FOR CONTRACT NO.: 07-241304

INFORMATION HANDOUT

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
BOARD ORDER NO. 08-067

PERMITS

U.S. ARMY CORPS OF ENGINEERS
PERMIT NO. SPL-2008-01015-PHT

AGREEMENTS

CALIFORNIA DEPARTMENT OF FISH AND GAME
NOTIFICATION NO. 1600-2008-0155-R5

ENCROACHMENT PERMITS

COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT

MATERIALS INFORMATION

GEOTECHNICAL DESIGN REPORT FOR SEPULVEDA BLVD UC WIDENING, LA, NOVEMBER 26, 2007

GEOTECHNICAL DESIGN REPORT FOR CENTINELA AVE UC WIDENING, LA, FEBRUARY 18, 2009

GEOTECHNICAL DESIGN RECOMMENDATIONS FOR RETAINING WALLS 402, 408, 410, AND OVERHEAD SIGN 4A FOUNDATION FOR NORTH BOUND 405 WIDENING AT CULVER CITY, LA, NOVEMBER 26, 2007

FINAL HYDRAULIC REPORT FOR CENTINELA AVE UC/CENTINELA CREEK CHANNEL MODIFICATIONS, MARCH 5, 2008

FOUNDATION REVIEW FOR CENTINELA AVE UC WIDENING, FEBRUARY 24, 2009

FOUNDATION REVIEW FOR SEPULVEDA BLVD UC WIDENING, FEBRUARY 24, 2009

FOUNDATION REVIEW FOR RETAINING WALLS 402, 408, 410, AND OVERHEAD SIGN 4A, FEBRUARY 24, 2009

GEOTECHNICAL DESIGN REPORT FOR CENTINELA AVE UC WIDENING, LA, JUNE 23, 2009

GEOTECHNICAL DESIGN REPORT FOR SEPULVEDA BLVD UC WIDENING, LA, JUNE 23, 2009

BATTERY BACKUP SYSTEM CONNECTION DIAGRAMS AND FOUNDATION DETAILS

ROUTE: 07-LA-405-39.7/41.5

Linda S. Adams
Agency Secretary

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Arnold Schwarzenegger
Governor

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

· FILE copy for Nancy Pe.

Mr. Christopher Stevenson
California Department of Transportation
100 South Main Street
Los Angeles, CA 90012

WATER QUALITY CERTIFICATION FOR PROPOSED LA-405 AUXILIARY LANE (LA TIJERA BLVD. TO JEFFERSON BLVD.) PROJECT, CENTINELA CREEK CHANNEL, CITY OF CULVER CITY, LOS ANGELES COUNTY (File No. 08-067)

Dear Mr. Stevenson:

Board staff has reviewed your request on behalf of the California Department of Transportation (Applicant) for a Clean Water Act Section 401 Water Quality Certification for the above-referenced project. Your application was deemed complete on June 16, 2008.

I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 - DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges that have received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Certification.

The Applicant shall be liable civilly for any violations of this Certification in accordance with the California Water Code. This Certification does not eliminate the Applicant's responsibility to comply with any other applicable laws, requirements and/or permits.

Should you have questions concerning this Certification action, please contact Valerie Carrillo, Lead, Section 401 Program, at (213) 576-6759.

Chief Deputy E.O. for

Tracy J. Egoscue
Executive Officer

8-5-08
Date

DISTRIBUTION LIST

Bill Orme
State Water Resources Control Board
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Naeem Siddiqui
California Department of Fish and Game
Streambed Alteration Team
4949 View Ridge Avenue
San Diego, CA 92123

Kenneth Wong
U.S. Army Corps of Engineers
Regulatory Branch, Los Angeles District
P.O. Box 532711
Los Angeles, CA 90053-2325

Eric Raffini (via electronic copy)
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105

Jim Bartel
U.S. Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, CA 92009

ATTACHMENT A

Project Information
File No. 08-067

1. Applicant: California Department of Transportation
100 South Main Street
Los Angeles, CA 90012

Phone: (213) 897-0146 Fax: (213) 897-0685

2. Applicant's Agent: Christopher Stevenson

3. Project Name: LA-405 Auxiliary Lane (La Tijera Blvd. to Jefferson Blvd.)

4. Project Location: Culver City area, Los Angeles County

Longitude	Latitude:
118°23'25.24"	33°58'42.91"

5. Type of Project: 405 Freeway widening project

6. Project Purpose: This project is part of the larger effort to improve traffic and congestion along the busy 405 freeway corridor through West Los Angeles and the San Fernando Valley.

7. Project Description: This project proposes to widen the La Tijera Blvd. on-ramp of the 405 freeway. This work will impact the Centinela Creek Storm Water Channel, which drains into Ballona Creek, as drilling within the channel will be necessary for the footings of support beams.

Widening of the lane will require the construction of 15 support columns with cast-in-drill-hole piles within the Centinela Creek Channel. These columns will be constructed along the existing wall of the channel and are not expected to have significant effects on the downstream channel stability or flow. The channel is lined with concrete with no natural vegetation and seasonal rainy-scason flow, therefore, the primary concern would be to potential silts or spoils that could enter the channel during drilling.

ATTACH

Project Information
File No. 08-067

The construction will include the installation of 15 new support columns within the channel for the footings of the support columns. Drilling and construction equipment will be inside the channel during construction and low-flows will be diverted around the project work areas. Work will take place within the dry season between April 1st and October 1st.

8. Federal Agency/Permit:	U.S. Army Corps of Engineers NWP No. 14
9. Other Required Regulatory Approvals:	California Department of Fish and Game Streambed Alteration Agreement
10. California Environmental Quality Act Compliance:	The proposed project is Categorically Exempt from CEQA pursuant to the CEQA Guidelines, Section (e.g., 15302 Replacement or Reconstruction).
11. Receiving Water:	Centinela Creek Channel (Hydrologic Unit No. 405.15)
12. Designated Beneficial Uses:	MUN*, REC-1, REC-2, WARM, WILD *Conditional beneficial use
13. Impacted Waters of the United States:	Non-wetland waters (unvegetated streambed): 0.43 permanent acres (impacts within completely concrete-lined channel)
14. Dredge Volume:	None
15. Related Projects Implemented/to be Implemented by the Applicant:	The Applicant has not identified any related projects carried out in the last 5 years or planned for implementation in the next 5 years.

ATTACH

Project Information
File No. 08-067

16. Avoidance/ Minimization Activities:

The Applicant has proposed to implement several Best Management Practices, including, but not limited to, the following:

- Disturbing the existing slopes only when necessary;
- Minimizing cut and fill areas to reduce slope lengths;
- Incorporating retaining walls to reduce steepness of slopes or to shorten slopes;
- Avoiding soil formations that will be particularly difficult to re-stabilize; and
- Collecting concentrated flows in stabilized drains and channels. It is not feasible to relocate or realign the project to avoid impacts to the Centinela Creek Channel, however, every effort is made to implement an alternative that has the lowest impact.

Specific to this project
Alternatives have been explored!

17. Proposed Compensatory Mitigation:

The Applicant has not proposed any compensatory mitigation due to the temporary nature of impacts associated with the project and the location of the project within a concrete lined channel.

18. Required Compensatory Mitigation:

Since the project impacts are temporary in nature, the Regional Board will not require any additional compensatory mitigation.

See *Attachment B, Conditions of Certifications, Additional Conditions* for modifications and additions to the above proposed compensatory mitigation.

ATTACHMENT B

Conditions of Certification
File No. 08-067

STANDARD CONDITIONS

Pursuant to §3860 of Title 23 of the California Code of Regulations (23 CCR), the following three standard conditions shall apply to this project:

1. This Certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to §13330 of the California Water Code and Article 6 (commencing with 23 CCR §3867).

2. This Certification action is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent Certification application was filed pursuant to 23 CCR Subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. Certification is conditioned upon total payment of any fee required pursuant to 23 CCR Chapter 28 and owed by the Applicant.

ADDITIONAL CONDITIONS

Pursuant to 23 CCR §3859(a), the Applicant shall comply with the following additional conditions:

1. The Applicant shall submit to this Regional Board copies of any other final permits and agreements required for this project, including, but not limited to, the U.S. Army Corps of Engineers' (ACOE) Section 404 Permit and the California Department of Fish and Game's (CDFG) Streambed Alteration Agreement. **These documents shall be submitted prior to any discharge to waters of the State**.

2. The Applicant shall adhere to the most stringent conditions indicated with either this certification, the CDFG's Streambed Alteration Agreement, or the ACOE Section 404 Permit.

3. The Applicant shall comply with all water quality objectives, prohibitions, and policies set forth in the *Water Quality Control Plan, Los Angeles Region (1994).*

4. The Avoidance/Minimization activities proposed by the Applicant as described in Attachment A, No. **16**, are incorporated as additional conditions herein.

who approve? and what consist of this plan?

5. The Applicant and all contractors employed by the Applicant shall have copies of this Certification, the approved maintenance plan, and all other regulatory approvals for this project on site at all times and shall be familiar with all conditions set forth.

6. Fueling, lubrication, maintenance, operation, and storage of vehicles and equipment shall not result in a discharge or a threatened discharge to waters of the State. At no time shall the Applicant use any vehicle or equipment which leaks any substance that may impact water quality. Staging and storage areas for vehicles and equipment shall be located outside of waters of the State.

7. All excavation, construction, or maintenance activities shall follow best management practices to minimize impacts to water quality and beneficial uses. Dust control activities shall be conducted in such a manner that will not produce downstream runoff.

8. No construction material, spoils, debris, or any other substances associated with this project that may adversely impact water quality standards, shall be located in a manner which may result in a discharge or a threatened discharge to waters of the State. Designated spoil and waste areas shall be visually marked prior to any excavation and/or construction activity, and storage of the materials shall be confined to these areas.

9. All waste and/or dredged material removed shall be relocated to a legal point of disposal if applicable. A legal point of disposal is defined as one for which Waste Discharge Requirements have been established by a California Regional Water Quality Control Board, and is in full compliance therewith. Please contact Rodney Nelson, Land Disposal Unit, at (213) 620-6119 for further information.

Disposal of Drill Material

10. The Applicant shall implement all necessary control measures to prevent the degradation of water quality from the proposed project in order to maintain compliance with the Basin Plan. The discharge shall meet all effluent limitations and toxic and effluent standards established to comply with the applicable water quality standards and other appropriate requirements, including the provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act. This Certification does not authorize the discharge by the applicant for any other activity than specifically described in the 404 Permit.

11. The discharge shall not: a) degrade surface water communities and populations including vertebrate, invertebrate, and plant species; b) promote the breeding of mosquitoes, gnats, black flies, midges, or other pests; c) alter the color, create visual contrast with the natural appearance, nor cause aesthetically undesirable discoloration of the receiving waters; d) cause formation of sludge deposits; or e) adversely affect any designated beneficial uses.

12. The Applicant shall allow the Regional Board and its authorized representative entry to the premises, including all mitigation sites, to inspect and undertake any activity to determine compliance with this Certification, or as otherwise authorized by the California Water Code.

13. Application of pesticides must be supervised by a certified applicator and be in conformance with manufacturer's specifications for use. Compounds used must be appropriate to the target species and habitat. All pesticides directed toward aquatic species must be approved by the Regional Board. Pesticide utilization shall be in accordance with State Water Resources Control Board Water Quality Order Nos. 2004-0008-DWQ and 2004-0009-DWQ.

14. The Applicant shall not conduct any construction activities within waters of the State during a rainfall event. The Applicant shall maintain **a five-day (5-day) clear weather forecast** before conducting any operations within waters of the State.

15. If rain is predicted after operations have begun, grading activities must cease immediately and the site must be stabilized to prevent impacts to water quality, and minimize erosion and runoff from the site.

16. No activities shall involve wet excavations (i.e., no excavations shall occur below the seasonal high water table). A minimum **5-foot** buffer zone shall be maintained above the existing groundwater level. If construction or groundwater dewatering is proposed or anticipated, the Applicant shall file a **Report of Waste Discharge** to this Regional Board and obtain any necessary NPDES permits/Waste Discharge Requirements prior to discharging waste. Sufficient time should be allowed to obtain any such permits (generally 180 days). If groundwater is encountered without the benefit of appropriate permits, the Applicant shall cease all activities in the areas where groundwater is present, file a Report of Waste Discharge to this Regional Board, and obtain any necessary permits prior to discharging waste.

17. All project activities not included in this Certification, and which may require a permit, must be reported to the Regional Board for appropriate permitting. Bank stabilization and grading, as well as any other ground disturbances, are subject to restoration and revegetation requirements, and may require additional Certification action.

18. All surface waters, including ponded waters, shall be diverted away from areas undergoing grading, construction, excavation, vegetation removal, and/or any other activity which may result in a discharge to the receiving water. If surface water diversions are anticipated, the Applicant shall develop and submit a **Surface Water Diversion Plan** (plan) to this Regional Board. The plan shall include the proposed method and duration of diversion activities, structure configuration, construction materials, equipment, erosion and sediment controls, and a map or drawing indicating the locations of diversion and discharge points.

Contingency measures shall be a part of this plan to address various flow discharge rates. The plan shall be submitted prior to any surface water diversions. If surface flows are present, then upstream and downstream monitoring for the following shall be implemented:

- pH
- temperature
- dissolved oxygen
- turbidity
- total suspended solids(TSS)
- Downstream TSS shall be maintained at ambient levels
- Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases shall not exceed 20%. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

Analyses must be performed using approved US Environmental Protection Agency methods, where applicable. These constituents shall be monitored for on a daily basis during the first week of diversion and/or dewatering activities, and then on a weekly basis, thereafter, until the in-stream work is complete.

Results of the analyses shall be submitted to this Regional Board by the 15th day of each subsequent sampling month. A map or drawing indicating the locations of sampling points shall be included with each submittal. Diversion activities shall not result in the degradation of beneficial uses or exceedance of water quality objectives of the receiving waters. Any such violations may result in corrective and/or enforcement actions, including increased monitoring and sample collection.

19. The Applicant shall restore all area of TEMPORARY IMPACTS to waters of the United States and all other areas of temporary disturbance which could result in a discharge or a threatened discharge to waters of the State. Restoration shall include grading of disturbed areas to pre-project contours and revegetation with native species. Restored areas shall be monitored and maintained with native species as necessary for five years. The Applicant shall implement all necessary Best Management Practices to control erosion and runoff from areas associated with this project.

20. The Applicant shall submit to this Regional Board **a Final Project Report** (Annual Reports) by **January 1st** of the year following project completion. The Annual Reports shall describe in detail all of the project/construction activities performed during the previous year and all restoration and mitigation efforts; including percent survival by plant species and percent cover. The Annual Reports shall describe the status of other agreements (e.g., mitigation banking) and at a minimum the Annual Reports shall include the following:

    (a) Color photo documentation of the pre-and post-project and mitigation site conditions;

(b) Geographical Positioning System (GPS) coordinates in decimal-degrees format outlining the boundary of the project and mitigation areas;

(c) The overall status of project including a detailed schedule of work;

(d) Copies of all permits revised as required in Additional Condition 1;

(e) Water quality monitoring results for (as required) compiled in an easy to interpret format;

(f) A certified Statement of "no net loss" of wetlands associated with this project;

(g) Discussion of any monitoring activities and exotic plant control efforts; and

(h) A certified Statement from the permittee or his/her representative that all conditions of this Certification have been met.

21. Prior to any subsequent maintenance activities within the project areas, including clearing, maintenance by-hand, and/or the application of pesticides, the Applicant shall submit to this Regional Board a NOTIFICATION of any such activity. Notification shall include: (a) the proposed schedule; (b) a description of the existing condition/capacity; (c) the area of proposed temporary impact within waters of the State; (c) a description of any existing aquatic resources (e.g., wetland/riparian vegetation); and (d) any proposed compensatory mitigation. Notifications must be submitted a minimum of **three (3) weeks** prior to commencing work activities.

22. All applications, reports, or information submitted to the Regional Board shall be signed:

(a) For corporations, by a principal executive officer at least of the level of vice president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which discharge originates.

(b) For a partnership, by a general partner.

(c) For a sole proprietorship, by the proprietor.

(d) For a municipal, State, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

23. Each and any report submitted in accordance with this Certification shall contain the following completed declaration:

ATTACHMENT B

Conditions of Certification
File No. 08-067

"I declare under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who managed the system or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on the 12th day of August at Los Angeles, CA.

(Signature)
Senior Dist. Biologist (Title)"

24. All communications regarding this project and submitted to this Regional Board shall identify the Project File Number **08-067**. Submittals shall be sent to the attention of the 401 Certification Unit.

25. Any modifications of the proposed project may require submittal of a new Clean Water Act Section 401 Water Quality Certification application and appropriate filing fee.

26. Coverage under this Certification may be transferred to the extent the underlying federal permit may legally be transferred and further provided that the Applicant notifies the Executive Officer at least 30 days before the proposed transfer date, and the notice includes a written agreement between the existing and new Applicants containing a specific date of coverage, responsibility for compliance with this Certification, and liability between them.

27. The Applicant or their agents shall report any noncompliance. Any such information shall be provided verbally to the Executive Officer within 24 hours from the time the Applicant becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Applicant becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

28. *Enforcement:*

    (a) In the event of any violation or threatened violation of the conditions of this Certification, the violation or threatened violation shall be subject to any remedies,

penalties, process or sanctions as provided for under State law. For purposes of section 401(d) of the Clean Water Act, the applicability of any State law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this Certification.

(b) In response to a suspected violation of any condition of this Certification, the State Water Resources Control Board (SWRCB) or Regional Water Quality Control Board (RWQCB) may require the holder of any permit or license subject to this Certification to furnish, under penalty of perjury, any technical or monitoring reports the SWRCB deems appropriate, provided that the burden, including costs, of the reports shall be a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

(c) In response to any violation of the conditions of this Certification, the SWRCB or RWQCB may add to or modify the conditions of this Certification as appropriate to ensure compliance.

29. This Certification shall expire **five (5) years** from date of this Certification. The Applicant shall submit a complete application prior to termination of this Certification if renewal is requested.

ORIG.
RECV'd 3/2/09

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

February 3, 2009

REPLY TO
ATTENTION OF:
Office of the Chief
Regulatory Division

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT AUTHORIZATION

Christopher Stevenson
California Department of Transportation, District 7
100 South Main Street, Suite 100
Los Angeles, California 90012

Dear Mr. Stevenson:

This is in reply to your application (File No. SPL-2008-01015-PHT) dated May 21, 2008, for a Department of the Army Permit to discharge fill into waters of the U.S., in association with the addition of an auxiliary lane on northbound I-405 from the La Tijera Boulevard on-ramp to the Jefferson Boulevard off-ramp. The proposed work would take place in Centinela Creek within the City of Los Angeles, Los Angeles County, California, as depicted on the enclosed plans.

Based on the information you have provided, the Corps of Engineers has determined that your proposed activity complies with the enclosed terms and conditions of Nationwide Permit No. 14 for Linear Transportation Projects [Federal Register, March 12, 2007, pp. 11092-11198], as described in enclosure 1.

Specifically, you are authorized to:

1. Permanently impact 0.022 acre for the construction of 15 support columns with cast-in-drill-hole piles along an existing channel wall; and
2. Temporarily impact 0.43 acre between April 1st and November 1st for the placement of a water diversion, as depicted on the enclosed plans.

This letter of verification is valid through February 3, 2011. All nationwide permits expire on March 18, 2012. It is incumbent upon you to remain informed of changes to the nationwide permits. If the Corps of Engineers modifies, reissues, or

revokes any nationwide permit at an earlier date, we will issue a public notice announcing the changes.

A nationwide permit does not grant any property rights or exclusive privileges. Also, it does not authorize any injury to the property or rights of others or authorize interference with any existing or proposed Federal project. Furthermore, it does not obviate the need to obtain other Federal, state, or local authorizations required by law.

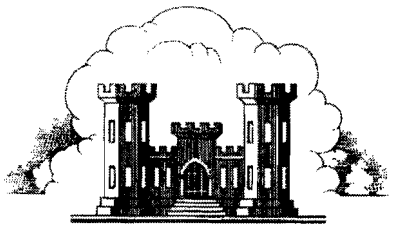
Thank you for participating in our regulatory program. If you have any questions, please contact Phuong Trinh of my staff at 213.452.3372 or via e-mail at Phuong.H.Trinh@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Mark D. Cohen
Deputy Chief, Regulatory Division

Enclosure



LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CERTIFICATION OF COMPLIANCE WITH
DEPARTMENT OF THE ARMY NATIONWIDE PERMIT

Permit Number: *SPL-2008-01015-PHT*

Name of Permittee: *California Department of Transportation, District 7*

Date of Issuance: *February 3, 2009*

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

U.S Army Corps of Engineers
Regulatory Division
ATTN: CESPL-RG-SPL-2008-01015-PHT
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

Please note that your permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to comply with this nationwide permit you may be subject to permit suspension, modification, or revocation procedures as contained in 33 CFR 330.5 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit condition(s).

Paul Cam _____ 3-9-09 _____

Signature of Permittee Date

Enclosure 1: NATIONWIDE PERMIT NUMBER 14 Linear Transportation Projects TERMS AND CONDITIONS

. **Nationwide Permit 14 Linear Transportation Projects Terms:**

Your activity is authorized under Nationwide Permit Number 14 Linear Transportation Projects subject to the following terms:

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars. Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404) Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

2. Nationwide Permit General Conditions:
The following general conditions must be followed in order for any authorization by an NWP to be valid:

1. *Navigation.*

   (a) No activity may cause more than a minimal adverse effect on navigation.

   (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

   (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. *Aquatic Life Movements.* No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

3. *Spawning Areas.* Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. *Migratory Bird Breeding Areas.* Activities in waters of the United States that serve as breeding areas for migratory birds must

be avoided to the maximum extent practicable.

5. *Shellfish Beds.* No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

6. *Suitable Material.* No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. *Water Supply Intakes.* No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. *Adverse Effects From Impoundments.* If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. *Management of Water Flows.* To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the preconstruction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. *Fills Within 100-Year Floodplains.* The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. *Equipment.* Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. *Soil Erosion and Sediment Controls.* Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. *Removal of Temporary Fills.* Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. *Proper Maintenance.* Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

15. *Wild and Scenic Rivers.* No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

16. *Tribal Rights.* No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

17. *Endangered Species.*

    (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

    (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add speciesspecific regional endangered species conditions to the NWPs. (e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at *http://www.fws.gov/* and *http://www.noaa.gov/fisheries.html* respectively.

18. *Historic Properties.*

(a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the preconstruction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete preconstruction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h–2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any

historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

19. *Designated Critical Resource Waters.* Critical resource waters include: NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

20. *Mitigation.* The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require preconstruction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory

mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

21. *Water Quality.* Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

22. *Coastal Zone Management.* In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

23. *Regional and Case-By-Case Conditions.* The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

24. *Use of Multiple Nationwide Permits.* The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

25. *Transfer of Nationwide Permit Verifications.* If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____ _____

(Transferee) (Date)

26. *Compliance Certification.* Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

27. *Pre-Construction Notification.*

(a) *Timing.* Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information,

then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity:

(1) Until notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) If 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) *Contents of Pre-Construction Notification*: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

(4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan;

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) *Form of Pre-Construction Notification*: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) *Agency Coordination*:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring preconstruction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the preconstruction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each preconstruction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

(5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

(e) *District Engineer's Decision*: In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either:

(1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit;

(2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or

(3) that the project is authorized under the NWP with specific modifications or conditions.

Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

28. *Single and Complete Project.* The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

3. Regional Conditions for the Los Angeles District:

In accordance with General Condition Number 23, "Regional and Case-by-Case Conditions," the following Regional Conditions, as added by the Division Engineer, must be met in order for an authorization by any Nationwide to be valid:

1. For coastal watersheds from the southern reach of the Santa Monica Mountains in Los Angeles County to the San Luis Obispo County/Monterey County boundary, all road crossings must employ a bridge crossing design that ensures passage and/or spawning of steelhead (*Oncorhynchus mykiss*) is not hindered in any way. In these areas, bridge designs that span the stream or river, including designs for pier- or pile-supported spans, or designs based on use of a bottomless arch culvert simulating the natural stream bed (i.e., substrate and streamflow conditions in the culvert are similar to undisturbed stream bed channel conditions) shall be employed unless it can be demonstrated the stream or river does not support resources conducive to the recovery of federally listed anadromous salmonids, including migration of adults and smolts, or rearing and spawning. This proposal also excludes approach embankments into the channel unless they are determined to have no detectable effect on steelhead.

2. For the State of Arizona and the Mojave and Sonoran (Colorado) desert regions of California in Los Angeles District (generally north and east of the San Gabriel, San Bernardino, San Jacinto, and Santa Rosa mountain ranges, and south of Little Lake, Inyo County), no nationwide permit, except Nationwide Permits 1 (Aids to Navigation), 2 (Structures in Artificial Canals), 3 (Maintenance), 4 (Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities), 5 (Scientific Measurement Devices), 6 (Survey Activities), 9 (Structures in Fleeting and Anchorage Areas), 10 (Mooring Buoys), 11 (Temporary Recreational Structures), 20 (Oil Spill Cleanup), 22 (Removal of Vessels), 27 (Stream and Wetland Restoration Activities), 30 (Moist Soil Management for Wildlife), 31 (Maintenance of Existing Flood Control Projects), 32 (Completed Enforcement Actions), 35 (Maintenance Dredging of Existing Basins), 37 (Emergency Watershed Protection and Rehabilitation), 38 (Cleanup of Hazardous and Toxic Waste) and 47 (Pipeline Safety Program Designated Time Sensitive Inspections and Repairs), or other nationwide or regional general permits that specifically authorize maintenance of previously authorized structures or fill, can be used to authorize the discharge of dredged or fill material into a jurisdictional special aquatic site as defined at 40 CFR Part 230.40-45 (sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle-and-pool complexes).

3. For all projects proposed for authorization by nationwide or regional general permits where prior notification to the district engineer is required, applicants must provide color photographs or color photocopies of the project area taken from representative points documented on a site map. Pre-project photographs and the site map would be provided with the permit application. Photographs should represent conditions typical or indicative of the resources before impacts.

4. Notification pursuant to general condition 27 shall be required for projects in all special aquatic sites as defined at 40 CFR Part 230.40-45 (sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle-and-pool complexes), and in all perennial waterbodies in the State of Arizona and the Mojave and Sonoran (Colorado) desert regions of California in Los Angeles District (generally north and east of the San Gabriel, San Bernardino, San Jacinto, and Santa Rosa mountain ranges, and south of Little Lake, Inyo County), excluding the Colorado River from Davis Dam downstream to the north end of Topock and downstream of Imperial Dam (Federal Register dated March 12, 2007 (72 FR 11092) - regional conditions requiring notification do not apply to Nationwide Permit 47).

5. Notification pursuant to general condition 27 shall be required for projects in all areas designated as Essential Fish Habitat by the Pacific Fishery Management Council (i.e., all tidally influenced areas - Federal Register dated March 12, 2007 (72 FR 11092), regional conditions requiring notification do not apply to Nationwide Permit 47).

6. Notification pursuant to general condition 27 shall be required for projects in all watersheds in the Santa Monica Mountains in Los Angeles and Ventura counties bounded by Calleguas Creek on the west, by Highway 101 on the north and east, and by Sunset Boulevard and Pacific Ocean on the south (Federal Register dated March 12, 2007 (72 FR 11092) - regional conditions requiring notification do not apply to Nationwide Permit 47).

7. Individual permits shall be required for all discharges of fill material in jurisdictional vernal pools.

8. Individual permits shall be required in Murrieta Creek and Temecula Creek watersheds in Riverside County for new

permanent fills in perennial and intermittent watercourses otherwise authorized under NWPs 29, 39, 42 and 43, and in ephemeral watercourses for these NWPs for projects that impact greater than 0.1 acre of waters of the United States. In addition, when NWP 14 is used in conjunction with residential, commercial, or industrial developments the 0.1 acre limit would also apply.

9. Individual permits shall be required in San Luis Obispo Creek and Santa Rosa Creek in San Luis Obispo County for bank stabilization projects, and in Gaviota Creek, Mission Creek and Carpinteria Creek in Santa Barbara County for bank stabilization projects and grade control structures.

10. Notification pursuant to general condition 27 shall be required for projects in the Santa Clara River watershed in Los Angeles and Ventura counties, including but not limited to Aliso Canyon, Agua Dulce Canyon, Sand Canyon, Bouquet Canyon, Mint Canyon, South Fork of the Santa Clara River, San Francisquito Canyon, Castaic Creek, Piru Creek, Sespe Creek and the main-stem of the Santa Clara River (Federal Register dated March 12, 2007 (72 FR 11092) - regional conditions requiring notification do not apply to Nationwide Permit 47).

4. **Further information:**

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:
   ( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
   (x) Section 404 of the Clean Water Act (33 U.S.C. 1344).
   ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.
   (a) This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
   (b) This permit does not grant any property rights or exclusive privileges.
   (c) This permit does not authorize any injury to the property or rights of others.
   (d) This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
   (a) Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
   (b) Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
   (c) Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
   (d) Design or construction deficiencies associated with the permitted work.
   (e) Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

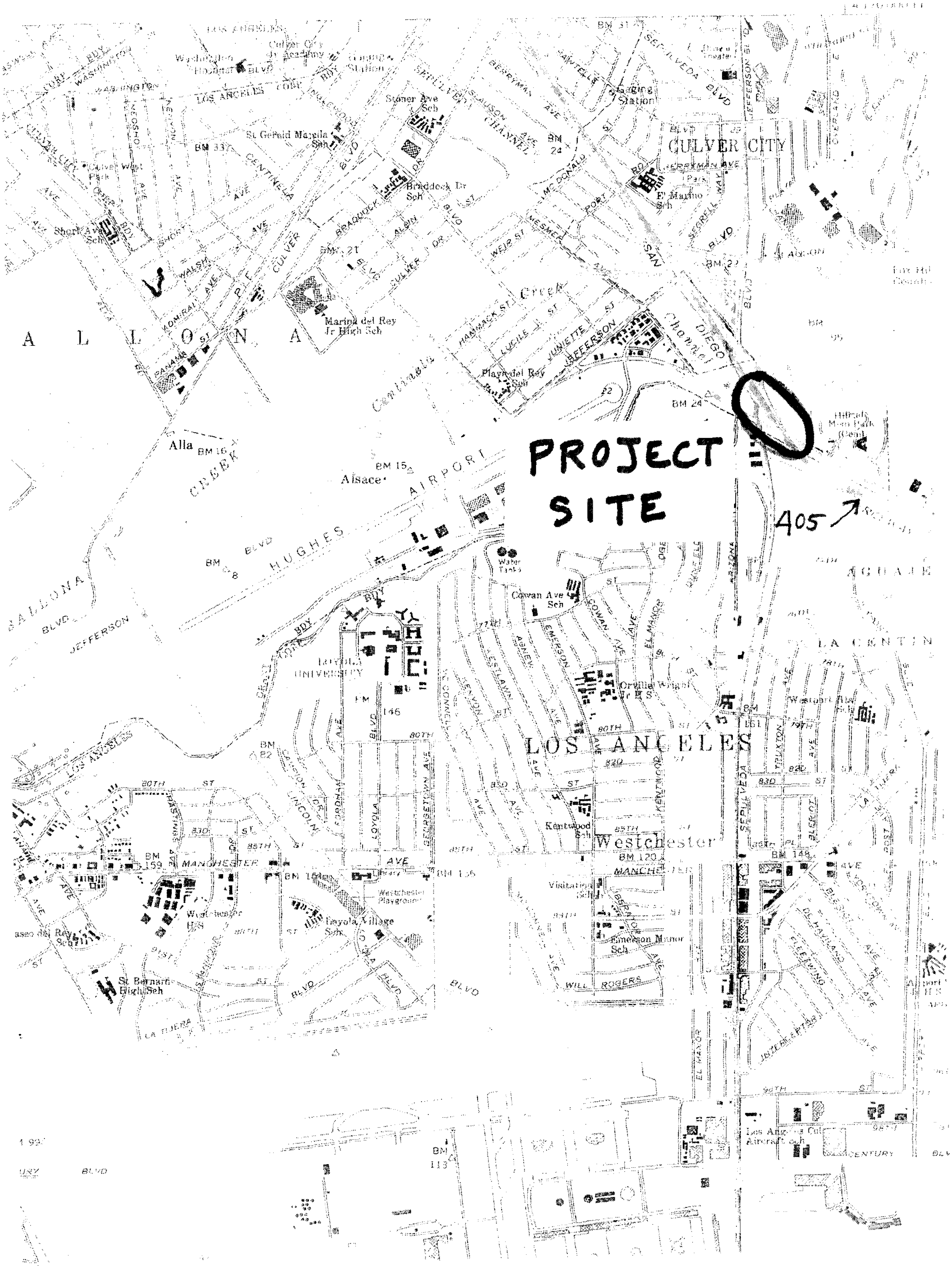
5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
   (a) You fail to comply with the terms and conditions of this permit.
   (b) The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
   (c) Significant new information surfaces which this office did not consider in reaching the original public interest decision.

   Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 330.5 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. This letter of verification is valid for a period not to exceed two years unless the nationwide permit is modified, reissued, revoked, or expires before that time.

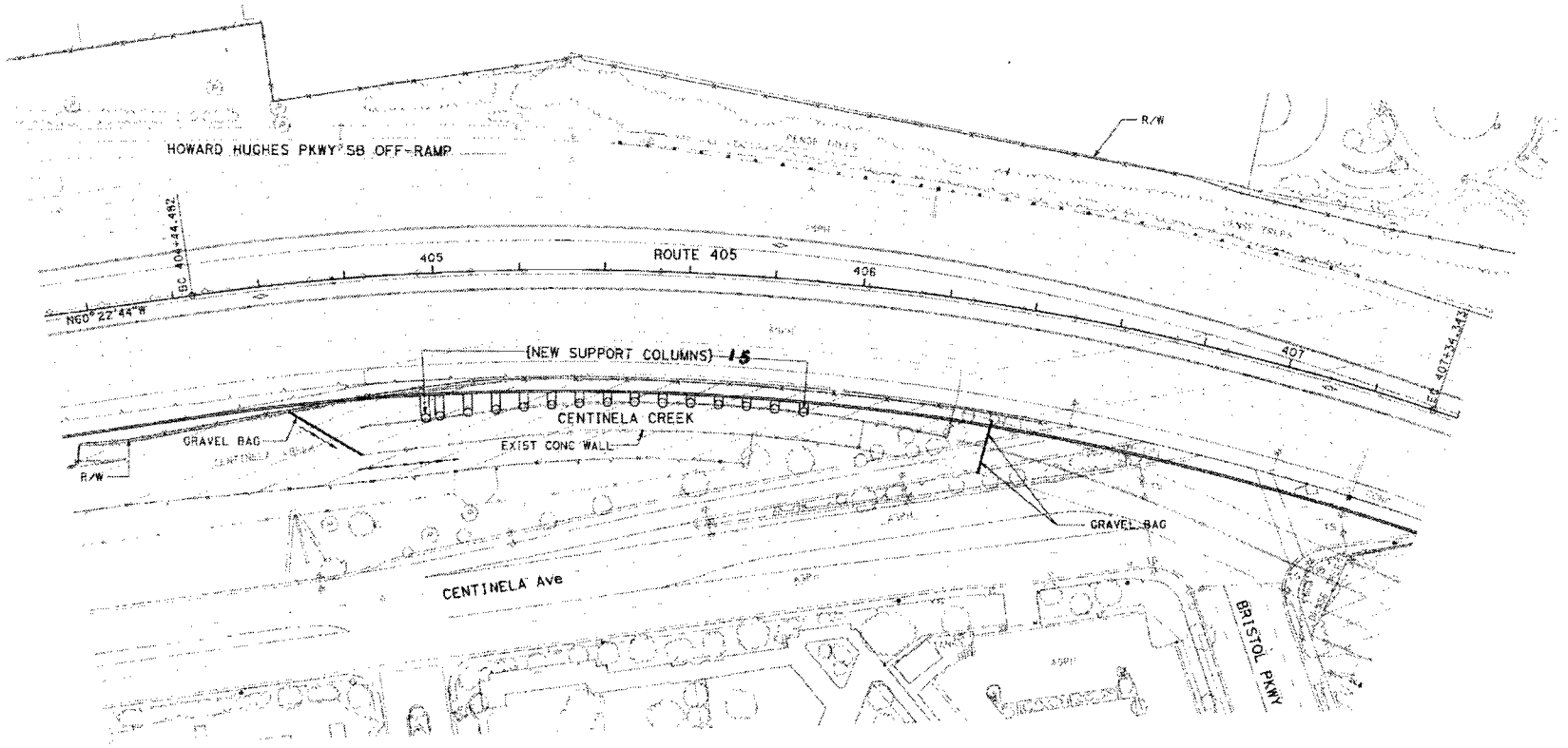
7. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition H below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

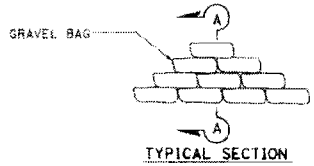
8. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.


PROJECT SITE
405
CULVER CITY
LOS ANGELES
Westchester
LOYOLA UNIVERSITY
HUGHES
AIRPORT
BALLONA
CREEK
SAN DIEGO
Channel
SEPULVEDA
MANCHESTER
AVE
JEFFERSON
BLVD
Marina del Rey Jr High Sch
Playa del Rey Sch
Cowan Ave Sch
Kentwood Sch
Visitation Sch
Emerson Manor Sch
Westchester H S
Loyola Village Sch
St Bernard High Sch
Westchester Playground
Braddock Dr Sch
Stoner Ave Sch
El Marino Sch
Short Ave Sch
Water Tanks
Los Angeles Col Aircraft Sch
Alla
Alsace
WILL ROGERS
CENTURY
LA TIJERA

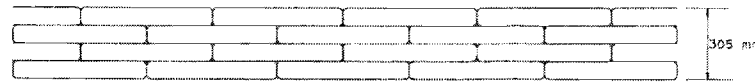
NOTE:

GRAVEL BAG ROWS AND LAYERS SHALL BE STAGGERED TO ELIMINATE GAPS





TYPICAL SECTION
NO SCALE



SECTION A-A
NO SCALE

ALL DIMENSIONS ARE IN METERS
UNLESS OTHERWISE SHOWN

CONSTRUCTION DETAIL

Diverge Water Flow in the Channel During Construction

SCALE 1:500

C-6

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA		39.65/41.47		

REGISTERED CIVIL ENGINEER — DATE

NGIM NANCY PE No. 58161 CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE 6-30-08

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.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans OFFICE OF DESIGN A

FUNCTIONAL SUPERVISOR: NGIM NANCY PE
CALCULATED-DESIGNED BY: ANDREW LY
CHECKED BY: NGIM NANCY PE
REVISED BY
DATE REVISED

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => A123321
DGN FILE => 7241.30gd06.dgn

CU 07225

EA 241.30

LAST REVISION DATE PLOTTED => 25 APR 2008
00-00-00 TIME PLOTTED => 14:58

State of California - The F urces Agency ARN SCHWARZENEGGER, Governor
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
4949 Viewridge Avenue
San Diego, CA 92123
(858) 467-4201

July 9, 2008

Mr. Christopher Stevenson
California Department of Transportation
100 South Main Street
Los Angeles, California 90012

Re: Notification of Lake or Streambed Alteration
Notification No. 1600-2008-0155-R5
Project: I-405 Addition to Auxiliary Lane at La Tijera Blvd.
Water: Centinela Creek, tributary to Ballona Creek

Dear Mr. Stevenson:

Your notification was deemed complete on May 9, 2008 by the Department, the Department had until July 8, 2008, to submit a Draft Lake or Streambed Alteration Agreement to you or inform you that an agreement is not required. Due to staffing constraints, the Department was unable to meet that date. As a result, by law, you may now complete the project described in your notification without an agreement. In doing so, however, the project must be the same one and conducted in the same manner as described in the notification package. That includes completing the project within the proposed term and seasonal work period and implementing all mitigation and avoidance measures to protect fish and wildlife resources specified in the notification. (Fish and Game Code section 1602(a)(4)(D).

If your project differs from the one described in the notification, including dates you may be in violation of Fish and Game Code section 1602. Also, even though you are entitled to complete the project without an agreement, you are still responsible for complying with all other applicable local, state, and federal laws, including, for example, the state and federal Endangered Species Acts and Fish and Game Code sections 5650 (water pollution) and 5901 (fish passage).

Finally, you must have a copy of this letter *and* your notification with all attachments available at all times at the work site. If you have any questions regarding this matter, please contact me at (562)493-6897.

Sincerely,

Naeem Siddiqui
Environmental Scientist, Region 5

COPY 5/6/08

FOR DEPARTMENT USE ONLY				
Date Received	Amount Received	Amount Due	Date Complete	Notification No
	$	$		

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Complete EACH field, unless otherwise indicated, following the enclosed instructions and submit ALL required enclosures. Attach additional pages, if necessary.

1. APPLICANT PROPOSING PROJECT

Name	California Dept. of Transportation		
Business/Agency	Department of Environmental Planning		
Street Address	100 S. Main St.		
City, State, Zip	Los Angeles, CA. 90012		
Telephone		Fax	
Email			

2. CONTACT PERSON (*Complete only if different from applicant*)

Name	Christopher Stevenson-Dept. of Environmental Planning		
Street Address	100 S. Main St.		
City, State, Zip	Los Angeles, CA. 90012		
Telephone	(213) 897-0146	Fax	(213) 897-2593
Email	christopher_stevenson@dot.ca.gov		

3. PROPERTY OWNER (*Complete only if different from applicant*)

Name			
Street Address			
City, State, Zip			
Telephone		Fax	
Email			

4. PROJECT NAME AND AGREEMENT TERM

A. Project Name	I-405 Addition to Auxiliary Lane
B. Agreement Term Requested	☑ Regular (*5 years or less*) ☐ Long-term (*greater than 5 years*)

C. Project Term		D. Seasonal Work Period		E. Number of Work Days
Beginning (*year*)	Ending (*year*)	Start Date (*month/day*)	End Date (*month/day*)	
2009	2011	12/04	05/12	420.00

5. AGREEMENT TYPE

Check the applicable box. If box B, C, D, or E is checked, complete the specified attachment.	
A.	☑ Standard *(Most construction projects, excluding the categories listed below)*
B.	☐ Gravel/Sand/Rock Extraction (*Attachment A*) *Mine I.D. Number:* _____
C.	☐ Timber Harvesting (*Attachment B*) THP *Number:* _____
D.	☐ Water Diversion/Extraction/Impoundment (*Attachment C*) *SWRCB Number:* _____
E.	☐ Routine Maintenance (*Attachment D*)
F.	☐ DFG Fisheries Restoration Grant Program (FRGP) *FRGP Contract Number:* _____
G.	☐ Master
H.	☐ Master Timber Harvesting

6. FEES

Please see the current fee schedule to determine the appropriate notification fee. Itemize each project's estimated cost and corresponding fee. ***Note: The Department may not process this notification until the correct fee has been received.***

	A. Project	B. Project Cost	C. Project Fee
1	I-405 Addition to Auxiliary Lane	$23,000,000.00	$4,000.00
2			
3			
4			
5			
		D. Base Fee *(if applicable)*	
		E. TOTAL FEE ENCLOSED	$4,000.00

7. PRIOR NOTIFICATION OR ORDER

A. Has a notification previously been submitted to, or a Lake or Streambed Alteration Agreement previously been issued by, the Department for the project described in this notification?

☐ Yes (*Provide the information below*) ☑ No

Applicant: _____ Notification Number: _____ Date: _____

B. Is this notification being submitted in response to an order, notice, or other directive ("order") by a court or administrative agency (including the Department)?

☑ No ☐ Yes (*Enclose a copy of the order, notice, or other directive. If the directive is not in writing, identify the person who directed the applicant to submit this notification and the agency he or she represents, and describe the circumstances relating to the order.*)

☐ *Continued on additional page(s)*

8. PROJECT LOCATION

A. Address or description of project location.

(Include a map that marks the location of the project with a reference to the nearest city or town, and provide driving directions from a major road or highway)

405 Freeway at La Tijera Blvd., between the Northbound on-ramp (Post mile 24.64) and Jefferson Blvd. Northbound off-ramp (Post mile 25.77) in the city of Culver City, Los Angeles County.

Thomas Guide pg. 672, H-7

Opp. Hillside Memorial Park & Mort. 6001 Centinela Ave.

☐ *Continued on additional page(s)*

B. River, stream, or lake affected by the project.	Centinela Creek
C. What water body is the river, stream, or lake tributary to?	Ballona Creek
D. Is the river or stream segment affected by the project listed in the state or federal Wild and Scenic Rivers Acts?	☐ Yes ☑ No ☐ Unknown
E. County	Los Angeles

F. USGS 7.5 Minute Quad Map Name	G. Township	H. Range	I. Section	J. ¼ Section
Venice	Culver City	14W	T.2.S.	19

☐ *Continued on additional page(s)*

K. Meridian (*check one*) ☐ Humboldt ☐ Mt. Diablo ☑ San Bernardino

L. Assessor's Parcel Number(s)

N/A

☐ *Continued on additional page(s)*

M. Coordinates (*If available, provide at least latitude/longitude or UTM coordinates and check appropriate boxes*)

Latitude/Longitude	*Latitude:* 33,58,42.91	*Longitude:* 118,23, 25.57.	
	☑ Degrees/Minutes/Seconds	☐ Decimal Degrees	☐ Decimal Minutes
UTM	*Easting:*	*Northing:*	☐ Zone 10 ☐ Zone 11
Datum used for Latitude/Longitude or UTM	☑ NAD 27	☐ NAD 83 or WGS 84	

9. PROJECT CATEGORY AND WORK TYPE *(Check each box that applies)*

PROJECT CATEGORY	NEW CONSTRUCTION	REPLACE EXISTING STRUCTURE	REPAIR/MAINTAIN EXISTING STRUCTURE
Bank stabilization – bioengineering/recontouring	☐	☐	☐
Bank stabilization – rip-rap/retaining wall/gabion	☐	☐	☐
Boat dock/pier	☐	☐	☐
Boat ramp	☐	☐	☐
Bridge	☐	☐	☐
Channel clearing/vegetation management	☐	☐	☐
Culvert	☐	☐	☐
Debris basin	☐	☐	☐
Dam	☐	☐	☐
Diversion structure – weir or pump intake	☐	☐	☐
Filling of wetland, river, stream, or lake	☐	☐	☐
Geotechnical survey	☐	☐	☐
Habitat enhancement – revegetation/mitigation	☐	☐	☐
Levee	☐	☐	☐
Low water crossing	☐	☐	☐
Road/trail	☐	☐	☐
Sediment removal – pond, stream, or marina	☐	☐	☐
Storm drain outfall structure	☐	☐	☐
Temporary stream crossing	☐	☐	☐
Utility crossing : Horizontal Directional Drilling	☐	☐	☐
Jack/bore	☐	☐	☐
Open trench	☐	☐	☐
Other *(specify)*: Widen On-ramp	■	☑	☐

10. PROJECT DESCRIPTION

A. Describe the project in detail. Photographs of the project location and immediate surrounding area should be included.

- Include any structures (e.g., rip-rap, culverts, or channel clearing) that will be placed, built, or completed in or near the stream, river, or lake.
- Specify the type and volume of materials that will be used.
- If water will be diverted or drafted, specify the purpose or use.

Enclose diagrams, drawings, plans, and/or maps that provide all of the following: site specific construction details; the dimensions of each structure and/or extent of each activity in the bed, channel, bank or floodplain; an overview of the entire project area (i.e., "bird's-eye view") showing the location of each structure and/or activity, significant area features, and where the equipment/machinery will enter and exit the project area.

This project involves the addition of an auxilary lane from the two-laned La Tijera norhtbound off-ramp to a three-lanes at the ramp terminal.
The proposed structure widening requires suppoft columns to be constructed in the Centinela Creek. This includes placing columns inside the concreted-lined storm water channel, where the freeway runs parrallel to the channel (see Construction Details, General Plan #3, Deck Drainage Detail #2).

Drilling will be necessary to install the new support columns at the interface of the box channel dividers.

Drilling will be restricted to the NON-RAINY SEASON (April 1 to November 1). The drilling spoils will be removed and hauled away.

The inside channel of the creek will be blocked off during drilling and construction with gravel bags
(see Construction Detail - Diverge Water to Flow).

Access into the creek of heavy equipment for drilling and construction will be required. Drilling rigs and other heavy equipment will be crane lowered into channel. Drill spoils will be lifted (bucketed) out to dump trucks outside of the creek. (Access via Private Property immediately adjacent to project site- Right of Way Application in process).

An access road / area exists along the channel (LACDWP - Flood Control District Access).
See Map provided in ATTACHMENT A.

☐ *Continued on additional page(s)*

B. Specify the equipment and machinery that will be used to complete the project.

Backhoe, Truck Mounted Drill Rig, Clamshell, Dump Trucks, Crane, Concrete Trucks, Various small pick up Trucks

☐ *Continued on additional page(s)*

C. Will water be present during the proposed work period (specified in box 4.D) in the stream, river, or lake (specified in box 8.B).	☐ Yes ☑ No (*Skip to box 11*)
D. Will the proposed project require work in the wetted portion of the channel?	☐ Yes (*Enclose a plan to divert water around work site*) ☐ No

11. PROJECT IMPACTS

A. Describe impacts to the bed, channel, and bank of the river, stream, or lake, and the associated riparian habitat. Specify the dimensions of the modifications in length (linear feet) and area (square feet or acres) and the type and volume of material (cubic yards) that will be moved, displaced, or otherwise disturbed, if applicable.

No permenant impacts to any riparian habitat (non present). This is an Concrete Lined channel that is void of natural water flow during the year, and is a stormwater channel. No riparian vegetation within the channel or adjacent. The permanent impact are from drilling and pouring concrete for the new support columns.
Permenant Impacted area = 0.002 Acres, 107 Square Feet
Temporary Impacted area = 0.466 Acres, 20,300 Square Feet

☐ *Continued on additional page(s)*

B. Will the project affect any vegetation? ☐ Yes (*Complete the tables below*) ☑ No

Vegetation Type	Temporary Impact	Permanent Impact
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____

Tree Species	Number of Trees to be Removed	Trunk Diameter (range)

☐ *Continued on additional page(s)*

C. Are any special status animal or plant species, or habitat that could support such species, known to be present on or near the project site?

☐ Yes *(List each species and/or describe the habitat below)* ☑ No ☐ Unknown

☐ *Continued on additional page(s)*

D. Identify the source(s) of information that supports a "yes" or "no" answer above in Box 11.C.

Dept. of Fish & Game: California Natural Diversity Database

☐ *Continued on additional page(s)*

E. Has a biological study been completed for the project site?

☑ Yes (*Enclose the biological study*) ☐ No

Note: A biological assessment or study may be required to evaluate potential project impacts on biological resources.

F. Has a hydrological study been completed for the project or project site?

☑ Yes (*Enclose the hydrological study*) ☐ No

Note: A hydrological study or other information on site hydraulics (e.g., flows, channel characteristics, and/or flood recurrence intervals) may be required to evaluate potential project impacts on hydrology.

12. MEASURES TO PROTECT FISH, WILDIFE, AND PLANT RESOURCES

A. Describe the techniques that will be used to prevent sediment from entering watercourses during and after construction.

Contractor will supply a Stormwater Pollution Prevention Plan prior to start of construction.
SWPPP to include standard stormwater BMP's to control of siltration from drilling within channel.

Temporary diversion (with Gravel bags), of the inner most channel to divert any water within the inside channel during the drilling period (see Construction Detail C-6 /Diversion of Water Flow)

☐ *Continued on additional page(s)*

B. Describe project avoidance and/or minimization measures to protect fish, wildlife, and plant resources.

Work within the Centinella Creek will be limited to non-rainy season (April 1 to Nov. 1)

☐ *Continued on additional page(s)*

C. Describe any project mitigation and/or compensation measures to protect fish, wildlife, and plant resources.

No impacts to fish, wildlife or plant resources

☐ *Continued on additional page(s)*

13. PERMITS

List any local, state, and federal permits required for the project and check the corresponding box(es). Enclose a copy of each permit that has been issued.

A. Army Corp. of Engineers - Nationwide Permi (JD form) ☑ Applied ☐ Issued

B. California Regional Water Quality Control Board ☑ Applied ☐ Issued

C. _____ ☐ Applied ☐ Issued

D. Unknown whether ☐ local, ☐ state, or ☐ federal permit is needed for the project. (*Check each box that applies*)

☐ *Continued on additional page(s)*

14. ENVIRONMENTAL REVIEW

A. Has a draft or final document been prepared for the project pursuant to the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), California Endangered Species Act (CESA) and/or federal Endangered Species Act (ESA)?

☑ Yes (*Check the box for each CEQA, NEPA, CESA, and ESA document that has been prepared and enclose a copy of each*)

☐ No (*Check the box for each CEQA, NEPA, CESA, and ESA document listed below that will be or is being prepared*)

☑ Notice of Exemption	☐ Mitigated Negative Declaration	☑ NEPA document (*type*): CE
☐ Initial Study	☐ Environmental Impact Report	☐ CESA document (*type*):
☐ Negative Declaration	☐ Notice of Determination (*Enclose*)	☐ ESA document (*type*):
☐ THP/ NTMP	☐ Mitigation, Monitoring, Reporting Plan	

B. State Clearinghouse Number (*if applicable*)			
C. Has a CEQA lead agency been determined?	☐ Yes (*Complete boxes D, E, and F*)	☐ No (*Skip to box 14.G*)	
D. CEQA Lead Agency	Cal-Trans		
E. Contact Person	Skylar Feltman	F. Telephone Number	(213) 897-2984

G. If the project described in this notification is part of a larger project or plan, briefly describe that larger project or plan.

I-405 Widening between Culver City and 101 Freeway.

☐ *Continued on additional page(s)*

H. Has an environmental filing fee (Fish and Game Code section 711.4) been paid?

☑ Yes (*Enclose proof of payment*) ☐ No (*Briefly explain below the reason a filing fee has not been paid*)

Check enclosed

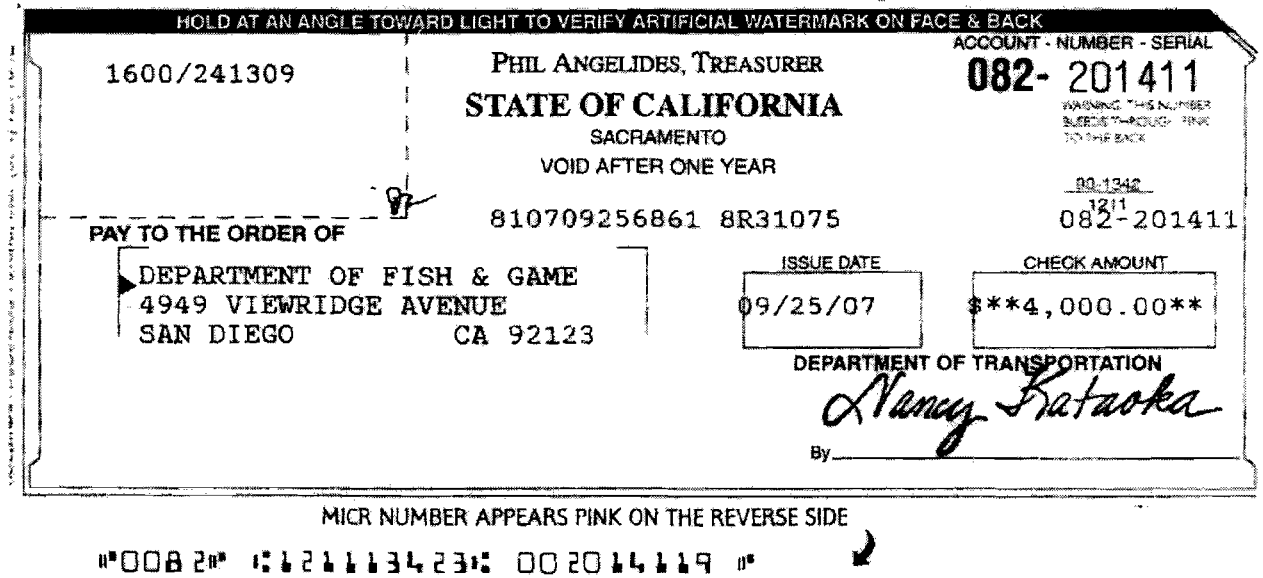
Note: If a filing fee is required, the Department may not finalize a Lake or Streambed Alteration Agreement until the filing fee is paid.

15. SITE INSPECTION

Check one box only.

☐ In the event the Department determines that a site inspection is necessary, I hereby authorize a Department representative to enter the property where the project described in this notification will take place at any reasonable time, and hereby certify that I am authorized to grant the Department such entry.

☐ I request the Department to first contact (*insert name*) _____ at (*insert telephone number*) _____ to schedule a date and time to enter the property where the project described in this notification will take place. I understand that this may delay the Department's determination as to whether a Lake or Streambed Alteration Agreement is required and/or the Department's issuance of a draft agreement pursuant to this notification.



HOLD AT AN ANGLE TOWARD LIGHT TO VERIFY ARTIFICIAL WATERMARK ON FACE & BACK

1600/241309

PHIL ANGELIDES, TREASURER

STATE OF CALIFORNIA

SACRAMENTO

VOID AFTER ONE YEAR

ACCOUNT - NUMBER - SERIAL

082- 201411

WARNING THIS NUMBER SHOULD PRODUCE PINK TO THE BACK

00-1342

810709256861 8R31075

1211
082-201411

PAY TO THE ORDER OF

DEPARTMENT OF FISH & GAME
4949 VIEWRIDGE AVENUE
SAN DIEGO CA 92123

ISSUE DATE: 09/25/07

CHECK AMOUNT: $**4,000.00**

DEPARTMENT OF TRANSPORTATION

Nancy Kataoka

By

MICR NUMBER APPEARS PINK ON THE REVERSE SIDE

⑈0082⑈ ⑆121113423⑆ 00201411⑈

Tract #:

Issued By:
Issued Date:

Permit #: **PCFL T200502217**

FOR BIDDING PURPOSES ONLY

Permit Office: 6

PC-MODIFIC
MODIFICATION OF FLOOD
CONTROL FACILITY

COUNTY OF LOS ANGELES-DPW
Department Of Public Works
Alhambra, CA 91803 - (626)458-3129

Flood Control District Permit

Individual's / Company Name	Address / City, State Zip	Work Phone	Home Phone
(APP) STATE OF CALIFORNIA, DOT MIKE NOURI	100 S. MAIN ST., STE 100, MS 1 LOS ANGELES, CA 90012	213-897-6362	
(CNT) TBD			

Emergency Contact

Location

Site Address:

Description: CENTINELA CREEK CHANNEL: CENTINELA AVENUE

Scope of Work

PERMIT PURPOSES:

FOR BIDDING PURPOSES ONLY. NOT FOR CONSTRUCTION

TO AUTHORIZE THE WORK DESCRIBED BELOW AFFECTING THE SUBJECT STREAM IN ACCORDANCE WITH THE SUBMITTED PLANS, LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DRAWING Nos. 190-F192.1-.19 (LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DRAWING Nos. PF544574-592.)

