18 October 2017

Mr. Brett Nelson
Carmel Partners
1000 Sansome Street, 1st Floor
San Francisco, California 94111

Subject: Supplemental Geotechnical Recommendations
Revised Settlement and Mat Design
385 14th Street
Oakland, California
Langan Project No.: 750636401

Dear Mr. Nelson:

This letter presents our revised settlement and mat design recommendations for the proposed development at 385 14th Street in Oakland. We previously conducted a geotechnical investigation for this project and presented our findings and recommendations in a report dated 20 July 2017. The conclusions and recommendations presented herein supplement and supersede, where applicable, those presented in our previous report.

We drilled boring B-9 from 26 June to 30 June 2017; a draft log of boring was included in our 20 July report. However, the final laboratory test results were not available at the time of publication. The final log is provided in Figure A-9 and the laboratory test results are included as Figures C-22 through C-32, which are attached. Concurrent with our testing, Hart Crower performed testing on split samples from boring B-9. We were provided draft consolidation test results from their analysis.

To evaluate the distribution of stresses in the ground resulting from construction of the proposed building and the anticipated settlement of the foundations, we performed soil consolidation analysis using a program called Settle3D version 4.010, build date 27 March 2017. We modeled the soil stratigraphy and groundwater based on the conditions encountered in our soil borings. We used test results from our evaluation and from Hart Crowser to develop soil properties for our Settle3D model. We modeled the proposed mat thickness and depth, and the foundation loading using information provided by MKA. To provide subgrade moduli for design of the mat, we performed an iterative process with MKA. During this process we performed settlement analysis based on the dead plus live loads and calculated subgrade moduli based on the loads and resulting settlements. We then provided MKA with our updated subgrade moduli. MKA re-evaluated their structural model with the new subgrade moduli and generated new loading diagrams. This process was repeated several times until the results of both MKA's and Langan's analyses reached relative convergence.

Based on our analysis, we estimate the pile-supported mat with the pile lengths and spacing indicated will settle about 3¾ inches under the tower core and about 2½ to 3½ inches near the corners of the tower. We estimate the majority of the podium mat will generally settle up to

about 1 to 2½ inches, except at the western approximately 20 feet of the podium where the podium mat meets the tower mat; in this area, we predict about 3 to 4½ inches of settlement will occur due to the influence of the loading from the tower.

Table 1 presents the mat pressure, pile length, spacing, and estimated loading for each zone under the tower mat and the mat pressure under the podium mat. For each zone, we calculated the estimated settlement and resulting modulus values. Table 1 presents the estimated modulus values from the final iteration with MKA.

TABLE 1
Subgrade Modulus

Zone	Design Modulus (kcf)	Pile Lengths (feet)	Pile Spacing (feet)	Approximate Average Load in Zone (ksf)
1	41	110	3D by 6D	11.2
2	40	110	3D by 6D	11.2
3	37	110	3D by 6D	10.4
4	38	110	3D by 6D	12.1
5	33	110	3D by 6D	10.4
6	30	110	3D by 6D	9.9
7	42	130	3D by 6D	13.0
8	40	130	3D by 6D	12.6
9	37	130	3D by 6D	10.6
10	37	110	3D by 6D	11.7
11	32	110	3D by 6D	10.0
12	30	110	3D by 6D	10.1
13	36	100	3D by 6D	10.0
14	25	80	3D by 6D	5.7
15	24	80	3D by 6D	5.5
16	23	80	3D by 6D	5.5
17	35	100	3D by 6D	10.0
18	32	100	3D by 6D	9.4

Zone	Design Modulus (kcf)	Pile Lengths (feet)	Pile Spacing (feet)	Approximate Average Load in Zone (ksf)
A	6	N/A	N/A	2.4
B	8	N/A	N/A	2.4
C	10	N/A	N/A	2.7
D	12	N/A	N/A	2.1
E	20	N/A	N/A	2.4
F	15	N/A	N/A	2.4

Note: See Figure 2 for zone locations.

For design of the mat under a seismic loading condition we recommend using the method presented in the "NEHRP Seismic Design Technical Brief No. 7". We recommend using an effective shear modulus value of 658,000 pounds per square foot (psf) and a Poisson's ratio of 0.30 for use in conjunction with Table 3.1.

We trust this letter provides the information needed at this time. If you have any questions, please do not hesitate to call.

Sincerely,
Langan Engineering & Environmental Services, Inc.

Jonathan Sanglerat
Senior Staff Engineer

Lori A. Simpson, PE, GE
Principal

REGISTERED PROFESSIONAL ENGINEER
LORI A. SIMPSON
NO. GE 2396
EXP. 9/30/18
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments:
Figure 1 – Site Plan
Figure 2 – Modulus Values
Figure A-9 – Log of Boring B-9
Figure A-10 – Classification Chart
Figure C-22 – Plasticity Chart
Figure C-23 through C-32 – Consolidation Test Results

750636401.22 JLS_385 14th Street_Supplemental GTK Recommendations #2

EXPLANATION

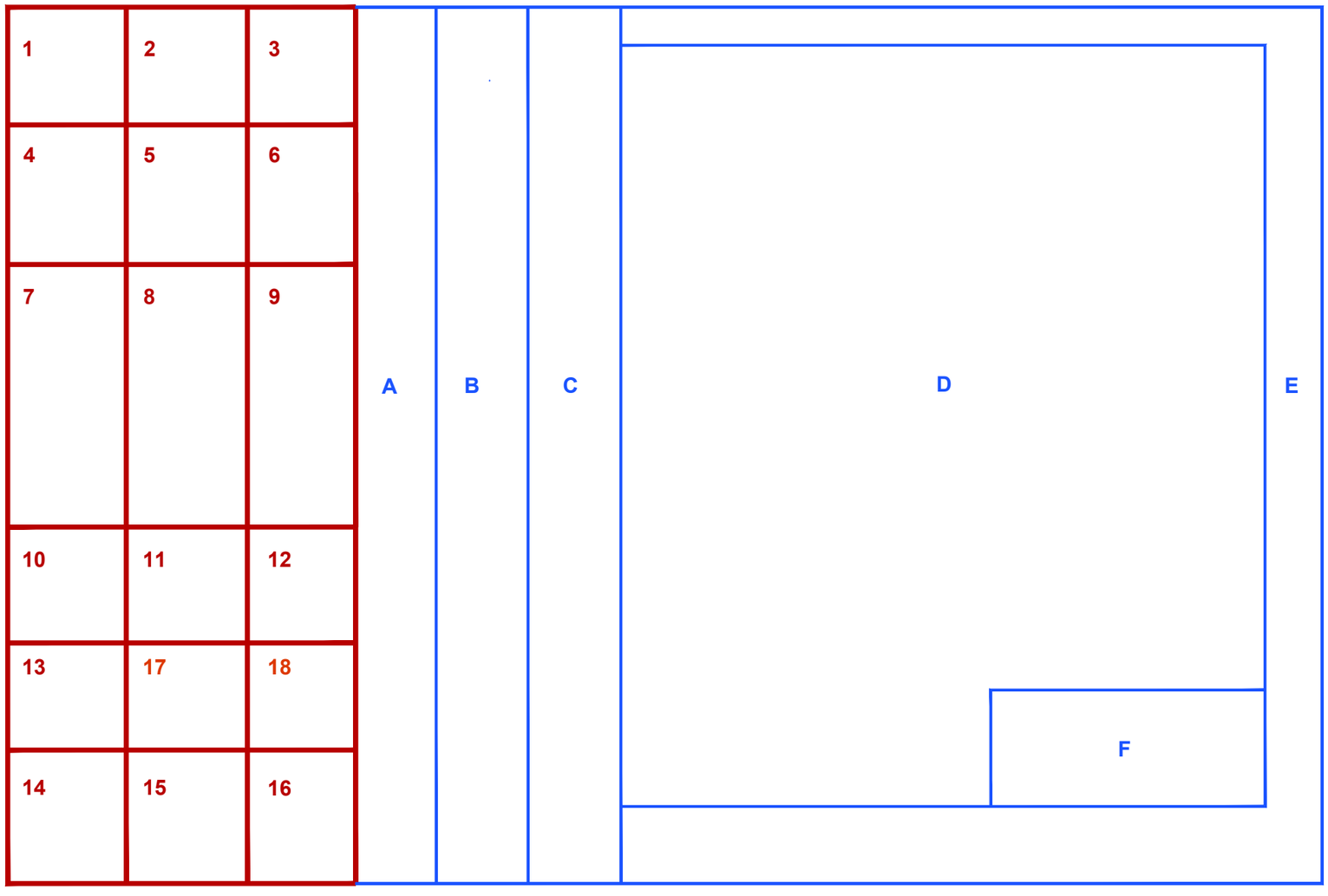
- B-9 — Approximate location of geotechnical boring by Langan, June 2017
- B-7 — Approximate location of geotechnical boring by Langan, January 2017
- B-1 — Approximate location of geotechnical boring by Langan Treadwell Rollo, May 2016

Note: Borings B-5 and B-6 were drilled in the basement.

