APPENDIX C

GEOPLus Laboratory Test Results, sheets C-1 through C-3, Sierra Testing Laboratories, Sunland Analytical Laboratory, and FGL Topsoil Analysis Test Results (6 sheets)

LABORATORY TEST RESULTS

Test Pit No.	Depth (feet)	Dry Unit Weight (lb/ft^3)	Moisture Content (%)	Particle Size / Percentage Passing 3"	3/4"	No. 4	No. 16	No. 30	No. 50	No. 100	No. 200	Atterberg Limits Liquid Limit	Plastic Index	Other Tests
B-17	5													pH = 7.3, min. resistivity = 1,770 ohm-cm, 10 ppm chloride, 3 ppm sulfate
	5.5	96	23											
B-18	1.5	91	24											
	2					100					74	54	34	
	3.5				100	98					33			
	4	92	20											
B-19	1-4											47	28	EI (UBC 18-2) = 53 at γ_d = 99 pcf @ w = 14%
														ASTM D1557: γ_d = 119 pcf @ w + 14.5%
														pH = 7.4, min. resistivity = 1,340 ohm-cm, 16 ppm chloride, 8 ppm sulfate
														swell = 5.5% @ γ_d = 114 pcf @ w + 16.5%
														swell = 5.1% @ γ_d = 116 pcf @ w + 16.5%
	2.5	93	23											
	3	106	20											u_c = 3.2ksf @ 5% strain
	5					39					10			
	8				100	83					16			
B-20	2	97	15											
	3													pH = 7.8, min. resistivity = 1,470 ohm-cm, 6 ppm chloride, 2 ppm sulfate
B-21	3			100		49					13			

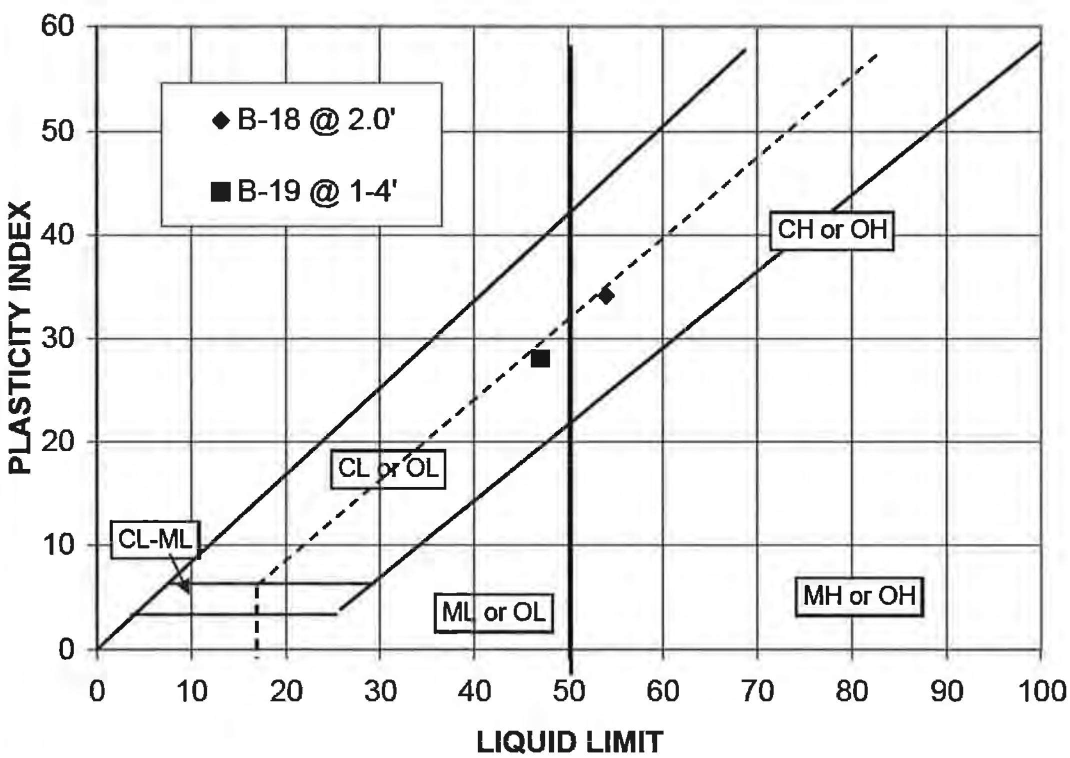
Project No.: 1235
Doc.No.: 07D098
Drafted by: JLF
Date: 12/21/07

GEO Plus

SUMMARY OF LABORATORY TESTS
Wal-Mart Store #2044-03 Expansion
Chico, California

PLATE
C-1

ATTERBERG LIMITS TEST RESULTS



GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL
OL	Organic silts and organic silty clays of low plasticity
ML	Inorganic clayey silts to very fine sands of slight plasticity
CL	Inorganic clays of low to medium plasticity
OH	Organic sillts and clays of medium to high plasticity
MH	Inorganic silts, clayey silts, and sandy silts
CH	Inorganic clays of high plasticity

SAMPLE IDENTIFICATION	DEPTH (feet)	LL	PL	PI
B-18 @ 2.0'	2.0'	54	20	34
B-19 @ 1-4'	1-4'	47	19	28

Note: Test performed in accordance with ASTM D4318

GEO/Plus

Project No.:	1235	Date:	12/13/07
Drafted by:	JLF	Doc#	07D099

ATTERBERG LIMITS

Wal-Mart Store #2044-03 Expansion
Chico, California

PLATE

C-2

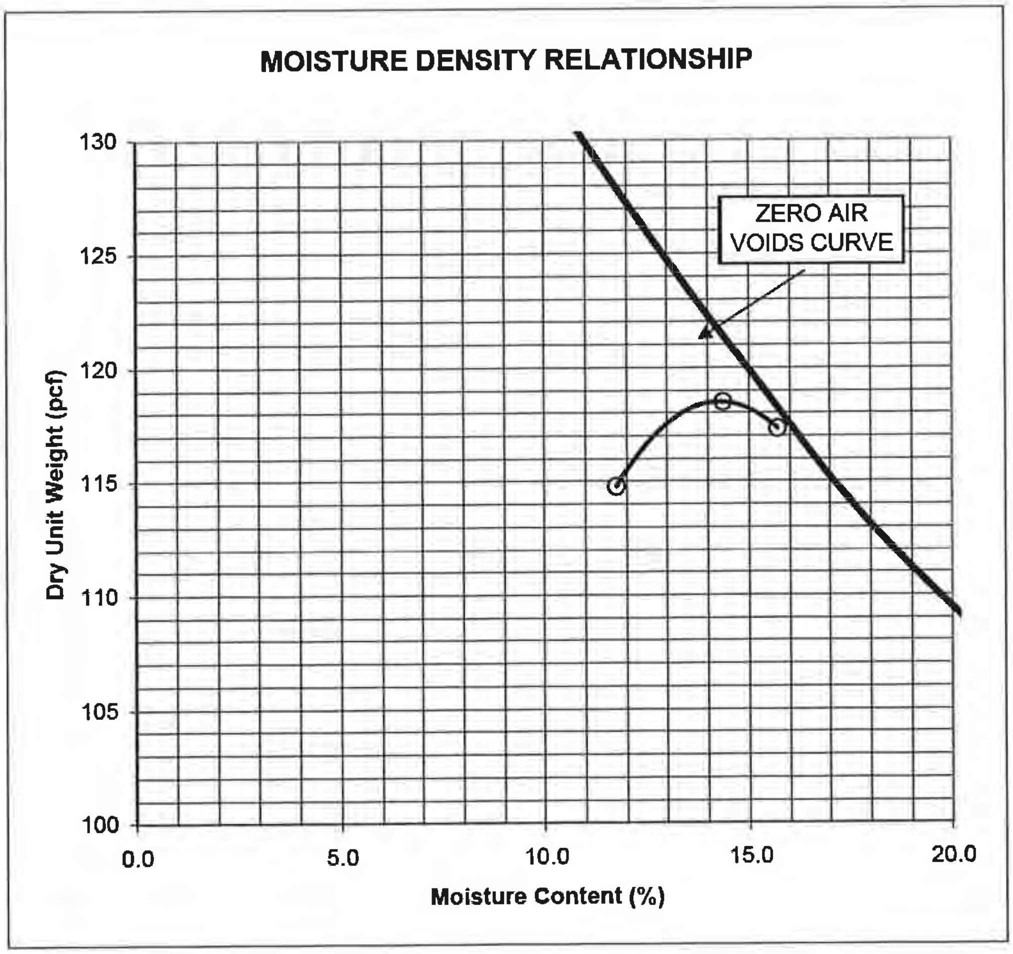
1 of 1

Sample Identification: B-19 @ 1-4 ft.

Visual Soil Classification: Brown, Sandy, Lean/Fat Clay

Screen Size	+ 3/4	+ 3/8	+ No.4	- No. 4
mmulative % Retained	0.5%	2.2%	5.2%	94.8%

ASTM D 1557 Curve Method: A



Maximum Dry Unit Weight (lb/ft^3) 118.5

Optimum Moisture Content (%) 14.5

Gravel Correction Calculations

Gravel Specific Gravity[1] 2.70 **Gravel Absorption[1] (%)** 1.0

Note - 1: Estimated

Percentage Plus 3/4"	5	10	15	20	25	30
Dry Unit Weight (lb/ft^3)	120.3	122.1	124.0	126.0	128.0	130.1
Moisture Content (%)	13.8	13.15	12.5	11.8	11.1	10.45

GEO/Plus

Project No. 1235 Date: 12/11/07
Drafted By TEM Doc. Number 07D100

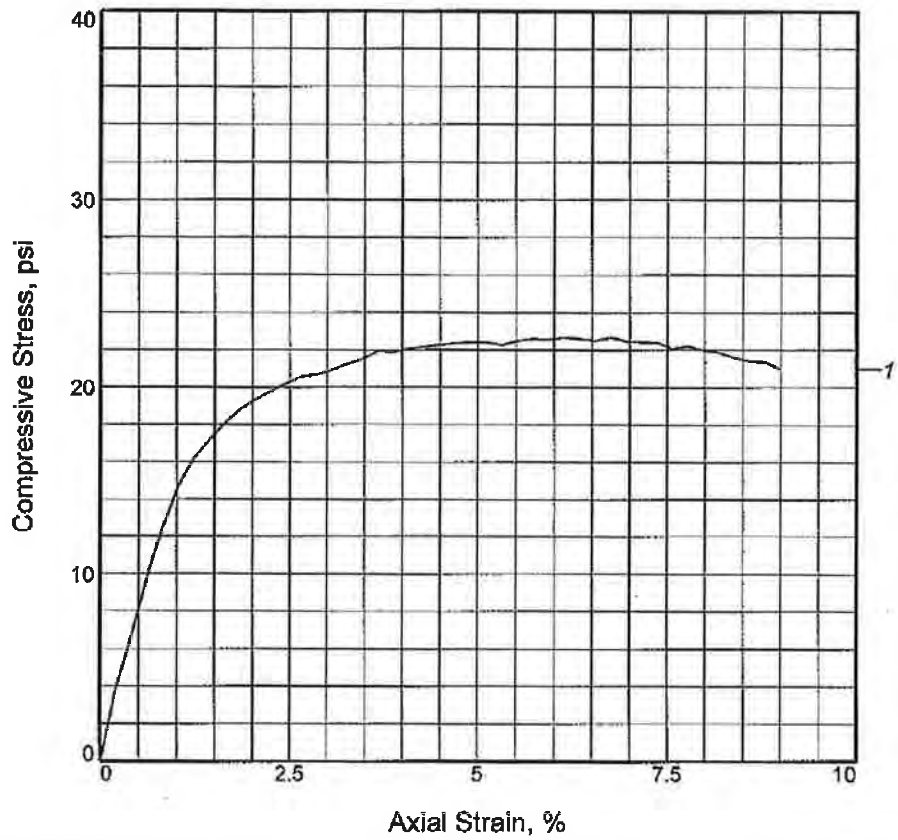
COMPACTION TEST

Wal-Mart Store #2044-03 Expansion
Chico, California

PLATE

C-3

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	22.67			
Undrained shear strength, psi	11.34			
Failure strain, %	6.7			
Strain rate, in./min.	0.03			
Water content, %	20.0			
Wet density, pcf	127.4			
Dry density, pcf	106.2			
Saturation, %	91.8			
Void ratio	0.5866			
Specimen diameter, in.	2.40			
Specimen height, in.	4.89			
Height/diameter ratio	2.04			

Description:

LL =	PL =	PI =	Assumed GS= 2.70	Type: Undisturbed

Project No.: 07-432
Date Sampled: 12/11/07
Remarks:

Figure ________

Client: GeoPlus

Project: Wal-Mart Expansion-Chico #1235
Location: B-19
Sample Number: S2838 **Depth:** 3.0

UNCONFINED COMPRESSION TEST

SIERRA TESTING LABS, INC.

Tested By: JS **Checked By:** JF

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

RECEIVED
DEC 17 2007
GEOPlus, Inc.

Date Reported 12/14/2007
Date Submitted 12/11/2007

To: John Finnigsmier
Geo Plus, Inc.
19690 Hirsch Court #2
Anderson, CA 96007-4941

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1235 WALMART CHICO Site ID : B-17 @ 5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 52289-104543.

EVALUATION FOR SOIL CORROSION

Soil pH	7.33		
Minimum Resistivity	1.77	ohm-cm (x1000)	
Chloride	10.0 ppm	00.00100	%
Sulfate	3.1 ppm	00.00031	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 12/14/2007
Date Submitted 12/11/2007

To: John Finnigsmier
Geo Plus, Inc.
19690 Hirsch Court #2
Anderson, CA 96007-4941

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1235 WALMART CHICO Site ID : B-19 @ 1-4'.
Thank you for your business.

* For future reference to this analysis please use SUN # 52289-104544.

EVALUATION FOR SOIL CORROSION

Soil pH	7.40		
Minimum Resistivity	1.34	ohm-cm (x1000)	
Chloride	15.5 ppm	00.00155	%
Sulfate	8.0 ppm	00.00080	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 12/14/2007
Date Submitted 12/11/2007

To: John Finnigsmier
Geo Plus, Inc.
19690 Hirsch Court #2
Anderson, CA 96007-4941

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1235 WALMART CHICO Site ID : B-20 @ 3'.
Thank you for your business.

* For future reference to this analysis please use SUN # 52289-104545.

EVALUATION FOR SOIL CORROSION

Soil pH	7.81	
Minimum Resistivity	1.47 ohm-cm (x1000)	
Chloride	6.1 ppm	00.00061 %
Sulfate	2.3 ppm	00.00023 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

FRUIT GROWERS LABORATORY, INC.

ANALYTICAL CHEMISTS

December 20, 2007

Geo Plus
19690 Hirsch Court, #2
Anderson, CA 96007

Lab ID : CH 0777205-001
Customer ID : 7-9250

Sampled On : December 7, 2007-:
Sampled By : Corky Metcalf
Received On : December 7, 2007-13:29
Matrix : Soil

Description : GC-1 (G1-G5)
Project : Job #1235

Sample Results - Ag

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Physical Char. BPa								
% Sand	25.6	0.5	%		CSSS47.3	12/11/07:211952	CSSS47.3	12/14/07:212867
% Silt	25.4	0.5	%		CSSS47.3	12/11/07:211952	CSSS47.3	12/14/07:212867
% Clay	49.0	0.5	%		CSSS47.3	12/11/07:211952	CSSS47.3	12/14/07:212867

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (BPa) Bag - Paper Preservatives: N/A

FRUIT GROWERS LABORATORY, INC.

Chad E. Lessard, Soil Scientist

CEL:EHB

CH 0777205

FRUIT GROWERS LABORATORY, INC.

ANALYTICAL CHEMISTS

December 20, 2007

Geo Plus
19690 Hirsch Court, #2
Anderson, CA 96007

Lab ID : CH 0777205-001
Customer ID : 7-9250

Sampled On : December 7, 2007-:
Sampled By : Corky Metcalf
Received On : December 7, 2007-13:29
Matrix : Soil

Description : GC-1 (G1-G5)
Project : Job #1235

Sample Results - Ag

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Soil BPa								
Saturation	69.0	0.1	%		UCS:2.0	12/12/07:211975	SA1:7-2	12/12/07:212751
pH	6.12	--	units		UCS:2.0	12/12/07:211975	SA2:12.2	12/13/07:212776
Soil Salinity (ec)	0.52	0.01	mmhos/cm		UCS:2.0	12/12/07:211975	WS 51.20	12/13/07:212795
SAR	0.3	0.1	meq/L		UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Limestone	< 0.1	0.1	%		USDAH23A	12/12/07:211974	USDAH23A	12/18/07:212966
Calcium, Soluble	2.8	0.1	meq/l	45.9%	UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Magnesium, Soluble	2.7	0.16	meq/l	44.3%	UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Sodium, Soluble	0.50	0.087	meq/l	8.2%	UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Potassium, Soluble	0.10	0.026	meq/L	1.6%	UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Chloride	0.86	0.01	meq/l		UCS:2.0	12/12/07:211975	WS 51.40	12/13/07:212799
Sulfate	0.4	0.1	meq/l		UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Nitrate Nitrogen	1.7	0.9	ppm		SA2:9-3	12/12/07:211977	4500NO3F	12/14/07:212865
Phosphorus	9	2	ppm		USC:12.0	12/12/07:211976	UCS:12.1	12/18/07:212952
Boron	0.03	0.02	ppm		UCS:2.0	12/12/07:211975	6010-Ag	12/14/07:212881
Zinc	1.4	0.1	ppm		SA2:19-3	12/12/07:211978	6010-Ag	12/13/07:212836
Manganese	38.9	0.1	ppm		SA2:19-3	12/12/07:211978	6010-Ag	12/13/07:212836
Iron	46.4	0.2	ppm		SA2:19-3	12/12/07:211978	6010-Ag	12/13/07:212836
Copper	2.6	0.1	ppm		SA2:19-3	12/12/07:211978	6010-Ag	12/13/07:212836
CEC	34.3	0.01	meq/100g		UCS:2.0	12/12/07:211975	SA2:12.2	12/13/07:212776
Exchangeable Calcium	18.1	0.1	meq/100g		SA2:9-3	12/12/07:211977	6010-Ag	12/13/07:212816
Exchangeable Magnesium	15.6	0.16	meq/100g		SA2:9-3	12/12/07:211977	6010-Ag	12/13/07:212816
Exchangeable Potassium	0.47	0.026	meq/100g		SA2:9-3	12/12/07:211977	6010-Ag	12/13/07:212816
Exchangeable Sodium	0.16	0.087	meq/100g		SA2:9-3	12/12/07:211977	6010-Ag	12/13/07:212816
Exchangeable Hydrogen	ND	0.01	meq/100g		UCS:2.0	12/12/07:211975	SA2:12.2	12/13/07:212776
% Organic Matter	3.01	0.01	%		993.13	12/17/07:212158	993.13	12/18/07:212964

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (BPa) Bag - Paper Preservatives: N/A

FRUIT GROWERS LABORATORY, INC.

Chad E. Lessard, Soil Scientist

CEL:EHB

CH 0777205

Corporate Offices & Laboratory
P.O. Box 272 / 853 Corporation Street
Santa Paula, CA 93061-0272
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Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-0182

Office & Laboratory
563 East Lindo Avenue
Chico, CA 95926
TEL: (530) 343-5818

Field Office
Visalia, California
TEL: (559) 734-9473
FAX: (559) 734-8435

Geo Plus

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name:	FGL Environmental, Inc.	Analytical Report:	Page 1 of 5
Contact:	Shawn Peck	Project Name:	No Project
Address:	P.O. Box 272	Project Number:	777205 (7-9250)
	Santa Paula, CA 93060	**Work Order Number:**	**A7L0956**
Report Date:	26-Dec-2007	Received on Ice (Y/N):	Yes Temp: 11 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	Matrix	Date Sampled	By	Date Submitted	By
A7L0956-01	777205 (7-9250) 1 Job #1235/Comp Of G1-G5	Solid	12/07/07 13:00	Corky Metcalf	12/11/07 09:10	Courier (CA/ON)

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Shawn Peck
Address: P.O. Box 272
Santa Paula, CA 93060

Report Date: 26-Dec-2007

Project Name: No Project
Project Number: 777205 (7-9250)

Work Order Number: A7L0956
Received on Ice (Y/N): Yes Temp: 11 °C

Laboratory Reference Number
A7L0956-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
777205 (7-9250) 1 Job #1235/Comp Of G1-G5	Solid	12/07/07 13:00	12/11/07 9:10

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Chlorinated Herbicides by EPA 8151A							
2,4,5-T	ND	100	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
2,4-D	ND	100	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
2,4,5-TP Silvex	ND	100	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
2,4-DB	ND	400	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
Dalapon	ND	200	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
Dicamba	ND	50	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
Dichlorprop	ND	400	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
Dinoseb	ND	100	ug/kg	EPA 8151A	12/20/07 12:39	ETL	
Surrogate: DCAA	*72.8 %*	*10-117*		EPA 8151A	12/20/07 12:39	ETL	

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Shawn Peck
Address: P.O. Box 272
Santa Paula, CA 93060

Report Date: 26-Dec-2007

Project Name: No Project
Project Number: 777205 (7-9250)

Work Order Number: A7L0956
Received on Ice (Y/N): Yes   Temp: 11 °C

Chlorinated Herbicides by EPA 8151A - Batch Quality Control

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch 7L18006 - EPA 3550B										
Blank (7L18006-BLK1)				Prepared: 12/18/07 Analyzed: 12/20/07						
2,4,5-T	ND	100	ug/kg							
2,4-D	ND	100	ug/kg							
2,4,5-TP Silvex	ND	100	ug/kg							
2,4-DB	ND	400	ug/kg							
Dalapon	ND	200	ug/kg							
Dicamba	ND	50	ug/kg							
Dichlorprop	ND	400	ug/kg							
Dinoseb	ND	100	ug/kg							
Surrogate: DCAA	*3380*		ug/kg	*5000*		*67.6*	*10-117*			
LCS (7L18006-BS1)				Prepared: 12/18/07 Analyzed: 12/20/07						
2,4,5-T	454	100	ug/kg	500		90.9	15-110			
2,4-D	398	100	ug/kg	500		79.6	14-110			
2,4,5-TP Silvex	426	100	ug/kg	500		85.1	10-124			
2,4-DB	56.8	400	ug/kg	500		11.4	10-110			
Dalapon	448	200	ug/kg	500		89.5	44-120			
Dicamba	446	50	ug/kg	500		89.2	34-125			
Dichlorprop	421	400	ug/kg	500		84.2	16-118			
Dinoseb	429	100	ug/kg	500		85.7	43-117			
Surrogate: DCAA	*3050*		ug/kg	*5000*		*60.9*	*10-117*			
LCS Dup (7L18006-BSD1)				Prepared: 12/18/07 Analyzed: 12/20/07						
2,4,5-T	425	100	ug/kg	500		85.1	15-110	6.60	49	
2,4-D	375	100	ug/kg	500		75.0	14-110	5.91	39	
2,4,5-TP Silvex	424	100	ug/kg	500		84.8	10-124	0.433	41	
2,4-DB	44.9	400	ug/kg	500		8.97	10-110	23.5	60	QLrpd
Dalapon	500	200	ug/kg	500		100	44-120	11.1	28	
Dicamba	475	50	ug/kg	500		95.0	34-125	6.26	34	
Dichlorprop	407	400	ug/kg	500		81.4	16-118	3.29	28	
Dinoseb	449	100	ug/kg	500		89.8	43-117	4.67	31	
Surrogate: DCAA	*2880*		ug/kg	*5000*		*57.5*	*10-117*			

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: FGL Environmental, Inc.
Contact: Shawn Peck
Address: P.O. Box 272
Santa Paula, CA 93060

Report Date: 26-Dec-2007

Project Name: No Project
Project Number: 777205 (7-9250)

Work Order Number: A7L0956
Received on Ice (Y/N): Yes Temp: 11 °C

Chlorinated Herbicides by EPA 8151A - Batch Quality Control

Analyte(s)	Result	RDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch 7L18006 - EPA 3550B										
Matrix Spike (7L18006-MS1)	**Source: A7L0956-01**			Prepared: 12/18/07		Analyzed: 12/20/07				
2,4,5-T	404	100	ug/kg	500	ND	80.7	24-110			
2,4-D	396	100	ug/kg	500	ND	79.2	10-125			
2,4,5-TP Silvex	387	100	ug/kg	500	ND	77.4	22-115			
2,4-DB	145	400	ug/kg	500	ND	29.0	10-110			
Dalapon	434	200	ug/kg	500	ND	86.7	28-133			
Dicamba	408	50	ug/kg	500	ND	81.6	24-122			
Dichlorprop	407	400	ug/kg	500	ND	81.3	26-118			
Dinoseb	385	100	ug/kg	500	ND	76.9	40-113			
Surrogate: DCAA	*3030*		ug/kg	*5000*		*60.7*	*10-117*			
Matrix Spike Dup (7L18006-MSD1)	**Source: A7L0956-01**			Prepared: 12/18/07		Analyzed: 12/20/07				
2,4,5-T	422	100	ug/kg	500	ND	84.3	24-110	4.40	48	
2,4-D	430	100	ug/kg	500	ND	86.1	10-125	8.35	37	
2,4,5-TP Silvex	432	100	ug/kg	500	ND	86.4	22-115	11.0	54	
2,4-DB	132	400	ug/kg	500	ND	26.5	10-110	8.94	56	
Dalapon	449	200	ug/kg	500	ND	89.8	28-133	3.48	53	
Dicamba	442	50	ug/kg	500	ND	88.3	24-122	7.85	41	
Dichlorprop	454	400	ug/kg	500	ND	90.8	26-118	11.1	38	
Dinoseb	426	100	ug/kg	500	ND	85.2	40-113	10.2	22	
Surrogate: DCAA	*3550*		ug/kg	*5000*		*70.9*	*10-117*			

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name:	FGL Environmental, Inc.	Analytical Report:	Page 5 of 5
Contact:	Shawn Peck	Project Name:	No Project
Address:	P.O. Box 272 Santa Paula, CA 93060	Project Number:	777205 (7-9250)
		Work Order Number:	**A7L0956**
Report Date:	26-Dec-2007	Received on Ice (Y/N):	Yes Temp: 11 °C

Notes and Definitions

QLrpd The LCS recovery and LCS/LCSD RPD met laboratory acceptance criteria. LCSD recovery was not within range.

ND: Analyte NOT DETECTED at or above the Method Detection Limit **(if MDL is reported)**, otherwise at or above the Reportable Detection Limit (RDL)

NR: Not Reported

RDL: Reportable Detection Limit

MDL: Method Detection Limit

* / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted. Babcock Laboratories and its officers and employees assume no responsibility and make no warranty, express or implied, for uses or interpretations made by any recipients, intended or unintended, of this report.

Humaira Saleem

☑ Project Manager ☐ Allison Mackenzie General Manager ☐ Lawrence J. Chrystal Laboratory Director

cc:

ESB_Standard_5.5 Report

FRUIT GROWERS LABORATORY

CHAIN OF CUSTODY
AND ANALYSIS REQUEST DOCUMENT

ORIGINAL

CLIENT DETAILS — SECTION I

Client: X Geo Plus
X New Customer
Customer Number: 7-9250
Address: X
Phone: X
FAX:
Project name: Job # 1235
Contact person:
Billing Information (if different from above)
Name
Addr
Phon
FAX
Cont
Purc

(7-9250)
Geo Plus
CH 0777205
SNF-12/11/2007-14:30:07

SAMPLING — SECTION II

Sampler (s): ~~Frazer~~ Metcalf "Conrad"
Date of Sampling: ~~Corr~~ Comp: 12/7/07
Time:
Mileage:

REPORT INFORMATION — SECTION III

Rush Analysis : 5 Days ____ 7 Days ____
Subject to surcharge
QA/QC report required : yes ____
Tissue Monitoring Required: yes ____
Lab number : CH0777205
Lab Loc: SP ☐ STK ☐ VI ☐

SAMPLE INFORMATION — SECTION IV

Sample Number	Location/Description	Date of Planting	Crop	Growth Stage	Sample Depth
1	Composite Sample: GC-1 (G1-G5)				

SAMPLE INFO

- Recommendations: Yes (Y) No (N) Preplant (PP)
- Soil Texture: Light (L) Medium (M) Heavy (H)
- Irrigation: Solid Set Sprinklers (SSS) Dragline Sprinklers (DLS) Furrow (F) Fanjet (FJ) Flood (FL) Drip (DP) Fogger (FO)
- Plant Condition: Very Good (VG) Good (G) Fairly Good (FG) Fair (F) Poor (P)

ANALYSES REQUESTED

Analysis	Sample 1
SOIL ANALYSES: [illegible] Soil Suitability	X
Basic Soil	
Gypsum Requirement	
Organic Materials Analysis	
Other: Specify [illegible]	X
PLANT TISSUE ANALYSES: Comprehensive Leaf	
Comprehensive Petiole	
Basic Leaf	
Basic Petiole	
Other: Specify	
OTHER ANALYSES: Whole Fruit	
Soil Amendments	
Fertilizers	
PATHOLOGY: Citrus Phytophthora	
Citrus Nematode	
Avocado Phytophthora PCinn ____ PCit ____	
Disease Assay	
IRRIGATION SUITABILITY	
Sub Contract - Babcock Chlorinated Phenoxy Herbicides	2

REMARKS — SECTION V

~~No optimum [illegible] Rpt~~
~~[illegible]~~
~~No Recommendations NO Crop.~~

CUSTODY — SECTION VI

Relinquished by and subject to the terms and conditions on the reverse of this document:

	Signature	Print Name	Date	Time
Relinquished by:	[signature]	TEMETCALF, JR	12-07-07	13:29
Received by:				
Relinquished by:	[signature]			
Received by:	Cal Over		12/10	1730

APPENDIX D

Twining Laboratories Ins., 1992 Geotechnical Investigation Report

The Twining Laboratories, Inc.
Since 1898
Geotechnical and Environmental Consultants • Engineering and Chemical Laboratories

GEOTECHNICAL ENGINEERING INVESTIGATION

PROPOSED WAL-MART STORE

CHICO, CALIFORNIA

TL 492-0200-01

For:

Wal-Mart Stores, Inc.
c/o CEI Engineering
4630 West Jacquelyn, Suite 110
Fresno, California

December 15, 1992

☐ 2527 Fresno Street • P.O. Box 1472
Fresno, California 93716 • (209) 268-7021

☐ 9401 West Goshen Avenue
Visalia, California 93291 • (209) 651-2190

☐ 1405 Granite Lane, Suite 1

☐ 3701 Pegasus Drive, Suite 124

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage,* to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

December 15, 1992 TL 492-0200-01

Wal-Mart Stores, Inc.
C/O CEI Engineering
4630 West Jacquelyn, Suite 110
Fresno, California

Attention: Mr. Stephen Kazmer

Subject: Geotechnical Engineering Investigation
Proposed Wal-Mart Store
Chico, California

Dear Mr. Kazmer:

We are pleased to submit this geotechnical engineering investigation report prepared for the proposed Wal-Mart store to be located in Chico, California. The contents of the report include the purpose of the investigation, scope of services, background information, investigative procedures, our findings, evaluation, conclusions and recommendations.