WORK DESCRIPTION:
TO WIDEN CENTINELA AVENUE UC BRIDGE PER SUBMITTED PLANS.

WORK WITHIN DISTRICT'S RIGHT OF WAY SHALL NOT COMMENCE UNTIL AN INSPECTION DEPOSIT OF $25,000 HAS BEEN PAID, CONTRACTOR HAS PROVIDED CONTACT INFORMATION AND LIABILITY INSURANCE, AND FALSEWORK PLANS HAVE BEEN APPROVED BY THE DISTRICT.

NO WORK IS ALLOWED IN OR AFFECTING THE CHANNEL BETWEEN OCTOBER 15 AND APRIL 15.

PERMITTEE MUST NOTIFY PERMIT OFFICE No. 3 (7:00 AM TO 3:30 PM) AT TELEPHONE (310) 649-6300 AT LEAST 24 HOURS BEFORE STARTING WORK UNDER THIS PERMIT. FAILURE TO SO NOTIFY THE PERMIT OFFICE IS CAUSE FOR REVOCATION OF PERMIT. SHOULD PERMITTEE FAIL TO TAKE ACTION WITHIN 180 DAYS FROM DATE OF ISSUANCE OF THIS PERMIT OR FAIL TO ACTIVELY AND DILIGENTLY EXERCISE THE PRIVILEGES OF THIS PERMIT, THE PERMIT BECOMES NULL AND VOID.

A COPY OF THIS PERMIT SHALL BE KEPT AT THE WORK SITE DURING ALL PERIODS OF OPERATION WITHIN THE DISTRICTS RIGHT OF WAY AND SHALL BE SHOWN TO ANY DISTRICT REPRESENTATIVE OR LAW ENFORCEMENT OFFICER UPON DEMAND.

CC: Design (Chang, Zandieh)
Flood Maintenance (South)
Mapping and Property Management (Hernandez, Rothman)
Construction (Office, P.O. #3, Houmsi)

Permit Detail

FILE CODE NO. :	190.032
FLOOD FACILITY NAME :	CENTINELA CREEK CHANNEL
INSPECTION PCA :	C200502217
LOCATION 1:	CENTINELA AVENUE
THOMAS GUIDE :	672-H7

Comments

PCFL T200502217

REPORT: lapwrp028

Tract #:

Issued By:
Issued Date:

Permit #: **PCFL T200502217**

FOR BIDDING PURPOSES ONLY

Permit Office: 6

Fees	Fee Code	Acount Code	Amount
ACTUAL COST DEP FOR PLN CHK AND/OR INSP	PCACTFLD	B07_8371	$25,000.00
PLN CK OF CAL TRANS PROJ.-FCD R/W-NO FEE	PCADOTPLCK	B07_8371	$0.00
		Total Fees:	$25,000.00

Is hereby permitted to complete scope of work on the public highways subject to provisions required by County of Los Angeles Highway Permit Ordinance (Division 1 of Title 16, Los Angeles County Code), the Municipal Code, and City Ordinance governing the area where this work is to be done, and the attachments hereon specified. Permit revocable at option of Public Works Director, in consideration of granting of this permit, it is agreed by the applicant that the County of Los Angeles and/or the city wherein the permit work is to be performed and any of their officers or employees thereof shall be saved harmless by the applicant from any liability or responsibility for any accident, loss, or damage to persons or property, happening occurring as the proximate result of any of the work undertaken under the terms of this application and the permit or permits which may be granted in response thereto, and that all of said liabilities are hereby assumed by the applicant, it is further agreed that if any part of this installation interferes with the future use of the highway by the general public, it must be removed or relocated, asdesignated by the Director of Public Works or Superintendent of Streets, at the expense of the permittee of his successor in interest. The permit is void if the permittee is not in compliance with Section 3800 of the Labor Code

Performance of the work of activity under this permit is tantamount to agreeing to the conditions of this permit, Copy of this permit shall be kept at work site during period of operation within District's/Road right of way and shall be shown to District's representative or any law enforcement officer upon demand.

INSPECTION REQUIRED

CALL PERMIT OFFICER 24 HOURS BEFORE STARTING WORK UNDER THIS PERMIT. FAILURE TO DO SO IS CAUSE FOR REVOCATION OF THIS PERMIT. THIS PERMIT IS VOID IF WORK NOT STARTED IN 60 DAYS (FOR ROAD PERMIT) OR 180 DAYS (FOR FLOOD PERMIT) FROM THE DATE OF THE ISSUANCE.

PERMIT OFFICE NO. PCHQ
PUBLIC WORKS CONSTRUCTION
900 S. Fremont Ave.
Los Angeles County, CA 91803
PHONE NO. 626-458-3129
FAX NO. 626-576-7739

PCFL T200502217

REPORT: lapwrp028

Conditions of Approval
By Permit

Run Date: Monday March 15, 2010 5:19 p

Permit: PCFL - T200502217

The following Conditions of Approval are required to complete the permit:

Condition of Approval	Entered	By	Completed	By
GENERAL FLOOD PROVISION NO. 1	15-MAR-10	HHOUMSI		
Use of District's right of way for the construction or activity authorized under this permit is tantamount to agreeing to the conditions herein.(G1)				
GENERAL PROVISION NO.2	15-MAR-10	HHOUMSI		
Permittee shall be responsible for notifying his contractor and all subcontractors of the provisions of this permit. No work will be started until a copy of this permit is given to the contractor and each of his subcontractors. Further, the copy will be left at the site of the work being done by each contractor.(G2)				
GENERAL PROVISION NO.3	15-MAR-10	HHOUMSI		
Permittee is notified that in accordance with the STATE OF CALIFORNIA CONSTRUCTION SAFETY ORDERS, Section 1503, the permittee or his contractor may be required to acquire a permit from CAL/OSHA if the work authorized herein more than 5 feet deep. The inspection provided by the District can in no way be construed as a safety inspection.(G3)				
GENERAL PROVISION NO. 4	15-MAR-10	HHOUMSI		
Unless otherwise indicated in this permit, all work authorized by this permit shall conform to the latest edition of the Standard Specifications for Public Work Construction, as amended, and published by Building News, Inc., 3055 Overland Avenue, Los Angeles, CA 90034 and the latest edition of the Los Angeles County Department of Public Works "Additions and Amendments to the Standard Specifications for Public Works Construction".(G4)				
GENERAL PROVISION NO.5	15-MAR-10	HHOUMSI		
This permit is subject to such further conditions as the Director or his representative may issue during the period of this use. When possible, such additional conditions shall be promptly delivered in writing to the address shown on page one of this permit. Conditions delivered orally of necessity shall be promptly confirmed in writing.(G5)				
GENERAL PROVISION NO.8	15-MAR-10	HHOUMSI		
Issuance of this permit shall not be construed as an obligation on the part of this District for the operation and maintenance of the proposed facilities.(G8)				
GNERAL PROVISION NO. 13	15-MAR-10	HHOUMSI		
The District reserves the right to order the removal of all equipment if District's activities so require. The District assumes no responsibility for any loss to permittee's equipment or personnel's.(G13)				
GENERAL PROVISION NO. 14	15-MAR-10	HHOUMSI		
Upon completion of work authorized under this permit, permittee shall restore the area to the satisfaction of the District's representative.(G14)				
GENERAL PROVISION NO.16	15-MAR-10	HHOUMSI		
Permittee shall take the necessary precautionary measures to prevent dust or other nuisances which might be created by reason of his activities.(G16)				
GENERAL PROVISION NO. 17	15-MAR-10	HHOUMSI		
Permittee shall keep District right of way clear of obstructions for through access at all times and shall not interfere with the activities of the District's employees or the District's contractors.(G17)				
GENERAL PROVISION NO. 18	15-MAR-10	HHOUMSI		
Permittee shall not use District's right of way for the temporary or permanent storage of excavated materials, rock, sand, cement, or other material or any equipment, except as specifically noted.(G18)				
GENERAL PROVISION NO. 24	15-MAR-10	HHOUMSI		
During the period of operations conducted under the permit, Permittee shall maintain in effect an insurance policy (minimum limit $ONE million) naming the Los Angeles County Flood Control District/Los Angeles County Department of Public Works and/or U.S. Army Corps of Engineers as co-insured with respect to these operations. A copy of this policy shall be submitted to the District for inclusion in the District file copy of this permit. Expiration or cancellation of the insurance policy shall constitute revocation of this permit.(G24)				
GENERAL PROVISION NO. 35	11-MAR-10	HHOUMSI		
Permittee shall submit a copy of the as-built drawings for the completed construction authorized by this permit.(G35)				
GENERAL PROVISION NO. 47	11-MAR-10	HHOUMSI		
Permittee shall be prepared to remove all material or equipment upon short notice when required for operation and maintenance. Permittee's use of heavy equipment within the right of way is specifically prohibited.(G47)				
PROVISION OVERBUILT NO. 01	15-MAR-10	HHOUMSI		
The inspection fee deposited with the District is the estimated cost to inspect the work authorized under this permit. Should the actual cost be more than the amount deposited permittee shall submit the difference to the District upon receipt of a written request. In no case will the fee for the actual cost inspection be less than $600. Actual cost will include cost to the District for inspector's time, if required; interim and/or actual cost inspection; and the connection fees to District's facilities, where applicable.(O1)				

Conditions of Approval
By Permit

Run Date: Monday March 15, 2010 5:19 p

Permit: PCFL - T200502217

The following Conditions of Approval are required to complete the permit:

Condition of Approval	Entered	By	Completed	By
PROVISION OVERBUILT NO. 02	15-MAR-10	HHOUMSI		
Permittee shall submit in writing the name and telephone number of individual(s) authorized to request interim and/or inspections. Should permittee fail to provide same. it is understood that permittee's contractor has the authority to request inspections. Cost for said inspections will be taken from the amount deposited for actual cost inspection as set forth in the paragraph above.(O2)				
PROVISION WORK IN CHANNEL NO.1	15-MAR-10	HHOUMSI		
During the storm season. from October 15 to April 15: a. No portion of the channel shall be obstructed. b. No openings in the channel invert or side walls will be permitted.(W1)				
PROVISION WORK IN CHANNEL NO.3	15-MAR-10	HHOUMSI		
Plans and calculations of any falsework or cofferdam to be placed within the channel waterway area must be submitted to this District for review and approval at least 30 days prior to installation.(W3)				
PROVISION WORK IN CHANNEL NO.7	15-MAR-10	HHOUMSI		
Permittee shall not allow any primary fallout of sandblasting material or paint residue to fall onto the flowing water under any conditions. Any material accidentally deposited in this area shall be removed immediately by the permittee prior to any further painting or sandblasting operations.(W7)				
PROVISION WORK IN CHANNEL NO.14	15-MAR-10	HHOUMSI		
All work in the channel must be accomplished during the period between April 15 and October 15.(W14)				
PROVISION WORK IN CHANNEL NO.15	15-MAR-10	HHOUMSI		
Permittee shall not allow any material/debris to fall into the flowing water under any conditions. Any material/debris accidentally deposited in this area shall be removed immediately by the permittee prior to any further work on the bridge.(W15)				
PROVISION FENCING NO.1	15-MAR-10	HHOUMSI		
Should it become necessary to cut the District's right of way fence. permittee shall properly brace fence in accordance with the District's standards and to the satisfaction of the District's representative.(F1)				
PROVISION FENCING NO.2	15-MAR-10	HHOUMSI		
Upon completion of work authorized under this permit. permittee shall repair District's right of way fence to the satisfaction of the District's representative. Security fencing shall be provided across any opening in the fence at the end of each day's work.(F2)				
PROVISION FENCING NO.4	15-MAR-10	HHOUMSI		
Fencing shall be installed/replaced in accordance with the American Public Works Association Standard Drawing 600-0 (F4)				
PROVISION POLUTION NO. 02	15-MAR-10	HHOUMSI		
Permittee shall be responsible for the selection and implementation of Best Management Practices (BMP's) for construction activities. If the Director or authorized representative determines that additional BMP's or corrective steps for existing ones are necessary. permittee shall immediately comply with the requests. (P2)				

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS

Date: 03/15/2010
Permit No: PCFL T200502217

STANDARD FLOOD CONTROL PERMIT PROVISIONS

A. This permit is valid only for the purpose specified herein. No change of purpose as outlined in application or drawings submitted with application is permitted except upon written permission of the Chief Engineer or his representative.

B. Activities and uses authorized under this permit are subject to any instructions of the Chief Engineer or his representative. **ALL INSTRUCTIONS MUST BE STRICTLY OBSERVED.**

C. Permittee shall assume entire responsibility for all activities and uses under this permit and shall save the District and Los Angeles County free and harmless from any and all expense, cost, or liability in connection with or resulting from the exercise of this permit including, but not limited to, property damage, personal injury, and wrongful death.

D. Any damage caused to Flood Control structures by reason of exercise of this permit shall be repaired, at the permittee's sole expense, to the satisfaction of the District. Should the permittee neglect to promptly make repairs, the District may perform such work or have others perform the work, and the permittee agrees to reimburse the District for all costs of the work so performed upon receipt of a statement thereof.

E. Any structure or portions thereof or plantings placed on District rights of way or which affect District structures must be removed, revised, and/or relocated by permittee without cost to the District, or any other public agency the District shall so designate, should future activities or policy so require.

F. This permit is valid only to the extent of District jurisdiction. Acquisition of permits required by other affected agencies and consent of underlying fee owner(s) of District easement lands are the responsibility of the permittee. **NOTHING CONTAINED IN THIS PERMIT SHALL BE CONSTRUED AS A RELINQUISHMENT OF ANY RIGHTS NOW HELD BY THE DISTRICT.**

G. This permit is subject to all prior unexpired permits, agreements, easements, privileges, or other rights, whether recorded or unrecorded, in the area specified by this permit. Permittee shall make his own arrangements with holders of such prior rights.

H. Unless otherwise specified herein, this permit may be revoked or canceled at any time by the Chief Engineer or his representative when required for District purposes.

I. Upon written notice of cancellation or revocation of this permit for any cause whatsoever, permittee shall restore District right of way and structures to their condition prior to the issuance of the permit and then shall vacate District property. Should permittee neglect to restore the premises or structures to a condition satisfactory to the Chief Engineer or his representative, the District may perform such work or have others perform the work, and the permittee agrees to reimburse the District for all costs of the work so performed upon receipt of a statement thereof.

J. In the event of a District employee work stoppage, the Chief Engineer or his representative reserves the right to suspend all activity authorized under this permit which requires inspection by the District. Activity authorized by the permit shall not resume until District approval to do so is given.

K. Unless otherwise specifically provided, all costs incurred by permittee as a result of the conditions of the permit or exercise by District of any right, authority, or reservation contained therein shall be the sole responsibility of and shall be borne entirely by the permittee.

State of California — Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MATT HOLM
Chief
Bridge Design Branch 12

Date: 11/26/07

File: 07-LA-405-KP40.97
07-241301
BR53-1254

Attention: Leon Valla

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Report for Sepulveda Blvd UC Widening , LA

This is the Geotechnical Design Report (GDR) for the proposed widening of Sepulveda Blvd Undercrossing (UC), which is planned as a part of highway widening from KP39.3 to KP41.4 of northbound 405, in Culver City, Los Angeles County. The project site is shown on the Vicinity Map (Figure 1) of the Attachments.

The geotechnical recommendations presented in this report are based on results of field reconnaissance, literature study, subsurface exploration, laboratory testing of the soil samples recovered from subsurface exploration, and geotechnical analyses for the proposed improvement. The bridge information is presented in Table 1 below.

Table 1. Information of Existing Bridge

Bridge Name	Bridge No.	KiloPost	Number of Spans	Existing Foundation Type (close to future widening)	Proposed Foundation Type
Sepulveda Ave UC	53-1254	40.97	4	Spread Footings	CIDH Piles

Regional Geology

The site is located on the Coastal Plain of Los Angeles County and is considered part of the Peninsular Range geomorphic province of California, and underlain by a thick sequence of marine and non-marine unconsolidated sediments. According to the *Geologic Map of California, Long Beach Sheet,* the proposed improvement is located within a region of quaternary dune sand deposits of recent age. The geologic map of this area is shown on Figure 2 of Attachments.

Seismicity

The site is close to a number of faults that are considered to be active or potentially active. The information of adjacent faults which could impact the proposed improvement is presented in Table

2 below. According to the Caltrans' Seismic Map (Figure 3, Attachments), the peak bedrock acceleration (PBA) at the subject site is expected to be 0.6 g.

Table 2 Fault Information

Fault Name	Fault Type	Distance to Site	Maximum Creditable Event (MCE)
Charnock Fault (CNK)	Strike-Slip	0.6 km Southwest	6.5
Newport-Inglewood-Rose Canyon Fault (NIE)	Strike-Slip	2.6 km Northeast	7.0

However based on Sadigh et al (1997), the estimated medium PBA of the site from CNK and NIE are 0.7g and 0.6g respectively. Based on the results of recent subsurface investigation, the soil profile can be defined as type D ($15 < N < 50$). Considering the near fault effect (Seismic Design Criteria 1.1, Caltrans, July 1999), the compound ARS curves based on both CNK and NIE were plotted in Figure 3 of the Attachment. The interception period (T_0) of two curves is about 0.24 seconds. That is:

- For the fundamental period of structure less than 0.24 seconds, ARS for CNK (MCE = 6.5, PBA = 0.7 g) will control;
- For the fundamental period higher than 0.24 seconds, modified ARS for NIE (MCE = 7.0, PBA = 0.6 g) will control the seismic design.

Liquefaction

The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level (MSL) based on the readings (3/13/2007 and 4/23/2007) from the piezometers installed at B-1, B-4, and B-6, which is above the bottom of proposed structural foundation. However, according to our subsurface exploration, foundation soils below the groundwater table are generally dense to very dense as interpreted from relatively high SPT N values. Therefore, the effects of potential liquefaction on the proposed structural foundations due to seismic event is negligible.

Seismic Induced Settlement

Seismic compaction under earthquake event is also negligible due to observed high soil density and relatively high fine content within foundation soils.

Ground Rupture

No active faults are known to transverse the project site, and the site is not located within currently designated Alquist-Priolo Earthquake Fault Zone. As such, ground rupture hazard will not be a consideration for the bridge design.

Scour Evaluation

Scour should not be of a concern for bridge foundation design, since the proposed bridge replacement is not located within flowing stream or unlined creek channel.

Subsurface Exploration

The subsurface exploration consisted of advancing test boreholes using mud rotary to depths of 16.0 m to 32.8 m below the existing grade at the locations tabulated on the table below. The boring plans are presented in Figures 4-1 and 4-2 of the Attachments.

Table 3. Summary of Soil Exploration Plan
(Sepulveda Blvd UC Widening, 07-LA-405-KP40.97, EA: 07-241301)

Bridge No.	Boring No.	Station	Offset (m)	Ground Elevatrion (m)	Borehole Depth (m)	Equipment / Exploration Method	Hammer Type/ Energy Efficiency
53-1253	B-1	410+05	57.0R	10.4	28.2	CME85 / Mud Rotary	Auto/0.87
	B-2	409+66	23.4R	17.5	32.8	CME85 / Mud rotary	Auto/0.87
	B-3	408+51	25.0R	18.6	16.0	CME85 / Mud Rotary	Auto/0.87

Drilling and Sampling

Standard penetration tests (SPT) were conducted in general accordance with ASTM D1586. Disturbed bulk samples were recovered for corrosion testing. Relatively undisturbed soil samples were sealed by plastic caps/tapes in brass rings to prevent moisture loss and transported to Caltrans' Soil Laboratory for testing.

Drilled holes were backfilled with on-site soil upon completion of sampling and testing. For the borings on highway and city streets, the drill holes were backfilled with onsite soil to 2.5 cm below pavement subgrade elevation, and then backfilled to pavement finished grade with tamped asphalt concrete cold patch.

Laboratory Test

Laboratory tests that include moisture-density determinations (California Test Method (CTM) 226), particle size analysis (CTM 203), direct-shear testing of undisturbed soil specimens (CTM 222), Atterberg limits (CTM204), and corrosion tests (CTM 417, 422, and 424) were performed. Some of the test results are summarized in Table 4 below.

Table 4. Summary of Laboratory Test Results
(Sepulveda Blvd UC Widening, 07-LA-405-KP40.97, EA: 07-241301)

Boring No.	Depth (m)	Group Symbol	Field Moisture Content (%)	Dry Unit Weight (kN/M3)	Direct Shear Test		Atterberg Limits (LL/PI)	Other Field Test	
					ϕ (Degree)	c (kPa)		PP# (tsf)	SPT
B-1	3.6-3.8	SP	10.5	15.6	36.9	33.3	N/A	N/A	N/A
	12.7-12.9	SM	21.0	16.4	36.8	87.1	N/A	N/A	N/A
B-3	11.1-11.4	CL	13.8	19.0	30.4	53.1	N/A	N/A	N/A
	11.3-12.5	CL	N/A	N/A	N/A	N/A	27/13	2.5	N/A
	14.0-14.6	CL	N/A	N/A	N/A	N/A	28/12	2.5	N/A
	14.6-15.2	CL	N/A	N/A	N/A	N/A	32/17	2.5	N/A

Corrosion Test

For corrosion evaluation, bulk samples were recovered from selected boreholes and tested for pH value, and minimum electrical resistivity. The tests for sulfate and chloride are usually not conducted unless the resistivity of the sample soil is 1000 Ohm-cm or less. Where resistivity is greater than 1000 Ohm-cm, the soil is considered not corrosive.

According to the test results, the subsurface soil for the proposed bridge widening is considered non-corrosive. The corrosion test results are summarized in the following table (Table 4).

Table 5. Corrosion Test Results

Boring Number	Depth of Sample (m)	pH	Soluble Sulfates	Soluble Chlorides	Minimum Resistivity
B-2	12.5 - 12.8	7.58	N/A	N/A	2000 ohm-cm
B-2	17.7 - 20.1	6.10	N/A	N/A	1500 ohm-cm
B-3	3.4 - 9.1	8.11	N/A	N/A	2300 ohm-cm
B-3	9.5 - 11.0	6.98	N/A	N/A	2100 ohm-cm
Caltrans Criteria for Non-corrosive Area		> 5.5	< 2000 PPM	< 500 PPM	> 1000 Ohm-cm

Subsurface Condition

The subsurface materials below the natural grade are mostly composed of medium dense to very dense sand, silty sand, and sandy silt with scattered interbeds of lean clay within the upper 8 m of the native soils. The materials for embankment fill generally consists of medium dense to dense sand, silty sand and clayey sand with 0.6 m thick stiff lean clay layer from 1.8 to 2.4 m below the existing pavement grade.

Subsurface condition for structural foundation was summarized in Tables 6 below.

Table 6. Subsurface Information for Sepulveda Blvd UC (BR53-1254)

Reference Boring	B-1		Boring Location		Stationing	410+05	Elevation (m)	10.4
					Offset (m)	57.0 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0	4.6	10.4	5.8	Poorly Graded SAND (SP). Medium dense			
2	4.6	5.8	5.8	4.6	Silty SAND (SM), Medium Dense			
3	5.8	9.5	4.6	0.9	Poorly Graded SAND (SP). Medium dense to dense			
4	7.9	9.5	2.5	0.9	SILT with Sand (ML). Dense			
5	9.5	10.4	0.9	0	Well graded SAND (SW). Very Dense			
6	10.4	28.2	0	-17.8	Silty SAND (SM), Very Dense			

Reference Boring	B-2		Boring Location		Stationing	409+66	Elevation (m)	17.5
					Offset (m)	23.4 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.2	1.8	17.3	15.7	Silty SAND (SM), Medium dense			
2	1.8	2.4	15.7	15.1	Sandy Lean CLAY (CL), Hard			
3	2.4	4.0	15.1	13.5	Clayey SAND (SC), Medium dense			
4	4.0	6.7	13.5	10.8	Poorly Graded SAND with Clay (SP-SC), Medium dense			
5	6.7	11.0	10.8	6.5	Silty SAND (SM), Medium dense to dense			
6	11.0	15.9	6.5	1.6	Sandy SILT (ML), Dense			
7	15.9	20.0	1.6	-2.5	Poorly graded SAND (SP). Very dense.			
8	20.0	21.6	-2.5	-4.1	Well graded SAND (SW). Very Dense			
9	21.6	32.8	-4.1	-15.3	Silty SAND (SM), Very dense			

Table 6 continued …

Reference Boring	B-3		Boring Location		Stationing	408+51	Elevation (m)	18.6
					Offset (m)	25.0 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.2	1.8	18.4	16.8	Silty SAND (SM), Loose			
2	1.8	2.3	16.8	16.3	Sandy Lean CLAY (CL), Stiff			
3	2.3	9.1	16.3	9.5	Silty SAND (SM), Dense			
4	9.1	10.1	9.5	8.5	Poorly Graded SAND (SP), Medium Dense			
5	10.1	12.5	8.5	6.1	Sandy Lean CLAY (CL), Very Stiff			
6	12.5	14.0	6.1	4.6	Silty SAND (SM). Medium dense			
7	14.0	15.2	4.6	3.4	Sandy Lean CLAY (CL), Very Stiff			
8	15.2	16.0	3.4	2.6	Silty SAND with Clay (SM-SC), Medium dense			

* Groundwater is at 3.7 m above Mean Sea Level according to the well readings at B-1 (3/13/07, 4/23/07)
Shaded area indicates embankment fill materials

Foundation Design

Axial Pile Capacity

Cast-in-drilled-hole (CIDH) piles are suggested as structural foundation of the proposed bridge replacement. The design of CIDH piles has been performed on the basis of shaft friction, neglecting the end bearing. The pile ultimate friction capacities were obtained using the procedures outlined by Reese and O'Neil (1988).

Long term settlement will not be a concern for the widened portion of the bridge foundation. The immediate settlement for individual piles and pile group under the service load is expected to be less than 25 mm.

Pile Lateral Analysis at Bents

The lateral analysis was performed using LPILE PLUS 5.0 for the 1.5 m diameter CIDH piles at Bents 2 to 4 of Sepulveda Ave UC (widen). Based on the pile dimension and soil profiles, the p-y curves were obtained, and presented in the Attachments of this memo.

Geotechnical Recommendations

1) Based on the subsurface exploration, The Soil Profile Type for the subject bridge should be classified as Type D. The recommended ARS Curve is shown in Figure 3 of the Attachments.

2) The foundation soils for the bridge are classified as non-corrosive to reinforced concrete according to the corrosion test results of selected soil samples from the field.

3) CIDH piles were recommended for the bridge foundation. Due to the high groundwater table, wet method may be used for pile installation, which requires a minimum pile diameter of 0.6 m. Table 7 summarized the suggested pile tip elevation based on the design load for the abutment and required nominal resistance for the bents.

Table 7 Pile Data Table for Sepulved Blvd UC Widening (53-1254)

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Bent 2	1500 mm	N/A	5250kN	N/A	10.30	5.50	-7.50 (1)	-7.50
Bent 3	1500 mm	N/A	5250 kN	N/A	10.50	5.50	-7.50 (1)	-7.50
Bent 4	1500 mm	N/A	5250 kN	N/A	10.20	5.50	-7.50 (1)	-7.50
Abut 1	600 mm	750 kN	1500 kN	N/A	14.80	13.15	0.65 (1)	0.65

Note: Design tip elevations are controlled by the following demands: (1) Compression; (2) Tension; (3) Lateral Loads.

Construction Considerations

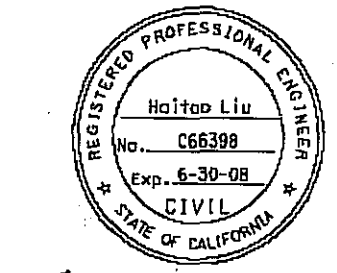
1) The groundwater was measured at 3.7 m above Mean Sea Level based on the readings from the piezometers installed at B-1, which is above the proposed structural foundations. Wet (drilling slurry) method should be used wherever groundwater is encountered to stabilize the drilled hole during pile installation. In addition, the contractor should have temporary casing on-site, and have readily available equipment and techniques to remedy soil cave-in, according to Section 49-4.03 of *Standard Specification (July 1999)*.

2) Temporary casing, if used, must be removed during CIDH pile installation. Oscillating and spinning temporary casing will potentially reduce pile skin friction. Should the above method be used for casing installation, this office must be notified to provide further recommendations.

3) Pile construction sequence is important for pile groups with center-to-center (CTC) spacing equal to or less than three times of pile diameter. Construction of adjacent piles should be performed only after the Portland cement concrete of the previously installed piles properly set and developed adequate strength.

If you have any question, please contact Haitao Liu at (916) 227-0992.

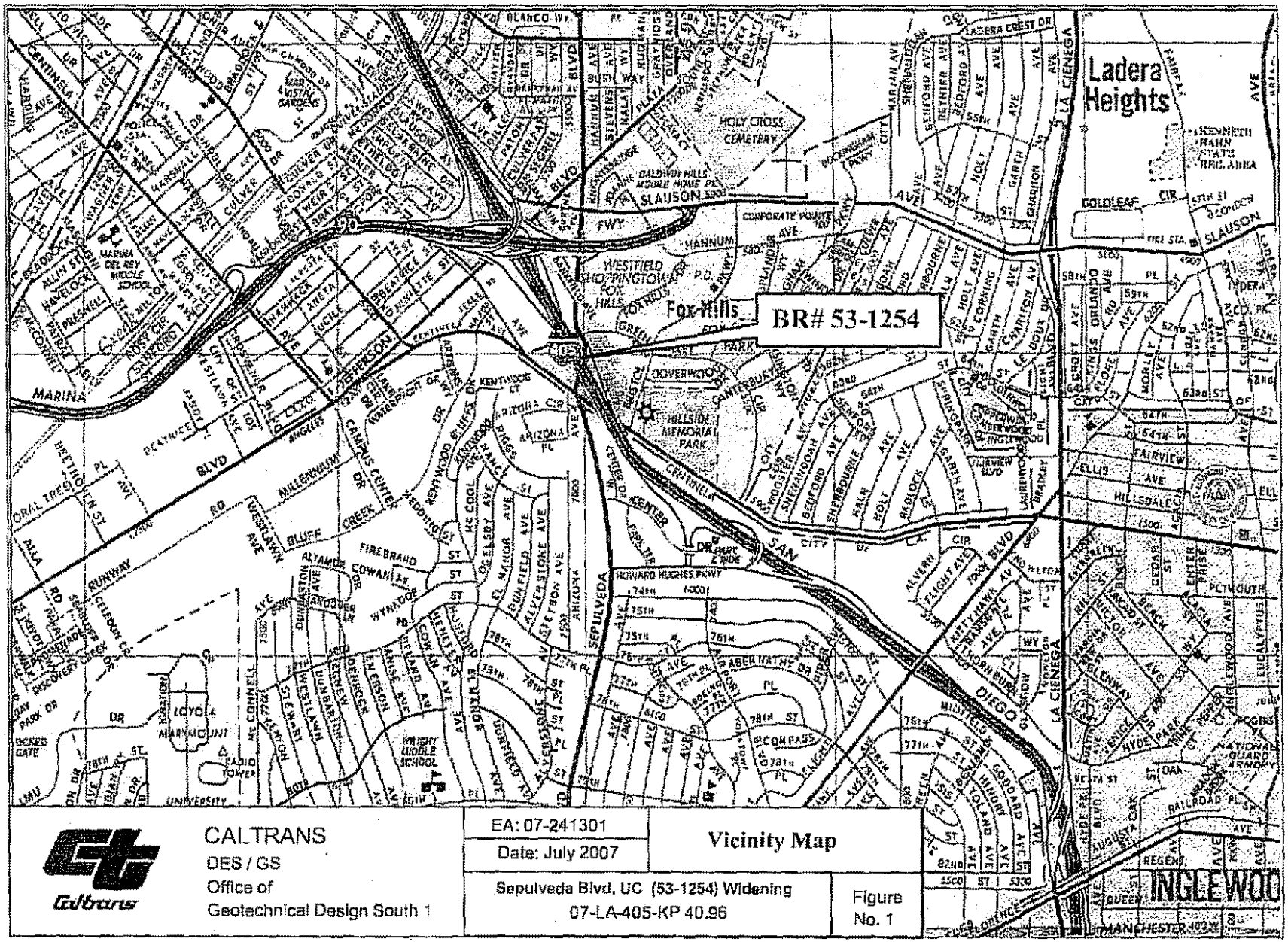
Prepared by: Date: 11/26/2007



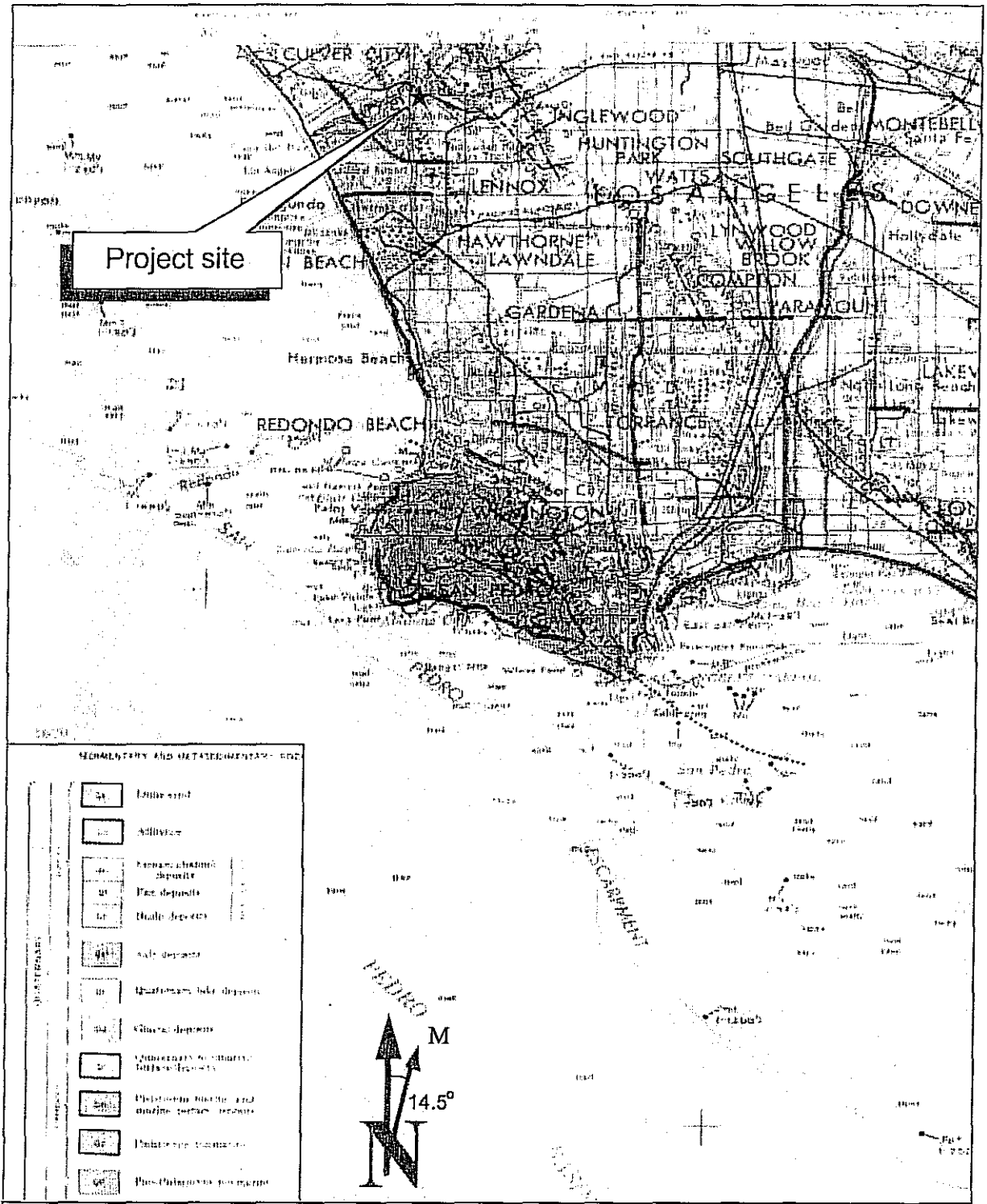
Haitao Liu, P.E. C66398
Transportation Engineer, Civil
Branch A / OGDS-1

Cc: OGDS1 - Sacramento
OGDS1 – L.A.
GS - File Room
Deh-Jeng Jang (OGDS-1)

ATTACHMENTS



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Vicinity Map**
	Sepulveda Blvd. UC (53-1254) Widening 07-LA-405-KP 40.96	Figure No. 1



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Geologic Map**	
	Sepulveda Blvd UC (53-1254) Widening 07-LA-405-KP40.97		Figure No. 2

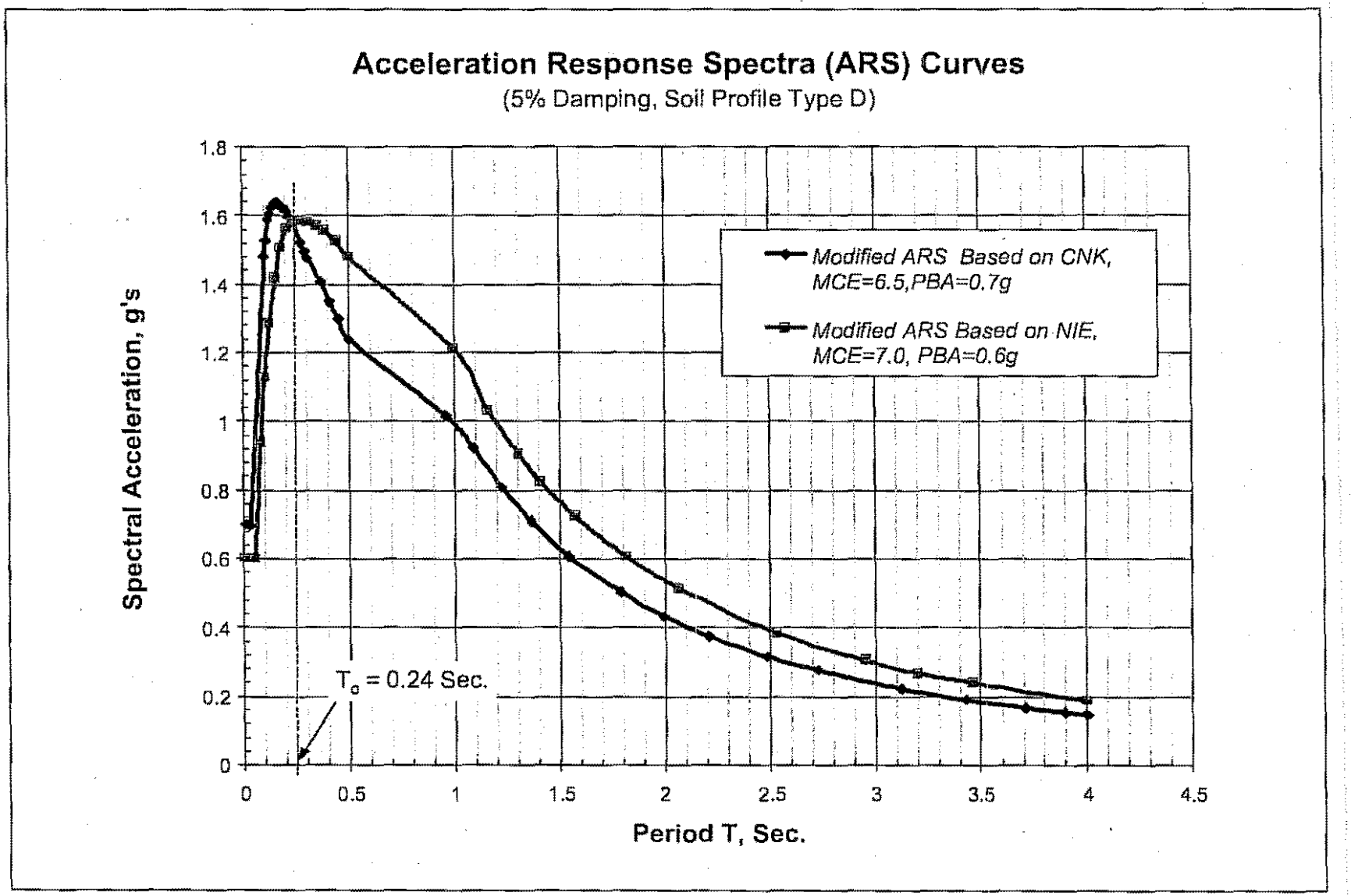


Figure 3: Recommended Acceleration Response Spectra (ARS) Curve

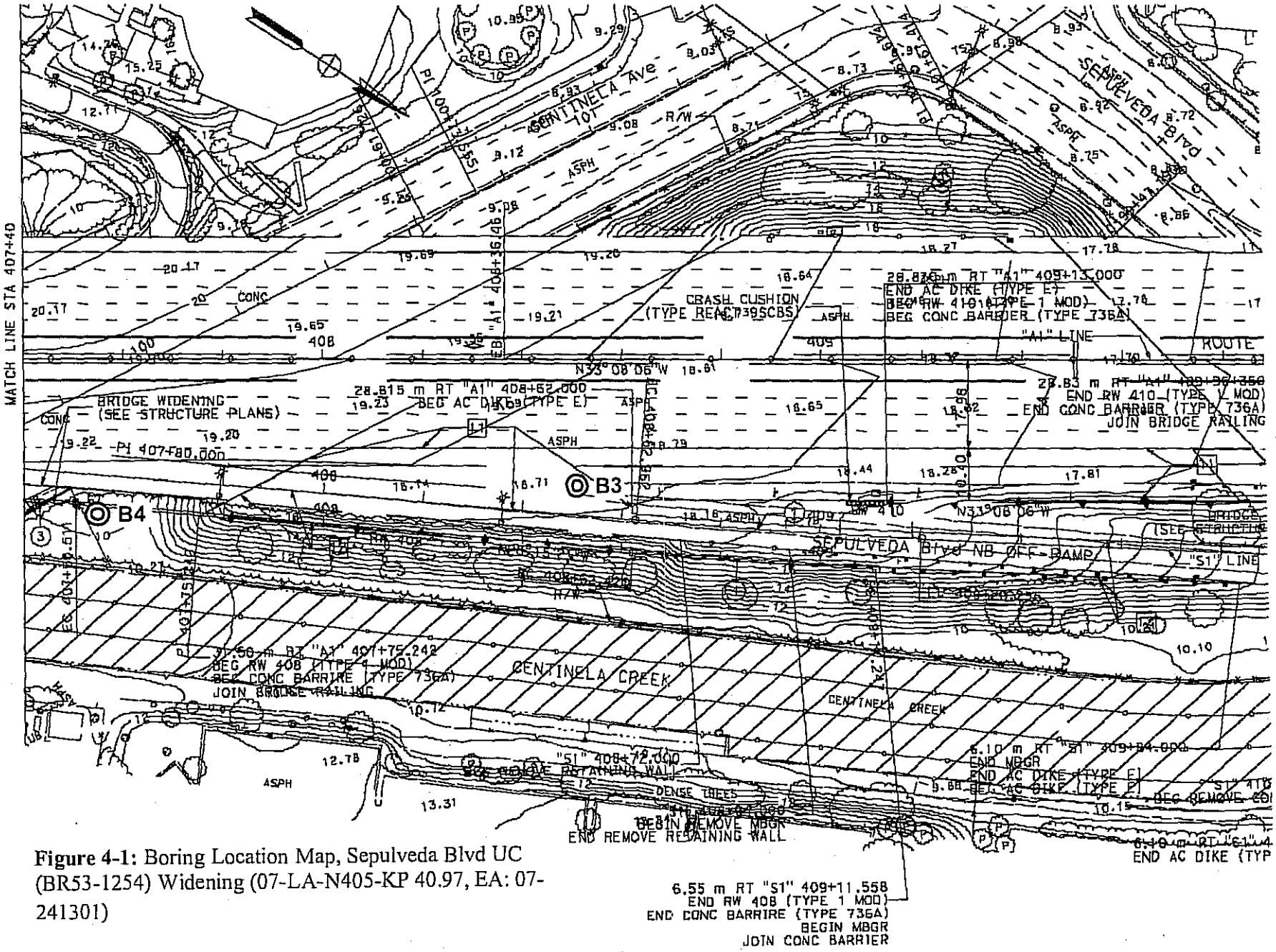


Figure 4-1: Boring Location Map, Sepulveda Blvd UC (BR53-1254) Widening (07-LA-N405-KP 40.97, EA: 07-241301)

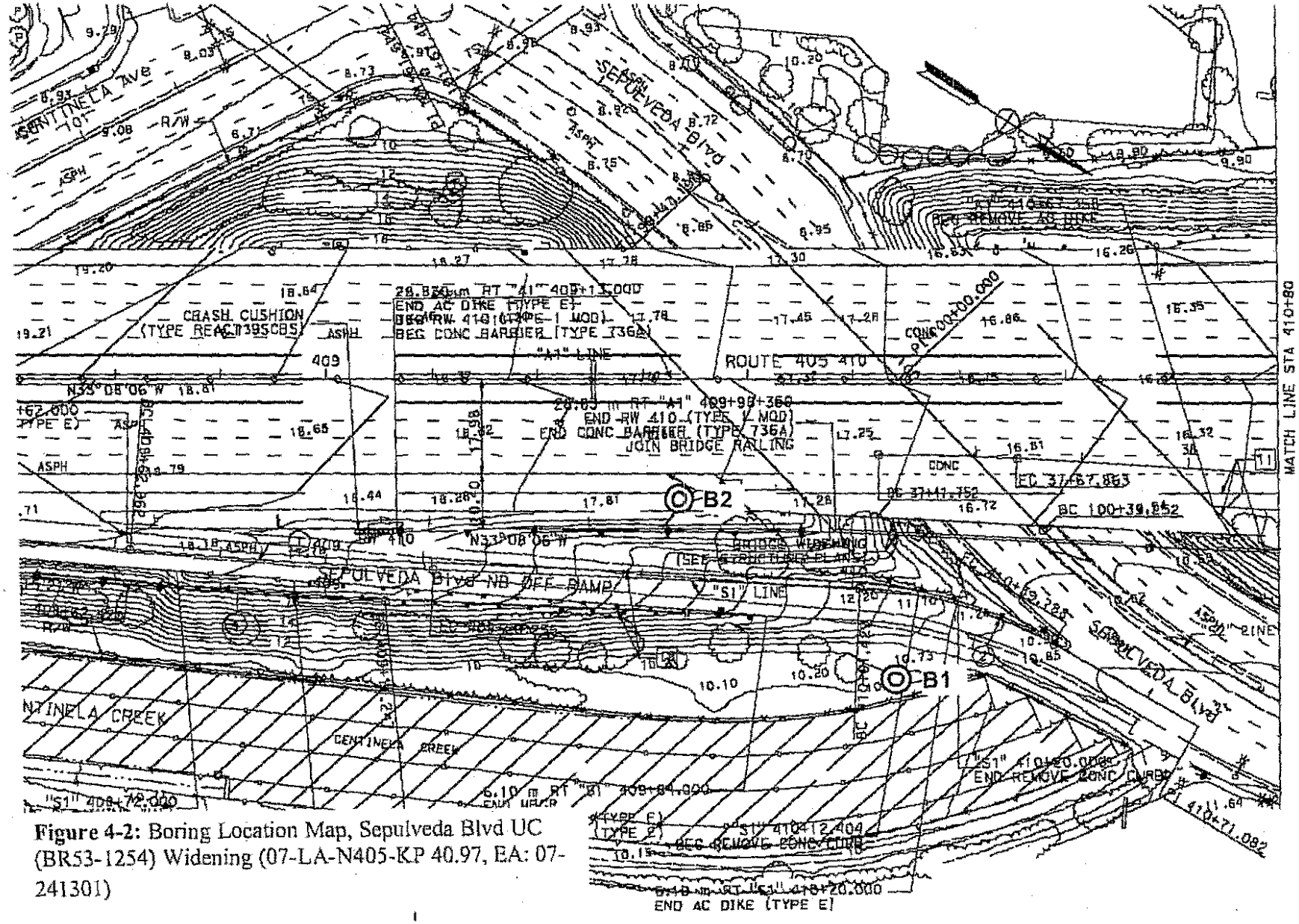
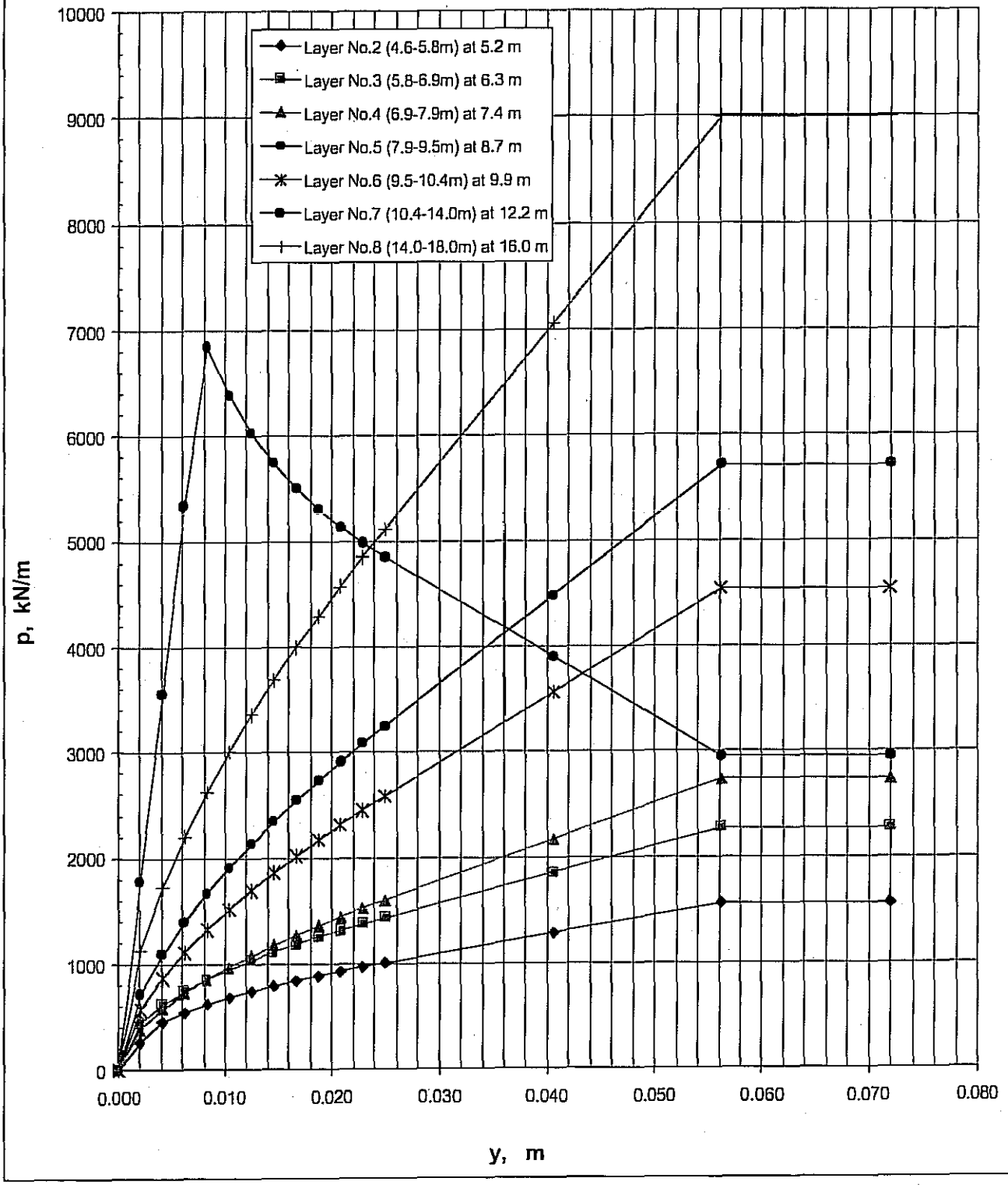


Figure 4-2: Boring Location Map, Sepulveda Blvd UC (BR53-1254) Widening (07-LA-N405-KP 40.97, EA: 07-241301)

P-y Curves for 1500 mm CIDH Piles (Single) at Bents 2, 3, and 4

Sepulveda Blvd. UC (53-1254) Widening



State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MATT HOLM
Chief
Bridge Design Branch 12

Date: 2/18/2009

File: 07-LA-405-KP40.76
07-241301
BR53-1253

Attention: Leon Valla

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Report for Centinela Ave UC Widening , LA

This is the Geotechnical Design Report (GDR) for the proposed widening of Centinela Ave Undercrossing (UC), which is planned as a part of highway widening from KP39.3 to KP41.4 of northbound 405, in Culver City, Los Angeles County. The project site is shown on the Vicinity Map (Figure 1) of the Attachments.

The geotechnical recommendations presented in this report are based on results of field reconnaissance, literature study, subsurface exploration, laboratory testing of the soil samples recovered from subsurface exploration, and geotechnical analyses for the proposed improvement. The bridge information is presented in Table 1 below.

Table 1. Information of Existing Bridge

Bridge Name	Bridge No.	KiloPost	Number of Spans		Existing Foundation Type (close to future widening)	Proposed Foundation Type
			Slab Bridge R. of Existing Embankment	Main Bridge (Box Girder)		
Centinela Ave UC	53-1253	40.76	33 (Abut 1A to Bent T1)	5 (Bent 1 to Abut 6)	CIDH Piles (For First Northbound Widening)	CIDH Piles

Regional Geology

The site is located on the Coastal Plain of Los Angeles County and is considered part of the Peninsular Range geomorphic province of California, and underlain by a thick sequence of marine and non-marine unconsolidated sediments. According to the *Geologic Map of California, Long Beach Sheet*, the proposed improvement is located within a region of quaternary dune sand deposits of recent age. The geologic map of this area is shown on Figure 2 of Attachments.

Seismicity

The site is close to a number of faults that are considered to be active or potentially active. The information of adjacent faults which could impact the proposed improvement is presented in Table 2 below. According to the Caltrans' Seismic Map (Figure 3, Attachments), the peak bedrock acceleration (PBA) at the subject site is expected to be 0.6 g.

Table 2 Fault Information

Fault Name	Fault Type	Distance to Site	Maximum Creditable Event (MCE)
Charnock Fault (CNK)	Strike-Slip	0.6 km Southwest	6.5
Newport-Inglewood-Rose Canyon Fault (NIE)	Strike-Slip	2.6 km Northeast	7.0

However based on Sadigh et al (1997), the estimated medium PBA of the site from CNK and NIE are 0.7g and 0.6g respectively. Based on the results of recent subsurface investigation, the soil profile can be defined as type D ($15 < N < 50$). Considering the near fault effect (Seismic Design Criteria 1.1, Caltrans, July 1999), the compound ARS curves based on both CNK and NIE were plotted in Figure 3 of the Attachment. The interception period (T_0) of two curves is about 0.24 seconds. That is:

- For the fundamental period of structure less than 0.24 seconds, ARS for CNK (MCE = 6.5, PBA = 0.7 g) will control;
- For the fundamental period higher than 0.24 seconds, modified ARS for NIE (MCE = 7.0, PBA = 0.6 g) will control the seismic design.

Liquefaction

The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level (MSL) based on the readings (3/13/2007 and 4/23/2007) from the piezometers installed at B-1, B-4, and B-6, which is above the bottom of proposed structural foundation. However, according to our subsurface exploration, foundation soils below the groundwater table are generally dense to very dense as interpreted from relatively high SPT N values. Therefore, the effects of potential liquefaction on the proposed structural foundations due to seismic event is negligible.

Seismic Induced Settlement

Seismic compaction under earthquake event is also negligible due to observed high soil density and relatively high fine content within foundation soils.

Ground Rupture

No active faults are known to transverse the project site, and the subject site is not located within currently designated Alquist-Priolo Earthquake Fault Zone. As such, ground rupture hazard will not be a consideration for the bridge design.

Scour Evaluation

Scour should not be of a concern for bridge foundation design, since the proposed bridge widening is located within concrete-lined creek channel (Bent C to Bent P1).

Subsurface Exploration

The subsurface exploration consisted of advancing test boreholes using mud rotary to depths of 18.9 m to 32.8 m below the existing grade at the locations tabulated on the table below. The shallow boring of B-6 was conducted for the foundation investigation of retaining wall No. 402 and overhead sign structure associated with northbound 405 widening and referenced here for the subsurface exploration of bridge foundation. The boring plans are presented in Figures 4-1 to 4-4 of the Attachments.

Table 3. Summary of Soil Exploration Plan
(Centinela Ave UC Widening, 07-LA-405-KP40.76, EA: 07-241301)

Bridge No.	Boring No.	Station	Offset (m)	Ground Elevatrion (m)	Borehole Depth (m)	Equipment / Exploration Method	Hammer Type/ Efficiency
53-1253	B-4	407+57	31.0R	10.0	28.2	CME85 / Mud Rotary	Auto/0.87
	B-5	405+12	63.3R	10.3	28.2	CME85 / Mud rotary	Auto/0.87
	B-6	404+02	25.0R	16.0	18.9	Acker AD2 / Mud Rotary	Auto/0.80
	B-8	405+67	2.5R	18.5	32.8	CME85 / Mud Rotary	Auto/0.87

Drilling and Sampling

Standard penetration tests (SPT) were conducted in general accordance with ASTM D1586. Disturbed bulk samples were recovered for corrosion testing. Relatively undisturbed soil samples were sealed by plastic caps/tapes in brass rings to prevent moisture loss and transported to Caltrans' Soil Laboratory for testing.

