State of California Business, Transportation and Housing Agency

Memorandum

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To: Mr. Yen-Hsi Deng
Structures Design
MS#9-3/3G

Date: April 21, 2004

File: 11-SD-15
KP M35.4/M38.7
EA 11 – 080911

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2, Branch D

Subject: Interstate 15, Managed Lanes Project, Unit 2: Foundation Recommendations for the Retaining Walls RW364L, RW376R, and RW380R.

INTRODUCTION

In accordance with your request, a geotechnical investigation was performed for the purpose of providing foundation recommendations for the subject retaining structures that are required for construction of the I-15 Managed Lanes project. The investigation consisted of a site reconnaissance, a review of the existing as-built plans and geologic maps, limited geologic mapping, a subsurface investigation that included drilling and sampling, engineering analysis, and the writing of this report. The project information provided by the Project Engineer included wall layout sheets on a scale of 1:1000 and pertinent cross sections, which were reviewed and used in the writing of this report.

GENERAL

Retaining Wall RW364L.

A standard Type 1 or Crib Wall RW364L is proposed for the widening of the existing offramp from southbound I-15 to Camino del Norte. In addition, an MSE wall design alternative is proposed for Wall RW364L. From about Station 363+57 to 367+40, this wall, located at about the Right of Way boundary and 9.7 m in maximum height, will parallel the offramp to the west. Wall RW364L will retain a fill slope that is planned to be placed on the face of the existing fill embankment slope (ramp). At about Station 365+92, a major culvert about 2.7 m in diameter crosses the alignment of Wall RW364L. Foundation recommendations for the Type 1 retaining Wall RW364L and the spanning of the culvert were provided to your office on April 15, 2004. Foundation recommendations for the standard Crib Wall and MSE wall design alternative for Wall RW364L were recently requested from your office and are presented in this report.

Retaining Wall RW376R.

A standard Type 1 or Crib Wall RW376R is proposed for the widening of the existing offramp from northbound I-15 to Bernardo Center Drive. In addition, a MSE wall design alternative is proposed for Wall RW376R. From about Station 376 +77 to 379+01, this wall, located at about the Right of Way boundary and about 6.0 m in maximum height, will parallel the offramp to the east. Wall RW376R will retain a ramp built of fill materials. Foundation recommendations for the standard Type 1 or Crib Walls, and MSE wall design alternative for Wall 376R were recently requested from your office and are presented in this report.

Retaining Wall RW380R.

A standard Type 1 or Crib Wall RW380R is proposed for the widening of the existing northbound section of I-15 between Bernardo Center Drive and Rancho Bernardo Road. In addition, a MSE wall design alternative is proposed for Wall RW380R. From about Station 380 +92 to 389+08.4, this wall will be located at about the toe (Right of Way) of the existing embankment fill slope. Wall RW 380R will be about 4.2 m in maximum height. This wall will retain a fill slope that is planned to be placed on the face of the existing embankment fill slope. Foundation recommendations for the standard Type 1 or Crib Walls, and MSE wall design alternative for Wall RW 380L were recently requested from your office and are presented in this report.

GEOLOGY

The project site lies within the western San Diego Peninsular Ranges Geomorphic Province of California. The project area is generally underlain by fill materials, topsoil, and/or colluvium, and locally alluvium. These surficial geologic units are underlain by the sedimentary upper Tertiary Mission Valley Formation that is underlain by the Stadium Conglomerate Formation that in turn is underlain by lower Tertiary Friars Formation.

The Friars Formation is underlain by a Mesozoic basement consisting of igneous and metamorphic rocks. The basement, which upper layer is weathered, is composed of upper Jurassic Santiago Peak Volcanics and mid Cretaceous granitic rocks of the Southern California Batholith (Kennedy and Peterson, 1975).

The Mission Valley Formation is composed of marine, lagoonal, and nonmarine sandstone that lies conformably upon the Stadium Conglomerate. It consists of friable and soft sandstone that locally is interstratified with carbonate cemented beds (concretions). Locally it comprises cobble conglomerate zones. Locally it grades to silty sand/sandstone. Shallow and localized slipouts are known to occur in the hilly topography where the Mission Valley Formation soils were exposed on slopes.