We recommend that those portions of the plans and specifications that pertain to earthwork, foundations and pavements be reviewed by Twining to verify that they are consistent with our recommendations. This additional service is part of this current contractual agreement and the client should provide these documents for our review prior to their issuance for construction bidding purposes.

It is recommended that Twining be retained to provide inspection and testing services for the excavation, earthwork, foundation and pavement phases of construction. These services are necessary to determine that the subsurface conditions are compatible with those used in the analysis and formulation of recommendations for this project, and that construction is compatible with our recommendations. This additional service is not, however, part of this current contractual agreement. We would appreciate the opportunity to provide a proposal for this service after construction documents are completed. We will have Mr. Ron Reese with our Fresno office (209-268-7021) contact you in the near future regarding these services.

We appreciate the opportunity to be of service to CEI Engineering and Wal-Mart Stores, Inc. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,

THE TWINING LABORATORIES, INC.

David R. Ansolabehere
Staff Engineer
Geotechnical Engineering Division

DRA/mv

EXECUTIVE SUMMARY

We understand that the proposed project will consist of the construction of a 124,809 square foot building with a 30,000 square foot expansion area. The structure will be a one-story, masonry block building with a concrete slab-on-grade floor. The proposed construction will also include approximately 8.5 acres of paved parking and driveways.

The investigation was authorized by a written agreement between The Twining Laboratories, Inc. and CEI Engineering, dated September 21, 1992. The agreement was signed on behalf of CEI Engineering by Mr. Tim Martin.

During the geotechnical field investigation, 13 test borings were drilled in the area of the proposed structure and 11 test borings were drilled in the proposed parking area. Soil samples were collected and returned to our laboratory for classification and testing.

Based on the results of the field and laboratory investigations, the soils encountered consisted of lean clays from the surface to depths ranging from about 2.5 to 7.5 feet BSG, underlain by clayey gravels and cobbles to the maximum depths explored, approximately 11.5 feet BSG. Auger refusal was encountered in very dense clayey gravels and cobbles before the proposed 20 foot depth was obtained. These soils are underlain by a very dense partially cemented alluvium and volcanic mud flow. The near surface soils are generally very stiff to hard clays and exhibit low to moderate shrink/swell potential with cyclic moisture fluctuations.

From a geotechnical standpoint, the site is suitable for the proposed construction with regard to support of shallow spread foundations, concrete slabs-on-grade and pavements, provided the recommendations contained in this report are followed.

Shallow spread foundations supported at a minimum depth of 30 inches below adjacent site grade can provide adequate support for the proposed structure. Interior floor slabs may be supported on a minimum of 12 inches of non-expansive, granular fill or lime treated native soils. Exterior flatwork should be supported on a minimum of 12 inches of non-expansive, granular engineered fill soils. The near-surface native soils in the proposed parking area exhibit poor support characteristics for pavements.

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GEOTECHNICAL ENGINEERING INVESTIGATION

PROPOSED WAL-MART STORE

CHICO, CALIFORNIA

Project Number: TL 492-0200-01

1.0 INTRODUCTION

This report presents the results of a geotechnical engineering investigation for a proposed Wal-Mart store to be located in Chico, California. The investigation was authorized by a written agreement between The Twining Laboratories, Inc. (Twining) and CEI Engineering (CEI), dated September 21, 1992. The agreement was signed on behalf of CEI Engineering by Mr. Tim Martin.

The contents of the report include the purpose of the investigation and the scope of services provided. Background information regarding the site history, previous studies, existing site features and anticipated construction are discussed. In addition, a description of the investigative procedures used and the subsequent findings obtained are presented. Finally, the report provides an evaluation of the findings, general conclusions and related recommendations. The four report appendices contain the drawings (Appendix A), the logs of borings (Appendix B), the results of laboratory tests (Appendix C) and Wal-Mart Geotechnical fact sheets (Appendix D).

The Geotechnical Engineering Division of Twining, located in Fresno, California, performed the investigation.

2.0 PURPOSE AND SCOPE OF INVESTIGATION

The purpose of the investigation was to conduct a field exploration and laboratory testing program, evaluate the data collected during the field and laboratory portions of the investigation and provide geotechnical engineering design parameters for use in project design and construction specifications. A previous geotechnical engineering investigation (our reference TL 489-0633-01, dated January 5, 1989) had been conducted at this site by our firm. However, the proposed location of the structure has been moved, therefore, this report is provided specifically for the location and structure referenced in the anticipated construction. This geotechnical report supersedes the previous report dated January 5, 1989. The intent of the investigation was to comply with the geotechnical investigation report specifications (dated September 1992) provided by Wal-Mart Stores, Inc.

This investigation did not include a geologic hazards evaluation, flood plain investigation, compaction tests, environmental investigation or environmental audit.

Our proposal (TLP 492-131-01, dated September 15, 1992) outlined the scope of our services. The actions taken during the investigation are summarized as follows:

I. **A site grading plan for the proposed project (Sheet 4 of 7), prepared by CEI Engineering, dated October 22, 1992 was reviewed.** In addition, a geotechnical engineering investigation report dated January 5, 1989 and an environmental audit report dated October 23, 1989, both performed for the proposed project by Twining, were reviewed.

II. A site reconnaissance and a subsurface exploration were conducted.

III. Laboratory tests were conducted to determine selected physical and engineering properties of the subsurface soils.

IV. Mr. Steve Kazmer (CEI), Mr. Mike Sonnefeld (Wal-Mart Stores, Inc.), Mr. Tim Besser (Besser Drilling) and Professor Bill Guyton (Professor at California State University, Chico) were consulted during the investigation.

V. The data obtained from the investigation were evaluated to develop an understanding of the subsurface conditions and engineering properties of the subsoils. Conclusions and recommendations were developed for project design and preparation of construction specifications.

VI. This report was prepared.

3.0 BACKGROUND INFORMATION

The site history, previous studies, existing site features and the anticipated construction are summarized in the following subsections.

3.1 Site History: Prior to our investigation, the site appears to have been undeveloped land and used for agricultural purposes, i.e. cattle grazing. This assumed former use was substantiated by interviews with individuals familiar with the property referenced in our environmental audit report, dated October 23, 1989.

3.2 Previous Studies: Our firm previously performed a geotechnical engineering investigation and environmental audit for the proposed project. Based on discussions with Mr. Steve Kazmer, we understand that the proposed store will be moved about 200 feet to the west, from the proposed location of the structure referenced in our January 5, 1989 geotechnical engineering investigation report. In addition, the proposed parking area will be located east of the proposed store site rather than north of the proposed store, as referenced in our previous geotechnical engineering investigation report.

3.3 **Site Description**: The project site is located west of the intersection of Forest Avenue and Parkway Village Drive in Chico, California. The site is located in Butte County and at evaluations ranging from approximately 223 to 230 feet above mean sea level. A site location map is presented on Drawing No. 1 in Appendix A. The project site comprises approximately 12 acres. The site was bound to the north by undeveloped land and commercial buildings; to the east by undeveloped land and Forest Avenue; to the south by undeveloped land; and to the west by undeveloped land and State Highway 99.

At the time of the field investigation, the topography of the project site was relatively level. The site was covered with dry grasses, gravels and cobbles and scattered rodent holes. An unlined drainage ditch, approximately 4 to 6 feet in depth, extended along the western and southern perimeters of the site. At the time of the field investigation, no water was noted in the drainage ditch. Wire fences were located east and west of the western drainage ditch. Power poles were noted along the southern perimeter of the site. Based on our review of the site plan, we understand that an underground water line is located along the northern perimeter of the site, which is not within the proposed store location.

3.4 <u>Anticipated Construction</u>: We understand that design of the proposed building is currently underway, and final structural details for the proposed structure have not been finalized. However, design details outlined in the geotechnical investigation report specifications (dated September 1992) provided by Wal-Mart Stores, Inc. and on the site plan indicate that the proposed construction will consist of a 124,809 square foot structure. In addition, a 30,000 square feet expansion area, a lawn and garden center and a T.B.O. structure will be included.

The store super-structure will be a combination of load bearing concrete block walls and steel columns supporting roof loads by means of steel joist girders and steel bar joists. A maximum column load, due to severe live loading, of 140 kips is anticipated; however, interior and exterior column loads of 65 kips and 50 kips, respectively, are typical. A minimum column spacing of 38 feet is anticipated. Bearing wall loads ranging from between 4 and 6 kips per linear foot are anticipated. The maximum uniform floor slab load will be 125 pounds per square foot, and the maximum concentrated floor slab load will be 5 kips. A total maximum settlement of 1 inch is considered tolerable. The maximum allowable differential settlement for masonry walls shall be 0.5 inches in 40 linear feet of wall. The maximum allowable differential settlement between interior slabs and interior isolated footings shall be 1 inch in 40 feet. The maximum differential vertical movement between the exterior walls and the adjacent floor slabs shall be 0.5 inch.

The proposed T.B.O. structure is estimated to be founded at a depth of 9 feet below site grade. In addition, the slabs-on-grade will be constructed over a minimum of 6-inches of crushed stone/rock to provide an all-weather construction surface. The all-weather surface is constructed by placing a 3 inch layer after the building pad is constructed and a final 3 inch layer prior to the placement of the slabs-on-grade.

The proposed development will include driveways and parking for automobile and heavy truck traffic. Equivalent 18 kip axle loads (EAL) of 14,600 (two 18 kip EAL per day) and 51,100 (seven 18 kip EAL per day) for a design life of 20 years were recommended for design of "standard duty" and "heavy duty" pavement sections, respectively, by Wal-Mart Stores, Inc.

Based on the site grading plan (dated October 22, 1992), the landscaped areas are located in the proposed parking areas and not around the perimeter of the proposed store structure.

Grading plans for the proposed site indicate that the building pad will be raised approximately 2.5 feet in the north portion and 4.5 feet in the south portion to achieve rough pad grade. Based on the grading plan, finish floor elevation should be 227.50 feet above mean sea level. In addition, cuts in the area of the basin located west of the proposed building are estimated to be about 4 feet, and cut in the parking areas could be as much as about 2 feet. However, based on consultations with Mr. Mike Sonnefeld and Mr. Steve Kazmer, the basin may not be constructed. This earthwork is expected to achieve a level building pad and provide positive site drainage.

4.0 INVESTIGATIVE PROCEDURES

The field exploration and laboratory testing program conducted for this investigation are summarized in the following subsections.

4.1 Field Exploration: The field exploration consisted of a site reconnaissance, drilling test borings, soil sampling and standard penetration tests.

4.1.1 Site Reconnaissance: The site reconnaissance consisted of walking the site and noting visible surface features. The features noted are described in the background information.

4.1.2 Test Borings: The depth and location of test borings were selected based on the size of the structure, type of construction, depth of influence of surface loads, subsurface conditions and minimum requirements provided by Wal-Mart Stores, Inc.

On November 2, 3 and 4, 1992, twenty-four (24) test borings were drilled in the proposed locations of the building and pavement areas to depths of between 2.5 and 11.5 feet (BSG). Auger refusal due to very dense clayey gravels and cobbles was encountered at each test boring location. In addition, four (4) bulk samples of soil were obtained for Resistance (R)-value, expansion index and moisture-density relationship tests. The test boring and bulk sample locations are shown on Drawing No. 2 in Appendix A. Under the direction of a Twining staff engineer, the test borings were drilled using a CME-75 drill rig equipped with 6-5/8 inch outside diameter (O.D.) hollow stem augers. The soils encountered in the test borings were logged. The field soil classification was in accordance with the Unified Soil Classification System and consisted of particle size, color and other distinguishing features of the soil. Standard penetration tests were conducted and both disturbed and undisturbed soil samples were obtained.

Test boring locations were determined by measuring wheel with reference to the centerlines of the intersection of Forest Avenue and Parkway Village Drive and should be considered accurate to within 15 feet. Elevations of the test borings were not measured as a part of the investigation. The locations of the test borings are described on the boring logs in Appendix B. The test borings were loosely backfilled with material excavated during the drilling operations; thus, some settlement can be expected.

4.1.3 **Soil Sampling:** The standard penetration resistance, N-value, is defined as the number of blows required to drive a standard split barrel sampler into the soil. The standard split barrel sampler has a 2 inch O.D. and a 1-3/8 inch inside diameter (I.D.). The sampler is driven by a 140 pound weight free falling 30 inches. The sampler is lowered to the bottom of the bore hole and set by driving it an initial 6 inches. It is then driven an additional 12 inches, and the number of blows required to advance the sampler the additional 12 inches is recorded as the N-value.

Relatively undisturbed soil samples for laboratory tests were obtained by pushing a California modified split barrel ring sampler into the soil. The soil was retained in brass rings, 2.5 inches O.D. and 1 inch in height. The lower 6 inch portion of the samples were placed in close-fitting, plastic, air-tight containers which, in turn, were placed in cushioned boxes for transport to the laboratory.

Soil samples obtained were taken to Twining's Fresno laboratory for classification and testing.

The presence and the level of free water in the borings were noted and recorded during drilling and immediately following completion of borings.

4.2 <u>Laboratory Testing</u>: The laboratory testing was programmed to determine selected physical and engineering properties of the soils underlying the site. The tests were conducted on disturbed and undisturbed samples representative of the subsurface material.

These Included:	To Determine:
Natural Moisture (ASTM D2116)................	moisture contents representative of field conditions at the time the sample was taken.
Natural Density............ (ASTM D2116)	dry unit weight of sample representative of in-situ or in-place undisturbed condition.

Atterberg Limits (ASTM D4318)................	the consistency and "stickiness", as well as the range of moisture contents within which the material is "workable".
Grain-Size Distribution (ASTM D422)..................	size and distribution of soil particles, i.e., clay, silt, sand, and gravel.
Direct Shear (ASTM D3080)................	soil shearing strength under varying loads and/or moisture conditions. For use in foundation design.
Unconfined Compressive Strength (ASTM D2166).......	General soil strength characteristics.
Consolidation (ASTM D2435)................	the amount and rate at which a soil sample compresses when loaded, and the influence of saturation on its behavior. For use in settlement analysis and foundation design.
Moisture-Density Relationship (ASTM D1557-78).............	the optimum (best) moisture content for compacting soil and the maximum dry unit weight (density) for a given compactive effort.
Expansion Index (UBC 29-2)..................	swell potential of soil with increases in moisture content.
R-Value (CA-301)...........	the capacity of a subgrade or subbase to support a pavement section designed to carry a specified traffic load.
Sulfate Content (Method A1000MOD)...........	percentage of water-soluble sulfate as (SO_4) in soil samples. Used as an indication of the relative degree of sulfate attack on concrete and for selecting the cement type.

Chloride Content (Method A1000MOD...........	percentage of soluble chloride content in soil. Used to evaluate the potential attack on encased reinforcing steel.
Resistivity (Method DOT 424)............	the potential of the soil to corrode metal.
pH (Method 150.1)	the acidity or alkalinity of subgrade material.

The results of laboratory tests are summarized on plates 1 through 11 in Appendix C. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

5.0 FINDINGS AND RESULTS

The findings and results of the field exploration and laboratory testing are summarized in the following subsections.

5.1 Soil Profile: The subsurface soils encountered generally consist of very stiff to hard lean clays from the surface to depths ranging from about 2.5 to 7.5 feet BSG, underlain by clayey gravels and cobbles to a depth of about 11.5 feet BSG, the maximum depth explored. All test borings were drilled to auger refusal.

Based on information from Professor Guyton, the clayey gravel and cobble stratum which was encountered at auger refusal is known as the Chico fan. This fan consists of alluvial deposits from erosion of the Tuscan Formation. This alluvium extends to a depth of about 50 feet BSG. These soils are underlain by the Tuscan Formation. This formation is a volcanic mud flow and contains basalt and andesite boulders. This information was substantiated by discussions with Mr. Tim Besser (waterwell driller) who has performed work near the project location.

The foregoing is a general summary of the soil conditions encountered in the test borings drilled for this investigation. Detailed descriptions of the soils encountered at each test boring are presented on the logs of borings in Appendix B. The stratification lines shown on the logs represent the approximate boundary between soil types; the actual in-situ transition may be gradual.

5.2 Soil Engineering Properties: The lean clays are very stiff to hard as indicated by standard penetration resistance, N-values ranging from 22 to over 100 blows per foot. The natural moisture content of the soils ranged from 8 to 22 percent and the dry density ranged from 89 to 103 pounds per cubic foot. Maximum dry density/optimum moisture determinations performed on two near-surface soil samples indicated maximum dry densities of 117.7 and 129.5 pounds per cubic foot, with optimum moisture contents of 15.9 and 9.1 percent, respectively. A direct shear test performed on one soil sample indicated an angle of internal friction of 30 degrees, with a cohesion of 400 pounds per square foot. An unconfined compression test performed on one sample indicated an unconfined compressive strength of 9.5 kips per square foot. The soils exhibited low compressibility characteristics with the addition of moisture as indicated by one consolidation test (about 3.8 percent consolidation under a load of 8 kips per square foot).

Under natural moisture, the soils exhibited moderate compressibility as indicated by one consolidation test (about 5.2 percent consolidation under a load of 8 kips per square foot). The soils exhibit a low expansion potential as indicated by an expansion index of 20. This characteristic was substantiated by the results of two consolidation tests which showed an expansion of approximately 4.6 percent under a load of 0.1 kips per square foot and 3.2 percent expansion under a load of 0.3 kips per square foot (existing overburden pressure) when inundated with water. The clays are moderately plastic as indicated by liquid limits of 46 and 50 percent and plasticity indices of 32 and 25 percent, respectively.

The clayey gravels are very dense as indicated by N-values of over 100 blows per foot. The natural moisture content of the soils ranged from 6 to 19 percent and the dry density of one sample was 90 pounds per cubic foot.

5.3 **Groundwater Conditions**: Groundwater was not encountered in the test borings drilled at the time of the field investigation (November 2, 3 and 4, 1992). It should be recognized, however, that water table elevations fluctuate with time, since they are dependent upon seasonal precipitation, irrigation, land use and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered both during the construction phase and the design life of the project. The evaluation of such factors is beyond the scope of this report.

6.0 EVALUATION

The data and methodology used to develop conclusions and recommendations for project design and preparation of construction specifications are summarized in the following subsections. The evaluation was based upon the subsurface conditions determined from the investigation and our understanding of the proposed construction.

6.1 Soil Conditions: In general, the near-surface soils exhibit moderate shear strength and consolidation characteristics under the anticipated structural loads. In addition, the clays exhibit low to moderate shrink/swell potential. From a geotechnical standpoint, the primary consideration for this project is the shrink/swell potential of the near-surface clays.

Over time the near surface clays will experience cyclic drying and wetting as the dry and wet seasons pass. However, at most sites there exists a depth to which the moisture content of the subgrade remains essentially constant throughout the year; thus, the clays would not undergo a significant volume change below this depth. Therefore, the depth, referred to as the "critical depth", to which significant moisture fluctuation occurs influences the selection of suitable foundation alternatives for this site. Climatic conditions, groundwater conditions and the soil conditions effect the critical depth. A plot of the moisture content results from all samples obtained indicated that the moisture in soils remained essentially consistent below a depth of about 4.5 feet BSG. However, the moisture contents in the upper 2.5 feet were significantly lower than those below 4.5 BSG. Thus, we conclude that the critical zone is about 2.5 feet or 30 inches below site grade.

6.2 **Pad Preparation:** To reduce the potential volume changes of the near-surface clays below interior floor slabs and foundation, three pad preparation alternatives were considered. These include: 1) supporting the slabs-on-grade on non-expansive, granular engineered fill soils, 2) supporting the slabs-on-grade on a minimum of 12 inches of non-expansive, granular engineered fill soils and construct the remaining portion of the pad with moisture conditioned native soils compacted as engineered fill and 3) supporting the slab-on-grade on a minimum of 24 inches of lime treated native soils.

Based on the near surface soil condition, pad preparation for these alternatives would consist of scarifying the near surface soils to a minimum depth of 12-inches below existing grade, moisture conditioning and recompacting the native soils to between 90 and 95 percent relative compaction. This would increase the moisture content of the native soils and reduce the amount of volume change with moisture fluctuations.

6.2.1 **First Alternative:**

The first alternative would consist of constructing the building pad entirely of imported, non-expansive, granular engineered fill soils. The non-expansive, granular engineered fill soils should be compacted to 92 percent relative compaction.

The primary advantage to this alternative is that the slabs-on-grade and foundations would be supported on non-expansive, granular fill soils, thereby reducing post construction movements. In addition, the use of granular fill soils would allow a higher modulus of subgrade reaction to be used in design and would provide less difficulty in obtaining the required compaction.

A disadvantage is the increase in construction costs to import non-expansive, granular fill soils for the building pad. However, fill sources are readily available and can provide engineered fill and aggregate base materials. The material sources are Baldwin Contracting and Mathews Ready Mix, located 15 miles and 24 miles from the proposed site, respectively.

6.2.2 Second Alternative:

The second alternative would consist of using native clays and imported fill soils to construct the building pad. The building pad would be constructed with native clay soils to 12 inches below the proposed elevation of finished pad grade. The native clays should be moisture conditioned and compacted to between 90 and 95 percent relative compaction.

Increasing the moisture content of the native soils to above the optimum, which is near saturation, thus, near the soils maximum probable swell, would induce expansion to occur during construction, thereby reducing post-construction movement of the floor slabs.

The moisture conditioning procedure will depend upon the time of year that the work is done. If work is done during or soon after the wet season, the on-site soils may be too wet to be used as engineered fill without treatment. Although, moisture conditioning is probably the least costly alternative, it does have some drawbacks, such as; some post-construction movement and minor cracking of slabs-on-grade and foundations; timing between moisture conditioning and placing concrete is critical; the construction technique requires close control; and moisture conditioning is not suitable below exterior slabs-on-grade.

The primary advantage to this alternative is that the native soils are used in the majority of the building pad and only the upper 12 inches of the building pad is constructed of imported, non-expansive, granular engineered fill soils. However, the decrease in costs from importing only 12 inches of fill material as compared to over 30 inches in Alternative I, will be offset by the difficulty in compacting the native clay soils.

The disadvantage is the increase in construction costs to import non-expansive, granular fill soils for the 12 inch layer of material. In addition, there is more potential for post construction movement compared to Alternative I and the native soils will be more difficult to compact as compared to the non-expansive fill materials.

6.2.3 **Third Alternative:**

The third alternative would consist of using native clays and supporting the slabs-on-grade on 24 inches of lime treated native soils. Intermixing or blending of the native soils with lime can reduce the clays shrink/swell potential. Lime will stabilize and reduce the soils expansion potential by increasing the plastic limit and decreasing the liquid limit of the soils resulting in a lower plasticity index. The potential for post construction movements can be reduced by placing the slabs-on-grade of the structure on a minimum of 24-inches of lime treated native soils. This procedure would require that first; native clay soils be excavated, second; the soils crushed or pulverized, third; the soils are intimately mixed with lime, typically 3 to 5 percent, at the proper moisture content and allowed to sit for the required mellowing period; and fourth, the mixture is compacted as engineered fill. The lime treatment should extend to a minimum depth of 24 inches below the structure for a minimum lateral distance of 5 feet outside the building perimeters.

Lime treatment will require additional soil testing to determine if the soils can be effectively treated with lime. In addition, lime percentages should be determined, based in part on California Test 373 for unconfined compressive strength. Our firm can provide this testing upon request. However, this testing is not considered part of our current contractual agreement.

The primary advantage to this alternative is that native soils are used; therefore, the costs to import fill materials and export unused native soils are reduced. However, this savings will be offset by the cost of adding lime to the native clay soils.

The disadvantages are that specialized equipment such as mixers and pulverizes are needed, and close control of construction techniques and extensive quality control is required. Other disadvantages are that lime treatment may not be compatible with the native clays, greater risk of post construction movement and the harmful effect on plants placed in the lime treated soils. If lime treatment is not compatible with the native clay, this alternatives should not be used.

6.3 <u>Foundations</u>: The near-surface soils should provide adequate support for the proposed structure. Post-construction differential foundation movement can be reduced by placing the foundations at a minimum depth of 30 inches below site grade, therefore, below the critical depth. In addition, perimeter foundations placed at this depth would serve as a moisture break reducing moisture migration under the slabs-on-grade.

To further reduce potential distress, a minimum of four, #4 reinforcement bars, two top and two bottom, should be placed in continuous foundations to resist potential movement.

Based on the anticipated structural loads, we estimate that spread foundations should be supported in either moisture conditioned native soils or non-expansive, granular engineered fill soils. The intent is to support the foundation on a uniform thickness of material. The foundations should be designed for a maximum net allowable soil bearing pressure of 2,000 pounds per square foot.

6.4 <u>T.B.O. Structure</u>: The lateral loading on the subsurface T.B.O. structure walls will consist of pressure from the soils and slabs-on-grade adjacent to the wall. We anticipate that the walls will be designed rigid and will not be allowed to deflect. Since rotation will be restrained, the walls should be designed to resist the at-rest pressure of the soils rather than the active pressure.

Lateral loads due to slabs-on-grade and pavements above the base of the walls should be included in design of the walls. The lateral loading contributed by slabs-on-grade should be taken as 1/3 times the design floor slab or traffic load placed within a 45° angle projection from the base of the walls. An additional lateral load on the walls due to foundations placed within a 1:1 projection from the base of the walls should be taken as 1/3 times the surcharge load. The point of application of this force is taken as the intersection of the back face of the wall with a line drawn from the foundations at an angle of 40° to the horizontal. **In addition, the T.B.O. structure should be designed as an isolated structure from the superstructure.** This is recommended due to the differential settlement that may be experienced between the T.B.O. structure and the store structure, due to the different soil conditions supporting the foundations.

Although groundwater was not encountered within the exploration depth below the project site, the backfill soils placed behind the subsurface walls may become inundated from surface runoff, broken water lines, etc. If this were to occur, hydrostatic forces could develop and lateral pressures on subsurface walls could increase by as much as 30 to 40 percent. To reduce this potential, a drainage system, such as Miradrain, should be placed between the backfill soil and the walls. In addition, if moisture intrusion through the walls is to be reduced, Volclay panels or equivalent should be placed between the drainage system and the walls to further seal the walls from moisture intrusion. A cross-section of a typical wall drainage system is shown on Drawing No. 3 in Appendix A.

6.5 **Exterior Flatwork**: Concrete exterior flatwork supported on the native subgrade will be subject to shrink/swell cycles which, like interior floor slabs, can cause potential distress in the form of cracking, etc. Some of the adverse effects of swelling and shrinking can be reduced, not eliminated, by supporting the flatwork on a minimum of 12 inches of non-expansive, granular engineered fill or lime treated native soils. To reduce the effects of drying around the edges of the flatwork, and the potential for infiltration of water into the granular fill, lateral cutoffs such as inverted curbs are suggested. If minor cracking and differential movement is not tolerable, additional measures would be required, such as: 1) increasing the depth of the lime treatment or non-expansive materials below the flatwork, 2) placement of additional reinforcement and 3) sealing to prevent infiltration of water.

6.6 **Excavation**: During the field investigation, auger refusal was encountered in the area of the proposed structure at depths ranging from 3 to 11.5 feet BSG. Auger refusal was encountered in very dense clayey gravels and cobbles which may be difficult to excavate. However, based on the grading plan, the site is anticipated to be raised 2.5 to 4.5 feet above the existing site grade with engineered fill soils. Therefore, since the finished floor elevation is at 227.50 feet above mean sea level, the very dense clayey gravels and cobbles should be a minimum of 6 feet below the finished pad grade.

The proposed structure is anticipated to include a below grade T.B.O. structure. Excavations of 9 to 11 feet below finished grade may be necessary. Considering the anticipated finish floor elevation, and the depth of auger refusal in the T.B.O. area, the very dense gravel and cobble stratum may be encountered in excavations below depths of 6 feet. Ripping or heavier equipment may be required to excavate below 6 feet. In addition, foundations supported on the very dense clayey gravel and cobble stratum may experience less settlement than foundations placed in fill or native clay soils. Therefore, differential settlement from these foundations and those supported on the clay soils may be equivalent to the total settlement estimated for the structure.

7.0 CONCLUSIONS

Based on the data collected during the field and laboratory investigations, our geotechnical experience in the vicinity of the project site, and our understanding of the anticipated construction, we present the following general conclusions:

7.1 The site is suitable for the proposed construction with regard to support of foundations, concrete slabs-on-grade and pavements provided the recommendations contained in this report are followed.

7.2 The subsoils at the site consist of very stiff to hard clays with moderate shear strength and compressibility characteristics. These soils were encountered from surface to depths of about 2.5 to 11.5 feet BSG. These soils were underlain by very dense clayey gravels and cobbles.

7.3 The near-surface clays exhibit low to moderate shrink/swell potential with cyclic moisture fluctuations.

7.4 Shallow spread footings placed at a minimum depth of 30 inches, either entirely in native soils or entirely in properly placed non-expansive, granular engineered fill soils can provide adequate support for the proposed structure. The intent is to support the foundations on a uniform thickness of material.

7.5 Based on the site conditions encountered some post-construction movement and cracking of slabs-on-grade and foundations can be anticipated over the life of the structure.

7.6 Maximum total and differential settlements for the proposed foundations should be 1 inch and 1/2 inch, respectively.

7.7 Interior floor slabs should be supported on non-expansive, granular engineered fill soils or lime treated native soils.

7.8 Exterior flatwork should be supported on non-expansive, granular engineered fill soils.

7.9 The near-surface soils exhibit poor support characteristics for pavements.

7.10 The analytical results of a soil sample analysis indicate that the near-surface soils exhibit a mild corrosion potential to buried metal objects.

7.11 The analytical results of one soil sample analysis indicate non-detectable sulfate and a low chloride concentration of 0.001 percent by dry weight in the soil sample tested. Therefore, a low potential for sulfate attack of concrete placed in the near-surface soils is anticipated.

7.12 Groundwater was not encountered in the test borings drilled during our field investigation.

8.0 RECOMMENDATIONS

Based on the evaluation of the field and laboratory data, and our geotechnical experience in the vicinity of the project, we present the following recommendations for use in the project design and construction.

8.1 General

8.1.1 All concrete placed around the perimeter of the structure should be properly sealed to prevent moisture infiltration.

8.1.2 Develop and maintain site grades which will drain surface and roof runoff away from foundations and floor slabs - both during and after construction. Adjacent exterior finished grades should be sloped a minimum of two percent for a distance of at least ten feet away from the structures to preclude ponding of water adjacent to foundations.

8.1.3 Landscaping after construction and runoff from the lawn and garden center should not promote ponding of water adjacent to the structure.

Care should be taken to maintain a leak-free sprinkler system. In addition, roof drains should be connected to the storm drain system proposed for the site.

