Colma Sand

FIG_79: Title
W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Plates\Fig_79.ai

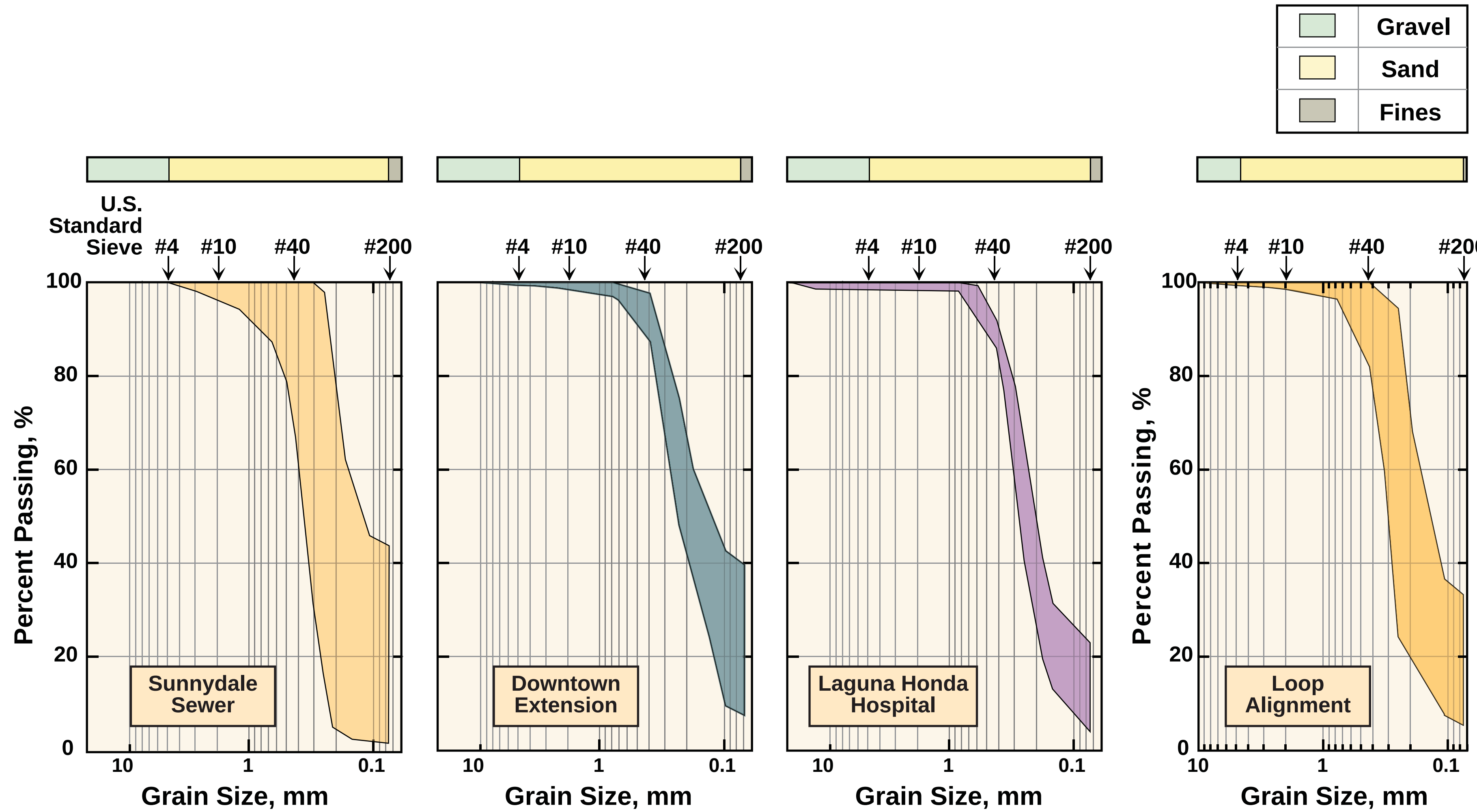


FIG_79A: Typical Gradations of Colma Sand from Four Sites

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_79A

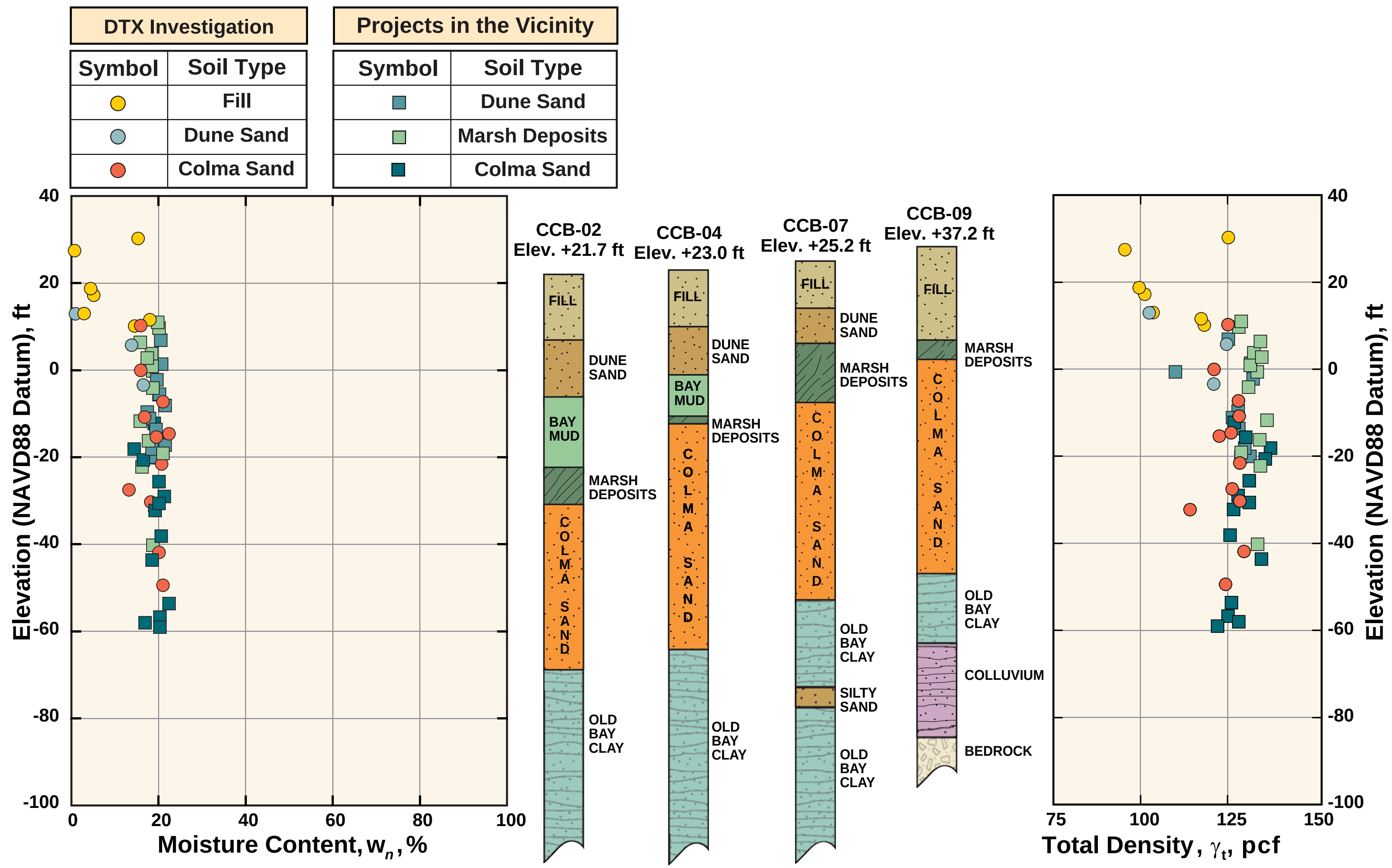


FIG_80: Moisture Contents and Total Densities of Colma Sand

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_80

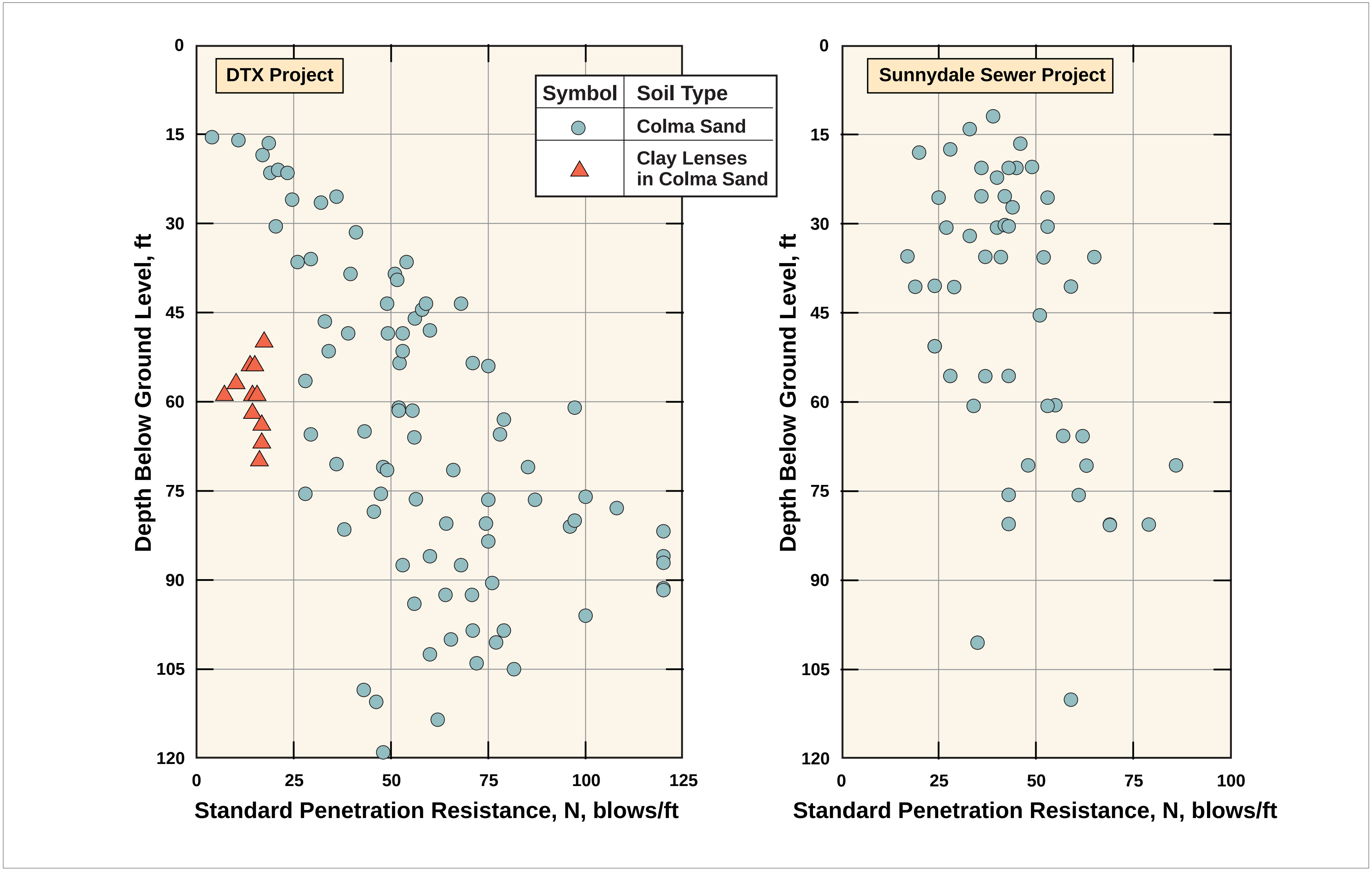
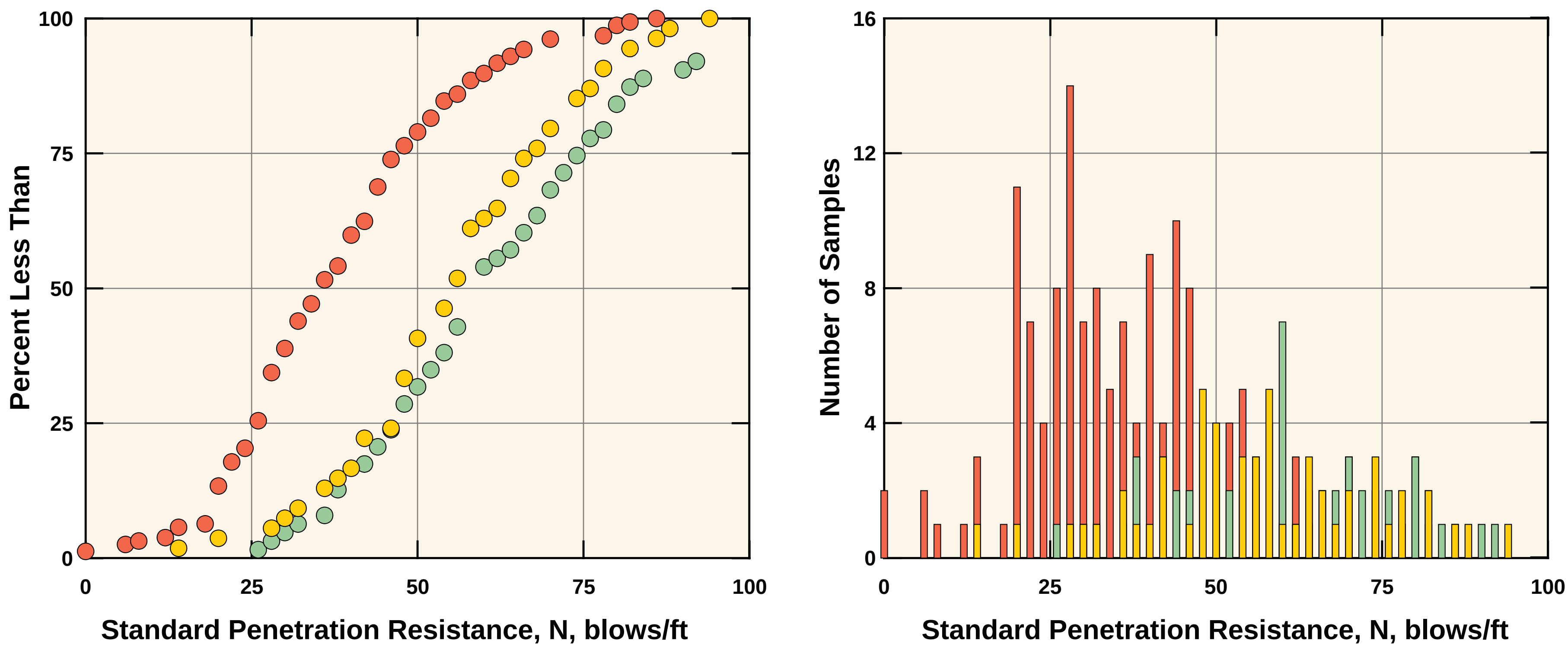


FIG_81: Variation of SPT N Values of Colma Sand

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\FIG_81



Project	Downtown Extension	Sunnydale Sewer	Laguna Honda
Symbol	● (green)	● (red)	● (yellow)
Number of Tests, N	63	157	54
Mean, μ, blows/ft	63	38	55
Standard Deviation, σ, blows/ft	23	17	17

