



Section # Page #	Description
Entire Document	Updated font to Arial
Preface Page i	Deleted signature and acknowledgments
Section 1 Page 1	Remove items found elsewhere in Geotechnical Manual such as Exceptions and Quality Assurance
Section 1.3 Page 1	Modify 1 st sentence of 2 nd paragraph to read: An LOTB is typically associated with a structure, is part of the Project Plans, and has an accompanying Test Boring Layout sheet that presents location information of the test borings in a plan view.
Figure 2-3 Page 6	Item 4 is amended to read: Borehole Location and Elevation: <ul style="list-style-type: none">• Location:<ul style="list-style-type: none">○ Physical location of the boring relative to a fixed object(s) must be measured and recorded such as light fixture, drainage inlet, begin or end bridge (required)○ Station and offset (if available)○ Northing and Easting, local coordinate reference system (required for LOTB and/or BR)• Elevation, vertical datum, benchmark location and description• Method(s) used for horizontal (e.g., steel tape, measuring wheel, range finder) and vertical (level survey, hand level) measurement
Figure 2-3 Page 6	Item 6 is amended to include: <ul style="list-style-type: none">• Bearing and degrees of inclination from horizontal (for horizontal borings only)
Figure 2-3 Page 6	Item 8, <i>Hole Completion</i> , 2 nd bullet is amended to read: <ul style="list-style-type: none">• <i>Sealing Method (e.g., grout, dry bentonite chips)</i>
Figure 2-3 Page 6	Add new: <ul style="list-style-type: none">• Part 9, "<i>Instrumentation Installed</i>"
Entire Document	Ensured ASTM tests were properly formatted "ASTM D1587"



Section # Page #	Description
Section 2.5.1 Page 7	Last complete soil descriptive sequence changed for clarity
Page 9	<p>Add new:</p> <p>Section 2.5.1.3, "Description of Isolated Interbeds/layer"</p> <p><i>For small, isolated layers or interbeds, it is acceptable to call out the isolated layer without having to create a new layer as long as the following conditions are met: (1) the isolated layer must be 2 feet thick or less, and (2) the isolated layer must be described completely per Sec. 2.5.1, and (3) predominant soil description above and below the isolated layer are the same.</i></p> <p><i>Poorly Graded SAND (SP); dense; brown; moist; fine sand.</i></p> <p><i>6-inch thick interbed of Fat Clay (CH); very stiff; black; moist; PP=3 tsf.</i></p>
Section 2.5.1.3 Page 9	<p>Amend description to:</p> <p style="padding-left: 40px;"><i>Poorly graded SAND (SP); dense; brown; moist; fine sand.</i></p> <p style="padding-left: 40px;"><i>6" thick interbed of fat CLAY (CH); very stiff; black; moist; PP=3.0 tsf</i></p>
Page 9	Change 2.5.1.3 Description of Fills to 2.5.1.4
Section 2.5.2 Page 10	<p>The 2nd paragraph is amended to read:</p> <p><i>The ASTM procedure for identifying and describing fine-grained and coarse-grained soil is only applicable to material passing the 3-inch sieve. The percentage(s) of cobbles and/or boulders (if encountered) must be reported per Section 2.5.17 and the group name must be modified accordingly.</i></p>
Section 2.5.2 Page 10	<p>The text is modified as follows:</p> <p><i>The group name for a soil with a borderline symbol must be the group name for the first symbol. except for:</i></p> <ul style="list-style-type: none"> <i>• CL/CH lean to fat CLAY</i> <i>• ML/CL CLAYEY SILT, and</i> <i>• CL/ML SILTY CLAY"</i>