8.2 <u>Site Preparation</u>

8.2.1 All topsoil, existing vegetation, organics, and debris should be removed from the building and pavement areas. The general depth of stripping should be sufficiently deep to insure the removal of root systems and organic topsoils. For estimate purposes, a minimum stripping depth of 4 inches should be used. The actual depth of stripping should be reviewed by our firm at the time of construction. Deeper stripping may be required in localized areas. Stripping should extend laterally a minimum of 5 feet outside the building and pavement perimeters. These materials will not be suitable for use as engineered fill; however, stripped topsoil may be stockpiled and reused in landscape areas at the discretion of the owner.

8.2.2 Any soft or pliant areas, debris pits, or other subsurface structures discovered during the site preparation should be entirely removed.

8.2.3 Following stripping, the native clays in the building and pavement areas should be scarified to a minimum depth of 12 inches below existing grade, moisture conditioned to 1 to 3 percent above optimum, and recompacted to between 90 and 95 percent relative compaction in accordance with ASTM Test Method D1557-78. The intent is to compact the soils to at least 90 percent and as close to 90 percent as possible without exceeding. Timing for the moisture conditioning is critical. The moisture conditioned soils should be kept moist and not allowed to dry prior to the placement of pavements, foundations and slabs-on-grade. The pad should then be prepared using one of the following three alternatives. The advantages and disadvantages of each alternative were discussed in the evaluation section. It should be noted that either of the three alternatives provided can be implemented; however, the thickness of each alternative should remain uniform across the pad. Based on the existing grading plan, the building pad is estimated to be raised about 2.5 and 4.5 feet above the existing site grade.

<u>Alternative I</u>: The first alternative would consist of constructing the entire building pad with non-expansive, granular engineered fill soils. After subgrade preparation, non-expansive, granular engineered fill soils should be placed and compacted to 92 percent relative compaction in accordance with ASTM Test Method D1557-78. The zone of scarification and granular fill placement should extend laterally a minimum of 5 feet outside all building perimeters.

<u>Alternative II</u>: The slabs-on-grade for the structure should be supported on a minimum of 12 inches of non-expansive, granular engineered fill soils. The remainder of the building pad should be constructed of native clay soils to an elevation equal to 12 inches below the elevation of the finished pad grade. The native clays should be moisture

conditioned to 1 to 3 percent above optimum moisture and compacted to between 90 and 95 percent relative compaction in accordance with ASTM Test Method D1557-78. The intent is to compact the soils to at least 90 percent and that the native clays are not compacted to over 95 percent. The scarification and moisture conditioning procedures should extend a minimum of 5 feet outside the building perimeters. The upper 12 inches of the building pad should then be constructed with non-expansive, granular engineered fill soils. The non-expansive, granular engineered soils should be compacted to 92 percent relative compaction in accordance with ASTM Test Method D1557-78

<u>Alternative III</u>: The slabs-on-grade for the structure can be supported on a minimum of 6-inches of aggregate material underlain by a minimum of 24 inches of lime treated native soils. Lime treatment should be accomplished by, first excavating the native clay soils to be treated; second, crushing or pulverizing the soils; third, mixing the soils with lime at the proper moisture content and allowed to

sit for the proper mellowing period; and fourth, compacting the mixture as engineered fill. The lime treatment zone should extend a minimum of 5 feet outside the building perimeters. Additional laboratory testing of the soils for lime treatment will be necessary to determine the type of lime, and application rate. Our firm can provide this testing upon request. If this alternative is selected a minimum of two weeks will be needed to conduct the appropriate compatibility tests. In addition, if the native soils are not compatible with lime treatment, this alternative should not be used.

8.2.4 The upper 6 inches of subgrade in the areas to receive pavements should be moisture conditioned to near optimum moisture content and compacted to a minimum of 95 percent relative compaction based on ASTM Test Method D1557-78.

8.2.5 All fill required to bring the site to final grade should be placed as engineered fill.

8.3 <u>Engineered Fill</u>

8.3.1 The on-site soils encountered are predominantly clays. These soils will be suitable for use as fill material, provided organics and debris are removed, and the clays are moisture conditioned and placed as described in section 8.3.2 of the recommendations. If soils other than those considered in this report are encountered, Twining should be notified to provide alternate recommendations. It should be noted that the compactibility of the native soils, is dependent upon the moisture contents, subgrade conditions, degree of mixing, type of equipment, as well as other factors. The evaluation of such factors was beyond the scope of this report. Therefore, we recommend that they be evaluated by the contractor during preparation of bids and construction of the project.

8.3.2 Native soils to be used as engineered fill should be placed in loose lifts approximately 8 inches thick, moisture conditioned to a minimum of 1 to 3 percent above optimum moisture and compacted to achieve a dry density of between 90 and 95 percent of the maximum dry density as determined by ASTM Test Method D1557-78. The intent is to compact the soils to at least 90 percent and that the native clays are not compacted to over 95 percent. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

8.3.3 Import fill soil should be non-expansive and granular in nature with the following acceptance criteria recommended.

Percent Passing 3-Inch Sieve	100
Percent Passing No. 4 Sieve	50 - 100
Percent Passing No. 200 Sieve	10 - 30
Plasticity Index	Less than 10
Expansion Index (UBC 29-2)	Less than 10
*R-Value	Minimum 40

* For fill soils placed in pavement areas only.

Prior to being transported to the site, the import fill material should be tested and approved by Twining.

8.3.4 Imported engineered fill soil and lime treated native soils should be placed in loose lifts approximately 8 inches thick, moisture conditioned as necessary, and compacted at or near optimum moisture to achieve a dry density of at least 92 percent of the maximum dry density as determined by ASTM Test Method D1557-78. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

8.4 Foundations

8.4.1 Structural loads may be supported on spread or continuous footings placed either entirely in undisturbed native soils or entirely on engineered fill soils. Spread and continuous footings may be designed for a maximum net allowable soil bearing pressure of 2,000 pounds per square foot for dead-plus-live loads. This value may be increased by one-third for short duration wind or seismic loads.

8.4.2 The footings should be placed at a minimum depth of 30 inches below rough pad grade or adjacent exterior grade, whichever is lower.

8.4.3 Footings should have a minimum width of 12 inches, regardless of load.

8.4.4 It is imperative that the footing excavations are not allowed to dry prior to placement of concrete. If shrinkage cracks appear in the footing excavations, the excavations should be thoroughly moistened to close all cracks prior to concrete placement.

8.4.5 Total and differential settlements of 1 inch and 1/2 inch, respectively, should be anticipated for design.

8.4.6 A swell of 1/2 inch should be anticipated between the exterior wall and the adjacent floor slab.

8.4.7 A minimum of four #4 reinforcement bars, two top and two bottom, should be placed in the perimeter continuous footings.

8.4.8 If soft or unstable materials are encountered at the bottom of the footing excavations, our firm should be notified so that the conditions can be reviewed and additional recommendations can be provided.

8.5 Frictional Coefficient and Earth Pressures

8.5.1 The bottom surface area of concrete footings or concrete slabs in direct contact with native soils or engineered fill can be used to resist lateral loads (slabs underlain by visqueen cannot be considered). An ultimate coefficient of friction of 0.35, reduced by an appropriate factor of safety, can be used for design.

8.5.2 The ultimate passive resistance of the native soils and engineered fill may be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per cubic foot. An appropriate factor of safety should be applied.

8.5.3 A minimum factor of safety of 1.5 should be used for the lateral resistance, or as required by the governing building codes. The frictional and passive resistance of the soil may be combined in determining the total lateral resistance. The upper 12 inches of subgrade should be neglected in determining the total passive resistance.

8.5.4 The active and at-rest pressures of the native soils and engineered fill may be assumed to be equal to the pressures developed by a fluid with a density of 40 and 55 pounds per cubic foot, respectively. These pressures assume level ground surface and do not include the surcharge effects of construction equipment, loads imposed by nearby foundations and roadways, and hydrostatic water pressure.

8.5.5 The at-rest pressure should be used in determining lateral earth pressures against walls which are not free to deflect. For walls which are free to deflect at least one percent of the wall height at the top, the active earth pressure may be used.

8.5.6 A minimum of 24 inches of free draining materials, such as imported engineered fill with less than 10 percent passing the #200 sieve, should be used as backfill against walls. A drainage system should be designed to prevent the buildup of hydro-static forces.

8.5.7 The proposed T.B.O. structure walls should be designed for the at-rest pressure of the soil. In addition, the lateral pressure contributed by slabs-on-grade and pavements should be taken as 1/3 times the surcharge load of slabs within a 45° angle projection from the base of the wall. For bearing wall foundations within a 45° angle projection from the base of the wall, a horizontal force along the wall equivalent to 1/3 the bearing wall load should be used for design. The point of application of this force is taken as the intersection of the back face of the wall with a line drawn from the point of application of the bearing wall load at an angle of 40° to the horizontal.

8.5.8 To reduce potential hydrostatic pressure against the subsurface structure walls and the migration of moisture into the structure, a Volclay panel moisture barrier (or equivalent substitute) and a drainage system, such as Miradrain, should be provided. A cross-section of a typical wall drainage system is shown on Drawing No. 3 in Appendix A.

8.5.9 Care should be taken during compaction of fill material adjacent to subsurface walls. Compaction of fill within 5 feet of the walls should be performed using hand whackers or small vibratory compactors only to reduce additional stresses on the walls.

8.6 Concrete Slabs-on-Grade

8.6.1 Interior concrete floor slabs should be supported on imported non-expansive, granular engineered fill or lime treated native soils in accordance with section 8.2.3.

8.6.2 Exterior flatwork should be supported on a minimum of 12 inches of imported, non-expansive, granular fill soils. Granular fill should extend laterally a minimum of 1 foot on all sides of the slabs. We suggest that lateral cutoffs, such as inverted curbs placed to 4 inches below the granular fill, be placed to reduce moisture infiltration and drying.

8.6.3 To further reduce the effects of expansive soils on exterior flatwork, we suggest additional measures, such as; 1) increasing the thickness of the non-expansive materials, 2) placement of additional reinforcement and 3) joint sealing.

8.6.4 To aide in curing of slabs, a minimum of 2 inches of moist concrete sand (ASTM C-33) should be placed beneath all slabs-on-grade.

8.6.5 An impermeable membrane such as Moistop™ or equivalent should be placed below the sand beneath all interior floor slabs where floor coverings, such as carpet and tile, are anticipated or where moisture could permeate into the interior and create problems. The underslab membrane should have a high puncture resistance, high abrasion resistance, rot resistant, and mildew resistant. We recommend the membrane be selected in accordance with ASTM C755-85, Standard Practice For Selection of Vapor Retarder For Thermal Insulation. The membrane should be installed so that there are no holes or uncovered areas. All seams should be overlapped and sealed so they are vapor tight. Where pipes extend through the membrane, the barrier should be sealed to the pipes. Tears or punctures in the membrane should be completely repaired prior to placement of concrete.

8.6.6 The impermeable membrane is not required beneath exposed concrete floors, such as storage areas, etc., provided that moisture intrusions into the structure are permissible.

8.6.7 A design modulus of subgrade reaction of 65 pounds per cubic inch should be used for slabs supported directly on the native or lime treated soils. If slabs are supported on a minimum of 12 inches of imported engineered fill (R-value of 40), a design subgrade modulus of 110 pounds per square inch per inch can be used. If the slabs are supported on 12 inches of Class II aggregate base (R-value of 78), a modulus of subgrade reaction of 130 pounds per square inch per inch should be used for design. The values presented are based on the Burmister analysis of two-layer systems and plate-loading tests made to determine K-values on subgrade and subbase materials for full-scale test slabs. This was defined in the Portland Cement Association's "Thickness Design for Concrete Highway and Street Pavements".

8.7 Asphaltic Concrete Pavements

Recommendations for asphaltic concrete pavement structural sections are presented in the following subsections. The structural sections were designed using the gravel equivalent method in accordance with Chapter 600 of the California Department of Transportation Highways Design Manual (fourth edition). Based on the traffic loading criteria included in the geotechnical investigation report specifications (dated September 1992) provided by Wal-Mart Stores, Inc., the following information was obtained. The "standard duty" pavement is described as a pavement with a design life of 20 years and an EAL (18 kip) per day of 2 axles. This equates to an EAL of 14,600 for the design life of the pavement and is equivalent to a traffic index of 5.5. The "heavy duty" pavement is described as a pavement with a design life of 20 years and an EAL (18 kip) per day of 7 axles. This equates to an EAL of 51,100 for the design life of the pavement and is equivalent to a traffic index of 6.5. If traffic loading is anticipated to be greater than assumed, the pavement sections should be re-evaluated.

The proposed construction should consist of approximately 8.5 acres of pavement. The anticipated subgrade soils are clays. The subgrade support characteristics of the native soils were evaluated by Resistance (R)-value tests. The results of three tests, obtained from depths ranging from 0.5 to 3.0 feet BSG, indicated the soils had R-values of less than 5. For the purpose of design, an R-value of 5 was used.

8.7.1 The following pavement sections are based on an R-value of 5 and a traffic index of 5.5 for the anticipated "standard duty" areas.

Pavement Component	Thickness, Inches	
Asphaltic Concrete	3.0	3.0
Class 2 Aggregate Base (95% Relative Compaction)	12.0	5.0
Class 2 Aggregate Subbase minimum R-value of 50 (95% Relative Compaction)	***	7.5
Compacted Subgrade (95% Relative Compaction)	6.0	6.0

8.7.2 The following pavement sections are based on an R-value of 5 and a traffic index of 6.5 for the anticipated "heavy duty" pavement areas.

Pavement Component	Thickness, Inches	
Asphaltic Concrete	3.5	3.5
Class 2 Aggregate Base (95% Relative Compaction)	14.5	6.5
Class 2 Aggregate Subbase minimum R-value of 50 (95% Relative Compaction)	***	9.0
Compacted Subgrade (95% Relative Compaction)	6.0	6.0

8.7.3 The upper 6 inches of subgrade beneath the structural section should be scarified, moisture-conditioned as necessary, and compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557-78.

8.7.4 A geotextile fabric would provide a stable base for pavement construction, prevent migration of clays into the aggregate base and provide improvement to the strength and longevity of the pavements. If used this fabric, such as Mirafi 500x, Supac 4NP or equivalent should be placed between the native clays and the aggregate base or subbase material. The use of a fabric would also facilitate construction during the wet weather season. Therefore, we suggest that the client consider the use of this material since it is usually cost effective in light of the benefit. However, this suggestion does not constitute a mandatory recommendation since the pavement section design does not require a fabric to achieve proper performance except where required to remedy an unstable subgrade.

8.7.5 Alternative pavement sections, such as full depth asphaltic concrete or equivalent granular sections may be used.

8.7.6 The subgrade soil conditions are based on the soils tested for this study. If unanticipated grading or soil importing significantly change the actual pavement subgrade materials, the pavement section should be reevaluated.

8.7.7 If the paved areas are to be used during construction, or if the type and frequency of traffic is greater than assumed in design, the pavement section should be re-evaluated for the anticipated traffic.

8.7.8 Pavement section design assumes that proper maintenance, such as sealing and repair of localized distress, will be performed on a periodic basis.

8.7.9 Pavement materials and construction methods should conform to Sections 25, 26 and 39 of the State of California Standard Specifications.

8.7.10 The asphalt concrete should be compacted to an average relative compaction of 97 percent, with no single test value being below a relative compaction of 95 percent, based on a 50 blow Marshall maximum density.

8.7.11 The asphalt concrete should comply with Type "B" asphalt concrete as described in Section 39 of the State of California Standard Specification. We recommend that an asphalt concrete mix design be prepared and approved prior to construction.

8.8 **Portland Cement Concrete (PCC) Pavements**

Recommendations for Portland Cement Concrete pavement structural sections are presented in the following subsections. The structural section was based primarily on the Portland Cement Association "Thickness Design of Highway and Street Pavements". For basis of design, a maximum stress ratio of 0.5 was utilized. Using this stress ratio, an unlimited number of repetitions for the assumed loading would be allowable. Our evaluation assumed that the wheel load is applied to the interior of the slab unit and does not take into account reinforcing steel or increased concrete thickness at edges and construction joints where the concrete stresses are the highest.

8.8.1 The following "Standard Duty" pavement section presents the thickness of PCC required for an annual EAL of 14,600 (two 18 kip EAL per day), a tandem axle weight of 34,000 pounds, a loading position in the interior of the slab unit, a tire contact area of 200 square inches, a K-value of 65 pounds per cubic inch per inch and a modulus of rupture of 550 pounds per square inch (compressive strength of 4,000 psi) at 28 days for concrete.

Pavement Component	Thickness, Inches
Portland Cement Concrete	5.5
Class 2 Aggregate Base (95% Relative Compaction)	4.0
Compacted Subgrade (95% Relative Compaction)	6.0

8.8.2 The following "heavy duty" pavement section presents the thickness of PCC required for an annual EAL of 51,100 (seven 18 kip EAL per day), a tandem axle weight of 34,000 pounds, a loading position in the interior of the slab unit, a tire contact area of 200 square inches, a K-value of 65 pounds per cubic inch per inch and a modulus of rupture of 550 pounds per square inch (compressive strength of 4,000 psi) at 28 days for concrete.

Pavement Component	Thickness, Inches
Portland Cement Concrete	6.0
Class 2 Aggregate Base (95% Relative Compaction)	4.0
Compacted Subgrade (95% Relative Compaction)	6.0

8.8.3 A geotextile fabric would provide a stable base for pavement construction, prevent migration of clays into the aggregate base and provide improvement to the strength and longevity of the pavements. If used this fabric, such as Mirafi 500x, Supac 4NP or equivalent should be placed between the native clays and the aggregate base or subbase material. The use of a fabric would also facilitate construction during the wet weather season. Therefore, we suggest that the client consider the use of this material since it is usually cost effective in light of the benefit. However, this suggestion does not constitute a mandatory recommendation since the pavement section design does not require a fabric to achieve proper performance except where required to remedy an unstable subgrade.

8.8.4 Stresses are anticipated to be greater at the edges and construction joints of the pavement section. A thickened edge is recommended on the outside of slabs subjected to wheel loads.

8.8.5 Joint spacing in feet should not exceed twice the slab thickness in inches, e.g., 12 X 12 ft for a 6 inch slab thickness. Regardless of slab thickness, joint spacing should not exceed 15 feet.

8.8.6 Lay out joints to form square panels. When this is not practical, rectangular panels can be used if the long dimension is no more than 1.5 times the short.

8.8.7 Control joints should have a depth of at least one-fourth the slab thickness, e.g. 1 inch for a 4 inch slab.

8.8.8 Isolation (expansion) joints should extend the full depth and should be used only to isolate fixed objects abutting or within paved areas.

8.8.9 Construction joint location should be determined by the contractor's equipment and procedures.

8.8.10 Pavement section design assumes that proper maintenance such as sealing and repair of localized distress will be performed on a periodic basis.

8.8.11 Pavement construction should conform to Sections 40 and 80 of the State of California Standard Specifications.

8.9 Temporary Excavations

It is the responsibility of the contractor to provide safe working conditions with respect to excavation slope stability. Temporary excavations should be constructed in accordance with CAL OSHA requirements. Temporary cut slopes should not be steeper than 1:1, horizontal to vertical, and flatter if possible. If excavations can not meet this criteria, the temporary excavations should be shored.

8.10 Utility Trenches

8.10.1 Utility trench backfill placed in or adjacent to building areas, paved exterior slabs, and pavement areas should be compacted to at, or near optimum moisture to at least 90 percent relative compaction based on ASTM Test Method D1557-78. The contractor should use appropriate equipment and methods to avoid damage to utilities and/or structures during placement and compaction of the backfill materials.

8.10.2 When utility trench backfills are determined by Twining to be nonstructural backfills, they should be compacted to a minimum 90 percent relative compaction based on ASTM Test Method D1557-78.

8.10.3 Where utility trenches extend from the exterior to the interior limits of a building, native clayey soils or lean concrete should be used as backfill material for a minimum distance of 2 feet laterally on each side of the exterior building line to prevent the trench from acting as a conduit to exterior surface water.

8.11 Corrosion Protection

The risk of corrosion of construction materials relates to the potential for soil-induced chemical reaction. The rate of deterioration depends on soil resistivity, texture, acidity and chemical concentration. These recommendations are based on analysis of three near-surface soil samples from depths ranging from about 1.5 to 4.5 feet BSG. If pipe or concrete is placed in contact with deeper soils or engineered fill, these soils should be analyzed to determine their corrosion potential.

In addition, it is suggested that a professional consultant with experience in corrosion protection be consulted to provide assistance in selecting the pipes or ferrous alloy objects placed in these soils.

8.11.1 Based on the ASTM Special Technical Publication 741 and the analytical results of a single soil sample analysis, the soils are mildly corrosive to ferrous alloy pipes, as indicated by the resistivity values of 28,700, 40,000 and 48,600 ohm-cm. Buried metal objects should be protected in accordance with manufacturer's recommendations based on the mild corrosion potential of the soil. The evaluation was limited to the effects of soils to metal subjects; corrosion due to other potential sources, such as stray currents and groundwater, was not evaluated.

8.11.2 Corrosion of concrete due to sulfate attack is not anticipated based on a non-detectable sulfate concentration determined for the near-surface soils. The ACI Manual of Concrete Practice, Section 201.22-12, recommends using a Type I or II cement for foundations placed in these soils.

9.0 DESIGN CONSULTATION

9.1 Twining should be provided the opportunity to review those portions of the contract drawings and specifications that pertain to earthwork, and foundations prior to finalization to determine whether they are consistent with our recommendations. This additional service is part of this current contractual agreement.

9.2 It is the client's responsibility, however, to provide plans and specification documents for our review prior to their issuance for construction bidding purposes.

9.3 If Twining is not afforded the opportunity for review, we claim no liability for the misinterpretation of our conclusions and recommendations.

10.0 CONSTRUCTION MONITORING

10.1 It is recommended that Twining be retained to observe the excavation, earthwork, and foundation phases of work to determine that the subsurface conditions are compatible with those used in the analysis and design.

10.2 Twining can conduct the necessary observation, field testing services, and provide results on a timely basis so that action necessary to remedy indicated deficiencies can be taken in accordance with the plans and specifications. Upon completion of the work, we will provide a written summary of our observations, field testing, and conclusions regarding the conformance of the completed work to the intent of the plans and specifications. This additional service is not, however, part of this current contractual agreement.

10.3 The construction monitoring is an integral part of this investigation. This phase of the work provides Twining the opportunity to verify the subsurface conditions interpolated from the soil borings and make alternative recommendations if the conditions differ from those anticipated.

10.4 If Twining is not afforded the opportunity to conduct observation, field testing services, then we recommend that the firm selected to conduct these services review this report. After their review, the firm should accept responsibility, in writing, for this geotechnical engineering report, including the conclusions and recommendations, so that it can provide an approval upon completion of the work.

11.0 LIMITATIONS AND NOTIFICATIONS

11.1 The conclusions and recommendations presented in this report are based on the information provided regarding the proposed construction, and the results of the field and laboratory investigation, combined with interpolation of the subsurface conditions between boring locations.

11.2 The nature and extent of subsurface variations between borings may not become evident until construction.

11.3 If variations or undesirable conditions are encountered during construction, Twining should be notified promptly so that these conditions can be reviewed and our recommendations reconsidered where necessary. It should be noted that unexpected conditions frequently require additional expenditures for proper construction of the project.

11.4 If the proposed construction is relocated or redesigned, or if there is a substantial lapse of time between the submission of our report and the start of work (over 12 months) at the site, or if conditions have changed due to natural cause or construction operations at or adjacent to the site, the conclusions and recommendations contained in this report should be considered invalid unless the changes are reviewed and our conclusions and recommendations modified or approved in writing.

11.5 Changed site conditions, or relocation of proposed structures, may require additional field and laboratory investigations to determine if our conclusions and recommendations are applicable considering the changed conditions or time lapse.

11.6 The conclusions and recommendations contained in this report are valid only for the project discussed in Section 3.2, Anticipated Construction. The use of the information and recommendations contained in this report for structures on this site not discussed herein or for structures on other sites is not recommended.

11.7 This report is issued with the understanding that it is the responsibility of the client to transmit the information and recommendations of this report to developers, owners, buyers, architects, engineers, designers contractors and subcontractors for the project so that steps necessary to carry out these recommendations in the design, construction and maintenance of the project are taken.

11.8 This report presents the results of a geotechnical engineering investigation only and should not be construed as an environmental audit or study.

11.9 Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally-accepted engineering principles and practices in Butte County, California in December, 1992. This warranty is in lieu of all other warranties either expressed or implied.

We appreciate the opportunity to be of service to CEI Engineering and Wal-Mart Stores, Inc. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,

THE TWINING LABORATORIES, INC.

David R. Ansolabehere
Staff Engineer
Geotechnical Engineering Division

Harry D. Moore, RCE, RGE
President

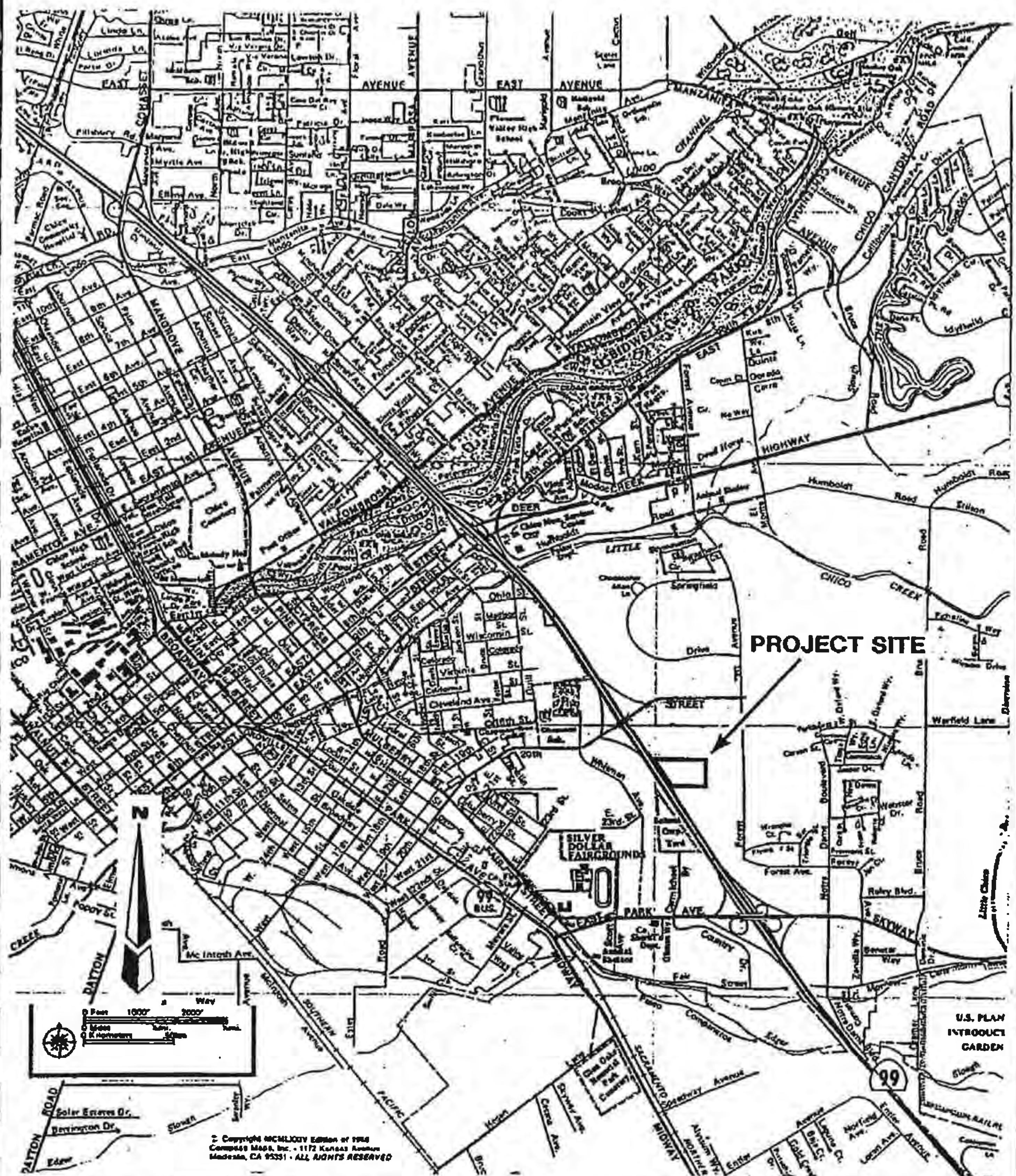
REGISTERED PROFESSIONAL ENGINEER HARRY D. MOORE No. GE2069 Exp. Date 9/30/95 GEOTECHNICAL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER HARRY D. MOORE No. C35147 Exp. Date 9/30/95 CIVIL STATE OF CALIFORNIA

DRA/HDM/mv

APPENDIX A

DRAWINGS



SITE LOCATION MAP WAL-MART CHICO HIGHWAY 99 AND FOREST AVENUE CHICO, CALIFORNIA	SCALE: AS NOTED	DATE: 12/2/92
	DRAWN BY: KMB	APPROVED BY:
		DRAWING No. 1

The Twining Laboratories, Inc.