FIG_82: Statistical Analyses of SPT N Values of Colma Sand from Three Sites

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_82.ai

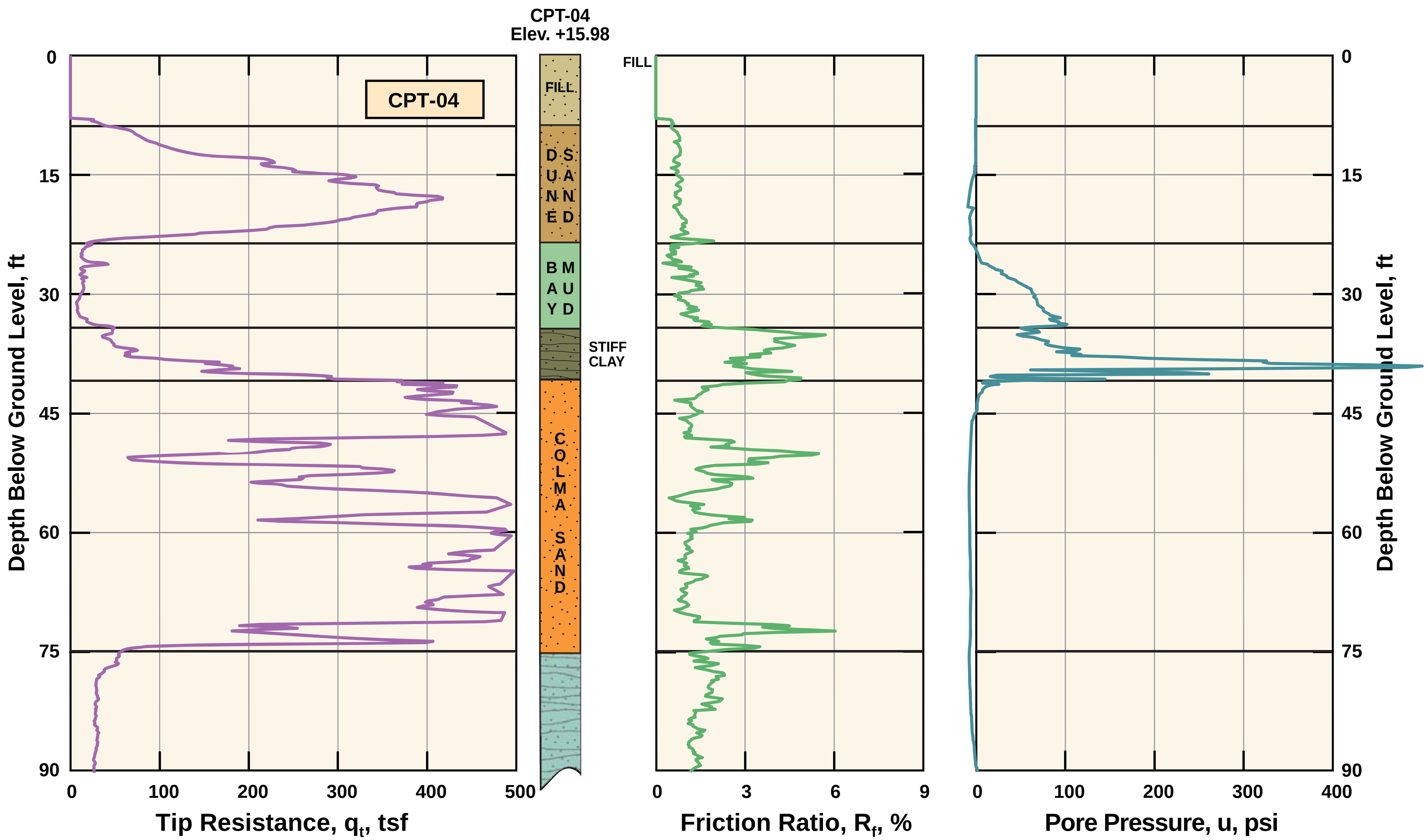


FIG_83: CPT Test in Colma Sand

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_83

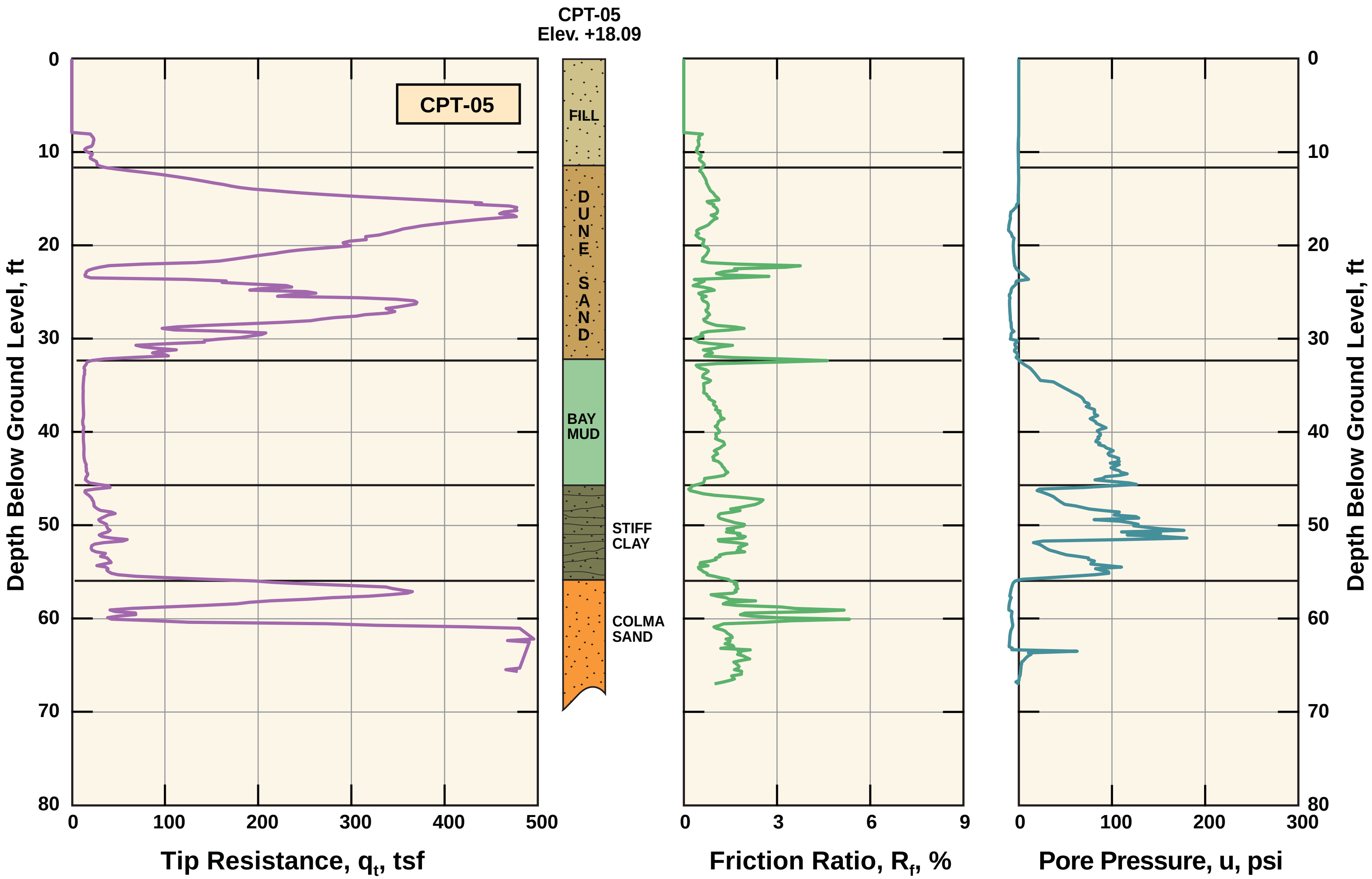


FIG_84: Refusal of CPT Tests in Colma Sand