Section # Page #	Description																											
Sec. 2.5.2 Page 10	<p>Dual Symbol is modified as follows:</p> <p><i>A dual symbol is two symbols separated by a hyphen, e.g., GP-GM, SW-SC, GW-GC. They are used to indicate that a soil has about 10% fines.</i></p>																											
Figure 2-13 Page 16	<p>The figure is amended to read:</p> <p>Percent or Proportion of Soil, Pp</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">Description</th> <th style="text-align: left;">Criteria</th> </tr> </thead> <tbody> <tr> <td><i>Trace</i></td> <td><i>Particles are present but estimated to be less than 5%</i></td> </tr> <tr> <td><i>Few</i></td> <td><i>5 - 10%</i></td> </tr> <tr> <td><i>Little</i></td> <td><i>15 - 25%</i></td> </tr> <tr> <td><i>Some</i></td> <td><i>30 - 45%</i></td> </tr> <tr> <td><i>Mostly</i></td> <td><i>50 - 100%</i></td> </tr> </tbody> </table>	Description	Criteria	<i>Trace</i>	<i>Particles are present but estimated to be less than 5%</i>	<i>Few</i>	<i>5 - 10%</i>	<i>Little</i>	<i>15 - 25%</i>	<i>Some</i>	<i>30 - 45%</i>	<i>Mostly</i>	<i>50 - 100%</i>															
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Figure 2-14 Page 16	<p>The figure is amended to read:</p> <p>Particle Size, Ps</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">Description</th> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Approximate Particle Size (in)</th> </tr> </thead> <tbody> <tr> <td><i>Boulder</i></td> <td><i>Greater than 12 in.</i></td> <td><i>12 < Ps</i></td> </tr> <tr> <td><i>Cobble</i></td> <td><i>3 - 12 in.</i></td> <td><i>3 < Ps ≤ 12</i></td> </tr> <tr> <td><i>Coarse Gravel</i></td> <td><i>3/4 - 3 in.</i></td> <td><i>3/4 < Ps ≤ 3</i></td> </tr> <tr> <td><i>Fine Gravel</i></td> <td><i>No. 4 - 3/4 in.</i></td> <td><i>1/5 < Ps ≤ 3/4</i></td> </tr> <tr> <td><i>Coarse Sand</i></td> <td><i>No. 10 - No. 4</i></td> <td><i>1/16 < Ps ≤ 1/5</i></td> </tr> <tr> <td><i>Medium Sand</i></td> <td><i>No. 40 - No. 10</i></td> <td><i>1/64 < Ps ≤ 1/16</i></td> </tr> <tr> <td><i>Fine Sand</i></td> <td><i>No. 200 - No. 40</i></td> <td><i>1/300 < Ps ≤ 1/64</i></td> </tr> <tr> <td><i>Fines</i></td> <td><i>Passing No. 200</i></td> <td><i>Ps ≤ 1/300</i></td> </tr> </tbody> </table>	Description	Sieve Size	Approximate Particle Size (in)	<i>Boulder</i>	<i>Greater than 12 in.</i>	<i>12 < Ps</i>	<i>Cobble</i>	<i>3 - 12 in.</i>	<i>3 < Ps ≤ 12</i>	<i>Coarse Gravel</i>	<i>3/4 - 3 in.</i>	<i>3/4 < Ps ≤ 3</i>	<i>Fine Gravel</i>	<i>No. 4 - 3/4 in.</i>	<i>1/5 < Ps ≤ 3/4</i>	<i>Coarse Sand</i>	<i>No. 10 - No. 4</i>	<i>1/16 < Ps ≤ 1/5</i>	<i>Medium Sand</i>	<i>No. 40 - No. 10</i>	<i>1/64 < Ps ≤ 1/16</i>	<i>Fine Sand</i>	<i>No. 200 - No. 40</i>	<i>1/300 < Ps ≤ 1/64</i>	<i>Fines</i>	<i>Passing No. 200</i>	<i>Ps ≤ 1/300</i>
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Sec 2.5.17 Page 19	<p>Added:</p> <p>If the field sample contains any cobbles or boulders, “with cobbles” or “with boulders” shall be added to the group name.</p>																											



Section # Page #	Description						
Sec. 2.5.19 Page 20	<p>“Additional Comments”, add bullet:</p> <ul style="list-style-type: none"> • <i>No SPT recovery</i> • <i>very from elev. XX to elev. XX</i> 						
Figure 2-23 Page 21	Item 4 is amended to read Bedding Thickness						
Figure 2-23 Page 21	<p>Item 11, “Relative Strength of Intact Rock”, is amended to read:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center; width: 50px;">11</td> <td style="text-align: center; width: 200px;">Relative Strength of Intact Rock</td> <td style="width: 50px;"></td> <td style="text-align: center; width: 50px;">3.3</td> <td style="width: 50px;"></td> <td style="text-align: center; width: 50px;">○</td> </tr> </table>	11	Relative Strength of Intact Rock		3.3		○
11	Relative Strength of Intact Rock		3.3		○		
Section 2.6.1.2 Page 22	Added section for isolated interbeds of rock						
Section 2.6.1.4 Page 22	<p>Add the following to the end of the section:</p> <p><i>If subsequent changes only occur in the soil properties, these changes can be shown independently in parentheses.</i></p> <p><i>SEDIMENTARY ROCK (SANDSTONE); medium grained; gray; intensely weathered; soft; unfractured (Well-graded SAND (SW); medium dense; moist; medium sand; weak cementation)</i></p> <p><i>(dense)</i></p> <p><i>(medium dense)</i></p>						
Figure 2-24 Page 25	Amended the table to include Ash fall and Ash flow under Tuff						
Figure 2-25 Page 26	Amended Categorization to include Chemical Rocks and breakout subsets into Evaporites and Precipitates						
Figure 2-38 Page 33	Amended figure by deleting Partially Healed and redefined Moderately Healed						
Section 2.7.1 Page 34	Updated year on Hole ID						