The Stadium Conglomerate consists of cobble conglomerate with a coarse-grained sandstone matrix. The sandstone can constitute up to 50 percent of the unit. However, the cobbles, up to

0.5 m in diameter, are the most dominant ingredient of the unit. Stadium Conglomerate Formation is resistant to erosion and known not to be susceptible to sliding or slipouts. The Friars Formation consists of siltstone and sandstone with interbeds of claystone. Landslides are common in the clay-rich part of the formation that is exposed on slopes in the hilly topography. Please refer to the section titled: "Project site geologic background and history" for more information that is pertinent.

Colluvium consists of formational materials, including topsoil that were eroded and deposited as a relatively thin mantle on the faces of slopes. Alluvium consists primarily of stream deposits of silt (often clayey), sand, and gravel derived from bedrock and residual sources that lie within or near the project area. Fill consists of compacted earth materials derived from local sources.

PROJECT SITE GEOLOGIC BACKGROUND AND HISTORY

The project site is located in the community of Rancho Bernardo, in the City of San Diego, along the segment of I-15, between the Camino Del Norte and Rancho Bernardo Road Undercrossings. That stretch of the freeway, in general, is underlain by fill materials, native soils of the Mission Valley Formation, Stadium Conglomerate, and Friars Formation. Therefore, based on our local experience and review of geologic literature, the project area is underlain in large part by geotechnically adverse sedimentary formations, mainly the Friars and Mission Valley Formations (Hart, 1972; Kennedy and Peterson, 1975). In the past, numerous landslides occurred in proximity to and along the segment of I-15 where the planned walls are to be located. Several reports on file in our Office of Geotechnical Design describe a large number of slope instability (landslide) problems in the project area (Allen, 1979; Mattox, 1983; Egan 1983 and 1992; Tesar 2002). In the report titled "Seismic safety study for the City of San Diego", issued in 1974, the Leighton and Associates consultants designated the southwestern quadrant of the Bernardo Center Drive (the location of Wall RW374L) as: "confirmed, known, or highly suspected landslide" (Leighton and Associates, 1974). In addition, on the State of California Landslides Map the majority of the project area is classified as 'Most Susceptible to Landslides' (California Division of Mines and Geology, OFR 95-04, Plate 35F). In 1998 the grading of a building pad that is adjacent to our Right of Way and located in the northwestern quadrant of Bernardo Center Drive triggered ongoing slope instability that will require extensive and complex mitigation measures (Birkhahn, 2002). In 1998 a Preliminary Geotechnical Report, titled "PGR Busway/HOV/Managed Lanes on I-15 from Sate Route 163 (SR-163) to SR 78" was issued to Mr. Robert Robinson (Oquita, 1998). In this report, the notorious claystone of the Friars Formation was singled out as potentially contributing to present and future stability problems where it underlies the traveled way. A 2000 report titled: "Preliminary Recommendations on Retaining Walls" was issued to Mr. Bruce Lambert from the Office of Advanced Planning (Yazdani and Hinman, 2000). In this report, among other geotechnical concerns related to the notorious instability of the project area, the cut slope in the southwestern quadrant of Bernardo Center Drive (location of Wall RW374L) was identified as only marginally stable. The authors stated that the temporary cut necessary to construct a Type 1 retaining wall, if needed, would most likely trigger the existing landslide and possibly jeopardize structures located at the top of

the slope. Therefore, a tieback wall was recommended for that location.
In the light of the geologic facts and the historical background of the project site it is obvious, that the majority of the project area is underlain by soils inherently prone to slope instability, including landslides.

SEISMICITY

No known Holocene faults exists within the project area. The nearest known active fault is the Newport-Inglewood-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 20 km southwest and west from the project site. The La Nacion Fault is located about 20 kilometers south from 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 40 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 0.25 g at the project site (Mualchin, 1996).