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Plates\FIG_84

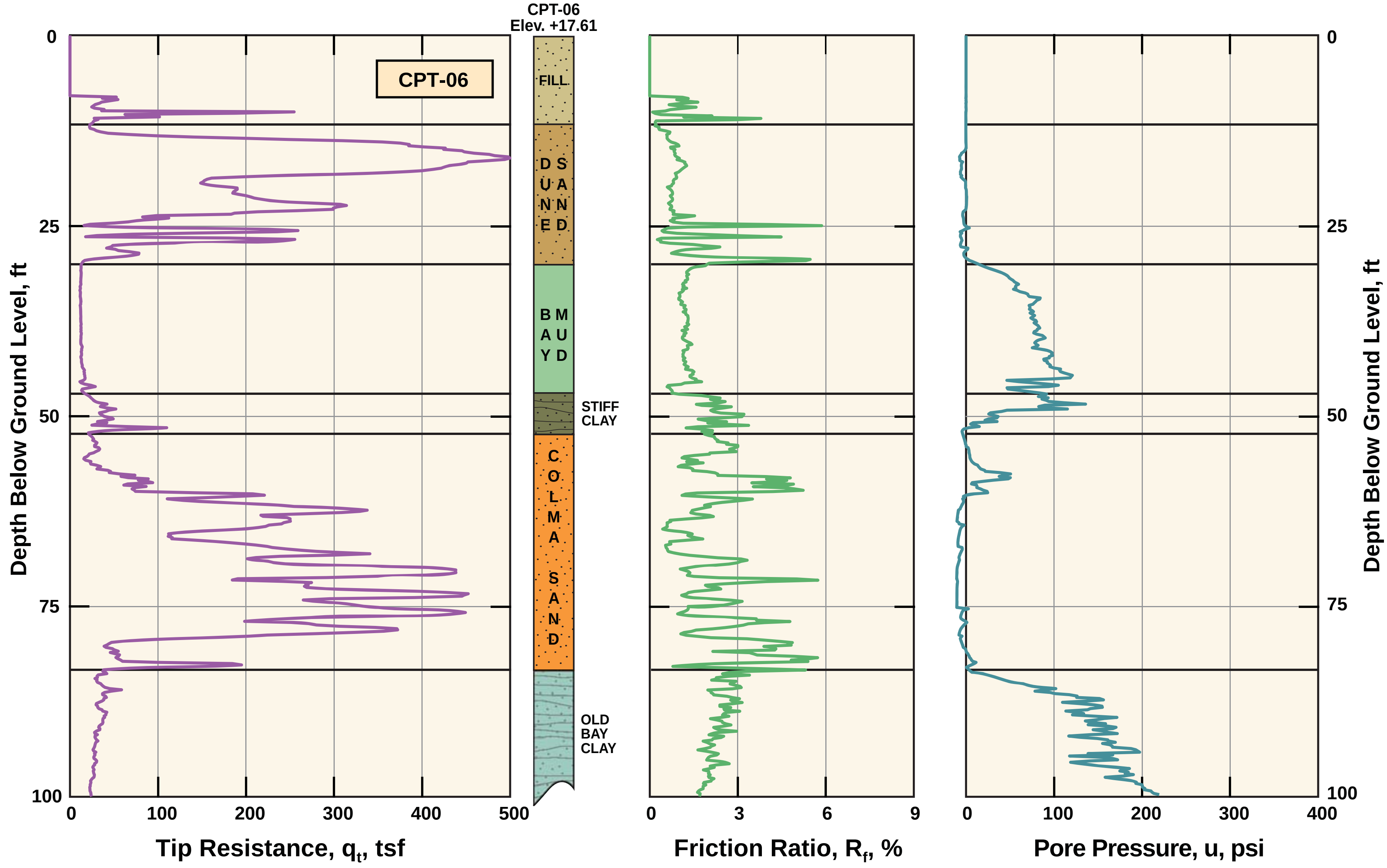


FIG_85: Results of CPT Tests in Colma Sand Illustrating Variability

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Plates\FIG_85

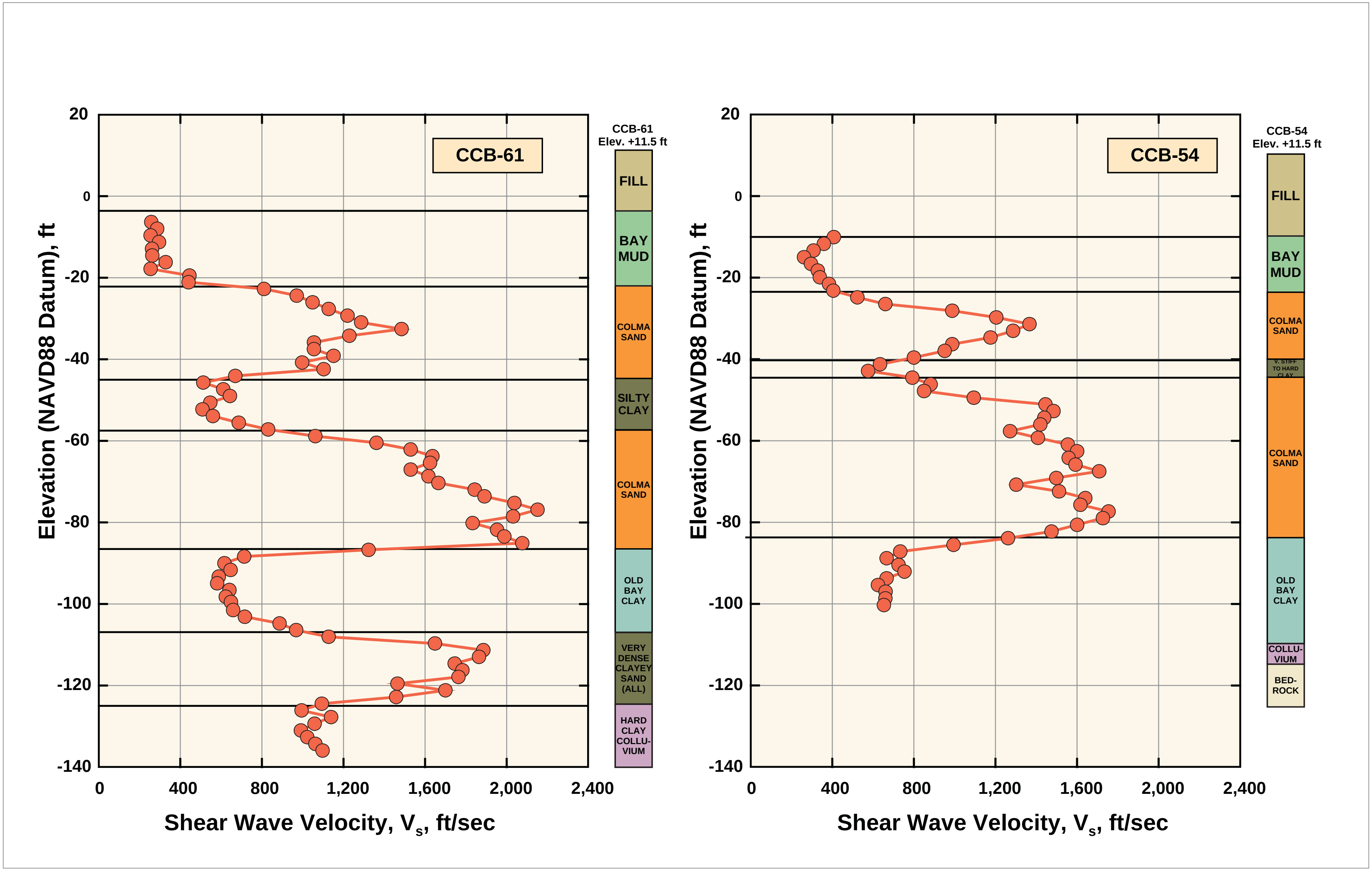


FIG_86: Shear Wave Velocities of Colma Sand Mission Bay Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_86