Section # Page #	Description										
Figure 2-42 and 2-43 Page 35	Updated “EA” to “EA/PID” to add Project ID										
Figure 2-44 Page 36-37	<p>Add new row:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">Test Method(s)</th> <th style="text-align: left;">Test Name</th> <th style="text-align: left;">Material Required</th> <th style="text-align: left;">Typical Sample Size/Type</th> <th style="text-align: left;">TL-101 Required</th> </tr> </thead> <tbody> <tr> <td>ASTM D6467</td> <td>Drained Residual Shear Strength</td> <td>1 lb.</td> <td>1 Tube</td> <td>No</td> </tr> </tbody> </table> <p>Also:</p> <ul style="list-style-type: none"> • Replace “ASTM D5333” with ASTM D4546” • Delete “ASTM D427” • Replace “ASTM D2938” with “ASTM D7012 Method C” • Replace “ASTM D4767” with “ASTM D7263 Method B” for Unit Weight • Add ASTM D1140 No. 200 Wash • Add ASTM D6913 Grain Size Distribution • Add ASTM D7928 Hydrometer • Replace EPA 9081 with AASHTO T267 	Test Method(s)	Test Name	Material Required	Typical Sample Size/Type	TL-101 Required	ASTM D6467	Drained Residual Shear Strength	1 lb.	1 Tube	No
Test Method(s)	Test Name	Material Required	Typical Sample Size/Type	TL-101 Required							
ASTM D6467	Drained Residual Shear Strength	1 lb.	1 Tube	No							
Figure 3-2 Page 44	Amended heading to include “Sand/Gravel” to match Figure 2-6										
Section 3.2.3 Page 48	Reworded second paragraph for clarity, added example of consistency descriptor based on lab testing.										
Section 3.2.4 Page 48	Section reworded for clarity										
Section 4.3.1 Page 51	<p>Bullet #8 is amended to read:</p> <ul style="list-style-type: none"> • Laboratory and field test results apply only to the sample at the location of the laboratory test symbol or field test result. Descriptors within a layer with the same field descriptions should be corrected based on the laboratory test(s) of one or more representative samples. For example, if three consecutive samples were field identified to contain “some silt”, and a representative laboratory test reported “little silt”, then the other two descriptors should be corrected to say “little silt”. 										



Section # Page #	Description
Section 4.3.1 Page 51	Deleted the 10 th bullet.
Section 4.4 Page 52	Reworded for clarity.
Figure 4-2 Page 54	Revised descriptions for clarity
Figure 4-3 Page 55	Change location information to Northing and Easting Changed descriptors to match Figure 4-2
Figure 4-4 Page 56	Revised figure to match descriptors
Section 5.1 Page 58	Modify 1 st sentence to read: An LOTB is typically associated with a structure, is part of the Project Plans, and has an accompanying Test Boring Layout sheet that presents location information of the test borings in a plan view.
Figure 5-1 Page 59-60	Replace Figure 5-1 with: <ul style="list-style-type: none">• Figure 5-1A, Test Boring Layout• Figure 5-1B, Log of Test Borings