GROUNDWATER

Retaining Wall RW364L

Groundwater was encountered in several of the exploratory borings drilled at about the location of the alignment of the Wall RW364L. In our opinion, groundwater will have no impact on the construction of the spread-footing foundation for Type 1 Wall RW364L, and foundations for the alternative standard Crib Wall and MSE wall. However, due to the clayey nature of surficial soils, during the construction, especially in rainy season, perched water could be encountered. In an event that unanticipated (perched) water is encountered during construction, mitigation measures will be provided by this office. Table 1 below provides a summary of groundwater data for the retaining Wall RW364L.

Table 1. Summary of Groundwater Data for Wall RW364L

Boring No.	Date Drilled or Groundwater measured	Boring Maximum Depth Elevation (m)	Groundwater Elevation (m)
RW364L-B1	1/5/04	202.15	Not Encountered
RW364L-B2	1/8/04	196.80	202.90*
RW364L-B3	1/8/04	202.81	204.96
RW364L-B4	1/8/04	204.81	205.13

Note: * - Seepage

Retaining Wall RW376R

Groundwater (seepage) was encountered in one exploratory boring drilled at about the location of the alignment of the Wall RW376R. In our opinion, groundwater will have no impact on the construction of the spread-footing foundation for Type 1 Wall RW364L, and foundations for the alternative standard Crib Wall and MSE wall. However, due to the clayey nature of surficial soils, during the construction, especially in rainy season, perched water could be encountered. In an event that unanticipated (perched) water is encountered during construction, mitigation measures will be provided by this office. Table 2 below provides a summary of groundwater data for the retaining Wall RW376R.

Table 2. Summary of Groundwater Data for Wall RW376R

Boring No.	Date Drilled or Groundwater measured	Boring Maximum Depth Elevation (m)	Groundwater Elevation (m)
RW376R-B1	12/11/03	188.59	191.00*
RW376R-B2	12/11/03	183.19	Not Encountered
RW376R-B3	12/16/03	176.85	Not Encountered

Note: * -- Seepage

Retaining Wall RW380R

Groundwater was encountered in two bucket-auger exploratory borings drilled at about the location of the alignment of the Wall RW380R. However, no ground water was encountered in the seven hollow-stem auger borings. In our opinion, groundwater will have no impact on the construction of the standard Type 1 wall or Crib Wall and MSE alternative design wall. However, due to clayey nature of surficial soils, during the construction, especially in rainy season, perched water could be encountered. In an event that unanticipated (perched) water is encountered during construction, mitigation measures will be provided by this office. Table 3 below provides a summary of groundwater data for the retaining Wall RW380R.

Table 3. Summary of Groundwater Data for Wall RW380R

Boring No.	Date Drilled or Groundwater measured	Boring Maximum Depth Elevation (m)	Groundwater Elevation (m)
RW380R-B1	1/27/04	169.50	173.20
RW380R-B4A	1/16/04	160.9	165.10

CORROSION

Retaining Wall RW364L

Several soil samples were collected from the location of the retaining Wall RW364L proposed for this project. These samples were tested for corrosive potential and found to be corrosive. The results of the corrosivity tests are presented in Table 4 below.

Table 4. Results of Corrosivity Tests for Retaining Wall RW364L.

BORING NO.	SAMPLE DEPTH (m)	pH	MINIMUM RESISTIVITY (ohm-cm)	SULFATE CONTENT (ppm)	CHLORIDE CONTENT (ppm)
RW364L-B1	2-5	7.8	1010	500	N/A
RW364L-B2	5-10	7.4	520	150	N/A
RW364L-B3	5-10	7.0	450	100	N/A

Note: Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

Retaining Wall 376R

A representative soil sample was collected from the location of the retaining Wall RW376R proposed for this project. This sample was tested for corrosive potential and found to be corrosive. In addition, soils that underlay the alignment of planned Wall RW376R are of the Friars Formation origin and as such are inherently corrosive. The results of the corrosivity tests for the retaining Wall RW376R are presented in Table 5 below.

Table 5. Results of Corrosivity Tests for Retaining Wall RW376R.