0 — 60 Feet
Approximate scale

Reference: Base map from nearmap, dated 02/01/2016.

385 14TH STREET Oakland, California		
SITE PLAN		
Date 10/16/17	Project No. 750636401	Figure 1
LANGAN		



EXPLANATION

1 - Tower Zone

A - Podium Zone

0 30 Feet

Approximate scale

385 14TH STREET
Oakland, California

MODULUS VALUES

Date 10/16/17	Project No. 750636401	Figure 2

LANGAN

PROJECT:	**385 14TH STREET** Oakland, California	**Log of Boring B-9** PAGE 1 OF 14

Boring location:	See Figure 2		Logged by: CSL/ HS Drilled By: Pitcher Drilling
Date started:	6/24/17	Date finished: 6/29/17	
Drilling method:	Rotary Wash		
Hammer weight/drop:	140 lbs./30 inches	Hammer type: Safety Auto	

Samplers: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Pitcher Barrel (PB), Shelby Tube (ST)

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						Ground Surface Elevation: 35.1 feet[2]						
1						6-1/2 inches of concrete						
1					SM	SILTY SAND with GRAVEL (SM) yellow-brown, moist, fine- to medium-grained, fine subangular gravel						
2						FILL						
3						CLAY SAND (SC) yellow-brown, moist, fine- to medium-grained						
4												
5					SC							
6												
7												
8						No samples were collected between 0 and 130 feet						
9												
10												
11												
12												
13						sand in cuttings at 13 feet						
14												
15												
16												
17												
18												
19												
20												
21												
22						sand in cuttings at 22 feet						
23												
24												
25												
26												
27												
28												
29												
30												

LANGAN

Project No.:	Figure:
750636401	A-9a

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
31						sand in cuttings at 31 feet						
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60						clay in cuttings at 60 feet						

LANGAN

Project No.: 750636401

Figure: A-9b

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												
81												
82												
83												
84												
85												
86												
87												
88												
89												
90												

LANGAN

Project No.: 750636401

Figure: A-9c

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
91						clay in cuttings at 91 feet						
92												
93												
94												
95												
96												
97												
98												
99												
100												
101						clay in cuttings at 100 feet						
102												
103												
104												
105												
106												
107												
108												
109												
110												
111												
112												
113												
114												
115												
116												
117												
118												
119						clay in cuttings at 119 feet						
120												

LANGAN

Project No.: 750636401

Figure: A-9d

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
121												
122						clay in cuttings at 122 feet						
123												
124												
125												
126												
127												
128												
129												
130						CLAY (CH) gray, hard, wet						
131	PB		200 psi			Consolidation Test, see Figure C-23	PP		>4,500		32.2	88.5
132												
133												
134												
135												
136												
137												
138												
139					CH							
140												
141												
142												
143												
144												
145												
146												
147												
148												
149												
150												

LANGAN

Project No.: 750636401

Figure: A-9e

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
151	PB					CLAY (CH) (continued) Consolidation Test, see Figure C-24	PP		>4,500		29.0	93.9
152												
153												
154												
155												
156												
157												
158												
159												
160												
161												
162												
163												
164												
165					CH							
166												
167												
168												
169												
170						LL = 86, PI = 53, see Figure C-22 Consolidation Test, see Figure C-25					30.7	90.6
171	PB		200 psi				PP		>4,500			
172												
173												
174												
175												
176												
177												
178												
179												
180												

LANGAN

Project No.: 750636401

Figure: A-9f

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
181						CLAY (CH) (continued)						
182												
183												
184												
185												
186												
187												
188												
189												
190												
191												
192												
193												
194												
195					CH	gray						
196	PB						PP		>4,500			
197						LL = 79, PI = 46, see Figure C-22 Consolidation Test, see Figure C-26					27.2	96.4
198												
199												
200												
201												
202												
203												
204												
205												
206												
207												
208												
209												
210												

LANGAN

Project No.: 750636401

Figure: A-9g

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
211						CLAY (CH) (continued)						
212												
213												
214												
215												
216												
217												
218												
219												
220												
221	PB		180 psi									
222						gray						
223						Consolidation Test, see Figure C-27					32.6	86.4
224	PB		180 psi				PP		>4,500			
225					CH							
226												
227												
228												
229												
230												
231												
232												
233												
234												
235												
236												
237												
238												
239												
240												

LANGAN

Project No.: 750636401

Figure: A-9h

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
241					CH	CLAY (CH) (continued)						
242						CLAY with SAND (CL) gray, hard, wet, fine-grained sand, trace silt						
243												
244												
245						LL = 35, PI = 15, see Figure C-22 Consolidation Test, see Figure C-28						
246	PB		190 psi				PP		4,000	74.9	20.5	103.6
247												
248												
249												
250												
251												
252												
253												
254												
255												
256					CL							
257												
258												
259												
260												
261												
262												
263												
264												
265												
266												
267												
268												
269												
270												

LANGAN

Project No.: 750636401

Figure: A-9i

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
							SAMPLES			LABORATORY TEST DATA		
271	PB		250 psi to 185 psi			CLAY with SAND (CL) (continued) Consolidation Test, see Figure C-29	PP		>4,500	80.7	13.8	122.5
272												
273												
274												
275												
276						coarse-grained sand in cuttings at 270 feet						
277												
278												
279												
280	S&H		50 40/ 3-1/2"	28/ 3-1/2"		brown to gray-brown, hard	PP		>4,500		15.8	117.7
281												
282												
283												
284												
285					CL							
286												
287												
288												
289												
290												
291												
292												
293												
294												
295						increased sand content	PP		>4,500			
296	PB		190 psi			Consolidation Test, see Figure C-30				74.7	14.4	121.3
297												
298												
299												
300												

LANGAN

Project No.: 750636401

Figure: A-9j

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
301						CLAY with SAND (CL) (continued)						
302												
303												
304												
305												
306	S&H		85/ 6"	60/ 6"		brown, mottled gray-brown to gray, hard, trace silt, fine-grained sand	PP		>4,500	70.1	19.1	111
307												
308												
309												
310					CL							
311												
312												
313												
314												
315												
316												
317												
318												
319						SANDY CLAY (CL)						
320						brown to gray-brown, hard, wet, fine-grained, trace silt						
321	PB						PP		>4,500			
322						LL = 47, PI = 29, see Figure C-22						
323						Consolidation Test, see Figure C-31					14.7	119
324												
325					CL							
326												
327												
328												
329												
330												

LANGAN

Project No.: 750636401

Figure: A-9k

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
331						SANDY CLAY (CL) (continued)						
332						thin layer of CLAYEY GRAVEL (GC) observed in cuttings, white, fine, subangular to angular gravel						
333												
334												
335												
336												
337												
338						thin layer of CLAYEY GRAVEL (GC) observed in cuttings, white, fine subangular to angular gravel						
339												
340												
341					CL	fine to coarse-grained sand observed in cuttings						
342												
343												
344												
345												
346	S&H		44 54/ 3"	38/ 3"		brown to yellow-brown and gray, hard, wet, fine-grained sand, with trace coarse-grained sand	PP		>4,500		14.4	121
347												
348												
349												
350												
351												
352						CLAYEY GRAVEL (GC) light brown, very dense, wet, fine, angular gravel						
353												
354					GC							
355												
356	SPT		50/ 2"	35/ 2"		CLAYEY SAND (SC) yellow-brown, very dense, wet, fine- to coarse-grained				44.3		
357												
358					SC							
359												
360												

LANGAN

Project No.: 750636401

Figure: A-9I

TEST GEOTECH LOG 750636401 -GEOTECH 385 14TH STREET_B-9.GPJ TR.GDT 10/16/17

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
361						CLAYEY SAND (SC) (continued)						
362												
363												
364												
365												
366												
367												
368												
369												
370												
371	PB					olive-brown, trace fine subangular gravel LL = 34, PI = 17, see Figure C-22 Consolidation Test, see Figure C-32	PP		>4,500			
372										34.7	14.9	109.3
373												
374					SC							
375												
376												
377												
378												
379												
380												
381												
382												
383												
384												
385												
386												
387						CLAY (CH)						
388					CH	brown to olive-gray, hard, wet, trace fine- to medium-grained sand						
389												
390												

LANGAN

Project No.: 750636401

Figure: A-9m

PROJECT: **385 14TH STREET**
Oakland, California

Log of Boring B-9

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
391	PB		200 psi		CH	CLAY (CH) (continued) LL = 53, PI = 30, see Figure C-22 Consolidation Test, see Figure C-33	PP		>4,500		22.0	104.1
392												
393												
394												
395												
396												
397												
398												
399												
400												
401												
402												
403												
404												
405												
406												
407												
408												
409												
410												
411												
412												
413												
414												
415												
416												
417												
418												
419												
420												

Boring terminated at a depth of 392.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater obscured by drilling method.
PP = Pocket penetrometer.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type
[2] Elevations based on Oakland City Datum.

