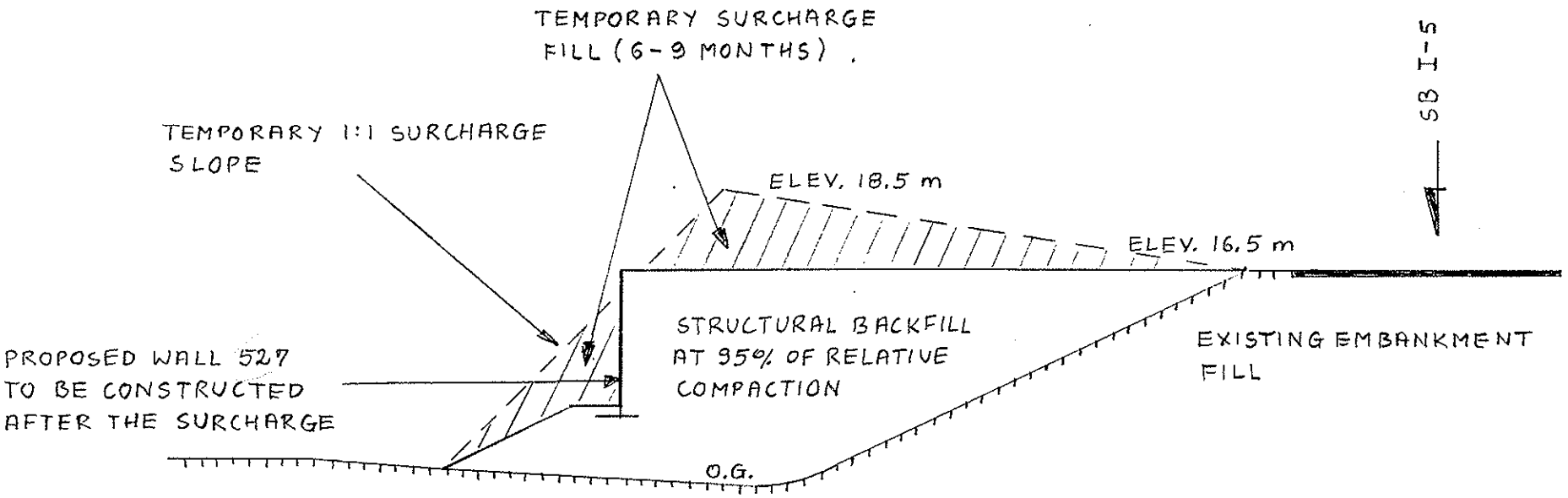


WALL 466: TYPICAL SURCHARGE SECTION

FIGURE 3

EA 0301U1

WALL 527, STATION 527+40



WALL 527: TYPICAL SURCHARGE SECTION

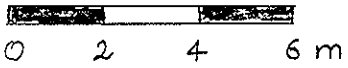


FIGURE 4

EA 030101

Photo 4: Wall 466 Location; looking north from about Station 465+80

Photo 5: Wall 466 Location; looking south from Sorrento Valley Blvd undercrossing

Photo 11: Wall 527 Location; looking south form about Station 529+60

Photo 12: Wall 527 Location; looking south from about Station 528+10

State of California Business, Transportation and Housing Agency

MEMORANDUM

To: Arturo Jacobo
Office of Design
MS 35

Date: January 8, 2001

File: 11-SD-5/805
KP 48.9 - 51.2 / 43.9 – 46.5
EA 11-0301U1

From: **DEPARTMENT OF TRANSPORTATION**
Engineering Service Center – Division of Materials and Foundations
Office of Roadway Geotechnical Engineering - South (RGES) -- MS#63

Subject: Interstates 5 and 805 Interchange, Proposed Retaining Walls: Wall 543 and 4.

GENERAL

At your request, we are providing our foundation recommendations for proposed Retaining Walls 543 and 4. These walls are part of the retaining wall project that comprises several walls. The foundation investigation report for these walls is currently under preparation. Since Walls 543 and 4 will require special design, we are submitting this report (a section of the aforementioned report) to help expedite the project.

If you have any questions regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-4062) or Zia Yazdani at (858) 467- 4054 (Calnet 734-4054).