FRESNO/MODESTO/VISALIA/BAKERSFIELD

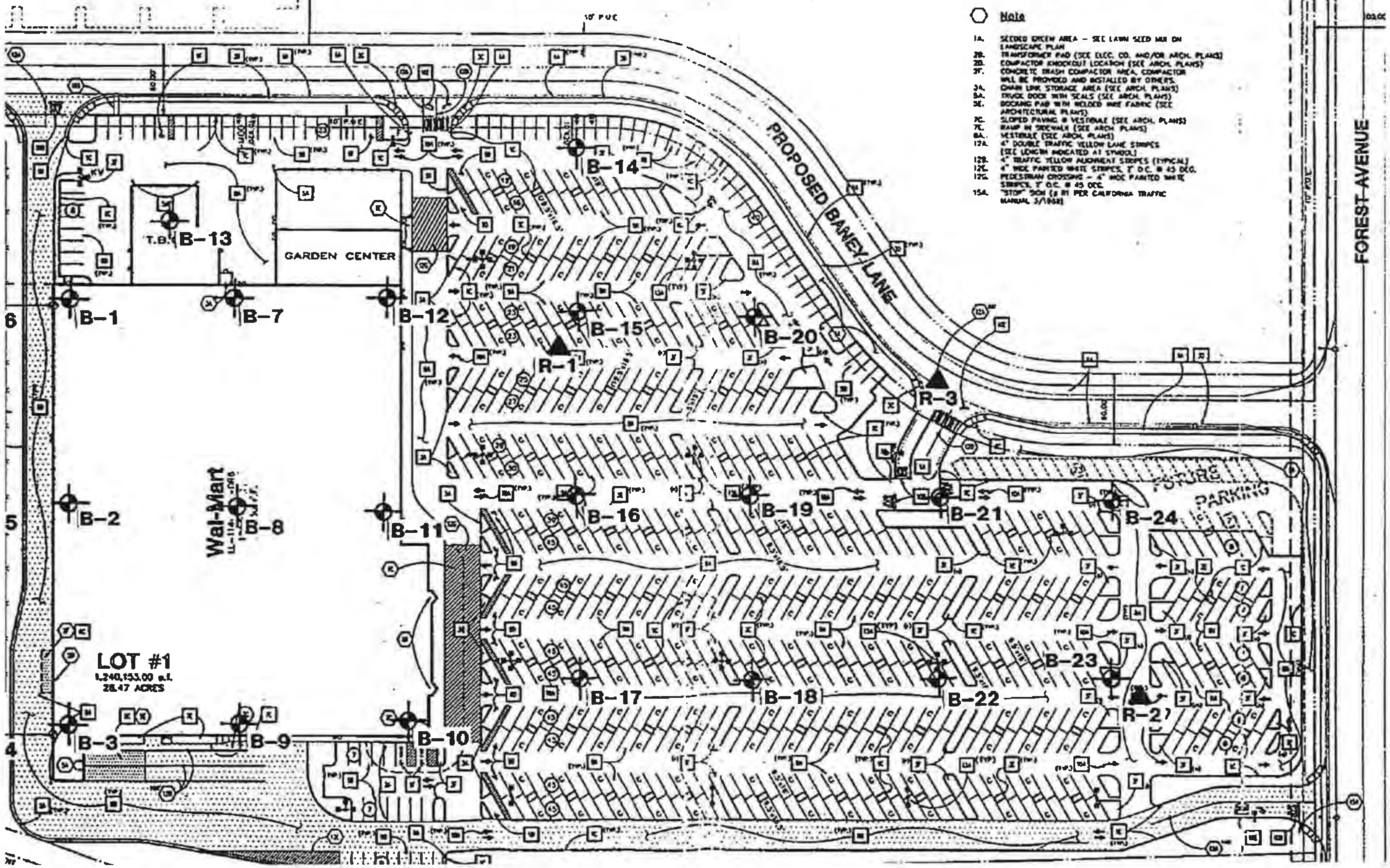
Parking Ratio

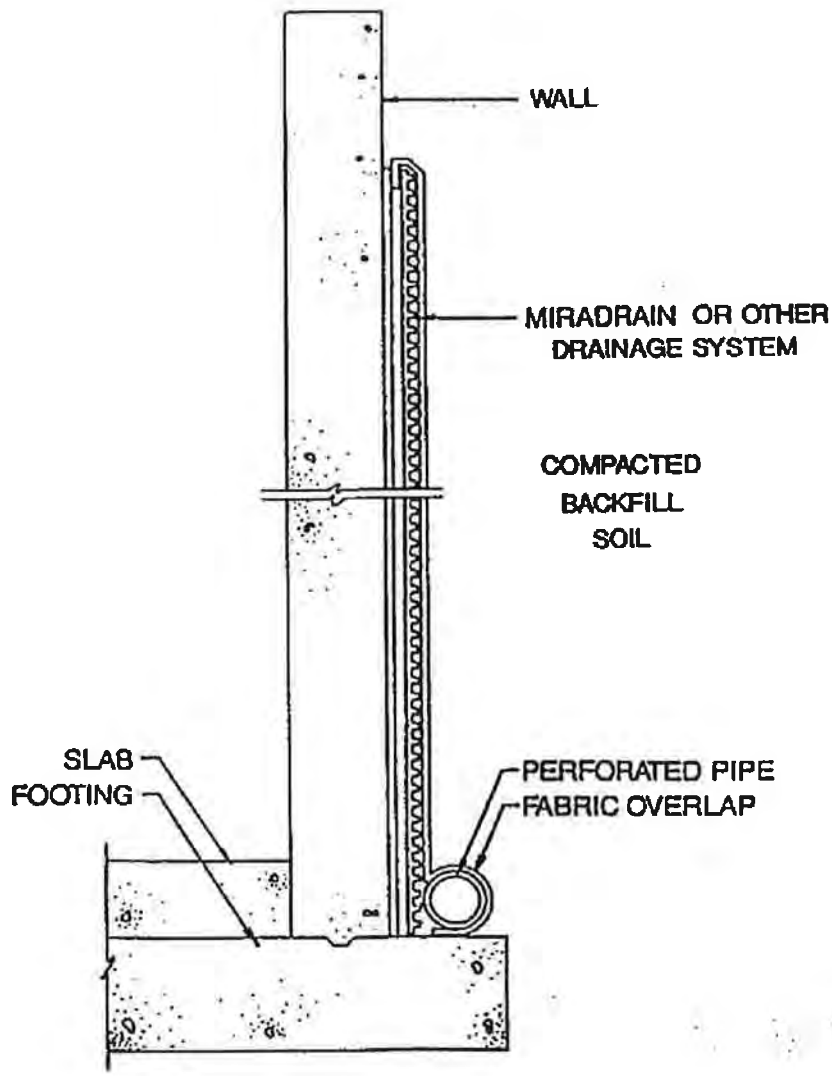
Building	Lot Number or Name	Lot Size in ACRES	PRE or POST Expansion	Building Size in Sq. Ft.	No. of Total Spaces	No. of Compact Spaces	No. of Handicapped Spaces	Ratio of Total Spaces per 1,000
Wal-Mart	Lot 1	16.6	Pre	124,000	816	190	16	3.5
Wal-Mart	Lot 1	15.8	Post	134,009	816	191	16	3.5

3E. TYPICAL TREE ISLAND
3F. SPECIAL LANDSCAPE ISLAND (TYPE DESIGNATED BY DETAIL SYMBOL)
5A. GUARD POST (SINGLE)
7A. CHAIN LINK FENCE
7C. SAFETY BARRIER @ EXISTING R-O-W FENCE
8A. REGULAR DUTY PAVING
8B. HEAVY DUTY PAVING
8C. HEAVY DUTY CONCRETE PAVING
9A. 60 DEG. PARKING SPACE STRIPING (TYP.,- SEE PLAN FOR SIZE)
9B. 90 DEG. PARKING SPACE STRIPING (TYP.,- SEE PLAN FOR SIZE)
9D. HANDICAP PARKING SPACE & SIGN (TYP.)
9F. 90° HANDICAP PARKING SPACES & SIGNS (TYP.)
9H. 60 DEG. PARKING SPACE STRIPING FOR COMPACT CARS (TYP.) - "C" DENOTES COMPACT SPACE
10A. TRAFFIC FLOW ARROW (TYP.)
10B. STOP BAR
10E. RIGHT/LEFT TURN ONLY ARROW

Note

1A. SEEDED GREEN AREA - SEE LAWN SEED MIX ON LANDSCAPE PLAN
2B. TRANSFORMER PAD (SEE ELEC. CO. AND/OR ARCH. PLANS)
2D. COMPACTOR KNOCKOUT LOCATION (SEE ARCH. PLANS)
2F. CONCRETE TRASH COMPACTOR AREA, COMPACTOR WILL BE PROVIDED AND INSTALLED BY OTHERS.
3A. CHAIN LINK STORAGE AREA (SEE ARCH. PLANS)
5A. TRUCK DOCK WITH SEALS (SEE ARCH. PLANS)
5E. DOCKING PAD WITH WELDED WIRE FABRIC (SEE ARCHITECTURAL PLANS)
7C. SLOPED PAVING @ VESTIBULE (SEE ARCH. PLANS)
7E. RAMP IN SIDEWALK (SEE ARCH. PLANS)
8A. VESTIBULE (SEE ARCH. PLANS)
12A. 4" DOUBLE TRAFFIC YELLOW LANE STRIPES (SEE LENGTH INDICATED AT SYMBOL)
12B. 4" TRAFFIC YELLOW ALIGNMENT STRIPES (TYPICAL)
12E. 4" WIDE PAINTED WHITE STRIPES, 3' O.C. @ 45 DEG.
12G. PEDESTRIAN CROSSING - 4" WIDE PAINTED WHITE STRIPES, 3' O.C. @ 45 DEG.
15A. "STOP" SIGN (R1) PER CALIFORNIA TRAFFIC MANUAL 3/1988)





Retaining Wall Cross Section Proposed Wal-Mart Store Chico, California	SCALE: NTS DRAWN BY: MHM PROJECT NO. 492-0200-01	DATE: 12-15-92 APPROVED BY: DRAWING NO. 3	The Twining Laboratories, Inc. FRESNO/MODESTO/VISALIA/BAKERSFIELD

APPENDIX B

LOG OF BORINGS

This appendix contains the final logs of borings. These logs represent our interpretation of the contents of the field logs and the results of the field and laboratory tests.

The boring logs and related information depict subsurface conditions only at these locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these test boring locations. Also, the passage of time may result in changes in the soil conditions at these test boring locations.

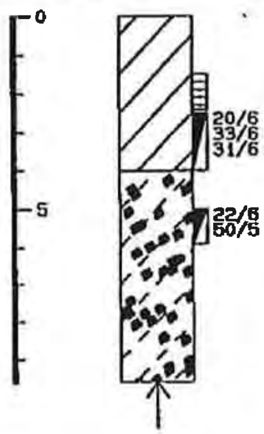
In addition, an explanation of the abbreviations used in the preparation of the logs and a description of the Unified Soil Classification System are provided.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-1

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-1



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown with trace of sand and gravel	DD= 89 pcf		16
	20/6 33/6 31/6				64	9
5	22/6 50/5	GC	GRAVEL, Clayey: very dense, damp, fine to medium grained with gravel and cobbles, subangular, gray-brown		>100	7
			auger refusal			

Test boring located approximately 1100 feet west and 90 feet north of the intersection of Parkway Village and Forest Avenues.

Figure Number 1

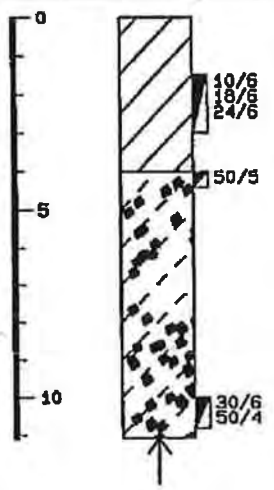
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-2

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-2

ELEVATION / DEPTH — SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA



USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
CL	LEAN CLAY: very stiff, damp, moderate plasticity, brown with red and white oxide		42	22
GC	GRAVEL, Clayey; very dense, damp, fine to coarse grained subangular with occasional cobbles, gray-brown		>100	11
			>100	13
	auger refusal			

Test boring located approximately 1100 feet west and 90 feet south of the intersection of Parkway Village and Forest Avenues.

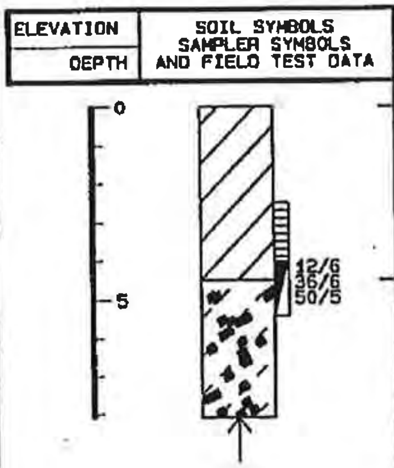
Figure Number 2

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-3

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-3



USCS	Soil Description	Remarks	N-Values Blows/Ft.	Moisture Content
CL	LEAN CLAY: hard, damp, slight plasticity, brown with sand and trace of gravel	DD= 94 pcf PHI= 30 deg C= 400 psf	>100	18 9
GC	GRAVEL, Clayey: very dense, fine to coarse grained, subangular, gray-brown auger refusal	-200= 64% -4= 100% PL= 18% LL= 50%		

Test boring located approximately 1100 feet west and 270 feet south of the intersection of Parkway Village and Forest Avenues.

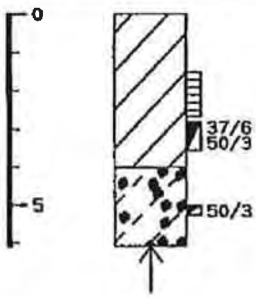
Figure Number 3

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-4

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-4



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
		CL	LEAN CLAY: hard, damp, moderate plasticity, brown with trace of sand and cobbles	DD= 103 pcf		13
	37/6 50/3				>100	8
	50/3	GC	GRAVEL, Clayey; very dense, fine to coarse with trace of cobbles, subangular, gray-brown auger refusal		>100	19

Test boring located approximately 1185 feet west and 270 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 4

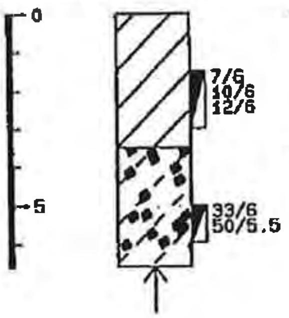
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-5

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-5



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0	7/6 10/6 12/6	CL	LEAN CLAY: very stiff, damp, moderate plasticity, brown, mottled white with traces of gravel increase in gravel content		22	15
5	33/6 50/5.5	GC	GRAVEL, Clayey: very dense, damp, subangular, gray-brown auger refusal		>100	9

Test boring located approximately 1185 feet west and 90 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 5

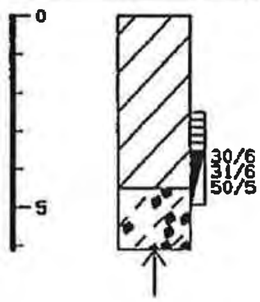
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-6

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-6



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown with white and black oxide trace of sand and gravel	DD= 93 pcf		16
	30/6 31/6 50/5		increase in gravel		>100	13
5		GC	GRAVEL, Clayey: very dense, damp, fine to coarse grained subangular with cobbles, auger refusal			

Test boring located approximately 1185 feet west and 90 feet north of the intersection of Parkway Village and Forest Avenues.

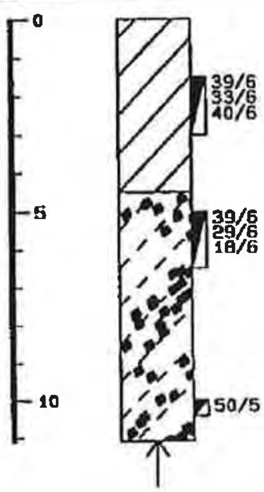
Figure Number 6

SOIL TEST BORING SYMBOLIC LOGS

BORING B-7

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-7



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0	39/6 33/6 40/6	CL	LEAN CLAY; hard, damp, moderate plasticity, brown with trace of sand and gravel		73	9
5	39/6 29/6 18/6	GC	GRAVEL, Clayey; very stiff, damp, fine to coarse grained subangular, gray-brown		47	8
10	50/5				>100	9
			auger refusal			

Test boring located approximately 965 feet west and 90 feet north of the intersection of Parkway Village and Forest Avenues.

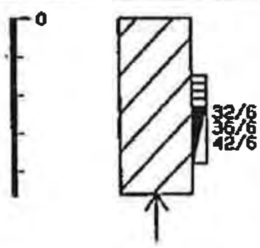
Figure Number 7

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-8

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-8

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown with trace of sand and gravel			14
					78	14
			increasing gravel content			
			auger refusal			

Test boring located approximately 965 feet west and 90 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 8

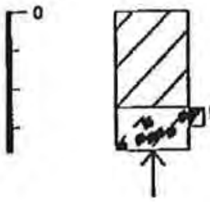
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-9

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-9

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: damp, moderate plasticity, brown with trace of sand and gravel			
	50/6	GC	GRAVEL, Clayey; very dense, damp, fine to coarse grained subangular, gray-brown auger refusal		>100	7

Test boring located approximately 955 feet west and 270 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 9

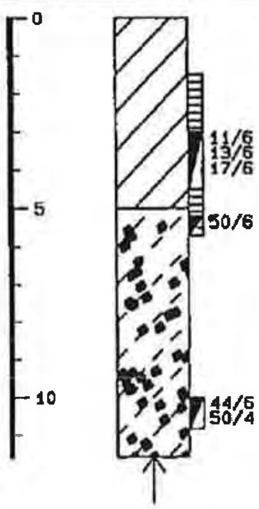
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-10

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-10



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: very stiff, damp, moderate plasticity, brown with trace of sand and gravel	DD= 91 pcf		14
				-4= 100%		
	11/6 13/6 17/6		stratum of silt	-200= 72%	30	13
				PC= 21%		
				LL= 46%		12
5	50/6	GC	GRAVEL, Clayey; very dense, damp, fine to medium grained, subangular gray-brown	DD= 90 pcf	>100	6
10	44/6 50/4				>100	6
			auger refusal			

Test boring located approximately 810 feet west and 270 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 10

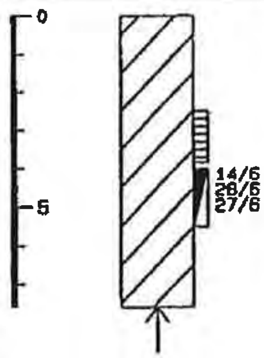
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-11

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-11



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, slight plasticity, light brown, some sand			
				DD= 91 pcf		19
	14/6 28/6 27/6				55	15
5			trace of gravel			
			auger refusal			

Test boring located approximately 830 feet west and 90 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 11

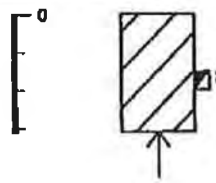
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-12

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-12

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0	 25/6	CL	LEAN CLAY: hard, damp, moderate plasticity, brown with trace of sand and gravel auger refusal		>100	9

Test boring located approximately 830 feet west and 90 feet north of the intersection of Parkway Village and Forest Avenues.

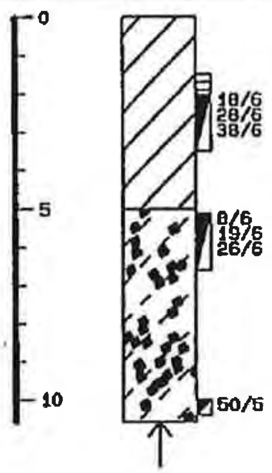
Figure Number 12

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-13

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-13



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0	18/6, 28/6, 38/6	CL	LEAN CLAY: hard, damp, moderate plasticity, brown with white oxide and trace of sand	DD= 95 pcf	66	18 20
5	8/6, 19/6, 26/6	GC	GRAVEL, Clayey: dense, damp, fine to medium grained, subangular, gray-brown, trace of cobbles		45	11
10	50/5		auger refusal		>100	8

Test boring located approximately 1015 feet west and 150 feet north of the intersection of Parkway Village and Forest Avenues.

Figure Number 13

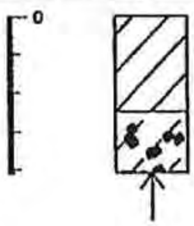
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-14

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-14

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: damp, moderate plasticity, brown			
		GC	GRAVEL, Clayey: damp, fine to medium grain, subangular, gray-brown auger refusal			

Test boring located approximately 670 feet west and 220 feet north of the intersection of Parkway Village and Forest Avenues.

Figure Number 14

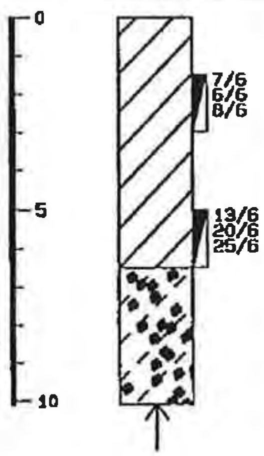
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-15

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-15



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: stiff, damp, moderate plasticity, brown trace of sand			
	7/6 6/6 8/6				14	18
5	13/6 20/6 25/6		increase in sand content, damp		45	18
		GC	GRAVEL, Clayey: damp, subangular, gray-brown			
10			auger refusal			

Test boring located approximately 670 feet west and 70 feet north of the intersection of Parkway Village and Forest Avenues.

Figure Number 15

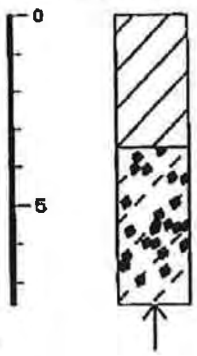
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-16

Project: Wal-Mart Chico
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-16



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
		CL	LEAN CLAY: damp, moderate plasticity, brown			
		GC	GRAVEL, Clayey: damp, subangular, gray-brown			
			auger refusal			

Test boring is located approximately 670 feet west and 80 feet south of the intersection Parkway Village and Forest Avenues.

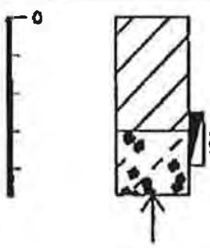
Figure Number 16

SOIL TEST BORING SYMBOLIC LOGS

BORING B-17

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-17

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown			
	16/6 40/6 50/5	GC	GRAVEL, Clayey: very dense, damp, fine to mediumd grained, subangular, gray-brown auger refusal		>100	5

Test boring located approximately 670 feet west and 230 feet south of the intersection of Parkway Village and Forest Avenues.

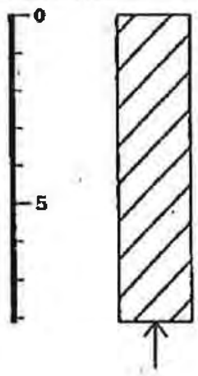
Figure Number 17

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-18

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-18



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft.	Moisture Content
		CL	LEAN CLAY: hard, damp, moderate plasticity, brown			
			trace of gravel and scattered cobbles			
			auger refusal			

Test boring located approximately 520 feet west and 230 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 18

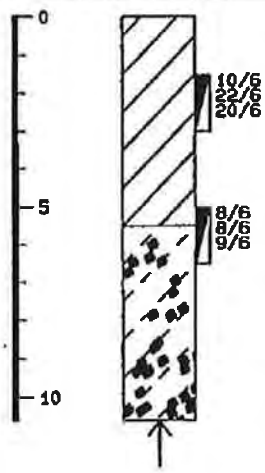
SOIL TEST BORING SYMBOLIC LOGS

BORING B-19

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-19

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown			
	10/6 22/6 20/6		12 inch layer of gravel clayey trace of gravel		42	13
5	8/6 8/6 9/6	GC	GRAVEL: Clayey, medium dense very moist, fine to coarse grained, subangular, reddish -brown		17	16
10			auger refusal			



Test boring located approximately 520 feet west and 80 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 19

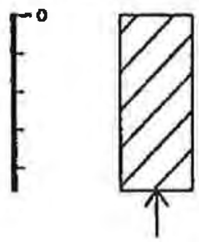
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-20

Project: Wal-Mart Chico .
Project Number: 492-0200
Logged By: J. Collins
Drilled By: T. Conley
Drill Type: CME 75
Auger Type: 6 5/8" O.D. Hollow Stem

Date: 11-2-92
Elevation: NA
Depth to Groundwater: NA
Cased to Depth: NA
Hammer Type: Trip
Test Boring: B-20

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: damp, moderate plasticity, brown trace of gravel auger refusal			

Test boring located approximately 520 feet west and 70 feet north of the intersection of Parkway Village and Forest Avenues.

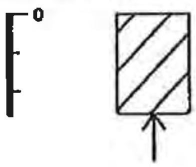
Figure Number 20

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-21

Project: Wal-Mart Chico .	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-21

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown auger refusal			

Test boring located approximately 340 feet west and 70 feet south of the intersection of Parkway Village and Forest Avenues.

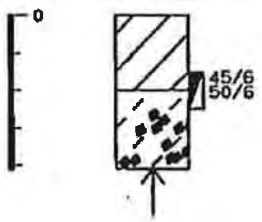
Figure Number 21

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-22

Project: Wal-Mart Chico	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-22



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		CL	LEAN CLAY: hard, damp, moderate plasticity, brown			
	45/6 50/6				>100	13
		GC	GRAVEL, Clayey: damp, fine to coarse grained, sub-angular, gray-brown auger refusal			

Test boring located approximately 370 feet west and 230 feet south of the intersection of Parkway Village and Forest Avenues.

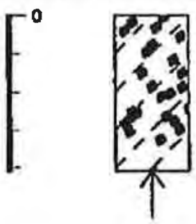
Figure Number 22

THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-23

Project: Wal-Mart Chico .	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-23

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0		GC	GRAVEL, Clayey; damp, gray-brown, fine subangular grains, with cobbles			
			auger refusal			

Test boring located approximately 220 feet west and 222 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 23

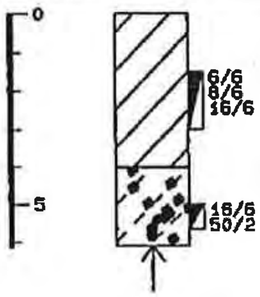
THE TWINING LABORATORIES, INC.

SOIL TEST BORING SYMBOLIC LOGS

BORING B-24

Project: Wal-Mart Chico .	Date: 11-2-92
Project Number: 492-0200	Elevation: NA
Logged By: J. Collins	Depth to Groundwater: NA
Drilled By: T. Conley	Cased to Depth: NA
Drill Type: CME 75	Hammer Type: Trip
Auger Type: 6 5/8" O.D. Hollow Stem	Test Boring: B-24

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values Blows/Ft	Moisture Content
0	6/6 8/6 16/6	CL	LEAN Clay: very stiff, damp, moderate plasticity, brown, with trace of sand		24	18
5	16/6 50/2	GC	GRAVEL, Clayey: very dense, damp, fine to medium grained grained, subangular, gray-brown auger refusal		>100	11



Test boring located approximately 220 feet west and 70 feet south of the intersection of Parkway Village and Forest Avenues.

Figure Number 24

THE TWINING LABORATORIES, INC.

Legend:

Symbol:	Description:	Symbol:	Description:
	LEAN CLAY:		brown
	California Sampler Split Barrel Ring Sampler (2.5" I.D.)	7/6 5/6	Standard penetration test. 140 lb. hammer dropped 30"
	Groundwater Level		Depth to which casing was installed
③			End of Boring

Notes:

1. Test borings were drilled on November 2, 3, and 4 1992 using a CME-75 drilling rig equipped with 6-5/8 inch O.D. hollow stem auger.

2. Groundwater was not encountered during drilling operations.

3. Boring locations were determined by measuring wheel from the centerlines of the intersection of Parkway Village and Forest Avenues.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

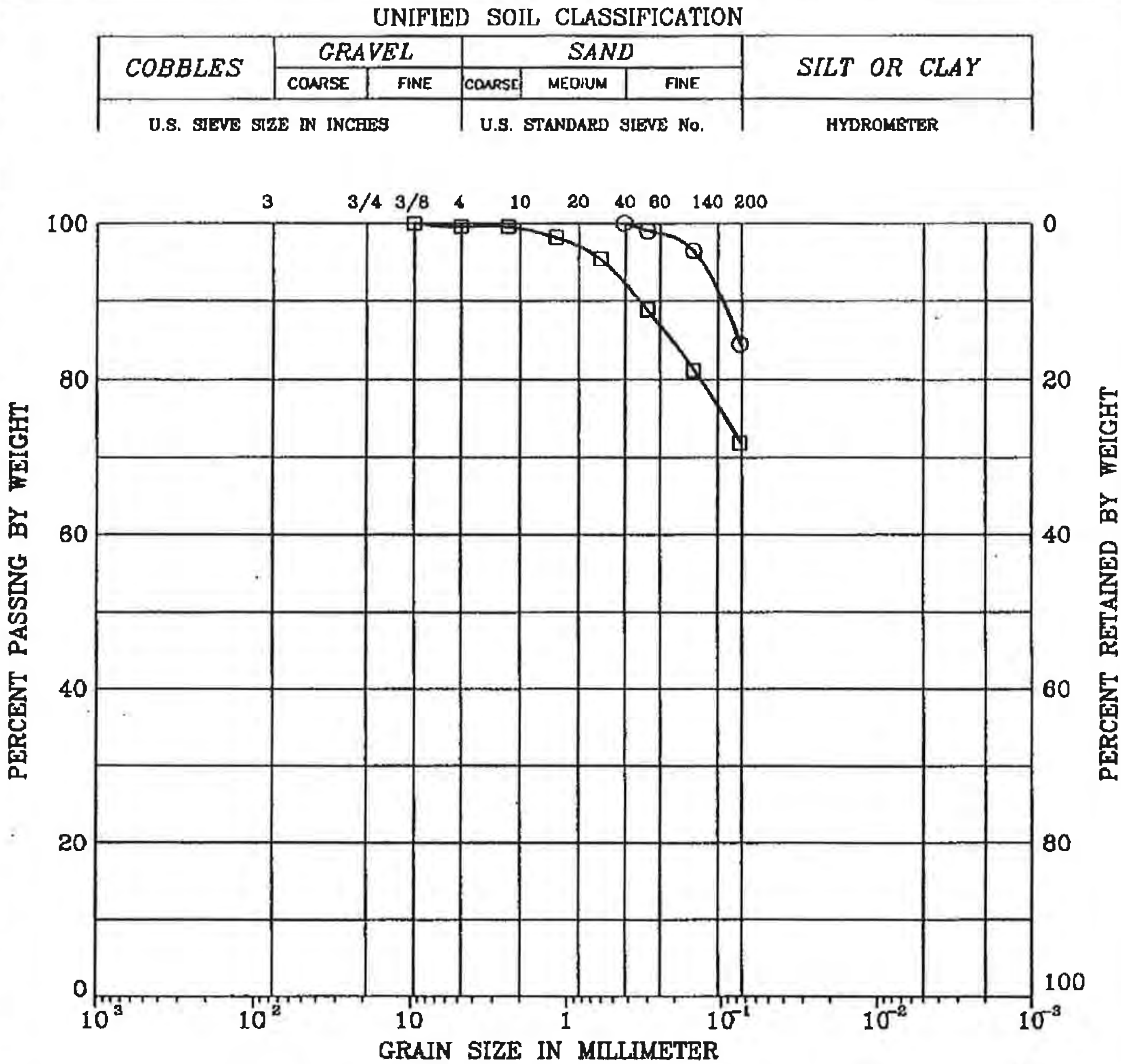
5. Results of tests conducted on samples recovered are reported on the logs. Abbreviations used are:

DD = natural dry density (pcf)	LL = Liquid limit (%)
UC = Unconfined compression (psf)	PI = Plasticity index (%)
-4 = percent passing #4 sieve (%)	pH = soil pH (%)
-200 = percent passing #200 sieve (%)	SS = Soluble sulfates (%)
SR = Soil resistivity (ohm-cm)	Cl = Soluble chlorides (%)
c = Cohesion (psf)	phi = Angle of internal Friction (degrees)

APPENDIX C

RESULTS OF LABORATORY INVESTIGATIONS

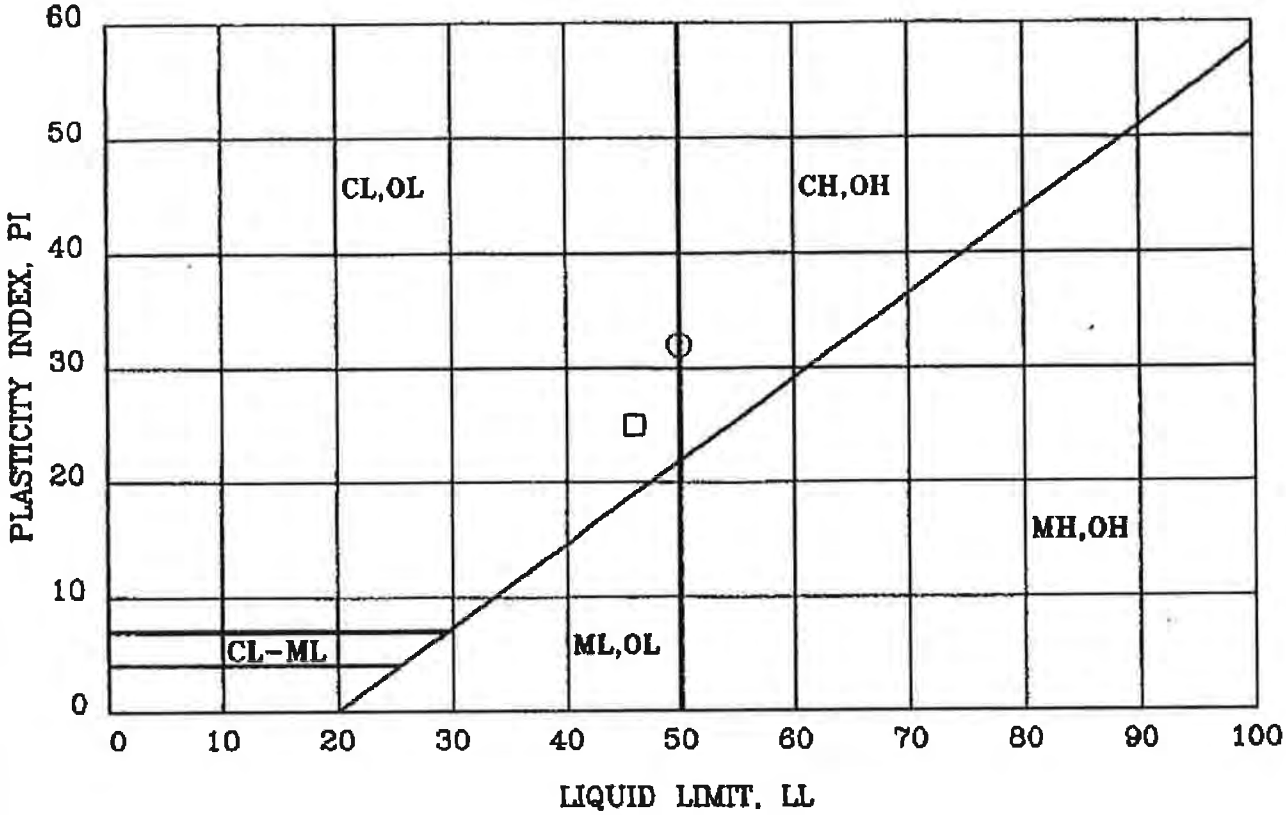
This appendix contains the individual results of grain size distribution, Atterberg Limit, direct shear, consolidation, unconfined compression, R-value tests, moisture/density curve and chemical analysis on the enclosed plates.