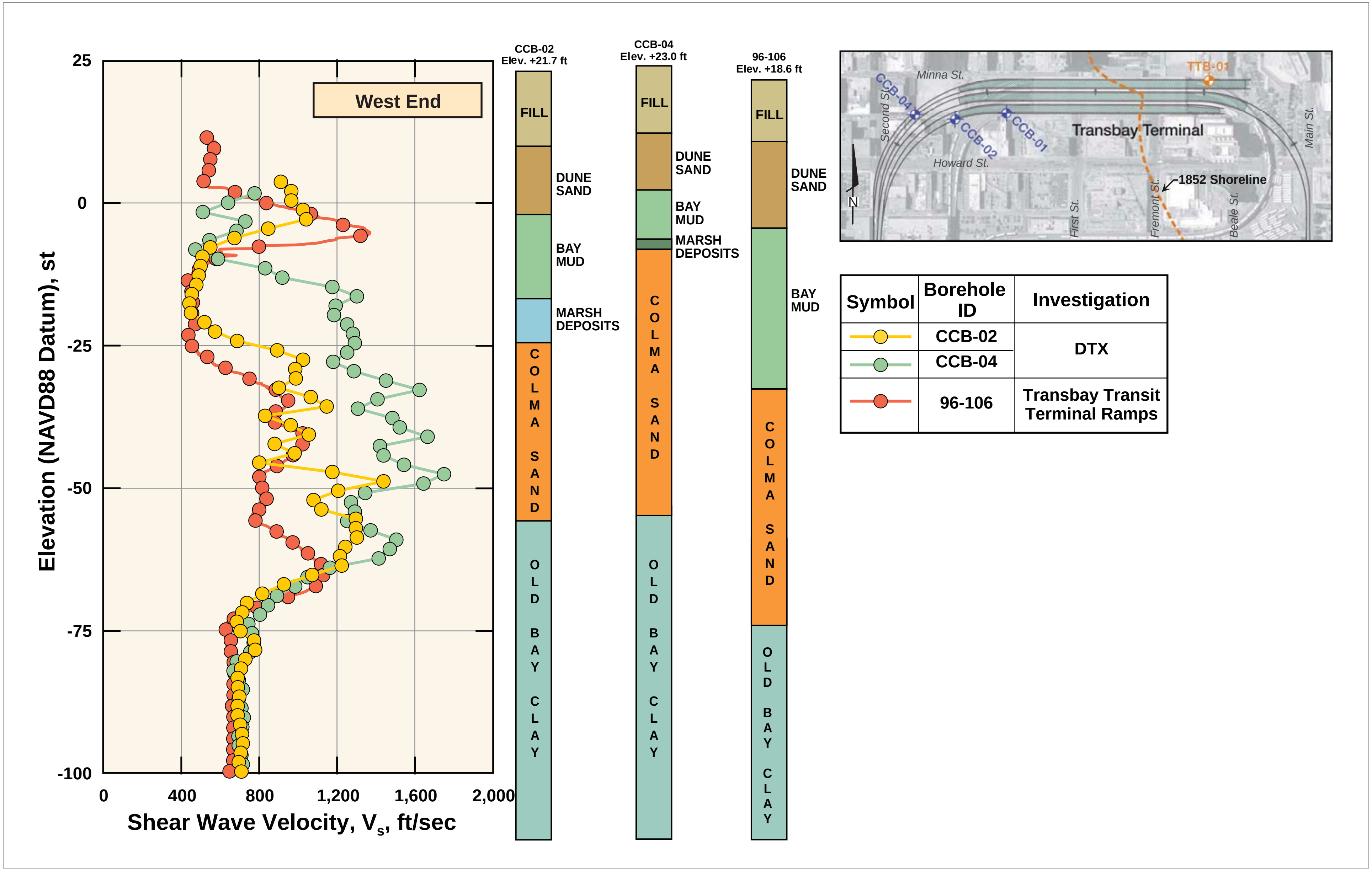


FIG_87: Shear Wave Velocities of Colma Sand Transbay Terminal Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_87

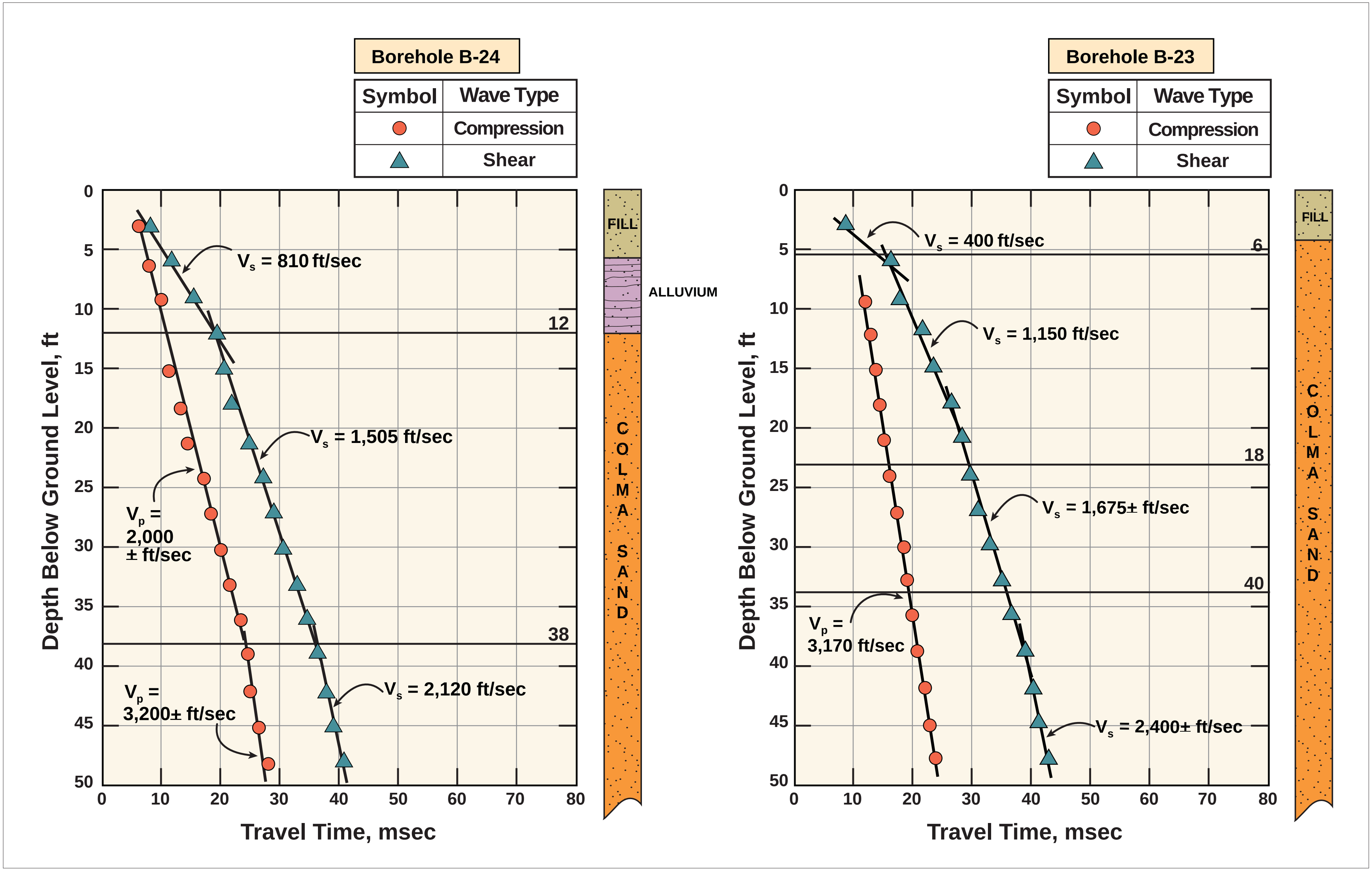


FIG_88: Shear and Compression Wave Velocities of Colma Sand Laguna Hond

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\FIG_88

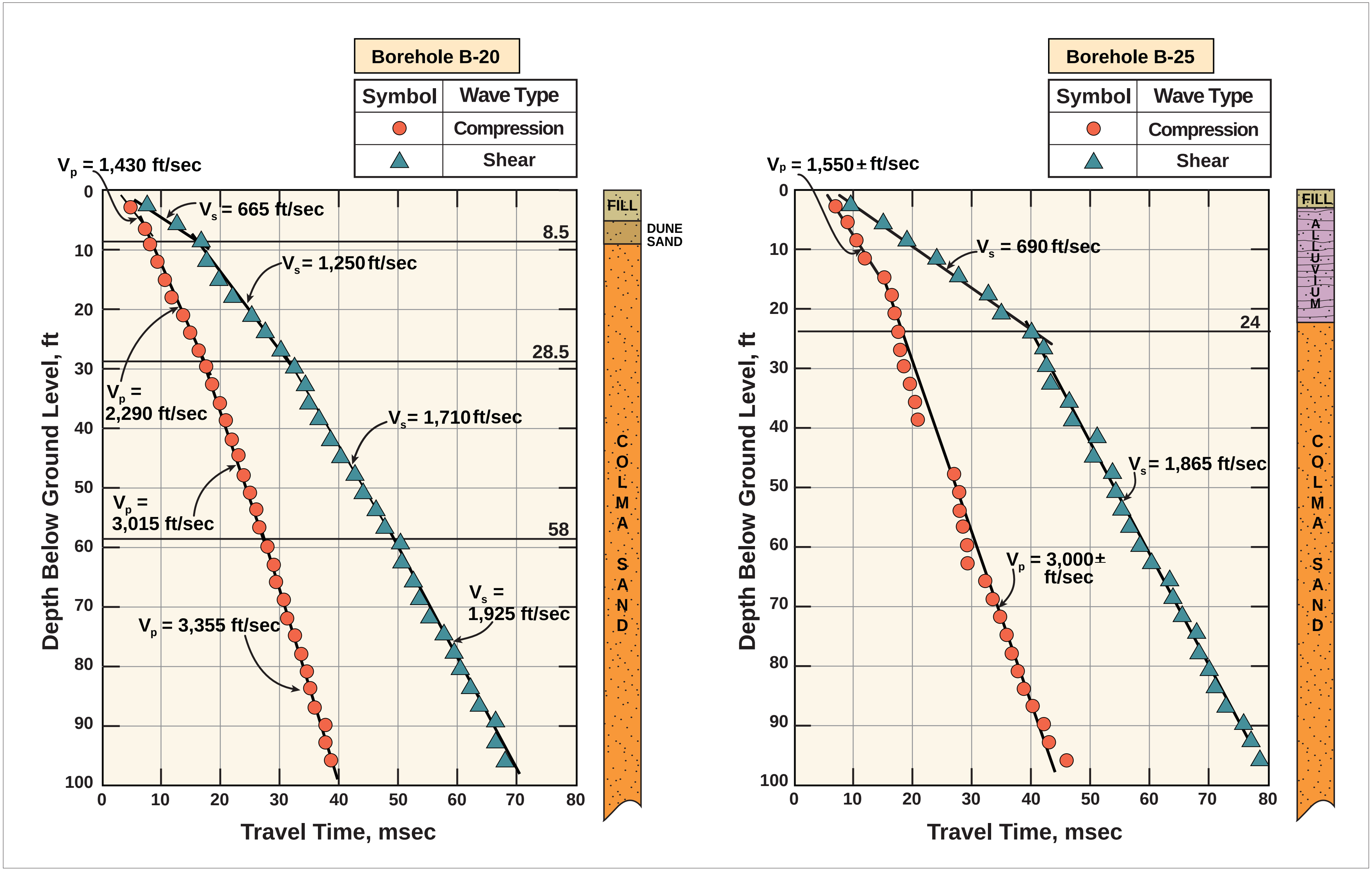


FIG_89: Shear Wave Velocities of Colma Sand Laguna Honda Hospital Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\FIG_89