J. Tesar

Jeff Tesar
Associate Engineering Geologist

Zia Yazdani

Zia Yazdani
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C:\5&805 RetainingWalls.doc

Attachments:

1. Table 2
2. Wall 543: Typical Foundation Improvement Section
3. Wall 543: Slope Stability Analysis
4. Photos

cc:
MKharrati
JPearce
JEgan

JT

Retaining Wall 543

Site Considerations

For the location of the proposed Retaining Wall 543, (Table 1) reference is directed to Figure 2-543. Wall 543 will be about 317 m long and 8.63 m in maximum height. It is proposed to be a Type1 standard retaining wall. However, for reasons to be explained later in this report, this wall will require special design. From Station 544+02.1 to 540+85, it will parallel southward the west-facing embankment slope of southbound I-5. Along this interval, the existing embankment fill slope is about 26.0 m in maximum height, and inclined at 1:2 (V:H) (see Attachment 2, Photos 13 and 14). The alignment of the wall footing lies at about mid-height of the slope.

It is our understanding that the existing embankment is to be widened to accommodate additional lanes. The widening will involve placement of fill on the existing embankment slope and retaining it with the proposed Wall 543. The footing of the new wall is to be embedded in newly compacted fill materials. A new fill slope is planned and will descend at 1:2 (V:H) westward from the bottom of the wall . Two CMP culverts cross laterally under the freeway along the wall alignment; at Stations 543+83 and 540+84.

Subsurface Soil Conditions

Our surface mapping and subsurface investigation was conducted in 1999 (Borings 543-B1 and 543-B2) and 1996 (Borings 543-896-6, 543-896-7, 543-896-8, and 543-996-10). It revealed that the subject section of the road embankment consists of a top layer of fill materials that is underlain by native soils of the Bay Point Formation. This section of southbound I-5 was constructed during side cut-and-fill grading of the west-facing slope. Fill materials underlie the alignment of the proposed Wall 543. The fill consists of sand, locally clayey, with gravel and chunks of siltstone. Its relative density, based on SPT blow counts was estimated to be medium dense to dense. Fill materials are underlain by native soils of the Bay Point Formation. They comprise of dense to very dense sands. Their geotechnical engineering strength parameters are presented in Table 2. The thickness of the fill layer along the wall alignment is variable. At Station 543+80, based on Borings 543-B1 and 543-B996-10, the fill and bedrock interface is estimated to be at about elevation 20.6 m. At Station 543+20, based on Borings 543-B2 and 543-896-6, it is estimated to be at about elevation 15.8 m, and at Station 542+70, based on Borings 543-B2 and 543-896-7, at about elevation 13.4 m.

For boring locations, reference is directed to Figure 2-543. It should be noted that the actual location of the proposed Wall 543 alignment was not accessible to conventional subsurface exploration equipment. Our borings were drilled as close as possible to the wall alignment; at the crest of the embankment slope and at its toe. Therefore, the subsurface soil conditions presented above were interpolated, based on the referenced borings. Variations from our estimated soil conditions could exist at the alignment of wall 543. In particular, the depth to the Bay Point Formation could vary significantly along the actual alignment of the wall. For example, at about Station 542+20, we expect it to be deeper. Seepage was encountered in

Borings 543-B1 and 543-B2. It was detected along the fill and native soils interface: in Boring 543-B1 at an elevation of 26.8 m, and in Boring 543-B2 at elevation of 28.8 m.

Foundation Recommendations

From a geotechnical standpoint, due to subsurface conditions along the alignment of Wall 543 and the wall's proposed location in proximity to a fill slope, the planned wall can not be designed as a Type 1 wall as per Caltrans Standard Plans. In our opinion, the existing subsurface fill materials along with the planned new fill layer will not be competent enough to support the spread footing foundation of the proposed 8.63 m maximum high Standard Plan retaining wall, unless the footing is widened to reduce maximum toe pressures.