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-3	2.5–4.0	50	32	LEAN CLAY (CL)
□	B-10	1.5–3.0	46	25	LEAN CLAY (CL)

Remark : TEST METHOD: ASTM D422

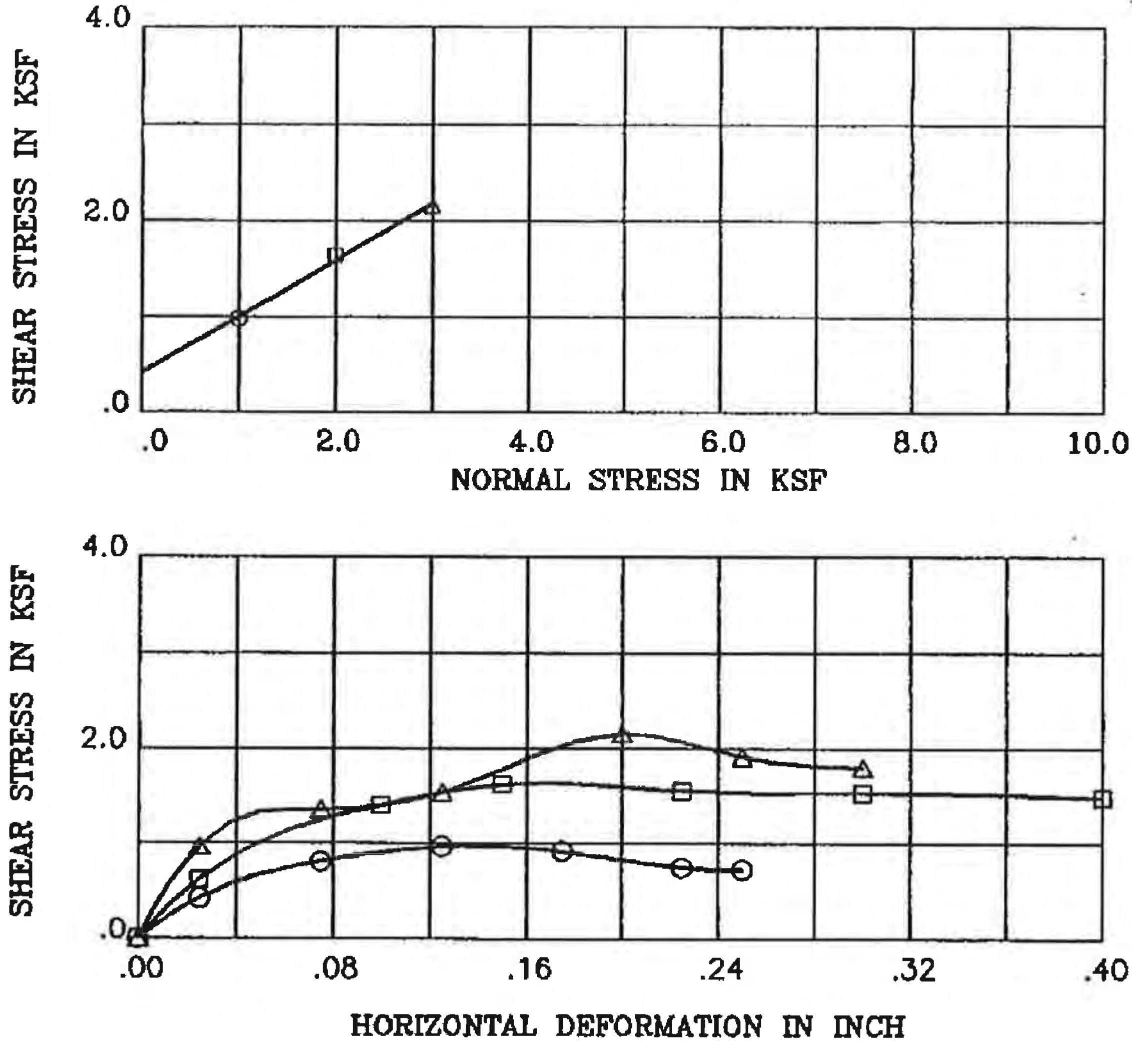
TL 492-0200-01	PROPOSED WAL-MART
The Twining Labs Inc. Fresno, CA	**GRAIN SIZE DISTRIBUTION** Figure No. 1



SYMBOL	BORING	DEPTH (ft)	MC (%)	LL (%)	PL (%)	PI (%)	LI (-)	DESCRIPTION
○	B-3	2.5-4.0	.0	50	18	32	-.57	LEAN CLAY (CL)
□	B-10	1.5-3.0	.0	46	21	25	-.84	LEAN CLAY (CL)

Remark : TEST METHOD: ASTM D4318

TL 492-0200-01	PROPOSED WAL-MART
The Twining Labs Inc. Fresno, CA	PLASTICITY CHART — Figure No. 2



BORING/SAMPLE : B-3 DEPTH (ft) : 2.5-4.0

DESCRIPTION : LEAN CLAY (CL)

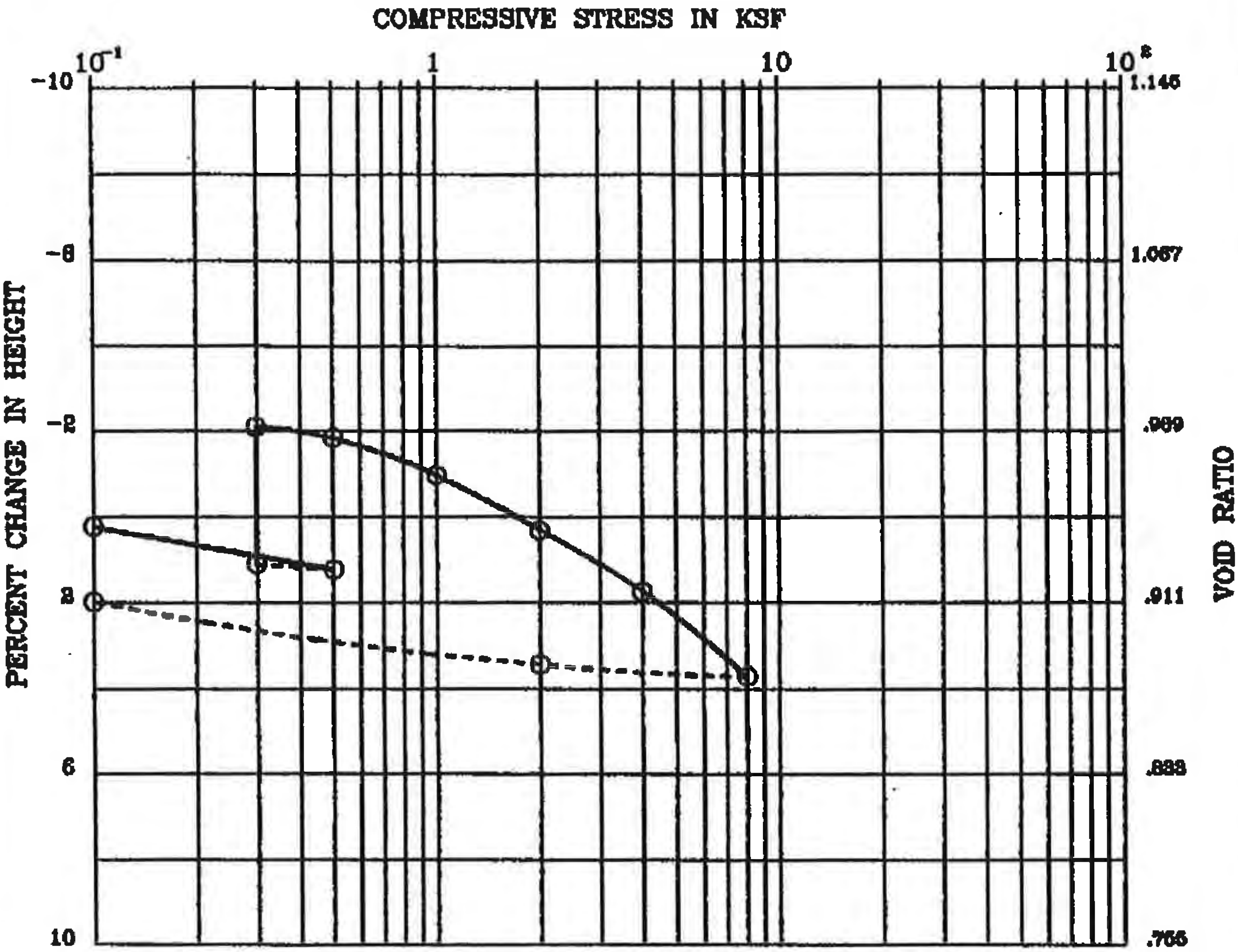
STRENGTH INTERCEPT (C) : .413 KSF

FRICTION ANGLE (PHI) : 30.5 DEG (PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
O	36.7	94.1	.756	1.00	.98	.72
□	37.8	92.4	.789	2.00	1.64	1.49
Δ	36.2	91.9	.799	3.00	2.15	1.80

Remark : TEST METHOD: ASTM D3080

TL 492-0200-01	PROPOSED WAL-MART
The Twining Labs Inc. Fresno, CA	DIRECT SHEAR TEST Figure No. 3



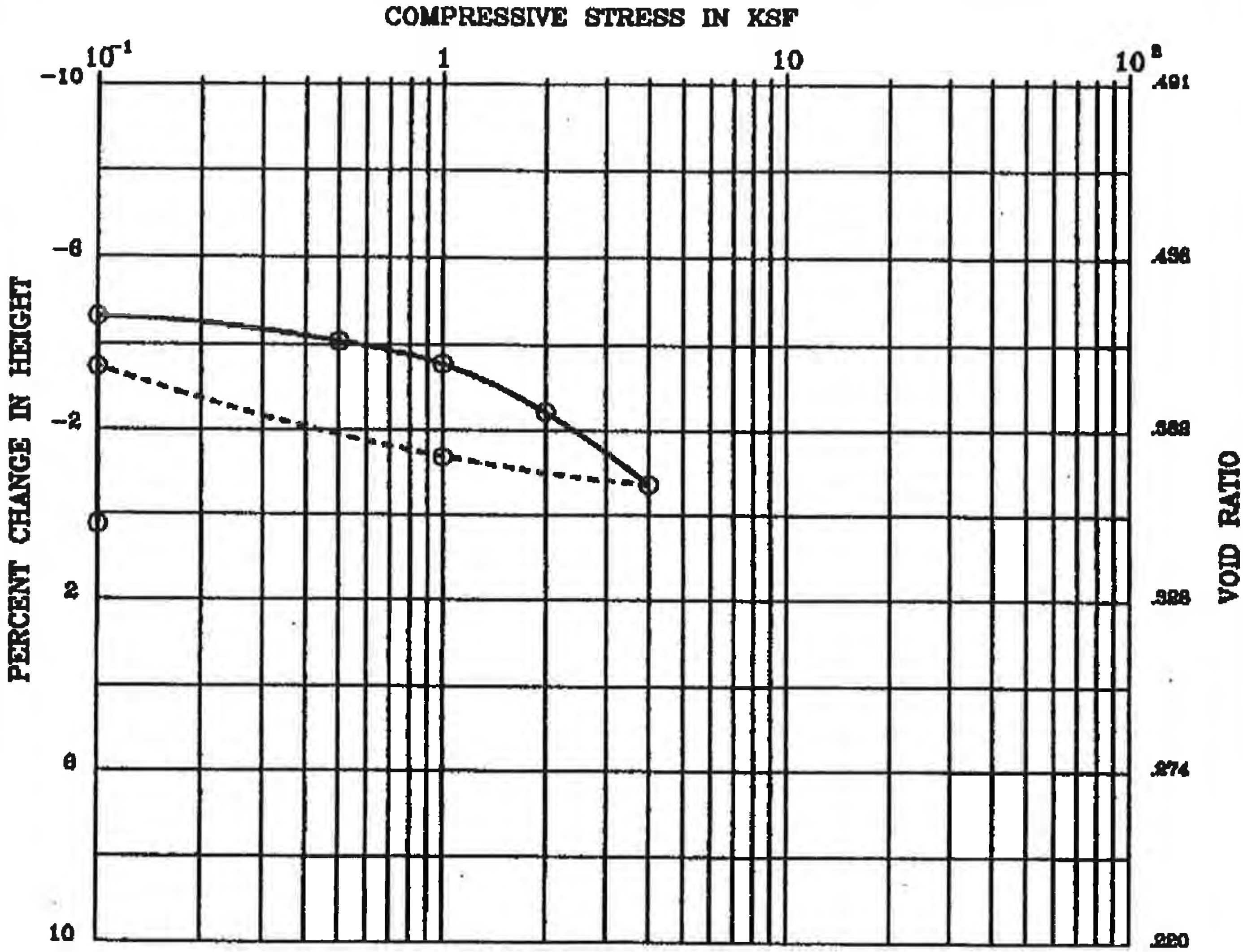
BORING : B-3
DEPTH (ft) : 2.5-4.0
SPEC. GRAVITY : 2.75

DESCRIPTION : LEAN CLAY
LIQUID LIMIT : 50
PLASTIC LIMIT : 18

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	23.6	88.1	68	.950
FINAL	36.8	89.9	111	.911

Remark : TEEST METHOD: ASTM D2435

TL 492-0200-01	Proposed Wal-Mart
The Twining Labs Inc. Fresno, CA	CONSOLIDATION TEST Figure No. 4

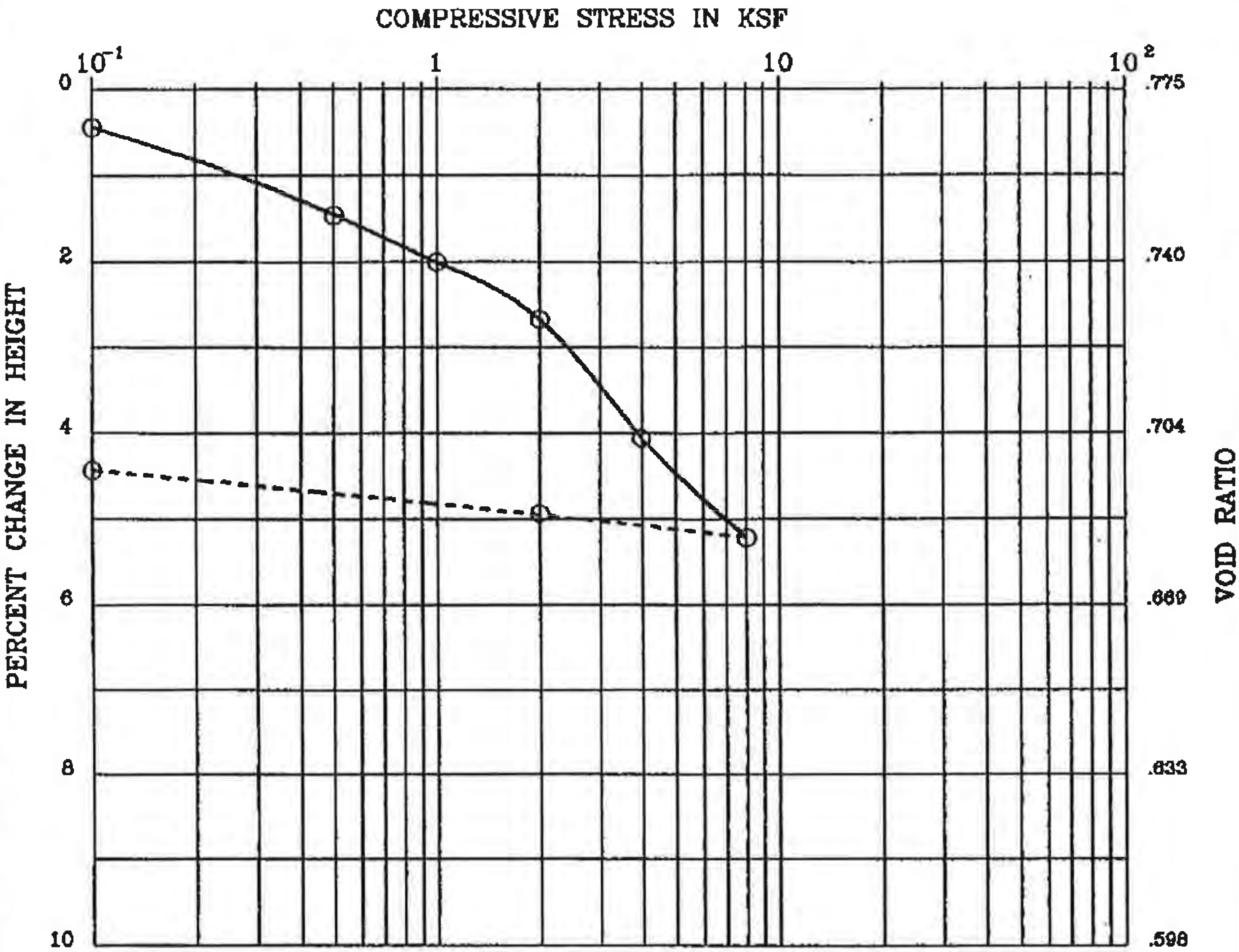


BORING	:	B-8	DESCRIPTION	:	LEAN CLAY
DEPTH (ft)	:	0-1.5	LIQUID LIMIT	:	
SPEC. GRAVITY	:	2.65	PLASTIC LIMIT	:	

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	7.6	122.2	57	.355
FINAL	11.9	118.0	79	.403

Remark : TEST METHOD: ASTM D2435

TL 492-0200-01	Proposed Wal-Mart
The Twining Labs Inc. Fresno, CA	CONSOLIDATION TEST Figure No. 5

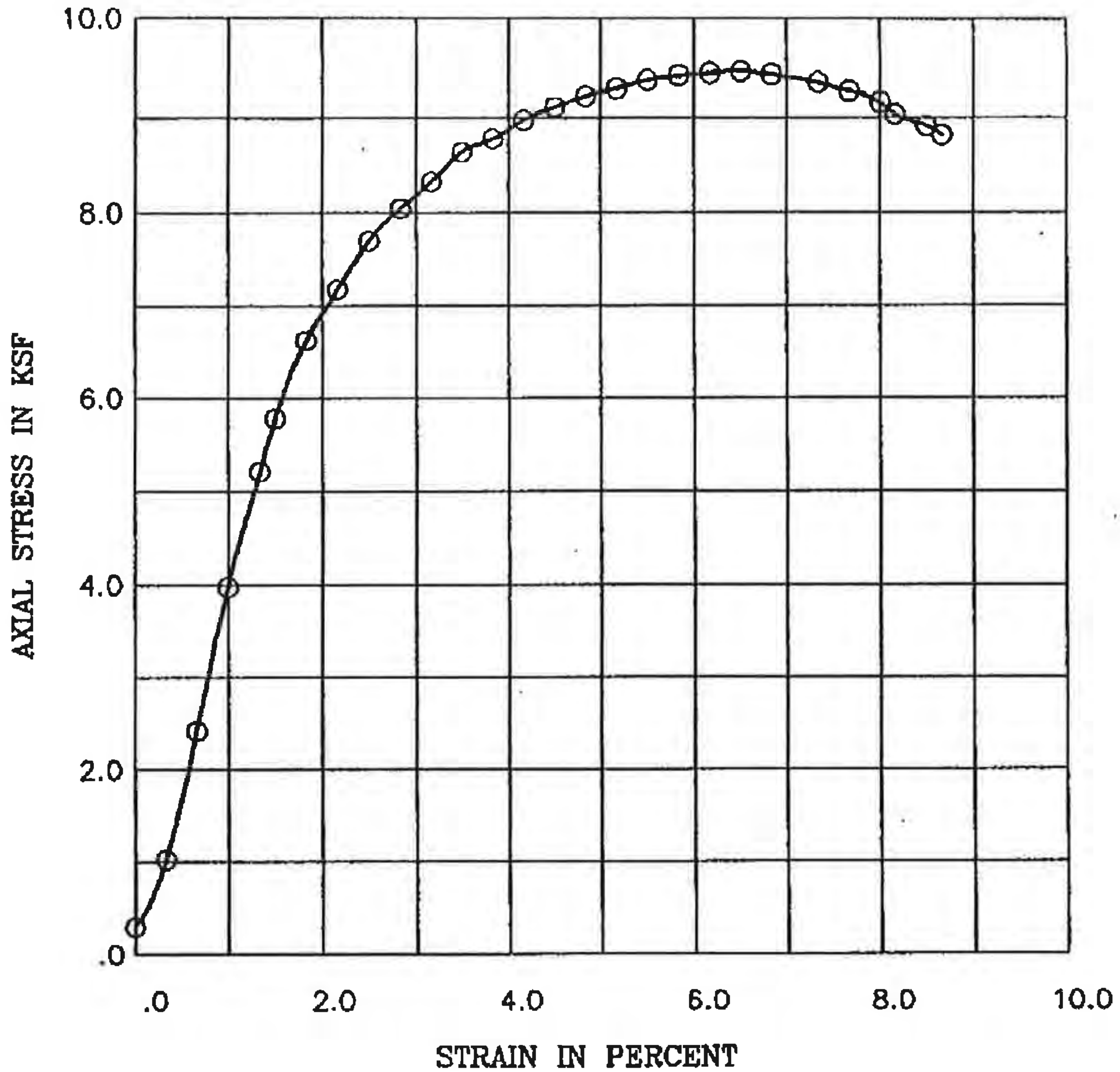


BORING	:	B-3	DESCRIPTION	:	LEAN CLAY (CL)
DEPTH (ft)	:	2.5-4.0	LIQUID LIMIT	:	50
SPEC. GRAVITY	:	2.65	PLASTIC LIMIT	:	18

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	14.5	93.3	50	.775
FINAL	11.8	97.6	45	.697

Remark : TEST METHOD: ASTM D2435

TL 492-0200-01	PROPOSED WAL-MART
The Twining Labs Inc. Fresno, CA	CONSOLIDATION TEST Figure No. 6

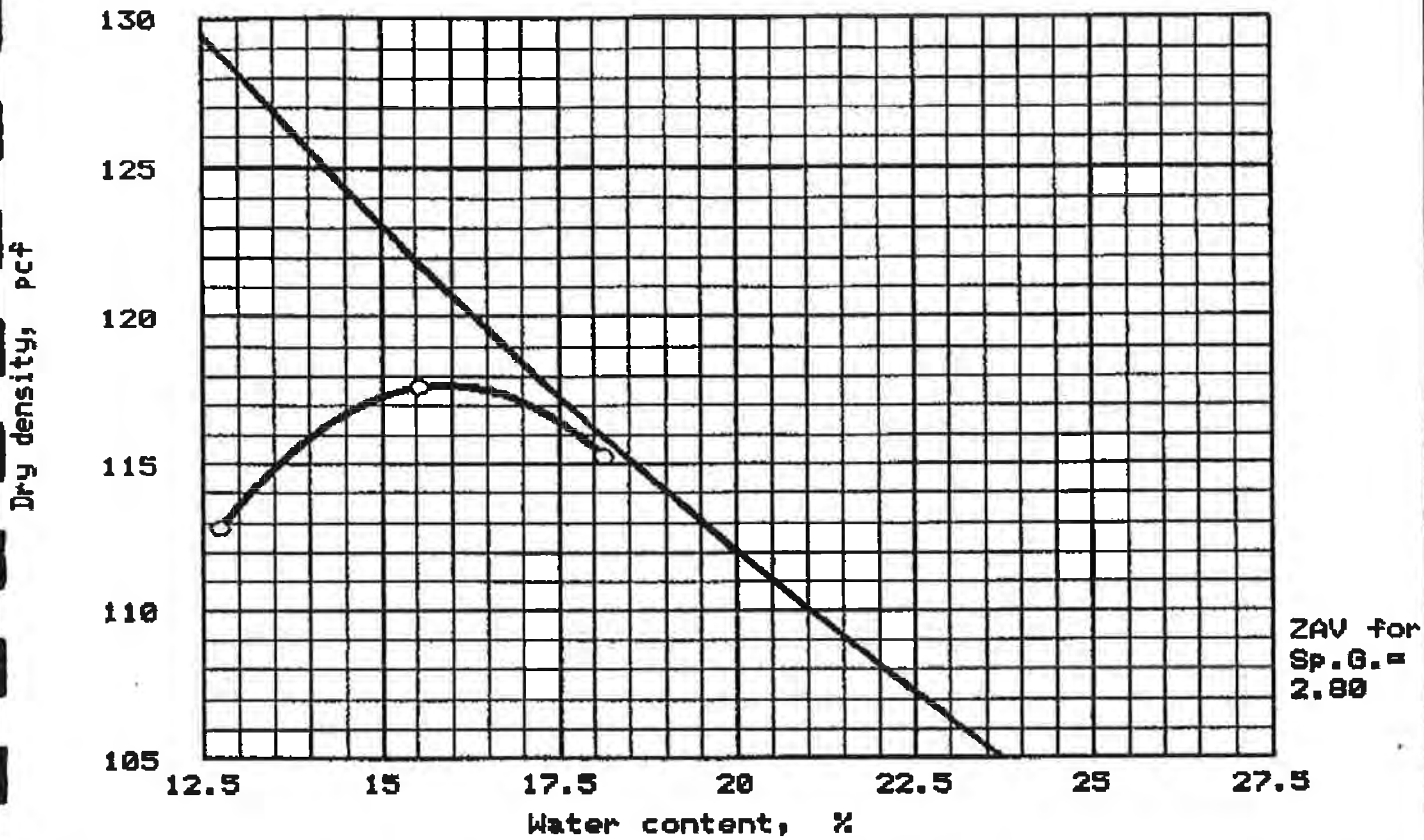


SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	PEAK STRESS (ksf)	AXIAL STRAIN (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
O	B-8	0.0-1.5		9.5	6.5	17.1	103.5

Remark : TEST METHOD: ASTM D2166

TL 492-0200-01	PROPOSED WAL-MART
The Twining Labs Inc. Fresno, CA	UNCONFINED COMPRESSION TEST Figure No. 7

PROCTOR TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
comp.			N/A %	2.80	*	*	* %	* %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 15.9 % Maximum dry density = 117.7 pcf	

Project No.: 492-0200-01
Project: PROPOSED WAL-MART
Location: R-1
CHICO, CA
Date: NOVEMBER 13, 1992

Remarks:

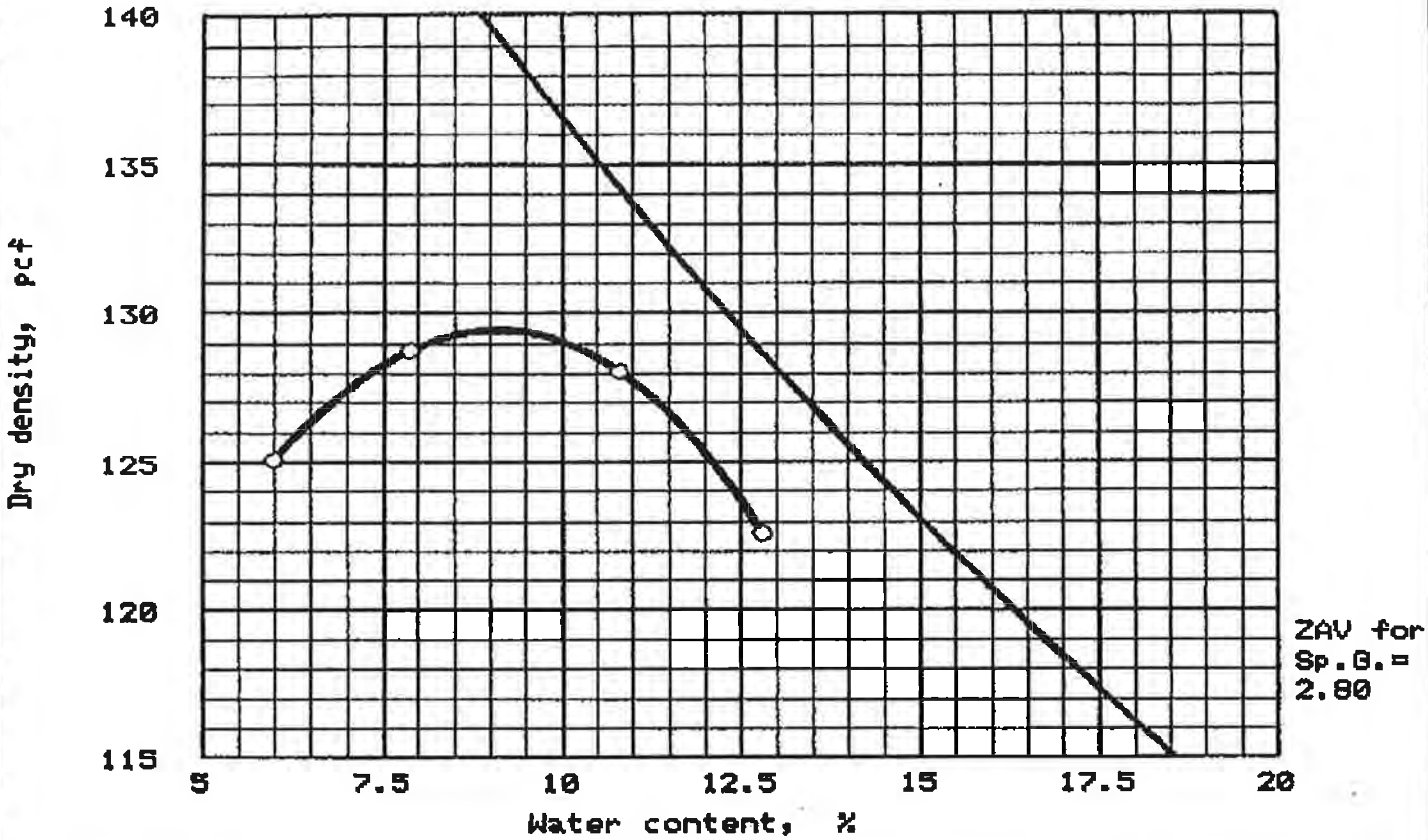
*

*

PROCTOR TEST REPORT
THE TWINING LABORATORIES, INC.