BORING NO.	SAMPLE DEPTH (m)	pH	MINIMUM RESISTIVITY (ohm-cm)	SULFATE CONTENT (ppm)	CHLORIDE CONTENT (ppm)
RW376R-B3	1-5	7.4	490	350	N/A

Note: Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

Retaining Wall 380R

Several soil samples were collected from the location of the Retaining Wall RW380R that is proposed for this project. These samples were tested for corrosive potential and found to be corrosive. In addition, fill materials or/and native soils that underlay the alignment of planned Wall RW380R are derived from the Friars Formation source and as such are inherently corrosive. The results of the corrosivity tests are presented in Table 6 on the following page.

Table 6. Results of Corrosivity Tests for Retaining Wall RW380R.

BORING NO.	SAMPLE DEPTH (m)	pH	MINIMUM RESISTIVITY (ohm-cm)	SULFATE CONTENT (ppm)	CHLORIDE CONTENT (ppm)
RW380R-B5	2-5	7.2	630	190	N/A
RW380R-B7	5-10	7.4	670	90	N/A
RW380R-B9	2-5	7.7	950	170	N/A

Note: Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

FOUNDATION RECOMMENDATIONS

Retaining Wall RW364L

Subsurface Soils Conditions

From approximate Station 365+30 to 366+60, the alignment of Wall RW364L is underlain by fill materials predominately derived from the local cuts in the Mission Valley Formation. In the past, a gully and a draining course (minor stream flowing southwest) crossed the planned wall alignment. During the grading of the freeway, a culvert about 2.7 m in diameter was constructed at about Station 365+92, and the gully was backfilled. Based on our subsurface investigation and local experience, we believe that this backfill material consisting of clayey and silty soils can contain a significant amount of buried oversized rocks or/and man-made objects. In addition, this fill surfically failed along the section of the offramp from I-15 to Camino Del Norte (Hinman, 1999). From approximate Station 365+30 to the southern limit of the wall, and from approximate Station 366+60 to its northern limit, the wall alignment is underlain by clayey and silty soils of the Mission Valley Formation. At Station 365+82, the depth of the interface between fill materials and native soils of the Mission Valley Formation was mapped to be at about an elevation of 203.40 m.

For Wall 364L, four Logs of Test Boring (LOTB) were developed and forwarded to the Project Engineer: RW364L-B1, RW364L-B2, RW364L-B3, and RW364L-B4.

Foundation Recommendations

Based on the results of our subsurface investigations and engineering analyses, the design and construction of Wall RW364L, may be based on the Caltrans Standard Plans for Type 1 wall or Crib Wall. In addition, this wall can be alternatively design as a MSE wall.

For the ***Type 1 Wall***, we recommend that this structure, 9.7 m in maximum height, be supported on a spread footing foundation as shown on sheet B3-2 in the "Standard Plans July 1999". With

Loading Case II, the 370 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall RW364L. In addition, we recommend that from Station 365+55 to 367+45, a 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed footing and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216. The horizontal limits of the removal and replacement should extend a minimum 1.5 m beyond either edge of the proposed wall footing.

For the ***Crib Wall*** design alternative, we recommend that this structure, 9.7 m in maximum height, be constructed as Reinforced Concrete Crib Battered Wall Type E as shown on sheet C7B in the "Standard Plans July 1999". With Loading Case II, the 330 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall RW364L. In addition, we recommend that from Station 365+55 to 367+45, a 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed Crib Wall foundation and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216. The horizontal limits of the removal and replacement should extend a minimum 1.5 m beyond either edge of the proposed wall footing.

For the ***MSE Wall*** design alternative, we recommend that this structure, about 10.0 m in maximum height, may be designed for an allowable soil bearing pressure of 370 kPa. This value assumes a minimum friction angle of 34 degrees for the foundation material. In addition, preliminary gross stability analysis suggests that from Station 365+55 to 367+45 the design of the MSE Wall design alternative should be based on a minimum wall base to wall height (B/H) ratio of 1.0. In addition, from Station 365+55 to 367+45 the 1.5 m thick layer of fill materials that exists below the foundation of proposed MSE wall should be removed and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216.