To improve the bearing capacity of soils and improve the wall's global stability along the alignment of the proposed wall spread footing, we recommend removal of the existing fill materials and their replacement with Structural Backfill compacted to 95% Relative Compaction, as shown on the attached Typical Foundation Improvement Section. To prevent buildup of hydrostatic pressures behind Wall 543, an adequate drainage system should be incorporated into the project plans. Temporary cuts in existing fill should be no steeper than 1:1 (vertical to horizontal). New foundation fill and wall backfill should be compacted in accordance with the Standard Specifications. All fill materials should be compacted to 95 % Relative Compaction. The new fill should be benched into the existing fill slope in accordance with the Standard Specifications. The Structural Backfill material, when compacted to 95 % of Relative Compaction should yield strength parameters no less than those shown below:

Cohesion:	9.6 Kpa
Angle of Internal Friction	36 degrees
Maximum Dry Density	18.9 KN/m^3

Based on shear failure and maximum allowable settlement criteria, the allowable bearing capacity of compacted fill, was calculated from the above geotechnical design parameters to be less than the maximum applied toe pressure of the 9.0 m high standard wall. The standard plan wall design is thus not suitable for this location and Wall 543 should be founded on a special design spread footing. The special design footing should be based on an allowable soil bearing capacity of 144 KPa (3.0 Ksf).

Slope stability analysis using the XSTABL computer application was performed on the section of the proposed embankment that includes Wall 543. It was performed to determine the stability of the new fill slope after the implementation of our foundation improvement recommendations. For the analysis, we utilized the soil strength parameters presented in Table 2. In addition, we used the cross sections shown on the plans provided by your office. The calculated simplified Bishop Safety Factor for the proposed new embankment slope is 1.5, which is considered to be acceptable. The slope stability computer output data are presented in Appendix 3.

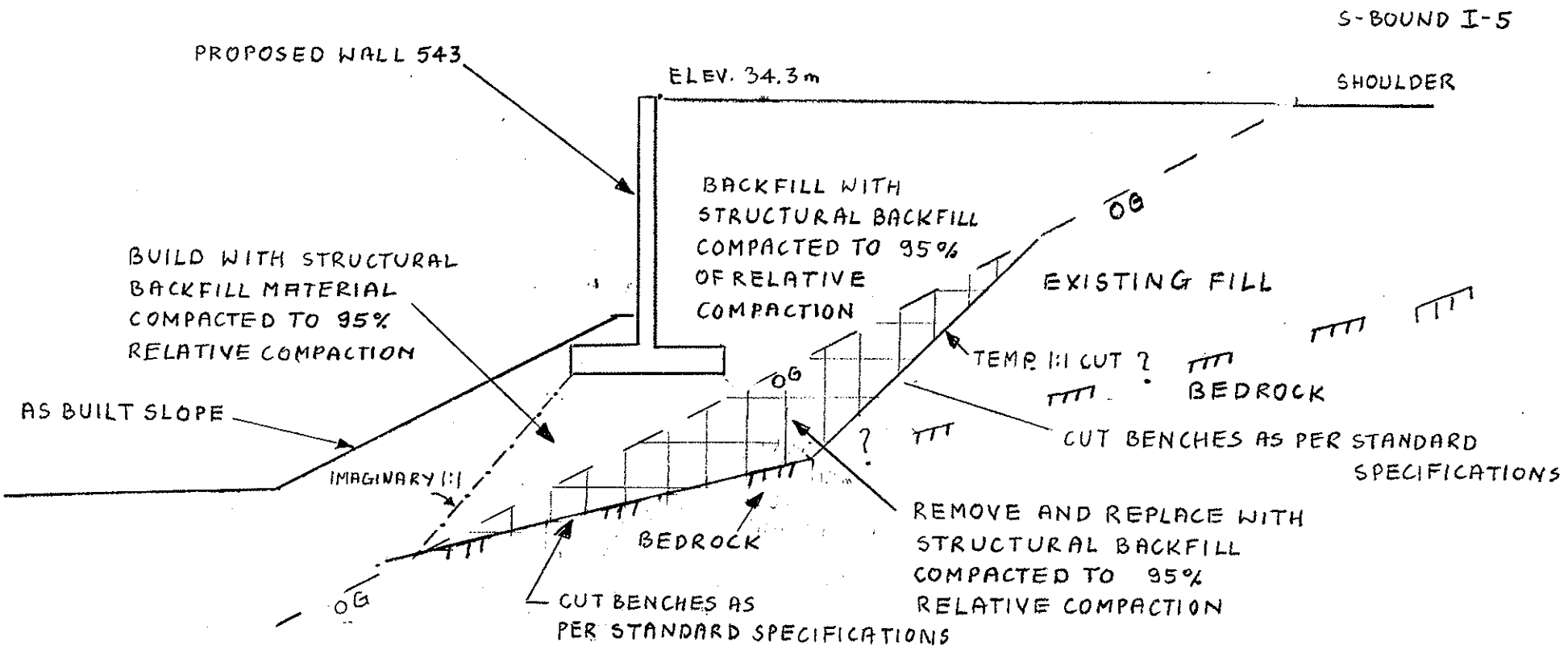
Alternatively, the wall may be supported on a pile foundation, which would also require