Figure No. 8

PROCTOR TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
comp.			N/A %	2.80	*	*	* %	* %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 9.1 % Maximum dry density = 129.5 pcf	

Project No.: 492-0200-01
Project: PROPOSED WAL-MART
Location: B-8
CHICO, CA
Date: NOVEMBER 12,1992

Remarks:

*

*

PROCTOR TEST REPORT

THE TWINING LABORATORIES, INC.

Figure No. 9

The Twining Laboratories, Inc.

Since 1898

Geotechnical and Environmental Engineering • Construction Inspection • Materials Testing • Analytical Chemistry

REPORT DATE : November 13, 1992 PROJECT MGR: D. Ansolabehere
EXAMINATION NO.: 692-6520.1-3

CLIENT : Wal-Mart, Inc.
c/o CEI Engineering
4630 W. Jacqueline, Ste. 110
Fresno, CA

PROJECT NAME : Proposed Wal-Mart
Chico, CA

TL NUMBER : 492-0200-01

DATE SAMPLED : 11-02-92 by J. Collins
DATE RECEIVED : 11-09-92 at 1543 from A. Beltran

The Twining Laboratories is accredited by the State of California Department of Health Services for the analysis of Drinking Water, Wastewater and Hazardous Waste under Certificate No. 1371.

In accordance with your instructions, the samples submitted were analyzed for the components specified. The analytical results\ are enclosed on the following pages.

Please contact us if you have any questions concerning the analyses or results. Thank you for letting us serve you.

Authorized Signature
The Twining Laboratories, Inc.
Chemistry Division

RBF:dab

2527 Fresno Street • P.O. Box 1472
Fresno, California 93716 • (209) 268-7021

1405 Granite Lane, Suite 1
Modesto, California 9535[illegible] • (209) [illegible]

9401 West Goshen Avenue
Visalia, California 93291 • (209) 651-2190

3701 Pegasus Drive, Suite 124

REPORT DATE : November 13, 1992
EXAMINATION NO.: 692-6520.1

PROJECT MGR: D. Ansolabehere

CLIENT : Wal-Mart, Inc.
c/o CEI Engineering

PROJECT NAME : Proposed Wal-Mart

TL NUMBER : 492-0200-01

DATE SAMPLED : 11-02-92 by J. Collins
DATE RECEIVED : 11-09-92 at 1543 from A. Beltran

DATE ANALYZED : 11-11-92 through 11-12-92

ANALYZED BY : D. Carlton
REVIEWED BY : J. Strutzel

SAMPLE TYPE : Soil
SAMPLE IDENTIFICATION: B-1 1^5 - 2^5

	RESULT	UNITS	MDL	METHOD
CORROSIVITY				
pH	7.1	pH	N/A	150.1
Resistivity	48600	ohms/cm	N/A	DOT424

NOTES:

ohms/cm: ohms per centimeter @ 25°C
DOT : Department of Transportation
N/A : Not Applicable
MDL : Method Detection Limit

REPORT DATE : November 13, 1992
EXAMINATION NO.: 692-6520.2

PROJECT MGR: D. Ansolabehere

CLIENT : Wal-Mart, Inc.
c/o CEI Engineering

PROJECT NAME : Proposed Wal-Mart

TL NUMBER : 492-0200-01

DATE SAMPLED : 11-02-92 by J. Collins
DATE RECEIVED : 11-09-92 at 1543 from A. Beltran

DATE ANALYZED : 11-11-92 through 11-12-92

ANALYZED BY : D. Carlton
REVIEWED BY : J. Strutzel

SAMPLE TYPE : Soil
SAMPLE IDENTIFICATION: B-8 $1^5 - 2^3$

	RESULT	UNITS	MDL	METHOD
CORROSIVITY				
pH	7.7	pH	N/A	150.1
Resistivity	28700	ohms/cm	N/A	DOT424

NOTES:

ohms/cm: ohms per centimeter @ 25°C
DOT : Department of Transportation
N/A : Not Applicable
MDL : Method Detection Limit

REPORT DATE : November 13, 1992
EXAMINATION NO.: 692-6520.3

PROJECT MGR: D. Ansolabehere

CLIENT : Wal-Mart, Inc.
c/o CEI Engineering

PROJECT NAME : Proposed Wal-Mart

TL NUMBER : 492-0200-01

DATE SAMPLED : 11-02-92 by J. Collins
DATE RECEIVED : 11-09-92 at 1543 from A. Beltran

DATE ANALYZED : 11-11-92 through 11-12-92

ANALYZED BY : D. Carlton, D. Spenhoff
REVIEWED BY : J. Strutzel

SAMPLE TYPE : Soil
SAMPLE IDENTIFICATION: B-10 $4^5 - 5^2$

	RESULT	UNITS	MDL	METHOD
CORROSIVITY				
pH	6.9	pH	N/A	150.1
Resistivity	40000	ohms/cm	N/A	DOT424
Chloride (Cl)	0.001	% by weight	0.001	A1000M
Sulfate (SO_4)	ND	% by weight	0.01	A1000M

NOTES:

ohms/cm: ohms per centimeter @ 25°C
DOT : Department of Transportation
N/A : Not Applicable
MDL : Method Detection Limit
ND : None Detected

The Twining Laboratories, Inc.

Fresno Modesto Visalia Bakersfield

APPENDIX D

WAL-MART GEOTECHNICAL FACT SHEETS

GEOTECHNICAL INVESTIGATION FACT SHEET

Include this form in the Geotechnical Report as an Appendix.

PROJECT: Wal-Mart Store LOCATION: Chico, California
Engineer: David R. Ansolabehere Phone#: (209) 268-7021

Firm: The Twining Laboratories, Inc Report Date: December 14, 1992.

Ground Water Elevation: N/A
(If Encountered)
Date Measured: N/A

Topsoil/Stripping Depth: 4 inches

Undercut (If Required): N/A

Standard Proctor Results: Attach plots.

Recommended Compaction Control Tests:

1 Test for Each 2,000 Sq. Ft. each Lift (bldg. area)
1 Test for Each 4,000 Sq. Ft. each Lift (parking area)

Structural Fill Maximum Lift Thickness 8 in. (Measured loose)

Subgrade Design CBR value = 5.

COMPONENT	ASPHALT standard	ASPHALT heavy	CONCRETE standard	CONCRETE heavy
Stabilized Subgrade (If Applicable)	6 in.	6 in.	6 in.	6 in.
Base Material (Stone, Sand/Shell, etc.)	12 in.	14.5 in.	4 in.	4 in.
Asphaltic Base Course	N/A	N/A	5.5	6.0 concrete
Leveling Binder Course	N/A	N/A	N/A	N/A
Surface Course	3 in.	3.5 in.	N/A	N/A

FOUNDATION DESIGN CRITERIA

Include this form as an appendix to the Geotechnical report.

LOCATION: Chico, California

ENGINEER: David R. Ansolabehere

COMPANY: The Twining Laboratories, Inc.

DATE: 12/14/92 PHONE # 209-268-7021

Foundation type: Shallow Spread

Allowable bearing pressure: 2,000 psf

Factor of Safety: 3

Minimum footing dimensions: Individual: 30 in. Continuous: 30 in.

Minimum footing embedment: Exterior: 30 in. Interior: 30 in.

Frost depth: 0

Maximum foundation settlements: Total: 1 inch
Differential: 1/2 inch

Slab: Potential vertical rise: 1/2 inch

Vapor barrier or capillary break (describe): Moistop™

Subgrade reaction modulus: 110 psi/in Method obtained: 12 inch imported granular engineered fill.

Perimeter Drains (describe): Building: N/A
Retaining walls: Backfill granular material

Cement Type: I or II

Retaining Wall: At rest pressure: 55 pcf
Coefficient of friction: 0.35

COMMENTS:

NOTE: This information should not be used separately from the geotechnical report.

WAL★MART
REALTY
A DIVISION OF WAL-MART STORES, INC.

Document ID:

350126

Document Separator Form

APPENDIX E

Pavement Engineering, Inc. 2008 Pavement Evaluation Report

REVISED
PAVEMENT ANALYSIS REPORT
for
WALMART SHOPPING CENTER
FORREST AVENUE
CHICO, CALIFORNIA

Pavement Engineering Inc.
Civil Engineering • Landscape Architecture
CalTrans/AMRL QC/QA • Construction Management

January 17, 2008 Project No. 070149-01

Mr. Mike Neer
Pacland
606 Columbia Street NW, Suite 211
Olympia, WA 98501

Subject: **REVISED** Walmart Shopping Center - Forrest Avenue
Chico, California

Dear Mike:

In accordance with your request, we have performed the field investigation at the subject location and are herein providing our Pavement Evaluation Report for the projects pavements.

Introduction

Our report consists of a pavement analysis; drainage considerations; PCC structures and miscellaneous site conditions; disabled access; repair recommendations; and cost considerations. Each topic will be discussed in detail.

Included with this report are several appendixes that may be referred to while reviewing this report. Appendix A is a site plan showing the different areas; Appendix B is a plan showing dynaflect tests, boring and photo locations; Appendix C is the 5 to 10 year plan and Appendix D is the 15 to 20 year plan. Additional attachments include the R-Value and dynaflect test results and project photographs.

Our field investigation included performing structural deflection testing of the pavement; obtaining core samples to determine the thickness of the asphalt concrete and aggregate layers; sampling of the native soil to determine the soils load bearing capacity (R-Value); and a visual condition survey. Pavement slopes were obtained using an electronic hand level.

Pavement Analysis

The pavement was divided into four separate areas based on varying pavement conditions or traffic usage. These areas will be referred to as Main Parking Area; Rear Parking Area; Main Storefront Drive and Truck Service Route. Each area will be discussed independently.

Main Parking Area

The pavement exhibits moderate raveling and shrinkage cracking. Some areas of severe raveling have developed in drainage paths. Previous maintenance includes pavement repairs. The approximate area is 275,000 sf.

The existing structural section at our boring locations consisted of 3-1/2 to 4 inches of asphalt concrete over 12 to 13 inches of aggregate base.

Based on the deflection analysis, the pavement is structurally adequate for a traffic index of 7.0.

Rear Parking Area

The pavement exhibits slight to moderate raveling and shrinkage cracking. The approximate pavement area is 32,000 sf.

The existing structural section at our boring locations consisted of 3-1/2 inches of asphalt concrete over 12 inches of aggregate base.

Based on the deflection analysis, the pavement is structurally adequate for a traffic index of 7.0.

Truck Service Route

The pavement exhibits severe raveling, joint cracking, block shrinkage cracking and areas of alligator cracking on the west side of the building. Previous maintenance includes pavement repairs.

The section of pavement on the south side of the building will be eliminated by the remodel.

The truck service route to the south of the building exhibits shrinkage cracking and slight to moderate raveling. The approximate pavement area of the Truck Service Route is 29,000 Sf.

The structural section at our coring locations consisted of 3-1/4 to 5-1/4 inches of asphalt concrete over 12-3/4 to 13 inches of aggregate base.

Based on the deflection analysis, the pavement in the Truck Service Route is structurally deficient by 0.03 ft for the traffic index of 7.5.

Main Storefront Drive

The pavement exhibits slight to moderate raveling, block shrinkage cracking. Small areas of alligator cracking are developing. Previous maintenance includes pavement repairs. The approximate pavement area is 20,000 sf. This area is being eliminated as part of the remodel.

The structural section at our coring location consisted of 3-3/4 inches of asphalt concrete over 13 inches of aggregate base.

Based on the deflection analysis, the pavement is structurally adequate for a traffic index of 7.5.

Native Soil

The native soil was sampled at two locations from the site. Sample #1, taken at core A1 in the Rear Parking Area, is a Brown silty clay with an R-value of 15.

Sample #2, obtained from core A4 in the main parking area near the Truck Service Route, is a brown clay with an R-value of 8. The soil is slightly expansive.

The recommended design R-value for the site is 8.

Drainage

The pavements drain to drop inlets located throughout the site. Pavement slopes range from 1 to 3.5 percent. The overall drainage appears to be adequate, although there are numerous small areas of ponding throughout the site.

Some settlement and pavement wear is occurring around the drop inlets. Pavement repairs should be performed around the inlets to insure adequate drainage and prevent a trip/fall hazard from developing.

Landscape runoff water from the turf area adjacent to the truck service route on the west side of the building is contributing to the pavement deterioration in this area. The turf will be replaced with pavement thus eliminating the influence of the landscape runoff on the pavement deterioration.

PCC Structures and Miscellaneous Site Conditions

PCC facilities throughout the site are generally in good to fair condition.

Disabled Access

The disabled access does not comply with ADA requirements. Non-complying items includes excessive slopes for landings at doors, pavement slopes and some ramp slopes; insufficient landing width at some doors; no detectable warnings; and some disabled users are compelled to travel behind other parking spaces.

Upgrading the disabled access will require significant work. It is our understanding that the store expansion will eliminate the existing Store Front Drive and sidewalk. It is important to insure that the remodel work include upgrading the site to meet all current disabled access requirements.

Discussion

The overall pavement condition is good to fair. PEI was asked to review the pavement and determine a 5 to 10 year service life and also to a 20 year life.

Typically overlays are designed for a 10 year service life. This is based on overlaying a pavement that is aged, cracked and is reaching the end of its service life for repetitions to failure. The cracked pavement will usually reflect to the surface of the overlay within 10 years.

The parking areas at the Walmart in Chico exhibits slight shrinkage cracking and raveling. Overlaying the parking areas at this time should extend the service life from 15 to 20 years. This life expectancy is based on routine maintenance every 4 to 5 years such as seal coating and pavement repairs as necessary. Pavement fabric should be used even though the cracking is limited. The fabric will provide some tensile strength to reduce cracking potential from the underlying pavement.

The pavement in the Truck Service Route could be extended to a 15 to 20 year life with pavement repairs of the areas exhibiting alligator cracking and an overlay.

Recommendations

Based on our analysis, the pavements are structurally adequate with the exception of a slight structural deficiency for the Truck Service Route.

Our recommendations will include providing maintenance recommendations for 5 to 10 year service life and 15 to 20 year service life. These recommendations are based on the existing Store Front Drive and the truck service turn around area being eliminated as part of the remodel.

5 to 10 Year Service Life

We recommend pavement repairs, crack filling and seal coating the Main Parking Area and the Rear Parking Area.

For the Truck Service Route on the west side of the building, we recommend removing and replacing the alligator cracked pavement to a depth of 0.33 ft, placing pavement fabric and a 0.17 ft asphalt concrete overlay. This work should also be performed in 2009.

Additional repairs should include repairs around the drop inlets and disabled access upgrades.

The next maintenance recommended during the 10 year maintenance period is in 2013. The recommended maintenance is pavement repairs, crack sealing and seal coating for all of the pavement areas.

15 to 20 Year Service Life

For 2009, we recommend placing an 0.17 ft asphalt concrete overlay for the Main Parking Area and Rear Parking Area. Pavement fabric, although not required, can be used to reduce the potential for reflective cracking.

For the Truck Service Route, we recommend removing and replacing the alligator cracking to a depth of 0.33 ft, placing pavement fabric and placing a 0.21 ft asphalt concrete overlay in 2009.

Disabled access upgrades should be an integral part of the pavement rehabilitation and expansion project.

Although some ponding can be expected after placing the overlay, some slight improvement to the overall drainage can be expected.

The next maintenance periods for the 15 to 20 year maintenance plan is 2013 when seal coating the entire pavement area is recommended. Seal coating is also recommended in 2018.

In 2023, maintenance should include seal coating for the Main Parking Area and Rear Parking Area. Reconstruction will likely be required in the Truck Service Route.

Budget Considerations

The cost for performing the recommended repairs are as follows:

5 to 10 Year Plan	**Description of Work**	**Estimated Cost**
2009	Seal coat, pavement repairs and crack fill Main Parking Area and Rear Parking Area; Pavement Repairs and overlay Truck Service Route with pavement fabric and a 0.17 ft asphalt concrete overlay	$185,000
2013	Seal coat, pavement repairs and crack fill Main Parking Area, Rear Parking Area and Truck Service Route west side of building	$165,000

15 to 20 Year Plan	Description of Work	Estimated Cost
2009	Place 0.17 feet overlay with pavement fabric for Main Parking Area and Rear Parking Area; Pavement repairs and overlay Truck Service Route west side of building with Pavement fabric and 0.21 feet asphalt concrete overlay.	$825,000
2013	Seal coat, crack fill and pavement repairs all pavement areas	$115,000
2018	Seal coat, crack fill and pavement repairs for all pavement areas	$165,000
2023	Seal coat and pavement repairs, Main Parking Area and Rear Parking Area; reconstruct Truck Service Route	$295,000

The costs provided are based on 2007 prices and no allowance for inflation is included. The repairs costs only apply to the existing pavement surfaces. Island additions and new pavement areas are not included in the budget estimates.

Limitations

This report has been prepared on the basis of the indicated field testing and application of our knowledge of pavement technology. The repair strategies in this report are based upon industry standards. The overlays have been designed in general conformance with California Test Method 356.

The report contains projections of future life. These are given to provide a broad outline for pavement maintenance budgeting. They should not be interpreted as providing definitive predictions of future pavement performance.

Our professional services were performed, findings obtained, and recommendations prepared in accordance with generally accepted engineering principles and practices. No warranty is either expressed or implied.

Summary

We have completed the pavement analysis at the Walmart Store in Chico, California. We have provided recommendations for 5 to 10 year service life and 15 to 20 year service life.

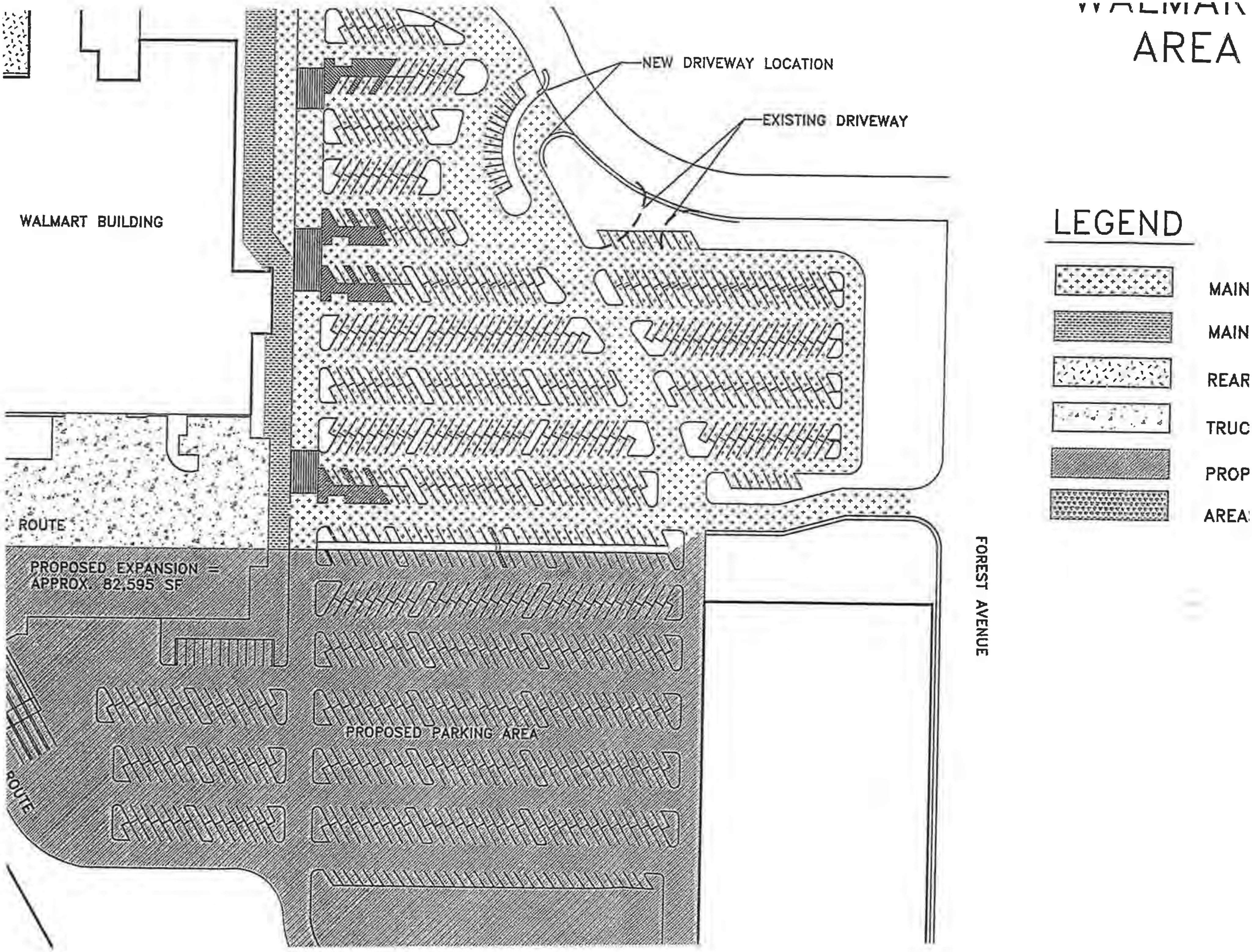
If you have any questions, please do not hesitate to give me a call at (530)224-4535.

Very truly yours,
PAVEMENT ENGINEERING INC.

William J. Long, P.E.
Principal

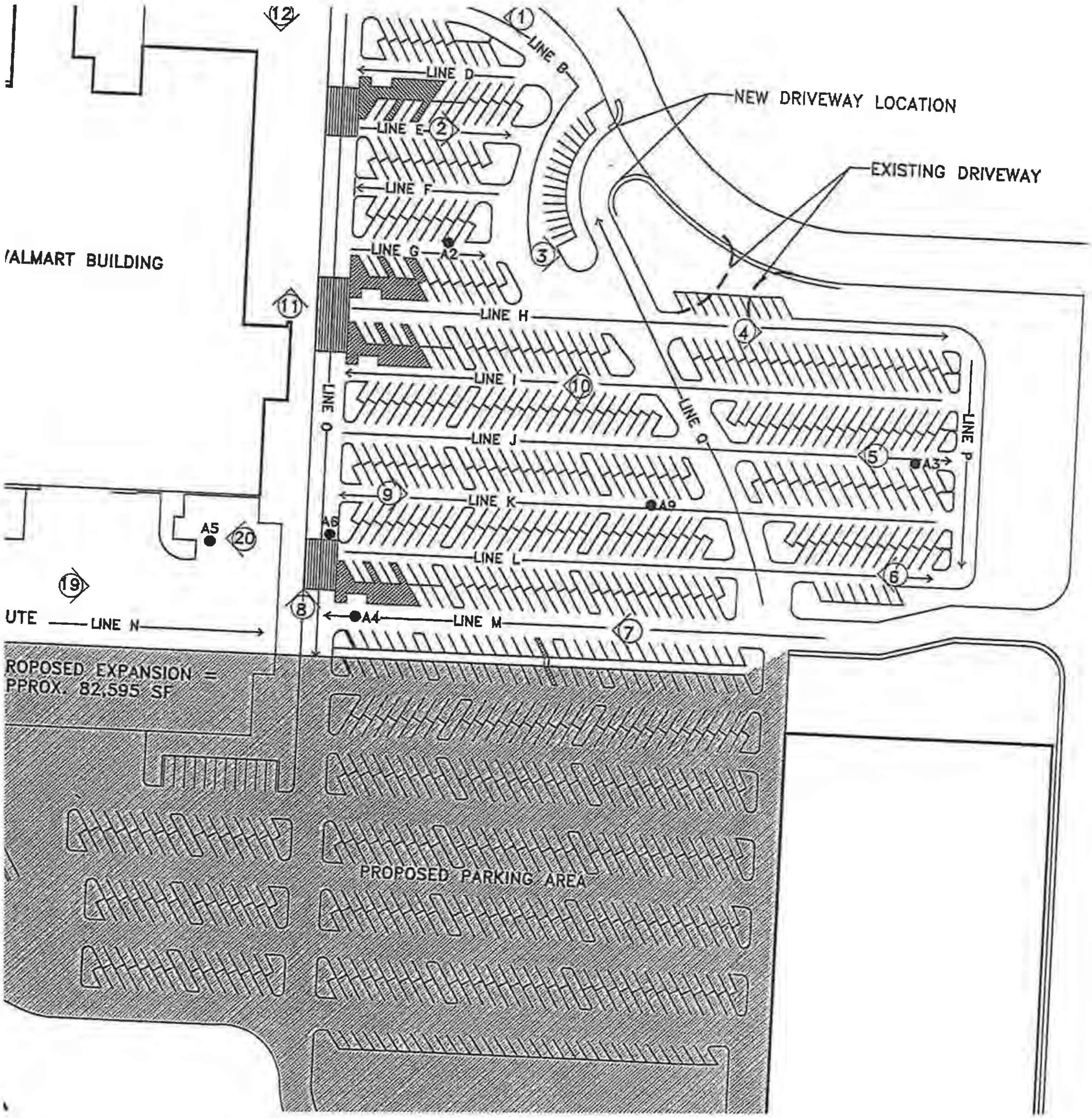
Attachments: Appendix A,B,C & D
R-values
Dynaflect Sheets
Photos

pc: C file
070149-01



AREA
NEW DRIVEWAY LOCATION
EXISTING DRIVEWAY
WALMART BUILDING
LEGEND
MAIN
MAIN
REAR
TRUC
PROP
ROUTE
PROPOSED EXPANSION =
APPROX. 82,595 SF
FOREST AVENUE
PROPOSED PARKING AREA
ROUTE

PHOTOS,
DYNAFL



LEGEND

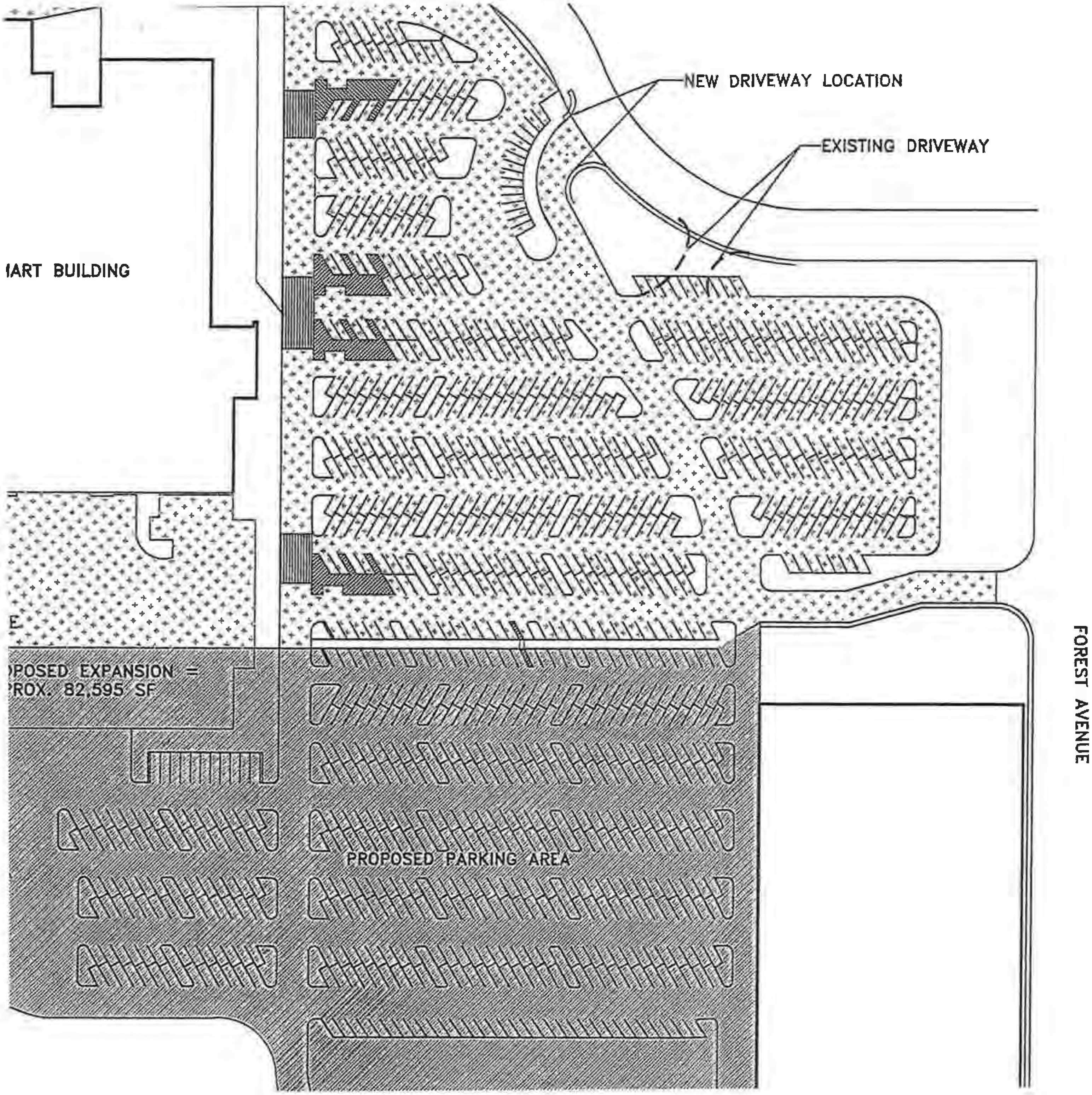
●

Ⓧ

←

BOR

NO.	AC
A1	3-1/2"
A2	4"
A3	3-1/2"
A4	3-1/2"
A5	3-3/4"
A6	3-3/4"
A7	5-1/4"
A8	3-1/4"
A9	3-1/2"