Results of Rising-Head Permeability Tests					
Borehole ID	Screened Interval (ft)	Screen Length, (ft)	Soil Type(s)	Permeability, K	
				(ft/sec)	(cm/s)
BH-05	55 to 74	19	Colma Sand	1.64E-04	5.00E-03
FV-07	61.5 to 80	19	Colma Sand	3.55E-05	1.08E-03
B-4-6	27 to 42	15	Colma Sand, some Hard Clay	1.84E-05	5.61E-04
B-4-12	25 to 45	20	Colma Sand	3.09E-05	9.41E-04
B-4-15	17 to 37	20	Colma Sand	1.94E-05	5.90E-04
B-4-16	15 to 35	20	Colma Sand	2.49E-05	7.60E-04
B-4-17	9.5 to 19.5	10	Colam Sand	5.19E-05	1.58E-03
B-4-21	15 to 25	10	Colma Sand	6.80E-05	2.07E-03
B-4-24	15 to 25	10	Colma Sand	6.34E-05	1.93E-03
B-4-25	15 to 25	10	Colma Sand, Hard Clay	2.77E-06	8.44E-05
				7.22E-06	2.20E-04
			Average	4.42E-05	1.35E-03

FIG_90: In-Situ Permeabilities of Colma Sand from Rising-Head Tests in Standpipe

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_90

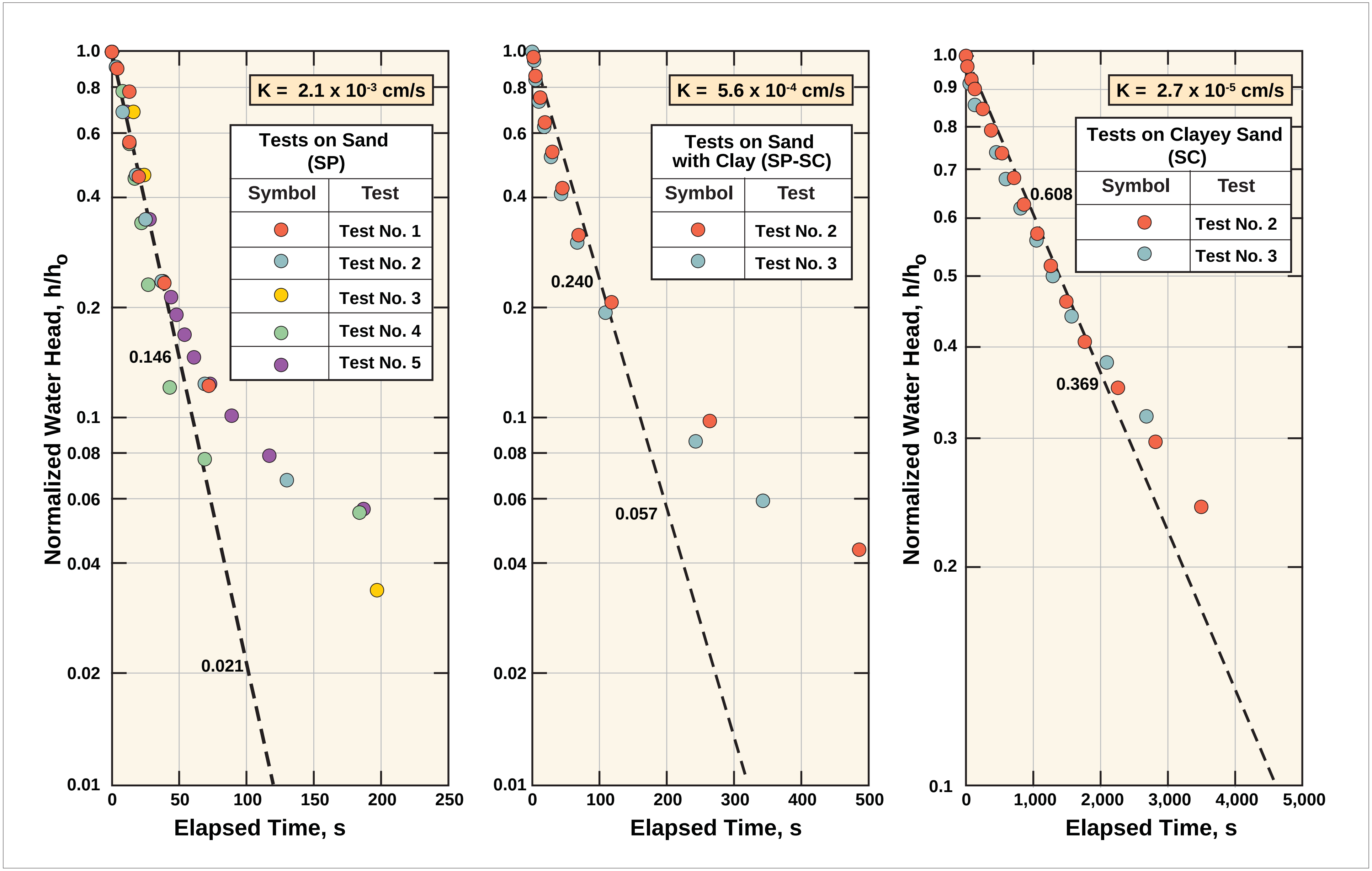


FIG_91: Typical Results of Rising-Head Permeability Tests Performed in Standpipe Piez