a special design. Additionally, supplemental field investigations utilizing a limited access drill rig would be required along the actual alignment of the proposed wall to better define the top elevation of the Bay Point Formation in which the piles will be supported.

Caltrans Hydraulics should be contacted to determine whether our proposed foundation improvement recommendations and construction of the new embankment slope would affect the existing culverts.

Retaining Wall 4

Retaining Wall 4 will be about 4.2 m long and 6.81 m in maximum height. It is contiguous to Wall 543 and at Station 544+02.1, it will connect to the northern end of Wall 543. Subsurface conditions along the alignment of Wall 4 are essentially similar to those encountered at the location of Wall 543. Therefore, the foundation recommendations presented above for Wall 543 are also applicable to Wall 4.



WALL 543: TYPICAL FOUNDATION IMPROVEMENT SECTION.

0 2 4 6 8 m

EA 0301U1

Table 2

UNIT	COHESION (Kpa)	ANGLE OF INTERNAL FRICTION (degree)	MAXIMUM DRY DENSITY (KN/m^3)
Ardath Shale	14.3	28	18.9
Torrey Sandstone	9.6	33	18.9
Bay Point Formation	24.0	38	19.6
Existing Fill	9.6	32	18.9
Structural Fill	9.6	36	18.9

XSTABL File: 543F 1-04-** 14:01

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*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*         Copyright (C) 1992 - 96       *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
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*                                       *
*  Ver. 5.105a                95 - 1474 *
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Problem Description : INTERSTATES 5 AND 805

SEGMENT BOUNDARY COORDINATES

---

5 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	328.0	340.2	334.6	340.2	1
2	334.6	340.2	373.3	362.2	1
3	373.3	362.2	377.0	362.2	1
4	377.0	362.2	377.1	387.5	1
5	377.1	387.5	448.8	387.5	1

8 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	367.4	353.3	367.5	356.3	4
2	367.5	356.3	383.9	356.3	4
3	383.9	356.3	384.0	353.3	4
4	367.4	353.3	384.0	353.3	1
5	328.0	328.0	395.7	346.8	3
6	395.7	346.8	420.0	369.5	2
7	420.0	369.5	448.8	378.5	2
8	395.7	346.8	467.2	362.2	3

ISOTROPIC Soil Parameters

---

5 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	120.0	120.0	200.0	36.00	.000	.0	0
2	120.0	120.0	200.0	32.00	.000	.0	0
3	130.0	130.0	500.0	36.00	.000	.0	0
4	150.0	150.0	9999.0	45.00	.000	.0	0
5	.0	.0	.0	.00	.000	.0	0

BOUNDARY LOADS

---

1 load(s) specified

Load No.	x-left (ft)	x-right (ft)	Intensity (psf)	Direction (deg)
1	377.0	430.0	150.0	.0

NOTE - Intensity is specified as a uniformly distributed force acting on a HORIZONTALLY projected surface.