Drilled holes were backfilled with on-site soil upon completion of sampling and testing. For the borings on highway and city streets, the drill holes were backfilled with onsite soil to 2.5 cm below pavement subgrade elevation, and then backfilled to pavement finished grade with tamped asphalt concrete cold patch.

Laboratory Test

Laboratory tests that include moisture-density determinations (California Test Method (CTM) 226), particle size analysis (CTM 203), direct-shear testing of undisturbed soil specimens (CTM 222), Atterberg limits (CTM204), and corrosion tests (CTM 417, 422, and 424) were performed. Some of the test results are summarized in Table 4 below.

Table 4. Summary of Laboratory Test Results
(Centinela Ave UC Widening, 07-LA-405-KP40.76, EA: 07-241301)

Boring No.	Depth (m)	Group Symbol	Field Moisture Content (%)	Dry Unit Weight (kN/M3)	Direct Shear Test		Atterberg Limits (LL/PI)	Other Field Test	
					ϕ (Degree)	c (kPa)		PP# (tsf)	SPT
B-4	1.9-2.2	SP	15.1	18.1	N/A	N/A	N/A	N/A	N/A
	5.0-5.3	SM	24.0	15.9	32.2	62.4	N/A	N/A	N/A
B-5	1.8-3.0	CL	N/A	N/A	N/A	N/A	44/25	4.0	N/A
	3.5-3.8	SP	25.8	14.8	35.8	25.2	N/A	N/A	N/A
	4.9-6.1	CL	N/A	N/A	N/A	N/A	42/21	4.5	N/A
	6.5-6.8	SP	23.4	15.6	35.3	34.1	N/A	N/A	N/A
B-8	2.1-3.4	CL	N/A	N/A	N/A	N/A	40/23	2.5	N/A
	3.4-4.9	CL	24.4	15.2	33.2	9.8	35/14	2.5	N/A
	4.9-6.4	CL	N/A	N/A	N/A	N/A	38/22	3.0	N/A
	7.0-9.5	CL	N/A	N/A	N/A	N/A	32/19	3.0	N/A
	13.7-16.2	CL	30.4	14.2	20.3	133.9	41/22	3.0	N/A
	16.2-17.7	ML	N/A	N/A	N/A	N/A	37/11	N/A	21

Corrosion Test

For corrosion evaluation, bulk samples were recovered from selected boreholes and tested for pH value, and minimum electrical resistivity. The tests for sulfate and chloride are usually not conducted unless the resistivity of the sample soil is 1000 Ohm-cm or less. Where resistivity is greater than 1000 Ohm-cm, the soil is considered not corrosive.

According to the test results, the subsurface soil for the proposed bridge widening is considered non-corrosive. The corrosion test results are summarized in the following table (Table 5).

Table 5 Corrosion Test Results

Boring Number	Depth of Sample (m)	pH	Soluble Sulfates	Soluble Chlorides	Minimum Resistivity
B-4	4.6 - 7.6	7.50	N/A	N/A	3500 ohm-cm
B-4	11.3 - 19.8	5.66	965	58	830 ohm-cm
B-8	0.9 - 9.1	7.97	72	279	880 ohm-cm
B-8	11.0 - 26.2	7.70	92	344	830 ohm-cm
Caltrans Criteria for Non-corrosive Area		> 5.5	< 2000 PPM	< 500 PPM	> 1000 Ohm-cm

Subsurface Condition

Subsurface condition for structural foundation was summarized in Tables 5-1 and 5-2. The subsurface materials below the natural grade are mostly composed of medium dense to very dense sand, silty sand, and sandy silt with scattered interbeds of lean clay within the upper 8 m of the native soil.

The materials for embankment fill are not uniform. The soil boring close to the centerline of freeway (B-8) revealed a near 8 m thick very stiff lean clay layer underneath 1.8 m of medium dense sand below the pavement. The boring (B-6) at the northbound shoulder shows medium dense sand with silt as major component of embankment fill with only a 1.6 m thick stiff lean clay layer within vertical limits of the embankment. This indicates that different embankment fill materials have been used in 1996 northbound widening from those used for original highway construction in 1962.

Table 6 Subsurface Information for Centinela Ave UC (BR53-1253)

Reference Boring	B-4		Boring Location	Stationing	407+57	Elevation (m)	10.0
				Offset (m)	31 Right		

Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile
	from	to	from	to	
1	0	1.2	10	8.8	SiILT (ML), Very Stiff
2	1.2	4.6	8.8	5.4	Poorly Graded SAND (SP). Medium dense
3	4.6	7.6	5.4	2.4	Silty SAND (SM), Medium Dense
4	7.6	9.1	2.4	0.9	SILT with Sand (ML). Dense
5	9.1	11.9	0.9	-1.9	Well graded SAND (SW). Dense
6	11.9	14.0	-1.9	-4	SILT (ML), Hard
7	14.0	16.8	-4	-6.8	Well graded SAND (SW). Very dense
8	16.8	28.2	-6.8	-18.2	Silty SAND (SM), Very Dense

Reference Boring	B-5		Boring Location	Stationing	405+12	Elevation (m)	10.3
				Offset (m)	63.3 Right		

Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile
	from	to	from	to	
1	0.2	1.8	10.1	8.5	Silty SAND (SM), Medium dense
2	1.8	3.0	8.5	7.3	Sandy Lean CLAY (CL/SC), Very Stiff
3	3.0	4.9	7.3	5.4	Poorly graded SAND (SP), Medium dense
4	4.9	6.1	5.4	4.2	Sandy Lean CLAY (CL), Hard
5	6.1	7.6	4.2	2.7	Poorly graded SAND (SP), Medium dense to dense
6	7.6	8.5	2.7	1.8	Poorly graded SAND with Silt (SP-SM), Dense
7	8.5	18.3	1.8	-8	Well graded SAND with Gravel (SW), Very dense
8	18.3	21.3	-8	-11	Poorly graded SAND (SP). Very dense.
9	21.3	28.2	-11	-17.9	Silty SAND (SM), Very dense

Table 6 Continued …

Reference Boring	B-6		Boring Location		Stationing	404+02	Elevation (m)	16.0
					Offset (m)	25 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.3	2.1	15.7	13.9	Well graded SAND with Silt (SW-SM). Loose			
2	2.1	3.7	13.9	12.3	Lean CLAY with Sand (CL), Stiff			
3	3.7	5.2	12.3	10.8	Well graded SAND with Silt (SW-SM). Medium Dense			
4	5.2	9.8	10.8	6.2	Poorly Graded SAND with Silt (SP-SM), Medium Dense to Dense			
5	9.8	12.8	6.2	3.2	SILT with Sand to SILT (ML), Very Stiff to Hard.			
6	12.8	18.9	3.2	-2.9	Well graded SAND (SW), Very Dense			
Reference Boring	B-8		Boring Location		Stationing	405+67	Elevation (m)	18.3
					Offset (m)	2.5 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.4	2.1	17.9	16.2	Poorly Graded SAND with Silt (SP-SM) , Medium Dense			
2	2.1	10.0	16.2	8.3	Sandy Lean CLAY to Lean CLAY (CL), Very Stiff			
3	10.0	11.9	8.3	6.4	Poorly graded SAND with Clay (SP-SC), Medium dense			
4	11.9	13.7	6.4	4.6	Poorly Graded SAND (SP), Dense			
5	13.7	16.2	4.6	2.1	Lean CLAY with Sand (CL), Hard			
6	16.2	17.7	2.1	0.6	Sandy SILT (ML), Vey Dense			
7	17.7	29.6	0.6	-11.3	Well graded SAND with Gravel (SW), Very dense			
8	29.6	32.8	-11.3	-14.5	Poorly graded SAND with Silt (SP-SM). Very dense.			

* Groundwater is at 3.5 m above Mean Sea Level according to the well readings at B-4 (3/13/07, 4/23/07).

Shaded area indicates embankment fill materials

Foundation Design

Axial Pile Capacity

Cast-in-drilled-hole (CIDH) piles are suggested as structural foundation of the proposed bridge widening. The design of CIDH piles has been performed on the basis of shaft friction, neglecting the end bearing. The pile ultimate friction capacities were obtained using the procedures outlined by Reese and O'Neil (1988).

Axial group effects were considered for pile group with center to center (CTC) spacing less than 3 times of pile diameter (3D). 20%-35% vertical capacity reduction was applied to group piles at Bents C to P1 within the Centinela Creek channel for the slab portion of the bridge widening, and the pile groups at Bents 4, 5 and Abutment 6 for the box portion of the bridge widening.

Long term settlement will not be a concern for the widened portion of the bridge foundation. The immediate settlement for individual piles and pile groups under the service load is expected to be less than 6.3 mm from Abut 1A to Bent P1, and less than 25 mm from Bents Q1 to Abut 6.

Lateral Capacity of Pile Groups

The pile lateral analysis was performed using LPILE PLUS 5.0 for the Bent 5 of Centinela Ave UC (widen). The allowed lateral deflection under service load is limited to 6.4 mm (or 0.25 in). For Bent 5 of box portion of Centinela Ave UC, the proposed pile center-to-center (CTC) spacing is approximately 2.1 times of pile diameter (2.1D) with group size of the piles being 5X6. P-multiplier is averaged at 0.35 for the lateral analysis, which makes Bent 5 dictate lateral capacity of pile group. The estimated pile load under different pile lateral deflection for Bent 5, assuming two types of pile/cap connection, is presented in the following table.

Table 7. Pile Load under Different Pile Top Deflection
(600 mm CIDH Piles at Bent 5, Centinela Ave UC)

Pile-Head Deflection (m)	Assuming Pile/Cap Rigid Connection		Assuming Pile/Cap Hinge Connection	
	Maximum Moment (on Pile Top) kN-m	Maximum Shear (on Pile Top) kN	Maximum Moment kN-m	Maximum Shear (on Pile Top) kN
0.0032	135	157	64	103
0.0064	226	242	84	130
0.0127	364	378	141	194

1) The material properties and reinforcement information are based on Sheet No. B2-3 of 2004 Std Plan for 600 mm CIDH piles;
2) The design is based on non-linear EI for the reinforced concrete piles.

P-Y Analysis

The p-y analysis for lateral soil resistance was performed using LPILE PLUS 5.0 for CIDH piles at bent locations. "P" reduction factors were considered for piles under group effect. The p-y curves were presented in the Attachments of this memo.

Geotechnical Recommendations

1) Based on the subsurface exploration, The Soil Profile Type for the subject bridge should be classified as Type D. The recommended ARS Curve is shown in Figure 3 of the Attachments.

2) The foundation soils for the bridge are classified as non-corrosive to reinforced concrete according to the corrosion test results of selected soil samples from the field.

3) CIDH piles were recommended for the bridge foundation. Due to the high groundwater table, wet method may be used for pile installation, which requires a minimum pile diameter of 0.6 m. Table 8 summarized the suggested pile tip elevation based on the design load for the abutments and required nominal resistance for the bents.

4) To reduce lateral load and/or vertical drag force on the existing concrete channel wall, isolation casings are recommended for the CIDH piles from Bent 1B through Bent 3, which are to be constructed near Centinela Creek. The bottom of the isolation casing should be extended to a depth at least to the bottom of channel floor.

Construction Considerations

1) The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level based on the readings from the piezometers installed at B-4, and B-6, which is above the proposed structural foundations. Wet, drilling slurry, method may be used wherever groundwater is encountered to stabilize the drilled hole during pile installation. In addition, the contractor should have temporary casing on-site, and have readily available equipment and techniques to remedy soil cave-in, according to Section 49-4.03 of *Standard Specification (July 1999)*.

2) Temporary casing, if used, must be removed during CIDH pile installation. Oscillating and twisting temporary casing during installation will potentially reduce pile skin friction. Should the above method be used for casing installation, this office must be notified to provide further recommendations.

3) Pile construction sequence is important for pile groups with center-to-center (CTC) spacing equal to or less than three times of pile diameter. Construction of adjacent piles should be performed only after the Portland cement concrete of the previously installed piles properly set and developed adequate strength.

Table 8. Pile Data Table for Centinela Ave UC Widening

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 1 Slab Bridge								
Abut 1A	600 mm	500 kN	1000 kN	N/A	14.25	8.15**	0.15 (1)	0.15
Bent 1B (L)	600 mm	N/A	1400 kN	N/A	15.21	15.21	2.71(1)	2.71
Bent 1B (R)	600 mm	N/A	1450 kN	N/A	14.00	8.15**	-1.00 (1)	-1.00
Bent 1C (L)	600 mm	N/A	1500 kN	N/A	15.28	15.28	2.28 (1)	2.28
Bent 1C (R)	600 mm	N/A	1450 kN	N/A	13.25	8.15**	-1.00 (1)	-1.00
Bent 1D (L)	600 mm	N/A	1150 kN	N/A	15.30	15.30	3.30 (1)	3.30
Bent 1D (R)	750 mm	N/A	2650 kN	N/A	13.85	8.15**	-3.85(1)	-3.85
Bent 1E (L)	600 mm	N/A	1350 kN	N/A	15.31	15.31	2.81 (1)	2.81
Bent 1E (R)	750 mm	N/A	2650 kN	N/A	13.90	8.15**	-3.85 (1)	-3.85
Bent 1F (L)	600 mm	N/A	1350 kN	N/A	15.33	15.33	2.83 (1)	2.83
Bent 1F (R)	750 mm	N/A	2650 kN	N/A	14.10	8.15**	-3.85 (1)	-3.85
Bent 1G (L)	600 mm	N/A	1600kN	N/A	15.38	15.38	1.38 (1)	1.38
Bent 1G (R)	600 mm	N/A	1450 kN	N/A	11.95	8.15**	-3.85 (1)	-3.85
Bent 1H (L)	600 mm	N/A	1600 kN	N/A	15.46	15.46	1.96 (1)	1.96
Bent 1H (R)	600 mm	N/A	1450 kN	N/A	11.90	7.90**	-3.60 (1)	-3.60
Bent 1I (L)	600 mm	N/A	1575 kN	N/A	15.51	15.51	2.01 (1)	2.01
Bent 1I (R)	600 mm	N/A	1450 kN	N/A	11.85	7.90**	-3.60 (1)	-3.60
Bent 1J (L)	600 mm	N/A	1550 kN	N/A	15.56	15.56	2.06 (1)	2.06
Bent 1J (R)	600 mm	N/A	1450 kN	N/A	11.80	7.90**	-3.60 (1)	-3.60
Bent 1K (L)	600 mm	N/A	1550 kN	N/A	15.58	15.58	2.08 (1)	2.08
Bent 1K (R)	600 mm	N/A	1450 kN	N/A	11.72	7.90**	-3.60 (1)	-3.60
Bent 1L (L)	600 mm	N/A	1450 kN	N/A	15.66	15.66	3.16 (1)	3.16
Bent 1L (R)	600 mm	N/A	1400 kN	N/A	11.69	7.90**	-3.60 (1)	-3.60
Bent 1M (L)	600 mm	N/A	1300 kN	N/A	15.69	15.69	3.69 (1)	3.69
Bent 1M (R)	600 mm	N/A	1350 kN	N/A	11.65	7.90**	-3.10 (1)	-3.10

Table 8. Continued ….

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 2 Slab Bridge								
Bent A	600 mm	N/A	1400 kN	N/A	11.60	8.23**	-3.27 (1)	-3.27
Bent B	600 mm	N/A	1950 kN	N/A	11.60	8.20**	-6.80 (1)	-6.80
Bent C (L)	600 mm	N/A	1600 kN	N/A	11.60	8.13**	-4.87 (1)	-4.87
Bent C (R)	600 mm	N/A	800 kN	550 kN	7.76	7.76	-3.24 (2)	-3.24
Bent C1 (L)	600 mm	N/A	1550 kN	N/A	11.55	8.10**	-4.40 (1)	-4.40
Bent C1 (R)	600 mm	N/A	800 kN	550 kN	7.71	7.71	-3.29 (2)	-3.29
Bent D1 (L)	600 mm	N/A	1800 kN	N/A	11.50	8.05**	-5.95 (1)	-5.95
Bent D1 (R)	600 mm	N/A	800 kN	550 kN	7.66	7.66	-3.34 (2)	-3.34
Bent E1 (L)	600 mm	N/A	1850 kN	N/A	11.30	8.00**	-6.50 (1)	-6.50
Bent E1 (R)	600 mm	N/A	800 kN	550 kN	7.61	7.61	-3.39 (2)	-3.39
Bent F1 (L)	600 mm	N/A	1750 kN	N/A	11.00	7.95**	-5.55 (1)	-5.55
Bent F1 (R)	600 mm	N/A	800 kN	550 kN	7.56	7.56	-3.44 (2)	-3.44
Bent G1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.90**	-5.10 (1)	-5.10
Bent G1 (R)	600 mm	N/A	800 kN	550 kN	7.51	7.51	-3.49 (2)	-3.49
Bent H1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.85**	-5.15 (1)	-5.15
Bent H1 (R)	600 mm	N/A	800 kN	550 kN	7.46	7.46	-3.54 (2)	-3.54
Bent I1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.80**	-5.20 (1)	-5.20
Bent I1 (R)	600 mm	N/A	800 kN	550 kN	7.41	7.41	-3.59 (2)	-3.59
Bent J1 (L)	600 mm	N/A	1700 kN	N/A	10.90	7.75**	-5.25 (1)	-5.25
Bent J1 (R)	600 mm	N/A	800 kN	550 kN	7.36	7.36	-3.64 (2)	-3.64
Bent K1 (L)	600 mm	N/A	1700 kN	N/A	10.80	7.70**	-5.30 (1)	-5.30
Bent K1 (R)	600 mm	N/A	800 kN	550 kN	7.31	7.31	-3.69 (2)	-3.69
Bent L1 (L)	600 mm	N/A	1700 kN	N/A	10.80	7.67**	-5.33 (1)	-5.33
Bent L1 (R)	600 mm	N/A	800 kN	550 kN	7.28	7.28	-3.72 (2)	-3.72
Bent M1 (L)	600 mm	N/A	1700 kN	N/A	10.81	7.65**	-5.35 (1)	-5.35
Bent M1 (R)	600 mm	N/A	800 kN	550 kN	7.26	7.26	-3.74 (2)	-3.74

Table 8 Continued…

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 2 Slab Bridge								
Bent N1 (L)	600 mm	N/A	1700 kN	N/A	10.85	7.60**	-5.40 (1)	-5.40
Bent N1 (R)	600 mm	N/A	800 kN	550 kN	7.21	7.21	-3.79 (2)	-3.79
Bent O1 (L)	600 mm	N/A	1700 kN	N/A	10.84	7.55**	-5.45 (1)	-5.45
Bent O1 (R)	600 mm	N/A	800 kN	550 kN	7.16	7.16	-3.84 (2)	-3.84
Bent P1 (L)	600 mm	N/A	1700 kN	N/A	10.63	7.50**	-5.50 (1)	-5.50
Bent P1 (R)	600 mm	N/A	800 kN	550 kN	7.11	7.11	-3.89 (2)	-3.89
Section 3 Slab Bridge Cee Bents								
Bent Q1	1200 mm	N/A	3200 kN	N/A	10.60	7.46**	-5.54 (1)	-5.54
Bent R1	1200 mm	N/A	3200 kN	N/A	10.56	7.39**	-5.61 (1)	-5.61
Bent S1	1200 mm	N/A	3200 kN	N/A	10.52	7.32**	-5.68 (1)	-5.68
Bent T1	1200 mm	N/A	3000 kN	N/A	10.48	7.25**	-5.75 (1)	-5.75
Bent U1	600 mm	N/A	1800 kN	N/A	17.72	16.58	1.58 (1)	1.58
Section 4 Box Biridge								
Bent 1	1500 mm	N/A	5600 kN	N/A	10.95	4.13**	-13.37 (1)	-13.37
Bent 2	2135 mm	N/A	6800 kN	N/A	10.95	7.10**	-4.90 (1)	-4.90
Bent 3	2135 mm	N/A	9500 kN	N/A	10.60	7.00**	-10.0 (1)	-10.0
Bent 4	600 mm	N/A	1800 kN	900 kN	10.68	7.96	-7.04 (1)	-7.04
Bent 5	600 mm	N/A	1800 kN	900 kN	9.67	5.18	-10.82 (1)	-10.82
Abut 6	600 mm	775 kN	1550 kN	N/A	14.32	11.86	-2.14 (1)	-2.14
Wingwall (Abut 6)	600 mm	250 kN	500 kN	N/A	14.75	13.69	5.69 (1)	5.69

Note: Design tip elevations are controlled by the following demands: (1) Compression; (2) Tension; (3) Lateral Loads;

** Assuming cut-off elevation at the bottom of isolation casing.

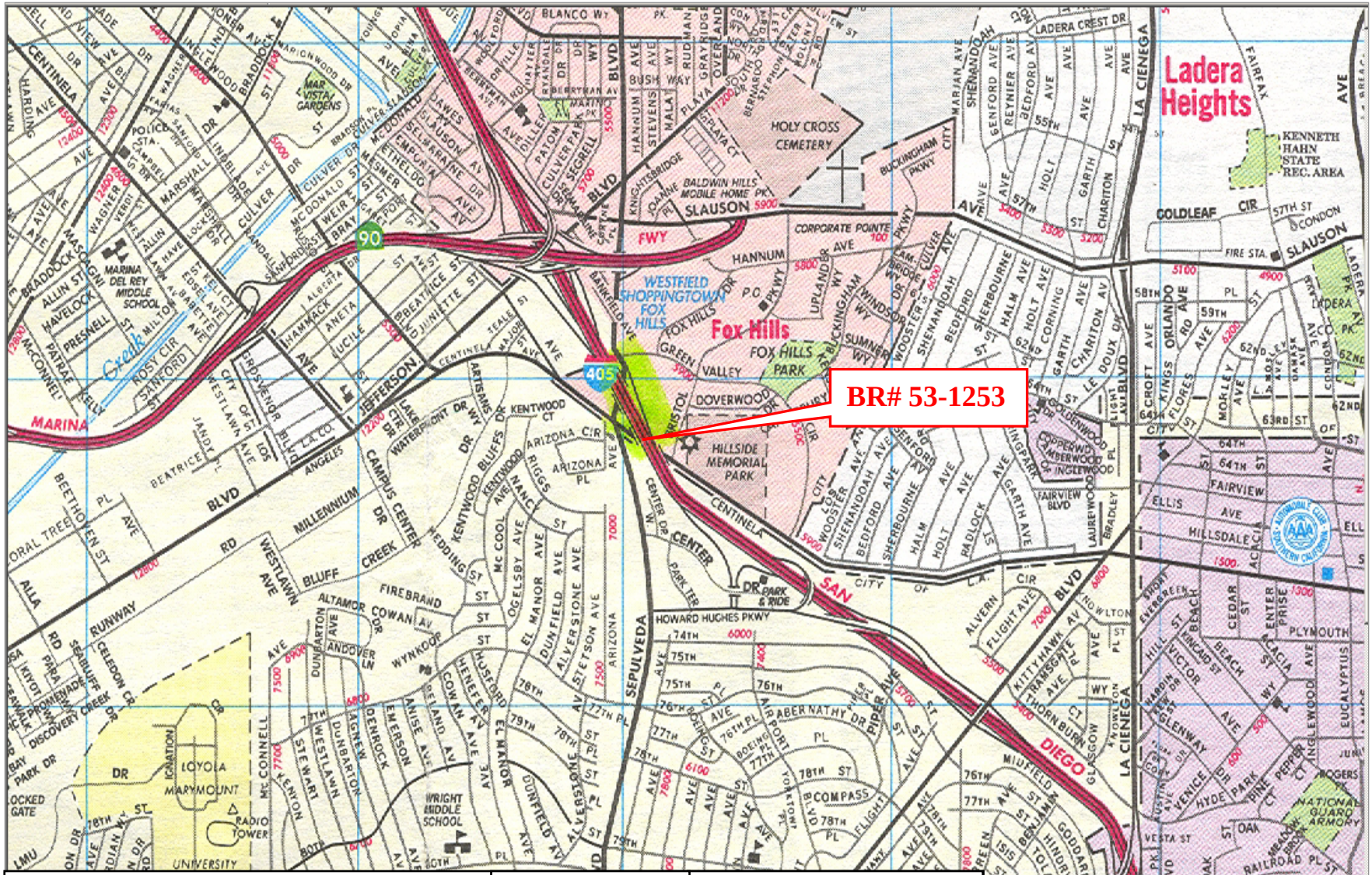
Should you have any question, please contact Haitao Liu at (916) 227-0992.

Prepared by: Date: 2/18/2009

Haitao Liu, P.E. C66398
Transportation Engineer, Civil
Branch A / OGDS-1

Cc: OGDS1 - Sacramento
OGDS1 – L. A.
GS - File Room
R.E. Pending File

ATTACHMENTS



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: Feb. 2009	**Vicinity Map**	
	Centinela Ave. UC (53-1253) Widening 07-LA-405-KP 40.7		Figure No. 1

CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: Feb. 2009	**Geologic Map**
	Centinela Ave UC (53-1253) Widening 07-LA-405-KP40.7	Figure No. 2

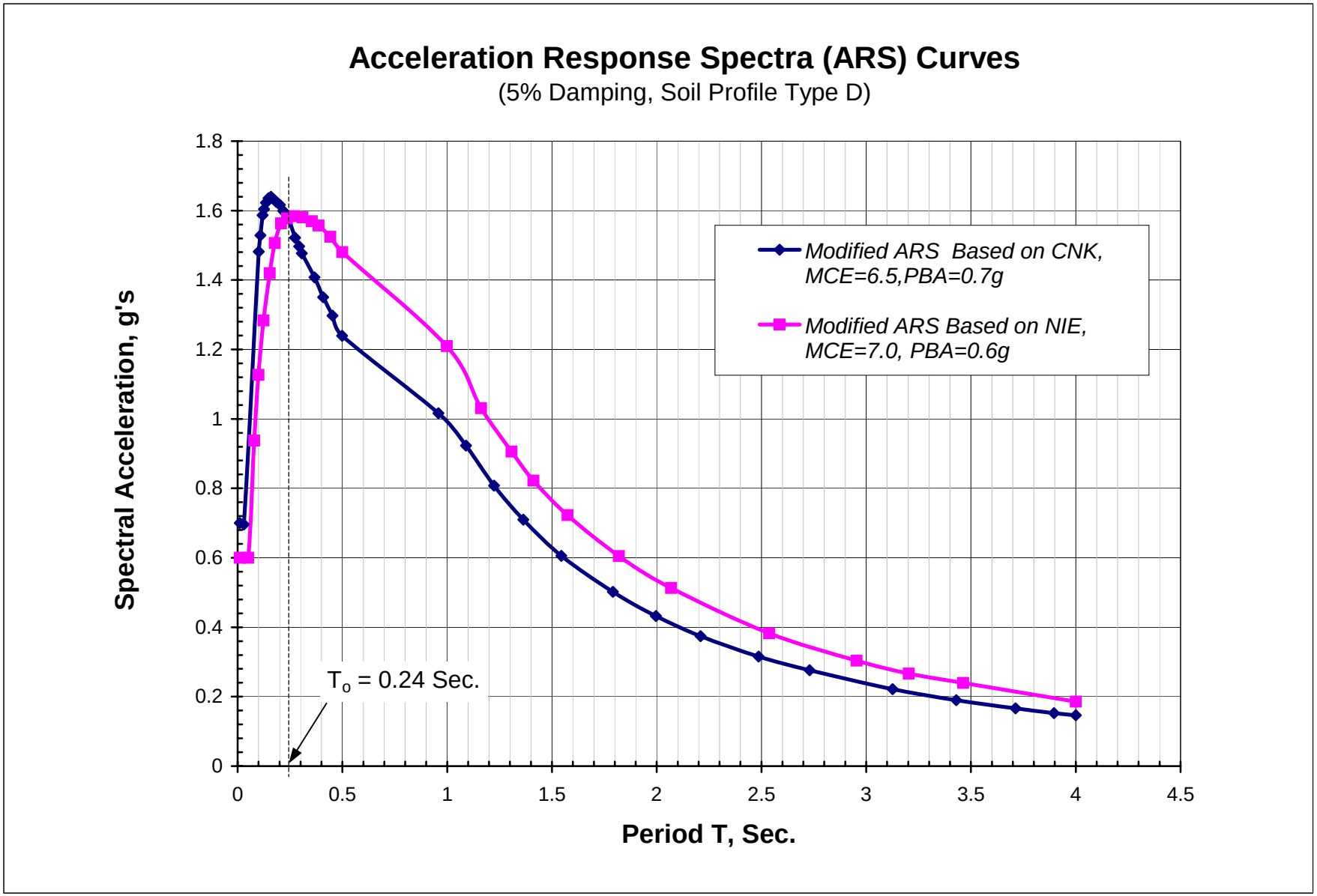


Figure 3: Recommended Acceleration Response Spectra (ARS) Curve

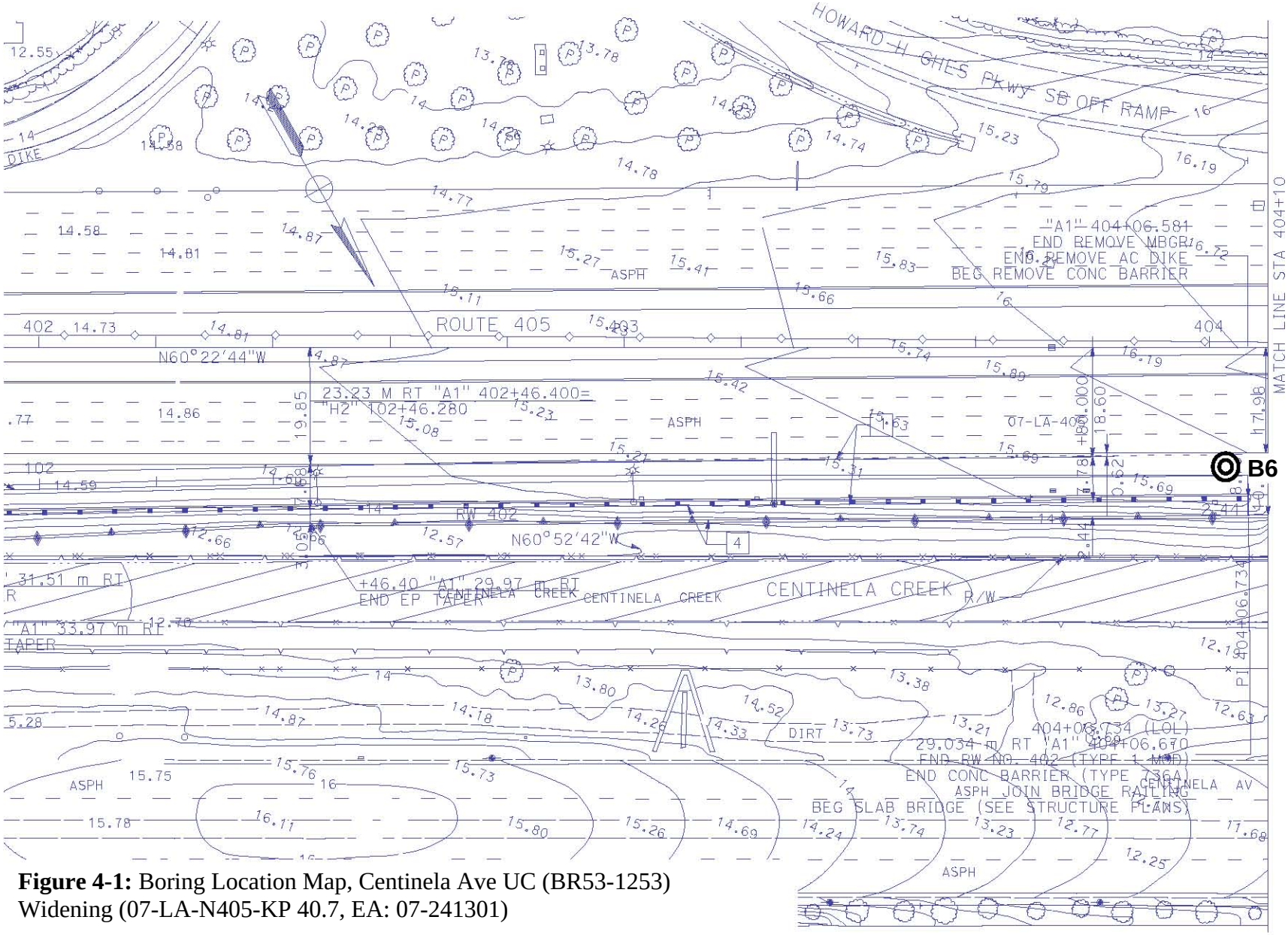
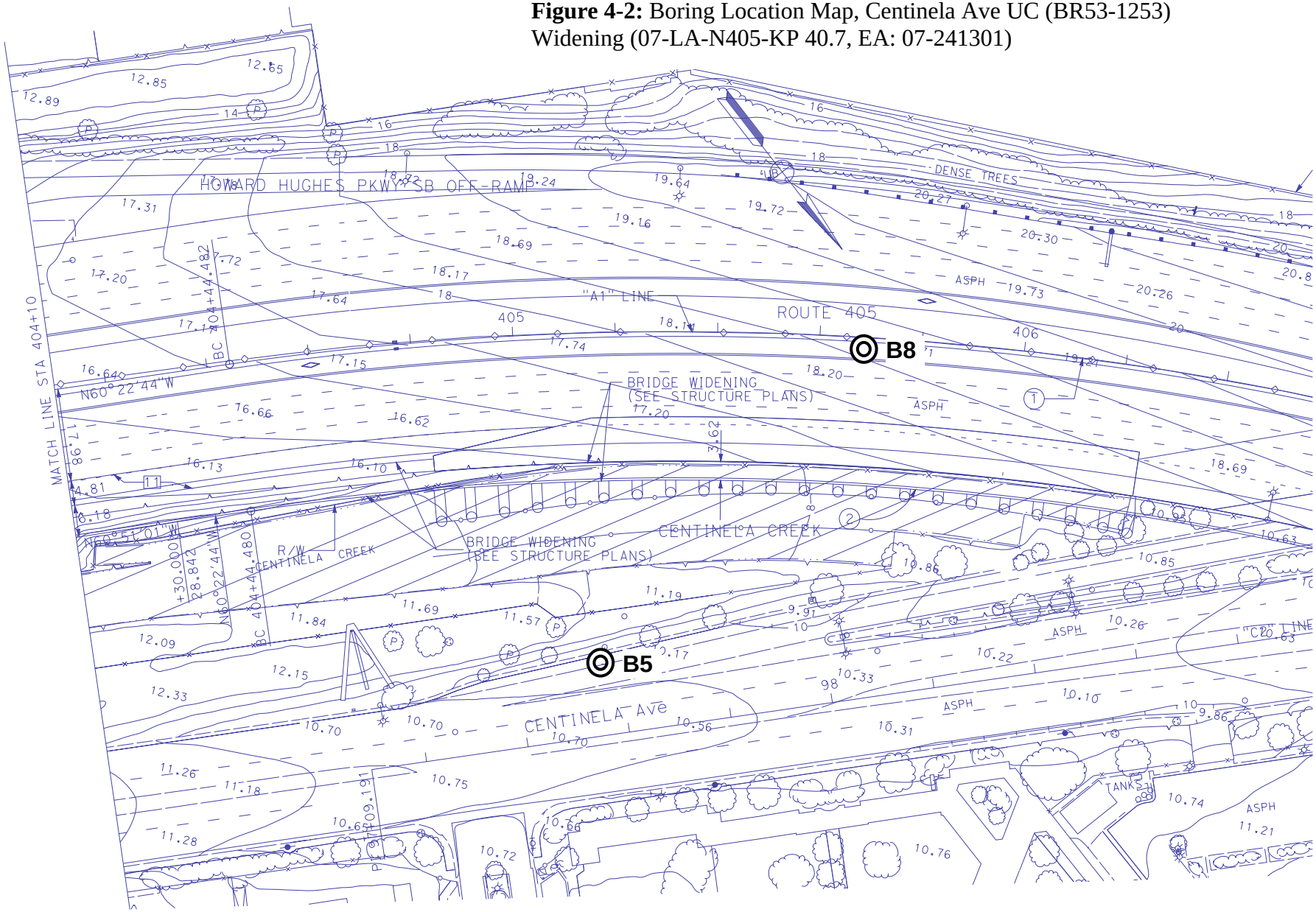


Figure 4-1: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)

Figure 4-2: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)



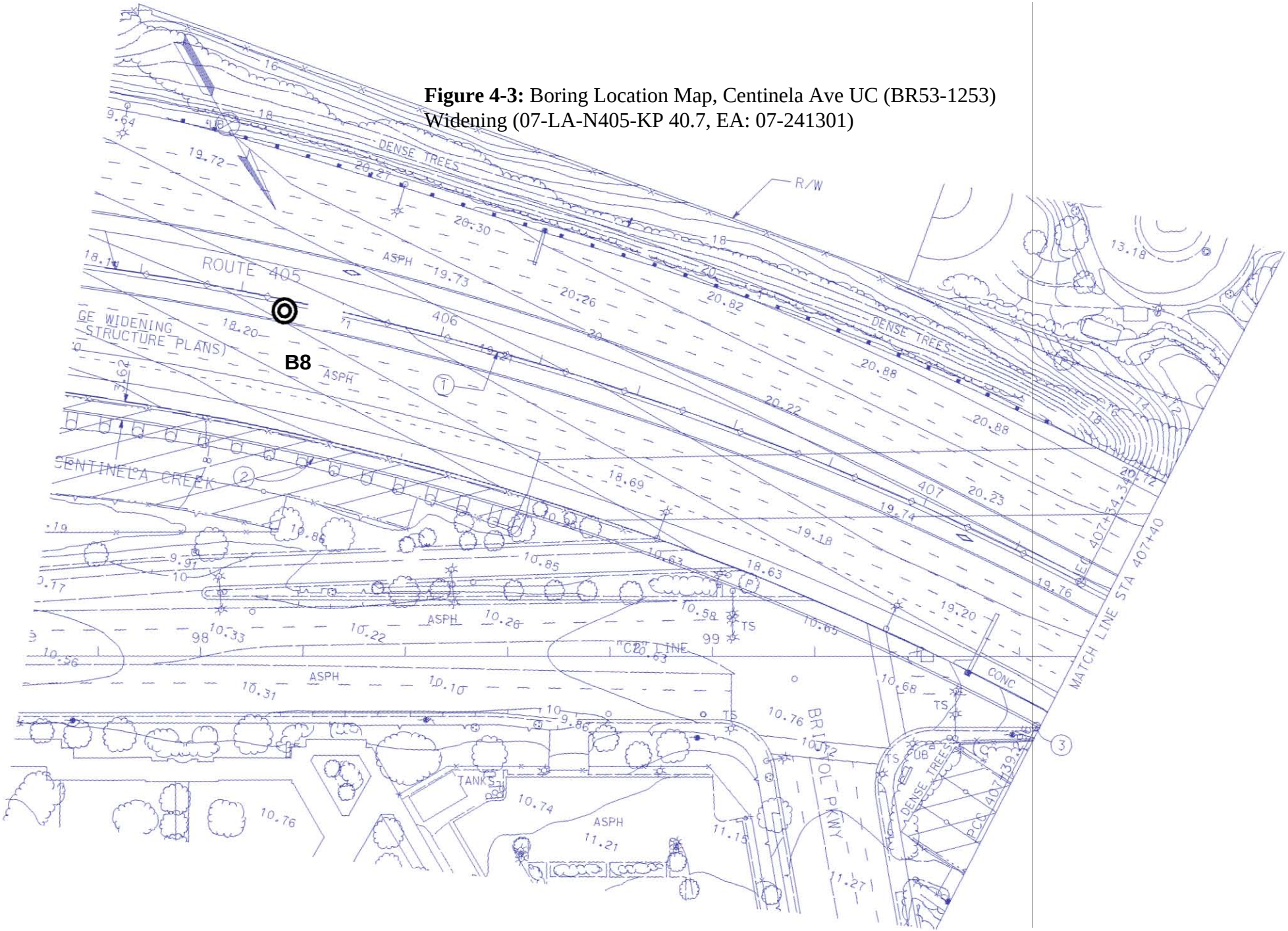


Figure 4-3: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)

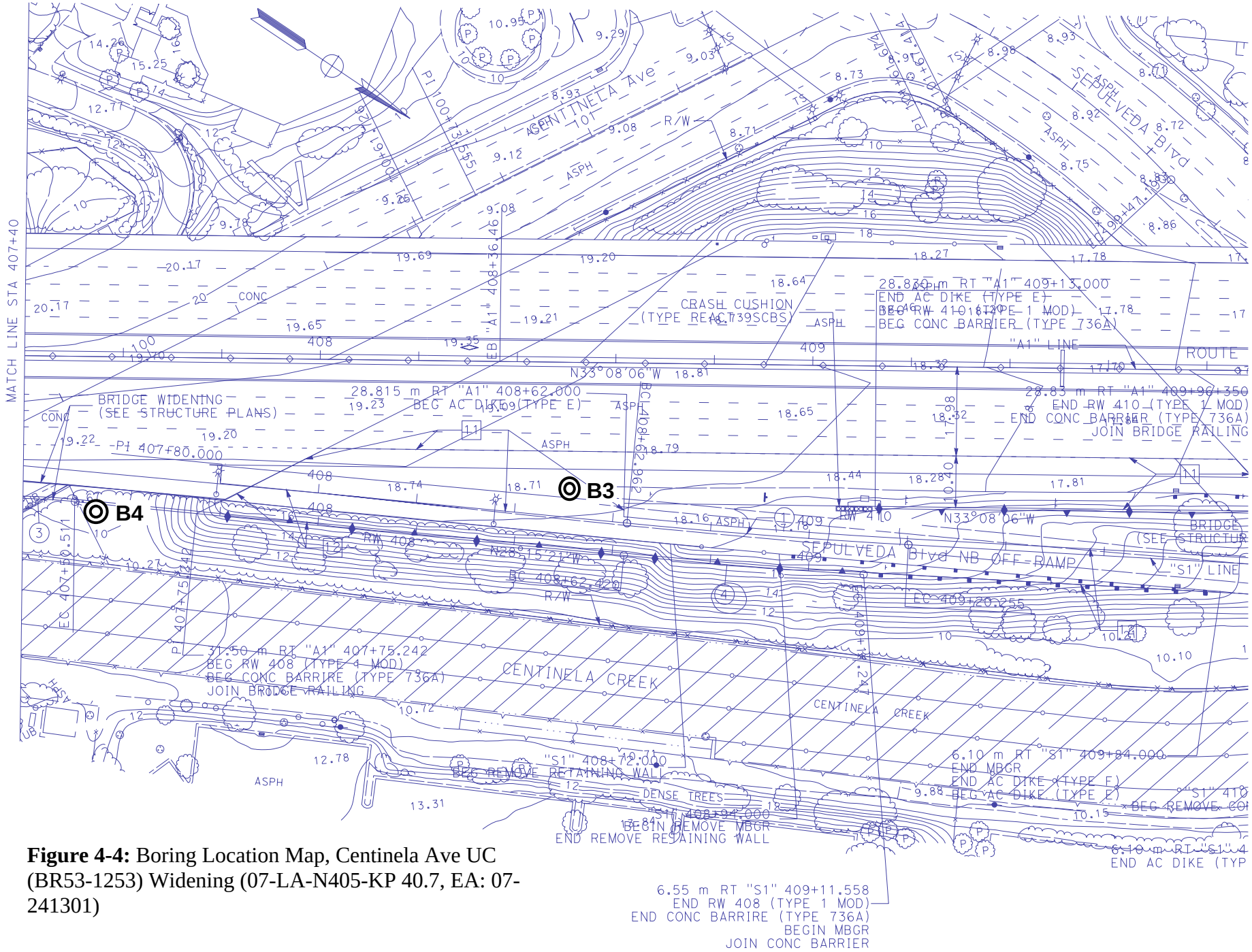
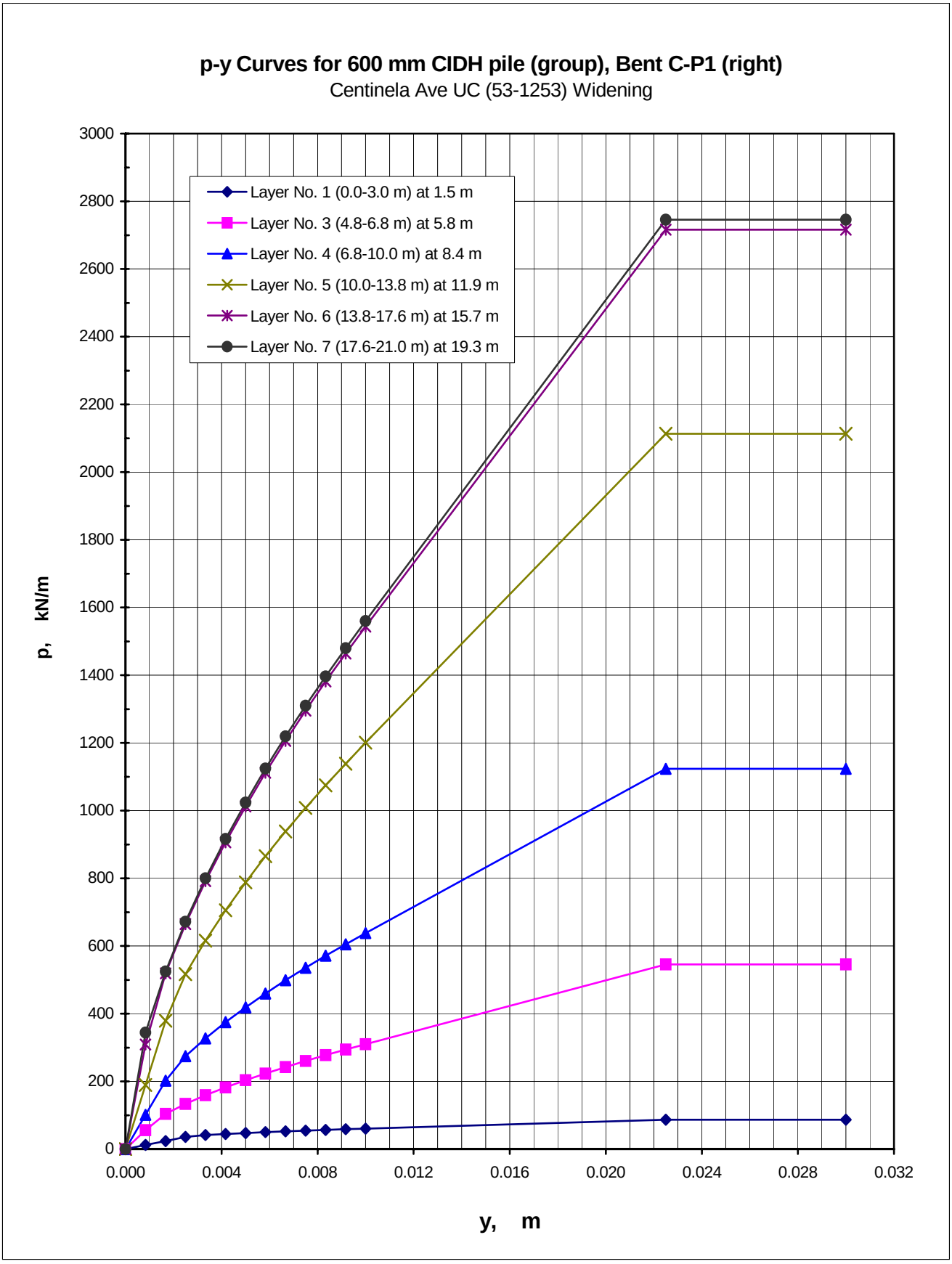
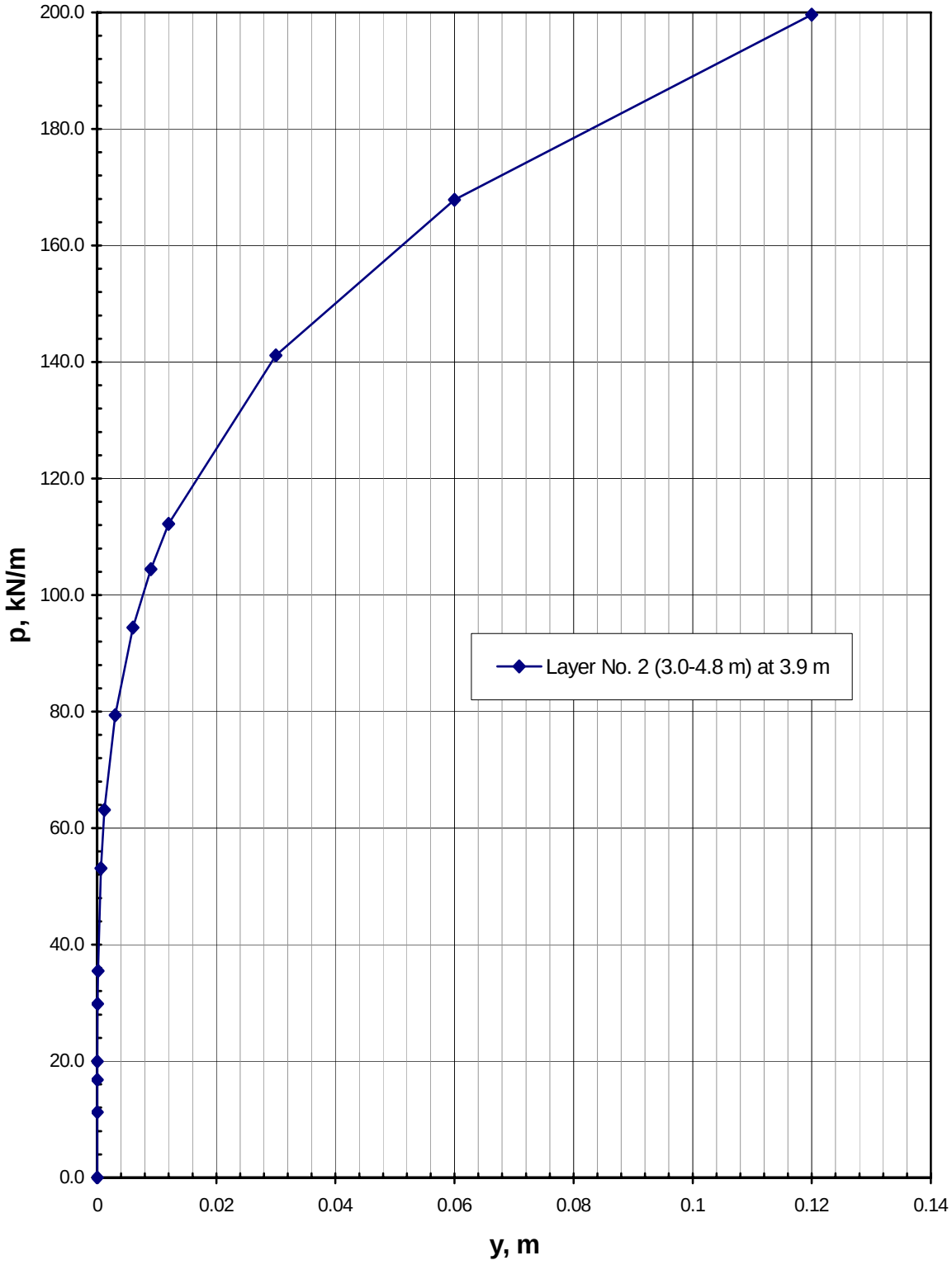


Figure 4-4: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)


p-y Curves for 600 mm CIDH pile (group), Bent C-P1 (right)
Centinela Ave UC (53-1253) Widening
Layer No. 1 (0.0-3.0 m) at 1.5 m
Layer No. 3 (4.8-6.8 m) at 5.8 m
Layer No. 4 (6.8-10.0 m) at 8.4 m
Layer No. 5 (10.0-13.8 m) at 11.9 m
Layer No. 6 (13.8-17.6 m) at 15.7 m
Layer No. 7 (17.6-21.0 m) at 19.3 m
p, kN/m
y, m
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
0.000
0.004
0.008
0.012
0.016
0.020
0.024
0.028
0.032

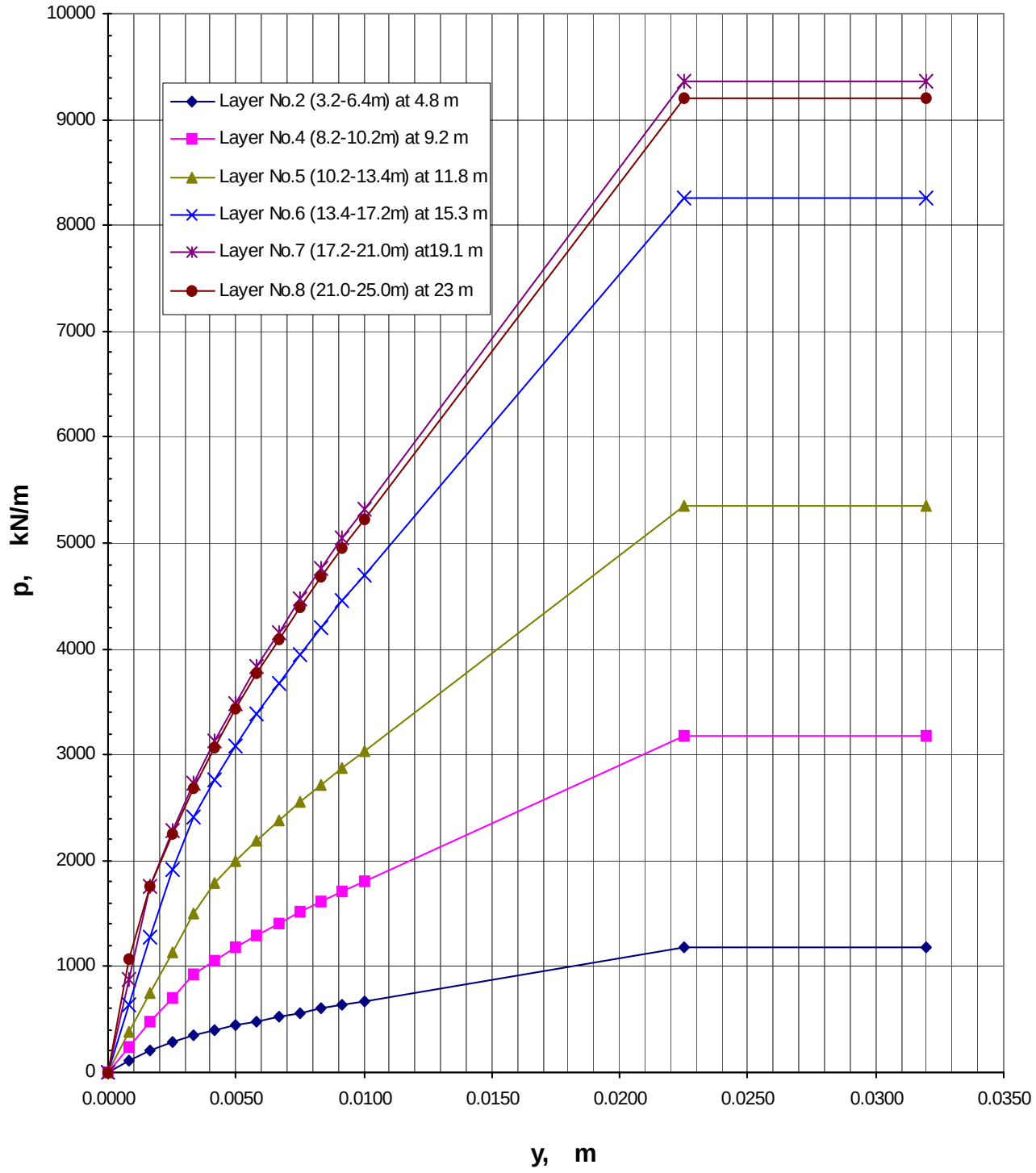
p-y Curves for 600 mm CIDH pile (group), Bent C-P1 (Right)

Centinela Ave UC (53-1253) Widening



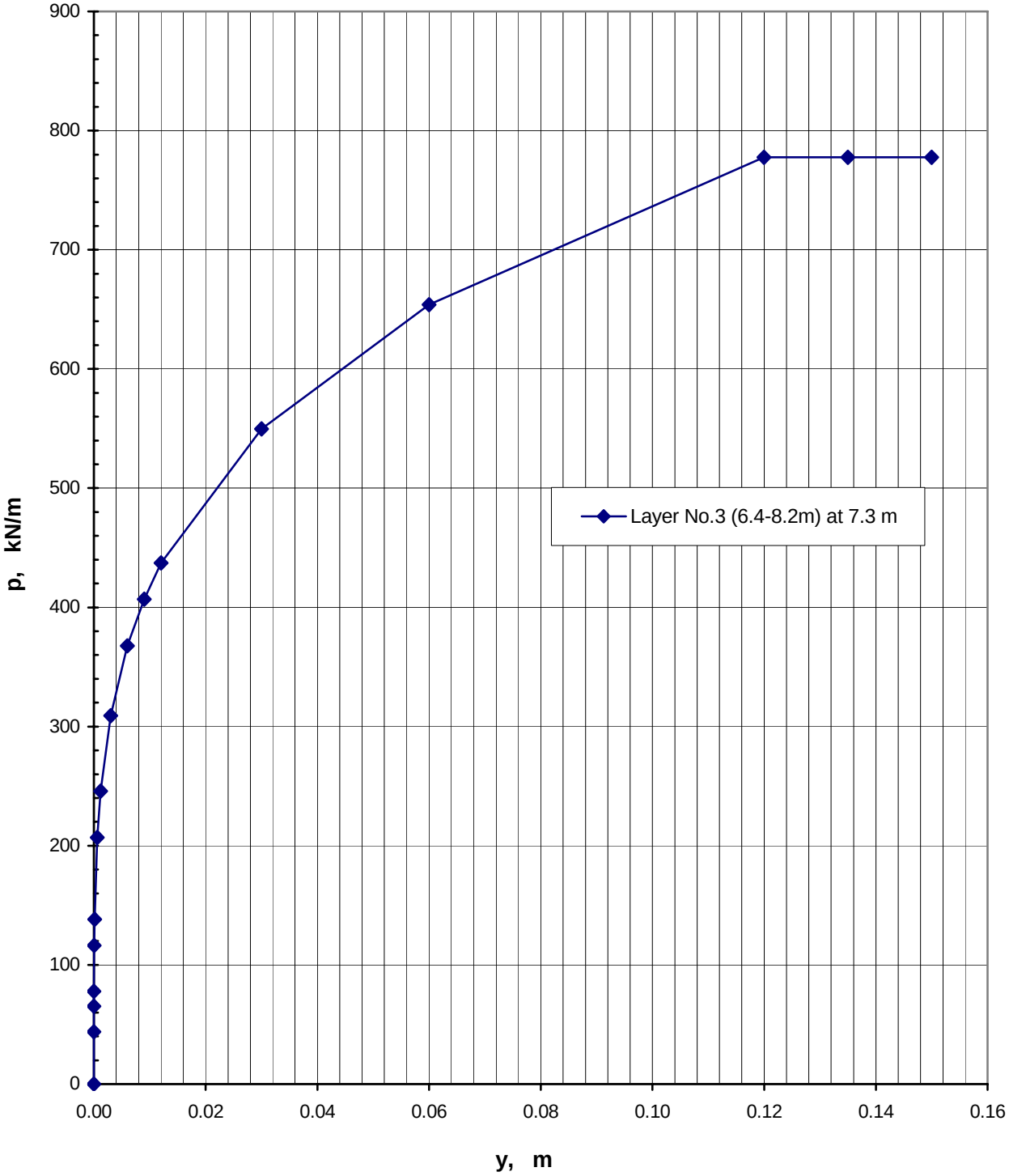
p-y Curves for 600 mm CIDH Piles at Bents A, B, C-P1 (L), and 1G-1M(R)