Construction Considerations

Based on the results of our subsurface investigation, our local experience, and the review of geologic references, we anticipate that excavations for the Wall RW364L foundations may be accomplished with the use of standard (heavy) earthwork equipment.

Retaining Wall RW376L

Subsurface Soils Conditions

The entire alignment of the proposed retaining Wall RW 376R is underlain by about 1.5 m thick layer of fill materials derived from the clayey and silty soils of the Friars Formation. The Fill layer is underlain by the Friars Formation consisting of clays and clayey siltstone. In Boring RW367R-B2, at about an elevation of 183.20 m the Friars Formation was found to be underlain by the weathered granitic bedrock. Based on a review of geologic literature, Wall RW376R is planned to be located at a toe of the ancient landslide (Leighton and Associates, 1974; State of California Landslide Map, 1995). See the "Project Site Geologic Background and History" section of this report for pertinent information.

For Wall RW376R, three LOTB's were developed and forwarded to the Project Engineer: RW376R-B1, RW376R-B2, and RW376R-B3.

Foundation Recommendations

Based on the results of our subsurface investigations and engineering analyses, the design and construction of Wall RW376R, may be based on the Caltrans Standard Plans for Type 1 wall or Crib Wall. In addition, this wall can be alternatively design as a MSE wall.

For the ***Type 1 Wall***, we recommend that this structure, 6.0 m in maximum height, be supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case 1, the 205 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall 376R. In addition, we recommend that along the entire alignment of Wall RW376R existing fill materials be removed from under the bottom of the proposed footing and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216. The horizontal limits of the removal and replacement should extend a minimum 1.5 m beyond either edge of the proposed wall footing.

For the ***Crib Wall*** design alternative, we recommend that this structure, 6.2 m in maximum height, be constructed as Reinforced Concrete Crib Battered Wall Type C as shown on sheet C7A in the "Standard Plans July 1999". With Loading Case I, the 195 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall RW376R. In addition, we recommend that along the entire alignment of Wall RW376R the 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed Crib Wall foundation and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216. The horizontal limits of the removal and replacement should extend a minimum 1.5 m beyond either edge of the proposed wall footing.

For the ***MSE Wall*** design alternative, we recommend that this structure, about 6.0 m in maximum height, may be designed for an allowable soil bearing pressure of 205 kPa. This value assumes a minimum friction angle of 34 degrees for the foundation material. In addition, preliminary gross stability analysis suggests that along the entire lengths of the wall alignment the design of the MSE Wall design alternative should be based on a minimum wall base to wall height (B/H) ratio of 0.8. In addition, we recommend that along the entire alignment of Wall RW376R the 1.5 m thick layer of fill materials that exists below the foundation of proposed MSE wall should be removed and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216.

Construction Considerations

Based on the results of our subsurface investigation, our local experience, and the review of geologic references, we anticipate that excavations for the Wall RW376R foundations may be accomplished with the use of standard (heavy) earthwork equipment.

Retaining Wall RW380R

Subsurface Soils Conditions

Initially, the entire alignment of the proposed retaining Wall RW380R was planned to be located at the face of the existing road embankment slope. Upon the evaluation of this location by our office and in the light of the geologic background of this area, the location of Wall RW380R was moved to the toe of the aforementioned embankment slope.

Based on data from our borings that were drilled at about the crest of the embankment, the embankment is built of fill materials derived predominantly from the clayey and silty soils of the Friars Formation. The fill layer that is variable in thickness is underlain by clayey silty and sandy soils of the Friars Formation. Due to time and permitting constrains, we were not able to investigate the subsurface soils conditions at the toe of the embankment. However, based on our subsurface investigation of 2003 and 2004, and local experience, we anticipate that the alignment of Wall RW380R will be underlain by either fill materials built of Friars Formation or the native soil of the Friars Formation.

Based on a review of geologic literature, a significant southern section of Wall RW380R is planned to be located at about a toe of the ancient landslide (Leighton and Associates, 1974; State of California Landslide Map, 1995). See the "Project Site Geologic Background and History" section of this report for pertinent information.