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = 328.0 ft
and x = 334.6 ft

Each surface terminates between x = 377.0 ft
and x = 440.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

5.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS :

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

****
-- WARNING -- WARNING -- WARNING -- WARNING -- (# 48)
****
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter. In such
cases, this effect can only be eliminated by reducing the "c" value.
****

USER SELECTED option to maintain strength greater than zero

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	334.60	340.20
2	339.56	339.55
3	344.55	339.31
4	349.55	339.48
5	354.52	340.05
6	359.42	341.04
7	364.22	342.42
8	368.90	344.19
9	373.41	346.34
10	377.74	348.85
11	381.84	351.71
12	385.69	354.89
13	389.27	358.38
14	392.55	362.16
15	395.52	366.19
16	398.14	370.44
17	400.40	374.90
18	402.29	379.53
19	403.79	384.30
20	404.52	387.50

**** Simplified BISHOP FOS = 1.515 ****

The following is a summary of the TEN most critical surfaces

Problem Description : INTERSTATES 5 AND 805

FOS (BISHOP)	Circle Center x-coord	Circle Center y-coord	Radius	Initial x-coord	Terminal x-coord	Resisting Moment

		(ft)	(ft)	(ft)	(ft)	(ft)	(ft-lb)
1.	1.515	345.00	400.23	60.92	334.60	404.52	7.028E+06
2.	1.532	345.08	401.02	62.80	329.47	406.38	7.907E+06
3.	1.551	340.39	423.13	83.56	330.20	415.94	1.121E+07
4.	1.557	347.98	390.81	52.95	332.40	400.79	6.296E+06
5.	1.566	344.32	414.58	75.33	332.40	414.57	1.046E+07
6.	1.585	348.02	403.16	64.69	333.13	410.75	9.091E+06
7.	1.597	348.89	394.84	57.29	331.67	405.70	7.767E+06
8.	1.624	344.21	420.61	81.62	330.20	418.77	1.247E+07
9.	1.652	347.19	415.03	76.42	331.67	418.45	1.219E+07
10.	1.661	348.69	402.77	65.90	328.00	412.76	1.055E+07

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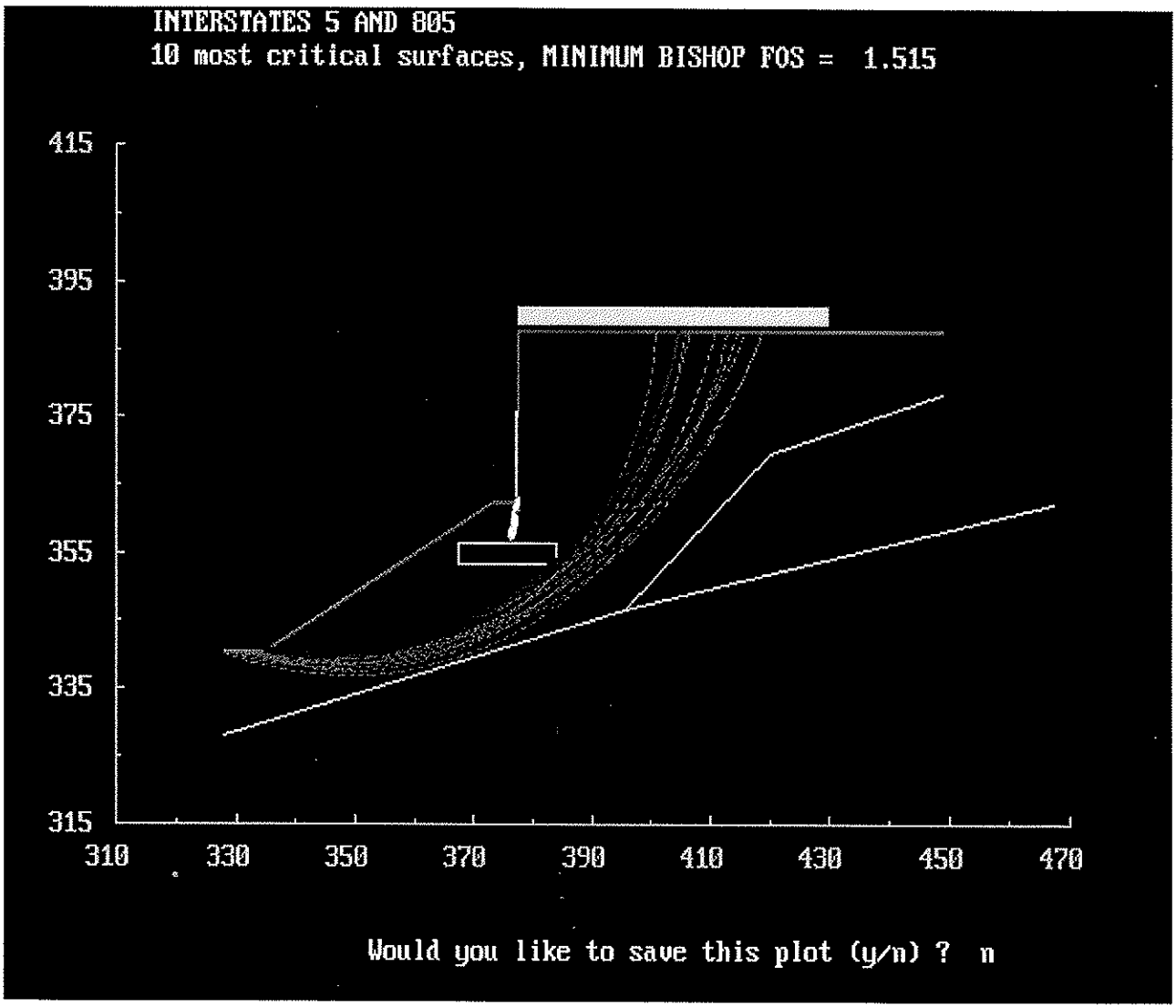
INTERSTATES 5 AND 805
10 most critical surfaces, MINIMUM BISHOP FOS = 1.515
415
395
375
355
335
315
310
330
350
370
390
410
430
450
470
Would you like to save this plot (y/n) ? n