Centinela Ave UC (53-1253) Widening



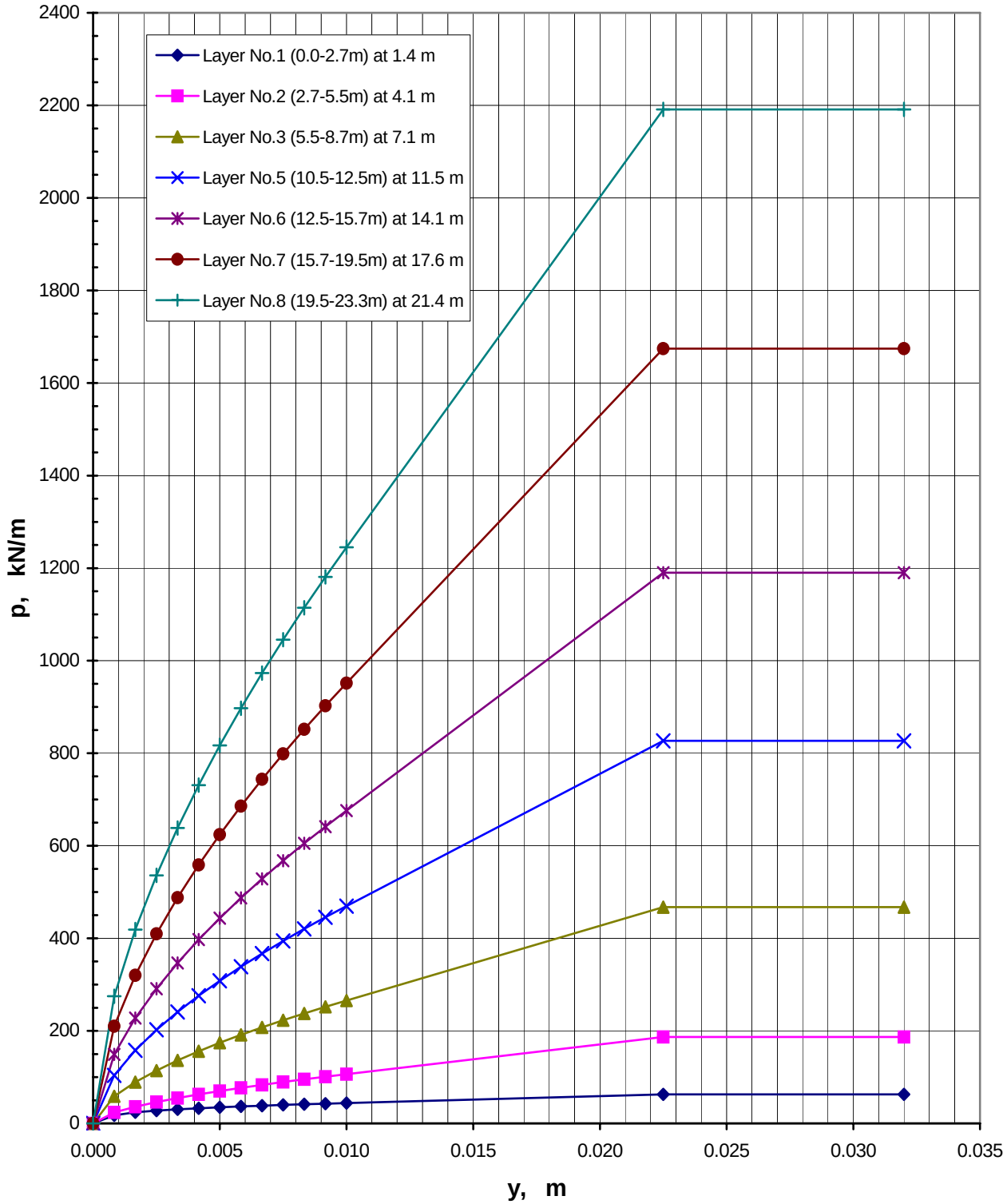
p-y Curves for 600 mm CIDH Piles at Bents A, B, C-P1 (L), and 1G-1M(R)

Centinela Ave UC (53-1253) Widening



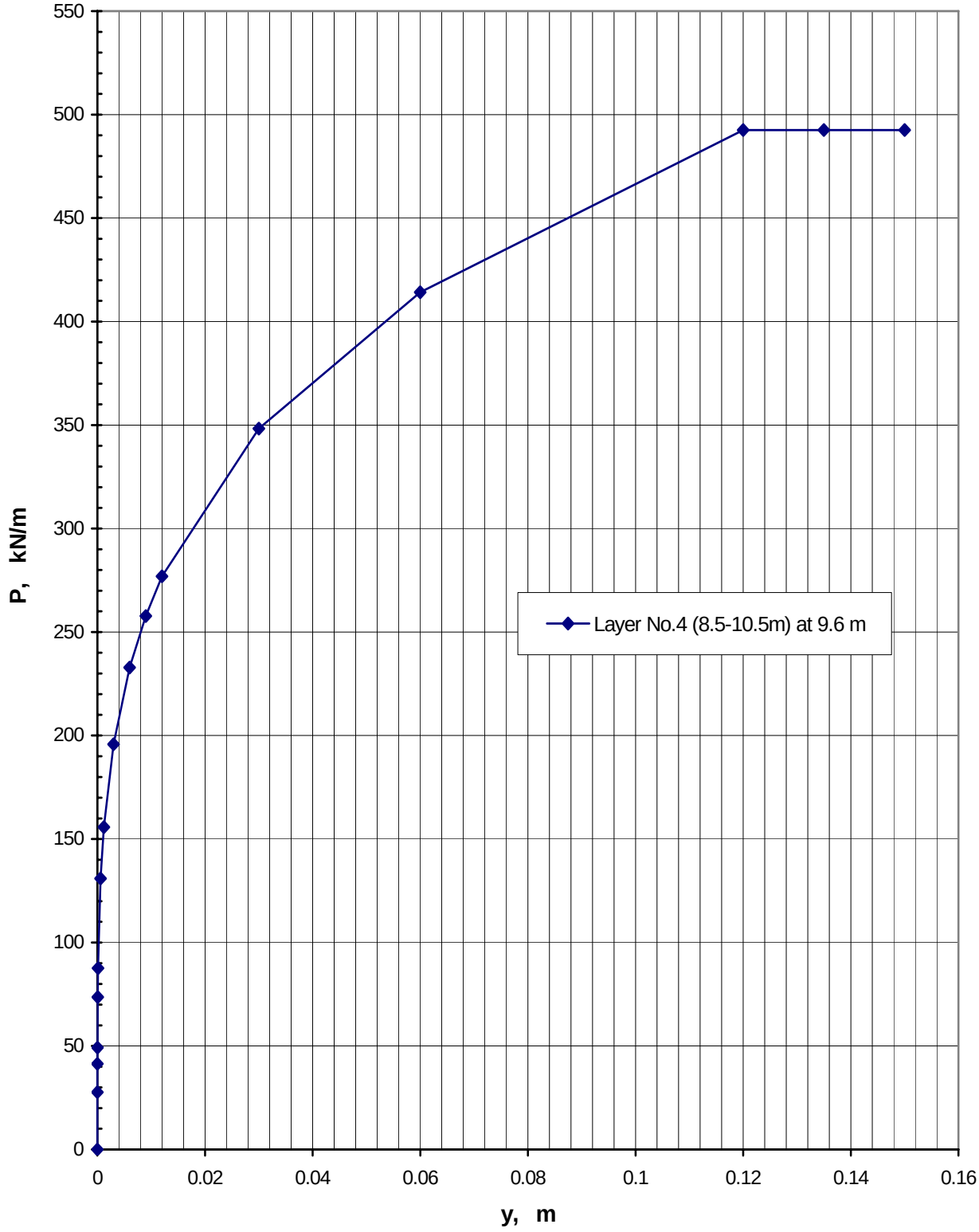
p-y Curves for 600 mm CIDH Pils at Bents 1B-1C (Right)

Centinela Ave. UC (53-1253) Widening



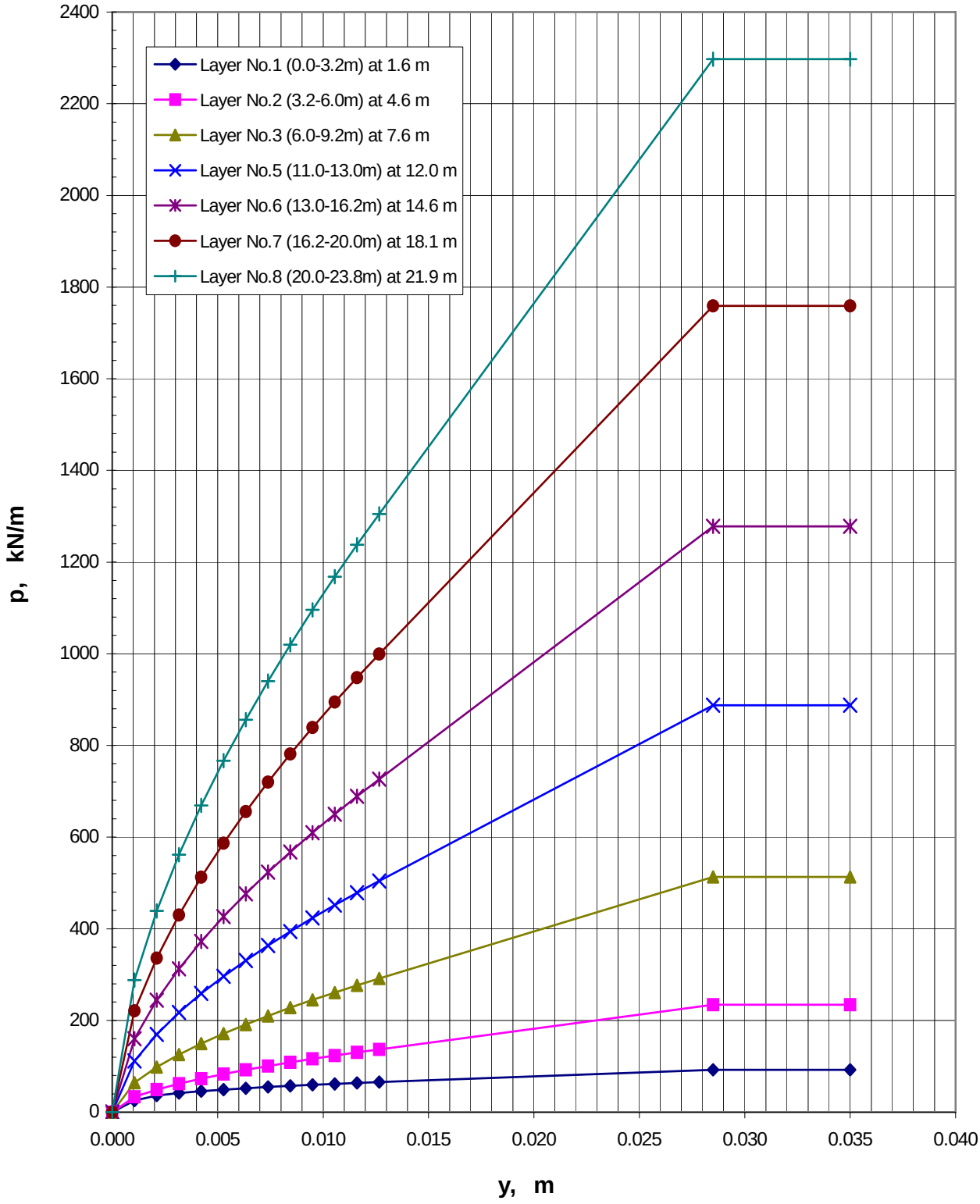
p-y Curve for 600 mm CIDH Piles at Bents 1B-1C (Right)

Centinela Ave. UC (53-1253) Widening



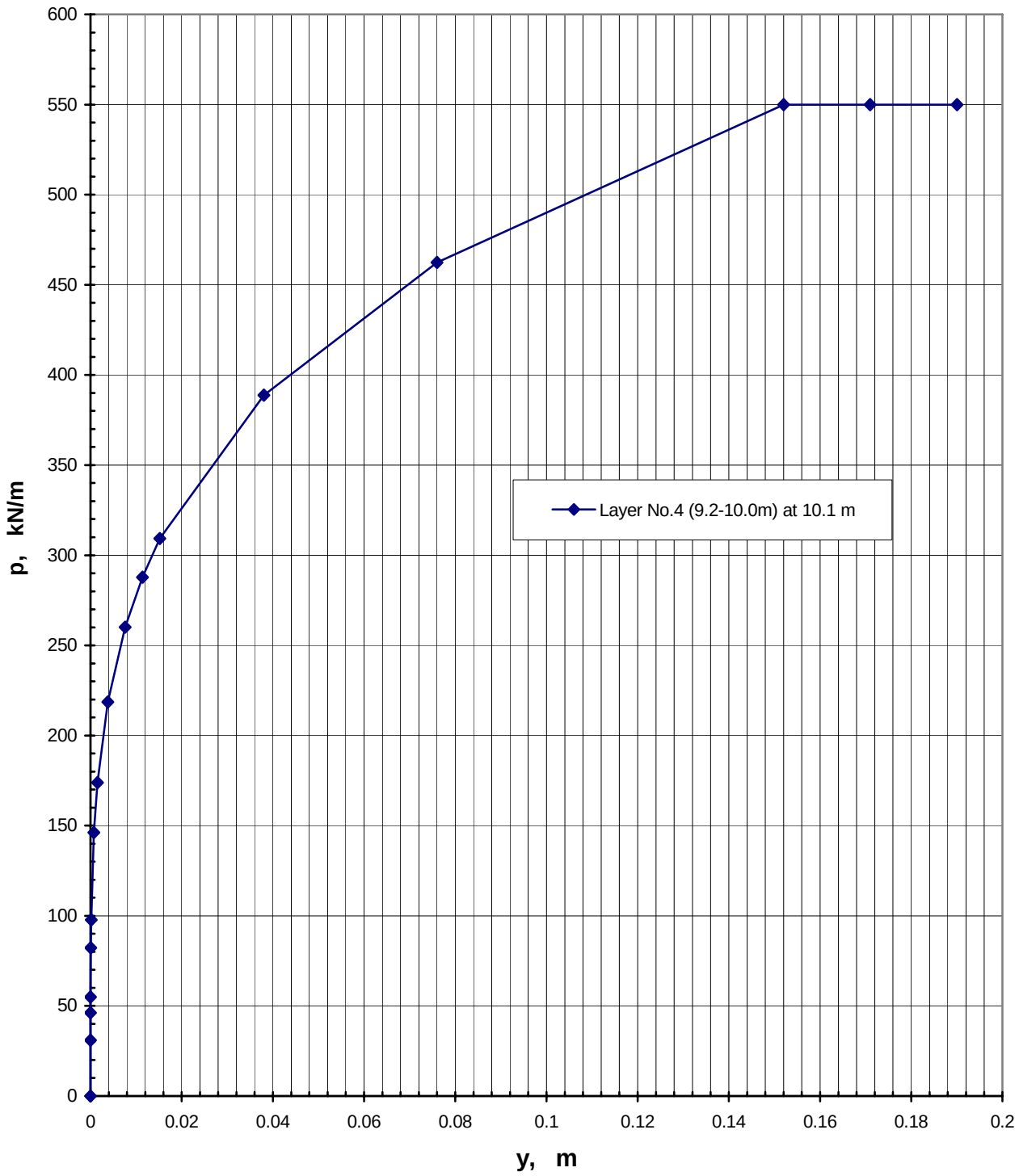
p-y Curves for 750 mm CIDH piles at Bents 1D-1F (Right)

Centinela Ave. UC (53-1253) Widening



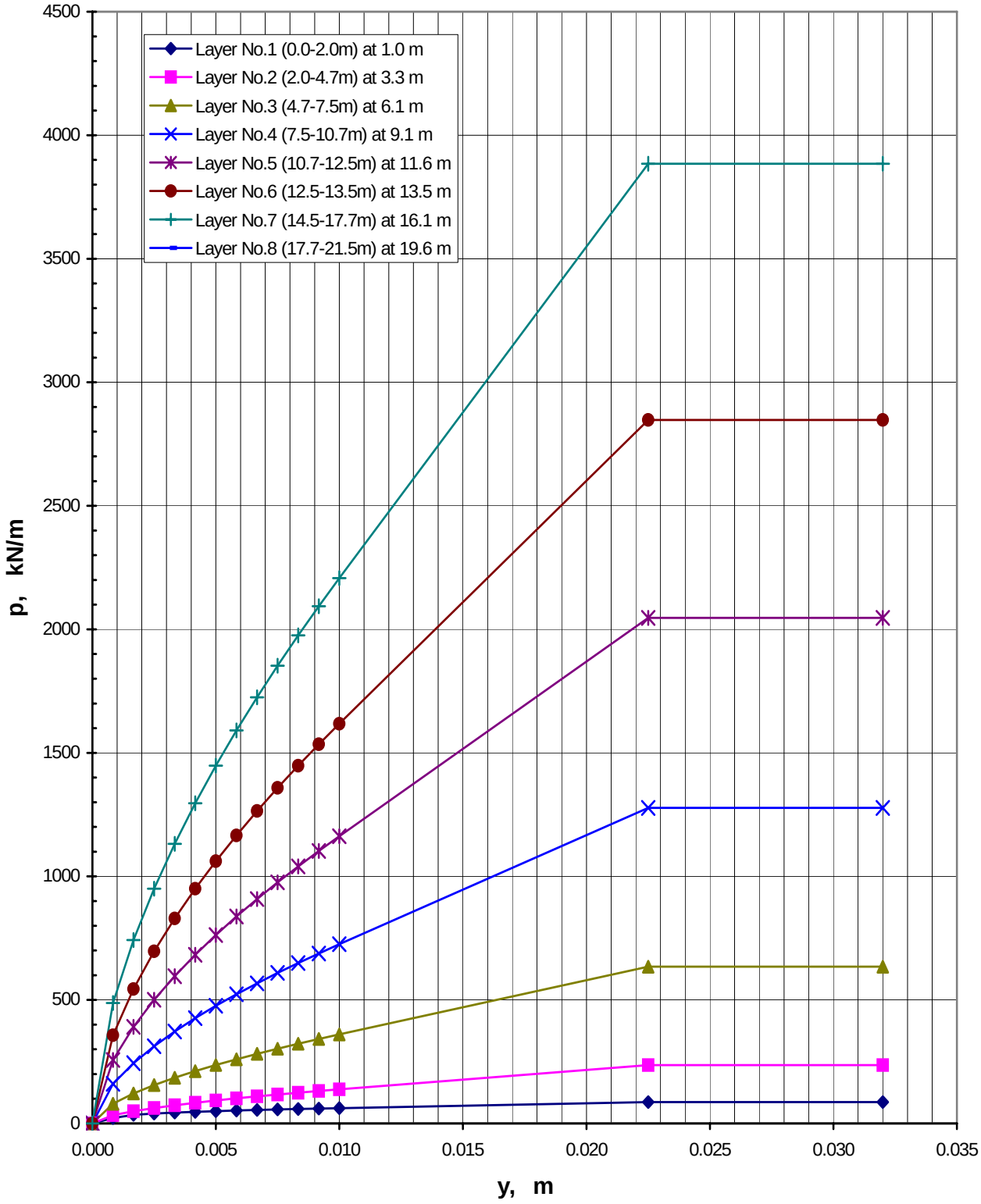
p-y Curve for 750 mm CIDH Piles at Bents 1D-1F (Right)

Centinela Ave UC (53-1253) Widening



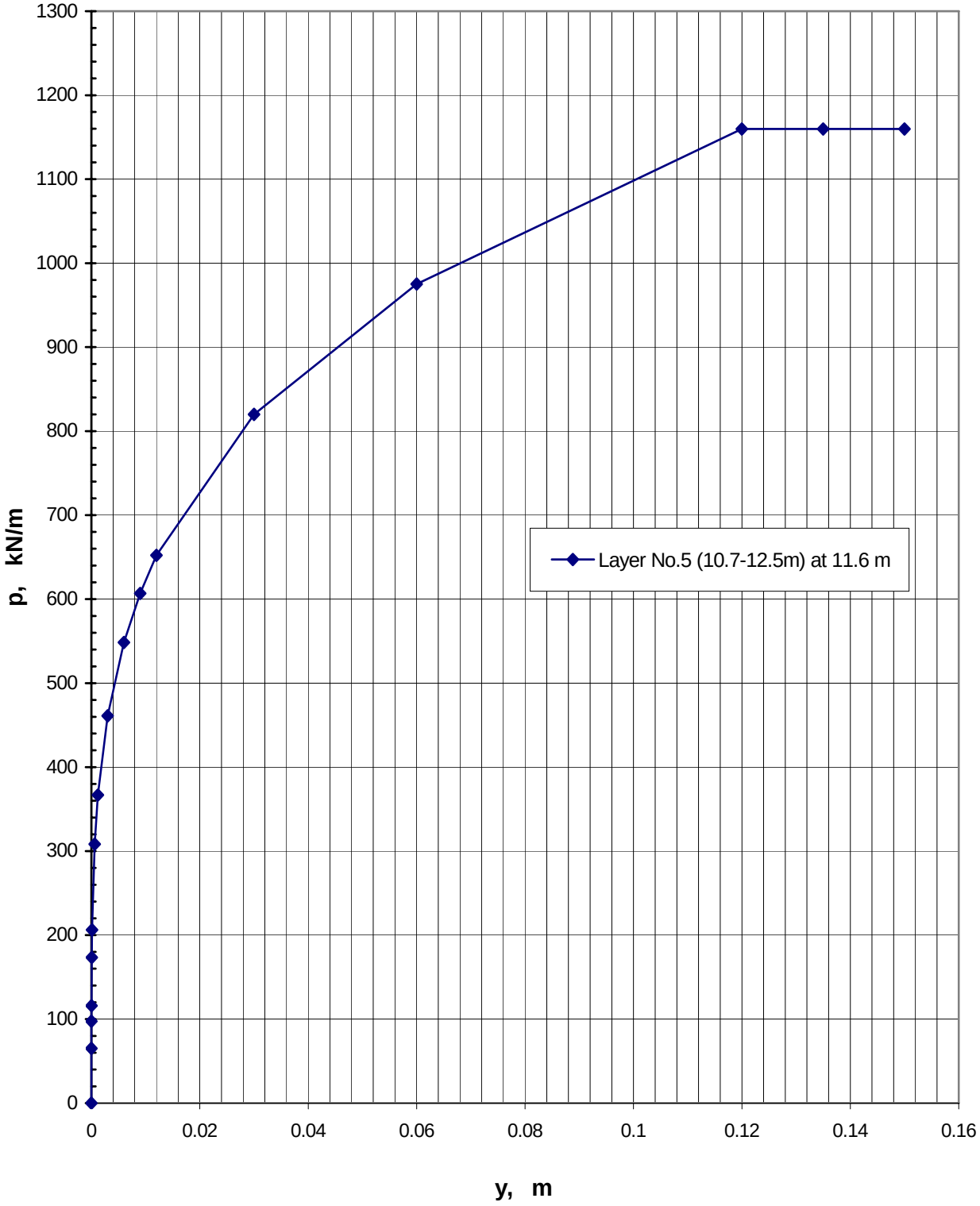
p-y Curves for 600 mm CIDH Piles at Bents 1B-1M (Left)

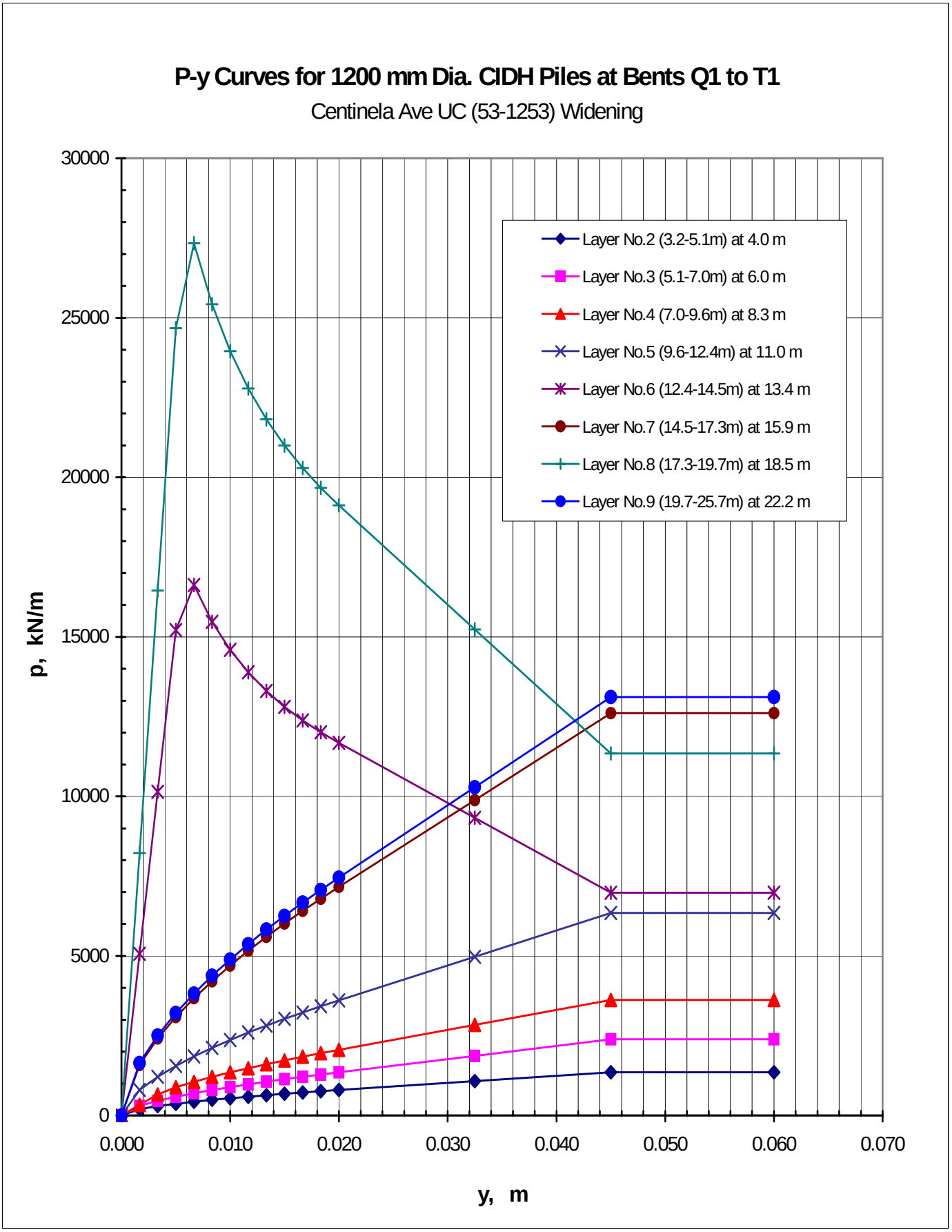
Centinela Ave UC (53-1253) Widening

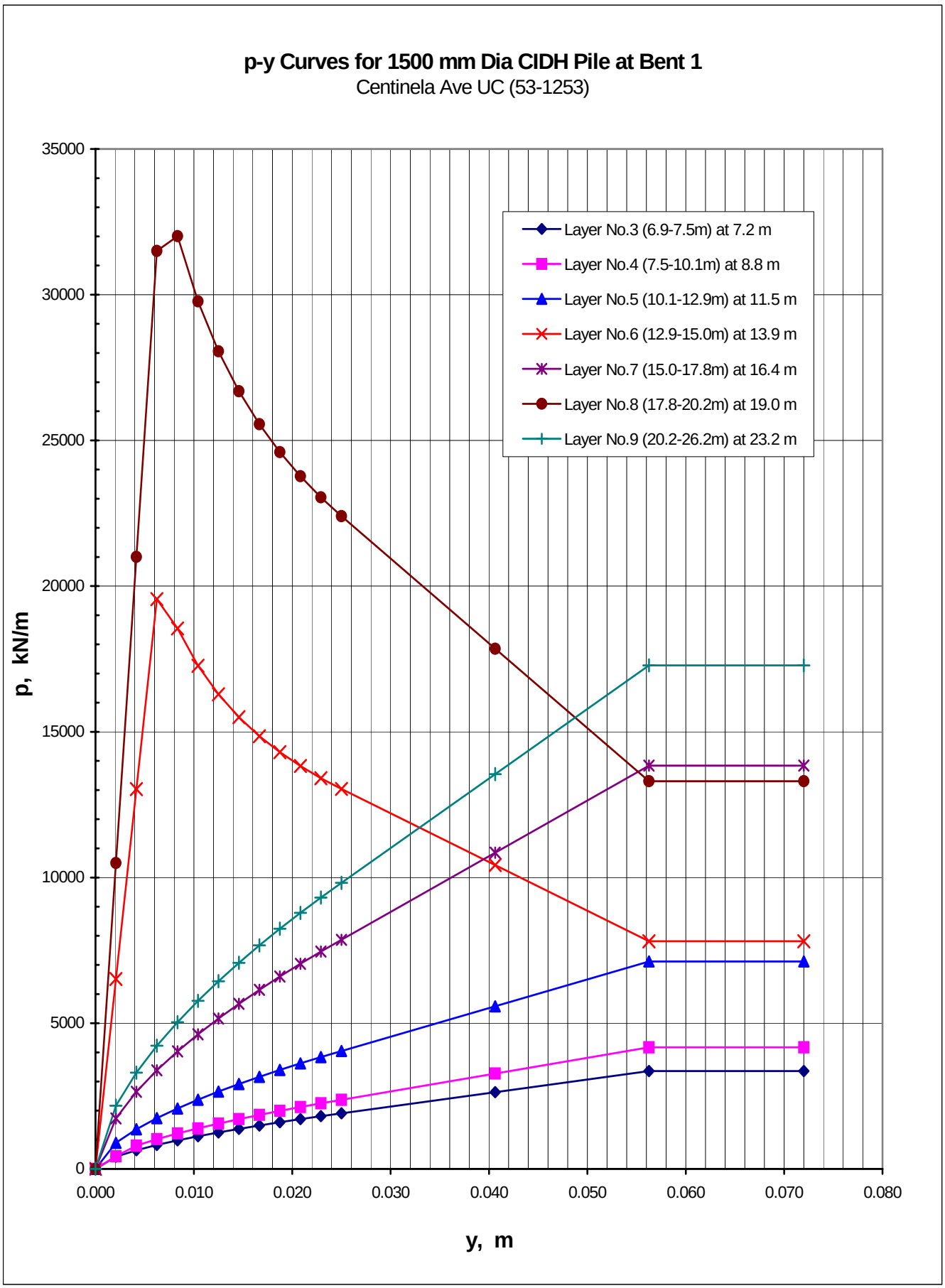


p-y Curve for 600 mm CIDH Piles at Bents 1B-1M (Left)

Centinela Ave UC (53-1253) Widening

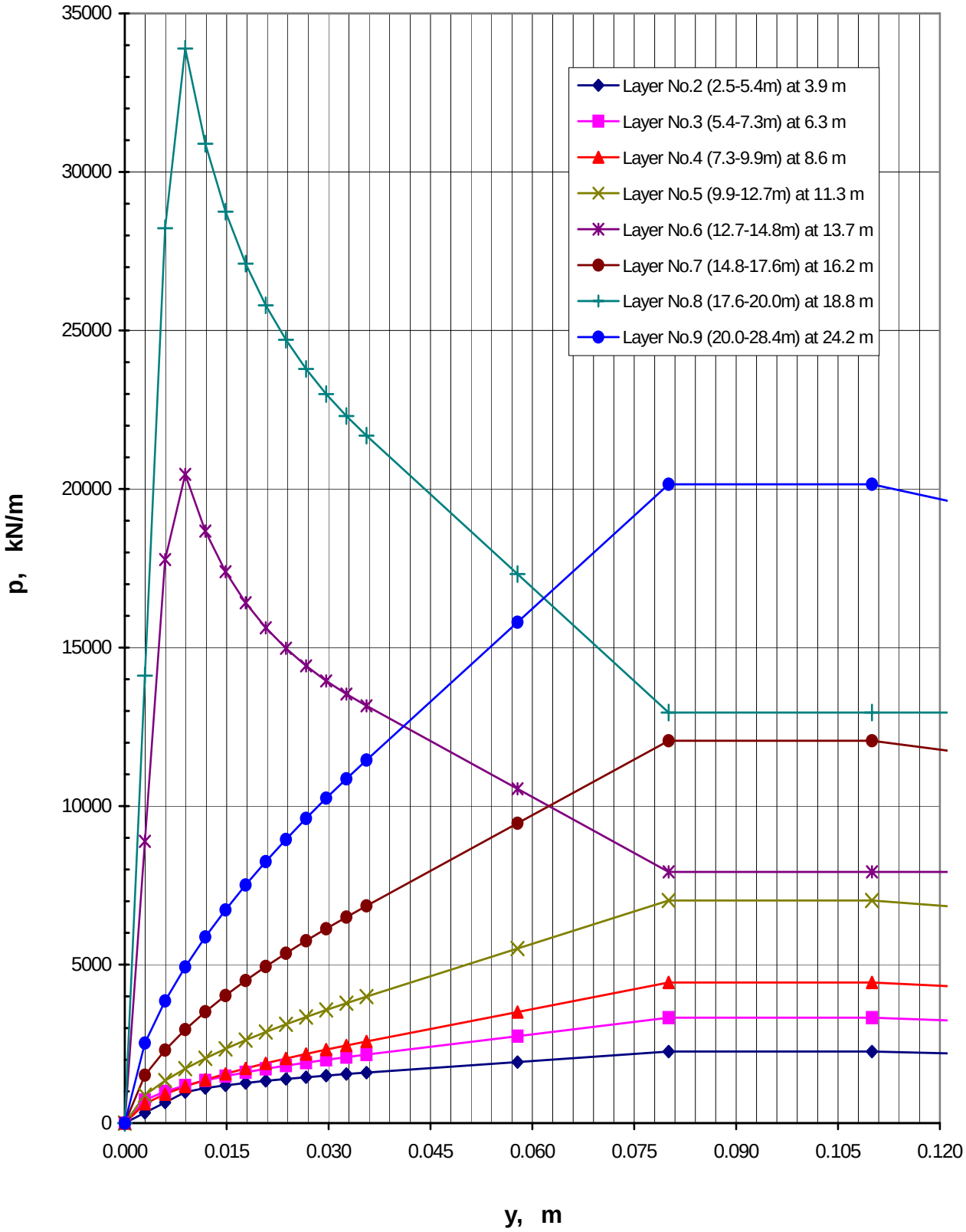



P-y Curves for 1200 mm Dia. CIDH Piles at Bents Q1 to T1
Centinela Ave UC (53-1253) Widening
p, kN/m
y, m
30000
25000
20000
15000
10000
5000
0
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
Layer No.2 (3.2-5.1m) at 4.0 m
Layer No.3 (5.1-7.0m) at 6.0 m
Layer No.4 (7.0-9.6m) at 8.3 m
Layer No.5 (9.6-12.4m) at 11.0 m
Layer No.6 (12.4-14.5m) at 13.4 m
Layer No.7 (14.5-17.3m) at 15.9 m
Layer No.8 (17.3-19.7m) at 18.5 m
Layer No.9 (19.7-25.7m) at 22.2 m


p-y Curves for 1500 mm Dia CIDH Pile at Bent 1
Centinela Ave UC (53-1253)
p, kN/m
y, m
35000
30000
25000
20000
15000
10000
5000
0
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
Layer No.3 (6.9-7.5m) at 7.2 m
Layer No.4 (7.5-10.1m) at 8.8 m
Layer No.5 (10.1-12.9m) at 11.5 m
Layer No.6 (12.9-15.0m) at 13.9 m
Layer No.7 (15.0-17.8m) at 16.4 m
Layer No.8 (17.8-20.2m) at 19.0 m
Layer No.9 (20.2-26.2m) at 23.2 m

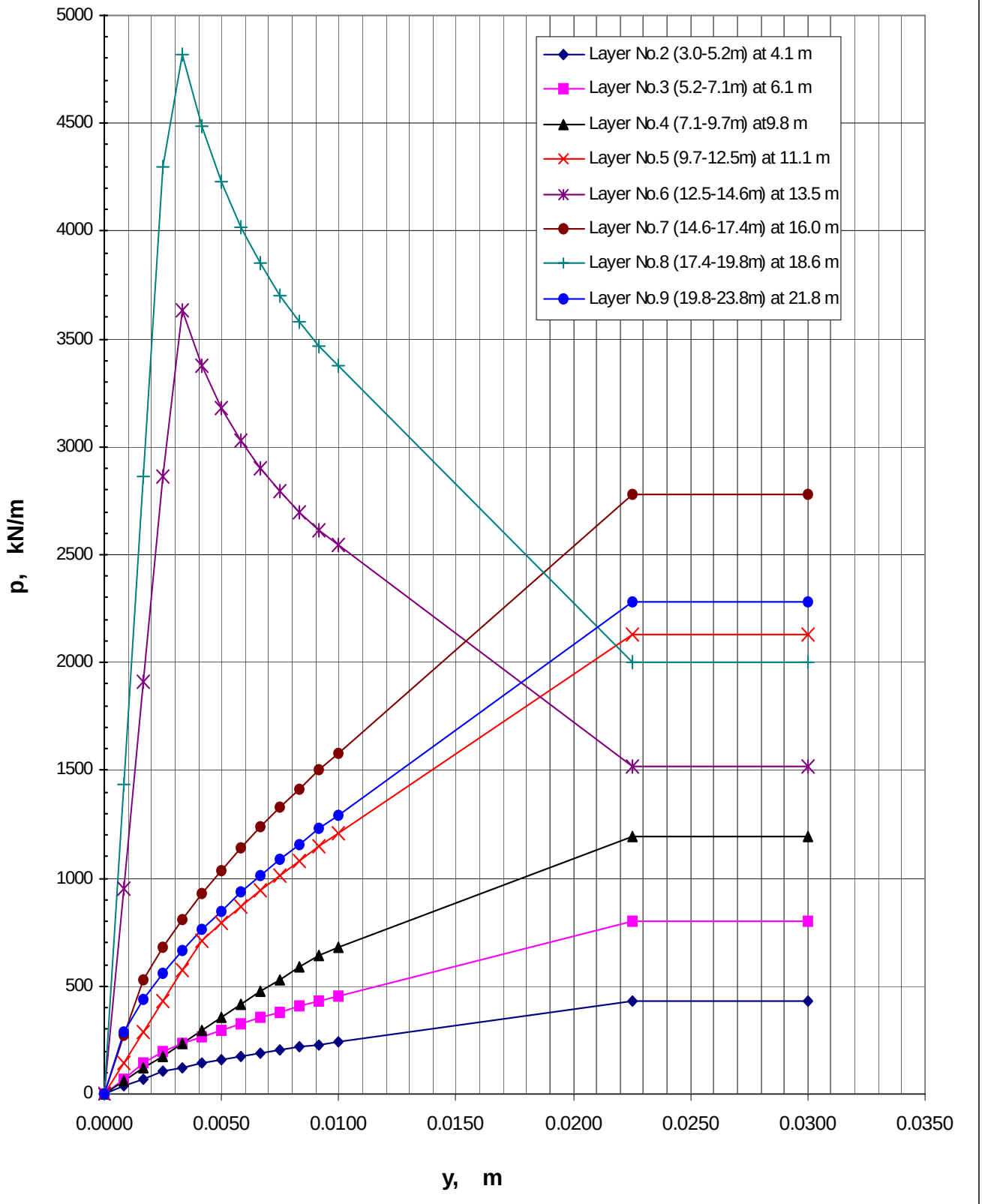
p-y Curves for 2135 mm Dia. CIDH Piles at Bent 2 & 3

Centinela Ave UC (53-1253) Widening



p-y Curves for 600 mm CIDH Piles at Bents 4 and 5

Centinela Ave UC (53-1253) wideing



State of California — Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MATT HOLM
Chief
Bridge Design Branch 12

Date: 11/26/07

File: 07-LA-405-KP39.3_41.4
07-241301
RW402, RW408, RW410, and Overhead Sign 4A

Attention: Leon Valla

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Recommendations for Retaining Walls 402, 408, 410, and Overhead Sign 4A Foundations for Northbound 405 Widening at Culver City , LA

This is the geotechnical design recommendations (GDR) for the foundations of proposed retaining walls and overhead sign post, which are planned as a part of highway widening from KP39.3 to KP41.4 of northbound 405, in Culver City, Los Angeles County. The location of the improvements are close to Centinela Ave UC (BR53-1253) and Sepulveda Ave UC (BR53-1254). The site location is shown on the Vicinity Map (Figure 1) of Attachments.

The geotechnical recommendations presented herein are based on results of field reconnaissance, literature study, subsurface exploration, laboratory testing of the soil samples recovered from subsurface exploration, and geotechnical analyses for the proposed improvement. The proposed retaining wall and overhead sign post information is presented in Table 1 below.

Table 1. Information of Proposed Retaining Walls and Overhead Sign Post

Retaining wall / Overhead Sign Number	Sign Location (Station/Offset)	Wall Location		Wall / Overhead Sign Type	Proposed Foundation Type	Comments on Wall / Sign Locations
		Beginning Station/Offset	End Station/Offset			
RW402	N/A	401+30.19 / 33.48 m R	403+86.84 / 29.206 m R	Modified Type 736 SV Concrete Barrier Wall	CIDH Piles	Right of NB 405
	N/A	403+86.84 / 29.206 m R	404+04.55 / 29.052 m R	Cantilever Retaining Wall Type I	Spread Footing	
RW408	N/A	407+80.87 / 31.98 m R	409+10.82 / 42.20 m R	Cantilever Retaining Wall Type I	Spread Footing / CIDH Piles at Sign 4A Location	Right of Sepulveda Blvd NB Offramp
RW410	N/A	409+18.00 / 28.83 m R	409+96.35 / 28.83 m R	Modified Type 736 SV Concrete Barrier Wall	CIDH Piles	Right of NB 405
Sign4A	407+84.35 / 32.27 m R	N/A	N/A	Single Post Sign (Truss) Type VIII	CIDH Piles under Pile Cap	Beginning of RW408

Regional Geology

The site is located on the Coastal Plain of Los Angeles County and is considered part of the Peninsular Range geomorphic province of California, and underlain by a thick sequence of marine and non-marine unconsolidated sediments. According to the *Geologic Map of California, Long Beach Sheet,* the proposed improvement is located within a region of quaternary dune sand deposits of recent age. The geologic map of this area is shown on Figure 2 of Attachments.

Seismicity

The site is close to a number of faults that are considered to be active or potentially active. The information of adjacent faults which could impact the proposed improvement is presented in Table 2 below. According to the Caltrans' Seismic Map (Figure 3, Attachments), the peak bedrock acceleration (PBA) at the subject site is expected to be 0.6 g.

Table 2 Fault Information

Fault Name	Fault Type	Distance to Site	Maximum Creditable Event (MCE)
Charnock Fault (CNK)	Strike-Slip	0.6 km Southwest	6.5
Newport-Inglewood-Rose Canyon Fault (NIE)	Strike-Slip	2.6 km Northeast	7.0

However based on Sadigh et al (1997), the estimated medium PBA of the site from CNK and NIE are 0.7g and 0.6g respectively. Based on the results of recent subsurface investigation, the soil profile can be defined as type D ($15 < N < 50$). Considering the near fault effect (Seismic Design Criteria 1.1, Caltrans, July 1999), the compound ARS curves based on both CNK and NIE were plotted in Figure 3 of the Attachment. The interception period (T_0) of two curves is about 0.24 seconds. That is:

- For the fundamental period of structure less than 0.24 seconds, ARS for CNK (MCE = 6.5, PBA = 0.7 g) will control;
- For the fundamental period higher than 0.24 seconds, modified ARS for NIE (MCE = 7.0, PBA = 0.6 g) will control the seismic design.

Liquefaction

The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level (MSL) based on the readings from the piezometers installed at B-1, B-4, and B-6. However, according to our subsurface exploration, foundation soils below the groundwater table are generally dense to very dense as interpreted from relatively high SPT N values. Therefore, liquefaction potential due to seismic event is negligible.

Seismic Induced Settlement

Seismic compaction under earthquake event is also negligible due to high soil density and relatively high percentage of fines within foundation soils.

Subsurface Exploration

The subsurface exploration consisted of advancing test boreholes using mud rotary to depths of 18.9 m to 32.8 m below the existing grade at the locations tabulated on the table below. Most of the borings were conducted for the foundation Design of Centinela Ave and Sepulveda Blvd UC widening, and referenced here for foundation recommendations of retaining walls and sign post. The boring locations are presented in Figures 4-1 to 4-4 of the Attachments.

Table 3. Summary of Soil Exploration Plan
(N405 Widening, 07-LA-405-KP 39.3_41.4, EA: 07-241301)

Boring No.	Station	Offset (m)	Ground Elevatrion (m)	Borehole Depth (m)	Equipment / Exploration Method	Hammer Type/ Efficiency
B-2	409+66	23.4R	17.5	32.8	CME85 / Mud rotary	Auto/0.87
B-3	408+51	25.0R	18.6	16.0	CME85 / Mud Rotary	Auto/0.87
B-4	407+57	31.0R	10.0	28.2	CME85 / Mud Rotary	Auto/0.87
B-6	404+02	25.0R	16.0	18.9	Acker AD2 / Mud Rotary	Auto/0.80

Drilling and Sampling

Standard penetration tests (SPT) were conducted in general accordance with ASTM D1586. Disturbed bulk samples were recovered for corrosion testing. Relatively undisturbed soil samples were sealed by plastic caps/tapes in brass rings to prevent moisture loss and transported to Caltrans' Soil Laboratory for testing.

Drilled holes were backfilled with on-site soil upon completion of sampling and testing. For the borings on highway and city streets, the drill holes were backfilled with onsite soil to 2.5 cm below pavement subgrade elevation, and then backfilled to pavement finished grade with tamped asphalt concrete cold patch.

Laboratory Test

Laboratory tests that include moisture-density determinations (California Test Method (CTM) 226), particle size analysis (CTM 203), direct-shear testing of undisturbed soil specimens (CTM 222), Atterberg limits (CTM204), and corrosion tests (CTM 417, 422, and 424) were performed.

Corrosion Test

For corrosion evaluation, bulk samples were recovered from selected boreholes and tested for pH value, and minimum electrical resistivity. The tests for sulfate and chloride are usually not conducted unless the resistivity of the sample soil is 1000 Ohm-cm or less. Where resistivity is greater than 1000 Ohm-cm, the soil is considered not corrosive. According to the test results, the subsurface soil for the proposed bridge widening is considered non-corrosive.

Subsurface Condition

RW402: The embankment fills are mostly composed of medium dense sand, and silty sand with interbed of stiff lean clay layer of various thickness stretching along the alignment of the proposed wall. The native materials immediately underneath the embankment fill are medium dense to dense sand with silt.

RW408, RW410 and Sign 4A.: The embankment fill materials consist of medium dense to dense silty sand and sand with clay. A 0.6 m thick stiff lean clay layer was found at approximately 1.8 m below the existing highway grade. The native materials below the fill are mostly medium dense to dense silty sand, with 1.2 m to 1.5 m thick stiff lean clay layers encountered at different depths of some borehole locations within the upper 8 m of the native soil.

Foundation Design

Sign 4A.

Cast-in-drilled-hole (CIDH) piles are suggested as the foundation of the proposed sign post. The design of CIDH piles has been performed on the basis of shaft friction, neglecting the end bearing. The pile ultimate friction capacities were obtained using the procedures outlined by Reese and O'Neil (1988).

Axial group effects were considered for pile group with center to center (CTC) spacing less than 3 times of pile diameter (3D). With CTC spacing of 2.1D to 2.9D, 30% vertical capacity reduction was applied to the group piles for the sign foundation.

Long term settlement will not be a concern for the foundation of sign post. The immediate settlement for individual piles and pile groups under the service load is expected to be less than 25 mm.

The pile lateral analysis was performed using LPILE PLUS 5.0, considering longitudinal and transverse loading directions. The allowed lateral deflection under service load is limited to 6.4 mm (or 0.25 in). The estimated pile load under different pile lateral deflection, assuming two types of pile/cap connection, is presented in the following table.

Table 4. Pile Load under Different Pile Top Deflection
(600 mm CIDH Piles at Sign 4A)

Pile-Head Deflection (m)	Transvers Direction (Assuming 2H:1V slope at loading direction)				Longitudinal Direction (Assuming level ground at loading direction)			
	Assuming Pile/Cap Rigid Connection		Assuming Pile/Cap Hinge Connection		Assuming Pile/Cap Rigid Connection		Assuming Pile/Cap Hinge Connection	
	Maximum Moment (on Pile Top) kN-m	Maximum Shear (on Pile Top) kN	Maximum Moment kN-m	Maximum Shear (on Pile Top) kN	Maximum Moment (on Pile Top) kN-m	Maximum Shear (on Pile Top) kN	Maximum Moment kN-m	Maximum Shear (on Pile Top) kN
0.0032	101	80	62	44	120	124	64	69
0.0064	153	112	66	53	194	180	76	88
0.0127	262	179	90	73	328	280	117	128
0.0191	344	234	125	96	389	347	161	168
0.0254	382	268	159	118	396	386	202	204

* Applied average P multiplier = 0.4, considering the group effect for CIDH piles

1) The material properties and reinforcement information are based on Plan No. B2-3 of 2004 Std Plan for 600 mm CIDH piles;
2) The analysis is based on non-linear EI for the reinforced concrete piles.

RW408

For the bearing capacity of retaining wall footings, Meyerhof's method (1957) for continuous footing on slope was used. A factor of safety of more than 3.0 has been reached for the bearing capacity analysis of standard Type I wall, neglecting cohesion part of soil shear resistance. The results of slope stability analysis also indicate that there will be no global stability problem for the retaining wall/embankment slope system based on the wall / ground geometries, and soil properties.

RW402 and RW 410

The retaining wall design is based on modified Type 736 SV concrete barrier provided by Office of Structural Design (OSD). The wall foundation will be 400 mm diameter CIDH piles with the exception of approximately 17 m of RW402 towards the northern end of wall alignment, where Type I wall on spread footing will be used to get across the underlying Airport Blvd and 76th Street storm drain channel. The retained soil height varies from 1.2 m to 1.9 m on highway side, with 1:2 (V:H) sloping ground near the bottom of the other side of the retaining wall for RW402 and 0.61 m berm followed by 1:2 slope for RW410. The pile design will be performed by OSD. The recommended soil friction angles (ϕ) for embankment fills are 32 degrees for RW402, and 35 degrees for RW410.

Geotechnical Recommendations

1) Based on the subsurface exploration, The Soil Profile Type for the proposed improvements should be classified as Type D. The recommended ARS Curve is shown in Figure 3 of the Attachments.

2) The foundation soils for the proposed improvements are classified as non-corrosive to reinforced concrete according to the corrosion test results of selected soil samples from the field.

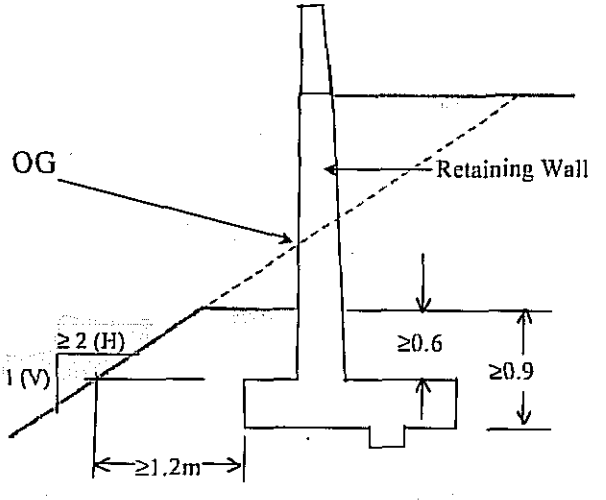
3) CIDH piles were recommended for the sign post foundation. Due to the high groundwater table, wet method may be used for pile installation, which requires a minimum pile diameter of 0.6 m. Table 4 summarized the suggested pile tip elevation based on the required nominal resistance for the piles.

Table 5. Pile Data Table for Overhead Sign Foundation at Retaining Wall 408

CIDH Pile Diameter	Design Load	Nominal Resistance		Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
		Compression	Tension				
600 mm	750 kN	1500 kN	300 kN	14.38	12.86	-1.14 (1)	-1.14

Note: Design tip elevations are controlled by the following demands: (1) Compression; (2) Tension; (3) Lateral Loads.

4) Retaining wall footings should be embedded a sufficient depth to provide adequate bearing, and erosion protection. A minimum footing embedment of 0.6 m measured to the top of footing, or 0.9 m measured to the bottom of the footing, whichever is greater, should be maintained. A minimum horizontal distance of 1.2 m, measured from the top of footing, shall be provided between the footing and the finished grade.



5) 400 mm diameter CIDH piles will be used for the foundations of RW410 and mostly portion of RW402, which are based on modified Type 736SV concrete barrier per Plan No. B15-8 of *Standard Plan (July, 2004)*. Groundwater will not be encountered above the pile tip due to relatively shallow pile embedment. Pile spacing and embedment length are to be determined by OSD. The recommended soil friction angle are 32 and 35 degrees for the embankment materials at RW402 and RW410 respectively.

6) Type 1 retaining wall with shallow footing can be used for RW408 and portion of RW402 (STA403+86.84 to STA404+04.550). The thickness and width of continuous footing for the proposed walls can be found on Plan No. B3-1 (Retaining Wall Type I) of *Standard Plan (July 2004)*. The estimated bearing capacities for the walls are listed in the following table.

Table 6 Bearing Capacity for Type 1 Retaining Walls

Retaining Wall No.	Wall Height	Friction Angle	Df/B	Allowable Bearing Capacity	Toe Pressure
RW402*	1.8 m	32°	0.92	150 kPa	90 kPa
RW408	4.8 m	35°	0.53	250 kPa	170 kPa
	2.4 m	35°	0.78	200 kPa	105 kPa

* Type I Wall on spread footing used from STA 403+86.84 to STA 404+04.550

Construction Considerations

1) The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level based on the readings from the piezometers installed at B-1, B4, and B-6, which is above the bottom of CIDH piles for Sign 4A foundation. It is recommended that wet (drilling slurry) method be used wherever groundwater is encountered, to stabilize the drilled hole during pile installation. In addition, the contractor should have temporary casing on-site, and have readily available equipment and techniques to remedy soil, according to Section 49-4.03 of *Standard Specification (July 1999)*.

2) Temporary casing, if used, must be removed during CIDH pile installation. Oscillating and spinning temporary casing will potentially reduce pile skin friction. Should the above method be used for casing installation, this office must be notified to provide further recommendation.

3) The pile construction sequence is important for the piles with center-to-center (CTC) spacing equal to or less than three times of pile diameter. Construction of adjacent pile should be performed only after the Portland cement concrete of the previously installed piles set and developed necessary strength.

If you have any question, please contact Haitao Liu at (916) 227-0992.