For Wall RW380R, nine LOTB's were developed and forwarded to the Project Engineer: RW380B-1, RW380R-B2, RW380R-B3, RW380R-B4, RW380-B4A, RW380-B5, RW380R-B6, RW380-B7, and RW380R-B8.

Foundation Recommendations

Based on the results of our subsurface investigations and engineering analyses, the design and construction of Wall RW380R, may be based on the Caltrans Standard Plans for Type 1 wall or Crib Wall. In addition, this wall can be alternatively design as a MSE wall.

For the ***Type 1 Wall***, we recommend that this structure, 6.7 m in maximum height, be supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case II, the 265 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall RW380R.
For the section of the Wall RW380R that is taller than 4.2 m, we recommend that under that section of the increased wall height, a 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed footing and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216.

For the ***Crib Wall*** design alternative, we recommend that this structure, 4.2 m in maximum

height, be constructed as Reinforced Concrete Crib Battered Wall Type A as shown on sheet C7A in the "Standard Plans July 1999". With Loading Case II, the 270 kPa Gross Allowable Soil Bearing Pressure may be used for design of the Wall RW380R.
For the section of Wall RW380R that is taller than 4.2 m, we recommend the 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed footing and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216

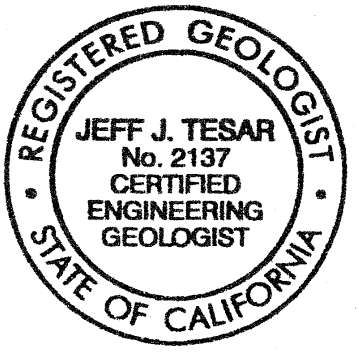
For the ***MSE Wall*** design alternative, we recommend that this structure, about 4.2 m in maximum height, may be designed for an allowable soil bearing pressure of 270 kPa. This value assumes a minimum friction angle of 34 degrees for the foundation material. In addition, the design of the MSE Wall design alternative should be based on a minimum wall base to wall height (B/H) ratio of 0.8.
For the section of Wall RW380R that is taller than 4.2 m, we recommend that the 1.5 m thick layer of existing fill materials be removed from under the bottom of the proposed footing and replaced with structural backfill compacted to 95 % Relative Compaction in accordance with CTM 216

Construction Considerations

Based on the results of our subsurface investigation, our local experience, and the review of geologic references, we anticipate that excavations for wall foundations may be accomplished with the use of standard (heavy) earthwork equipment.

If you have any question regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or Brian Hinman at (858) 467-4051 (Calnet 734-4051).

Prepared by:



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FOUNDATION REVIEW

ENGINEERING SERVICE CENTER
GEOTECHNICAL SERVICES

To: **Office of Structure Design**
1. Preliminary Report
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GS (Sacramento)
2. ~~GS~~

Date: 4-21-04

Retaining walls 364L, 376R, 380R
Structure Name

11-SD-15 KP Var
District County Route Post Mile

District Project Development
District Project Engineer

11-080911
E.A. Number Structure Number

Foundation Report By: J. Tesar & B. Hinman Dated: April 2004

Reviewed By: _____ (OSD) K. GRISWELL (GS)

General Plan Dated: Undated Foundation Plan Dated: Undated

☐ No changes. ☒ The following changes are necessary.

- Excavation limits showing Foundation recommendation of additional removal + replacement need be added to plans

With this change this review will be complete.

MSE **FOUNDATION CHECKLIST**

___ Pile Types and Design Loads	___ Footing Elevations, Design Loads, and Locations	✓ LOTB's
___ Pile Lengths	___ Seismic Data	___ Fill Surcharge
___ Predrilling	___ Location of Adjacent Structures and Utilities	___ Approach Paving Slabs
___ Pile Load Test	✓ Stability of Cuts or Fills	___ Scour
___ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No	___ Fill Time Delay	✓ Ground Water
	___ Effect of Fills on Abutments and Bents	___ Tremie Seals/Type D Excavation

Office of Structure Design Section No. Geotechnical Services

Rev. 10/02