LANGAN

Project No.: 750636401
Figure: A-9n

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size)	Gravels (More than half of coarse fraction > no. 4 sieve size)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine -Grained Soils (more than half of soil < no. 200 sieve size)	Silts and Clays LL = < 50	ML	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	MH	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		PT	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel	3" to No. 4	76.2 to 4.76
coarse	3" to 3/4"	76.2 to 19.1
fine	3/4" to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.075
coarse	No. 4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.420 to 0.075
Silt and Clay	Below No. 200	Below 0.075

Unstabilized groundwater level

Stabilized groundwater level

SAMPLE DESIGNATIONS/SYMBOLS

Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered

Classification sample taken with Standard Penetration Test sampler

Undisturbed sample taken with thin-walled tube

Disturbed sample

Sampling attempted with no recovery

Core sample

Analytical laboratory sample

Sample taken with Direct Push or Drive sampler

SAMPLER TYPE

C Core barrel

CA California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter

D&M Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube

O Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube

PT Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube

S&H Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter

SPT Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter

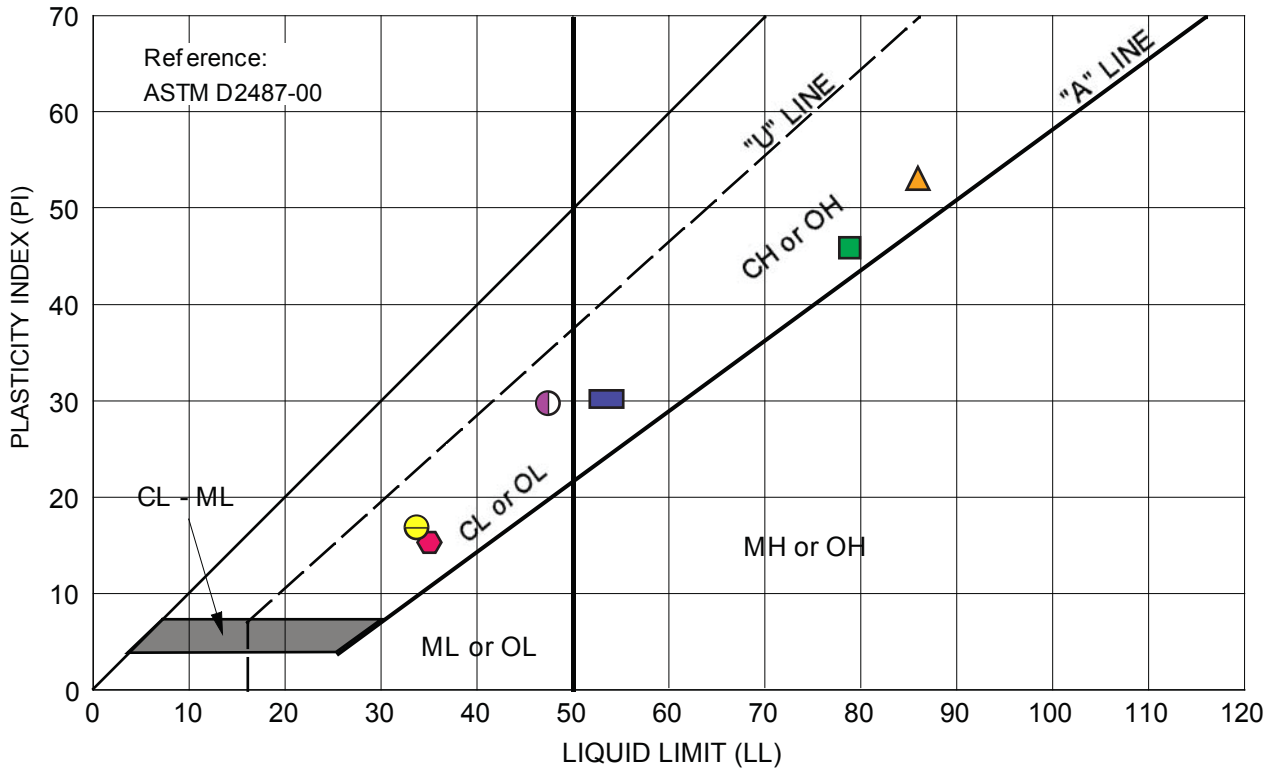
ST Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

385 14TH STREET
Oakland, California

LANGAN

CLASSIFICATION CHART

Date 07/07/17 | Project No. 750636401 | Figure A-10



NP = Non Plastic

Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
▲	B-9 at 170 feet	CLAY (CH), gray	30.7	86	53	--
■	B-9 at 195 feet	CLAY (CH), gray	27.2	79	46	--
⬢	B-9 at 245 feet	CLAY with SAND (CL), gray	20.5	35	15	74.9
◑	B-9 at 320 feet	SANDY CLAY (CL), brown to gray-brown	14.7	47	29	--
⊖	B-9 at 370 feet	CLAYEY SAND (SC), yellow-brown	14.9	34	17	34.7
▬	B-9 at 390 feet	CLAY (CH), brown to olive-gray	22.0	53	30	--

385 14TH STREET
Oakland, California

PLASTICITY CHART

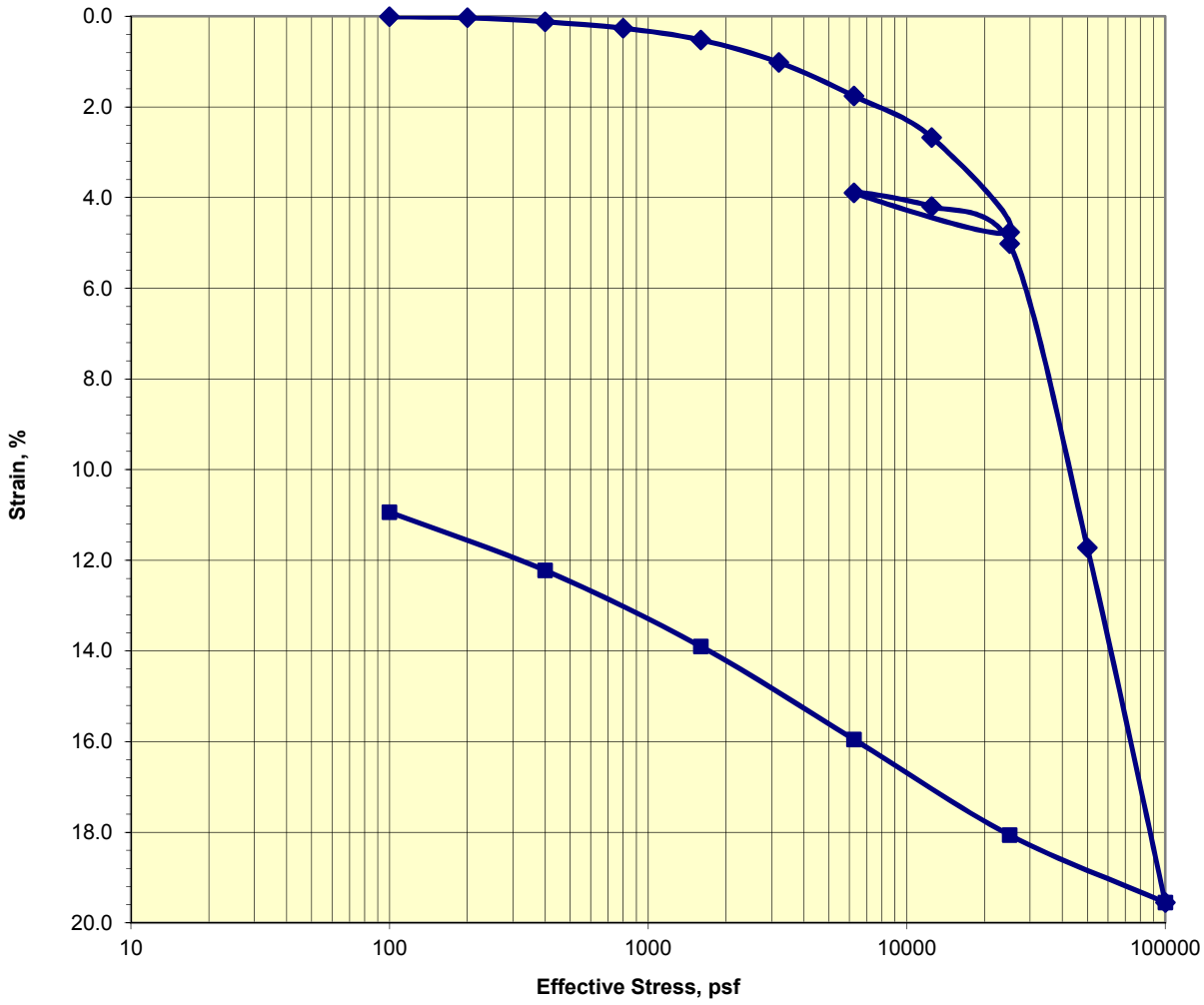
LANGAN

Date 10/16/17 | Project No. 750636401 | Figure C-22

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	1	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	130	**Checked:**	PJ/DC
Soil Type:	Greenish Gray CLAY w/ Sand			**Date:**	7/21/2017