Section # Page #	Description
Section 5.2.1 Page 61	<p>Entire section replaced with:</p> <p>5.2.1 - Contents and Characteristics of the LOTB and Test Boring Layout Sheets</p> <p>The Log of Test Borings (LOTB) and Test Boring Layout (Layout) sheets are part of the project plans and presented on separate plan sheets, and they:</p> <ul style="list-style-type: none"><li>• Present the boring logs on an elevation scale.<li>• Present a plan view showing the location of each boring relative to an alignment and/or existing or planned facility or structure.<li>• Present the type(s) of drilling method(s) used to perform the investigation, the type(s) of sampling performed, and how the sampler was advanced.<li>• Present the location and description, both graphical and written, of the types of soil and rock encountered within the borehole.<li>• Present the types of field and laboratory testing performed.<li>• Present field and laboratory test data.<li>• Are optimized for printing on full-size plan sheets (24" x 36") and typically reproduced on 11" x 17" sized paper.<li>• Allow presentation of more than one boring log per plan sheet.<li>• Are accompanied by LOTB legend sheets.



Section # Page #	Description
Section 5.2.2 Page 61	<p>Entire section replaced with:</p> <p>5.2.2 - Notes on the LOTB and Layout Sheets</p> <p>Each LOTB and Layout sheet must contain a note section for presentation of relevant factual data and one of the following two notes:</p> <p>If the procedures of this manual were followed without exception, then the following note must be placed on the LOTB sheet:</p> <p><i>“This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (Date)”</i></p> <p>If the procedures of this manual were followed without exception, then the following note must be placed on the Test Boring Layout sheet:</p> <p><i>“This Test Boring Layout sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (Date)”</i></p> <p>If an exception to the procedures of this manual has been approved and implemented, then the notes must be modified to read:</p> <p><i>“This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (Date) except as noted below”</i></p> <p>and</p> <p><i>“This Test Boring Layout sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (Date) except as noted below”</i></p> <p>Optional notes may include:</p> <ul style="list-style-type: none">• Changes in drilling equipment• Site observations• Other drilling observations• Depth and length of no recovery• No SPT recovery from elevation XX to elevation XX <p>Do not repeat the procedures or requirements set forth in this manual in the notes section. Notes specific to a borehole should be presented on the LOTB sheet. Only notes that are generalized for the project and/or alignment are presented on the Layout sheet.</p>



Section # Page #	Description
Section 5.2.3 Page 62	Entire section replaced with: 5.2.3 - LOTB and Layout Sheet Formatting Plan sheets must be prepared in accordance with this manual and the Caltrans <i>Plans Preparation Manual</i> . The plan sheet border must present the following:
Section 5.2.3.1 Page 62	Replace item "a" with: a) The State of California Registered Civil Engineer, Geotechnical Engineer, Structure Engineer (for Layout only), Certified Engineering Geologist, or Professional Geologist seal with the signature, date, license number, and registration certificate expiration date of the Geoprofessional in responsible charge of the LOTB sheet;
Section 5.2.3.2 Page 62	Replace items "c" and "d" with: c) "DRAWN BY": The name of the Engineering Graphics Unit person who prepared the LOTB and draft Layout sheet. d) "CHECKED BY": The name of the person who performed the quality control check of the LOTB and Layout sheet



Section # Page #	Description
Section 5.2.3.3 Page 63	<p>Entire section replaced with:</p> <p>5.2.3.3 - Plan View – Layout</p> <ul style="list-style-type: none"><li>a) The first project plan sheet(s) for test borings is used entirely for the Layout and consists of a Plan View and a Borehole Location Table.<li>b) Multiple Layout sheets must be numbered with reference to the stationing of the control line (i.e., showing the first sheet with the lowest stationing and the last sheet with the highest stationing).<li>e) “BENCH MARK” provide a note stating “Bench Marks shown on the Log of Test Borings sheets are for Design purposes only. For complete list of survey monuments for this project, see Survey Control information provided in the ROADWAY PLANS.”<li>c) Show the scale directly below the Plan View label.<li>d) Show a North arrow.<li>e) Lines or control lines shown in the Plan View must be consistent with those shown on the General Plan sheet.<li>f) Show stationing and names for control lines. Stationing must increase from left to right. Show a minimum of two stations on all lines.<li>g) Show control line intersection stationing and bearings.<li>h) Show names and directions of nearest cities.<li>i) Show names and directions of stream flows when applicable.<li>j) Show Table listing Hole Identification, Alignment Name, and Station and Offset<li>k) Plot boring locations with symbols as shown in the legend to identify drilling methods (e.g., auger hole, rotary hole, cone penetration). The Hole Identification must be presented with each symbol.<li>l) For horizontal borings include “(HORIZONTAL BORING)” below the Hole Identification and indicate the bearing to scale extending from the hole symbol (Figure 5-2).