5 – 1
MAINTENAN

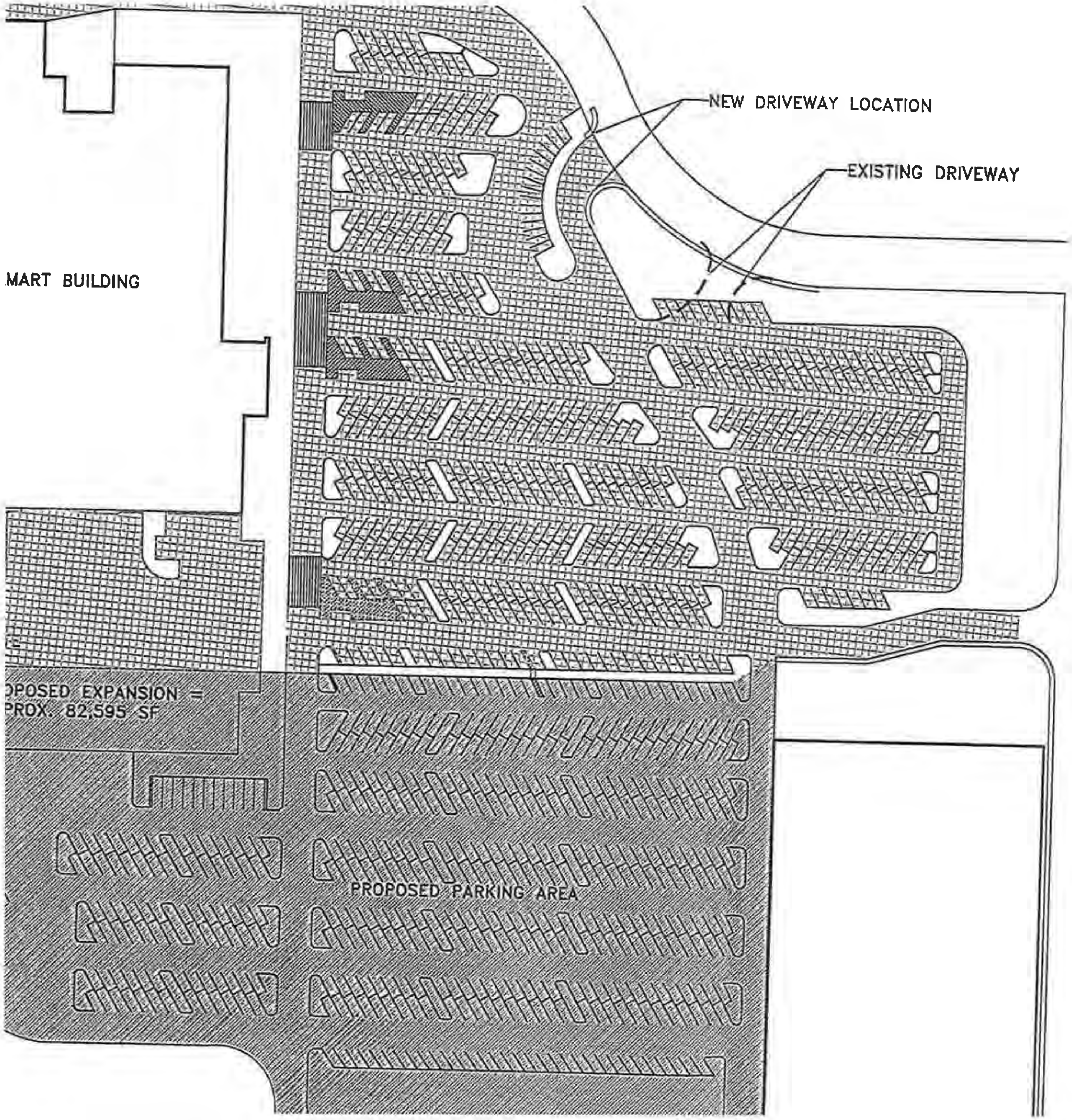
2009
LEGEND

OVERLAY & F
CRACK FILL,

2013

CRACK FILL,
CRACK FILL,

WALMART
15 – 2
MAINTENAN



2009
LEGEND

0.2

0.1

2013

SEAL

SEAL

2018

CRACI

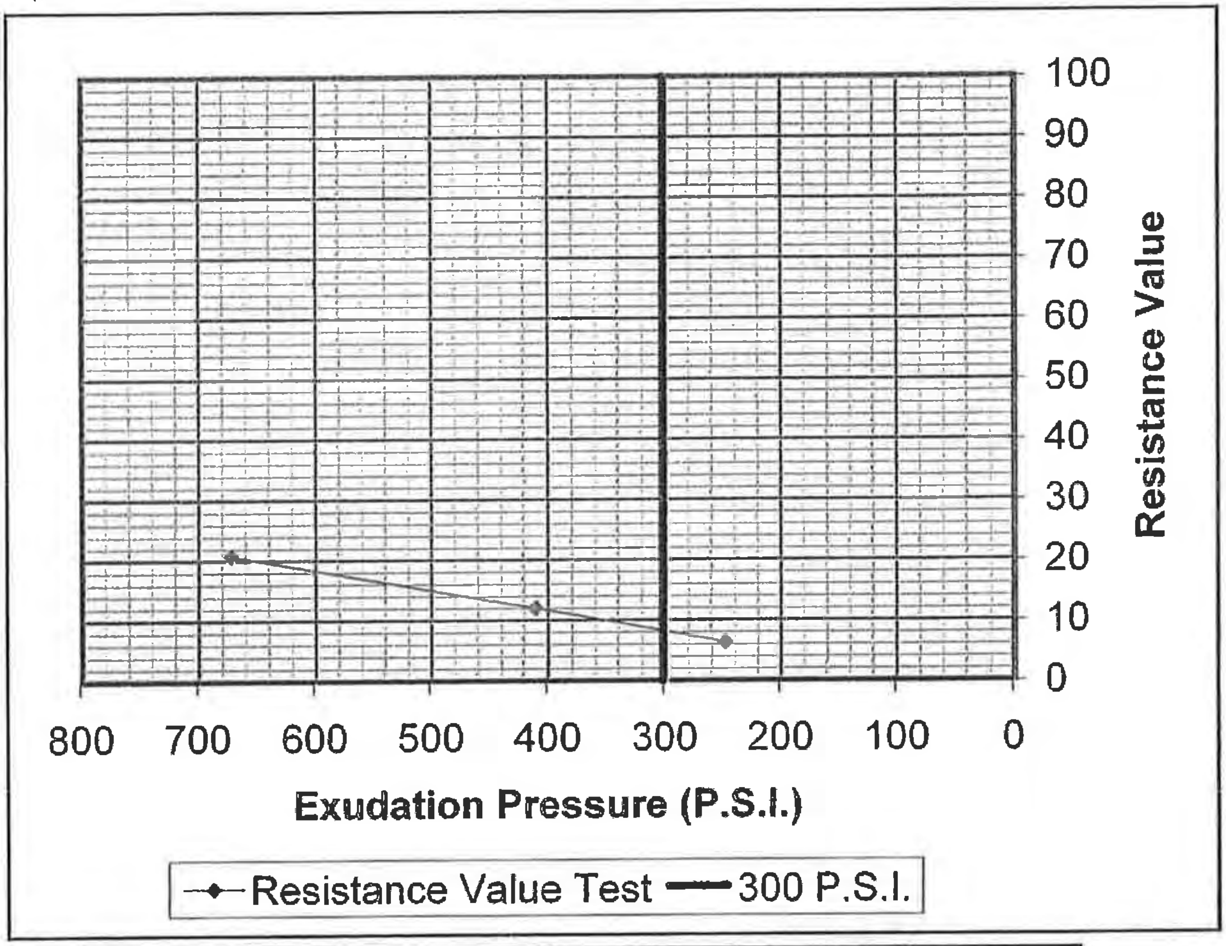
CRACI

2023

RECO

RESISTANCE (R) VALUE TEST
CTM 301

Laboratory No.: L070428-B
Project No.: 070149-01
Report Date: December 13, 2007
Client: Pacland
Project Name: Walmart - Chico, California
Sample Description: Brown Clay with Gravel
Sample Location: A4



Specimen No.	4	5	6
Moisture Content (%)	13.9	15.8	13.4
Dry Density (PCF)	123.1	119.0	126.6
Resistance Value (R)	12	6	21
Exudation Pressure (PSI)	410	248	672
Expansion Pressure	0	0	307

RESISTANCE VALUE AT 300 P.S.I. 8

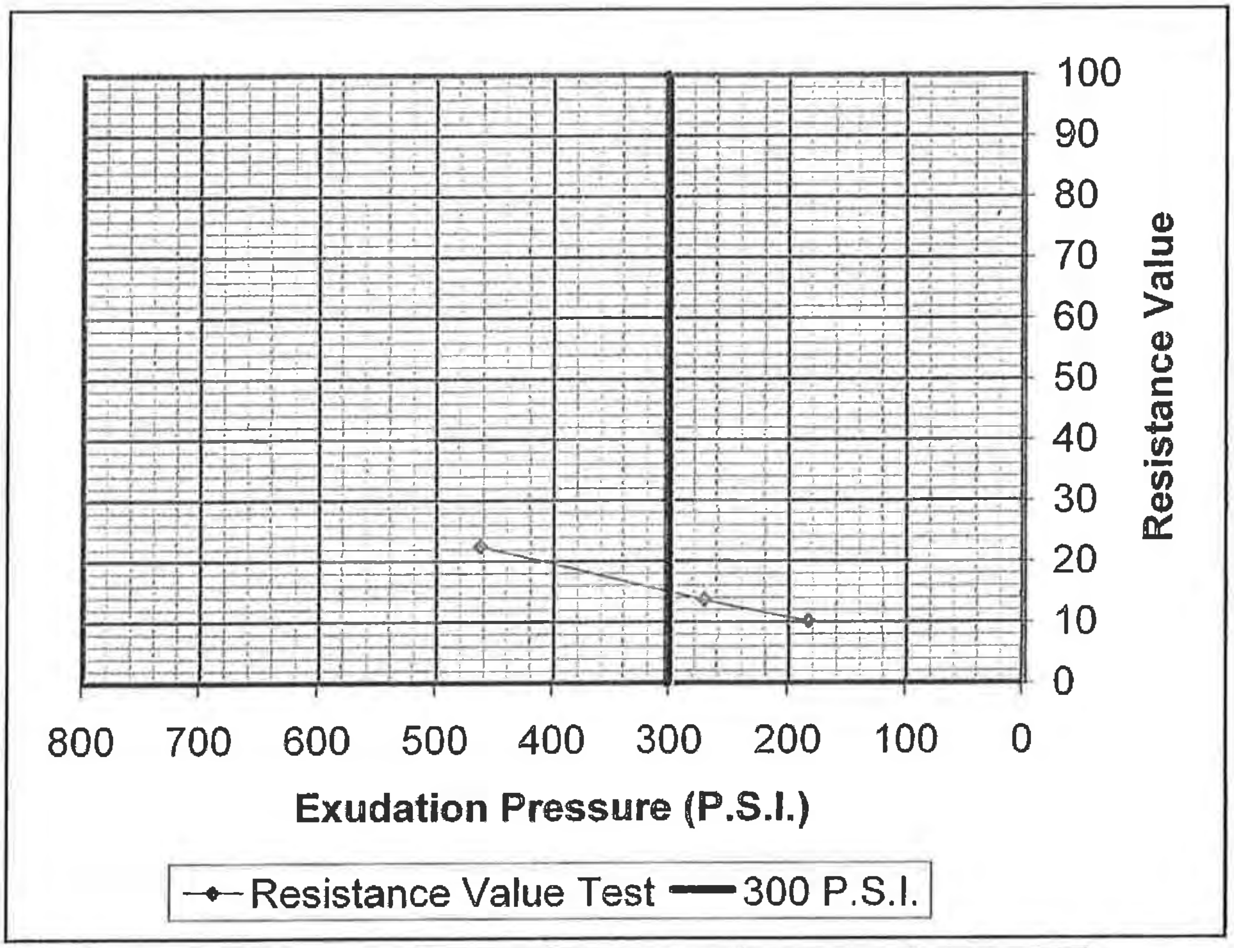
Pavement Engineering Inc.
20260 Skypark Drive
Redding, CA 96002-9221
(530) 224-4535

Reviewed By:

William J. Long, P.E.
Principal

RESISTANCE (R) VALUE TEST
CTM 301

Laboratory No.: L070428-A
Project No.: 070149-01
Report Date: December 13, 2007
Client: Pacland
Project Name: Walmart - Chico, California
Sample Description: Brown Silty Clay with Gravel
Sample Location: A1



Specimen No.	1	2	3
Moisture Content (%)	13.2	14.6	13.8
Dry Density (PCF)	125.3	120.3	123.1
Resistance Value (R)	23	10	14
Exudation Pressure (PSI)	462	183	271
Expansion Pressure	0	0	0

RESISTANCE VALUE AT 300 P.S.I. 15

Pavement Engineering Inc.
20260 Skypark Drive
Redding, CA 96002-9221
(530) 224-4535

Reviewed By: *William J. Long, P.E.*
Principal

PAVEMENT ENGINEERING INCORPORATED

Redding (530) 224-4535
Petaluma (707) 769-5330
San Luis Obispo (805) 781-2265

Pacland

Road: Wal-Mart Chico
From: Rear Parking Area
To: 0
Lane/Line: A & B

Survey Date: 12/12/2007
Thickness: 0.29
Traffic Index: 7.00
Project Number: 070149

Deflection Data Analysis

Deflection Readings (Equivalent Deflectometer Units)

No. of Tests	Low	Mean	High	Std. Dev.
10	6.99	11.32	18.33	3.98

Road Surface

Thickness	Traffic Index
0.29	7.00

Structural Design

Tolerable	%Reduction	80th Percentile	90th Percentile	Overlay
27.00	0.00	14.66	16.41	0.00

PAVEMENT ENGINEERING INCORPORATED

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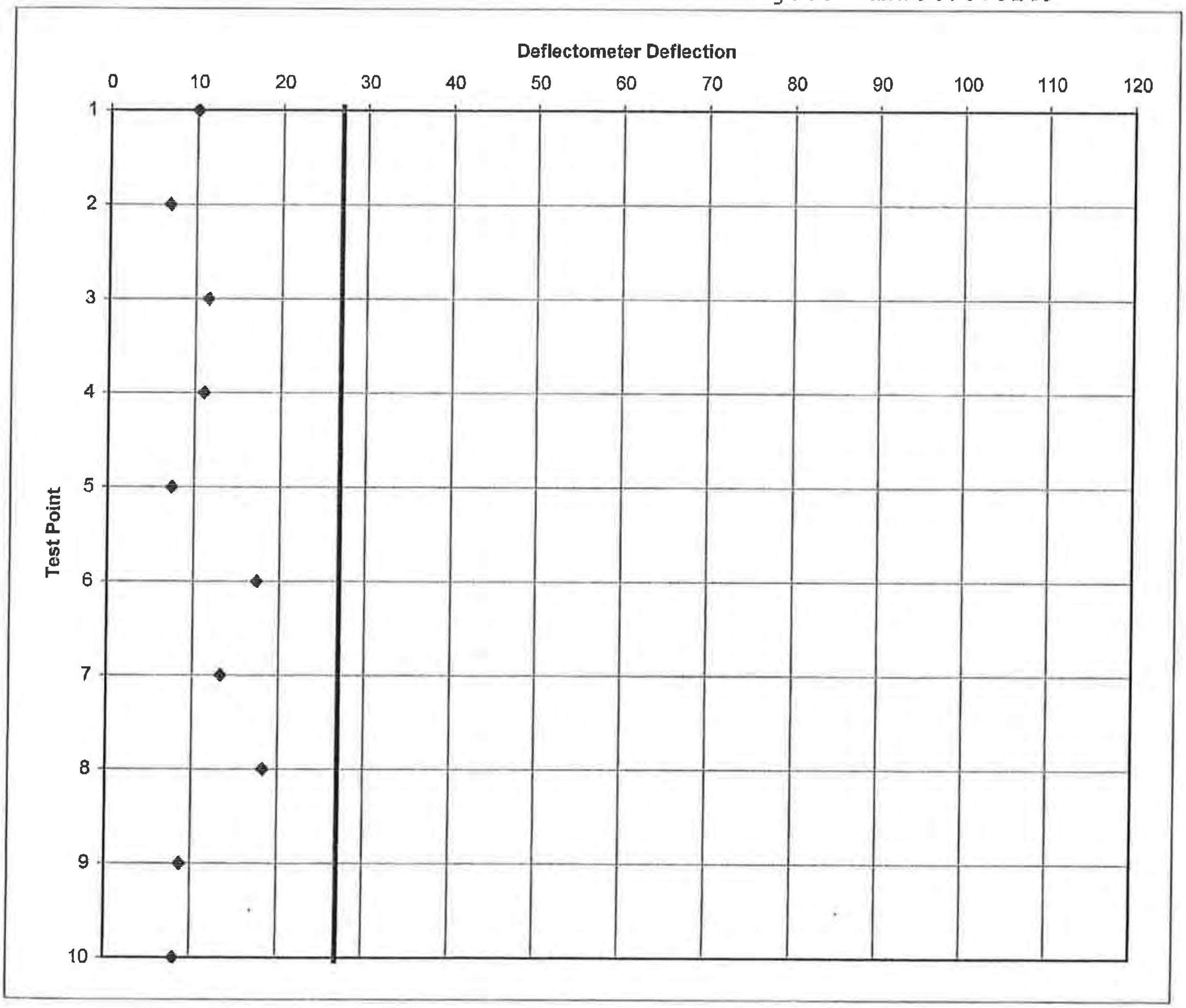
Pacland

Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Rear Parking Area	Thickness:	0.29
To:	0	Traffic Index:	7.00
Lane/Line:	A & B	Project Number:	070149



PAVEMENT ENGINEERING INCORPORATED

Redding	Petaluma	San Luis Obispo
(530) 224-4535	(707) 769-5330	(805) 781-2265

12/17/2007

Pacland

Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Main Parking Area	Thickness:	0.29
To:	0	Traffic Index:	7.00
Lane/Line:	C-M P, Q, & R	Project Number:	070149

Deflection Data Analysis

Deflection Readings (Equivalent Deflectometer Units)

No. of Tests	Low	Mean	High	Std. Dev.
103	8.12	19.99	48.96	6.84

Road Surface

Thickness	Traffic Index
0.29	7.00

Structural Design

Tolerable	%Reduction	80th Percentile	90th Percentile	Overlay
27.00	0.00	25.74	28.75	0.00

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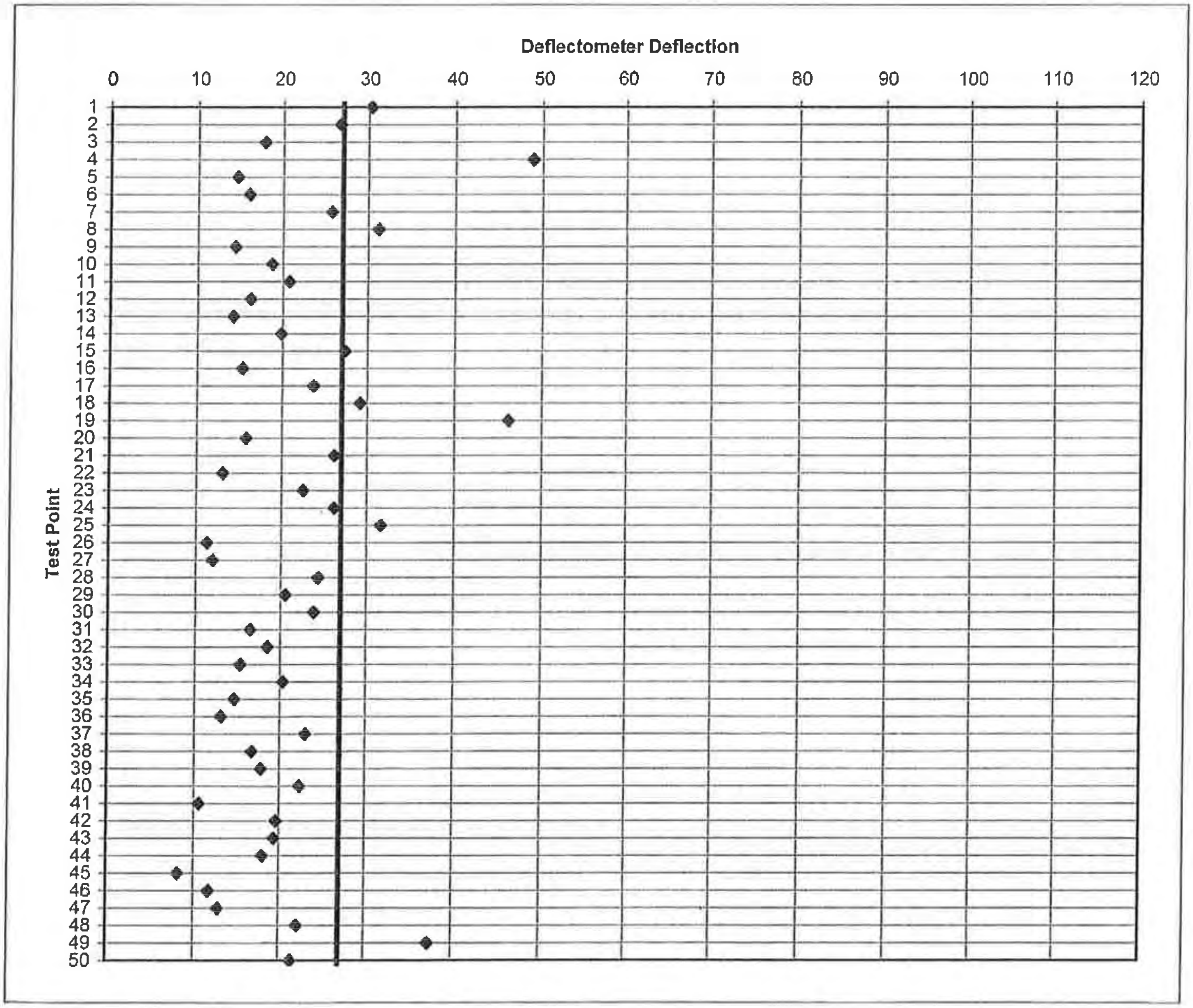
San Luis Obispo (805) 781-2265

Pacland

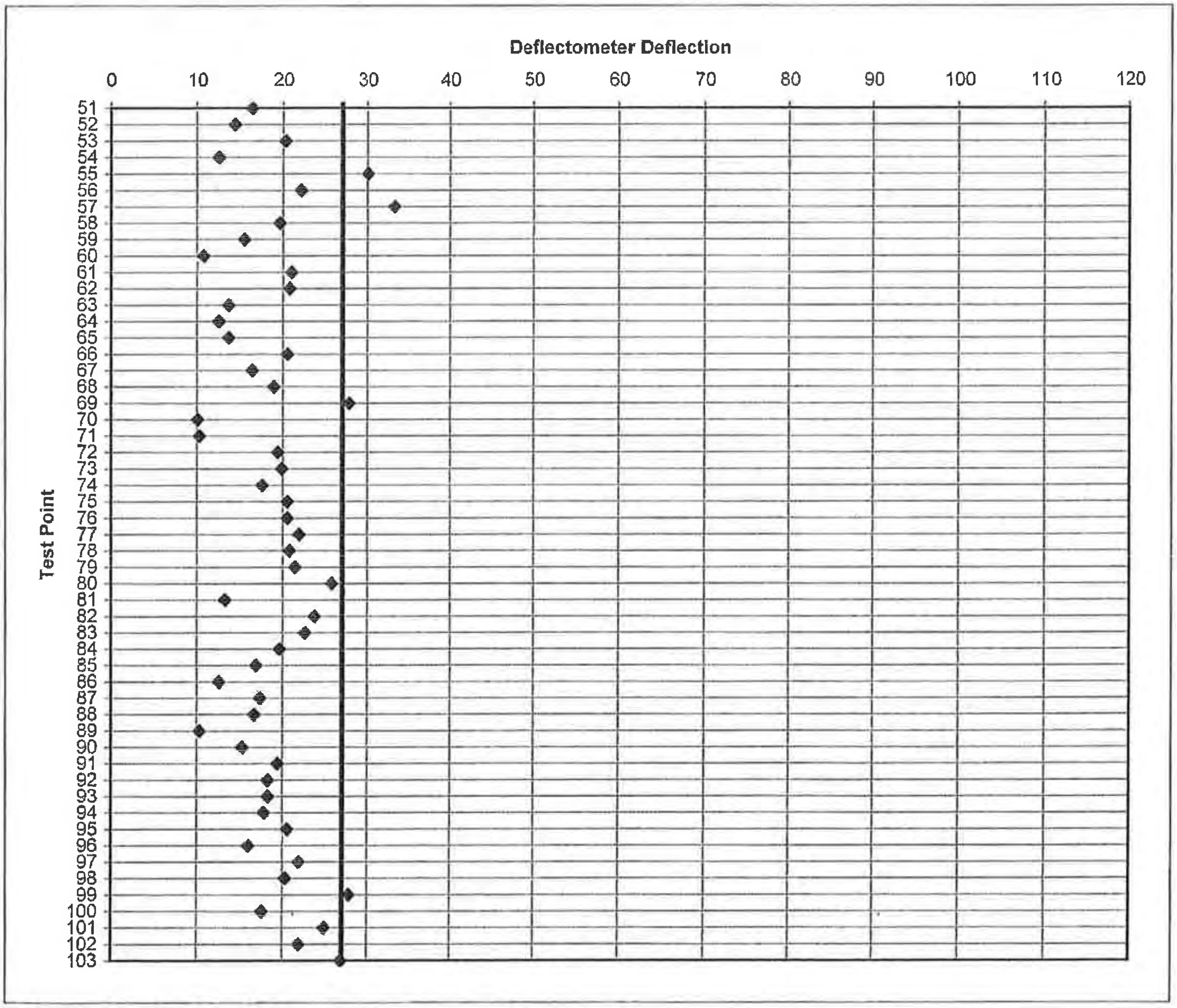
Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Main Parking Area	Thickness:	0.29
To:	0	Traffic Index:	7.00
Lane/Line:	C-M P, Q, & R	Project Number:	070149



Pacland

Road: Wal-Mart Chico
From: Main Parking Area
To: 0
Lane/Line: C-M P, Q, & R

Survey Date: 12/12/2007
Thickness: 0.29
Traffic Index: 7.00
Project Number: 070149



PAVEMENT ENGINEERING INCORPORATED

Redding	Petaluma	San Luis Obispo
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12/17/2007

Pacland

Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Truck Service Route	Thickness:	0.43
To:	0	Traffic Index:	7.50
Lane/Line:	N	Project Number:	070149

Deflection Data Analysis

Deflection Readings (Equivalent Deflectometer Units)

No. of Tests	Low	Mean	High	Std. Dev.
10	13.79	19.06	28.99	4.68

Road Surface

Thickness	Traffic Index
0.43	7.50

Structural Design

Tolerable	%Reduction	80th Percentile	90th Percentile	Overlay
20.00	12.99	22.99	25.04	0.03

PAVEMENT ENGINEERING INCORPORATED

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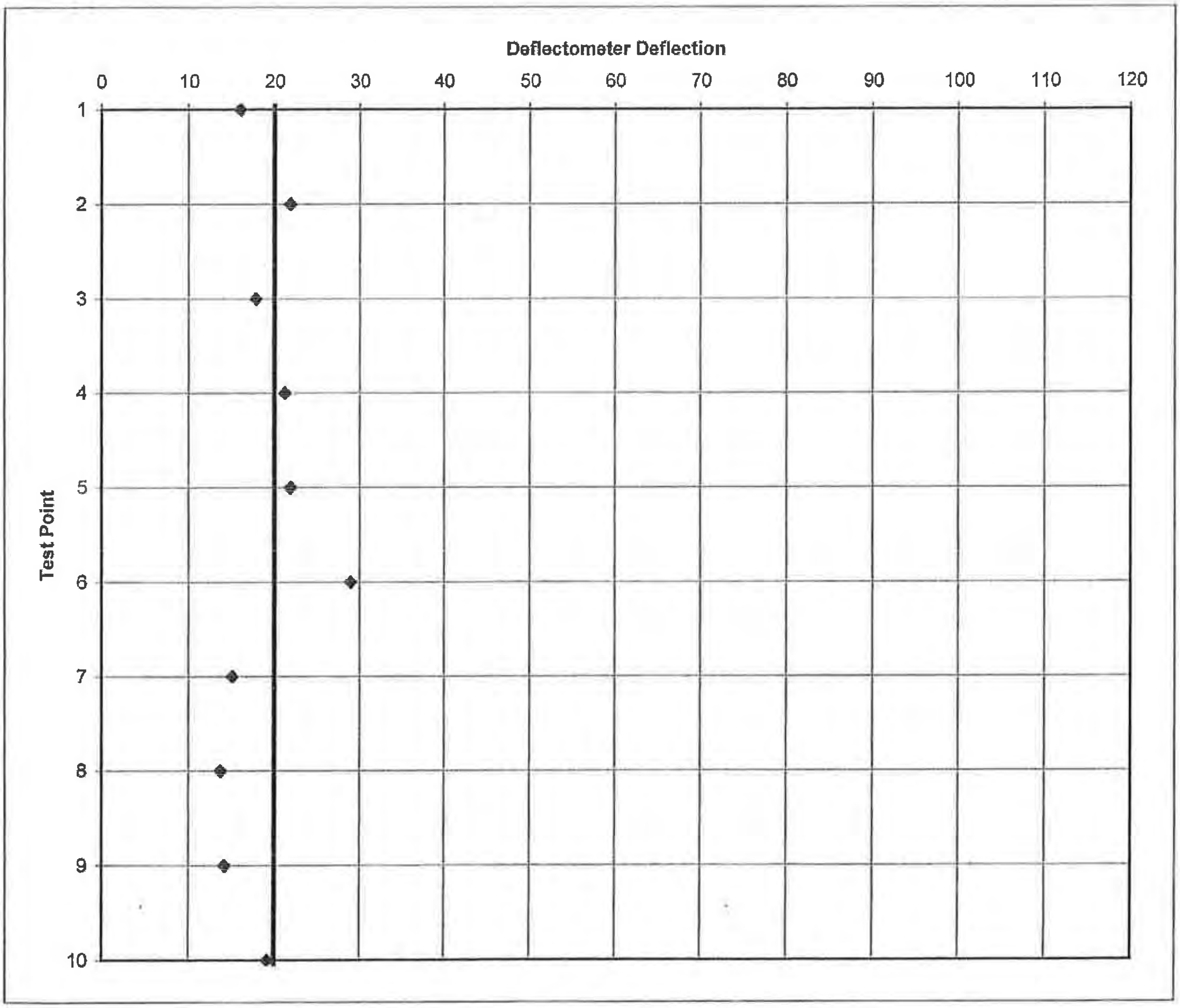
San Luis Obispo (805) 781-2265