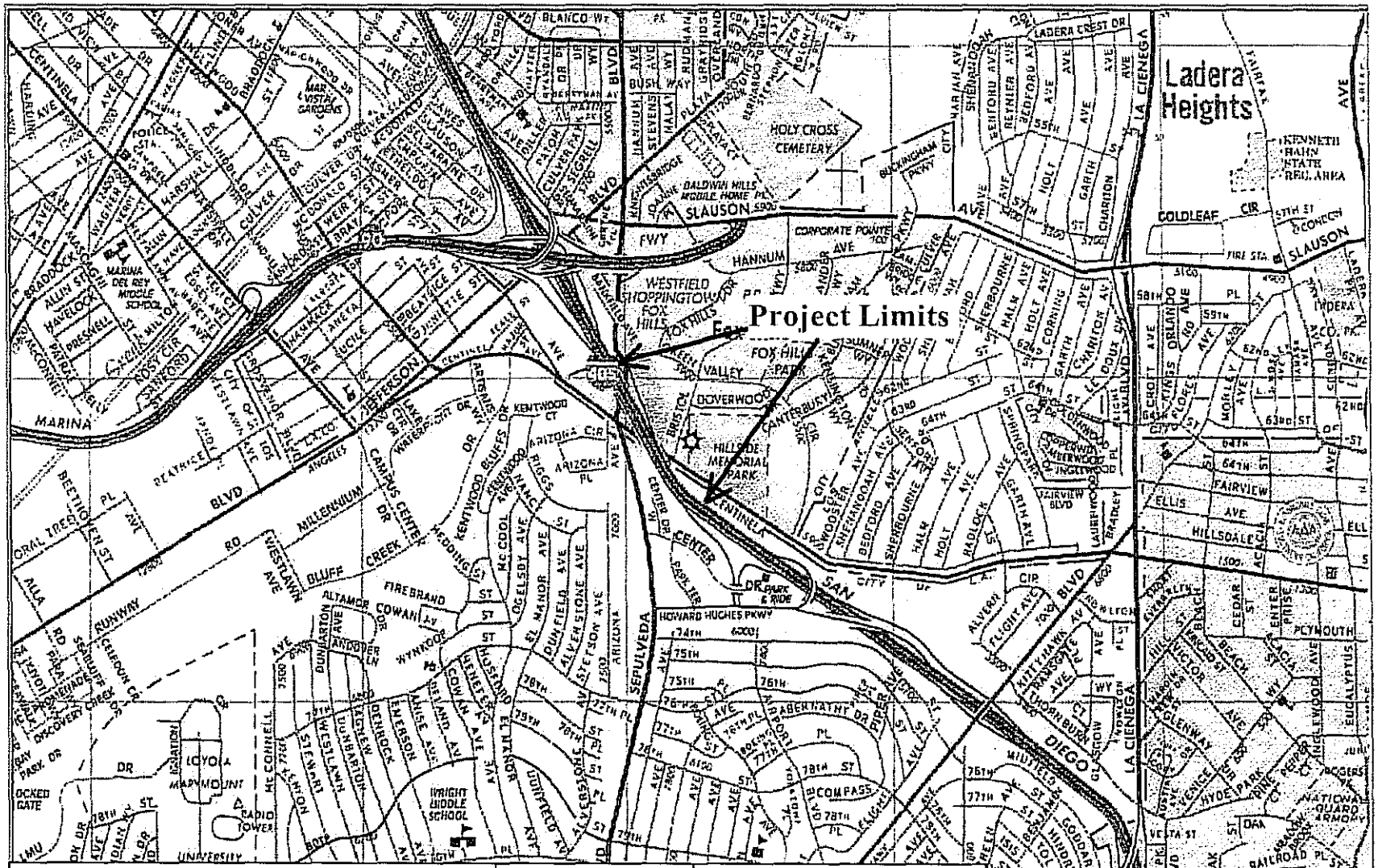
Prepared by:

Date: 11/26/2007

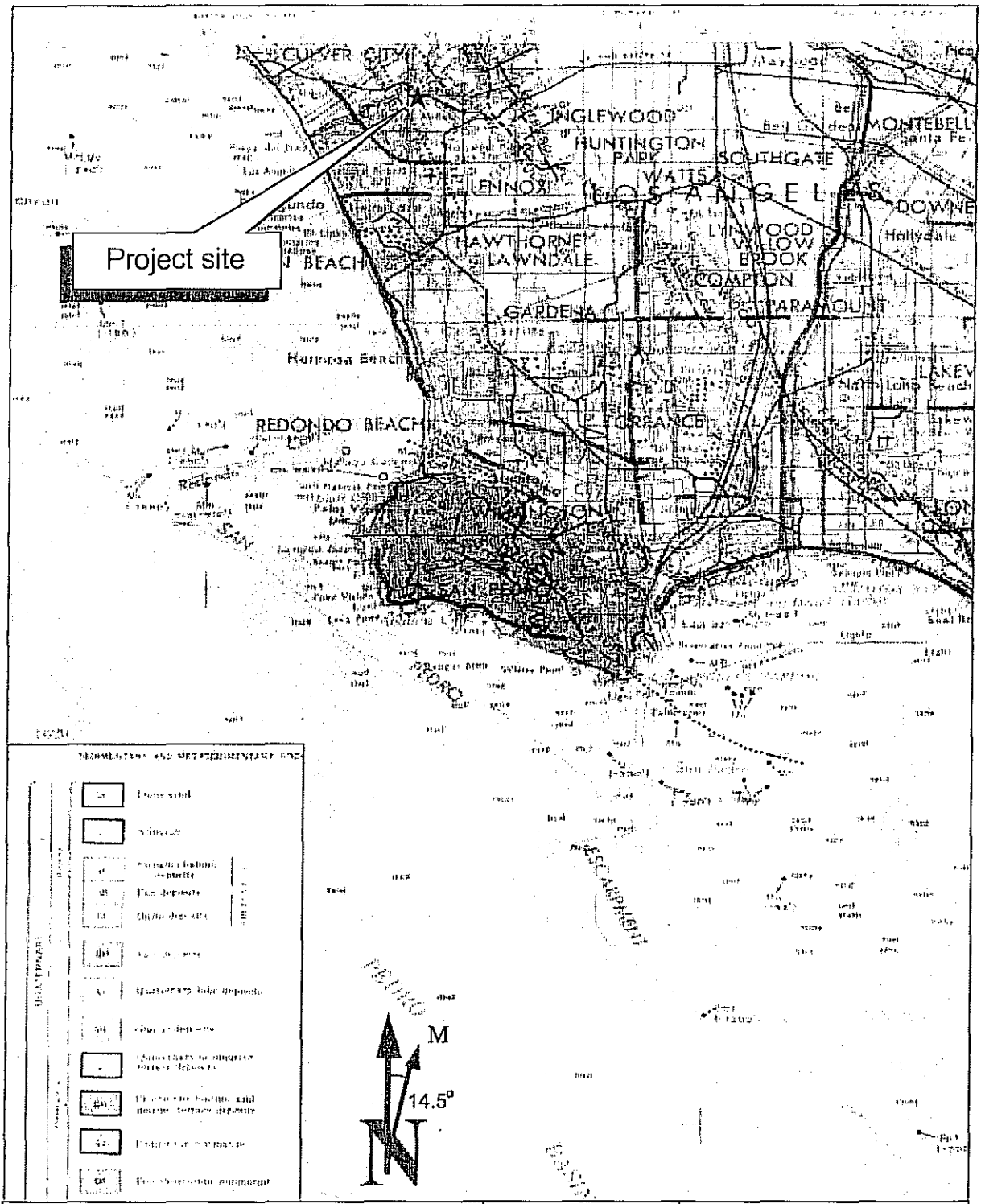
Haitao Liu, P.E. C66398
Transportation Engineer, Civil
Branch A / OGDS-1

Cc: OGDS1 - Sacramento
OGDS1 – L.A.
GS - File Room
Deh-Jeng Jang (OGDS-1)

ATTACHMENTS



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Vicinity Map**
	RW 402, 408, 410, and OH Sign 408 07-LA-405-KP 39.3/41.4	Figure No. 1



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Geologic Map**	
	RW402, 408, 410, and OH Sign 4A 07-LA-405-KP 39.3/41.4		Figure No. 2

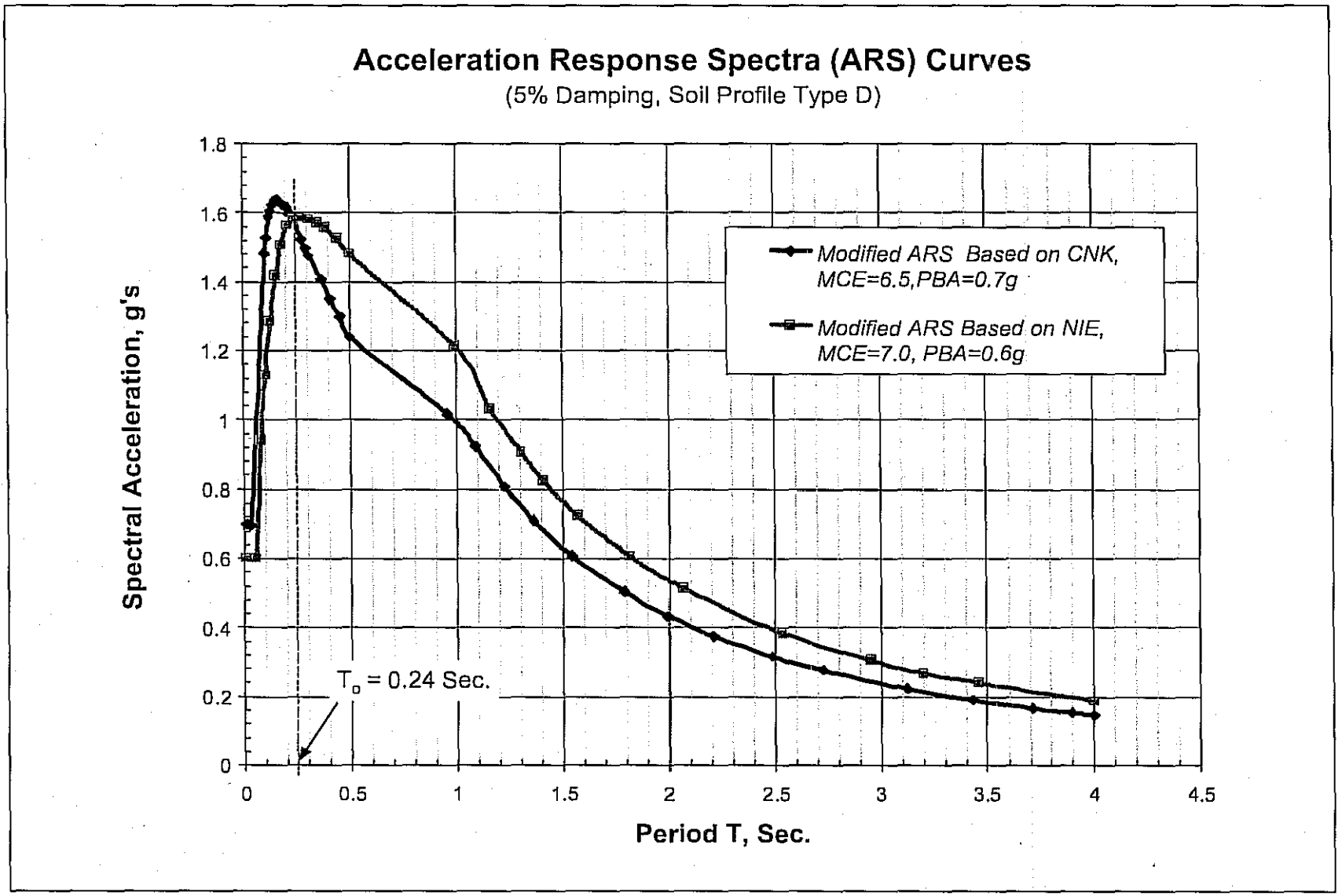


Figure 3: Recommended Acceleration Response Spectra (ARS) Curve

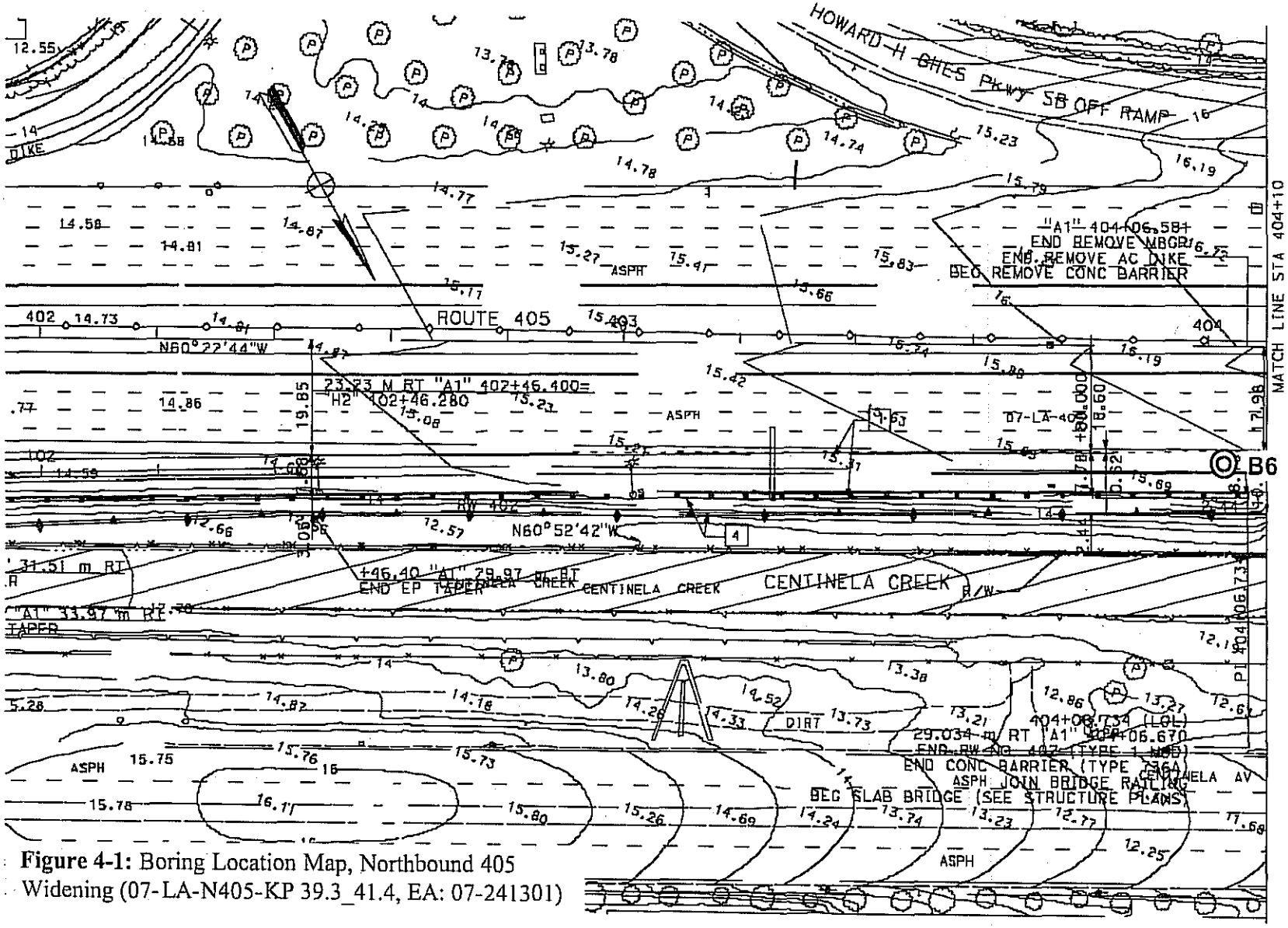


Figure 4-1: Boring Location Map, Northbound 405 Widening (07-LA-N405-KP 39.3_41.4, EA: 07-241301)

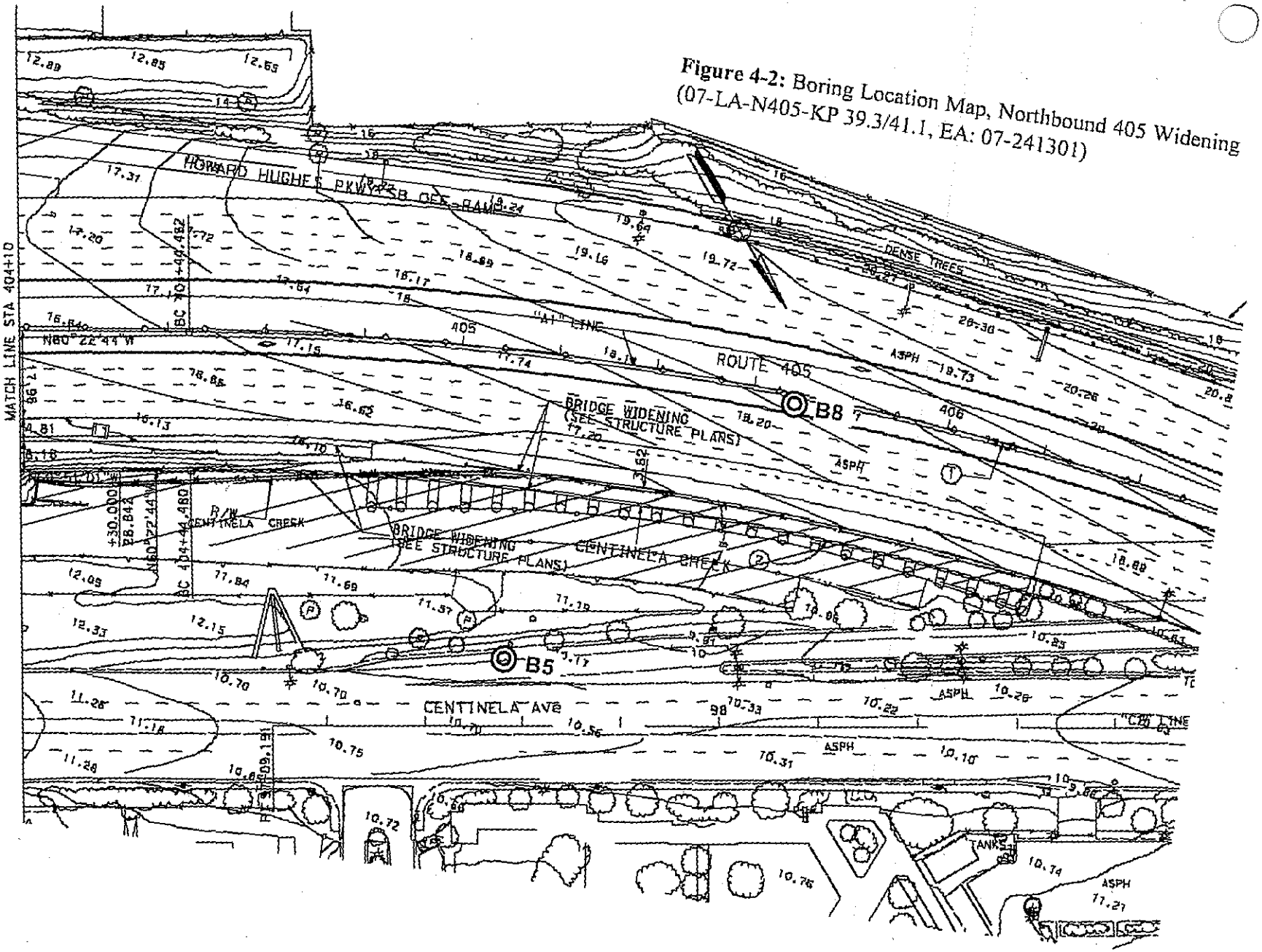


Figure 4-2: Boring Location Map, Northbound 405 Widening (07-LA-N405-KP 39.3/41.1, EA: 07-241301)

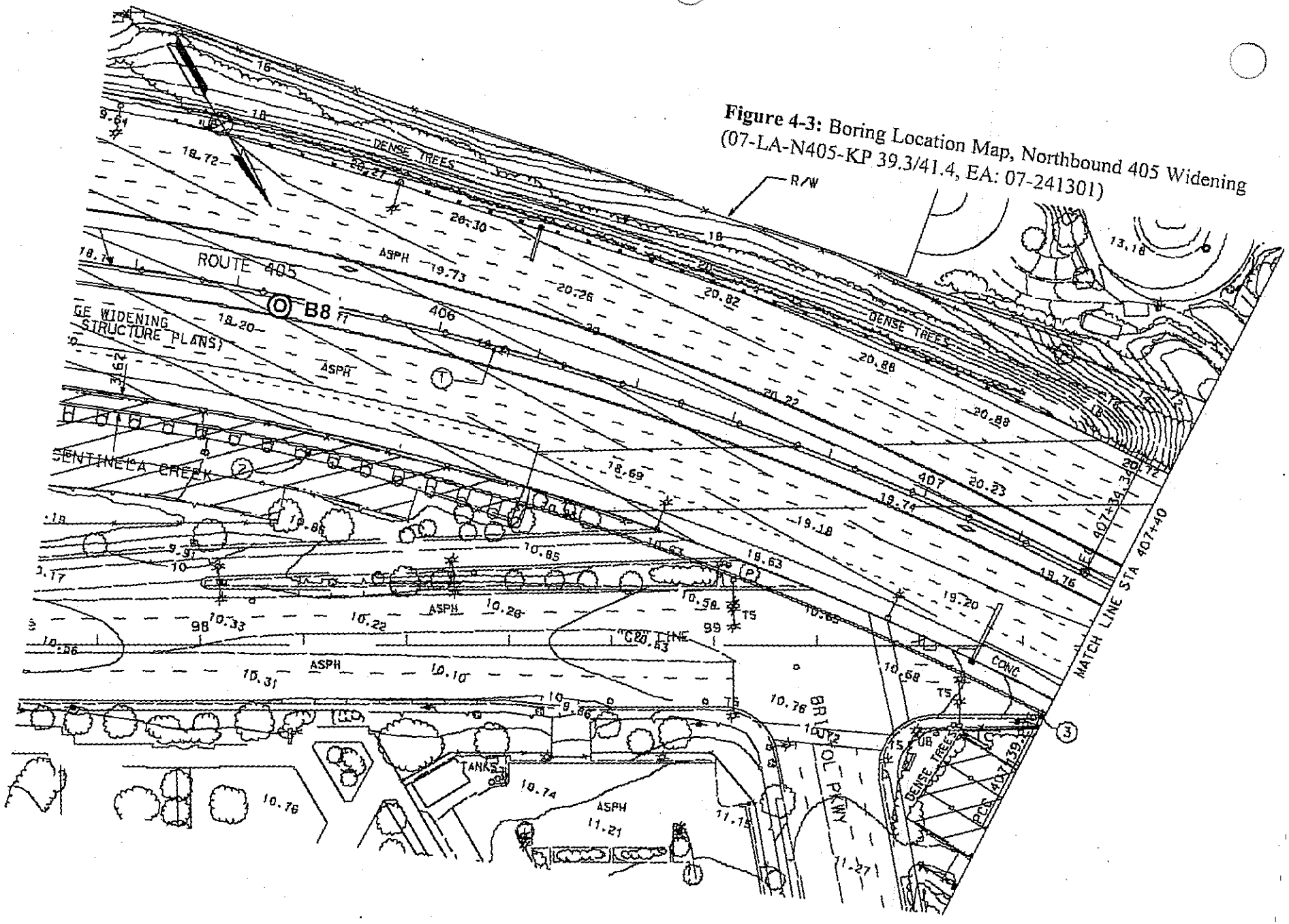


Figure 4-3: Boring Location Map, Northbound 405 Widening (07-LA-N405-KP 39.3/41.4, EA: 07-241301)

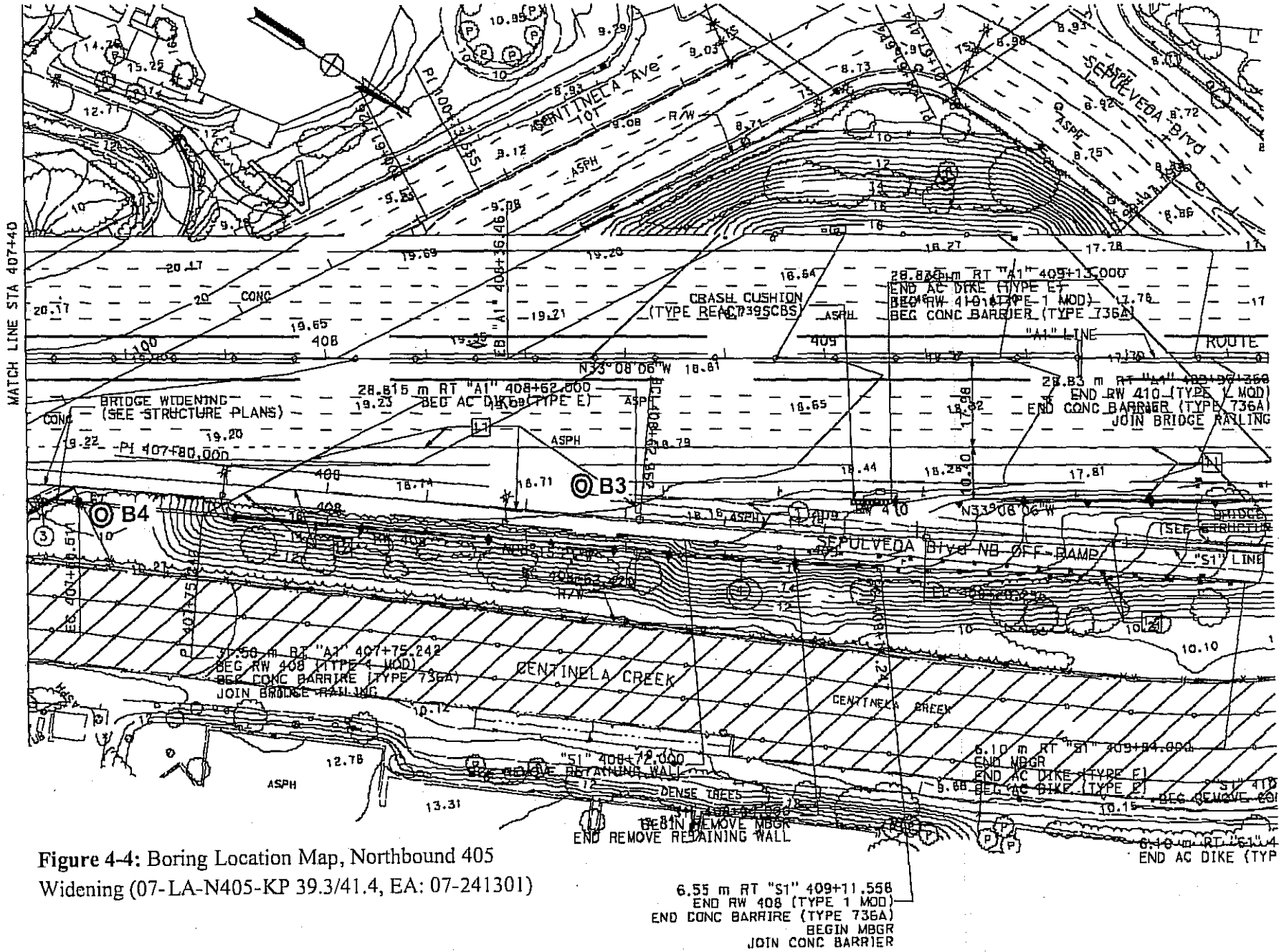


Figure 4-4: Boring Location Map, Northbound 405 Widening (07-LA-N405-KP 39.3/41.4, EA: 07-241301)

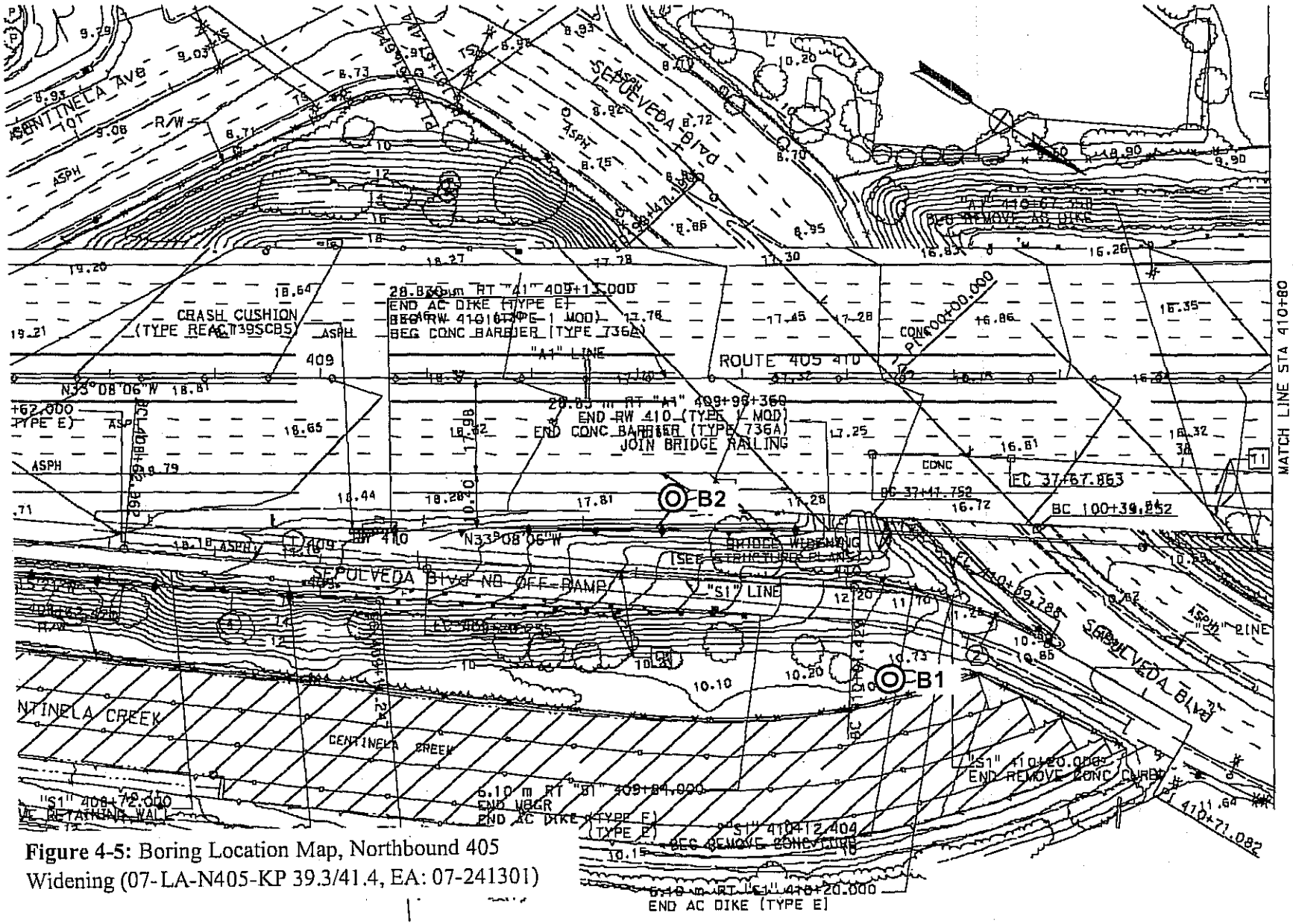


Figure 4-5: Boring Location Map, Northbound 405 Widening (07-LA-N405-KP 39.3/41.4, EA: 07-241301)

State of California
Department of Transportation

Structure Hydraulics

DIVISION OF STRUCTURES

FINAL HYDRAULIC REPORT

Centinela Avenue UC (Widen)/Centinela Creek Channel Modifications

Widen Centinela Avenue UC on Interstate 405
between Howard Hughes Parkway Northbound On-Ramp and Sepulveda Boulevard UC
within the City Limits of Inglewood, Los Angeles County, California

---

JOB:
Bridge No. 53-1253; EA 07-241301

LOCATION:
07-LA-405-KP 40.67

DATE:
March 5, 2008

WRITTEN BY: REVIEWED BY:
SARAVANA VIGNESWARAN, P.E.

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.

REGISTERED CIVIL ENGINEER (SIGNATURE)

REGISTRATION NUMBER DATE: March 5, 2008

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

FINAL HYDRAULIC REPORT

Centinela Avenue UC (Widen)/Centinela Creek Channel Modifications

Widen Centinela Avenue UC on Interstate 405
between Howard Hughes Parkway Northbound On-Ramp and Sepulveda Boulevard UC
within the City Limits of Inglewood, Los Angeles County, California

(Bridge No. 53-1253; EA 07-241301; Location: 07-LA-405-KP 40.67)

March 2008

Caltrans

State of California
Department of Transportation

Structure Hydraulics

DIVISION OF STRUCTURES

FINAL HYDRAULIC REPORT

Centinela Avenue UC (Widen)/Centinela Creek Channel Modifications

Widen Centinela Avenue UC on Interstate 405
between Howard Hughes Parkway Northbound On-Ramp and Sepulveda Boulevard UC
within the City Limits of Inglewood, Los Angeles County, California

JOB:
Bridge No. 53-1253; EA 07-241301

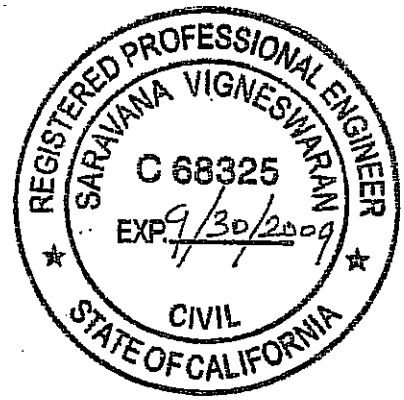
LOCATION:
07-LA-405-KP 40.67

DATE:
March 5, 2008

WRITTEN BY:
SARAVANA VIGNESWARAN, P.E.

REVIEWED BY:

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.



REGISTERED CIVIL ENGINEER (SIGNATURE)

REGISTRATION NUMBER DATE: March 5, 2008

1. INTRODUCTION

1.1 Project Background

The California Department of Transportation (Caltrans) intends to widen the Centinela Avenue Undercrossing (Bridge No. 53-1253) by adding an auxiliary lane on northbound Interstate 405 (I-405) at PM 25.27/KP 40.67 in Los Angeles County. The project site is located on I-405 freeway between Howard Hughes Parkway northbound on-ramp and Sepulveda Boulevard Undercrossing within the city limits of Inglewood near Culver City. **Figure 1.1** is a site location map. The Centinela Creek, a constructed flood control facility maintained by the Los Angeles County, runs parallel to the eastern edge of the project area. The proposed widening involves installation of fifteen columns with isolation casings in the creek's westerly divider wall. Structure Design is currently working on the final design of the project. Structure Hydraulics has performed studies regarding the design hydraulics in support of the final design efforts.

1.2 Purpose of Report

This report documents the hydraulic study for the proposed modifications to the Centinela Creek channel. In April 2006, Structure Hydraulics submitted a Final Hydraulic Report for the project and the current study reflects structural design changes that have occurred since then. Although two alternatives to the original design were studied, Structure Design currently focuses on Alternative-1 as requested by their Addendum Request #1 dated December 6, 2007 and subsequent emails. Since the Centinela Creek channel is a flood control facility maintained by the Los Angeles County, the information contained herein will be used by Caltrans District 7 to obtain a flood control permit from the county.

1.3 Previous Studies

The data contained in the following studies provided a basis for the current study.

- Hydrology Design Memorandum No. 1 for Centinela Creek Channel by the US Army Corps of Engineers Los Angeles District, 1955
- As-built plans for the Centinela Creek Channel construction by the US Army Corps of Engineers Los Angeles District, 1961
- WSPG model Hydraulic Design Summary for the existing Centinela Creek Channel by the US Army Corps of Engineers Los Angeles District, 1961

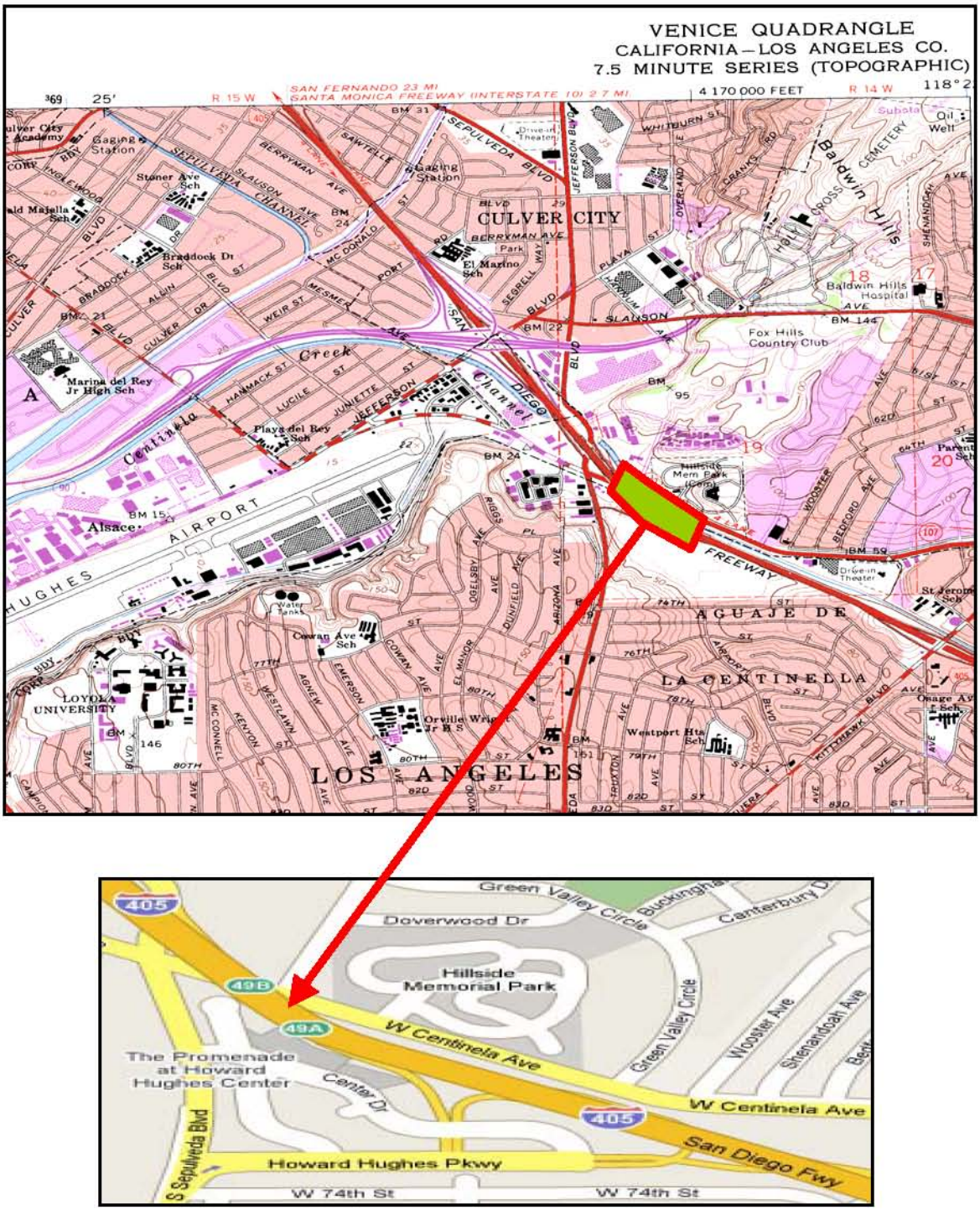


Figure 1.1 Site Location Map (Excerpt from USGS 7.5 minute Quadrangle)

2. HYDROLOGY

2.1 Drainage Basin Description

The Centinela Creek is a tributary to the Ballona Creek, which in turn flows into the Santa Monica Bay. The Ballona Creek watershed is a drainage area of approximately 130 square miles (336.7 square km). **Figure 2.1** shows the Ballona Creek Watershed. Various intermittent streams found in the area around the Baldwin Hills along with Centinella Creek drain the southern portion of the Ballona Creek watershed. The Centinela Creek drain a watershed of approximately 7.0 square miles (18.1 square km) near the project site. **Figure 2.2** shows the Centinela Creek Subwatershed. Following a subsequent flood in 1934, the US Army Corps of Engineers (USACE), in conjunction with the Los Angeles County Flood Control District (LACFCD) lined the lower portion of the Ballona Creek with large rocks and channelized the upper portions in concrete between 1935 and 1939. Channelization of major tributaries to Ballona Creek began in 1950 and the Centinela Creek channel was channelized between 1960 and 1962. The Los Angeles County Department of Public Works (LACDPW) currently maintains the Centinela Creek.

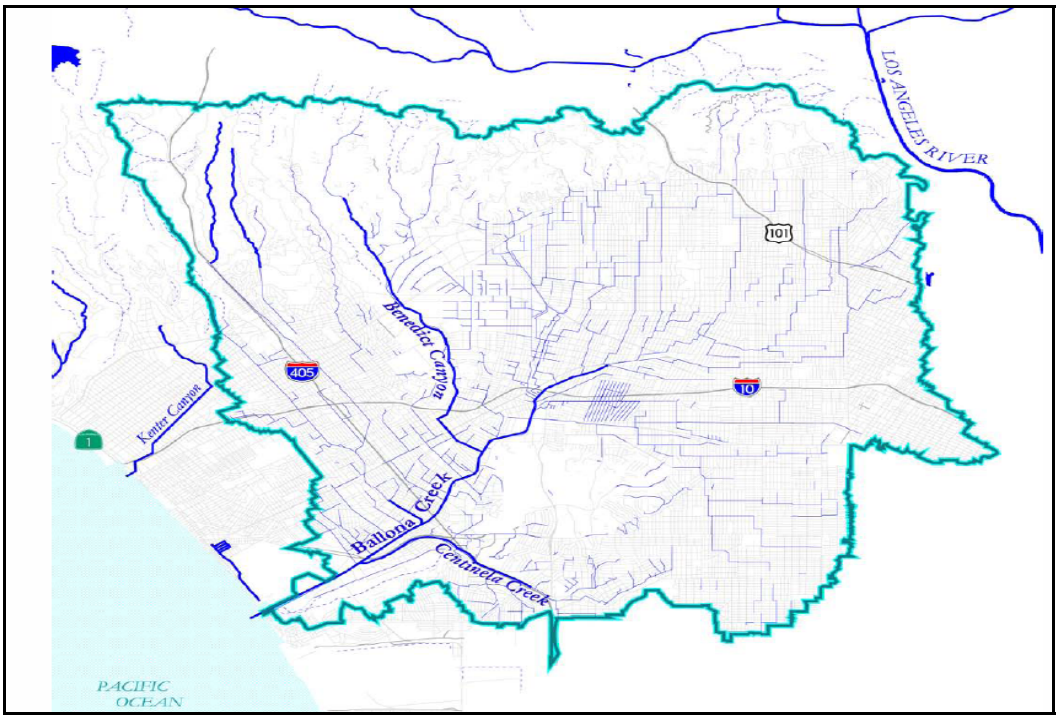


Figure 2.1 Ballona Creek Watershed

(Source: Ballona Creek Watershed Management Plan)

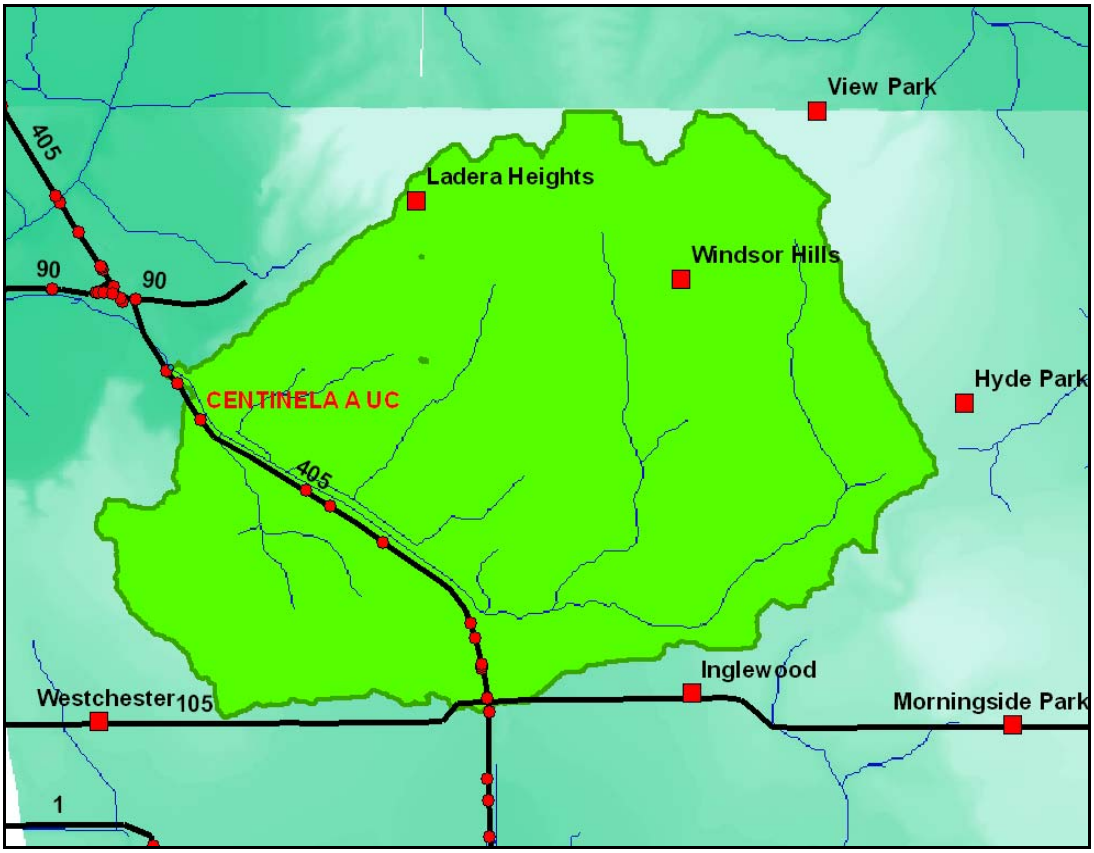


Figure 2.2 Centinela Creek Subwatershed

2.2 Selection of Design Flow Rates

The USACE's Design Memorandum No. 1 "Hydrology for Centinela Creek Channel" dated September 1955 presented peak discharge rates for the Standard Project Flood (SPF) and recommended that the SPF be used for channel design. In that study, the discharges were computed at several concentration points along the channel and it was 6,300 cfs (178.4 cms) in the channel reach where the proposed column installation will take place. In the channel reach upstream of the Airport Drain lateral inflow, the discharge was 5,200 cfs (147.3 cms). The SPF is the flood resulting from the most severe combination of meteorological and hydrological conditions considered reasonably characteristic of the region. It is not maximized for the most critical atmospheric conditions as in the case of probable maximum flood. Current study uses the same discharges as determined by the USACE. When the discharge increases, it causes the water level to rise above the top slab of the partially covered culvert section, the overtopping discharge being, it is estimated in the current study, in the order of 7,800 cfs (220.9 cms).

2.3 FEMA Floodplain Information

According to the Flood Insurance Rate Maps issued by FEMA, the project site is located within Zone "C." This zone designation is shown on the City of Los Angeles Community Panel Numbers 060137 0084 C and 060137 0085 C dated December 2, 1980. A Letter of Map Revision revised the above-referenced panels to show the effects of construction of the Airport Boulevard Storm Drain. The effective date of this LOMR was November 9, 2001. The LOMR revision determined that the base flood was contained in the storm drains and modified the floodplain boundary delineation of a portion of the area between Sepulveda Boulevard and I-405.

3. MODELING APPROACH

3.1 Comparison: WSPG Vs HEC-RAS

The Hydraulic Design Summary provided by the LACDPW summarized the flow depths at multiple locations along the channel. These calculations were performed using the WSPG program and the design flow rates of 6,300 cfs (178.4 cms) and 5,200 cfs (147.3 cms) were used in the channel reach downstream and upstream of the Airport Drain Inflow respectively.

Existing Condition Model – Our approach is to reproduce known results (computed using WSPG) as accurately as possible using HEC-RAS in the existing condition model. This was performed by running the HEC-RAS model at the same flow rate with the calibrated Manning's roughness coefficient (see Model Calibration below). The culvert geometry was modeled using the cross section method and the analysis was performed in supercritical flow regime.

Proposed Condition Model – Next, the existing condition geometry was modified to account for the proposed installation of columns and isolation casings by blocking a portion of the flow conveyance area. Multiple block option in Hec-RAS was used to represent the lateral width of isolation casings perpendicular to the flow while using the calibrated Manning's "n" value used in the existing condition run.

3.2 Model Calibration

The HEC-RAS model was calibrated against the Manning's n-value using the water surface elevation data from WSPG program. Using an n-value of 0.014 as a starting point, the n-value was progressively changed until an optimization parameter, P, was minimized.

P was calculated using, $P = \left(\sum_{i=1,t} (E_i - E_{ci})^2\right)^{1/2}$

Where E is the water surface elevation computed by WSPG, E_c is the computed water surface elevation in HEC-RAS at each cross section i and t is the total number of sections. Channel cross-sections located within the project reach were selected for these calculations. **Table 3.1** summarizes the results of calibration. The resulting n-value was the calibrated n-value. Errors can be attributed to the basic accuracy of the models' computational algorithms (between WSPG and HEC-RAS). The resulting optimization parameter, P was 0.93 with a calibrated n-value of 0.016.

Table 3.1 Summary of Model Calibration Results

River Station (ft)	Channel Invert (ft)	WSE WSPG (ft-msl)	WSE HEC-RAS (ft-msl)		
			n=0.014	n=0.016	n=0.018
176+98.14	25.59	30.62	30.06	30.33	30.62
176+48.14	25.18	30.19	29.68	30.01	30.38
174+84	23.84	28.78	28.46	28.91	29.45
173+50	22.75	27.62	27.40	27.84	28.33
173+10.38	22.71	27.75	27.47	27.98	28.55
171+68.59	22.56	28.24	27.81	28.56	29.04
171+66.59	22.56	28.25	27.81	28.56	29.04
170+68.59	22.44	28.58	28.10	28.46	28.88
170+18.59	22.40	28.76	28.37	28.39	28.79
170+07	22.31	28.61	28.18	28.19	28.89
168+00	20.65	25.92	25.60	25.60	25.69
Optimization Parameter, P			1.36	**0.93**	1.76

4. HYDRAULIC ANALYSIS

Hydrologic Engineering Center River Analysis Software (HEC-RAS 3.1.3) developed by USACE was used to compute water surface profiles for the Centinela Creek Channel study area. The results from the HEC-RAS model were used to evaluate the impact of the proposed design alternative on the flood conveyance capacity of the channel. Water surface profiles were completed for both the existing and proposed conditions.

4.1 Study Reach

The modeled reach was a 1,900 ft (579.1 m) stretch of a constructed channel between Sta. 187+00 and Sta. 168+00 as originally shown on the as-built plans. The study reach was extended approximately 980± ft (298.7± m) farther upstream and 610± ft (185.9± m) farther downstream from the project ends. The HEC-RAS model was extended far enough from the site that the impact of any error in starting water surface elevation was dampened well before the proposed work area. The reach consists of a concrete channel and its cross sections vary from multiple open channels with 3 divisions, multiple boxes with 3 barrels (fully and partially covered) to open rectangular channel sections. The channel varies in widths from 35 ft (10.7 m) at the upstream end, 48 ft (14.6 m) at the Airport Drain confluence to 65 ft (19.8 m) all the way through the end. A gradual enlargement occurs downstream from the confluence. The bed slope varies from 0.1056 % to 0.8163 %. The curved alignment has a radius of 500 ft (152.4 m).

4.2 Existing Bridge

The existing Centinela Avenue UC bridge is a continuous five span RC T-beam girder (48) and two CIP/PS box girder (1 cell). The north abutment of the bridge is an open-end diaphragm abutment. The south abutment of the bridge is a RC closed-end strutted abutment. The bridge has 13 and 14 column bents, all supported on CIDH piles. The structure is approximately 533 ft (162.5 m) long, has a total width of 166 ft (50.5 m) and carries ten lanes of traffic. The bridge was originally built in 1963 and later widened in 1987. The 1987 northbound widening includes a 21 span sidehill viaduct supported by 19 columns plus one inbedded column in the retaining wall. **Figure 4.1** is a photograph taken from the covered culvert section looking upstream. The Airport Drain Lateral is seen in the background.

Figure 3.1 Existing Centinela Creek Divider Walls (Looking Upstream)

4.3 Existing Condition Hydraulic Model

The existing condition model was prepared to reproduce known results as accurately as possible and assess the impacts of proposed design. The geometry for the model cross sections were obtained from the USACE's as-built plans for the Centinela Creek channel. Model cross sections were placed at locations to represent changes in channel geometry and slope. Main channel reach lengths and overbank distances between cross sections on curved alignments were calculated using the horizontal curve data shown on the as-built plans. **Table 4.1** summarizes the location of cross sections and other geometry data used to build the existing condition model. Channel roughness was based on the model calibration results using an optimization parameter as discussed above under "Model Calibration." A calibrated Mannings n-value of 0.016 was used for the channel reach. **Appendix A** contains cross section plots and profiles. **Appendix C** contains detailed calculations from the existing conditions HEC-RAS model.

Table 4.1 Cross Sections Locations for the Existing Condition Model

Station	Channel Type	Exterior Wall Ht. (ft)	Divider Wall Ht. (ft)	Width (ft)	Slope (ft/ft)	Invert (ft-msl)	Distance to D/S X-Section		
							LOB	MC	ROB
187+00	Begin Open Rectangular Channel	10	-	35	0.00333	29.17	300	300	300
184+00	Open Rectangular Channel	10	-	35	0.00333	28.17	300	300	300
181+00	Open Rectangular Channel	10	-	35	0.00333	27.17	116.66	116.66	116.66
179+83.34	Open Rectangular Channel	10	-	35	0.00333	26.79	35.2	35.2	35.2
179+48.14	Open Rectangular Channel	10	-	35	0.00333	26.67	25	25	25
179+23.14	Open Rectangular Channel	10	-	50.13	0.00333	26.58	25	25	25
178+98.14	Open Rectangular Channel	10	-	52.25	0.00333	26.5	25	25	25
178+73.14	Open Rectangular Channel	10	-	54.38	0.00333	26.42	25	25	25
178+48.14	Open Rectangular Channel	10	-	56.5	0.00333	26.34	25	25	25
178+23.14	Open Rectangular Channel	10	-	58.63	0.00333	26.25	25	25	25
177+98.14	Open Rectangular Channel	10	-	60.75	0.00333	26.17	25	25	25
177+73.14	Open Rectangular Channel	10	-	62.88	0.00333	26.08	4	4	4
177+69.14	Begin Multiple Open Channel/3 Divisions	10	-	63.22	0.00333	26.07	11.5	11.5	11.5
177+57.64	End Open Rectangular Channel; Begin Multiple Open Channel/3 Divisions	10	3.25	64.11	0.00333	26.035	9.5	9.5	9.5

Table 4.1 Continued…..

Station	Channel Type	Exterior Wall Ht. (ft)	Divider Wall Ht. (ft)	Width (ft)	Slope (ft/ft)	Invert (ft-msl)	Distance to D/S X-Section		
							LOB	MC	ROB
177+48.14	Multiple Open Channel/3 Divisions	10	6.5	65	Change	26	50	50	50
176+98.14	Multiple Open Channel/3 Divisions	10	6.5	65	0.008163	25.59	5	5	5
176+93.14	Multiple Open Channel/3 Divisions	9.5	6.5	65	0.008163	25.55	5	5	5
176+88.14	Multiple Open Channel/3 Divisions	9	6.5	65	0.008163	25.51	40	40	40
176+48.14	Multiple Open Channel/3 Divisions	9	6.5	65	0.008163	25.18	173.6	168.14	162.68
174+80	Multiple Open Channel/3 Divisions	9	6.5	65	0.008163	23.81	10.33	10	9.68
174+70	End Multiple Open Channel/3 Divisions; Begin Multiple Open/Box Section; Rt Barrel Covered	9	6.5	65	0.008163	23.73	53.69	52	50.31
174+18	Multiple Open/Box Section; Rt/Center Barrels Covered	9	6.5	65	0.008163	23.31	30.98	30	29.03
173+88	Multiple Open/Box Section; Rt/Center Barrels Covered	9	6.5	65	0.008163	23.06	39.24	38	36.77

Table 4.1 Continued…..

Station	Channel Type	Exterior Wall Ht. (ft)	Divider Wall Ht. (ft)	Width (ft)	Slope (ft/ft)	Invert (ft-msl)	Distance to D/S X-Section		
							LOB	MC	ROB
173+50	Multiple Open/Box Section; Rt/Center Barrels Covered	9	6.5	65	Change	22.75	25.81	25	24.19
173+25	End Multiple Open/Box Section; Begin Multi Box/3 Barrels; Rt/Center/Left Barrels Covered	6.5	6.5	65	0.001056	22.72	122.87	119	115.13
172+06	Multi Box/3 Barrels; Rt/Center/Left Barrels Covered	6.5/8.17	6.5/8.17	65	0.001056	22.6	38.63	37.41	36.19
171+68.59	Multi Box/3 Barrels; Rt/Center/Left Barrels Covered	8.17	8.17	65	0.001056	22.56	80	80	80
170+88.59	Multi Box/3 Barrels; Rt/Center/Left Barrel Covered	8.17	8.17	65	0.001056	22.45	70	70	70
170+18.59	Multi Box/3 Barrels; Rt/Center/Left Barrels Covered	8.17	8.17	65	Change	22.4	8.59	8.59	8.59
170+10	End Multi Box/3 Barrels; Begin Multiple Open Chnl/3 Divisions	10 Lt, 12 Rt	7.34	65	0.008006	22.33	210	210	210
168+00	Multiple Open Channel/3 Divisions	10 Lt, 12 Rt	8	65	Change	20.65	0	0	0
173+50	Multiple Open/Box Section; Rt/Center Barrels Covered	9	6.5	65	Change	22.75	25.81	25	24.19

4.4 Proposed Bridge

The proposed bridge will be widened by adding a 12 ft (3.67± m) wide auxiliary lane on the northbound side beyond the existing retaining wall.

As per Structure Design's two addendum requests dated December 6, 2007, there were two alternatives to the originally proposed design. However, Structure Design later decided that Alternative 2 was no longer needed and the current study only considered Alternative 1.

Addendum Request #1 for Alternative 1: This alternative proposed to install 4 ft (1,200 mm) columns with isolation casings extending through the westerly divider wall of the existing Centinela Creek channel. This modification will involve installation of fifteen columns with isolation casings between Sta. 173+00± and 178+00± along the channel alignment. In order to make the design work with respect to hydraulic conditions, the sizes of columns and isolation casings were further reduced in consultation with Structure Design. As a result, the width of the isolation casings will be 2.67 ft (815 mm) at bent locations C through E1 and 3.5 ft (1,065 mm) at bent locations F1 through P1.

Addendum Request #2 for Alternative 2: This alternative referred to loading Abutment 5 for Sepulveda Boulevard Undercrossing over the existing Centinela Creek channel culvert on a spread footing. This alternative proposes to retrofit the four-cell reinforced concrete box between Sta. 157+00± and 159+00± along the channel alignment in order to handle additional loading demands.

Appendix E contains plan sheets prepared for the Alternative 1 layout option.

4.5 Proposed Condition Hydraulic Model

The proposed condition was modeled in HEC-RAS to determine and compare its impacts on the water surface elevations for the standard project flood, to provide hydraulic design information for the structural design and to help expedite the permit approval process. Those changes in channel geometry included adding additional cross sections to the existing geometry and blocking a portion of the flow conveyance area to account for the proposed column/casing installation. **Table 4.2** summarizes bent locations where additional cross sections were placed. **Appendix B** contains cross section plots and profiles. **Appendix D** contains detailed calculations from the proposed conditions HEC-RAS model.