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_91

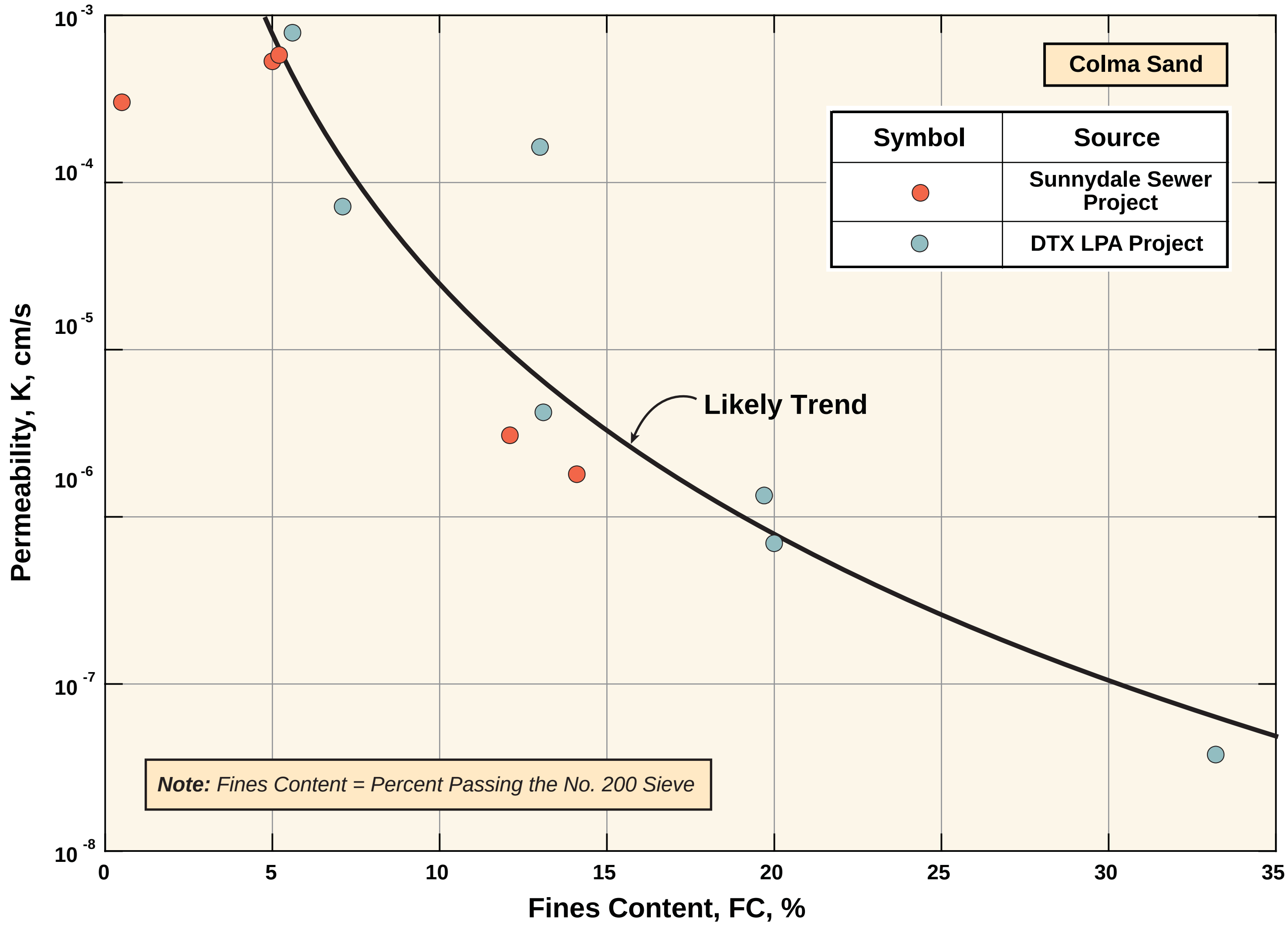


FIG_92: Variation of Vertical Permeability with Fines Content

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_92

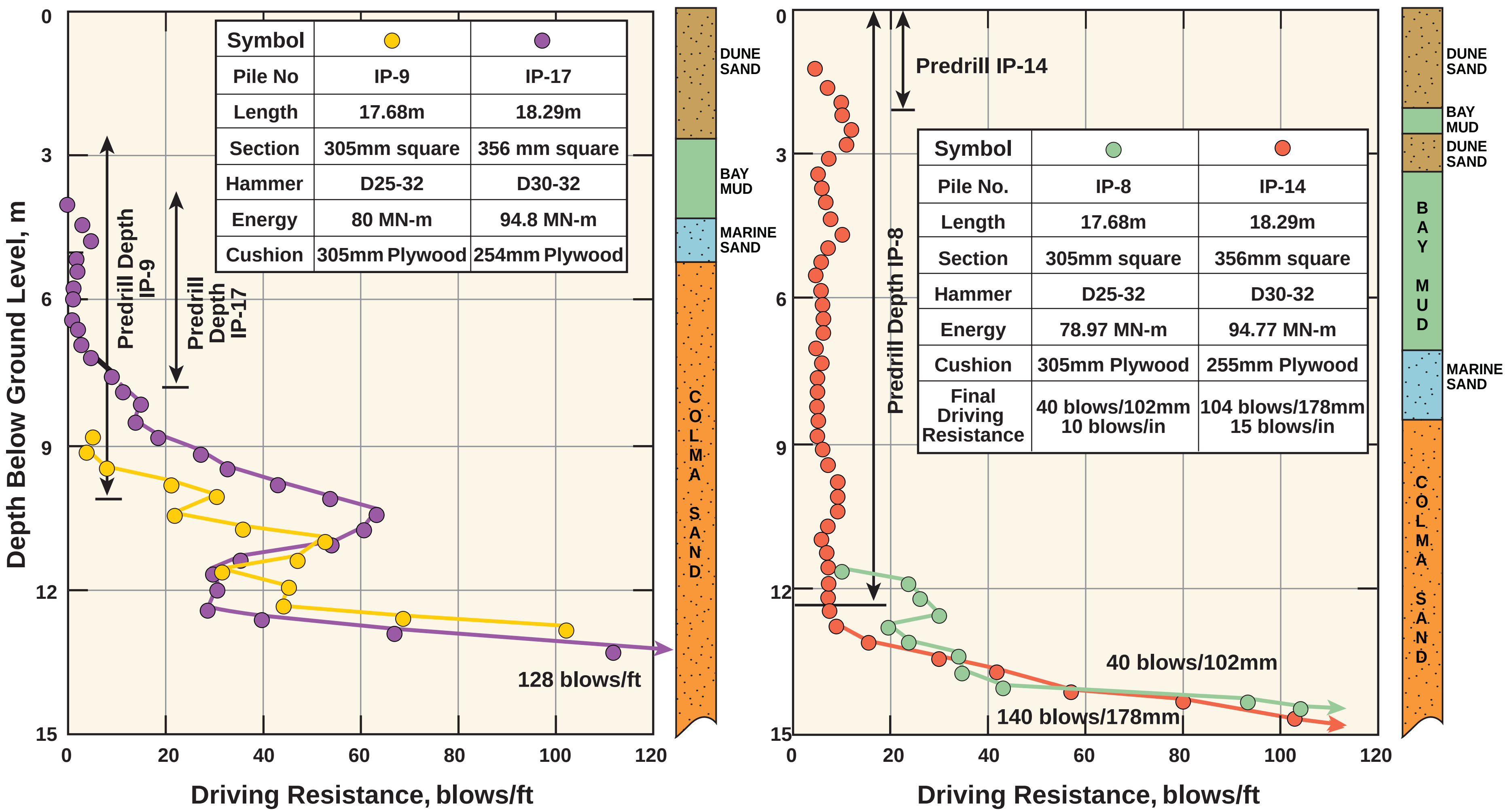
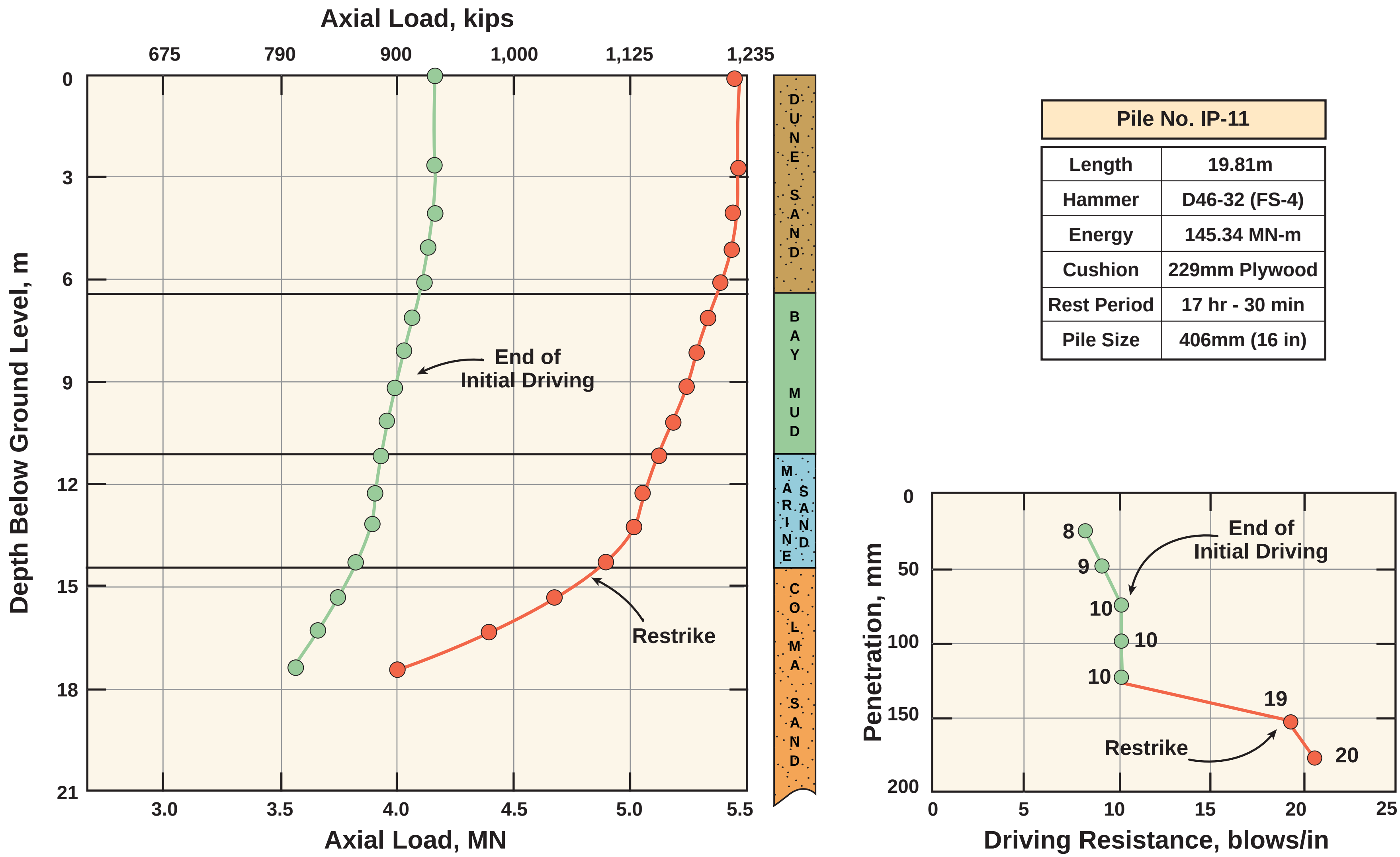


FIG_93: Typical Driving Records of Prestressed Concrete Piles Driven into Colma Sand

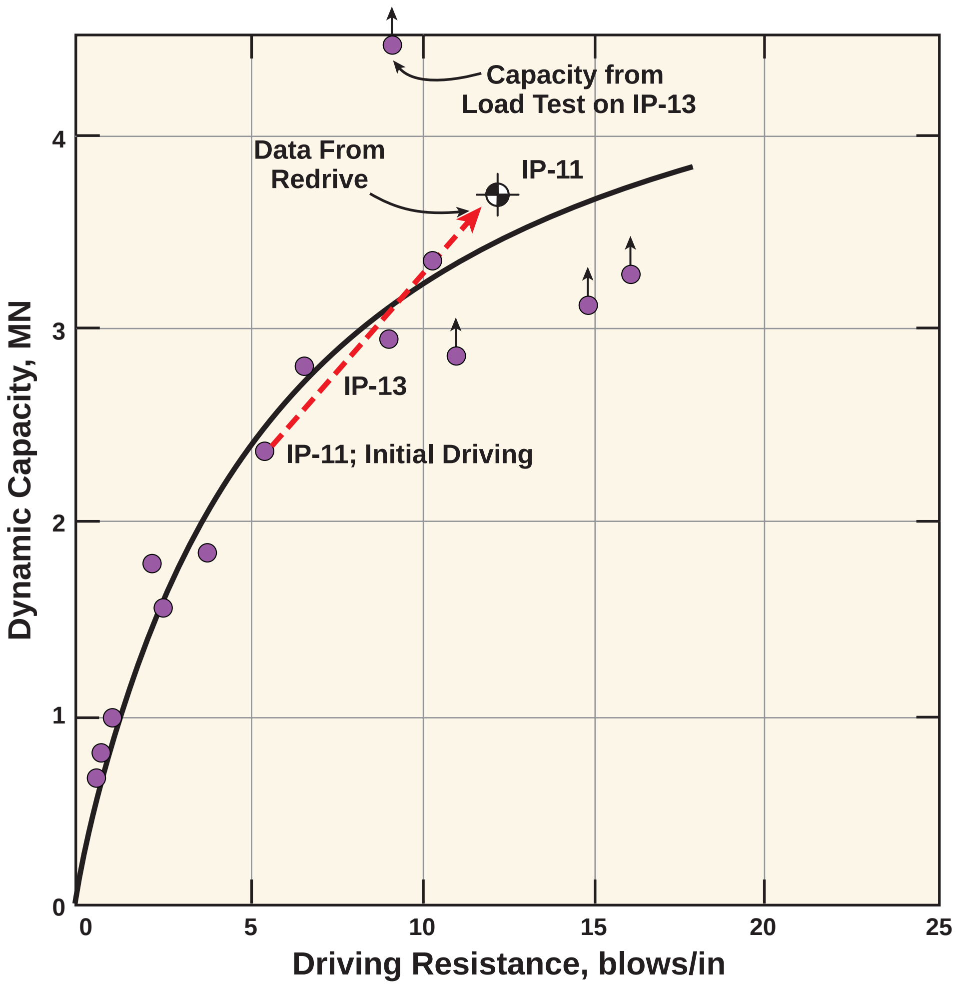
W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_93