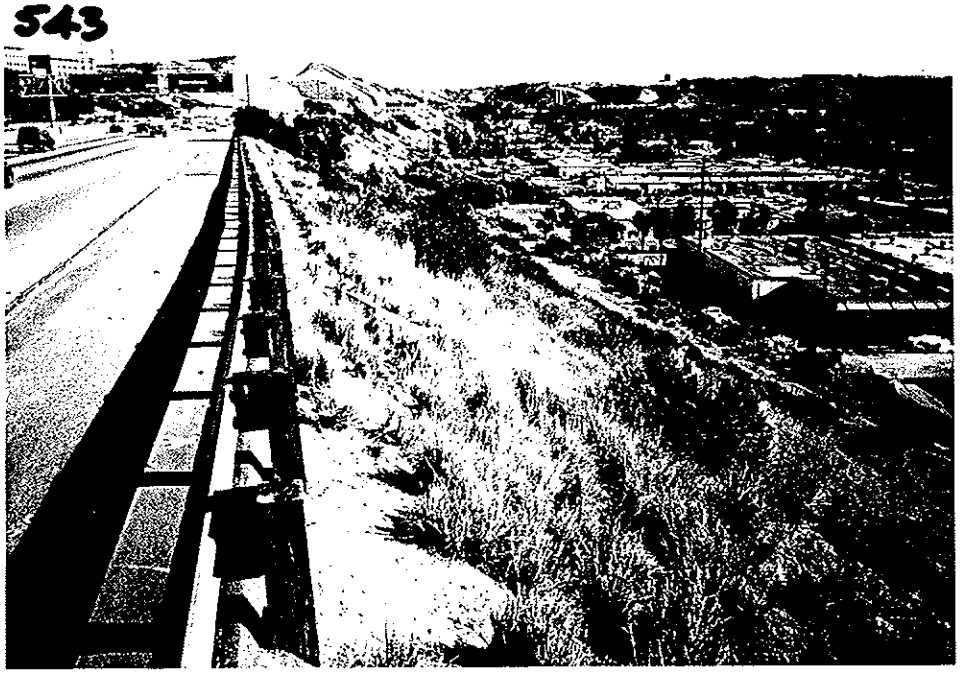

Photo 13: Wall 543 Location; looking south form about Station 544+0

Photo 14: Walls 543 & 4 Location; looking south from Carmel Mountain Rd undercrossing