Table 4.2 Column Locations for the Proposed Condition Model

Column Location (CEOB1 Sta.)	Width of Isolation Casing (ft)	Invert (ft)	Interior Wall Height (ft)	WSEL Existing (ft-msl)	WSEL Proposed (ft-msl)	Velocity (fps)	Free Board (ft)
C @ 177+19.93 (404+96.435)	3.5	25.77	6.5	30.44	30.86	20.42	1.41
C1 @ 177+09.26 (404+99.703)	3.5	25.68	6.5	30.38	30.77	20.39	1.41
D1 @ 176+87.84 (405+06.250)	3.5	25.51	6.5	30.25	30.81	19.60	1.20
E1 @ 176+66.42 (405+12.795)	3.5	25.33	6.5	30.11	30.63	19.60	1.20
F1 @ 176+44.19 (405+19.340)	2.67	25.15	6.5	29.97	30.50	19.15	1.15
G1 @ 176+23.67 (405+25.885)	2.67	24.98	6.5	29.84	30.33	19.15	1.15
H1 @ 176+02.24 (405+32.425)	2.67	24.80	6.5	29.69	30.15	19.16	1.15
I1 @ 175+80.82 (405+38.970)	2.67	24.62	6.5	29.55	29.96	19.17	1.16
J1 @ 175+59.40 (405+45.515)	2.67	24.46	6.5	29.40	29.81	19.15	1.15
K1 @ 175+37.97 (405+52.060)	2.67	24.28	6.5	29.26	29.63	19.16	1.15
L1 @ 175+16.55 (405+58.605)	2.67	24.11	6.5	29.12	29.46	19.16	1.15
M1 @ 174+95.12 (405+65.145)	2.67	23.93	6.5	28.97	29.27	19.17	1.16
N1 @ 174+73.7 (405+71.690)	2.67	23.76	6.5	28.82	29.33	18.38	0.93
O1 @ 174+52.28 (405+78.235)	2.67	23.58	6.5	28.68	29.61	16.98	0.47
P1 @ 174+30.85 (405+84.780)	2.67	23.41	6.5	28.54	29.37	17.18	0.54

5. DATA SUMMARY FOR BRIDGE DESIGN

Table 3.1 Hydrologic/Hydraulic Data Summary for Bridge Design

HYDROLOGIC/HYDRAULIC DATA SUMMARY	
Drainage Area	7.0 sq.mi. (18 sq.km)
Design Flood	Standard Project Flood
Design Discharge	6,300 cfs (178.4 cms)
Overtopping Discharge	7,800 cfs (220.9 cms)
Water Surface Elevation	Varies from 30.86 ft-msl (9.41 m-msl) to 29.37 ft-msl (8.95 m-msl) between Column C and Column P1
Minimum Soffit Elevation	Not Applicable
Clearance	Not Applicable
Average Velocity/Upstream of Column C	20.4 fps (6.22 m/s)
Average Velocity/Downstream of Column P1	17.2 fps (5.24 m/s)

6. CONCLUSIONS

Based on the hydraulic analysis of the channel condition with the proposed channel modification, the following conclusions can be drawn:

1. The maximum increase in the Standard Project Flood WSEL is 0.93 ft (0.28 m) due to the installation of fifteen columns with isolation casings in the Centinela Creek channel's westerly divider wall.

2. The Standard Project Flood can be conveyed through the modified channel with reduced freeboard. The freeboard varies from 1.41 ft to 0.54 ft (0.17 m) within the limits of channel modification.

3. The flood conveyance capacity of the Centinela Creek channel can be maintained under the flow conditions it was originally designed for.

7. REFERENCES

US Army Corps of Engineers, 1955. Design Memorandum No. 1: Hydrology for Centinela Creek Channel (Ballona Creek Basin)

US Army Corps of Engineers, 1961. Centinela Creek Channel Plans of Channel Construction

Los Angeles County Department of Public Works, 2004. Ballona Creek Watershed Management Plan

Federal Emergency Management Agency, 1980 and 2001. Flood Insurance Rate Maps for the City of Los Angeles Community Panel Nos. 060137 0084 C/060137 0085 C

California Department of Transportation, 2006. Highway Design Manual

US Army Corps of Engineers, 2002. HEC-RAS Hydraulic Reference Manual

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

Date: 2/24/09

Centinela Ave. UC
Structure Name

07-LA-405-40.76
District County Route Post Km

District Project Development
District Project Engineer

07-241301 53-1253
E.A. Number Structure Number

Foundation Report By: H. Liu Dated: 2/18/

Reviewed By: L. Valla (OSD) R. Price (GS)

General Plan Dated: 12/15; 12/11; 12/11; 12/18/08 Foundation Plan Dated: 12/23/09

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

✓ Pile Types and Design Loads	✓ Footing Elevations, Design Loads, and Locations	___ LQTB'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

Lisa Valla 12 [signature]
Office of Structure Design Branch No. Geotechnical Services

rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 2/24/09

Sepulveda Blvd. UC
Structure Name

07-LA-405 - 40.97
District County Route Post Km

07-241301 53-1254
E.A. Number Structure Number

Foundation Report By: H. Liu Dated: 11/26/07

Reviewed By: L. Valla (OSD) R. Price (GS)

General Plan Dated: 11/5/08 Foundation Plan Dated: 11/5/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

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

Lon Valla 12 [signature]
Office of Structure Design Branch No. Geotechnical Services

ev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

Date: 2/24/09

Ret Wall No. 402
Structure Name

07 - 4A - 405 - 40.27
District County Route Post Km

District Project Development
District Project Engineer

07-241301 53E0113
E.A. Number Structure Number

Foundation Report By: H. Liu Dated: 11/26/07

Reviewed By: L. Valla (OSD) R. Price (GS)

General Plan Dated: 9/2/08 Foundation Plan Dated: 2/27/07

☒ No changes. ☐ The following changes are necessary.

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	✓ Fill Time Delay	✓ Ground Water
✓ Concrete Piles ☐ Yes ☒ No	✓ Effect of Fills on Abutments and Bents	✓ Tremie Seals/Type D Excavation

Office of Structure Design 12 Branch No. Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 2/24/09

Ret Wall No 408
Structure Name

07 - LA - 405 - 40.84
District County Route Post Km

07-241301 53E0114
E.A. Number Structure Number

Foundation Report By: H. Liu Dated: 11/26/07

Reviewed By: L. Vella (OSD) R. Price (GS)

General Plan Dated: 1/13/09 Foundation Plan Dated: 11/20/06

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

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

L. Vella 12 R. Price
Office of Structure Design Branch No. Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 2/24/09

Ret Wall No. 410
Structure Name

07 LA 405 40.96
District County Route Post Km

07-241301 53E0115
E.A. Number Structure Number

Foundation Report By: H Liu Dated: 11/26/07

Reviewed By: L. Valla (OSD) R. Price (GS)

General Plan Dated: 9/25/08 Foundation Plan Dated: 2/11/09

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

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

Office of Structure Design 12 Branch No. Geotechnical Services

Rev. 10/02

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MATT HOLM
Chief
Bridge Design Branch 12

Date: 6/23/2009

File: 07-LA-405-KP40.76
07-241301
BR53-1253

Attention: Leon Valla

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Report for Centinela Ave UC Widening , LA

This is the Geotechnical Design Report (GDR) for the proposed widening of Centinela Ave Undercrossing (UC), which is planned as a part of highway widening from KP39.3 to KP41.4 of northbound 405, in Culver City, Los Angeles County. The project site is shown on the Vicinity Map (Figure 1) of the Attachments.

The geotechnical recommendations presented in this report are based on results of field reconnaissance, literature study, subsurface exploration, laboratory testing of the soil samples recovered from subsurface exploration, and geotechnical analyses for the proposed improvement. The bridge information is presented in Table 1 below.

Table 1. Information of Existing Bridge

Bridge Name	Bridge No.	KiloPost	Number of Spans		Existing Foundation Type (close to future widening)	Proposed Foundation Type
			Slab Bridge R. of Existing Embankment	Main Bridge (Box Girder)		
Centinela Ave UC	53-1253	40.76	33 (Abut 1A to Bent T1)	5 (Bent 1 to Abut 6)	CIDH Piles (For First Northbound Widening)	CIDH Piles

Regional Geology

The site is located on the Coastal Plain of Los Angeles County and is considered part of the Peninsular Range geomorphic province of California, and underlain by a thick sequence of marine and non-marine unconsolidated sediments. According to the *Geologic Map of California, Long Beach Sheet*, the proposed improvement is located within a region of quaternary dune sand deposits of recent age. The geologic map of this area is shown on Figure 2 of Attachments.

Seismicity

The site is close to a number of faults that are considered to be active or potentially active. The information of adjacent faults which could impact the proposed improvement is presented in Table 2 below. According to the Caltrans' Seismic Map (Figure 3, Attachments), the peak bedrock acceleration (PBA) at the subject site is expected to be 0.6 g.

Table 2 Fault Information

Fault Name	Fault Type	Distance to Site	Maximum Creditable Event (MCE)
Charnock Fault (CNK)	Strike-Slip	0.6 km Southwest	6.5
Newport-Inglewood-Rose Canyon Fault (NIE)	Strike-Slip	2.6 km Northeast	7.0

However based on Sadigh et al (1997), the estimated medium PBA of the site from CNK and NIE are 0.7g and 0.6g respectively. Based on the results of recent subsurface investigation, the soil profile can be defined as type D ($15 < N < 50$). Considering the near fault effect (Seismic Design Criteria 1.1, Caltrans, July 1999), the compound ARS curves based on both CNK and NIE were plotted in Figure 3 of the Attachment. The interception period (T_0) of two curves is about 0.24 seconds. That is:

- For the fundamental period of structure less than 0.24 seconds, ARS for CNK (MCE = 6.5, PBA = 0.7 g) will control;
- For the fundamental period higher than 0.24 seconds, modified ARS for NIE (MCE = 7.0, PBA = 0.6 g) will control the seismic design.

Liquefaction

The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level (MSL) based on the readings (3/13/2007 and 4/23/2007) from the piezometers installed at B-1, B-4, and B-6, which is above the bottom of proposed structural foundation. However, according to our subsurface exploration, foundation soils below the groundwater table are generally dense to very dense as interpreted from relatively high SPT N values. Therefore, the effects of potential liquefaction on the proposed structural foundations due to seismic event is negligible.

Seismic Induced Settlement

Seismic compaction under earthquake event is also negligible due to observed high soil density and relatively high fine content within foundation soils.

Ground Rupture

No active faults are known to transverse the project site, and the subject site is not located within currently designated Alquist-Priolo Earthquake Fault Zone. As such, ground rupture hazard will not be a consideration for the bridge design.

Scour Evaluation

Scour should not be of a concern for bridge foundation design, since the proposed bridge widening is located within concrete-lined creek channel (Bent C to Bent P1).

Subsurface Exploration

The subsurface exploration consisted of advancing test boreholes using mud rotary to depths of 18.9 m to 32.8 m below the existing grade at the locations tabulated on the table below. The shallow boring of B-6 was conducted for the foundation investigation of retaining wall No. 402 and overhead sign structure associated with northbound 405 widening and referenced here for the subsurface exploration of bridge foundation. The boring plans are presented in Figures 4-1 to 4-4 of the Attachments.

Table 3. Summary of Soil Exploration Plan
(Centinela Ave UC Widening, 07-LA-405-KP40.76, EA: 07-241301)

Bridge No.	Boring No.	Station	Offset (m)	Ground Elevatrion (m)	Borehole Depth (m)	Equipment / Exploration Method	Hammer Type/ Efficiency
53-1253	B-4	407+57	31.0R	10.0	28.2	CME85 / Mud Rotary	Auto/0.87
	B-5	405+12	63.3R	10.3	28.2	CME85 / Mud rotary	Auto/0.87
	B-6	404+02	25.0R	16.0	18.9	Acker AD2 / Mud Rotary	Auto/0.80
	B-8	405+67	2.5R	18.5	32.8	CME85 / Mud Rotary	Auto/0.87

Drilling and Sampling

Standard penetration tests (SPT) were conducted in general accordance with ASTM D1586. Disturbed bulk samples were recovered for corrosion testing. Relatively undisturbed soil samples were sealed by plastic caps/tapes in brass rings to prevent moisture loss and transported to Caltrans' Soil Laboratory for testing.

Drilled holes were backfilled with on-site soil upon completion of sampling and testing. For the borings on highway and city streets, the drill holes were backfilled with onsite soil to 2.5 cm below pavement subgrade elevation, and then backfilled to pavement finished grade with tamped asphalt concrete cold patch.

Laboratory Test

Laboratory tests that include moisture-density determinations (California Test Method (CTM) 226), particle size analysis (CTM 203), direct-shear testing of undisturbed soil specimens (CTM 222), Atterberg limits (CTM204), and corrosion tests (CTM 417, 422, and 424) were performed. Some of the test results are summarized in Table 4 below.

Table 4. Summary of Laboratory Test Results
(Centinela Ave UC Widening, 07-LA-405-KP40.76, EA: 07-241301)

Boring No.	Depth (m)	Group Symbol	Field Moisture Content (%)	Dry Unit Weight (kN/M3)	Direct Shear Test		Atterberg Limits (LL/PI)	Other Field Test	
					ϕ (Degree)	c (kPa)		PP# (tsf)	SPT
B-4	1.9-2.2	SP	15.1	18.1	N/A	N/A	N/A	N/A	N/A
	5.0-5.3	SM	24.0	15.9	32.2	62.4	N/A	N/A	N/A
B-5	1.8-3.0	CL	N/A	N/A	N/A	N/A	44/25	4.0	N/A
	3.5-3.8	SP	25.8	14.8	35.8	25.2	N/A	N/A	N/A
	4.9-6.1	CL	N/A	N/A	N/A	N/A	42/21	4.5	N/A
	6.5-6.8	SP	23.4	15.6	35.3	34.1	N/A	N/A	N/A
B-8	2.1-3.4	CL	N/A	N/A	N/A	N/A	40/23	2.5	N/A
	3.4-4.9	CL	24.4	15.2	33.2	9.8	35/14	2.5	N/A
	4.9-6.4	CL	N/A	N/A	N/A	N/A	38/22	3.0	N/A
	7.0-9.5	CL	N/A	N/A	N/A	N/A	32/19	3.0	N/A
	13.7-16.2	CL	30.4	14.2	20.3	133.9	41/22	3.0	N/A
	16.2-17.7	ML	N/A	N/A	N/A	N/A	37/11	N/A	21

Corrosion Test

For corrosion evaluation, bulk samples were recovered from selected boreholes and tested for pH value, and minimum electrical resistivity. The tests for sulfate and chloride are usually not conducted unless the resistivity of the sample soil is 1000 Ohm-cm or less. Where resistivity is greater than 1000 Ohm-cm, the soil is considered not corrosive.

According to the test results, the subsurface soil for the proposed bridge widening is considered non-corrosive. The corrosion test results are summarized in the following table (Table 5).

Table 5 Corrosion Test Results

Boring Number	Depth of Sample (m)	pH	Soluble Sulfates	Soluble Chlorides	Minimum Resistivity
B-4	4.6 - 7.6	7.50	N/A	N/A	3500 ohm-cm
B-4	11.3 - 19.8	5.66	965	58	830 ohm-cm
B-8	0.9 - 9.1	7.97	72	279	880 ohm-cm
B-8	11.0 - 26.2	7.70	92	344	830 ohm-cm
Caltrans Criteria for Non-corrosive Area		> 5.5	< 2000 PPM	< 500 PPM	> 1000 Ohm-cm

Subsurface Condition

Subsurface condition for structural foundation was summarized in Tables 5-1 and 5-2. The subsurface materials below the natural grade are mostly composed of medium dense to very dense sand, silty sand, and sandy silt with scattered interbeds of lean clay within the upper 8 m of the native soil.

The materials for embankment fill are not uniform. The soil boring close to the centerline of freeway (B-8) revealed a near 8 m thick very stiff lean clay layer underneath 1.8 m of medium dense sand below the pavement. The boring (B-6) at the northbound shoulder shows medium dense sand with silt as major component of embankment fill with only a 1.6 m thick stiff lean clay layer within vertical limits of the embankment. This indicates that different embankment fill materials have been used in 1996 northbound widening from those used for original highway construction in 1962.

Table 6 Subsurface Information for Centinela Ave UC (BR53-1253)

Reference Boring	B-4		Boring Location		Stationing	407+57	Elevation (m)	10.0
					Offset (m)	31 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0	1.2	10	8.8	SiILT (ML), Very Stiff			
2	1.2	4.6	8.8	5.4	Poorly Graded SAND (SP). Medium dense			
3	4.6	7.6	5.4	2.4	Silty SAND (SM), Medium Dense			
4	7.6	9.1	2.4	0.9	SILT with Sand (ML). Dense			
5	9.1	11.9	0.9	-1.9	Well graded SAND (SW). Dense			
6	11.9	14.0	-1.9	-4	SILT (ML), Hard			
7	14.0	16.8	-4	-6.8	Well graded SAND (SW). Very dense			
8	16.8	28.2	-6.8	-18.2	Silty SAND (SM), Very Dense			
Reference Boring	B-5		Boring Location		Stationing	405+12	Elevation (m)	10.3
					Offset (m)	63.3 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.2	1.8	10.1	8.5	Silty SAND (SM), Medium dense			
2	1.8	3.0	8.5	7.3	Sandy Lean CLAY (CL/SC), Very Stiff			
3	3.0	4.9	7.3	5.4	Poorly graded SAND (SP), Medium dense			
4	4.9	6.1	5.4	4.2	Sandy Lean CLAY (CL), Hard			
5	6.1	7.6	4.2	2.7	Poorly graded SAND (SP), Medium dense to dense			
6	7.6	8.5	2.7	1.8	Poorly graded SAND with Silt (SP-SM), Dense			
7	8.5	18.3	1.8	-8	Well graded SAND with Gravel (SW), Very dense			
8	18.3	21.3	-8	-11	Poorly graded SAND (SP). Very dense.			
9	21.3	28.2	-11	-17.9	Silty SAND (SM), Very dense			

Table 6 Continued …

Reference Boring	B-6		Boring Location		Stationing	404+02	Elevation (m)	16.0
					Offset (m)	25 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.3	2.1	15.7	13.9	Well graded SAND with Silt (SW-SM). Loose			
2	2.1	3.7	13.9	12.3	Lean CLAY with Sand (CL), Stiff			
3	3.7	5.2	12.3	10.8	Well graded SAND with Silt (SW-SM). Medium Dense			
4	5.2	9.8	10.8	6.2	Poorly Graded SAND with Silt (SP-SM), Medium Dense to Dense			
5	9.8	12.8	6.2	3.2	SILT with Sand to SILT (ML), Very Stiff to Hard.			
6	12.8	18.9	3.2	-2.9	Well graded SAND (SW), Very Dense			

Reference Boring	B-8		Boring Location		Stationing	405+67	Elevation (m)	18.3
					Offset (m)	2.5 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.4	2.1	17.9	16.2	Poorly Graded SAND with Silt (SP-SM) , Medium Dense			
2	2.1	10.0	16.2	8.3	Sandy Lean CLAY to Lean CLAY (CL), Very Stiff			
3	10.0	11.9	8.3	6.4	Poorly graded SAND with Clay (SP-SC), Medium dense			
4	11.9	13.7	6.4	4.6	Poorly Graded SAND (SP), Dense			
5	13.7	16.2	4.6	2.1	Lean CLAY with Sand (CL), Hard			
6	16.2	17.7	2.1	0.6	Sandy SILT (ML), Vey Dense			
7	17.7	29.6	0.6	-11.3	Well graded SAND with Gravel (SW), Very dense			
8	29.6	32.8	-11.3	-14.5	Poorly graded SAND with Silt (SP-SM). Very dense.			

* Groundwater is at 3.5 m above Mean Sea Level according to the well readings at B-4 (3/13/07, 4/23/07).

Shaded area indicates embankment fill materials

Foundation Design

Axial Pile Capacity

Cast-in-drilled-hole (CIDH) piles are suggested as structural foundation of the proposed bridge widening. The design of CIDH piles has been performed on the basis of shaft friction, neglecting the end bearing. The pile ultimate friction capacities were obtained using the procedures outlined by Reese and O'Neil (1988).

Axial group effects were considered for pile group with center to center (CTC) spacing less than 3 times of pile diameter (3D). 20%-35% vertical capacity reduction was applied to group piles at Bents C to P1 within the Centinela Creek channel for the slab portion of the bridge widening, and the pile groups at Bents 4, 5 and Abutment 6 for the box portion of the bridge widening.

Long term settlement will not be a concern for the widened portion of the bridge foundation. The immediate settlement for individual piles and pile groups under the service load is expected to be less than 6.3 mm from Abut 1A to Bent P1, and less than 25 mm from Bents Q1 to Abut 6.

Lateral Capacity of Pile Groups

The pile lateral analysis was performed using LPILE PLUS 5.0 for the Bent 5 of Centinela Ave UC (widen). The allowed lateral deflection under service load is limited to 6.4 mm (or 0.25 in). For Bent 5 of box portion of Centinela Ave UC, the proposed pile center-to-center (CTC) spacing is approximately 2.1 times of pile diameter (2.1D) with group size of the piles being 5X6. P-multiplier is averaged at 0.35 for the lateral analysis, which makes Bent 5 dictate lateral capacity of pile group. The estimated pile load under different pile lateral deflection for Bent 5, assuming two types of pile/cap connection, is presented in the following table.

Table 7. Pile Load under Different Pile Top Deflection
(600 mm CIDH Piles at Bent 5, Centinela Ave UC)

Pile-Head Deflection (m)	Assuming Pile/Cap Rigid Connection		Assuming Pile/Cap Hinge Connection	
	Maximum Moment (on Pile Top) kN-m	Maximum Shear (on Pile Top) kN	Maximum Moment kN-m	Maximum Shear (on Pile Top) kN
0.0032	135	157	64	103
0.0064	226	242	84	130
0.0127	364	378	141	194

1) The material properties and reinforcement information are based on Sheet No. B2-3 of 2004 Std Plan for 600 mm CIDH piles;
2) The design is based on non-linear EI for the reinforced concrete piles.

P-Y Analysis

The p-y analysis for lateral soil resistance was performed using LPILE PLUS 5.0 for CIDH piles at bent locations. "P" reduction factors were considered for piles under group effect. The p-y curves were presented in the Attachments of this memo.

Geotechnical Recommendations

1) Based on the subsurface exploration, The Soil Profile Type for the subject bridge should be classified as Type D. The recommended ARS Curve is shown in Figure 3 of the Attachments.

2) The foundation soils for the bridge are classified as non-corrosive to reinforced concrete according to the corrosion test results of selected soil samples from the field.

3) CIDH piles were recommended for the bridge foundation. Due to the high groundwater table, wet method may be used for pile installation, which requires a minimum pile diameter of 0.6 m. Table 8 summarized the suggested pile tip elevation based on the design load for the abutments and required nominal resistance for the bents.

4) To reduce lateral load and/or vertical drag force on the existing concrete channel wall, isolation casings are recommended for the CIDH piles from Bent 1B through Bent 3, which are to be constructed near Centinela Creek. The bottom of the isolation casing should be extended to a depth at least to the bottom of channel floor.

Construction Considerations

1) The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level based on the readings from the piezometers installed at B-4, and B-6, which is above the proposed structural foundations. Wet, drilling slurry, method may be used wherever groundwater is encountered to stabilize the drilled hole during pile installation. In addition, the contractor should have temporary casing on-site, and have readily available equipment and techniques to remedy soil cave-in, according to Section 49-4.03 of *Standard Specification (July 1999)*.

2) Temporary casing, if used, must be removed during CIDH pile installation. Oscillating and twisting temporary casing during installation will potentially reduce pile skin friction. Should the above method be used for casing installation, this office must be notified to provide further recommendations.

3) Pile construction sequence is important for pile groups with center-to-center (CTC) spacing equal to or less than three times of pile diameter. Construction of adjacent piles should be performed only after the Portland cement concrete of the previously installed piles properly set and developed adequate strength.

Table 8. Pile Data Table for Centinela Ave UC Widening

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 1 Slab Bridge								
Abut 1A	600 mm	500 kN	1000 kN	N/A	14.25	8.15**	0.15 (1)	0.15
Bent 1B (L)	600 mm	N/A	1400 kN	N/A	15.21	15.21	2.71(1)	2.71
Bent 1B (R)	600 mm	N/A	1450 kN	N/A	14.00	8.15**	-1.00 (1)	-1.00
Bent 1C (L)	600 mm	N/A	1500 kN	N/A	15.28	15.28	2.28 (1)	2.28
Bent 1C (R)	600 mm	N/A	1450 kN	N/A	13.25	8.15**	-1.00 (1)	-1.00
Bent 1D (L)	600 mm	N/A	1150 kN	N/A	15.30	15.30	3.30 (1)	3.30
Bent 1D (R)	750 mm	N/A	2650 kN	N/A	13.85	8.15**	-3.85(1)	-3.85
Bent 1E (L)	600 mm	N/A	1350 kN	N/A	15.31	15.31	2.81 (1)	2.81
Bent 1E (R)	750 mm	N/A	2650 kN	N/A	13.90	8.15**	-3.85 (1)	-3.85
Bent 1F (L)	600 mm	N/A	1350 kN	N/A	15.33	15.33	2.83 (1)	2.83
Bent 1F (R)	750 mm	N/A	2650 kN	N/A	14.10	8.15**	-3.85 (1)	-3.85
Bent 1G (L)	600 mm	N/A	1600kN	N/A	15.38	15.38	1.38 (1)	1.38
Bent 1G (R)	600 mm	N/A	1450 kN	N/A	11.95	8.15**	-3.85 (1)	-3.85
Bent 1H (L)	600 mm	N/A	1600 kN	N/A	15.46	15.46	1.96 (1)	1.96
Bent 1H (R)	600 mm	N/A	1450 kN	N/A	11.90	7.90**	-3.60 (1)	-3.60
Bent 1I (L)	600 mm	N/A	1575 kN	N/A	15.51	15.51	2.01 (1)	2.01
Bent 1I (R)	600 mm	N/A	1450 kN	N/A	11.85	7.90**	-3.60 (1)	-3.60
Bent 1J (L)	600 mm	N/A	1550 kN	N/A	15.56	15.56	2.06 (1)	2.06
Bent 1J (R)	600 mm	N/A	1450 kN	N/A	11.80	7.90**	-3.60 (1)	-3.60
Bent 1K (L)	600 mm	N/A	1550 kN	N/A	15.58	15.58	2.08 (1)	2.08
Bent 1K (R)	600 mm	N/A	1450 kN	N/A	11.72	7.90**	-3.60 (1)	-3.60
Bent 1L (L)	600 mm	N/A	1450 kN	N/A	15.66	15.66	3.16 (1)	3.16
Bent 1L (R)	600 mm	N/A	1400 kN	N/A	11.69	7.90**	-3.60 (1)	-3.60
Bent 1M (L)	600 mm	N/A	1300 kN	N/A	15.69	15.69	3.69 (1)	3.69
Bent 1M (R)	600 mm	N/A	1350 kN	N/A	11.65	7.90**	-3.10 (1)	-3.10

Table 8. Continued ….

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 2 Slab Bridge								
Bent A	600 mm	N/A	1400 kN	N/A	11.60	8.23**	-3.27 (1)	-3.27
Bent B	600 mm	N/A	1950 kN	N/A	11.60	8.20**	-6.80 (1)	-6.80
Bent C (L)	600 mm	N/A	1600 kN	N/A	11.60	8.13**	-4.87 (1)	-4.87
Bent C (R)	600 mm	N/A	800 kN	550 kN	7.76	7.76	-3.24 (2)	-3.24
Bent C1 (L)	600 mm	N/A	1550 kN	N/A	11.55	8.10**	-4.40 (1)	-4.40
Bent C1 (R)	600 mm	N/A	800 kN	550 kN	7.71	7.71	-3.29 (2)	-3.29
Bent D1 (L)	600 mm	N/A	1800 kN	N/A	11.50	8.05**	-5.95 (1)	-5.95
Bent D1 (R)	600 mm	N/A	800 kN	550 kN	7.66	7.66	-3.34 (2)	-3.34
Bent E1 (L)	600 mm	N/A	1850 kN	N/A	11.30	8.00**	-6.50 (1)	-6.50
Bent E1 (R)	600 mm	N/A	800 kN	550 kN	7.61	7.61	-3.39 (2)	-3.39
Bent F1 (L)	600 mm	N/A	1750 kN	N/A	11.00	7.95**	-5.55 (1)	-5.55
Bent F1 (R)	600 mm	N/A	800 kN	550 kN	7.56	7.56	-3.44 (2)	-3.44
Bent G1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.90**	-5.10 (1)	-5.10
Bent G1 (R)	600 mm	N/A	800 kN	550 kN	7.51	7.51	-3.49 (2)	-3.49
Bent H1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.85**	-5.15 (1)	-5.15
Bent H1 (R)	600 mm	N/A	800 kN	550 kN	7.46	7.46	-3.54 (2)	-3.54
Bent I1 (L)	600 mm	N/A	1700 kN	N/A	11.00	7.80**	-5.20 (1)	-5.20
Bent I1 (R)	600 mm	N/A	800 kN	550 kN	7.41	7.41	-3.59 (2)	-3.59
Bent J1 (L)	600 mm	N/A	1700 kN	N/A	10.90	7.75**	-5.25 (1)	-5.25
Bent J1 (R)	600 mm	N/A	800 kN	550 kN	7.36	7.36	-3.64 (2)	-3.64
Bent K1 (L)	600 mm	N/A	1700 kN	N/A	10.80	7.70**	-5.30 (1)	-5.30
Bent K1 (R)	600 mm	N/A	800 kN	550 kN	7.31	7.31	-3.69 (2)	-3.69
Bent L1 (L)	600 mm	N/A	1700 kN	N/A	10.80	7.67**	-5.33 (1)	-5.33
Bent L1 (R)	600 mm	N/A	800 kN	550 kN	7.28	7.28	-3.72 (2)	-3.72
Bent M1 (L)	600 mm	N/A	1700 kN	N/A	10.81	7.65**	-5.35 (1)	-5.35
Bent M1 (R)	600 mm	N/A	800 kN	550 kN	7.26	7.26	-3.74 (2)	-3.74

Table 8 Continued…

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Approx. Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation (m)	Specified Tip Elevation (m)
			Compression	Tension				
Section 2 Slab Bridge								
Bent N1 (L)	600 mm	N/A	1700 kN	N/A	10.85	7.60**	-5.40 (1)	-5.40
Bent N1 (R)	600 mm	N/A	800 kN	550 kN	7.21	7.21	-3.79 (2)	-3.79
Bent O1 (L)	600 mm	N/A	1700 kN	N/A	10.84	7.55**	-5.45 (1)	-5.45
Bent O1 (R)	600 mm	N/A	800 kN	550 kN	7.16	7.16	-3.84 (2)	-3.84
Bent P1 (L)	600 mm	N/A	1700 kN	N/A	10.63	7.50**	-5.50 (1)	-5.50
Bent P1 (R)	600 mm	N/A	800 kN	550 kN	7.11	7.11	-3.89 (2)	-3.89
Section 3 Slab Bridge Cee Bents								
Bent Q1	1200 mm	N/A	3200 kN	N/A	10.60	7.46**	-5.54 (1)	-5.54
Bent R1	1200 mm	N/A	3200 kN	N/A	10.56	7.39**	-5.61 (1)	-5.61
Bent S1	1200 mm	N/A	3200 kN	N/A	10.52	7.32**	-5.68 (1)	-5.68
Bent T1	1200 mm	N/A	3000 kN	N/A	10.48	7.25**	-5.75 (1)	-5.75
Bent U1	600 mm	N/A	1800 kN	N/A	17.72	16.58	1.58 (1)	1.58
Section 4 Box Biridge								
Bent 1	1500 mm	N/A	5600 kN	N/A	10.95	4.13**	-13.37 (1)	-13.37
Bent 2	2135 mm	N/A	6800 kN	N/A	10.95	7.10**	-6.40 (1)***	-6.40
Bent 3	2135 mm	N/A	9500 kN	N/A	10.60	7.00**	-16.5 (1)***	-16.5
Bent 4	600 mm	N/A	1800 kN	900 kN	10.68	7.96	-7.04 (1)	-7.04
Bent 5	600 mm	N/A	1800 kN	900 kN	9.67	5.18	-10.82 (1)	-10.82
Abut 6	600 mm	775 kN	1550 kN	N/A	14.32	11.86	-2.14 (1)	-2.14
Wingwall (Abut 6)	600 mm	250 kN	500 kN	N/A	14.75	13.69	5.69 (1)	5.69

Note: Design tip elevations are controlled by the following demands: (1) Compression; (2) Tension; (3) Lateral Loads;

** Assuming cut-off elevation at the bottom of isolation casing.

*** Permanent casings will be used for Bents 2 and 3, with the bottom of casing at elev. 5.57 m and –0.15 m respectively. The annular void between casing and foundation soils will be post grouted. No friction contribution is assumed in determining pile tip elevation.

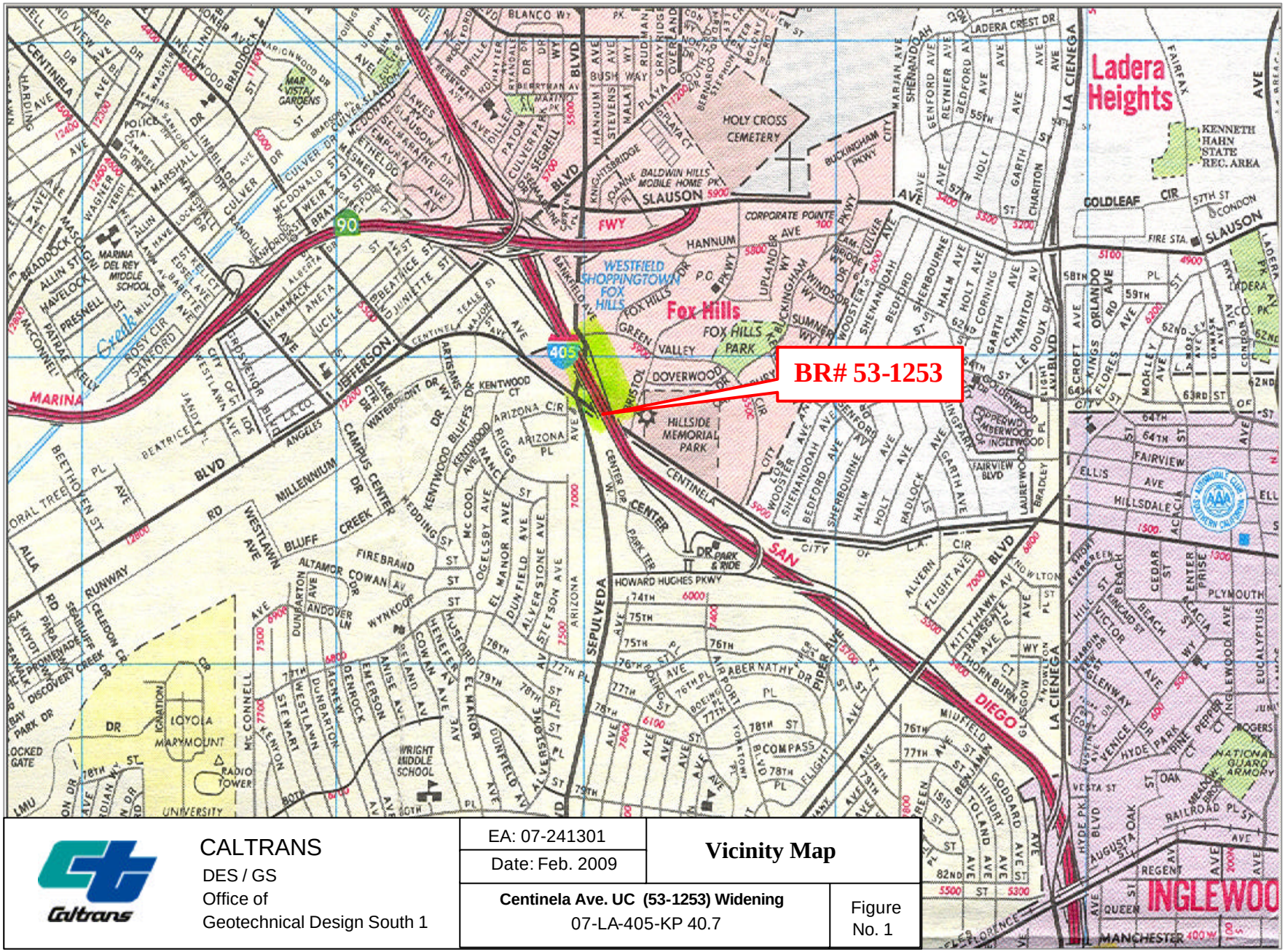
Should you have any question, please contact Haitao Liu at (916) 227-0992.

Prepared by: Date: 6/23/2009

Haitao Liu, P.E. C66398
Transportation Engineer, Civil
Branch A / OGDS-1

Cc: OGDS1 - Sacramento
OGDS1 – L. A.
GS - File Room
R.E. Pending File

ATTACHMENTS



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: Feb. 2009	**Vicinity Map**	
	Centinela Ave. UC (53-1253) Widening 07-LA-405-KP 40.7		Figure No. 1

CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: Feb. 2009	**Geologic Map**	
	Centinela Ave UC (53-1253) Widening 07-LA-405-KP40.7		Figure No. 2

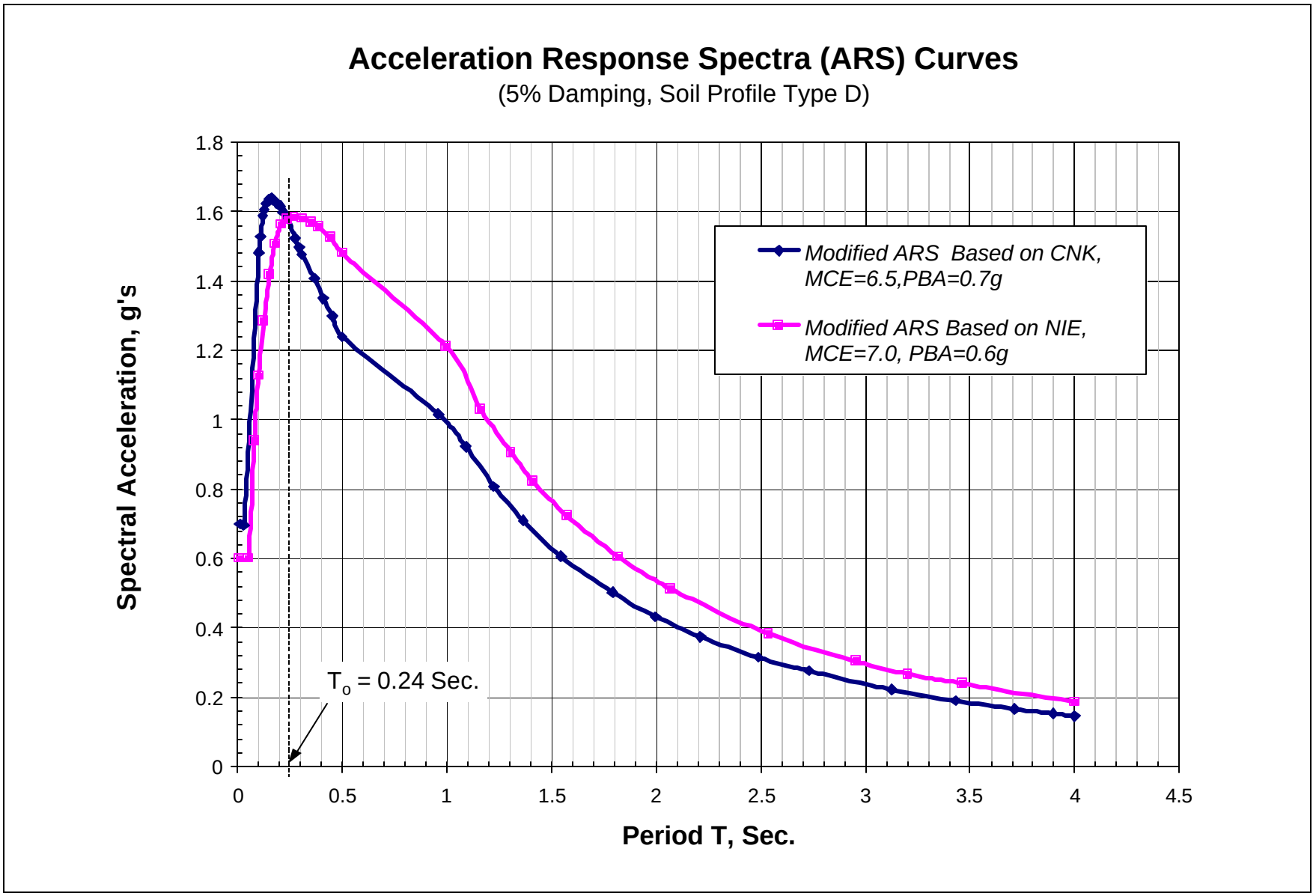


Figure 3: Recommended Acceleration Response Spectra (ARS) Curve

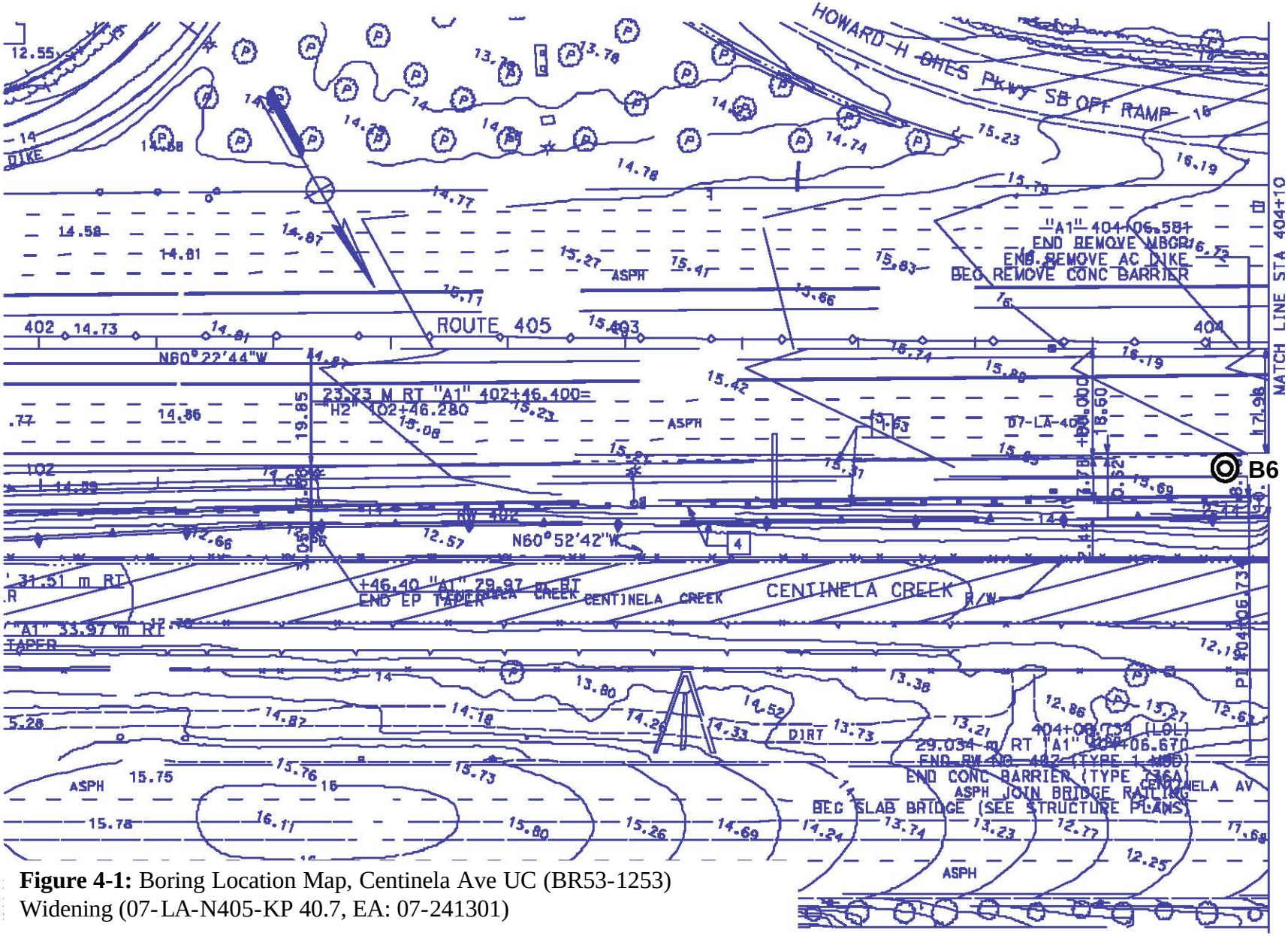


Figure 4-1: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)

Figure 4-2: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)

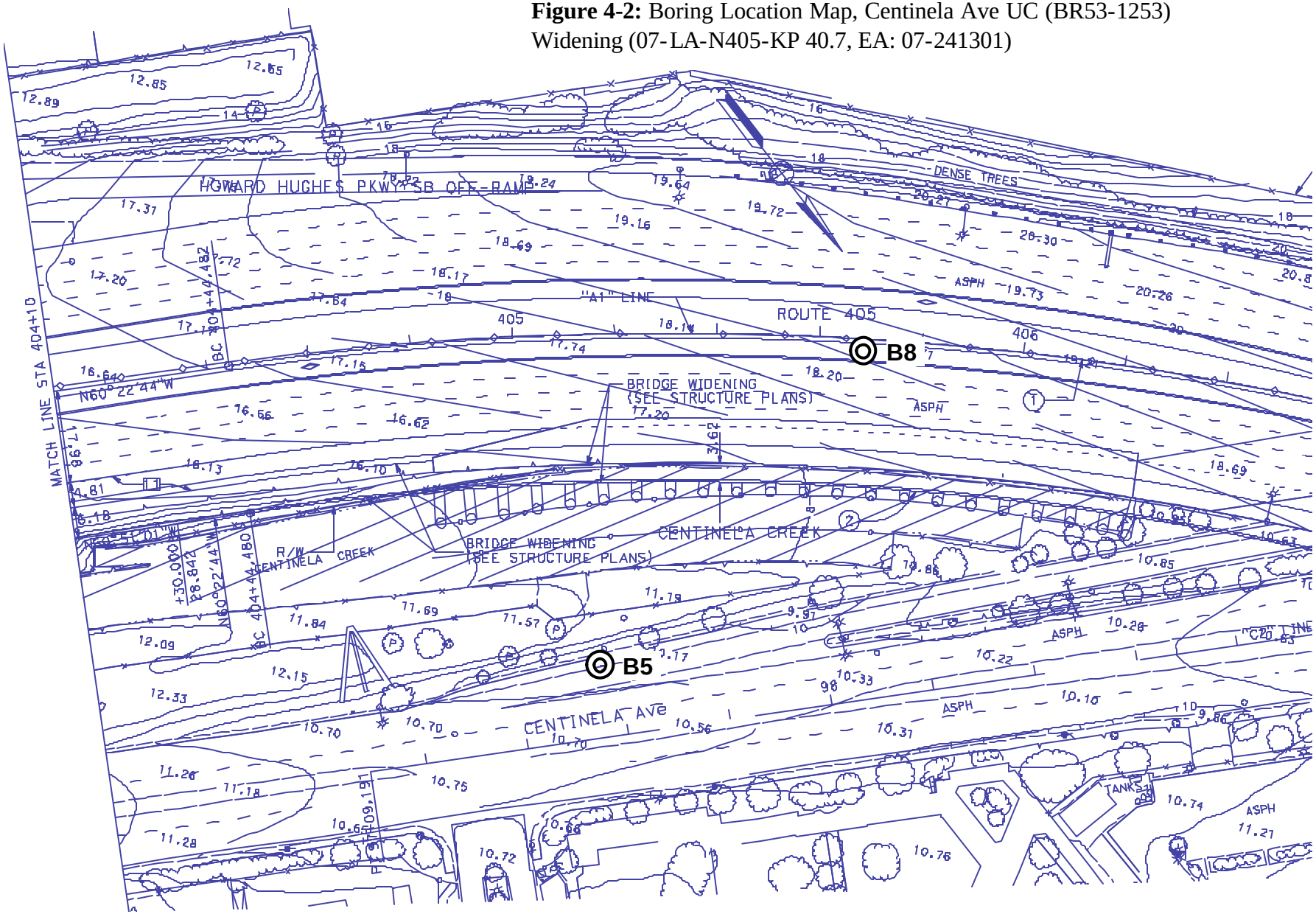
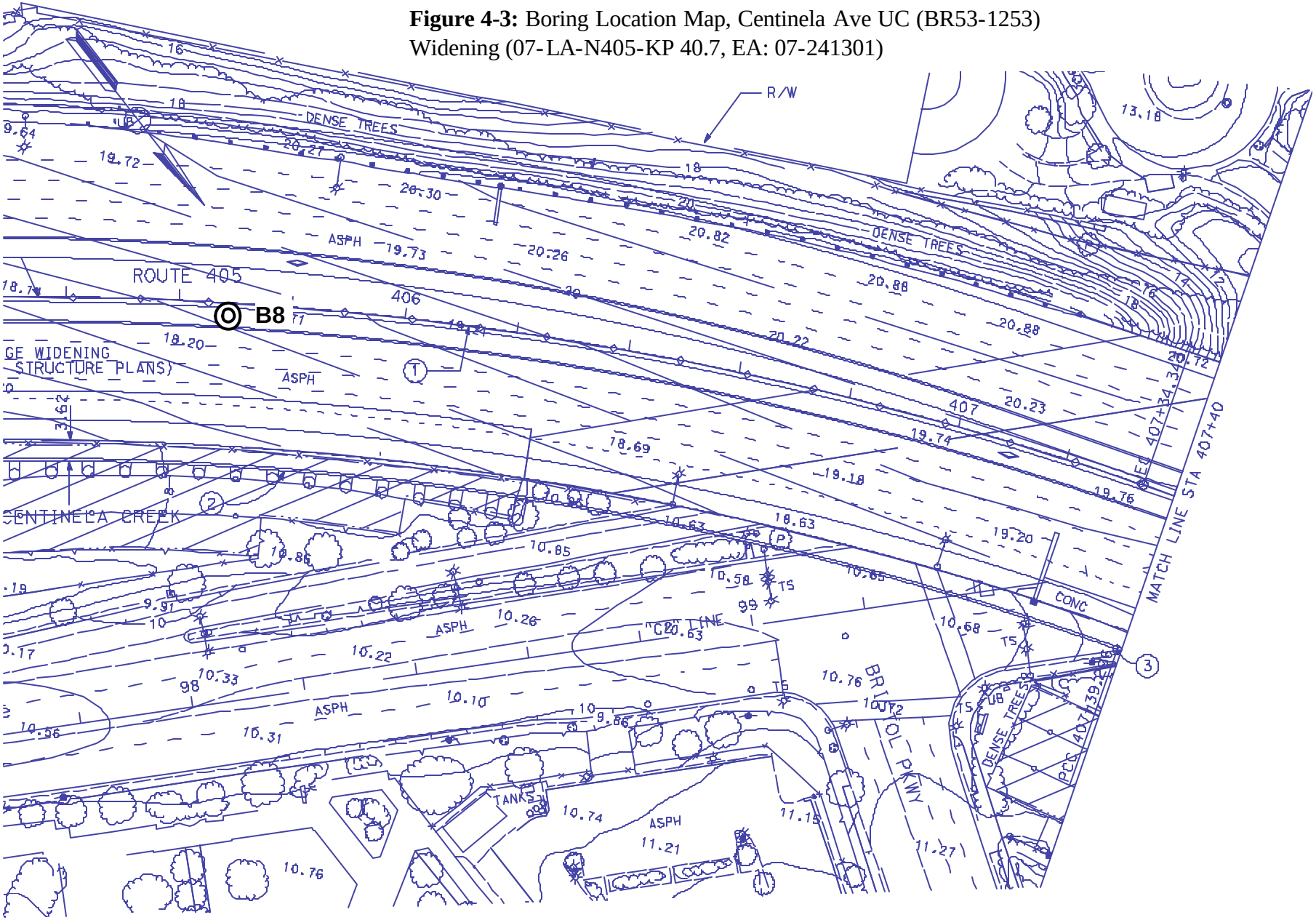


Figure 4-3: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)



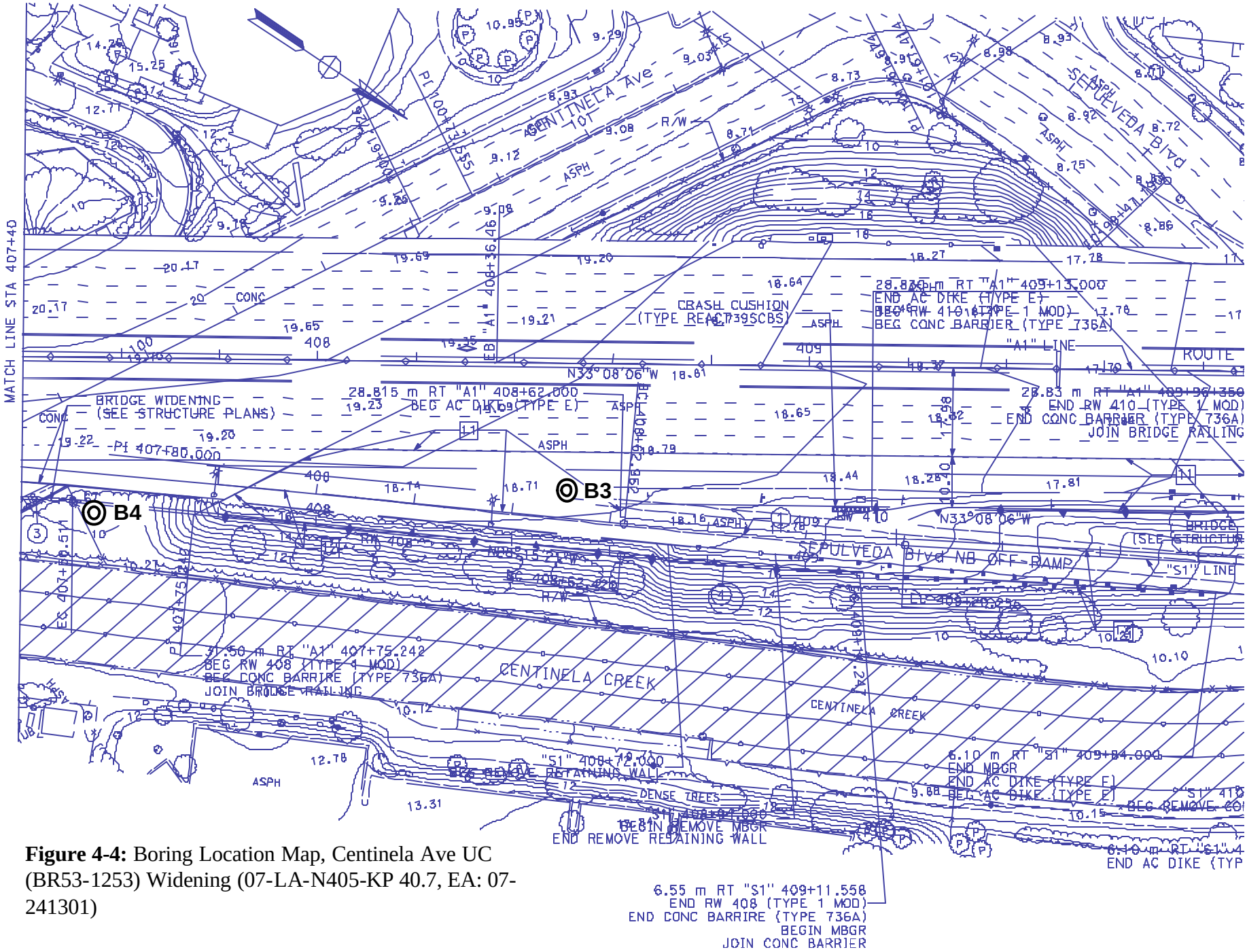
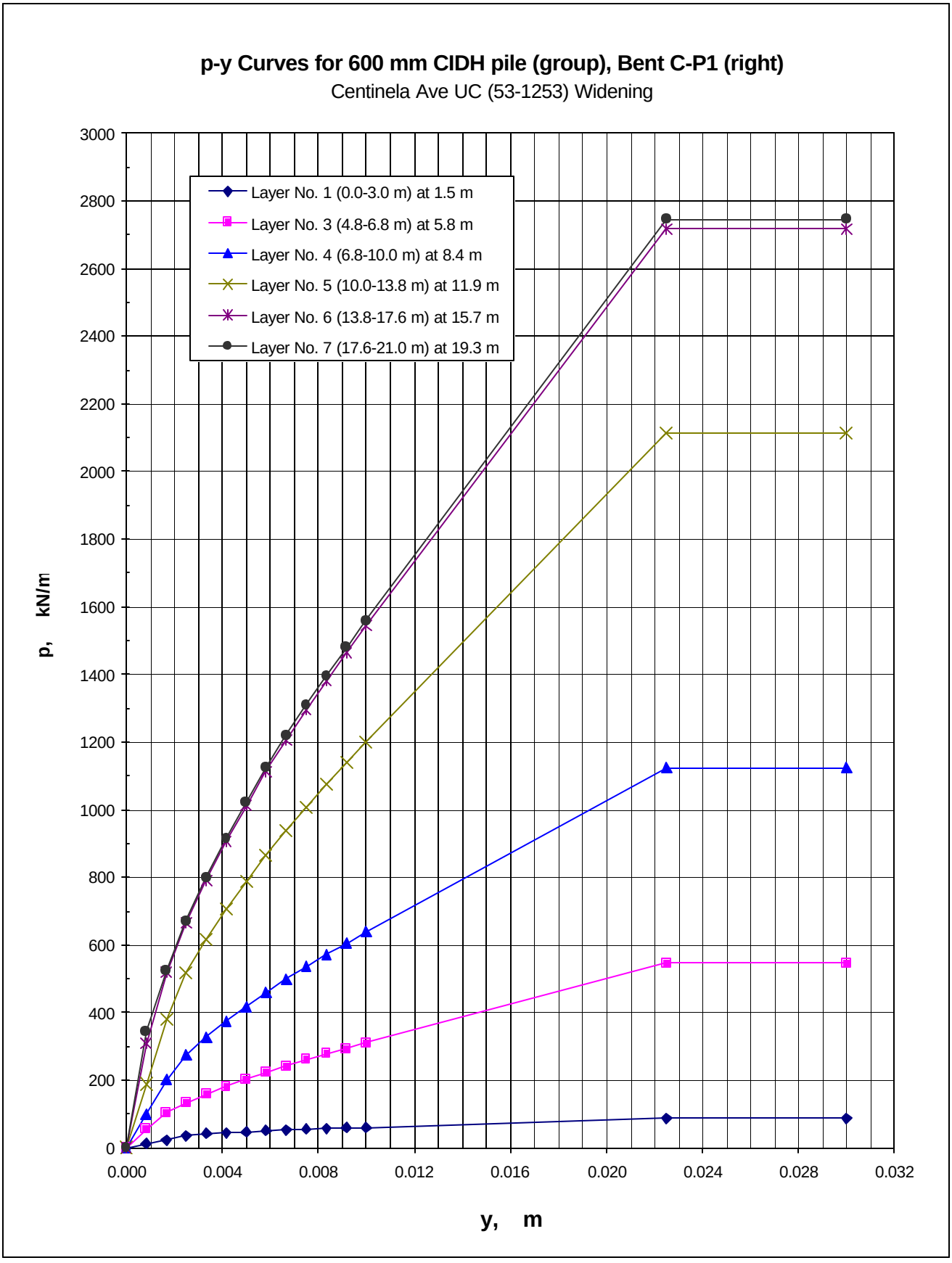
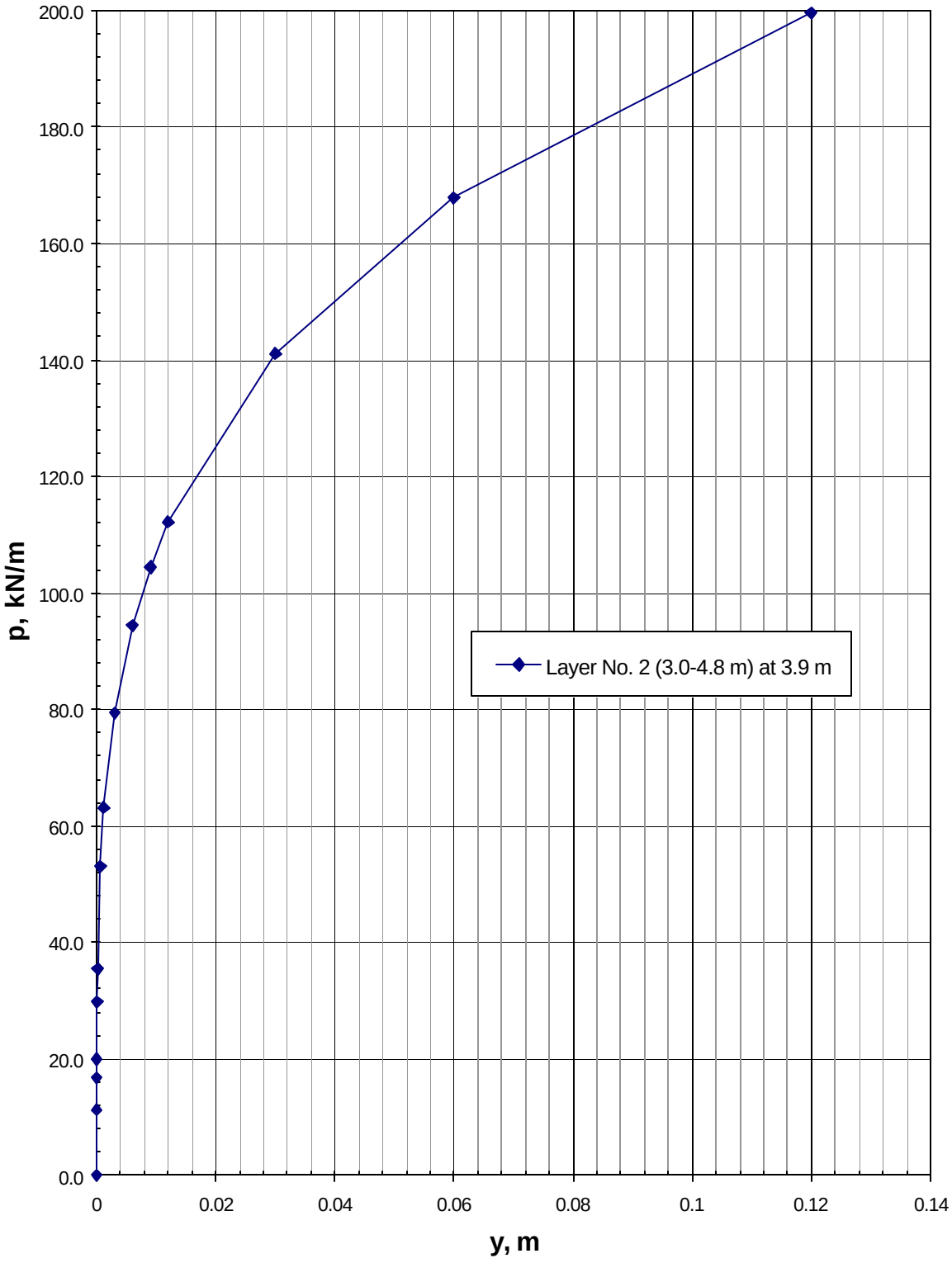