Pile No. IP-11	
Length	19.81m
Hammer	D46-32 (FS-4)
Energy	145.34 MN-m
Cushion	229mm Plywood
Rest Period	17 hr - 30 min
Pile Size	406mm (16 in)

FIG_94: Results of PDA Tests on Concrete Piles Driven in Colma Sand

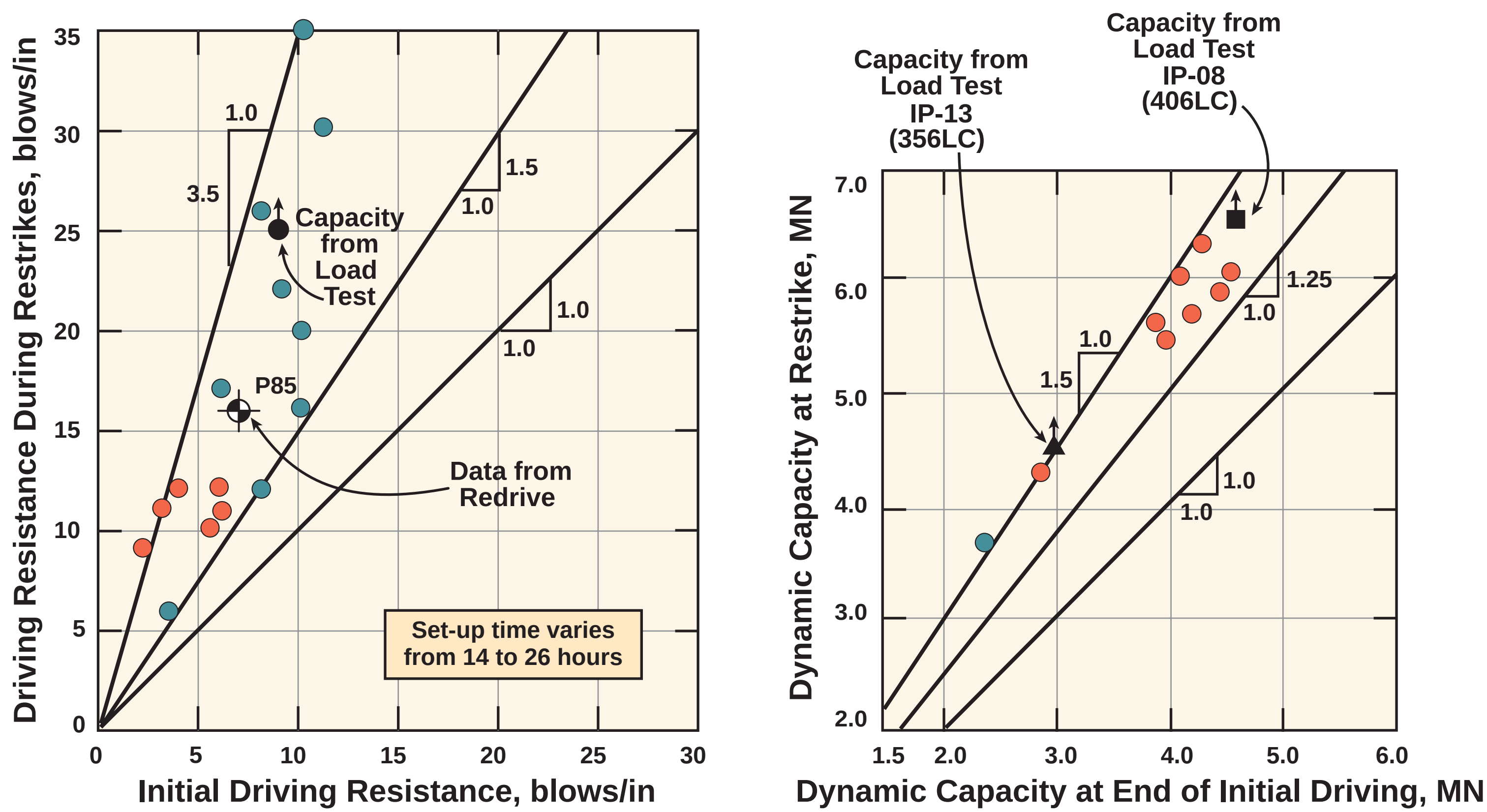
W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_94



Pile No. IP-11 to IP-18	
Section	356mm square
Pile Lengths	18.3 to 20.1m
Hammer	D30-32
Energy	94.77 MN-m
Cushion	254mm Plywood
Measured Energy	30-41 MN-m

FIG_95 : Dynamic Capacity Versus Driving Resistance from PDA Prestressed Concrete Piles Driven into Colma Sand

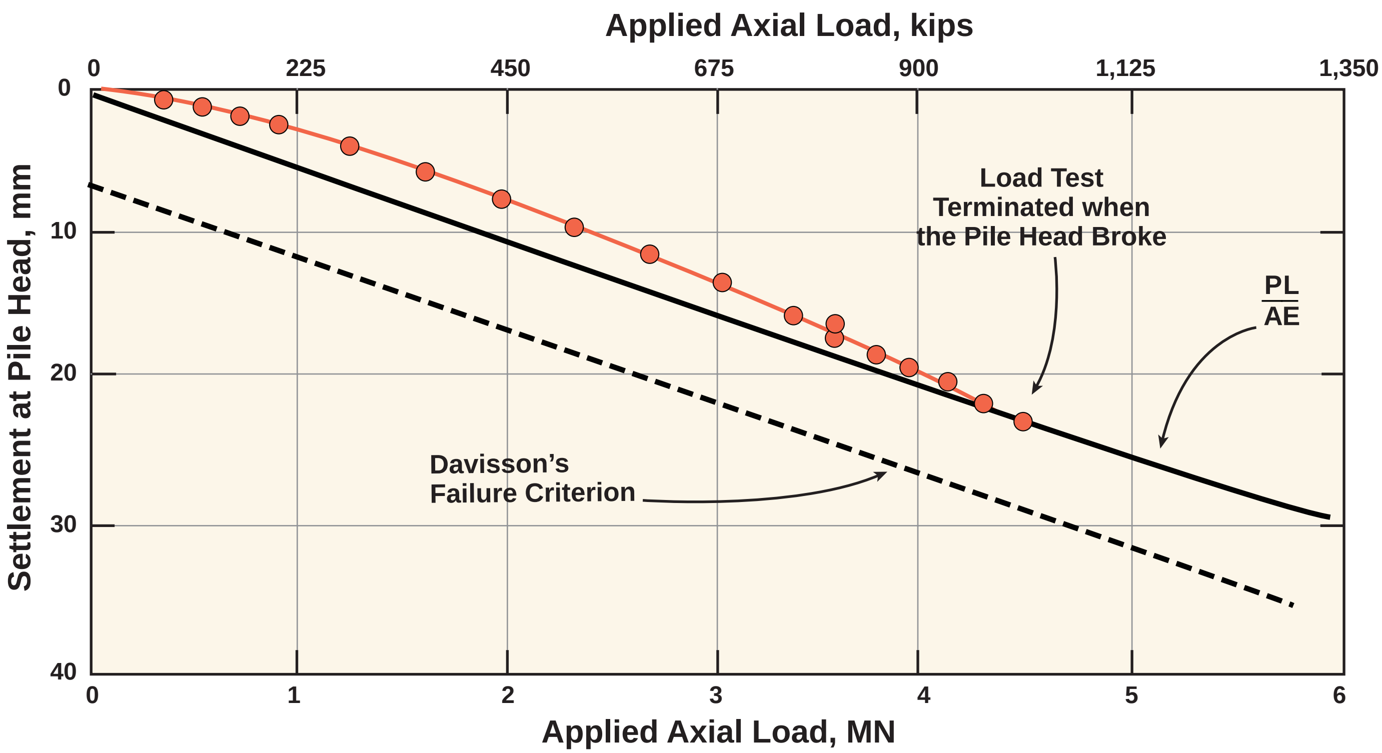
W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_95



Symbol	●	●
Pile Size	406mm (16 in)	356mm (12 in)
Hammer	D46-32 (FS-4)	D46-32 (FS-2)
Rated Energy	146 MN-M	95 MN-M

FIG_96: Effects of Soil Set-Up on Driving Resistance and Axial Capacity 12 in and 16 in Concrete Piles