Strain-Log-P Curve



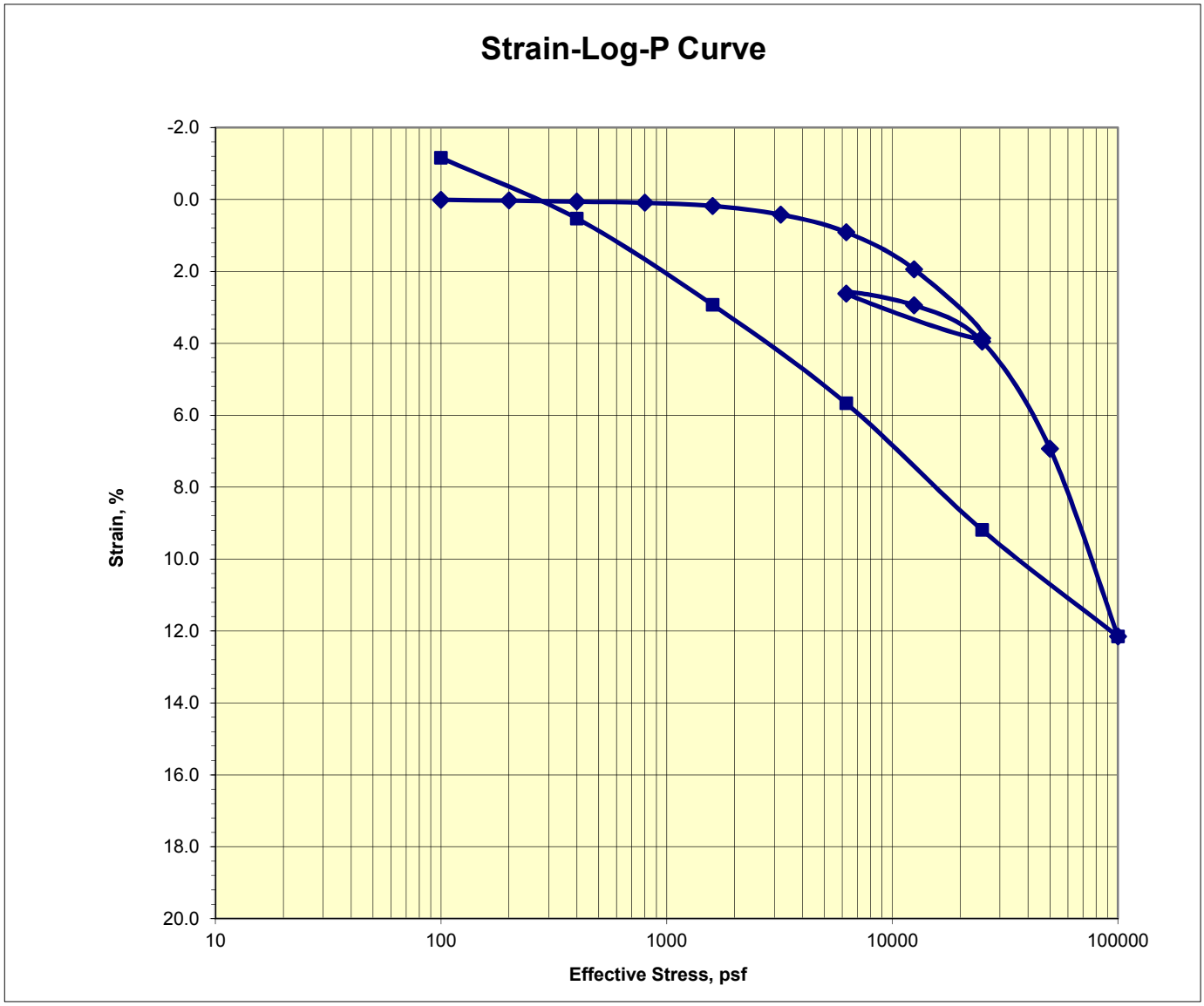
Assumed Gs 2.75	Initial	Final
Moisture %:	32.2	26.9
Dry Density, pcf:	88.5	98.7
Void Ratio:	0.939	0.739
% Saturation:	94.4	100.0

Remarks:

Figure C-23

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	2	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	150	**Checked:**	PJ/DC
Soil Type:	Greenish Gray CLAY			**Date:**	7/19/2017



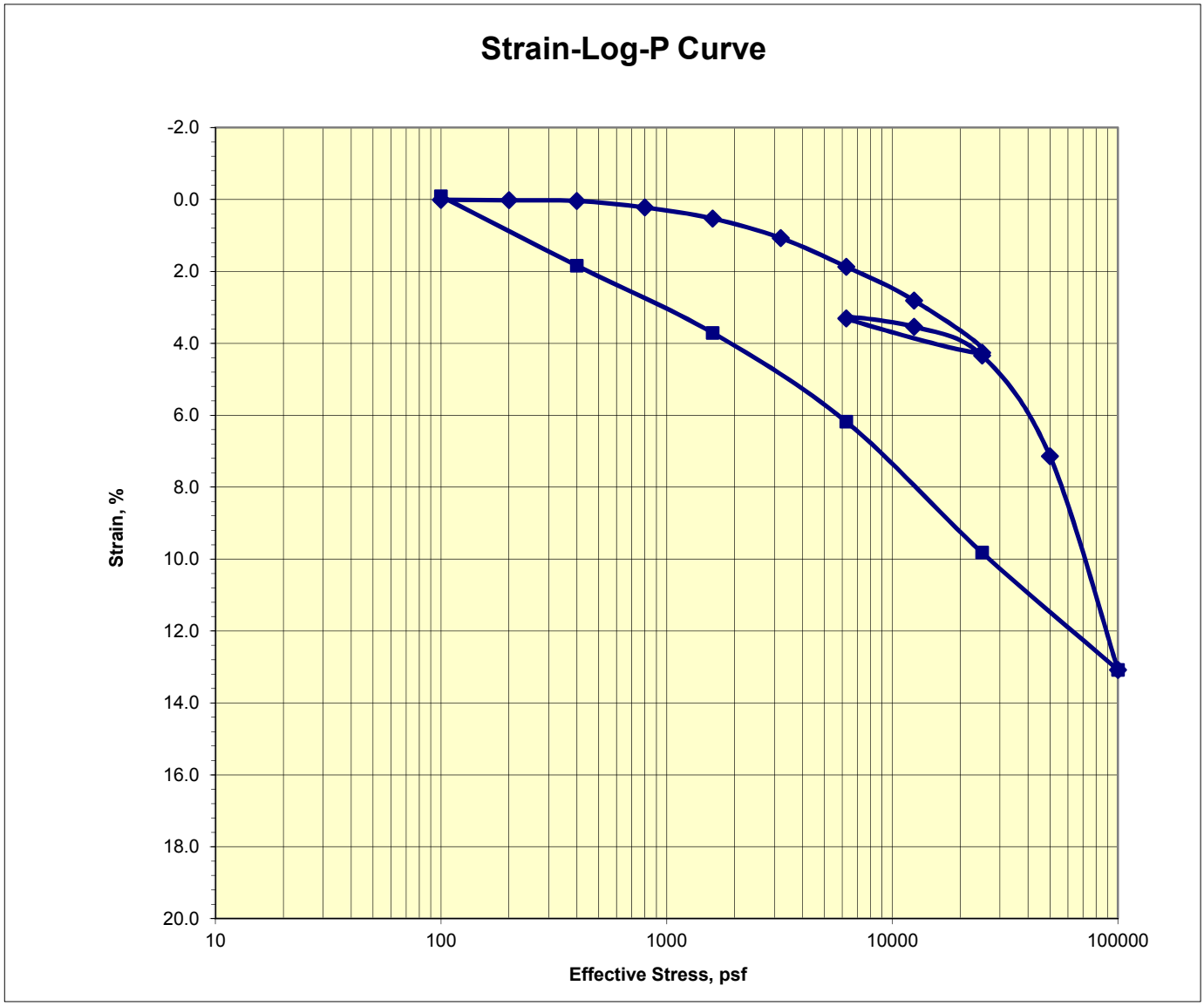
Assumed Gs 2.75	Initial	Final
Moisture %:	29.0	31.4
Dry Density, pcf:	93.9	92.1
Void Ratio:	0.828	0.863
% Saturation:	96.4	100.0