Section # Page #	Description
Section 5.2.3.4 Page 63-64	<p>Entire section replaced with:</p> <p>5.2.3.4 - Profile View – LOTB</p> <ul style="list-style-type: none"> a) Show the name, northing and easting, description, and elevation of the benchmark used for determining the top of boring elevations under the heading “BENCHMARK”. Identify the vertical datum (National Geodetic Vertical Datum, U.S. Geological Survey, U.S. Coast & Geodetic Survey, District, etc.) used to determine the benchmark elevations. b) Show the elevations and grid lines on both the left and right margins. Numerical values must be in multiples of 10 (e.g., 20, 10, 0, -10, -20). For horizontal borings, indicate length (feet) instead of elevation (Figure 5-3) c) Show the Hole Identification, top of hole elevation, Northing and Easting at the top of each boring log. For horizontal borings, include “(HORIZONTAL BORING)” adjacent to the Hole Identification (Figure 5-3) d) Show types and diameters of drill tools. e) Show the completion date of boring (m/d/y) at the bottom of each boring log. f) Show “Terminated at EL. XX” to indicate the bottom of boring elevation. g) Show the SPT hammer energy ratio, “Hammer Energy Ratio (ER_i) = XX%,” at the bottom of each boring. h) Provide groundwater information for each boring. If groundwater was measured, show the date(s) and elevation(s) of groundwater measurement(s) along the boring log. i) If groundwater was not encountered state, “Groundwater was not encountered in boring(s) #####” at the bottom of the boring log. If groundwater was encountered but not measured state, “Groundwater was encountered in boring(s) #####, but elevation was not measured” at the bottom of the boring log. If groundwater was not measured state, “Groundwater was not measured” at the bottom of the boring log j) Show results from field penetration tests at relevant elevations along the boring log (<i>see Appendix A.8</i>).
Section 5.2.3.4 cont'd	<ul style="list-style-type: none"> k) Show types of field and laboratory tests with symbols as indicated in the legend, at relevant elevations along the right side of the boring log. l) Show the Profile scales (horizontal and vertical) under the heading “PROFILE”. m) Show RQD and/or recovery n) For horizontal borings, include “Inclination ##° down from horizontal” at the bottom of the boring log (Figure 5-3)



Section # Page #	Description
Section 5.2.4.3 Page 64	Replace item “b” with: <ul style="list-style-type: none"> b) The State of California Registered Civil Engineer, Geotechnical Engineer, Structure Engineer (for Layout sheet only), Certified Engineering Geologist, or Professional Geologist seal with the signature, date, license number, and registration certificate expiration date of the Geoprofessional in responsible charge of the LOTB sheet
Figure 5-2 Page 65	Add figure “Horizontal Boring Plan View”
Figure 5-3 Page 66	Add figure “Horizontal Boring Profile View”
Figure 5-5 Page 67	Add: <ul style="list-style-type: none"> • <i>Groundwater symbol to CPT boring</i> • <i>Next to the diamond “symbol”, add Hole Type “RC” and Description “Rotary core with continuously-sampled, self-casing wire-line</i> • <i>Changed Hole I.D. to Hole Identification</i> • <i>Clarified SPT N-value test methods</i> • <i>Changed Size of Sampler to Inner Diameter of Sampler</i>
Figure 5-6 Page 68	Under Field and Laboratory Testing: Deleted tests that were not relevant to the descriptive sequence. Eliminated test methods.
Figures 5-8, 5-9, 5-11, 5- 12 Pages 71- 72	Figures updated to match Standard Plan sheet revisions
Section 5.2.5 Page 71	Amended “Four general hole type formats” to “Five general hole type formats”
Figure 5-16 Page 74-75	Updated Boring Record by revising title block and adding column for Sample Size
Figure 5-17 Page 76	Updated CPT title block



Section # Page #	Description
Figures 5-18, 5-19, and 5-20 Pages 78-80	Updated Boring Record Legend to reflect updates to the Manual
References Page 81	Amended references
Section A 8 Page 84	Amended Standard Penetration Test description to match ASTM D1586 and provide clarity in reporting blows.
Section A.10 Page 86	End of second paragraph, add: <ul style="list-style-type: none"><li>• <i>“Mechanical breaks must be fitted together and counted as one piece.”</i>