Pacland

Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Truck Service Route	Thickness:	0.43
To:	0	Traffic Index:	7.50
Lane/Line:	N	Project Number:	070149



PAVEMENT ENGINEERING INCORPORATED

Redding	Petaluma	San Luis Obispo
(530) 224-4535	(707) 769-5330	(805) 781-2265

12/17/2007

Pacland

Road:	Wal-Mart Chico	Survey Date:	12/12/2007
From:	Store Front Drive	Thickness:	0.29
To:	0	Traffic Index:	7.50
Lane/Line:	0	Project Number:	070149

Deflection Data Analysis

Deflection Readings (Equivalent Deflectometer Units)

No. of Tests	Low	Mean	High	Std. Dev.
10	17.88	22.41	26.72	3.54

Road Surface

Thickness	Traffic Index
0.29	7.50

Structural Design

Tolerable	%Reduction	80th Percentile	90th Percentile	Overlay
25.00	1.51	25.38	26.94	0.00

PAVEMENT ENGINEERING INCORPORATED

Redding (530) 224-4535 | **Petaluma** (707) 769-5330 | **San Luis Obispo** (805) 781-2265

12/17/2007

Pacland

Road: Wal-Mart Chico
From: Store Front Drive
To: 0
Lane/Line: 0

Survey Date: 12/12/2007
Thickness: 0.29
Traffic Index: 7.50
Project Number: 070149

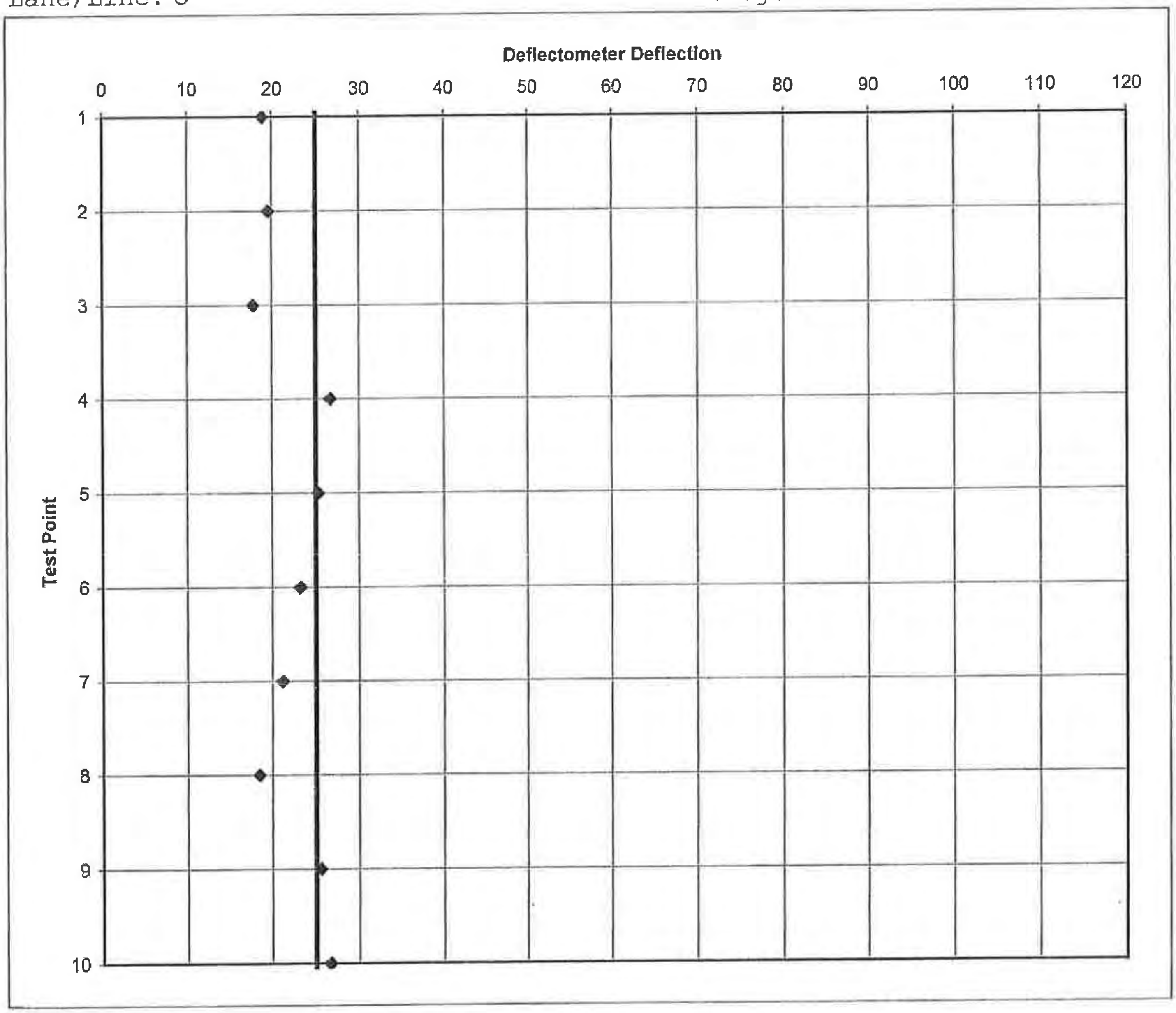


PHOTO NO. 1 - MAIN PARKING AREA

PHOTO NO. 2 - MAIN PARKING AREA

PHOTO NO. 3 - MAIN PARKING AREA

PHOTO NO. 4 - MAIN PARKING AREA

PHOTO NO. 5 - MAIN PARKING AREA

PHOTO NO. 6 - MAIN PARKING AREA

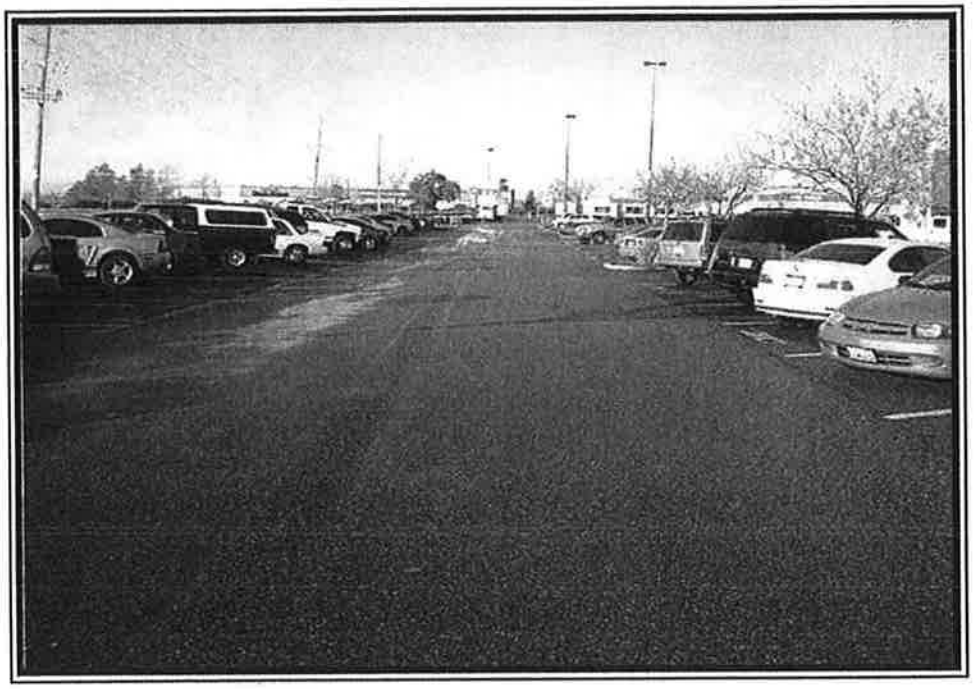


PHOTO NO. 7 - MAIN PARKING AREA

PHOTO NO. 8 - STORE FRONT DRIVE

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PHOTO NO. 9 - MAIN PARKING AREA

PHOTO NO. 10 - MAIN PARKING AREA

PHOTO NO. 11 - STORE FRONT DRIVE

PHOTO NO. 12 - STORE FRONT DRIVE

PHOTO NO. 13 - REAR PARKING AREA
SHRINKAGE CRACKING

PHOTO NO. 14 - REAR PARKING AREA

PHOTO NO. 15 - REAR PARKING AREA

PHOTO NO. 16 - TRUCK SERVICE ROUTE
SEVERE RAVELING AND JOINT CRACKING

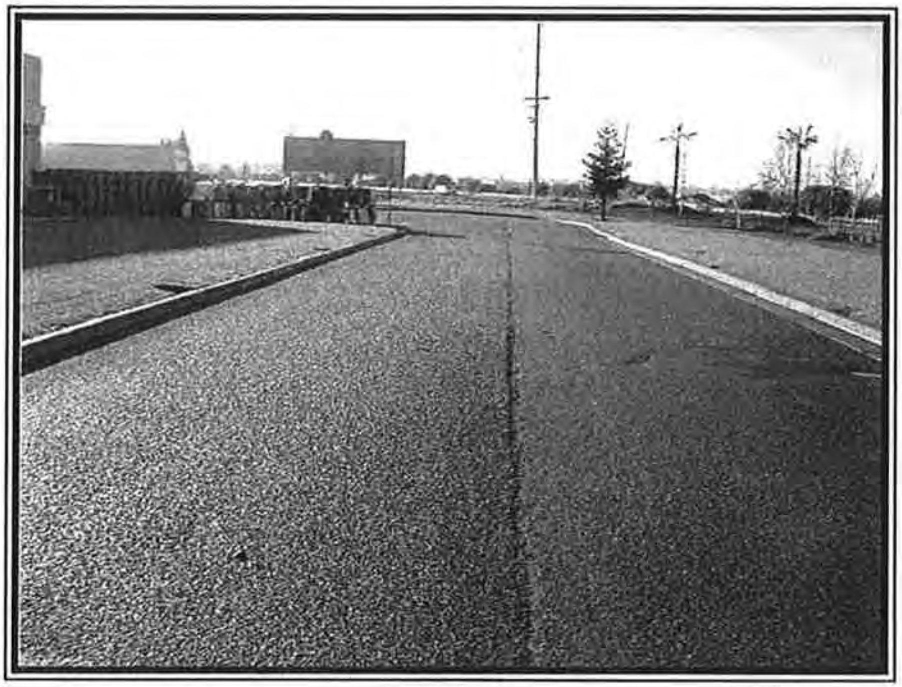

PHOTO NO. 17 - TRUCK SERVICE ROUTE
SEVERE RAVELING AND JOINT CRACKING

PHOTO NO. 18 - TRUCK SERVICE ROUTE
ALLIGATOR CRACKING

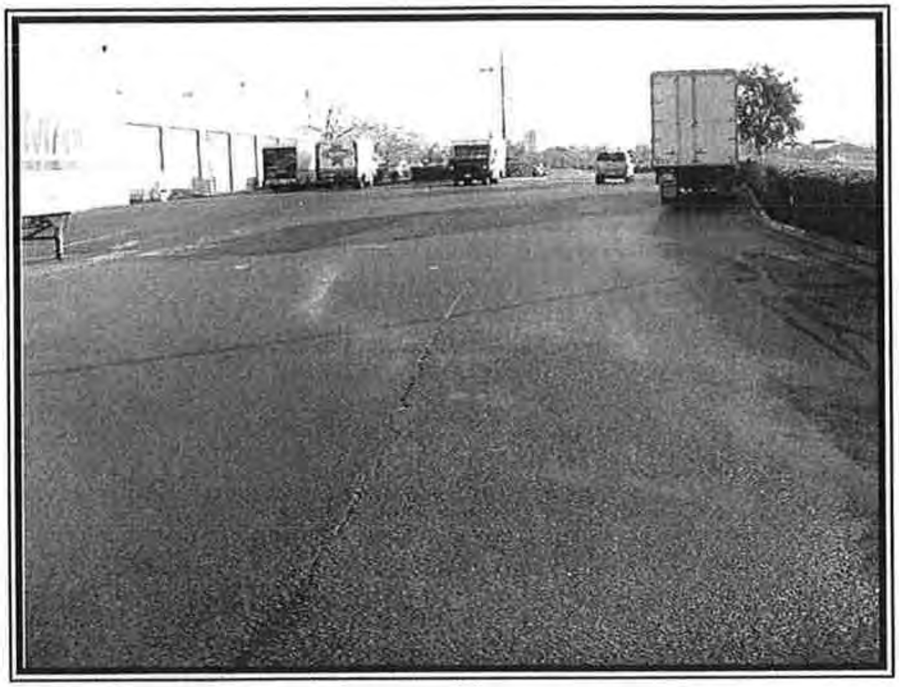

PHOTO NO. 19 - TRUCK SERVICE ROUTE SOUTH GENERAL VIEW

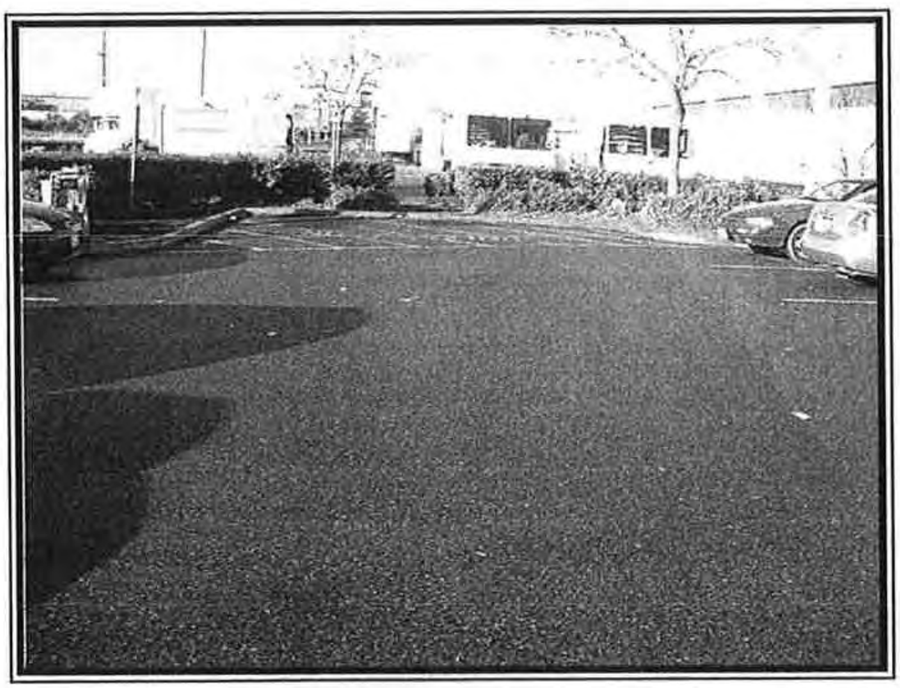

PHOTO NO. 20 - TRUCK SERVICE ROUTE SOUTH GENERAL VIEW

APPENDIX F

Geotechnical Investigation Fact Sheet
Foundation Design Criteria
Foundation Subsurface Preparation

GEOTECHNICAL INVESTIGATION FACT SHEET

Project Location: *2044 Forest Avenue, Chico, California*

Engineer: *Traver E. Metcalf, Jr., GE 2363* — Phone No.: *530.365.8088*

Geotechnical Engineering Co.: *GEOPlus, Inc.* — Report Date: *2/15/2008*

Groundwater Elevation (feet): 214

Date Groundwater Measured: 12/7/2008

Topsoil / Stripping Depth: *1 to 3* in.

Undercut (If Required): *12 to 24* in.

Modified Proctor Results: (Attach Plots)

Fill Soil Characteristics:

Maximum Liquid Limit: *30*

Maximum Plasticity Index: *12*

Specified Compaction: *88 to 92% / 93%*
90% / 95%

Moisture Content Range: *+1 to +4%* *0 to +3%*

pH: *7.3 to 7.8*

Resistivity (ohn-cm): *1,340 to 4,560*

Cement Type: *Type I or II*

Recommended Compaction Control Tests:

1 Test for Each *2,000* Sq. Ft. each Lift (Building Area)

1 Test for Each *4,000* Sq. Ft. each Lift (Parking Area)

Structural Fill Maximum Lift Thickness *8* in. (Measured Loose)

Subgrade Design Resistance Value = *10*

COMPONENT	ASPHALT		CONCRETE	
	Standard	Heavy	Standard	Heavy
Stabilized Subgrade (in.) (If applicable)	12.0	12.0	12.0	12.0
Base Material (in.) (Stone, Shell, Sand, Etc.)	16.5	16.5	4.0	4.0
Asphalt Base Course (in.)				
Leveling Binder Course (in.)	NA	NA	NA	NA
Surface Course (in,)	3.0	4.0	6.0	7.0

NOTE: This information shall not be used separately from the geotechnical report.

FOUNDATION DESIGN CRITERIA

Project Location: *2044 Forest Avenue, Chico, California*

Engineer: *Traver E. Metcalf, Jr. GE2363* Phone No.: *530.365.8088*

Geotechnical Engineering Co: *GEOPlus, Inc.* Report Date: *2/15/2008*

Foundation Type: *Shallow spread footing*

Allowable Bearing Pressure (psf): *2,000*

Factor of Safety: *3*

Minimum Footing Dimensions (in.): Individual: *30* Continuous: *18*

Minimum Footing Embedment (in.): Individual: *30* Continuous: *30*

Frost Depth (in.): *0*

Maximum Foundation Settlements (in.): Total: *3/4* Differential: *1/2*

Slab: Potential Vertical Rise (in.): *1/2*

Capillary Break (not a vapor retarder) describe: *4.0-inch thick crushed rock meeting the requirements of ASTM D-1241 General and Gradations "A", "C", or "D" requirements with the modified allowance of 5 to 12 percent passing the No. 200 sieve.*

Subgrade reaction modulus (psi/in): *150* Method obtained: *Empirical*

Active Equivalent Fluid Pressure (lb/ft^3): *35 (non-expansive granular soil)*

Passive Equivalent Fluid Pressure (lb/ft^3): *300*

Perimeter Drains (describe): Buildings: *None; storm drain in front of store to include provisions to remove seepage accumulating in storm drain trench backfill and divert into storm drain system.*

Walls: *Free-draining, fine to coarse, crushed gravel encapsulated in geosynthetic filter fabric*

Retaining Wall: At-Rest Pressure (lb/ft^3): *55*

Coefficent of friction: *0.35*

COMMENTS:

This information shall not be used separately from geotechnical report.

FOUNDATION SUBSURFACE PREPARATION

WAL-MART STORE #2044-03 EXPANSION
2044 FOREST AVENUE, CHICO, CALIFORNIA
FEBRUARY 15, 2008

UNLESS SPECIFICALLY INDICATED OTHERWISE IN THE DRAWINGS AND/OR SPECIFICATIONS, THE LIMITS OF THIS SUBSURFACE PREPARATION ARE CONSIDERED TO BE THAT PORTION OF THE SITE DIRECTLY BENEATH AND 5 FEET BEYOND THE BUILDING AND APPURTENANCES.

APPURTENANCES ARE THOSE ITEMS ATTACHED TO THE BUILDING PROPER (REFER TO DRAWING SHEET SP1), TYPICALLY INCLUDING, BUT NOT LIMITED TO, THE BUILDING SIDEWALKS, GARDEN CENTER, PORCHES, RAMPS, STOOPS, TRUCK WELLS/DOCKS, CONCRETE APRONS AT THE AUTOMOTIVE CENTER, COMPACTOR PAD, ETC. THE SUBBASE AND THE VAPOR RETARDER, WHERE REQUIRED, DO NOT EXTEND BEYOND THE LIMITS OF THE ACTUAL BUILDING AND THE APPURTENANCES.

ESTABLISH THE FINAL PAD SUBGRADE ELEVATION AT 9.0 INCHES BELOW FINISHED FLOOR ELEVATION TO ALLOW FOR A 5.0-INCH SLAB, OR AT 8.0 INCHES BELOW FINISHED FLOOR ELEVATION TO ALLOW FOR THE SLAB THICKNESS AND A 4.0 INCH BASE. THE BASE SHALL CONSIST OF 4 INCHES OF AGGREGATE MEETING THE FOLLOWING GRADTION REQUIREMENTS: 100% PASSING THE 1-1/2-INCH SIEVE, 15% TO 55% PASSING THE NO. 4 SIEVE AND 5% TO 12% PASSING THE NO. 200 SIEVE; OR ASTM D-1241 TABLE 1 SIZE NOS. A, C OR D WITH THE MODIFIED ALLOWANCE OF 5% to 12% PASSING THE NO. 200 SIEVE. AGGREGATE CHOKER UP TO ¾-INCH THICK MAY BE USED TO ACHIEVE FINE GRADING TOLERANCES AND/OR SURFACE BASE WHERE BASE MATERIAL DOES NOT HAVE SUFFICIENT FINE PARTICLE TO PRODUCE SURFACE FREE OF EXPOSED AGGREGATE OR SURFACE VOIDS GREATER THAN 3/8 INCH AT TIME OF SLAB INSTALLATION. AGGREGATE CHOKER SHALL CONSIST OF FINE AGGREGATE MEETING THE GRADATION REQUIREMENTS OF ASTM D-448 TABLE 1 SIZE NO. 10 WITH 6 TO 12 PERCENT PASSING THE NO. 200 SIEVE OR PER THE FOLLOWING TABLE.

STANDARD SIEVE SIZE	PERCENT PASSING
NO. 4	85 TO 90
NO. 8	75 TO 95
NO. 16	55 TO 75
NO. 50	25 TO 45
NO. 200	6 TO 12

THE AGGREGATE SHALL BE DENSIFIED BY ROLLING WITH A VIBRATORY ROLLER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ACCURATE MEASUREMENTS FOR ALL CUT AND FILL DEPTHS REQUIRED.

EXISTING FOUNDATIONS, SLABS, PAVEMENTS, AND BELOW-GRADE STRUCTURES SHALL BE REMOVED FROM THE BUILDING AREA. REMOVE SURFACE VEGETATION, TOPSOIL, ROOT SYSTEMS, ORGANIC MATERIAL, EXISTING FILL AND SOFT OR OTHERWISE UNSUITABLE MATERIAL BENEATH THE BUILDING AREA.

EXCAVATE THE BUILDING AREAS AND 5 FEET BEYOND, TO A DEPTH OF 1.5 FEET BENEATH SOIL SUBGRADE IN AREAS COVERED BY EXISTING ASPHALT CONCRETE PAVEMENTS, TO A DEPTH OF 0.5 FOOT BENEATH EXISTING UTILITY TRENCH BOTTOMS, AND TO A DEPTH OF 1 to 2 FEET BENEATH EXISTING SOIL GRADE IN UNDEVELOPED AREAS, WHICHEVER IS DEEPER. ANY EXISTING FILL MATERIALS BELOW THE OVEREXCAVATION BOTTOM SHOULD BE VERIFIED FOR THEIR COMPETENCE AND DEEPER REMOVAL MAY BE REQUIRED IF THE EXISTING FILL SOILS HAVE A RELATIVE COMPACTION OF LESS THAN 88 to 92 PERCENT FOR FILL LESS THAN 5 FEET THICK, AND LESS THAN 93 PERCENT FOR FILL DEEPER THAN 5 FEET BELOW GRADE. THE ACTUAL

DEPTH OF OVEREXCAVATION AND RECOMPACTION SHOULD BE DETERMINED BY OUR FIELD REPRESENTATIVE DURING CONSTRUCTION.

SUBGRADE MATERIAL SHALL BE FREE OF ORGANIC AND OTHER DELETERIOUS MATERIALS AND SHALL MEET THE FOLLOWING REQUIREMENTS:

LOCATION WITH RESPECT TO FINAL GRADE	P.I.	L.L.	E.I.
BUILDING AREA, BELOW 1 FOOT	20 MAX.	50 MAX.	50 MAX.
BUILDING AREA, UPPER 1 FOOT	12 MAX.	30 MAX.	20 MAX.

ANY IMPORT FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO IMPORTATION.

SUBGRADE MATERIALS SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS. NATIVE CLAY-RICH SOILS SHALL BE COMPACTED TO BETWEEN 88 AND 92 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557) AT A MOISTURE CONTENT WITHIN 1 TO 4 PERCENT ABOVE THE OPTIMUM WHERE FILL IS LESS THAN 5 FEET THICK; COMPACTION SHALL BE INCREASED TO A MINIMUM OF 93 PERCENT FOR ALL FILL BENEATH A DEPTH OF 5 FEET. NON-EXPANSIVE SOILS SHOULD BE COMPACTED TO AT LEAST 90 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557) AT A MOISTURE CONTENT 0 TO 3 PERCENT ABOVE THE OPTIMUM WHERE FILL IS LESS THAN 5 FEET THICK; COMPACTION SHALL BE INCREASED TO A MINIMUM OF 95 PERCENT FOR ALL FILL BENEATH A DEPTH OF 5 FEET.

THE FOUNDATION SYSTEM SHALL BE ISOLATED SPREAD FOOTINGS AT COLUMNS AND CONTINUOUS SPREAD FOOTINGS AT WALLS.

THIS FOUNDATION SUBSURFACE PREPARATION DOES NOT CONSTITUTE A COMPLETE SITE WORK SPECIFICATION. IN CASE OF CONFLICT, INFORMATION COVERED IN THIS PREPARATION SHALL TAKE PRECEDENCE OVER THE WAL-MART SPECIFICATIONS. REFER TO THE SPECIFICATIONS FOR SPECIFIC INFORMATION NOT COVERED IN THIS PREPARATION. THIS INFORMATION WAS TAKEN FROM A GEOTECHNICAL REPORT PREPARED BY GEOPLUS, INC., DATED FEBRUARY 15, 2008 (GEOTECHNICAL REPORT IS FOR INFORMATION ONLY AND IS NOT A CONSTRUCTION SPECIFICATION).

Engineer: Traver E. Metcalf, Jr., PE, GE
Geotechnical Engineering Co.: GEOPlus, Inc.
Phone #: 530 365-8088
Report Date: February 15, 2008

APPENDIX G

Pavement Section Calculations

ASPHALT CONCRETE PAVEMENT SECTION CALCULATION[1]

Project Name Wal-Mart Store #2044 Expansion, Chico, CA **Project No.** 1235

REQUIRED INPUT:	**Traffic Index (TI)**	7.0	**Resistance Value**	**10**
	(ESALS)	109,500		
	TI by ESALS[2]	6.92	**TI used for analysis**	**7**

GE_t = 0.0032 *TI*(100 - R-value$_b$)	=	2.016	**G_f[3] for TI =**	2.14
GEac(min) = 0.0032 *TI(100 - R-value$_{ab}$) (without safety factor)	=	0.4928		
GEac(min) = 0.0032 *TI(100 - R-value$_{ab}$) (with safety factor {0.2})	=	0.6928		
Use Safety Factor (Y or N) ??		n		

ASPHALT CONCRETE & AGGREGATE BASE SECTION

				Feet	Inches
Thickness AC = GE_{AC} / Gf_{TI}	=	0.230	AC	**0.25**	**3.0**
Thickness AB = (GE_t - (t(*ft*)* Gf)) / Gf_{AB}	=	1.35	AB	**1.35**	
Thickness AB = (GE_t - (t(in/12)* Gf)) / Gf_{AB}	=	1.35			**16.5**

ASPHALT CONCRETE, AGGREGATE BASE, & AGGREGATE SUBBASE SECTION

				Feet	Inches
Thickness AC = GE_{AC} / Gf_{TI}	=	0.230	AC	**0.25**	**3.0**
$GE_{ac+ab(min)}$ = 0.0032 *TI*(100 - R-value$_{asb}$)	=	1.120			
$GE_{ab(min)}$ = $GE_{ac+ab(min)}$ - $GE_{ac(min)}$	=	0.427	AB		
Thickness AB = ($Ge_{ab(min)}$/1.1)	=	0.388		**0.40**	
$GE_{ab(min)}$ = $GE_{ac+ab(min)}$ - $GE_{ac(min)}$	=	0.585	AB		
	=	0.532			**6.5**
GE_{asb} = GE_t - GE_{ac} - GE_{ab}	=	1.041	ASB		
Thickness ASB = (Ge_{asb}/1.0)				**1.05**	
GE_{asb} = GE_t - GE_{ac} - GE_{ab}	=	0.885	ASB		
Thickness ASB = (Ge_{asb}/1.0)					**11.0**

Notes:

1 - Caltrans Highway Design Manual, Section 608.4 Design Procedures for Flexible Pavement, July 1996.

2 - $TI = 9.0 \times \{(EAL / 10^6)^{0.119}\}$

3 - G_f from Table 604.8B

ASPHALT CONCRETE PAVEMENT SECTION CALCULATION[1]

Project Name Wal-Mart Store #2044 Expansion, Chico, CA **Project No.** 1235

REQUIRED INPUT:	**Traffic Index (TI)**	7.5	**Resistance Value**	10
	(ESALS)	211,700		
	TI by ESALS[2]	7.48	**TI used for analysis**	7.5

GE_t = 0.0032 *TI*(100 - R-value$_b$)	=	2.160	**G_f[3] for TI =**	2.01
GEac(min) = 0.0032 *TI(100 - R-value$_{ab}$) (without safety factor)	=	0.528		
GEac(min) = 0.0032 *TI(100 - R-value$_{ab}$) (with safety factor {0.2})	=	0.728		
Use Safety Factor (Y or N) ??		n		

ASPHALT CONCRETE & AGGREGATE BASE SECTION

				Feet	Inches
Thickness AC = GE_{AC} / Gf_{TI}	=	0.263	AC	**0.35**	**4.0**
Thickness AB = (GE_t - (t(*ft*)* Gf)) / Gf_{AB}	=	1.32	AB	**1.35**	
Thickness AB = (GE_t - (t(in/12)* Gf)) / Gf_{AB}	=	1.35			**16.5**

ASPHALT CONCRETE, AGGREGATE BASE, & AGGREGATE SUBBASE SECTION

				Feet	Inches
Thickness AC = GE_{AC} / Gf_{TI}	=	0.263	AC	**0.35**	**4.0**
$GE_{ac+ab(min)}$ = 0.0032 *TI*(100 - R-value$_{asb}$)	=	1.200			
$GE_{ab(min)}$ = $GE_{ac+ab(min)}$ - $GE_{ac(min)}$	=	0.472	AB		
Thickness AB = ($Ge_{ab(min)}$/1.1)	=	0.429		**0.45**	
$GE_{ab(min)}$ = $GE_{ac+ab(min)}$ - $GE_{ac(min)}$	=	0.530	AB		
	=	0.482			**6.0**
GE_{asb} = GE_t - GE_{ac} - GE_{ab}	=	0.9615	ASB		
Thickness ASB = (Ge_{asb}/1.0)				**1.00**	
GE_{asb} = GE_t - GE_{ac} - GE_{ab}	=	0.940	ASB		
Thickness ASB = (Ge_{asb}/1.0)					**11.5**

Notes:

1 - Caltrans Highway Design Manual, Section 608.4 Design Procedures for Flexible Pavement, July 1996.

2 - $TI = 9.0 \times \{(EAL / 10^6)^{0.119}\}$

3 - G_f from Table 604.8B