Remarks:

Figure C-24

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	3	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	170	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Fat CLAY			**Date:**	7/20/2017



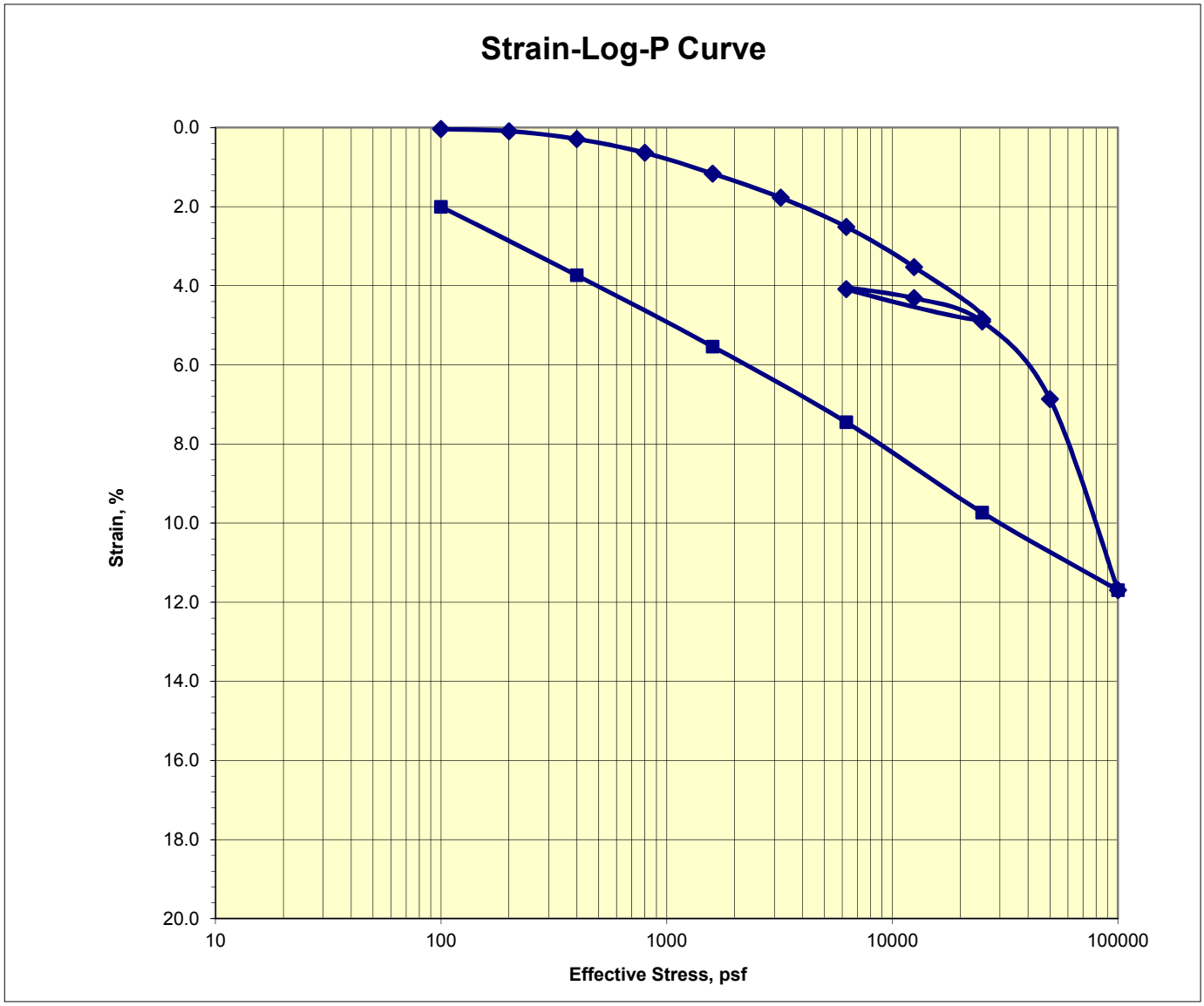
Assumed Gs 2.8	Initial	Final
Moisture %:	30.7	33.9
Dry Density, pcf:	90.6	89.7
Void Ratio:	0.929	0.950
% Saturation:	92.6	100.0

Remarks:

Figure C-25

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	4	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	195(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Fat CLAY			**Date:**	7/24/2017



Assumed Gs 2.8	Initial	Final
Moisture %:	27.2	28.6
Dry Density, pcf:	96.4	97.1
Void Ratio:	0.814	0.801
% Saturation:	93.6	100.0

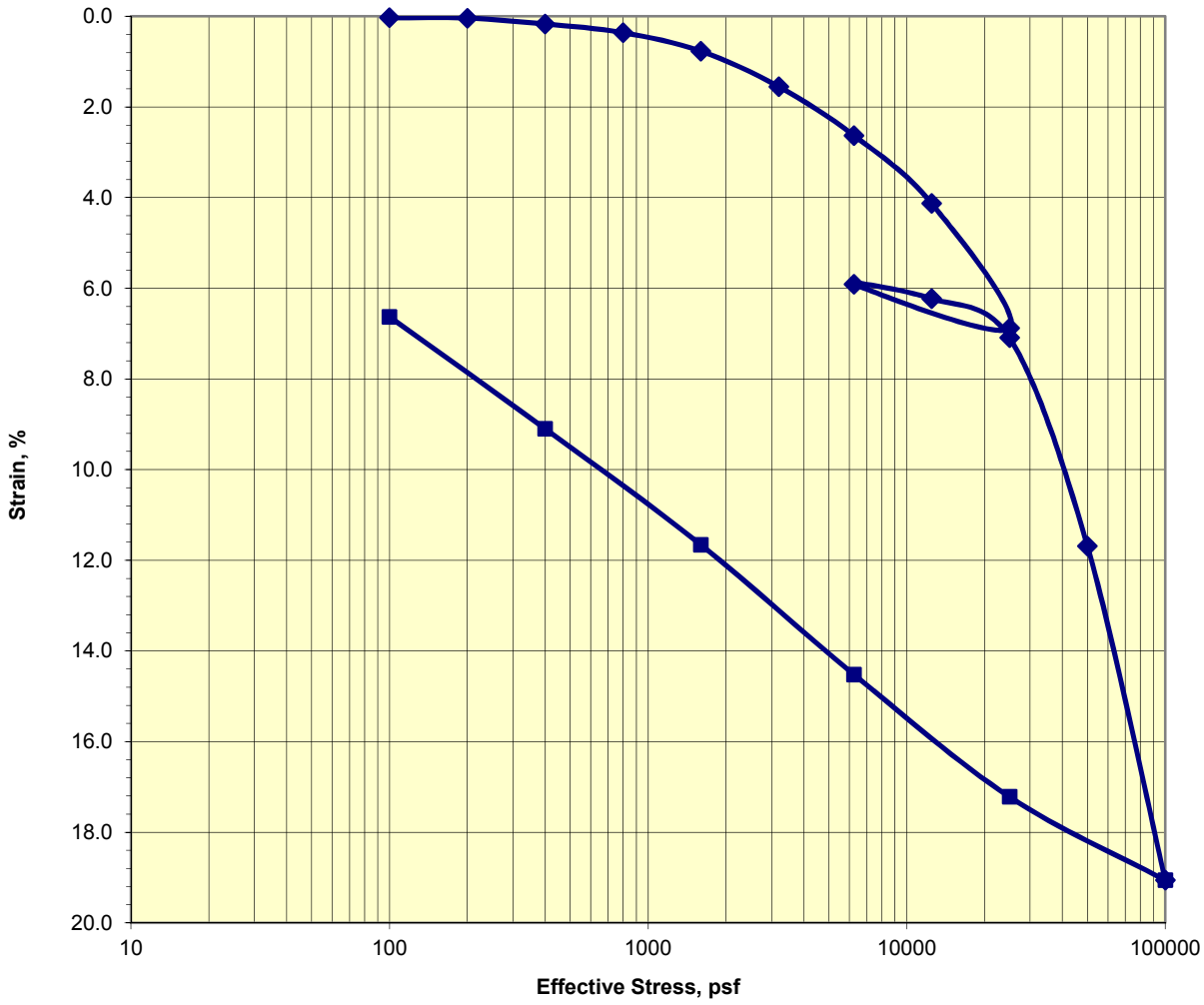
Remarks:

Figure C-26

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	5	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	222.5(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Greenish Gray CLAY			**Date:**	7/21/2017

Strain-Log-P Curve



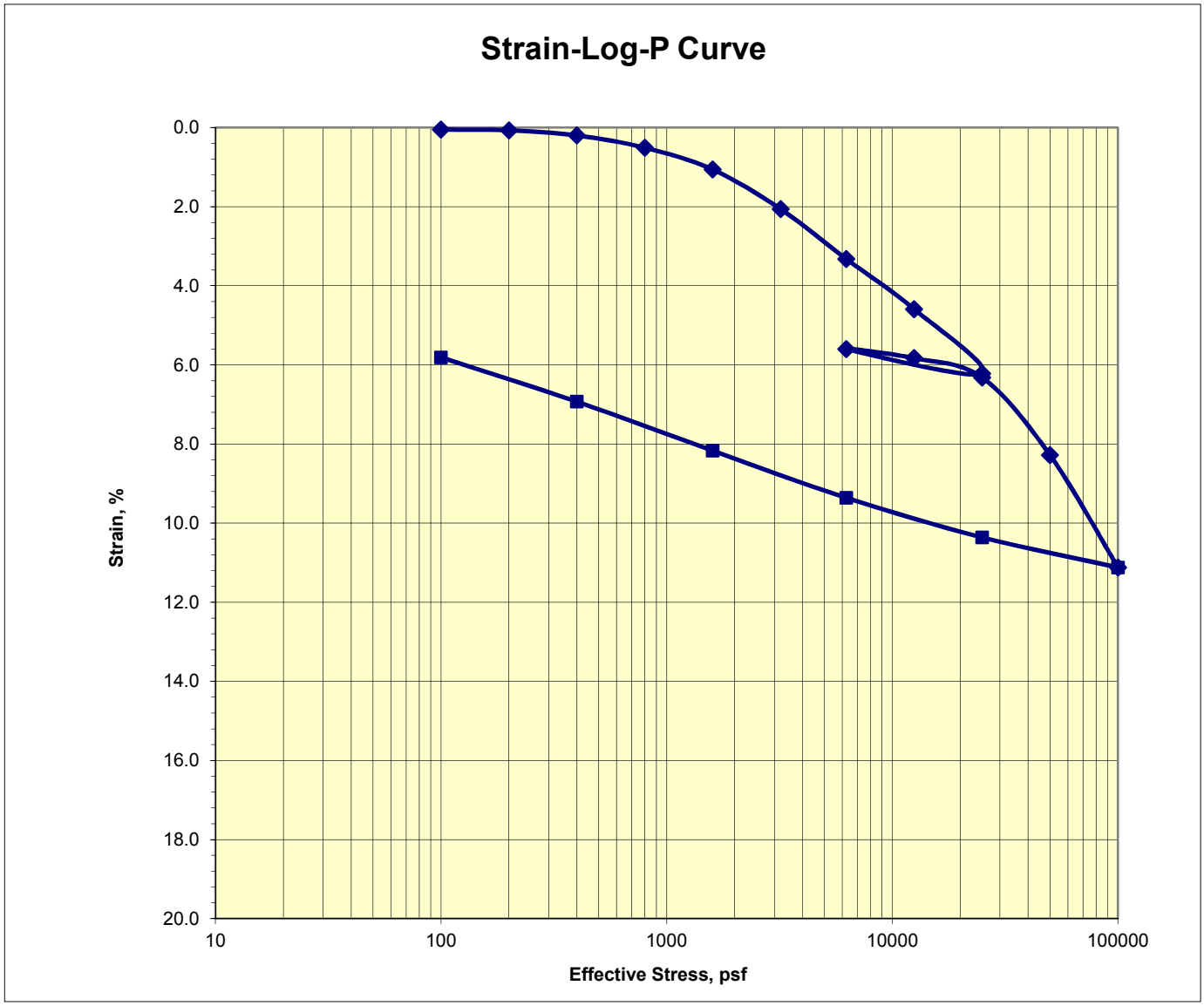
Assumed Gs 2.75	Initial	Final
Moisture %:	32.6	31.1
Dry Density, pcf:	86.4	92.6
Void Ratio:	0.987	0.854
% Saturation:	90.8	100.0

Remarks:

Figure C-27

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	6	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	245(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Lean CLAY w/ Sand			**Date:**	7/24/2017



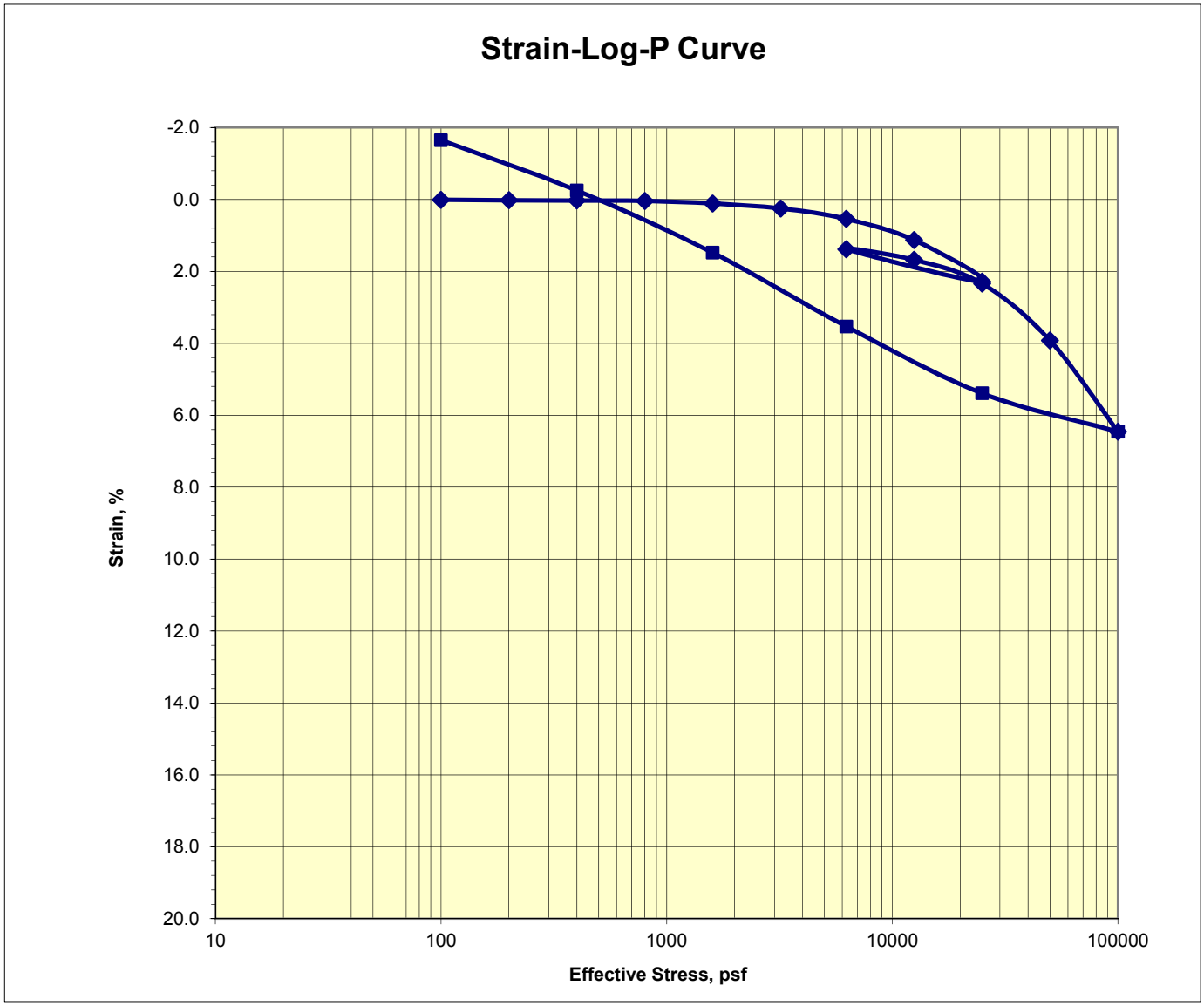
Assumed Gs 2.7	Initial	Final
Moisture %:	20.5	19.9
Dry Density, pcf:	103.6	109.6
Void Ratio:	0.627	0.537
% Saturation:	88.5	100.0

Remarks:

Figure C-28

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	7	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	270	**Checked:**	PJ/DC
Soil Type:	Greenish Gray CLAY w/ Sand			**Date:**	7/18/2017



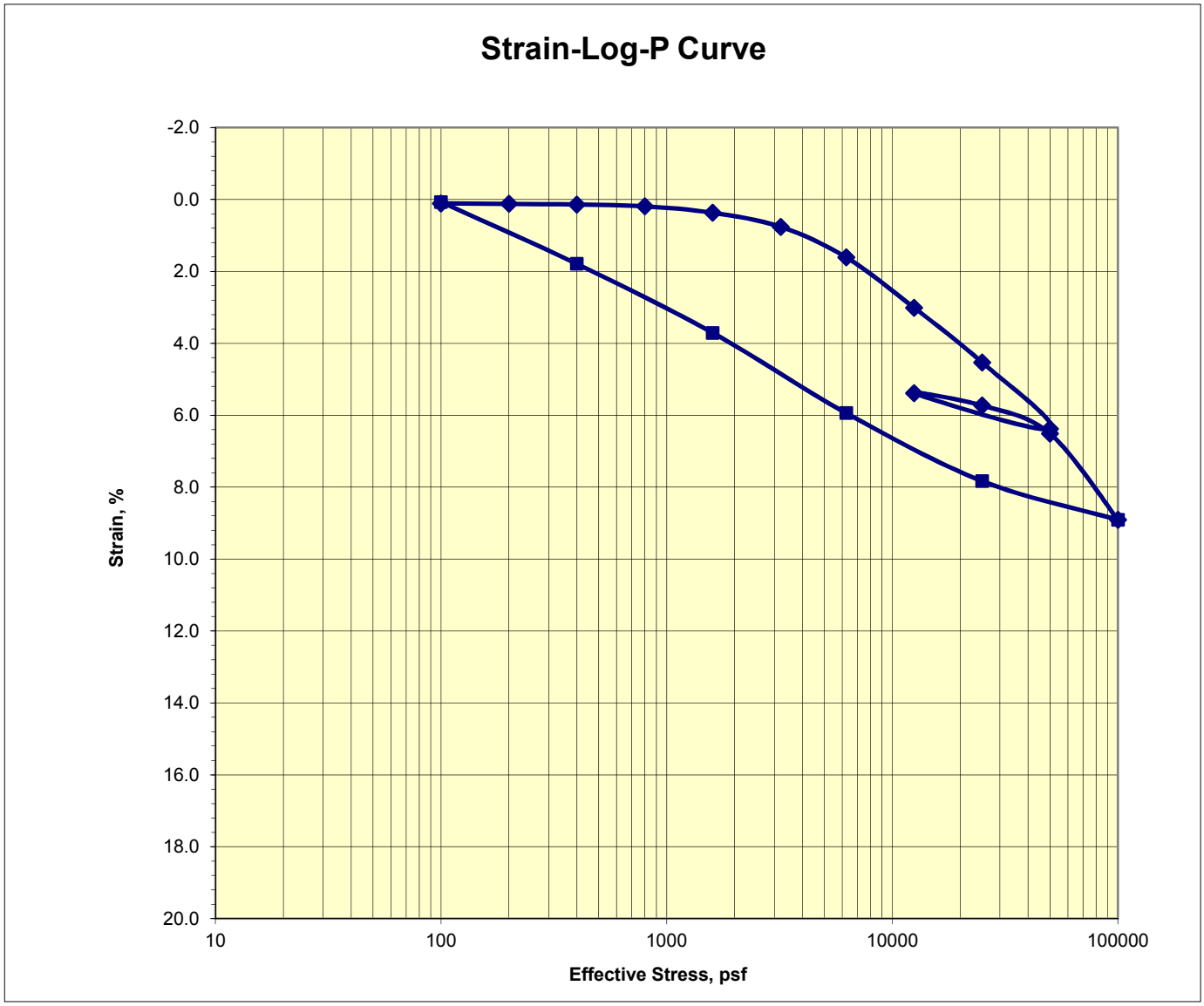
Assumed Gs 2.75	Initial	Final
Moisture %:	13.8	15.5
Dry Density, pcf:	122.5	120.4
Void Ratio:	0.401	0.426
% Saturation:	94.7	100.0

Remarks:

Figure C-29

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	9	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	295(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Olive CLAY w/ Sand			**Date:**	7/20/2017



Assumed Gs 2.8	Initial	Final
Moisture %:	14.4	16.4
Dry Density, pcf:	121.3	119.7
Void Ratio:	0.441	0.460
% Saturation:	91.3	100.0

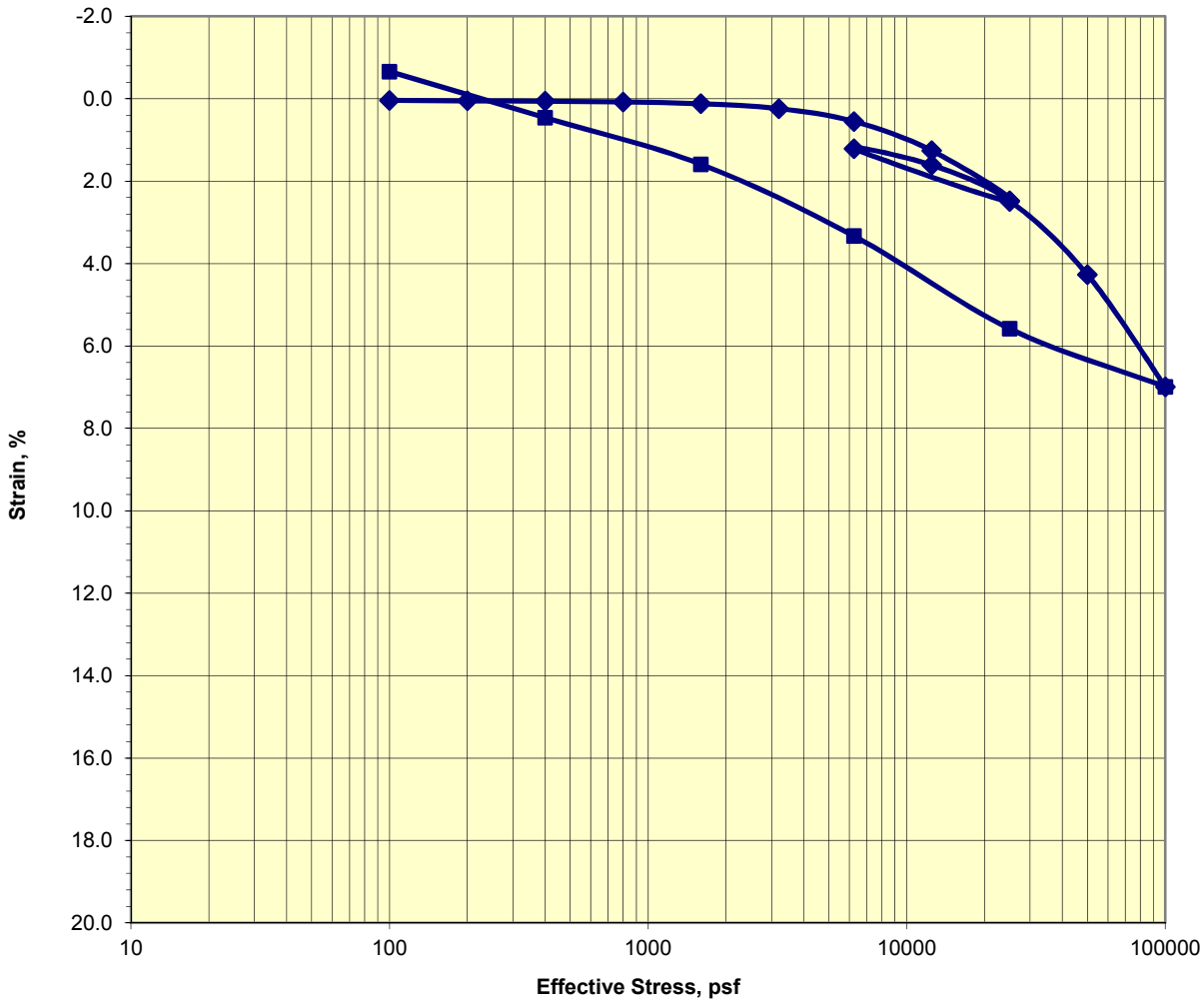
Remarks:

Figure C-30

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	11	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	320(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Olive Sandy Lean CLAY			**Date:**	7/19/2017