Figure 4-4: Boring Location Map, Centinela Ave UC (BR53-1253) Widening (07-LA-N405-KP 40.7, EA: 07-241301)


p-y Curves for 600 mm CIDH pile (group), Bent C-P1 (right)
Centinela Ave UC (53-1253) Widening
Layer No. 1 (0.0-3.0 m) at 1.5 m
Layer No. 3 (4.8-6.8 m) at 5.8 m
Layer No. 4 (6.8-10.0 m) at 8.4 m
Layer No. 5 (10.0-13.8 m) at 11.9 m
Layer No. 6 (13.8-17.6 m) at 15.7 m
Layer No. 7 (17.6-21.0 m) at 19.3 m
p, kN/m
y, m
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
0.000
0.004
0.008
0.012
0.016
0.020
0.024
0.028
0.032

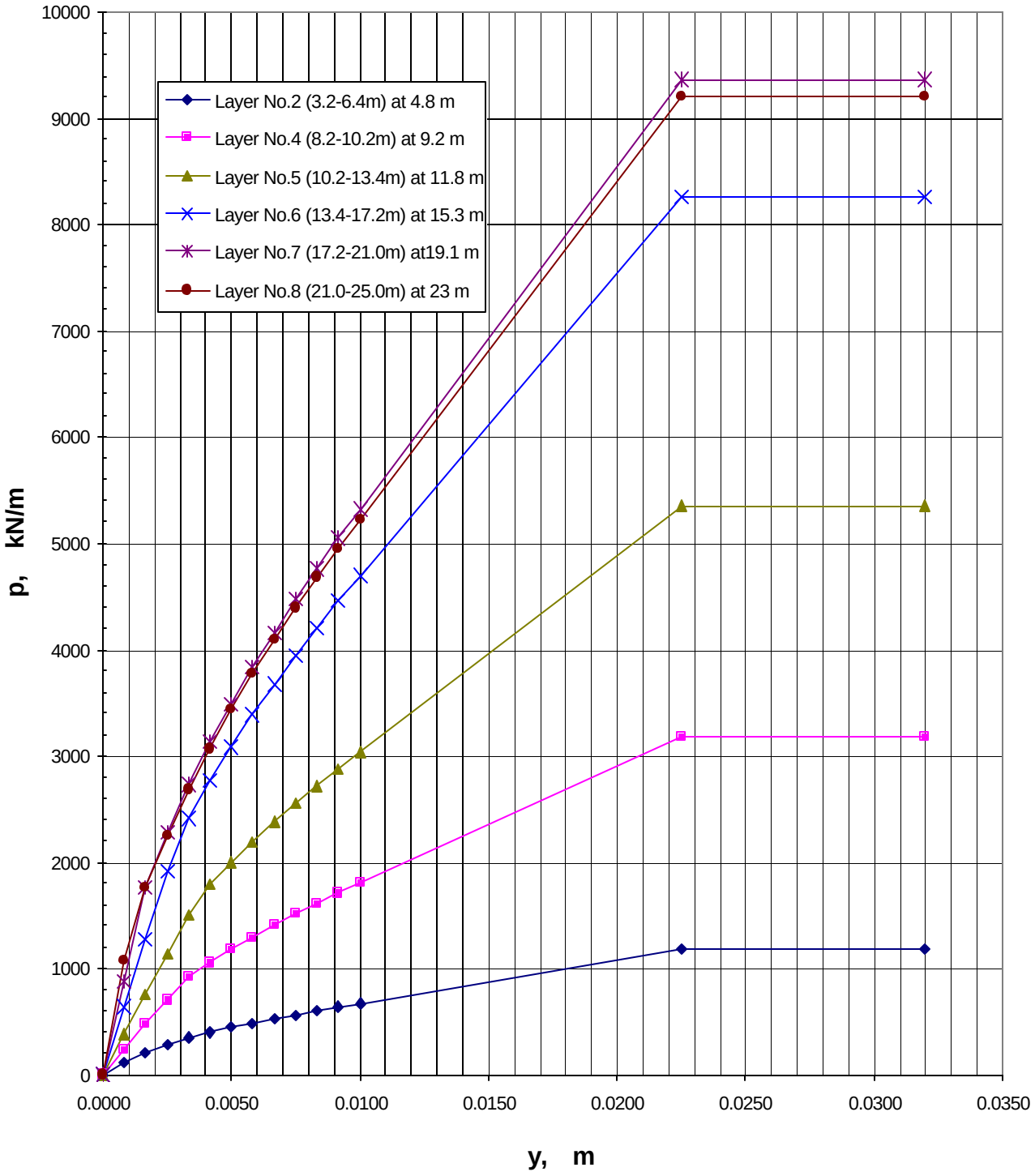
p-y Curves for 600 mm CIDH pile (group), Bent C-P1 (Right)

Centinela Ave UC (53-1253) Widening



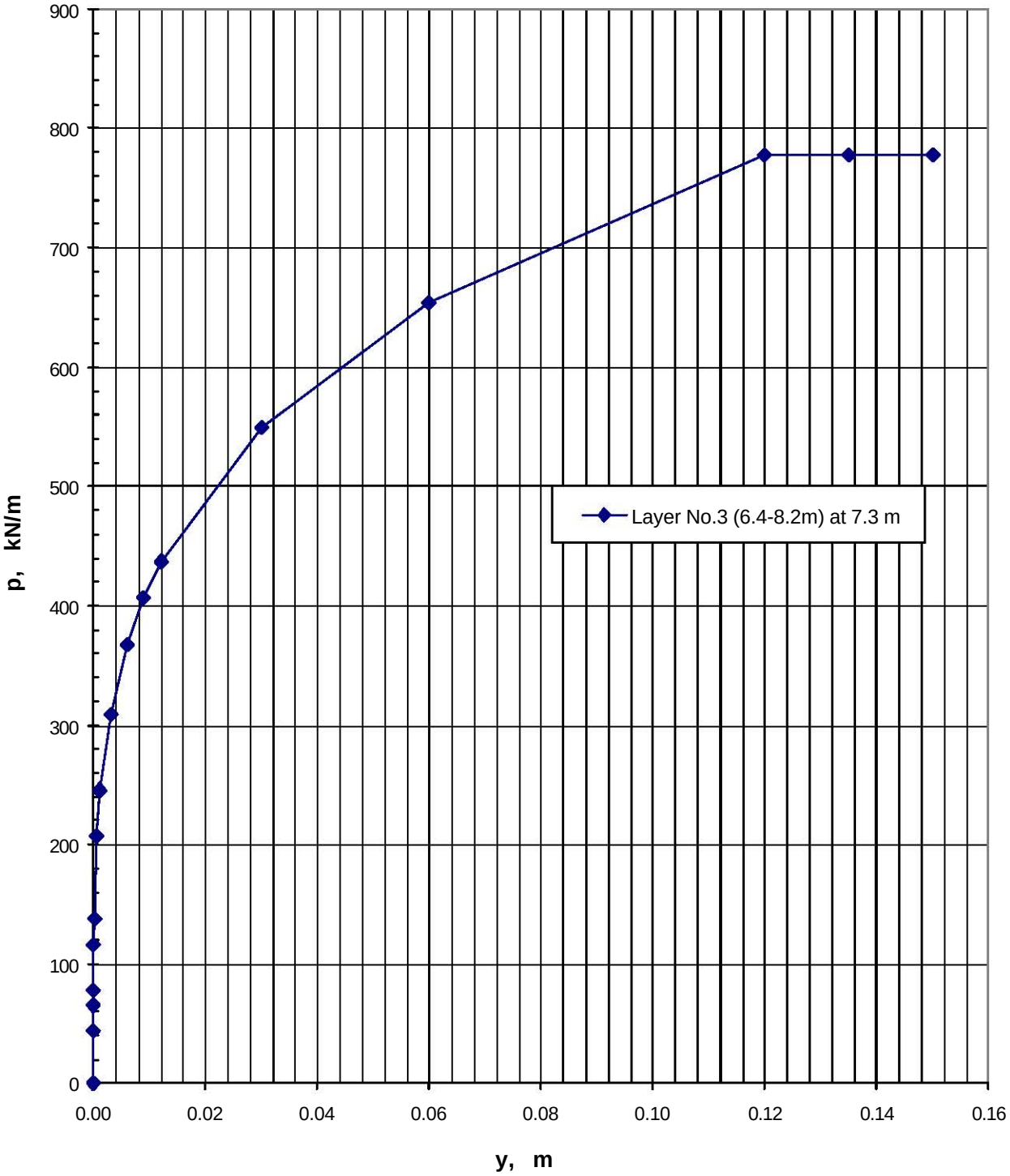
p-y Curves for 600 mm CIDH Piles at Bents A, B, C-P1 (L), and 1G-1M(R)

Centinela Ave UC (53-1253) Widening



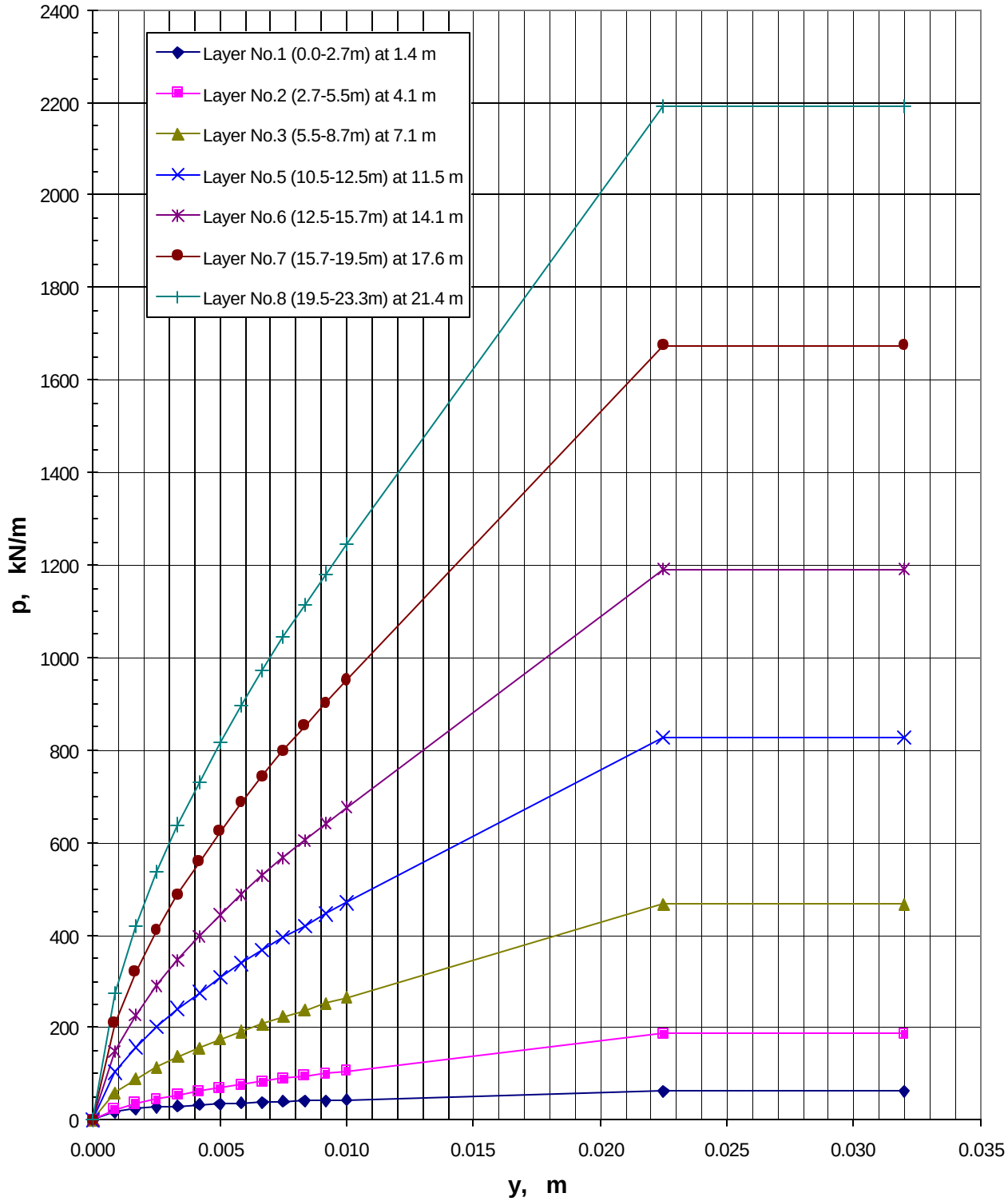
p-y Curves for 600 mm CIDH Piles at Bents A, B, C-P1 (L), and 1G-1M(R)

Centinela Ave UC (53-1253) Widening



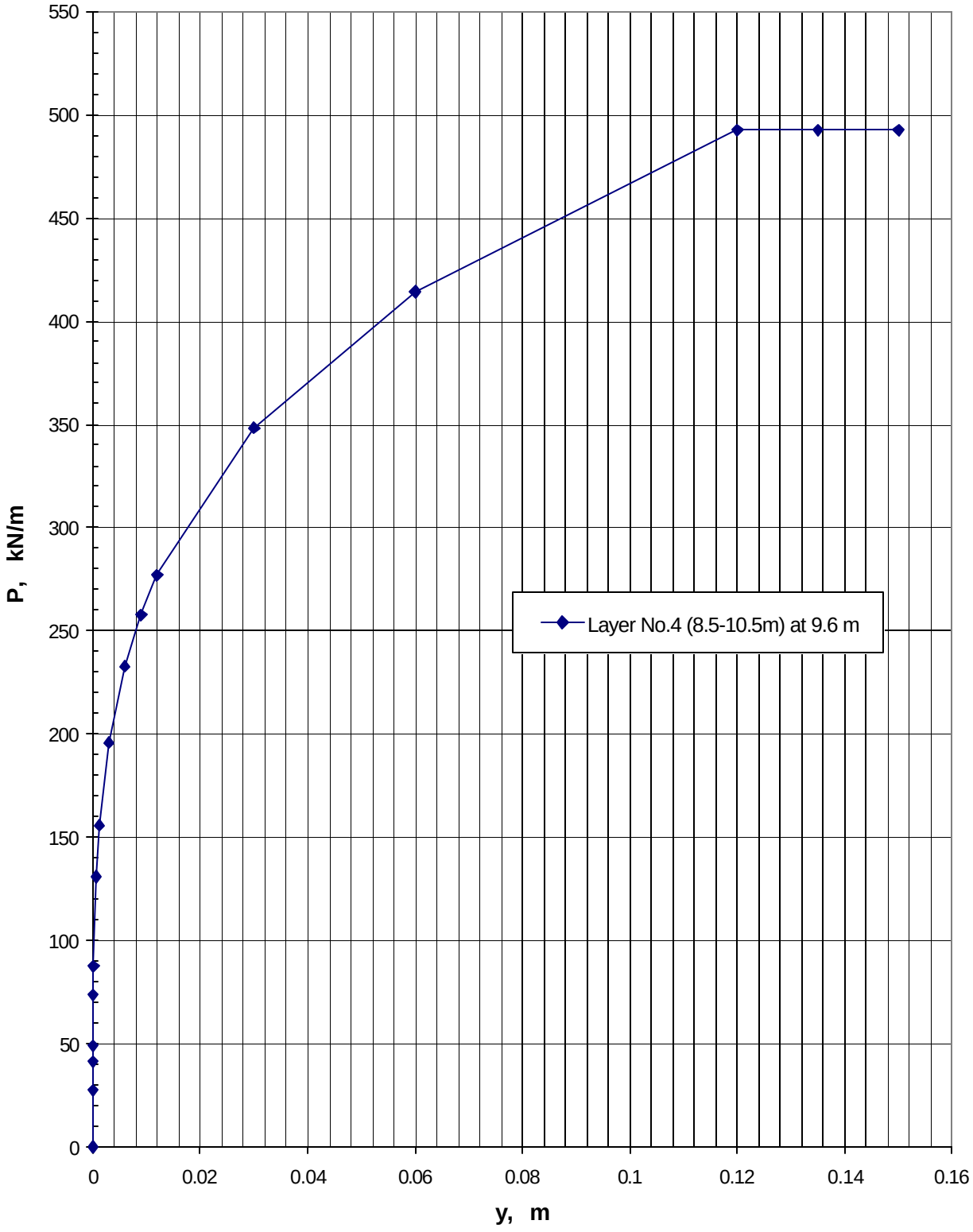
p-y Curves for 600 mm CIDH Pils at Bents 1B-1C (Right)

Centinela Ave. UC (53-1253) Widening



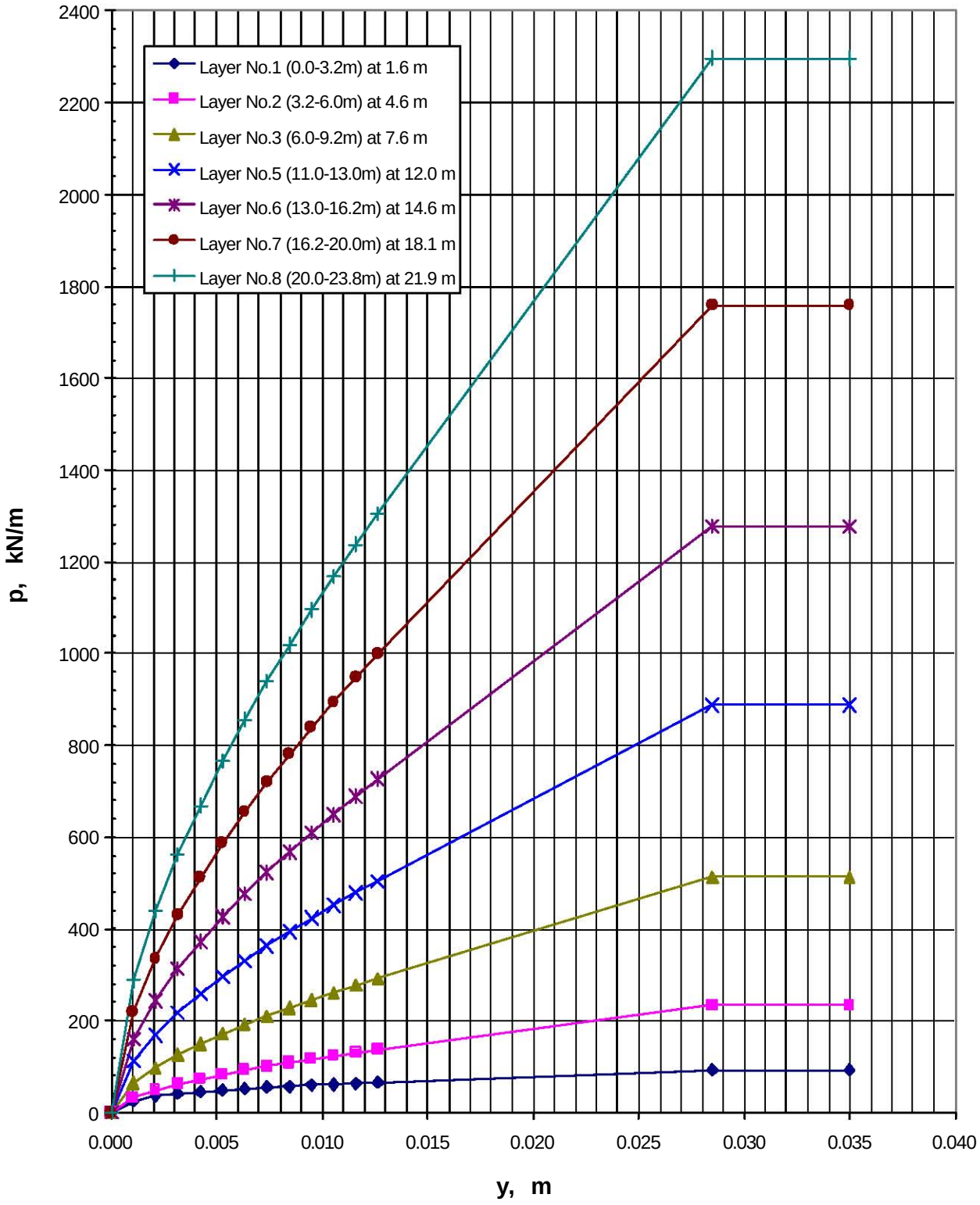
p-y Curve for 600 mm CIDH Piles at Bents 1B-1C (Right)

Centinela Ave. UC (53-1253) Widening



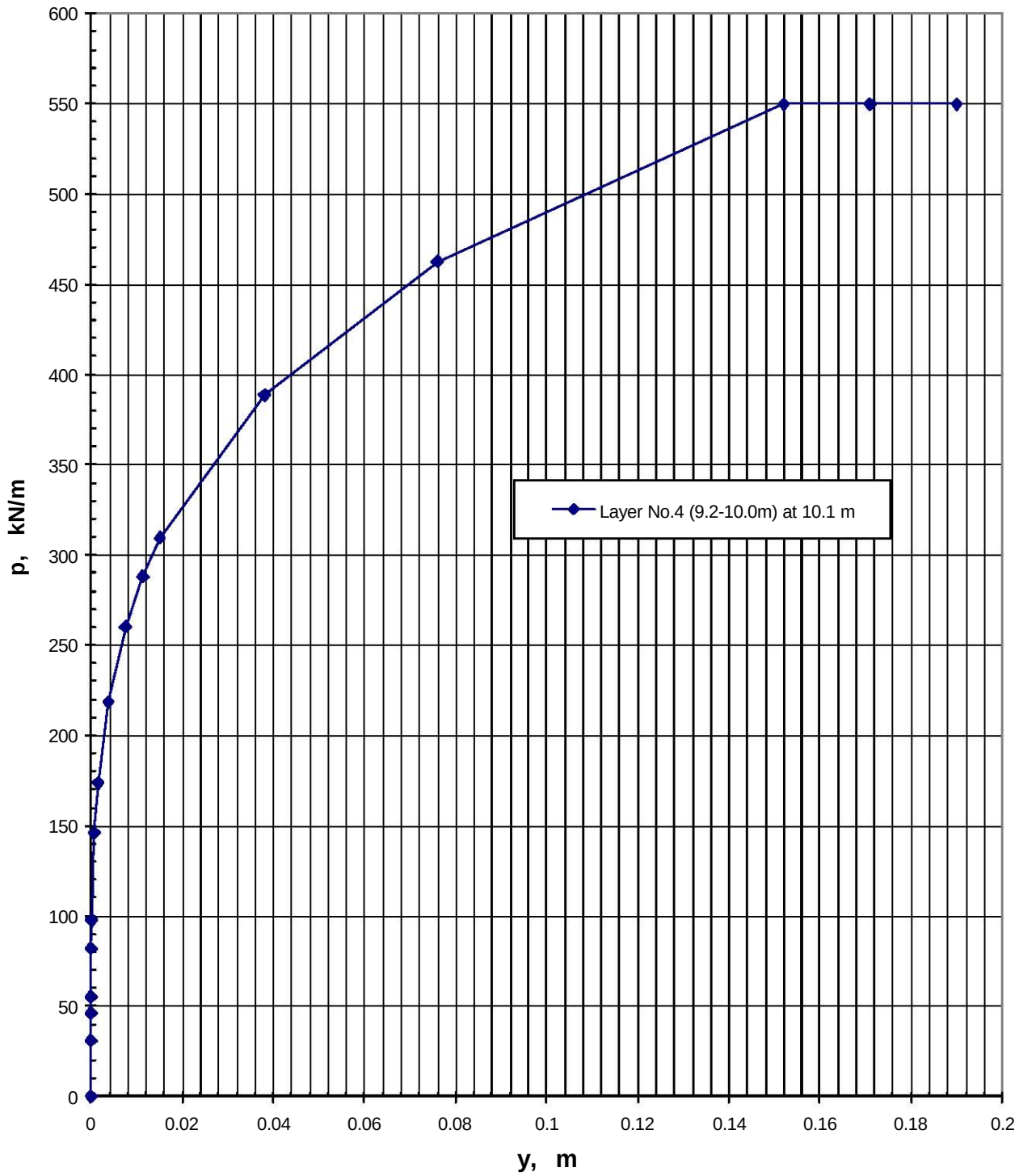
p-y Curves for 750 mm CIDH piles at Bents 1D-1F (Right)

Centinela Ave. UC (53-1253) Widening



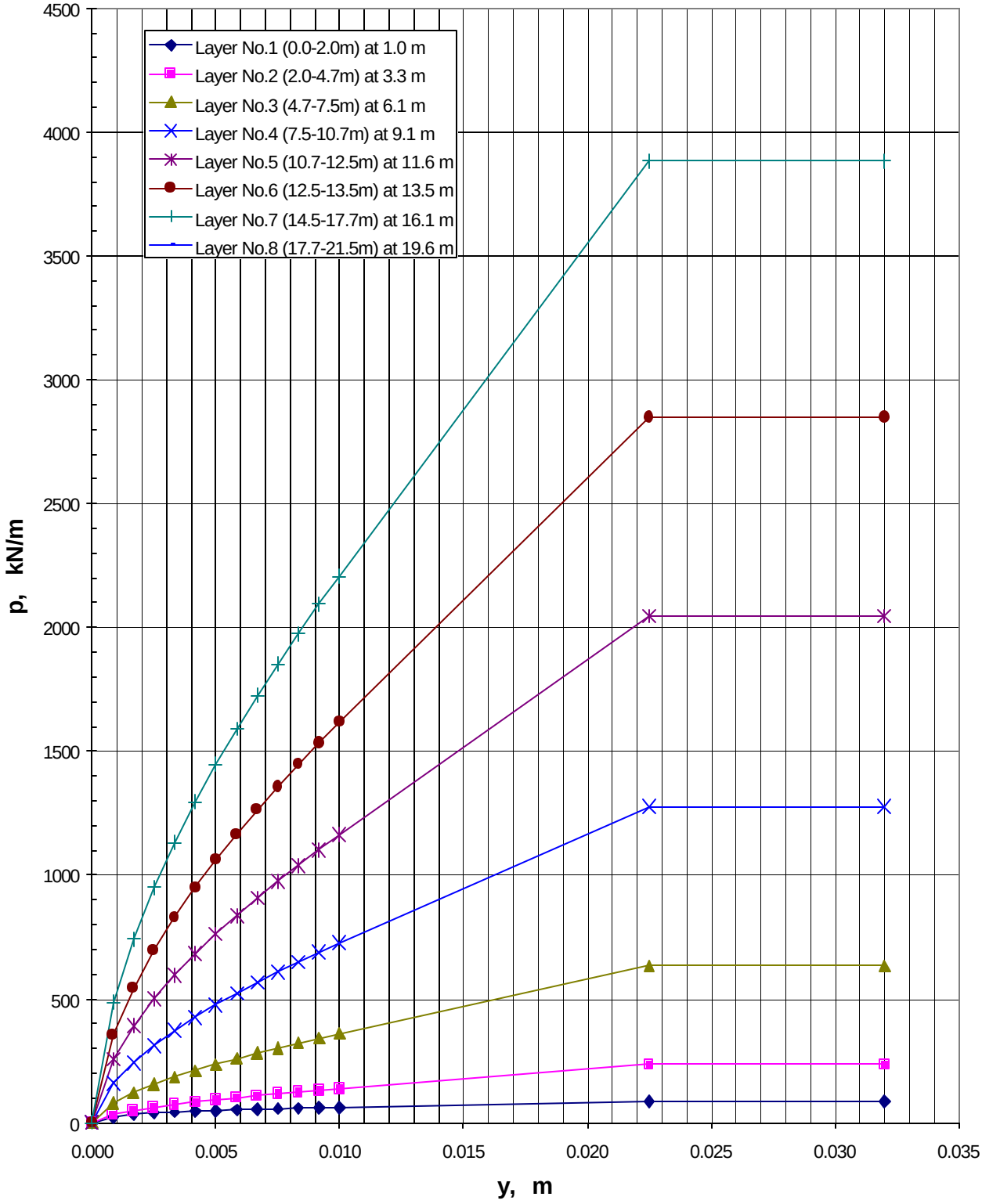
p-y Curve for 750 mm CIDH Piles at Bents 1D-1F (Right)

Centinela Ave UC (53-1253) Widening



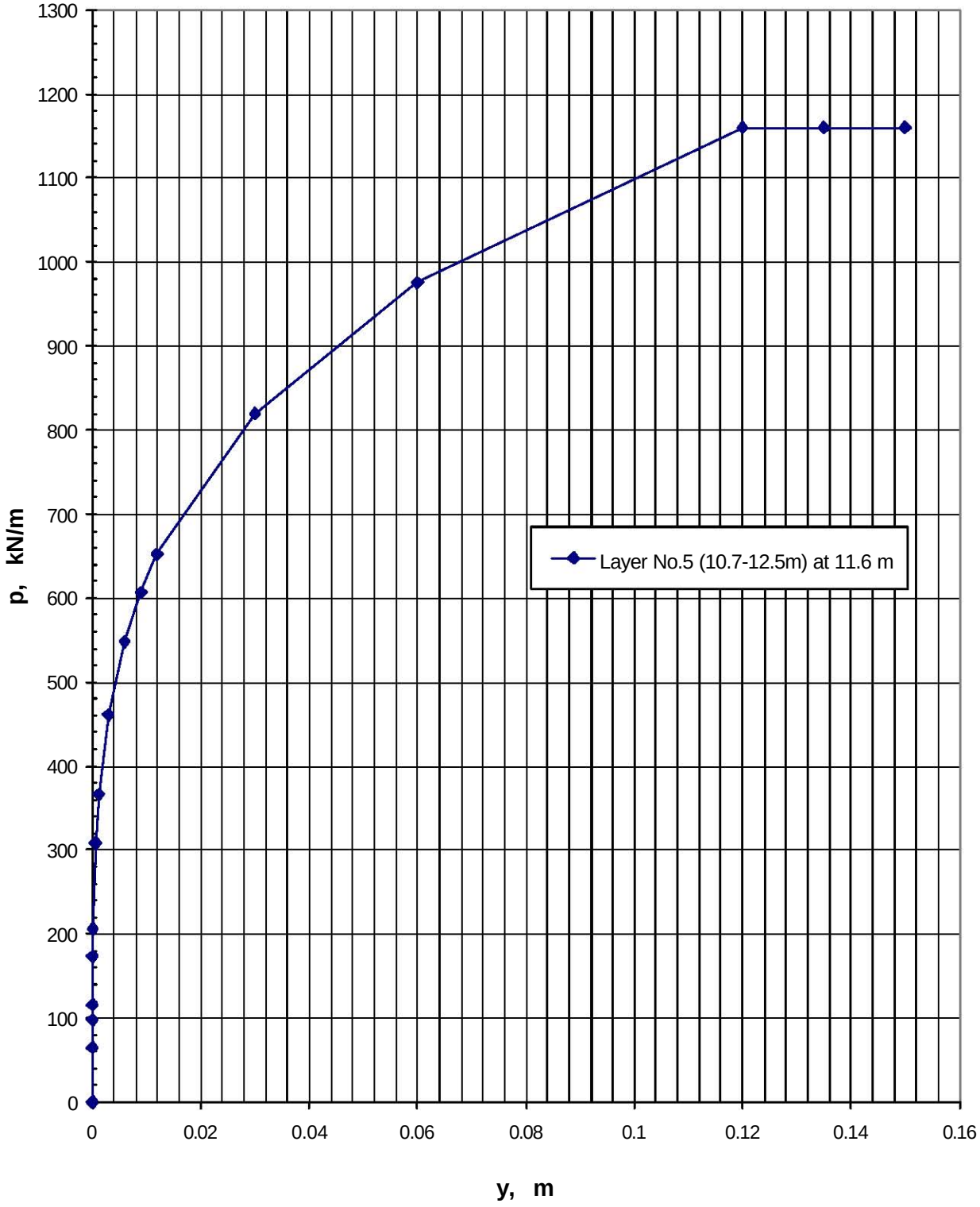
p-y Curves for 600 mm CIDH Piles at Bents 1B-1M (Left)

Centinela Ave UC (53-1253) Widening



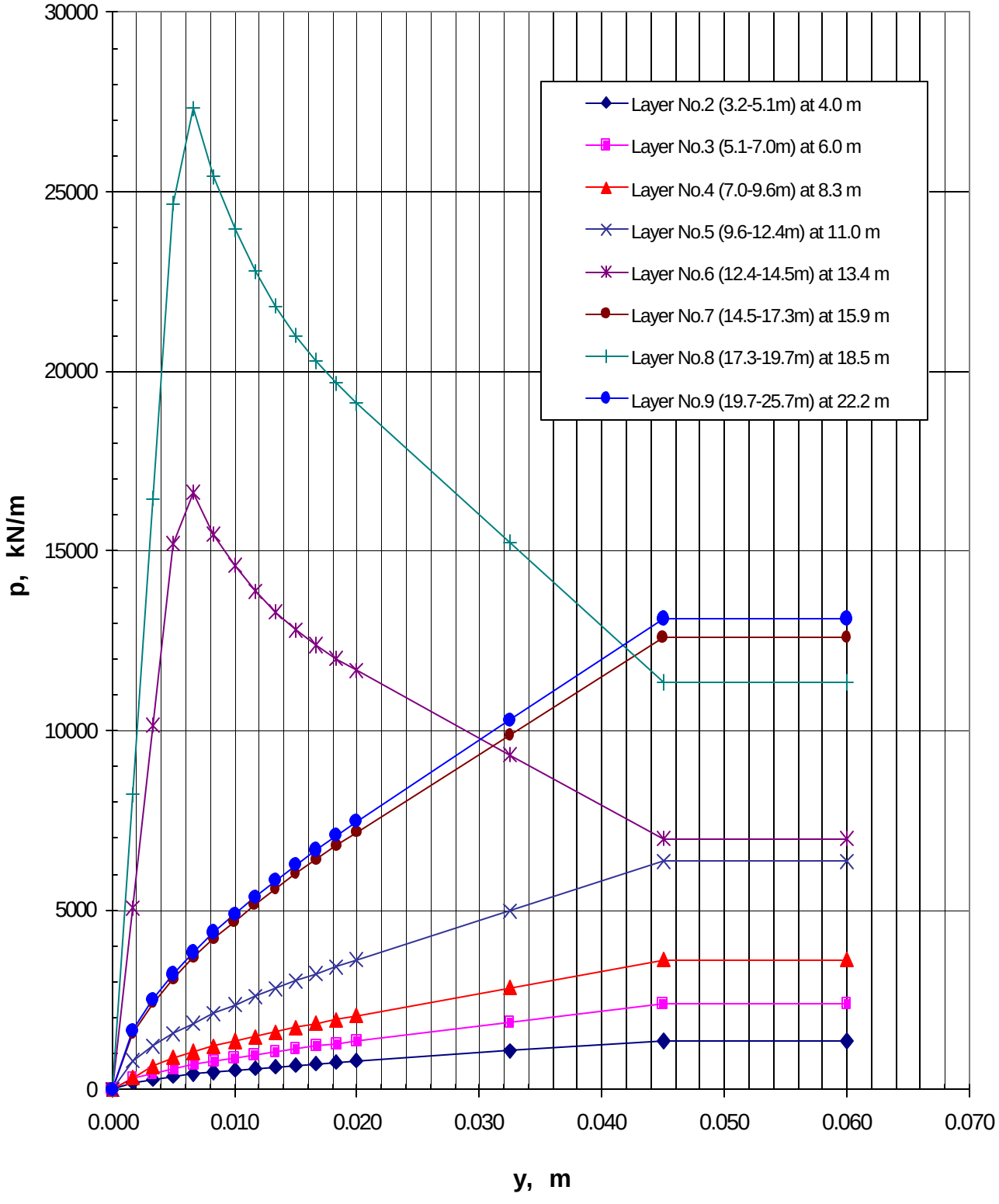
p-y Curve for 600 mm CIDH Piles at Bents 1B-1M (Left)

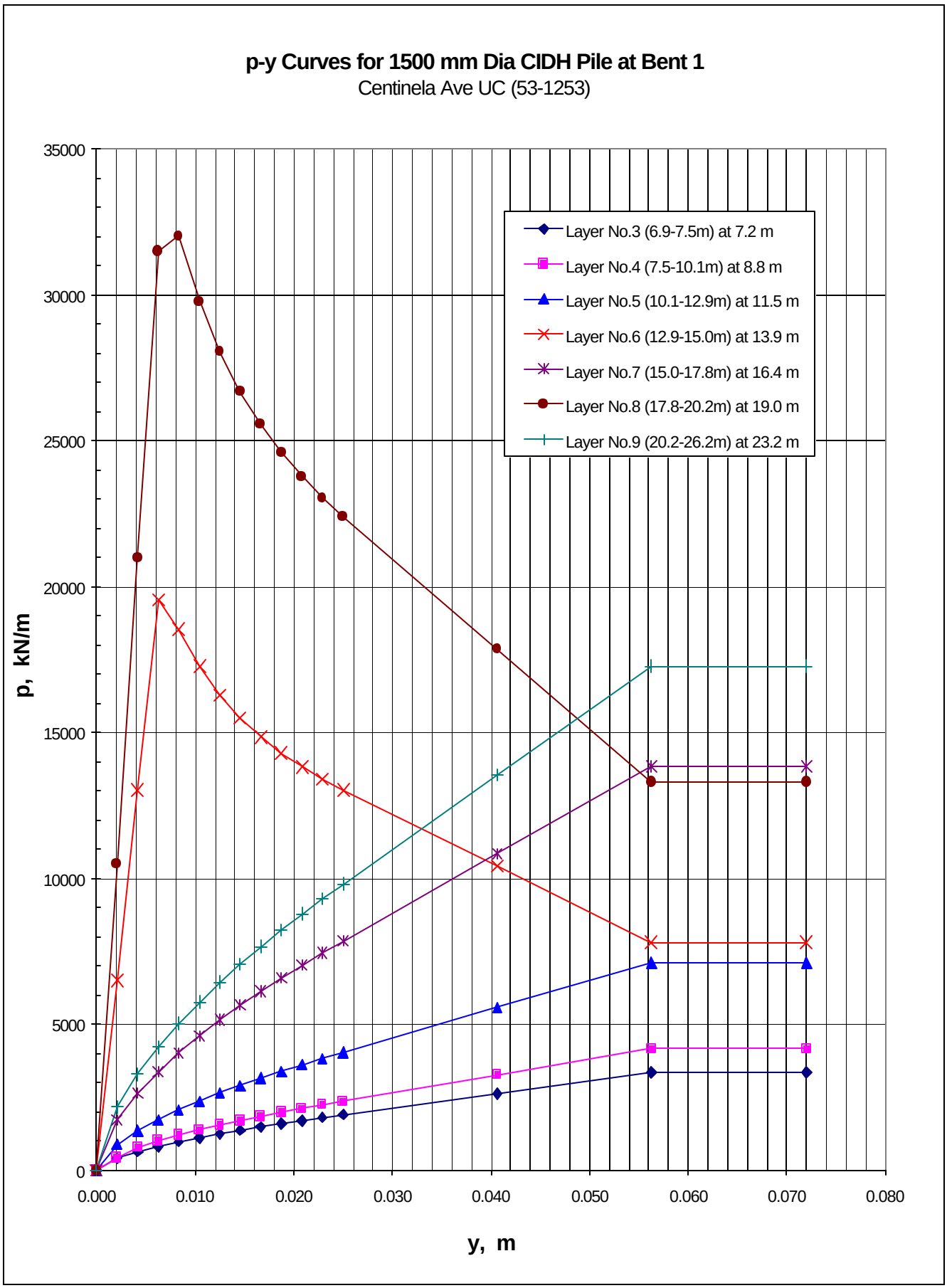
Centinela Ave UC (53-1253) Widening



P-y Curves for 1200 mm Dia. CIDH Piles at Bents Q1 to T1

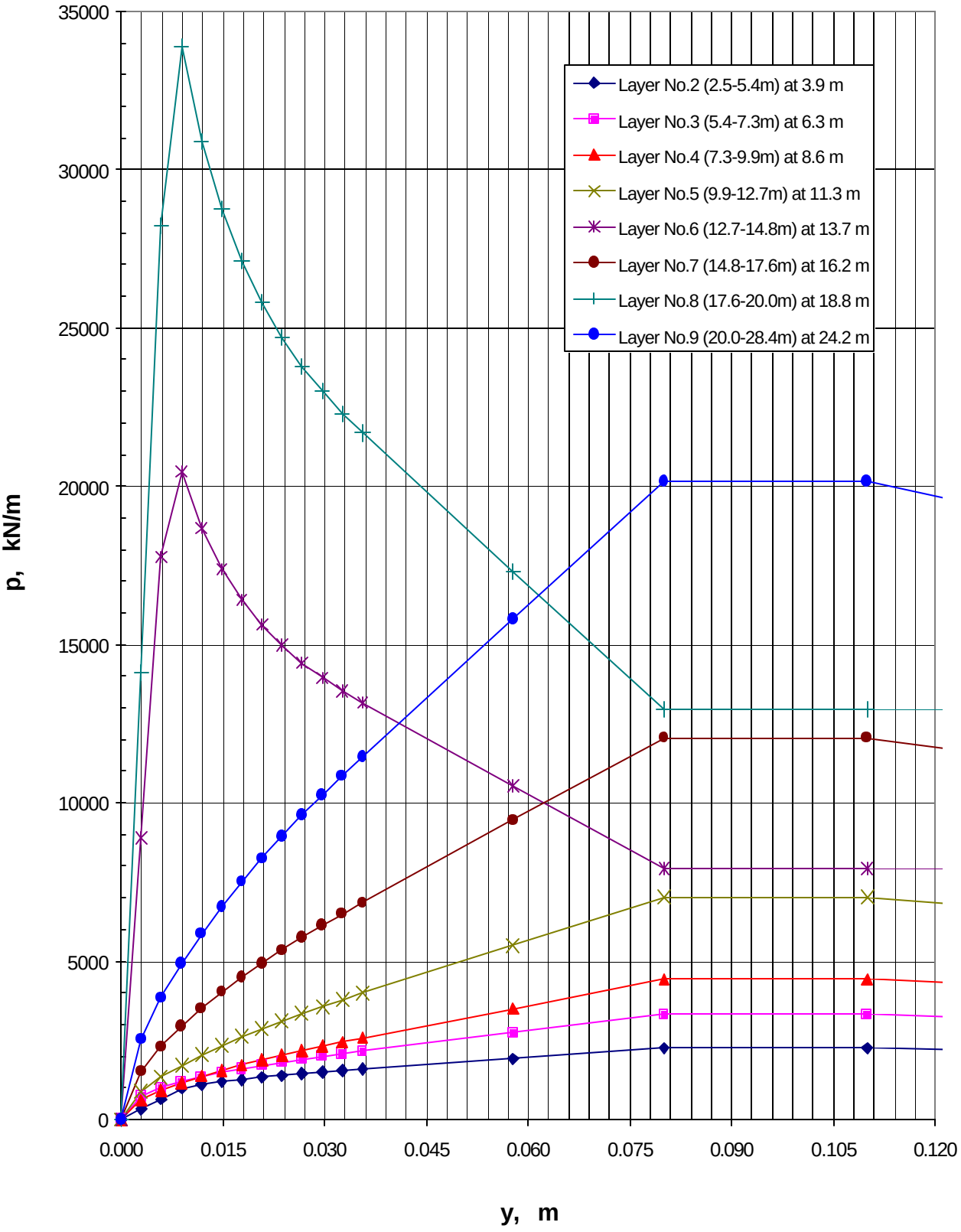
Centinela Ave UC (53-1253) Widening




p-y Curves for 1500 mm Dia CIDH Pile at Bent 1
Centinela Ave UC (53-1253)
35000
30000
25000
20000
15000
10000
5000
0
p, kN/m
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
y, m
Layer No.3 (6.9-7.5m) at 7.2 m
Layer No.4 (7.5-10.1m) at 8.8 m
Layer No.5 (10.1-12.9m) at 11.5 m
Layer No.6 (12.9-15.0m) at 13.9 m
Layer No.7 (15.0-17.8m) at 16.4 m
Layer No.8 (17.8-20.2m) at 19.0 m
Layer No.9 (20.2-26.2m) at 23.2 m

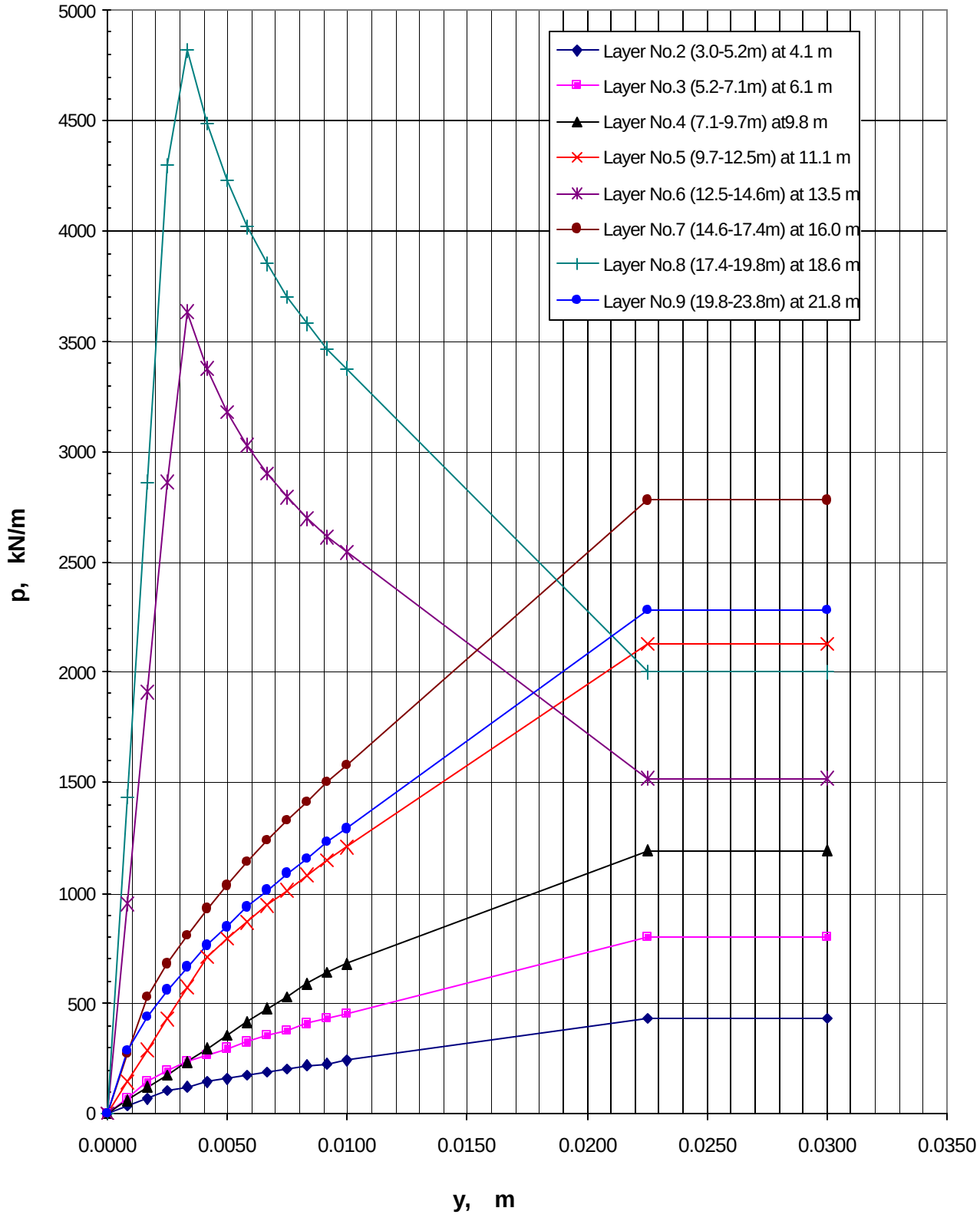
p-y Curves for 2135 mm Dia. CIDH Piles at Bent 2 & 3

Centinela Ave UC (53-1253) Widening



p-y Curves for 600 mm CIDH Piles at Bents 4 and 5

Centinela Ave UC (53-1253) wideing



M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MATT HOLM
Chief
Bridge Design Branch 12

Date: 6/23/2009

File: 07-LA-405-KP40.97
07-241301
BR53-1254

Attention: Leon Valla

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Report for Sepulveda Blvd UC Widening , LA

This is the Geotechnical Design Report (GDR) for the proposed widening of Sepulveda Blvd Undercrossing (UC), which is planned as a part of highway widening from KP39.3 to KP41.4 of northbound 405, in Culver City, Los Angeles County. The project site is shown on the Vicinity Map (Figure 1) of the Attachments.

The geotechnical recommendations presented in this report are based on results of field reconnaissance, literature study, subsurface exploration, laboratory testing of the soil samples recovered from subsurface exploration, and geotechnical analyses for the proposed improvement. The bridge information is presented in Table 1 below.

Table 1. Information of Existing Bridge

Bridge Name	Bridge No.	KiloPost	Number of Spans	Existing Foundation Type (close to future widening)	Proposed Foundation Type
Sepulveda Ave UC	53-1254	40.97	4	Spread Footings	CIDH Piles

Regional Geology

The site is located on the Coastal Plain of Los Angeles County and is considered part of the Peninsular Range geomorphic province of California, and underlain by a thick sequence of marine and non-marine unconsolidated sediments. According to the *Geologic Map of California, Long Beach Sheet*, the proposed improvement is located within a region of quaternary dune sand deposits of recent age. The geologic map of this area is shown on Figure 2 of Attachments.

Seismicity

The site is close to a number of faults that are considered to be active or potentially active. The information of adjacent faults which could impact the proposed improvement is presented in Table

2 below. According to the Caltrans' Seismic Map (Figure 3, Attachments), the peak bedrock acceleration (PBA) at the subject site is expected to be 0.6 g.

Table 2 Fault Information

Fault Name	Fault Type	Distance to Site	Maximum Creditable Event (MCE)
Charnock Fault (CNK)	Strike-Slip	0.6 km Southwest	6.5
Newport-Inglewood-Rose Canyon Fault (NIE)	Strike-Slip	2.6 km Northeast	7.0

However based on Sadigh et al (1997), the estimated medium PBA of the site from CNK and NIE are 0.7g and 0.6g respectively. Based on the results of recent subsurface investigation, the soil profile can be defined as type D ($15 < N < 50$). Considering the near fault effect (Seismic Design Criteria 1.1, Caltrans, July 1999), the compound ARS curves based on both CNK and NIE were plotted in Figure 3 of the Attachment. The interception period (T_0) of two curves is about 0.24 seconds. That is:

- For the fundamental period of structure less than 0.24 seconds, ARS for CNK (MCE = 6.5, PBA = 0.7 g) will control;
- For the fundamental period higher than 0.24 seconds, modified ARS for NIE (MCE = 7.0, PBA = 0.6 g) will control the seismic design.

Liquefaction

The groundwater was measured at 3.5 m to 3.7 m above Mean Sea Level (MSL) based on the readings (3/13/2007 and 4/23/2007) from the piezometers installed at B-1, B-4, and B-6, which is above the bottom of proposed structural foundation. However, according to our subsurface exploration, foundation soils below the groundwater table are generally dense to very dense as interpreted from relatively high SPT N values. Therefore, the effects of potential liquefaction on the proposed structural foundations due to seismic event is negligible.

Seismic Induced Settlement

Seismic compaction under earthquake event is also negligible due to observed high soil density and relatively high fine content within foundation soils.

Ground Rupture

No active faults are known to transverse the project site, and the site is not located within currently designated Alquist-Priolo Earthquake Fault Zone. As such, ground rupture hazard will not be a consideration for the bridge design.

Scour Evaluation

Scour should not be of a concern for bridge foundation design, since the proposed bridge replacement is not located within flowing stream or unlined creek channel.

Subsurface Exploration

The subsurface exploration consisted of advancing test boreholes using mud rotary to depths of 16.0 m to 32.8 m below the existing grade at the locations tabulated on the table below. The boring plans are presented in Figures 4-1 and 4-2 of the Attachments.

Table 3. Summary of Soil Exploration Plan
(Sepulveda Blvd UC Widening, 07-LA-405-KP40.97, EA: 07-241301)

Bridge No.	Boring No.	Station	Offset (m)	Ground Elevatrion (m)	Borehole Depth (m)	Equipment / Exploration Method	Hammer Type/ Energy Efficiency
53-1253	B-1	410+05	57.0R	10.4	28.2	CME85 / Mud Rotary	Auto/0.87
	B-2	409+66	23.4R	17.5	32.8	CME85 / Mud rotary	Auto/0.87
	B-3	408+51	25.0R	18.6	16.0	CME85 / Mud Rotary	Auto/0.87

Drilling and Sampling

Standard penetration tests (SPT) were conducted in general accordance with ASTM D1586. Disturbed bulk samples were recovered for corrosion testing. Relatively undisturbed soil samples were sealed by plastic caps/tapes in brass rings to prevent moisture loss and transported to Caltrans' Soil Laboratory for testing.

Drilled holes were backfilled with on-site soil upon completion of sampling and testing. For the borings on highway and city streets, the drill holes were backfilled with onsite soil to 2.5 cm below pavement subgrade elevation, and then backfilled to pavement finished grade with tamped asphalt concrete cold patch.

Laboratory Test

Laboratory tests that include moisture-density determinations (California Test Method (CTM) 226), particle size analysis (CTM 203), direct-shear testing of undisturbed soil specimens (CTM 222), Atterberg limits (CTM204), and corrosion tests (CTM 417, 422, and 424) were performed. Some of the test results are summarized in Table 4 below.