Strain-Log-P Curve



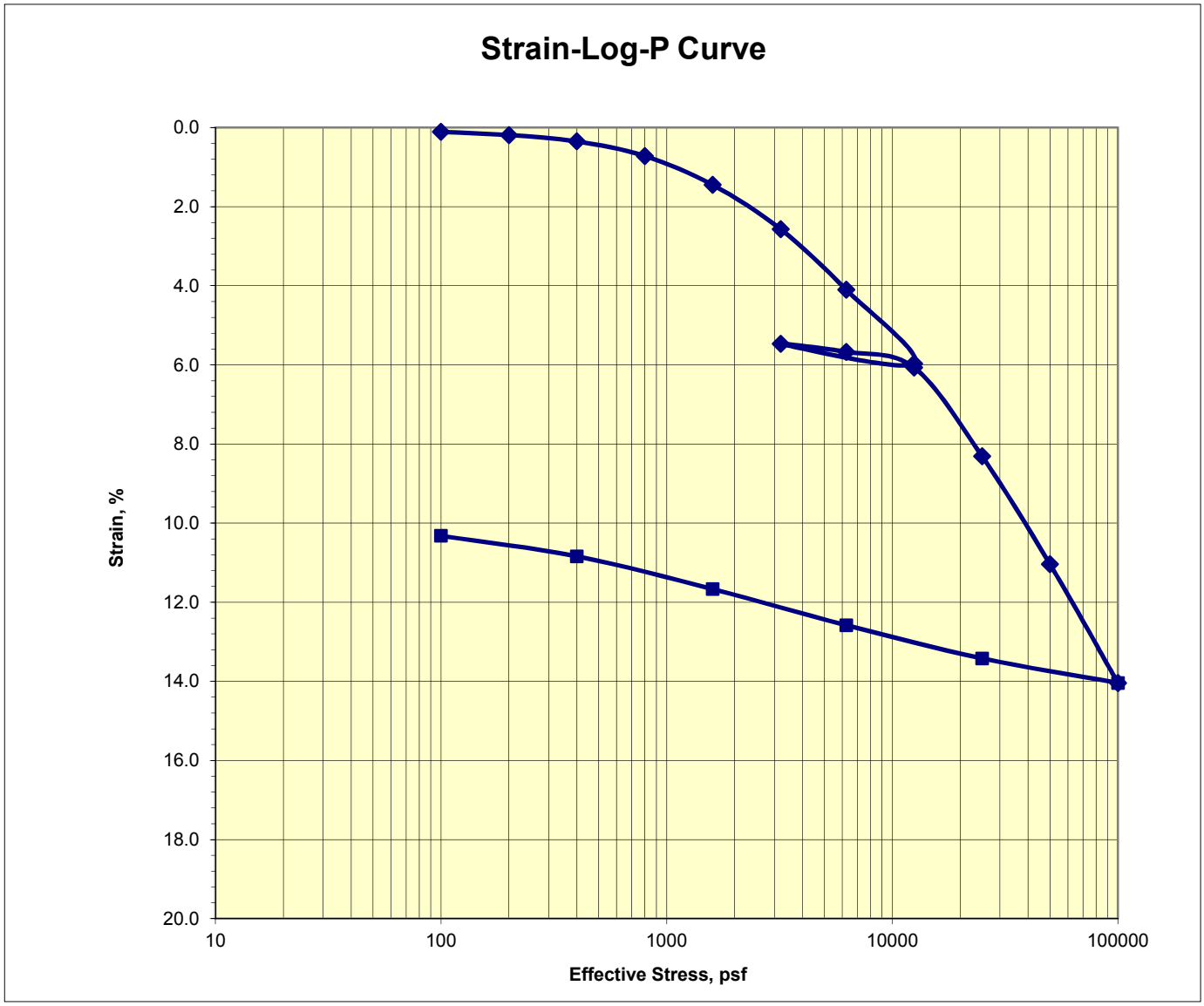
Assumed Gs 2.75	Initial	Final
Moisture %:	14.7	16.3
Dry Density, pcf:	119.0	118.6
Void Ratio:	0.442	0.447
% Saturation:	91.6	100.0

Remarks:

Figure C-31

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	15	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	370(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Olive Brown Lean Clayey SAND			**Date:**	7/24/2017



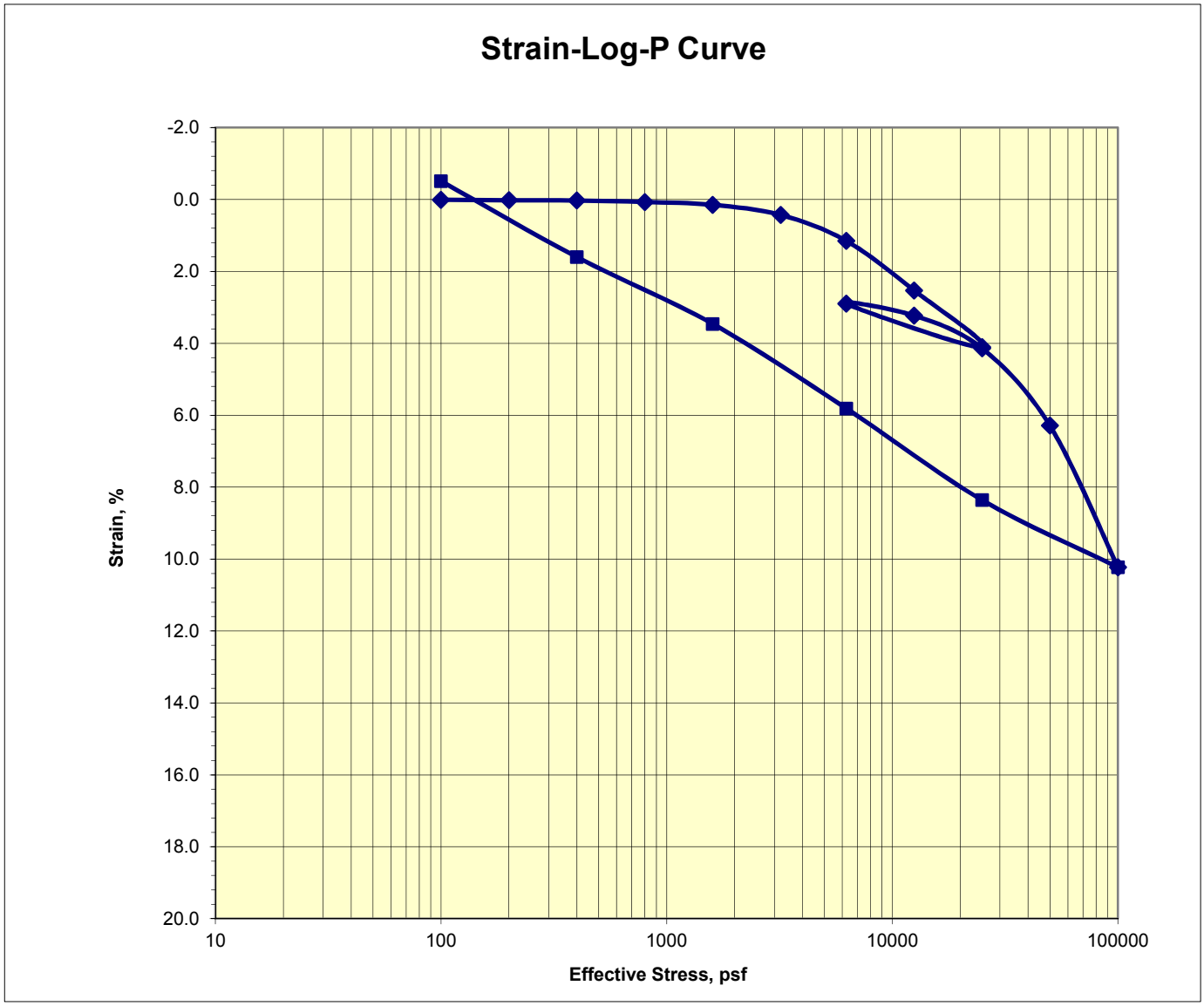
Assumed Gs 2.7	Initial	Final
Moisture %:	14.9	14.5
Dry Density, pcf:	109.3	121.0
Void Ratio:	0.542	0.393
% Saturation:	74.4	100.0

Remarks:

Figure C-32

Consolidation Test
ASTM D2435

Job No.:	010-1107	**Boring:**	B-9	**Run By:**	MD
Client:	Langan	**Sample:**	16	**Reduced:**	PJ
Project:	750636401/700/400	**Depth, ft.:**	390(Tip-4")	**Checked:**	PJ/DC
Soil Type:	Yellowish Brown Fat CLAY			**Date:**	7/20/2017



Assumed Gs 2.75	Initial	Final
Moisture %:	22.0	24.3
Dry Density, pcf:	104.1	102.8
Void Ratio:	0.649	0.669
% Saturation:	93.0	100.0

Remarks:

Figure C-33