Table 4. Summary of Laboratory Test Results
(Sepulveda Blvd UC Widening, 07-LA-405-KP40.97, EA: 07-241301)

Boring No.	Depth (m)	Group Symbol	Field Moisture Content (%)	Dry Unit Weight (kN/M3)	Direct Shear Test		Atterberg Limits (LL/PI)	Other Field Test	
					ϕ (Degree)	c (kPa)		PP# (tsf)	SPT
B-1	3.6-3.8	SP	10.5	15.6	36.9	33.3	N/A	N/A	N/A
	12.7-12.9	SM	21.0	16.4	36.8	87.1	N/A	N/A	N/A
B-3	11.1-11.4	CL	13.8	19.0	30.4	53.1	N/A	N/A	N/A
	11.3-12.5	CL	N/A	N/A	N/A	N/A	27/13	2.5	N/A
	14.0-14.6	CL	N/A	N/A	N/A	N/A	28/12	2.5	N/A
	14.6-15.2	CL	N/A	N/A	N/A	N/A	32/17	2.5	N/A

Corrosion Test

For corrosion evaluation, bulk samples were recovered from selected boreholes and tested for pH value, and minimum electrical resistivity. The tests for sulfate and chloride are usually not conducted unless the resistivity of the sample soil is 1000 Ohm-cm or less. Where resistivity is greater than 1000 Ohm-cm, the soil is considered not corrosive.

According to the test results, the subsurface soil for the proposed bridge widening is considered non-corrosive. The corrosion test results are summarized in the following table (Table 4).

Table 5. Corrosion Test Results

Boring Number	Depth of Sample (m)	pH	Soluble Sulfates	Soluble Chlorides	Minimum Resistivity
B-2	12.5 - 12.8	7.58	N/A	N/A	2000 ohm-cm
B-2	17.7 - 20.1	6.10	N/A	N/A	1500 ohm-cm
B-3	3.4 - 9.1	8.11	N/A	N/A	2300 ohm-cm
B-3	9.5 - 11.0	6.98	N/A	N/A	2100 ohm-cm
Caltrans Criteria for Non-corrosive Area		> 5.5	< 2000 PPM	< 500 PPM	> 1000 Ohm-cm

Subsurface Condition

The subsurface materials below the natural grade are mostly composed of medium dense to very dense sand, silty sand, and sandy silt with scattered interbeds of lean clay within the upper 8 m of the native soils. The materials for embankment fill generally consists of medium dense to dense sand, silty sand and clayey sand with 0.6 m thick stiff lean clay layer from 1.8 to 2.4 m below the existing pavement grade.

Subsurface condition for structural foundation was summarized in Tables 6 below.

Table 6. Subsurface Information for Sepulveda Blvd UC (BR53-1254)

Reference Boring	B-1		Boring Location		Stationing	410+05	Elevation (m)	10.4
					Offset (m)	57.0 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0	4.6	10.4	5.8	Poorly Graded SAND (SP). Medium dense			
2	4.6	5.8	5.8	4.6	Silty SAND (SM), Medium Dense			
3	5.8	9.5	4.6	0.9	Poorly Graded SAND (SP). Medium dense to dense			
4	7.9	9.5	2.5	0.9	SILT with Sand (ML). Dense			
5	9.5	10.4	0.9	0	Well graded SAND (SW). Very Dense			
6	10.4	28.2	0	-17.8	Silty SAND (SM), Very Dense			

Reference Boring	B-2		Boring Location		Stationing	409+66	Elevation (m)	17.5
					Offset (m)	23.4 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.2	1.8	17.3	15.7	Silty SAND (SM), Medium dense			
2	1.8	2.4	15.7	15.1	Sandy Lean CLAY (CL), Hard			
3	2.4	4.0	15.1	13.5	Clayey SAND (SC), Medium dense			
4	4.0	6.7	13.5	10.8	Poorly Graded SAND with Clay (SP-SC). Medium dense			
5	6.7	11.0	10.8	6.5	Silty SAND (SM), Medium dense to dense			
6	11.0	15.9	6.5	1.6	Sandy SILT (ML), Dense			
7	15.9	20.0	1.6	-2.5	Poorly graded SAND (SP). Very dense.			
8	20.0	21.6	-2.5	-4.1	Well graded SAND (SW). Very Dense			
9	21.6	32.8	-4.1	-15.3	Silty SAND (SM), Very dense			

Table 6 continued …

Reference Boring	B-3		Boring Location		Stationing	408+51	Elevation (m)	18.6
					Offset (m)	25.0 Right		
Soil Layer No.	Depth (m)		Elevation (m)		Soil Profile			
	from	to	from	to				
1	0.2	1.8	18.4	16.8	Silty SAND (SM). Loose			
2	1.8	2.3	16.8	16.3	Sandy Lean CLAY (CL), Stiff			
3	2.3	9.1	16.3	9.5	Silty SAND (SM). Dense			
4	9.1	10.1	9.5	8.5	Poorly Graded SAND (SP), Medium Dense			
5	10.1	12.5	8.5	6.1	Sandy Lean CLAY (CL), Very Stiff			
6	12.5	14.0	6.1	4.6	Silty SAND (SM). Medium dense			
7	14.0	15.2	4.6	3.4	Sandy Lean CLAY (CL), Very Stiff			
8	15.2	16.0	3.4	2.6	Silty SAND with Clay (SM-SC), Medium dense			

* Groundwater is at 3.7 m above Mean Sea Level according to the well readings at B-1 (3/13/07, 4/23/07)

Shaded area indicates embankment fill materials

Foundation Design

Axial Pile Capacity

Cast-in-drilled-hole (CIDH) piles are suggested as structural foundation of the proposed bridge replacement. The design of CIDH piles has been performed on the basis of shaft friction, neglecting the end bearing. The pile ultimate friction capacities were obtained using the procedures outlined by Reese and O'Neil (1988).

Long term settlement will not be a concern for the widened portion of the bridge foundation. The immediate settlement for individual piles and pile group under the service load is expected to be less than 25 mm.

Pile Lateral Analysis at Bents

The lateral analysis was performed using LPILE PLUS 5.0 for the 1.5 m diameter CIDH piles at Bents 2 to 4 of Sepulveda Ave UC (widen). Based on the pile dimension and soil profiles, the p-y curves were obtained, and presented in the Attachments of this memo.

Geotechnical Recommendations

1) Based on the subsurface exploration, The Soil Profile Type for the subject bridge should be classified as Type D. The recommended ARS Curve is shown in Figure 3 of the Attachments.

2) The foundation soils for the bridge are classified as non-corrosive to reinforced concrete according to the corrosion test results of selected soil samples from the field.

3) CIDH piles were recommended for the bridge foundation. Due to the high groundwater table, wet method may be used for pile installation, which requires a minimum pile diameter of 0.6 m. Table 7 summarized the suggested pile tip elevation based on the design load for the abutment and required nominal resistance for the bents.

Table 7 Pile Data Table for Sepulved Blvd UC Widening (53-1254)

Location	CIDH Pile Diameter	Design Load	Nominal Resistance		Finished Grade (m)	Cut-Off Elevation (m)	Design Tip Elevation* (m)	Specified Tip Elevation (m)
			Compression	Tension				
Bent 2	1500 mm	N/A	5250kN	N/A	10.30	5.50	-12.50** (1)	-12.50
Bent 3	1500 mm	N/A	5250 kN	N/A	10.50	5.50	-12.50** (1)	-12.50
Bent 4	1500 mm	N/A	5250 kN	N/A	10.20	5.50	-12.50** (1)	-12.50
Abut 1	600 mm	750 kN	1500 kN	N/A	14.80	13.15	0.65 (1)	0.65

Note: *Design tip elevations are controlled by the following demands: (1) Compression; (2) Tension.
** Permanent casings will be used from Bents 2 to 4, with the bottom of casing at elev. 0.77 m. The annular void between casing and foundation soils will be post grouted. No friction contribution is assumed in determining pile tip elevation.

Construction Considerations

1) The groundwater was measured at 3.7 m above Mean Sea Level based on the readings from the piezometers installed at B-1, which is above the proposed structural foundations. Wet (drilling slurry) method should be used wherever groundwater is encountered to stabilize the drilled hole during pile installation. In addition, the contractor should have temporary casing on-site, and have readily available equipment and techniques to remedy soil cave-in, according to Section 49-4.03 of *Standard Specification (July 1999)*.

2) Temporary casing, if used, must be removed during CIDH pile installation. Oscillating and spinning temporary casing will potentially reduce pile skin friction. Should the above method be used for casing installation, this office must be notified to provide further recommendations.

3) Pile construction sequence is important for pile groups with center-to-center (CTC) spacing equal to or less than three times of pile diameter. Construction of adjacent piles should be performed only after the Portland cement concrete of the previously installed piles properly set and developed adequate strength.

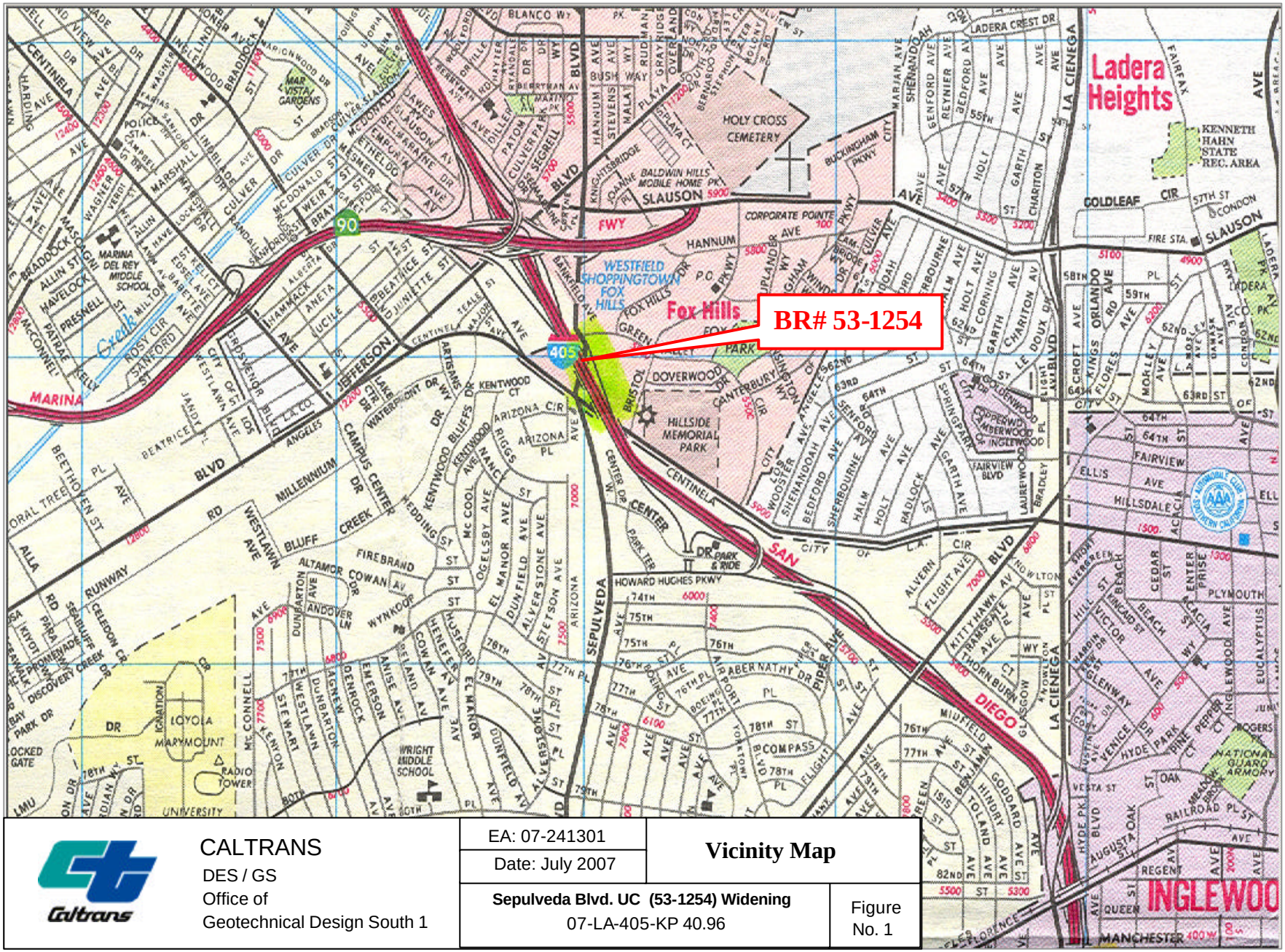
If you have any question, please contact Haitao Liu at (916) 227-0992.

Prepared by: Date: 6/23/2009

Haitao Liu, P.E. C66398
Transportation Engineer, Civil
Branch A / OGDS-1

Cc: OGDS1 - Sacramento
OGDS1 – L.A.
GS - File Room
Deh-Jeng Jang (OGDS-1)

ATTACHMENTS



CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Vicinity Map**	
	Sepulveda Blvd. UC (53-1254) Widening 07-LA-405-KP 40.96		Figure No. 1

CALTRANS DES / GS Office of Geotechnical Design South 1	EA: 07-241301 Date: July 2007	**Geologic Map**	
	Sepulveda Blvd UC (53-1254) Widening 07-LA-405-KP40.97		Figure No. 2

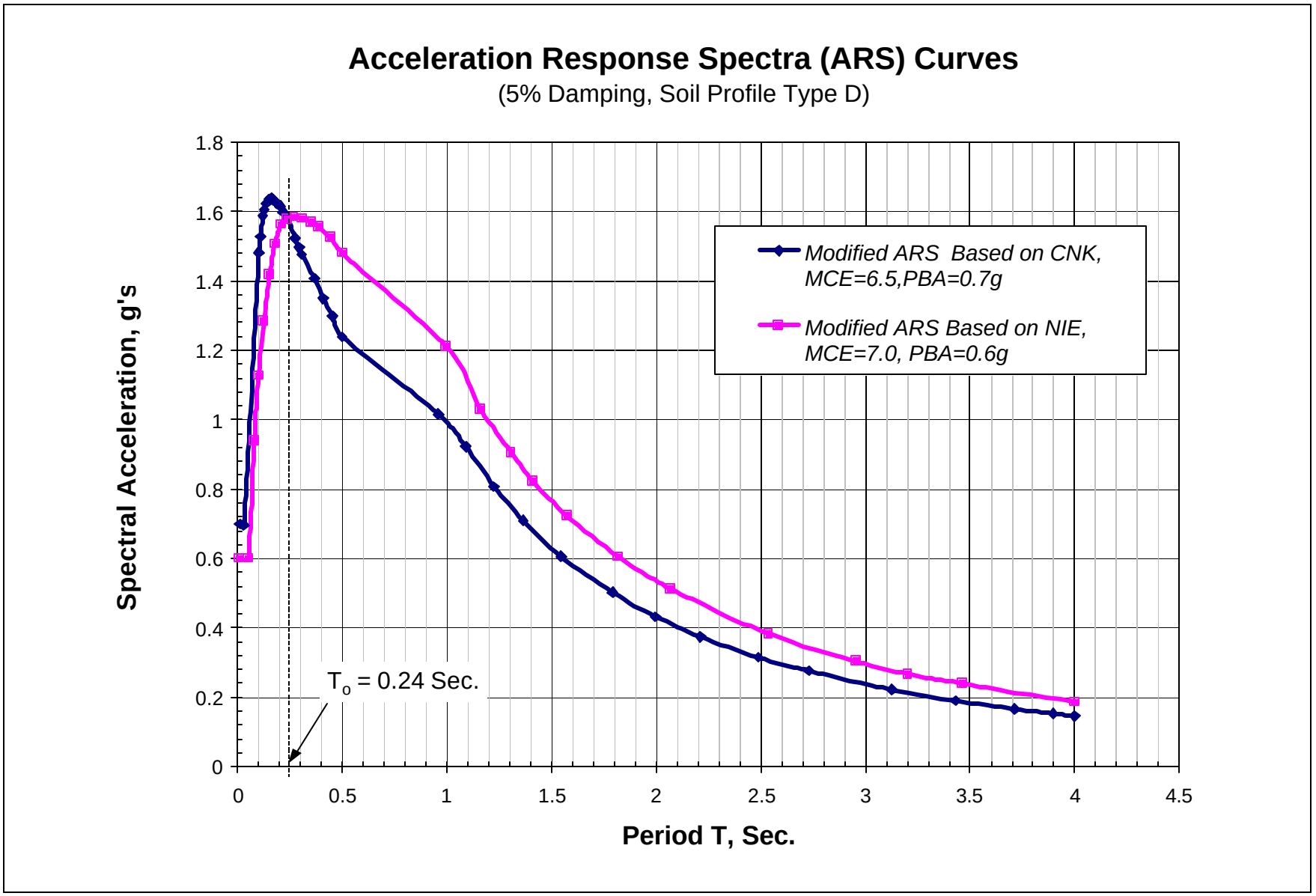


Figure 3: Recommended Acceleration Response Spectra (ARS) Curve

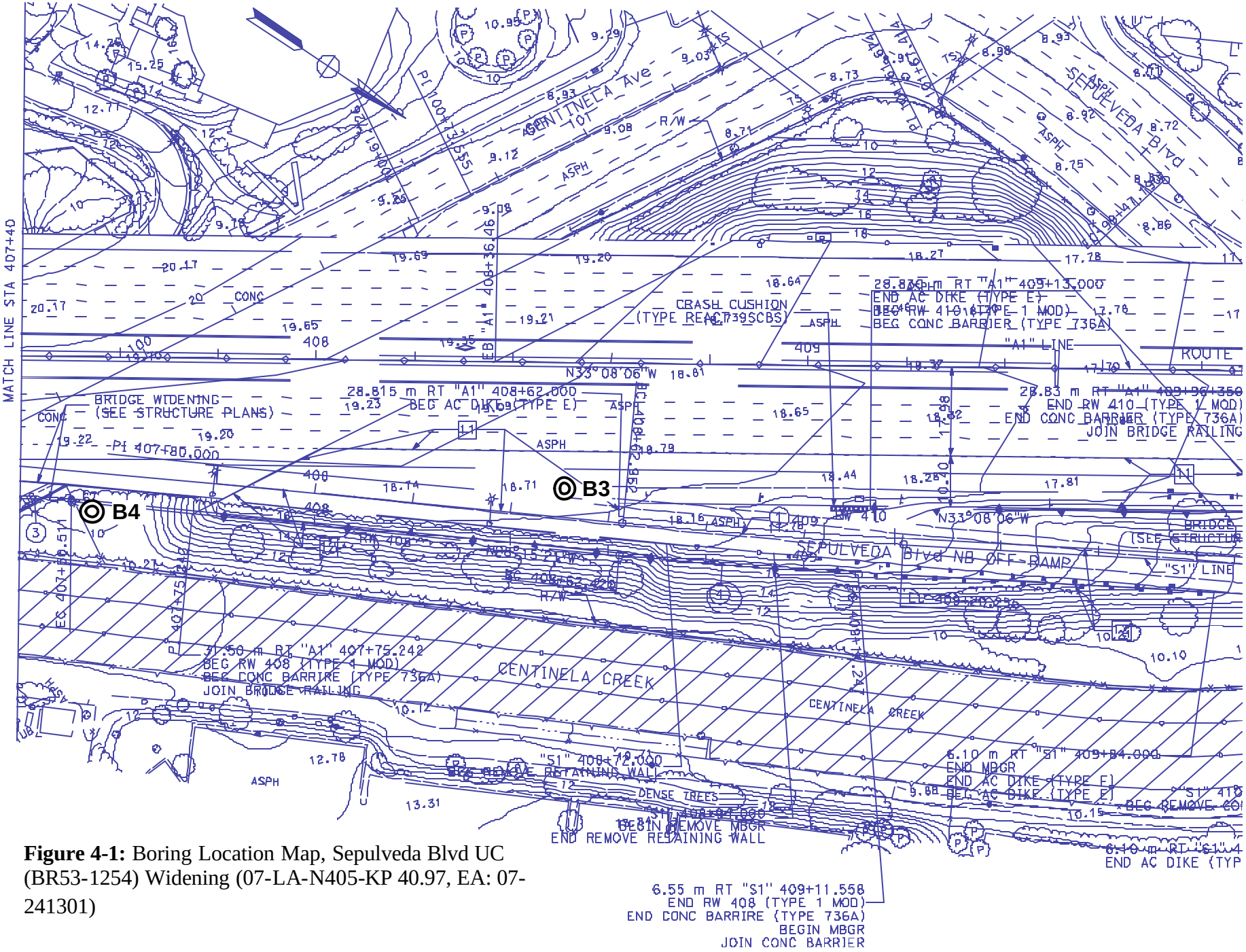


Figure 4-1: Boring Location Map, Sepulveda Blvd UC (BR53-1254) Widening (07-LA-N405-KP 40.97, EA: 07-241301)

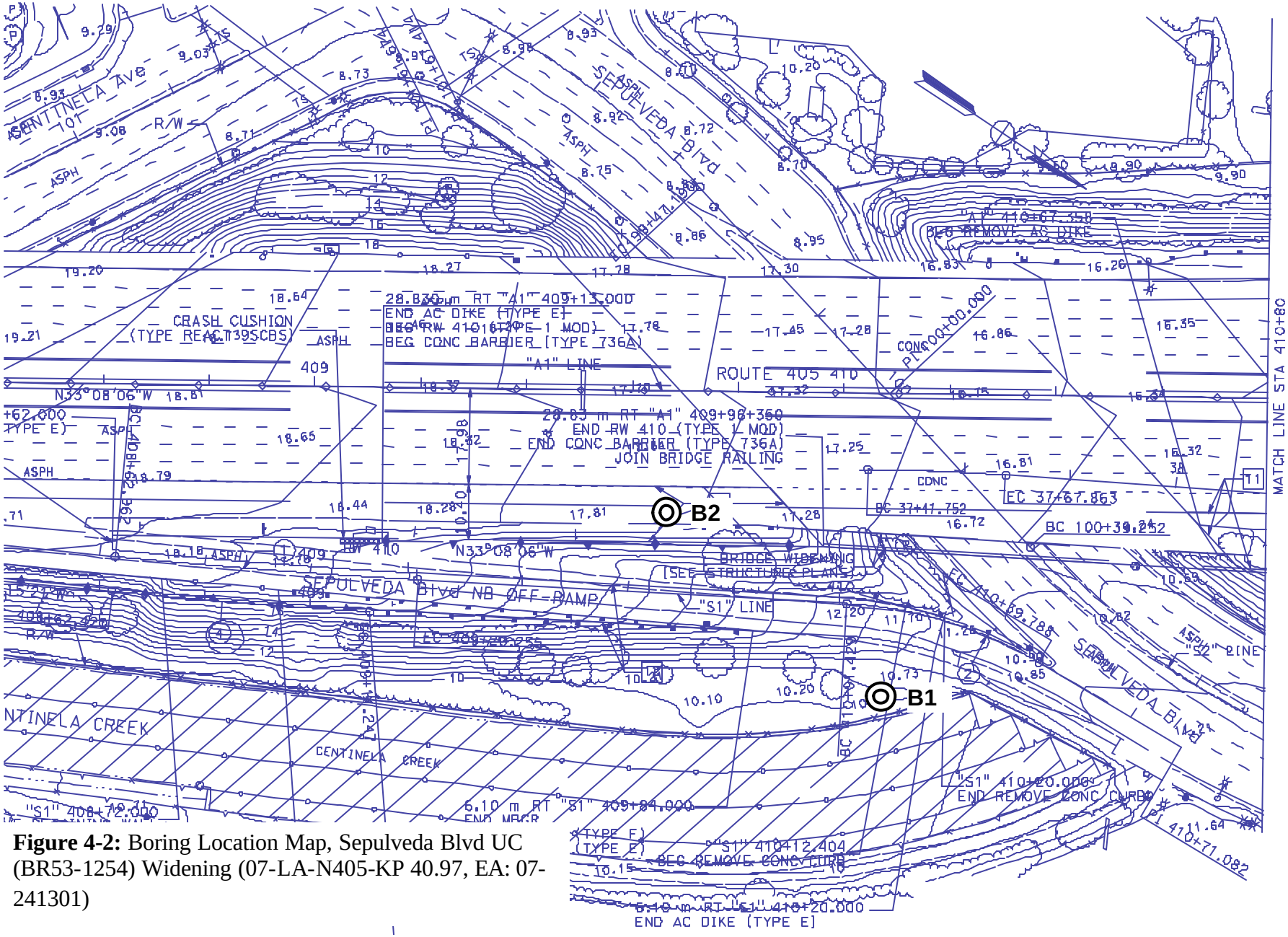
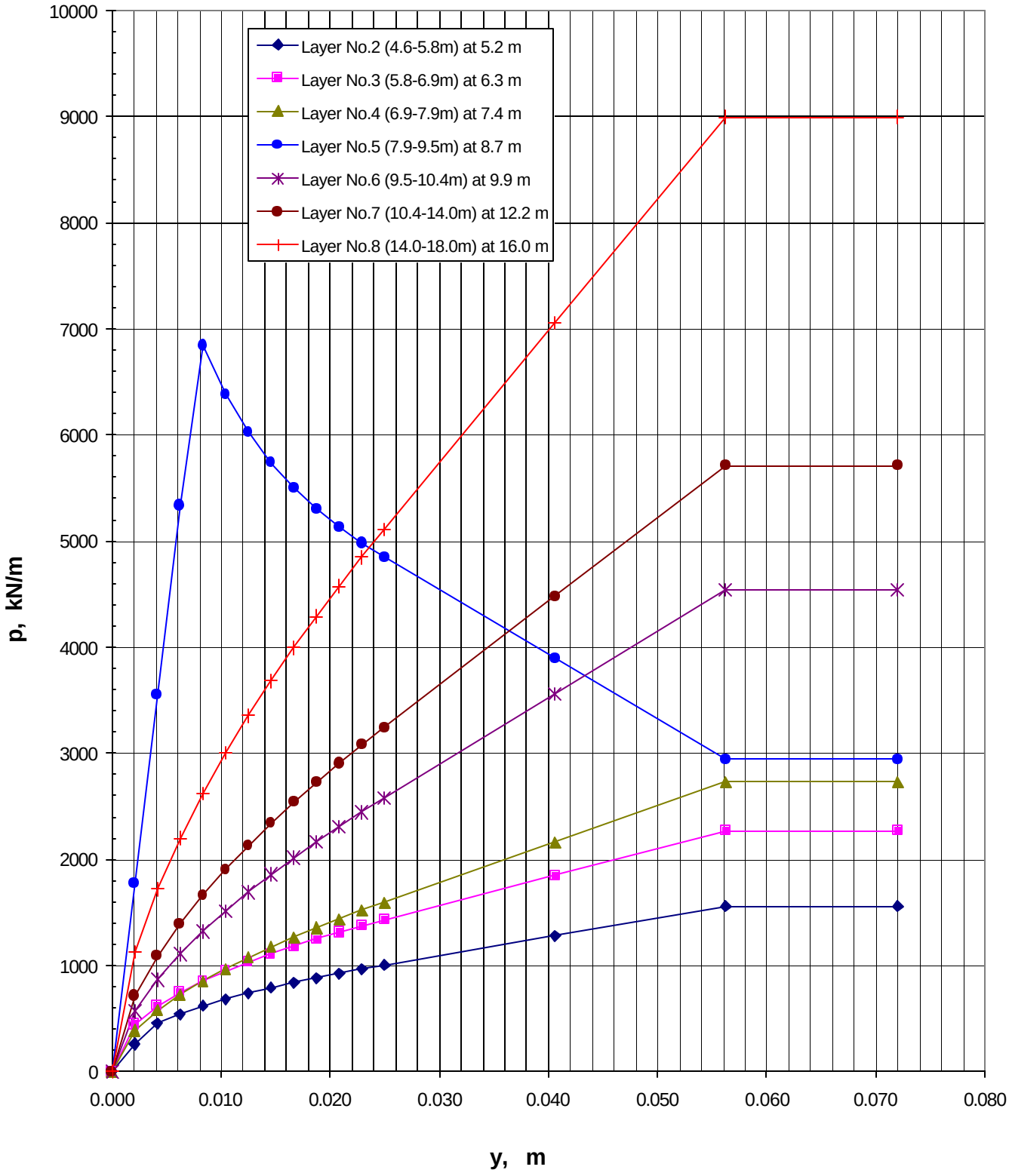


Figure 4-2: Boring Location Map, Sepulveda Blvd UC (BR53-1254) Widening (07-LA-N405-KP 40.97, EA: 07-241301)

P-y Curves for 1500 mm CIDH Piles (Single) at Bents 2, 3, and 4

Sepulveda Blvd. UC (53-1254) Widening



INFORMATION HANDOUT

BATTERY BACKUP SYSTEM CONNECTION DIAGRAMS AND FOUNDATION DETAILS

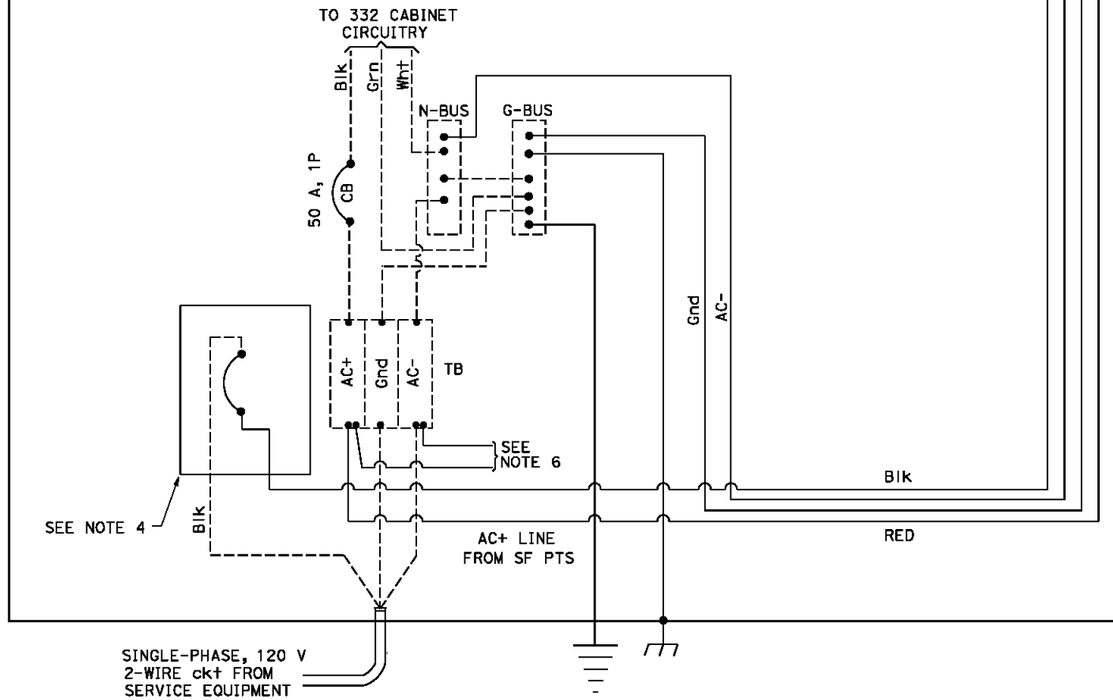
EA 07-241301

LEGEND: (THIS SHEET ONLY)

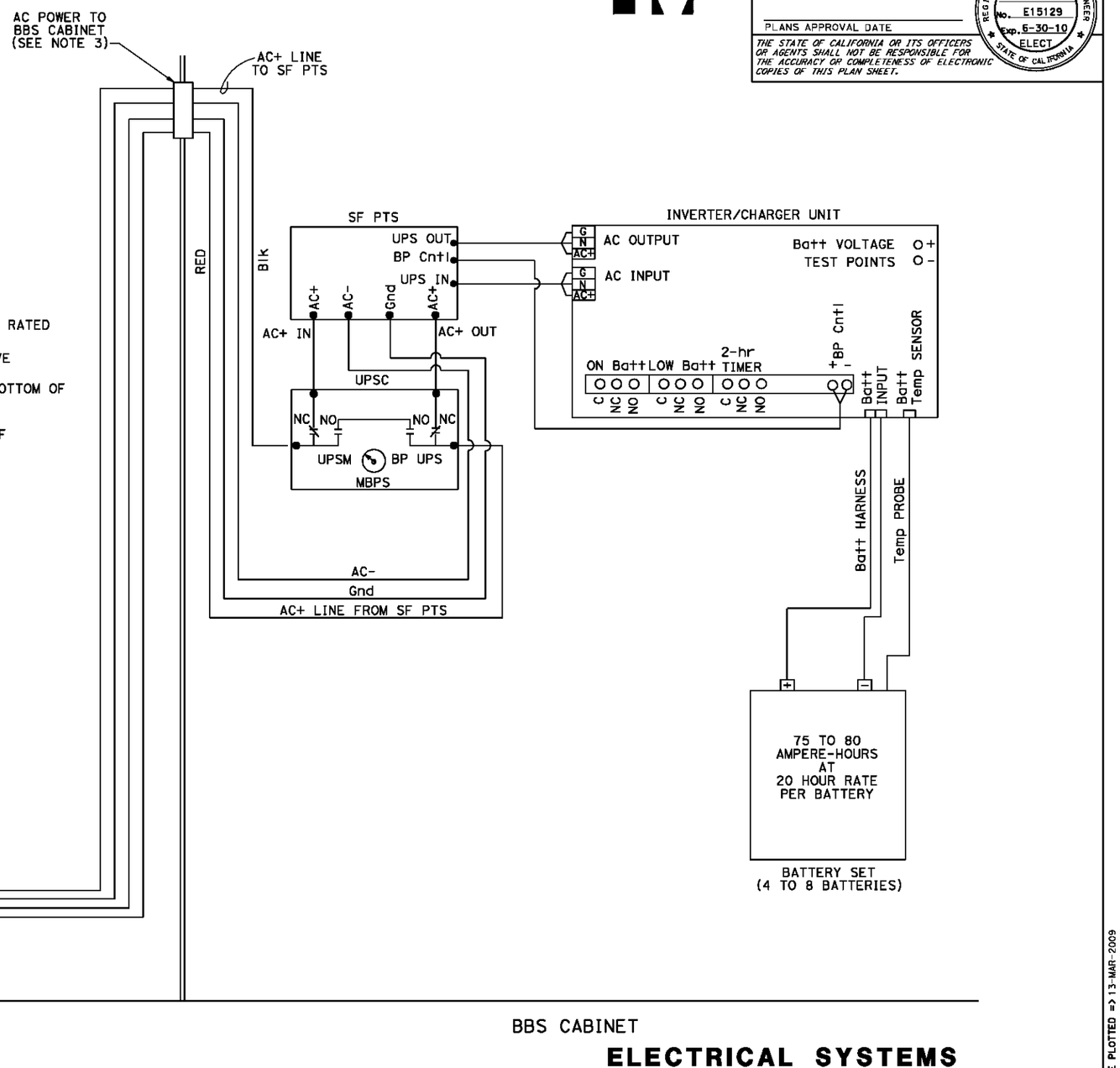
PTS = POWER TRANSFER SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM = UPS MODE
BP = BYPASS
MBPS = MANUAL BYPASS SWITCH
AC+ = UNGROUNDED CONDUCTOR
AC- = GROUNDED CONDUCTOR
C = COMMON
Grn = GREEN
Blk = BLACK
Wht = WHITE
SF = STATE-FURNISHED
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND
Temp = TEMPERATURE
Batt = BATTERY

NOTES: (THIS SHEET ONLY)

1. TYPE A REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER A.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OF THE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.



332 CONTROLLER CABINET



BBS CABINET

ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-1)

NO SCALE

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT
REGISTERED PROFESSIONAL ENGINEER 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.

Caltrans Metric

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 2-2-09
DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:05

BORDER LAST REVISED 3/1/2007
RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80
USERNAME => trcarol
DGN FILE => BBS 1250FSM metric.dgn
CU 00000
EA 000000

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

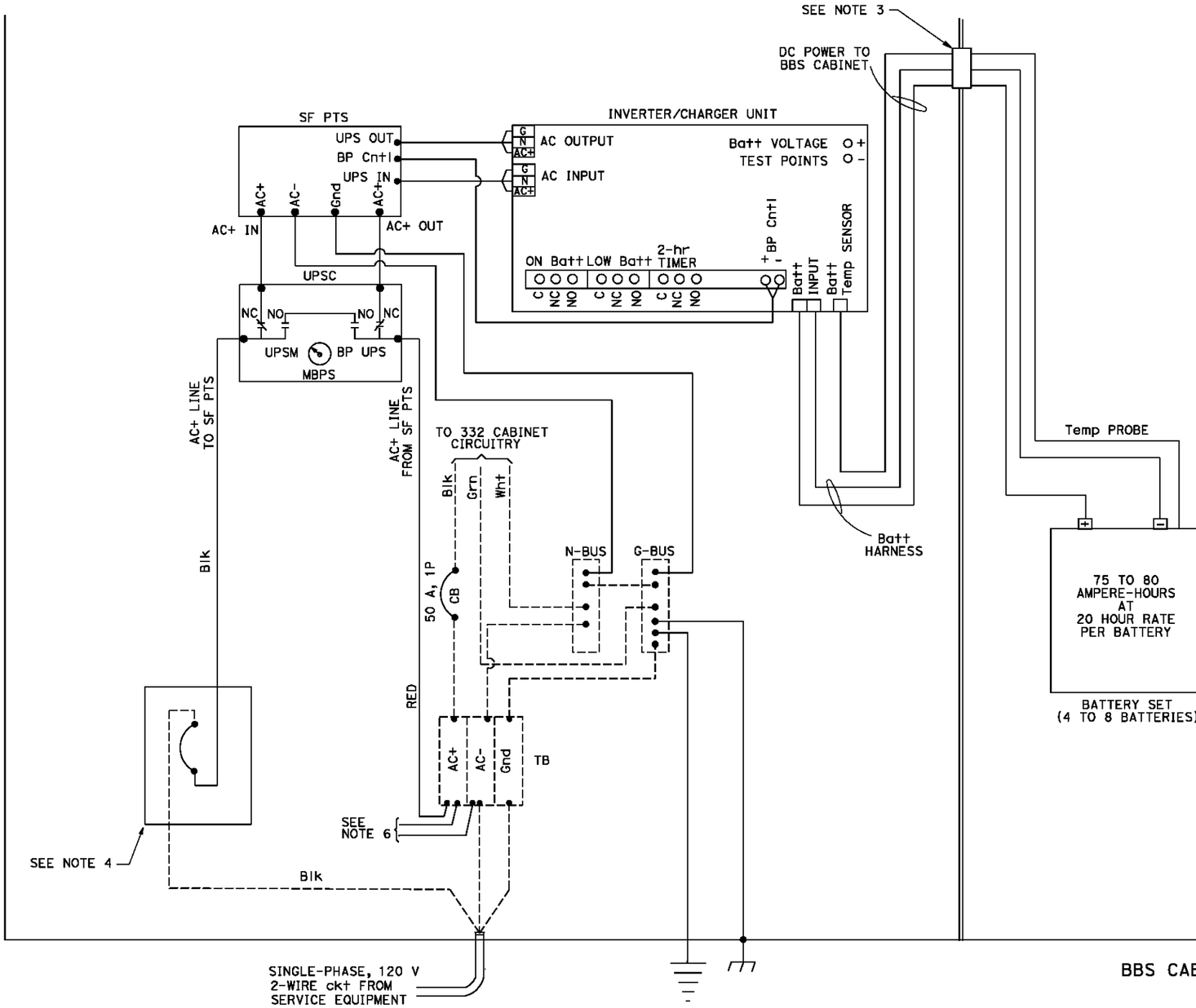
Caltrans Metric

Theresa Gabriel 12-20-07
REGISTERED ELECTRICAL ENGINEER DATE

Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT
REGISTERED PROFESSIONAL ENGINEER 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.



LEGEND: (THIS SHEET ONLY)

PTS = POWER TRANSFER SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM = UPS MODE
BP = BYPASS
MBPS = MANUAL BYPASS SWITCH
AC+ = UNGROUNDED CONDUCTOR
AC- = GROUNDED CONDUCTOR
C = COMMON
Grn = GREEN
Blk = BLACK
Wht = WHITE
SF = STATE-FURNISHED
Batt = BATTERY
Temp = TEMPERATURE
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND

NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-2 REFERS TO THE SITUATION WHEN ONLY THE BATTERIES ARE INSTALLED IN THE BBS CABINET. THE REMAINING EQUIPMENT IS PLACED IN THE 332 CONTROLLER CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OFTHE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.

ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-2)

NO SCALE

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY
CHECKED BY
FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 2-2-09
DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:06

BORDER LAST REVISED 3/1/2007
RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80
USERNAME => trcarol
DGN FILE => BBS 1250FSP metric.dgn
CU 00000
EA 000000

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED ELECT ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT STATE OF CALIFORNIA

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.

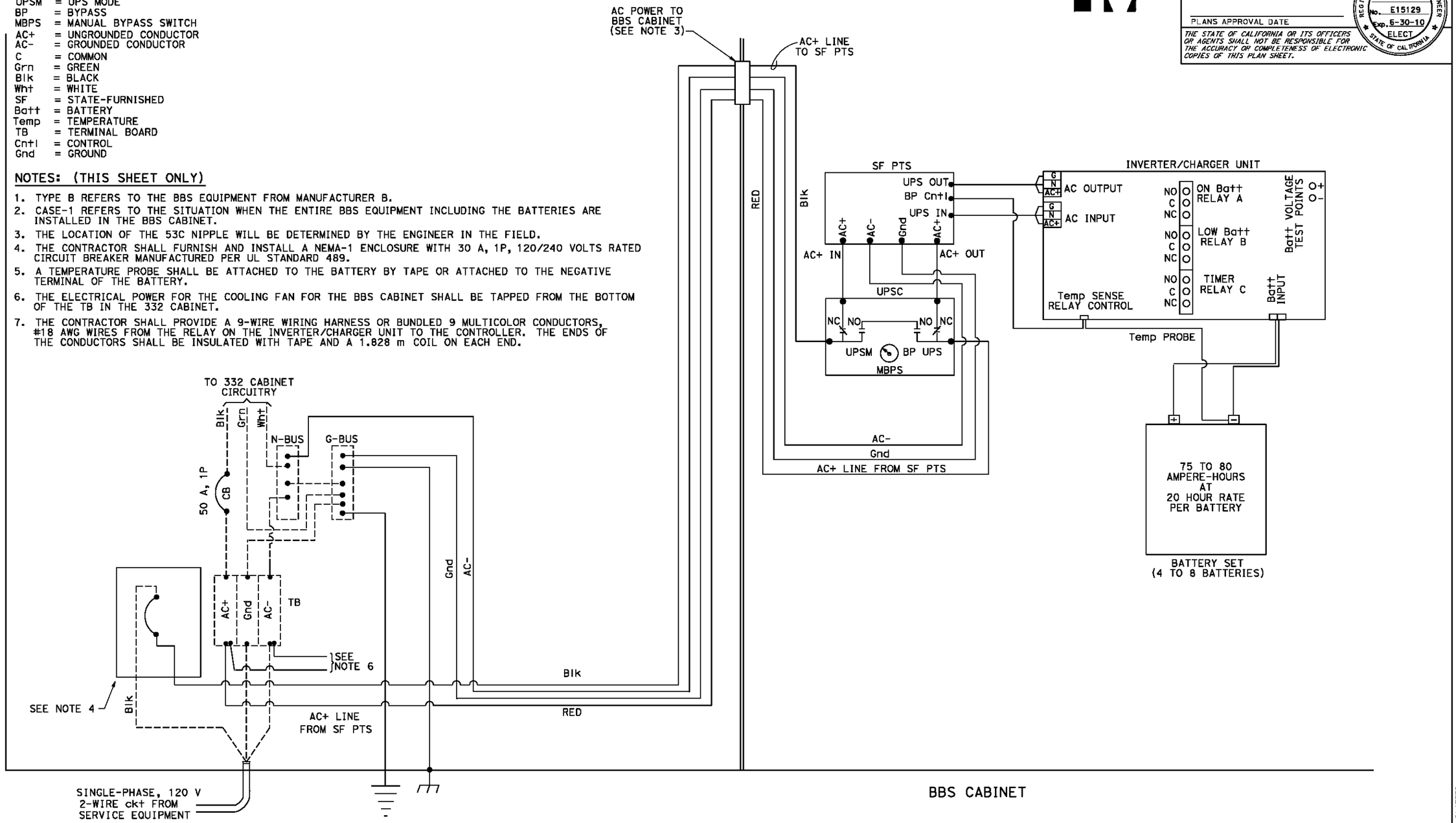
Caltrans Metric

LEGEND: (THIS SHEET ONLY)

PTS = POWER TRANSFER SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM = UPS MODE
BP = BYPASS
MBPS = MANUAL BYPASS SWITCH
AC+ = UNGROUNDED CONDUCTOR
AC- = GROUNDED CONDUCTOR
C = COMMON
Grn = GREEN
Blk = BLACK
Wht = WHITE
SF = STATE-FURNISHED
Batt = BATTERY
Temp = TEMPERATURE
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND

NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OF THE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.



ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-1)

NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

LAST REVISION 2-2-09
DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:07

BORDER LAST REVISED 3/1/2007
RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80
USERNAME => trcarol
DGN FILE => BBS DUIFSM metric.dgn
CU 00000
EA 000000

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

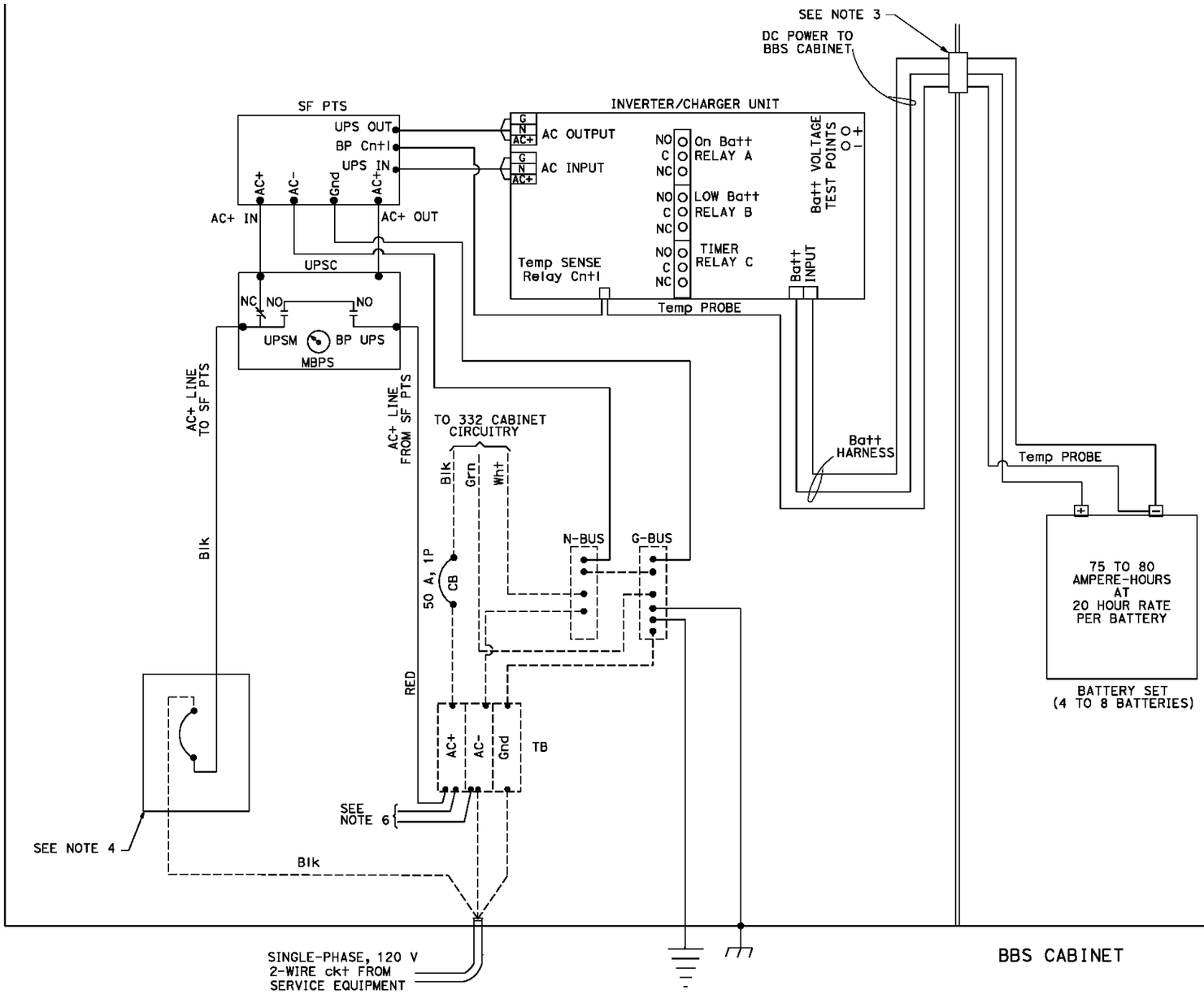
Caltrans Metric

Theresa Gabriel — REGISTERED ELECTRICAL ENGINEER — 12-20-07 DATE

Theresa A. Gabriel, No. E15129, exp. 6-30-10, ELECT — REGISTERED PROFESSIONAL ENGINEER — 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.



LEGEND: (THIS SHEET ONLY)

PTS = POWER TRANSFER SWITCH
UPS = UNINTERRUPTIBLE POWER SUPPLY
UPSC = UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM = UPS MODE
BP = BYPASS
MBPS = MANUAL BYPASS SWITCH
AC+ = UNGROUNDED CONDUCTOR
AC- = GROUNDED CONDUCTOR
C = COMMON
Grn = GREEN
Blk = BLACK
Wht = WHITE
SF = STATE-FURNISHED
Batt = BATTERY
Temp = TEMPERATURE
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND

NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-2 REFERS TO THE SITUATION WHEN ONLY THE BATTERIES ARE INSTALLED IN THE BBS CABINET. THE REMAINING EQUIPMENT IS PLACED IN THE 332 CONTROLLER CABINET.
3. THE LOCATION OF THE 53C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OFTHE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A 1.828 m COIL ON EACH END.

ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-2)

NO SCALE

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 2-2-09
DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:09

Dist	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS

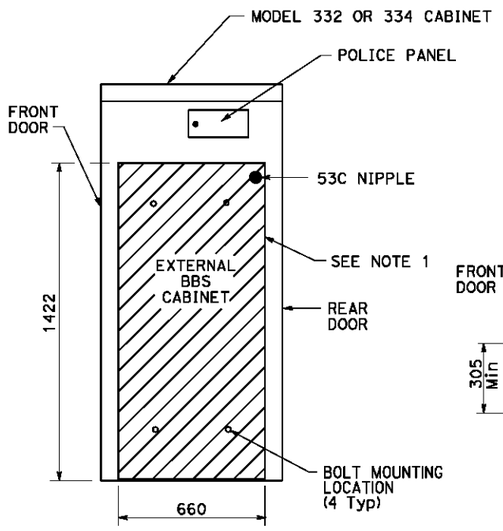
Caltrans Metric

Theresa Gabriel 12-20-07
REGISTERED ELECT. ENGINEER DATE

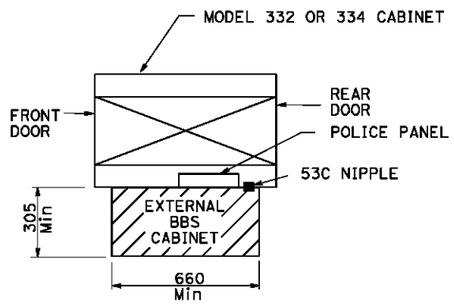
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Theresa A. Gabriel — No. E15129 — Exp. 6-30-10 ELECT — STATE OF CALIFORNIA

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.



SIDE VIEW

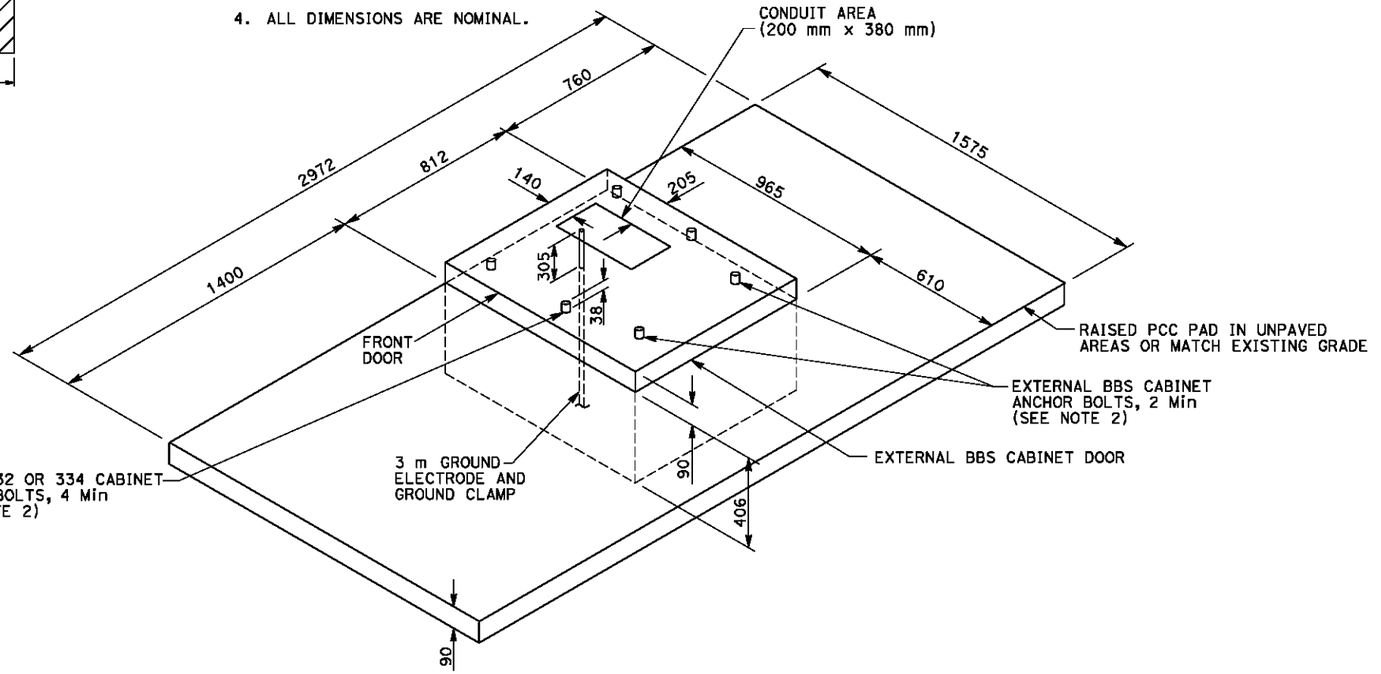


TOP VIEW

EXTERNAL BBS CABINET MOUNTED TO THE MODEL 332 OR 334 CABINET

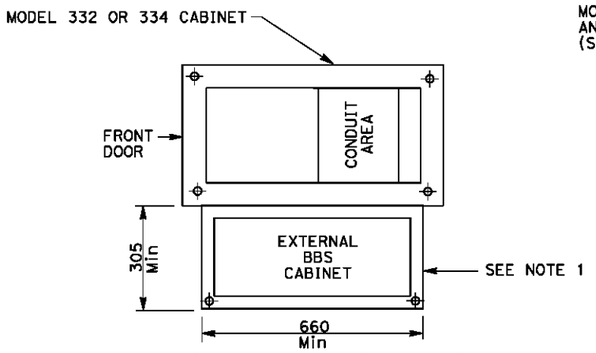
NOTE: (THIS SHEET ONLY)

1. THE EXTERNAL BBS CABINET SHALL BE MOUNTED TO THE MODEL 332 OR 334 CABINET WITH FOUR 18-8 STAINLESS STEEL HEX HEAD, FULLY-THREADED, 9.5 mm-16 X 25.4 mm BOLTS; TWO WASHERS PER BOLT, DESIGNED FOR 9.5 mm BOLTS AND ARE 18-8 STAINLESS STEEL, 25.4 mm OUTSIDE DIAMETER, ROUND, AND FLAT; AND ONE K-LOCK NUT PER BOLT, THAT IS 18-8 STAINLESS STEEL AND A HEX-NUT. THE ENGINEER WILL HAVE TO APPROVE THE BOLT MOUNTING LOCATION PRIOR TO INSTALLATION.
2. THE ANCHOR BOLTS SHALL BE 19 mm Dia X 380 mm WITH A 50 mm-90° BEND. THE CABINET MANUFACTURER'S SPECIFICATION SHALL DETERMINE THE LOCATION OF THE ANCHOR BOLTS IN THE FOUNDATION. THE ENGINEER WILL HAVE TO APPROVE ANCHOR BOLTS AND ITS LOCATION IN THE FOUNDATION PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL VERIFY THE DIMENSIONS OF THE BBS CABINET PRIOR TO CONSTRUCTING THE FOUNDATION OF THE MODIFIED PORTION OF THE Std MODEL 332 AND 334 CABINET FOUNDATION. THE ENGINEER WILL HAVE TO APPROVE ANY NECESSARY DEVIATIONS PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS ARE NOMINAL.



MODIFIED MODEL 332 AND 334 CABINET FOUNDATION DETAIL FOR BATTERY BACKUP SYSTEM (BBS)

(FOR DIMENSIONS AND DETAILS NOT SHOWN AND ADDITIONAL NOTES, SEE SHEET ES-3C OF THE STANDARDS PLANS FOR MODEL 332 AND 334 CABINETS)



BASE PLAN FOR BBS MOUNTED TO THE MODEL 332 OR 334 CABINET

(FOR DIMENSIONS AND DETAILS NOT SHOWN, SEE SHEET A6-1 TO A6-4, CABINET HOUSING DETAILS OF THE TRANSPORTATION ELECTRICAL EQUIPMENT SPECIFICATION (TEES))

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

ELECTRICAL SYSTEMS (BBS FOUNDATION DETAILS)

NO SCALE

THIS PLAN IS ACCURATE FOR ELECTRICAL WORK ONLY.

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
FUNCTIONAL SUPERVISOR
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 2-2-09 | DATE PLOTTED => 13-MAR-2009 | TIME PLOTTED => 09:10

BORDER LAST REVISED 3/1/2007 | RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80 | USERNAME => trcarol | DGN FILE => BBS Foundation metric.dgn | CU 00000 | EA 000000