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_96

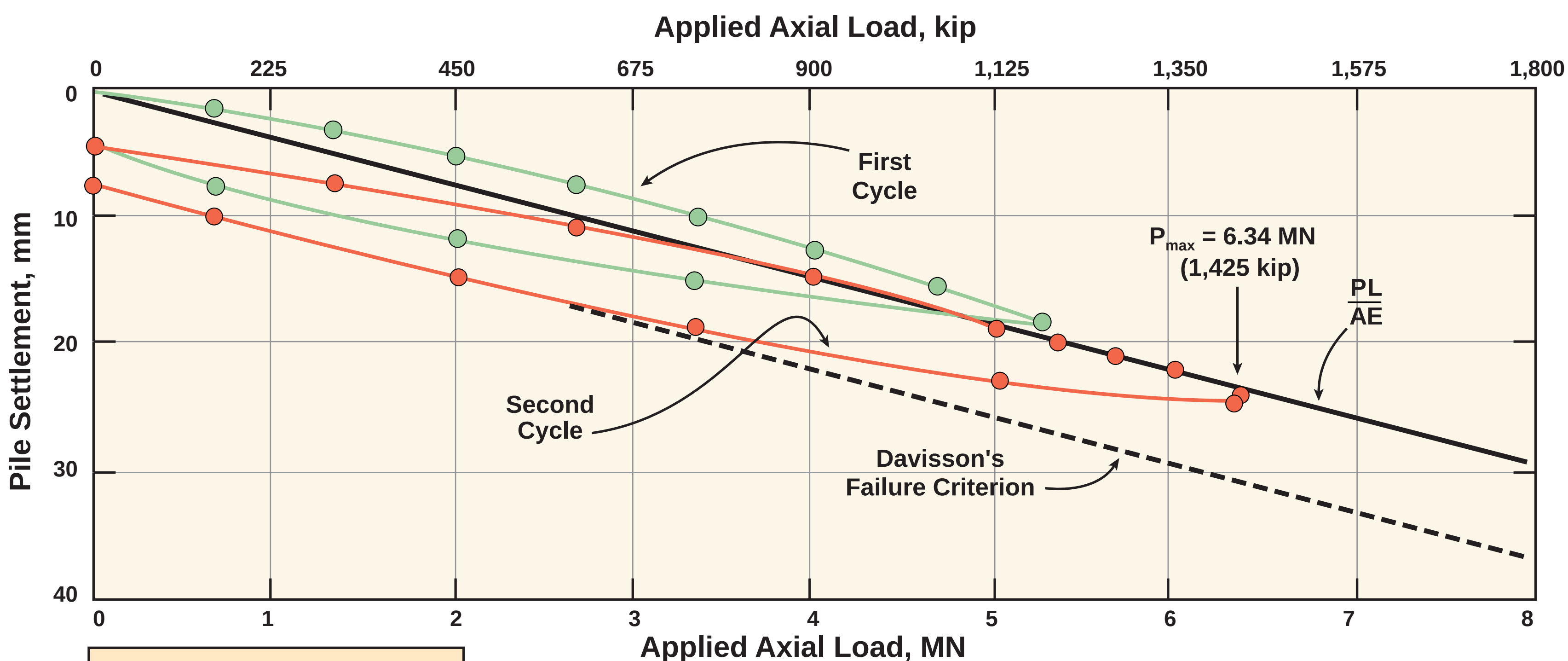


Pile No. IP-13
14-in Square Prestressed Precast Concrete Pile

Pile Length	19.66m
Hammer	D 30-32
Rated Energy	94.77 MN-m
Cushion	254mm Plywood
Final Driving Resistance	64 blows/178mm
Penetration into Bearing Sand	3.66m

FIG_97: Results of Load Test on 14-in Prestressed Concrete Pile

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_97



Pile No. IP-8
14-in Square Prestressed Precast Concrete Pile

Pile Length	17.6m
Hammer	D46-32
Energy	145 MN-m
Cushion	229mm Plywood
Final Driving Resistance	7 blows/in
Penetration into Bearing Sands	6.1m

FIG_98: Results of Axial Compression Load Test 16-Inch Pre-Stressed Concrete Pile

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_98

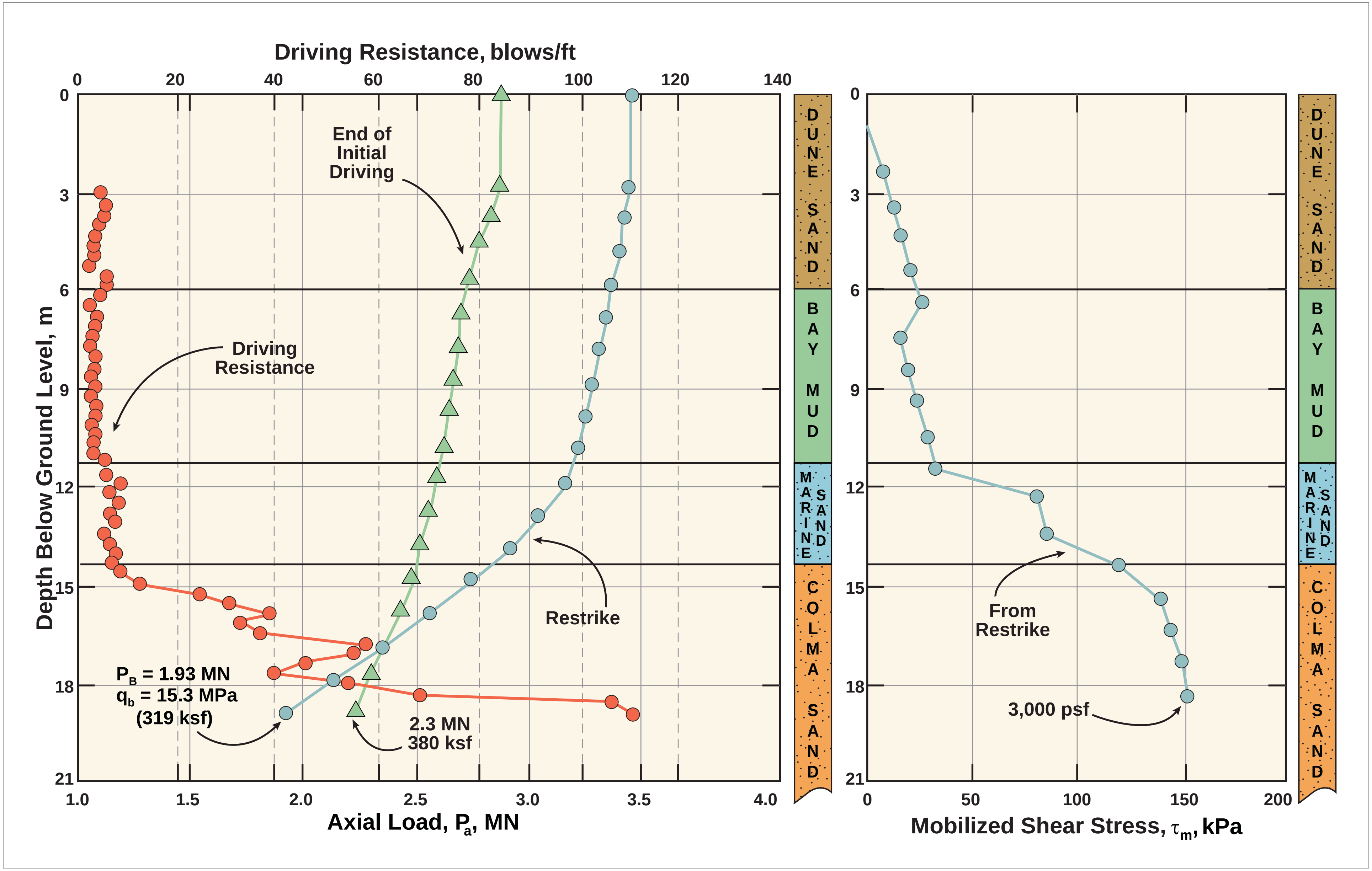
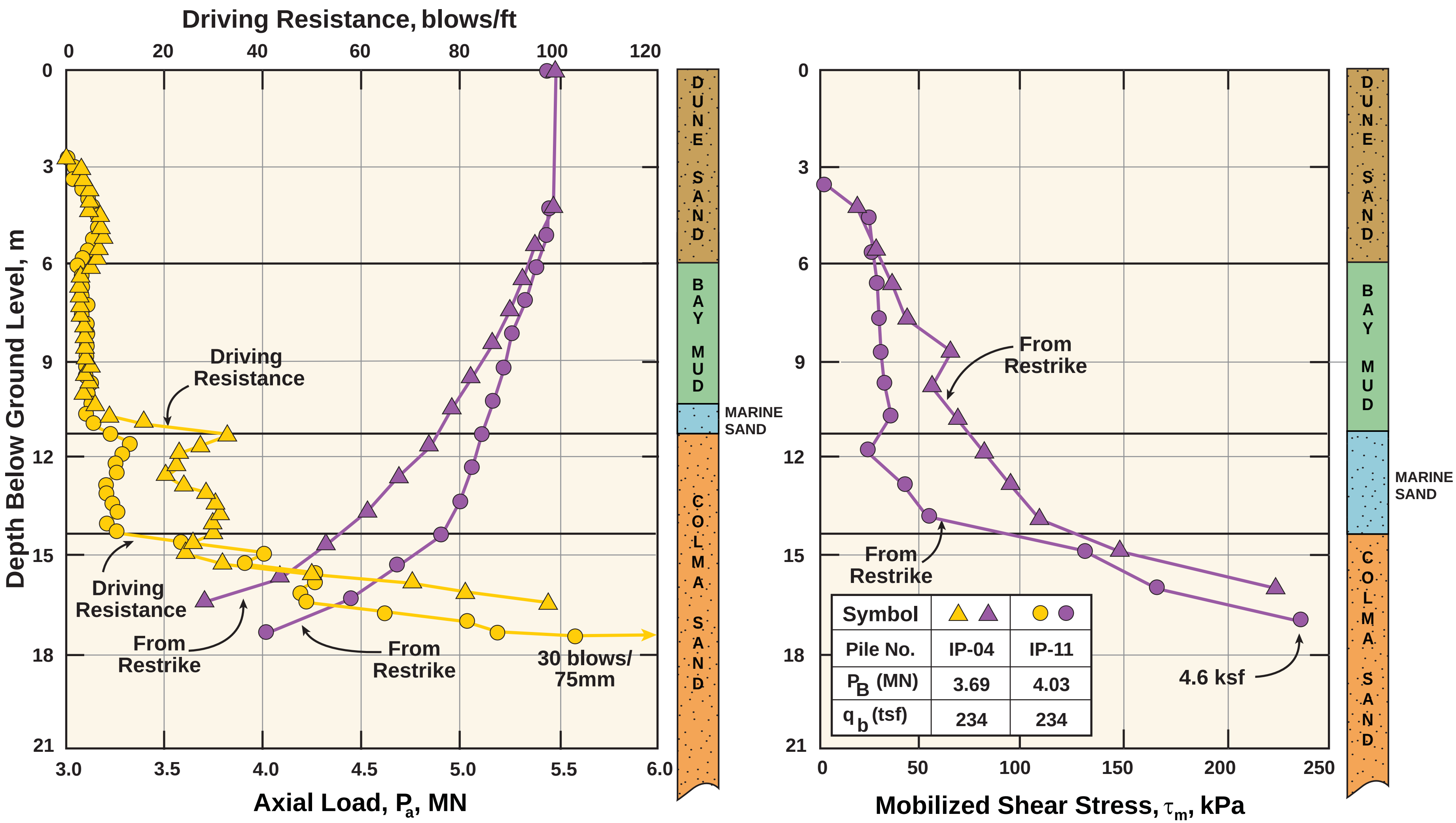


FIG_99: Axial Load Distribution, Mobilized Skin Friction, and End-Bearing Resistance from PDA Tests

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\Final Figures\FIG_99



Symbol	▲ ▲	● ●
Pile No.	IP-04	IP-11
P_B (MN)	3.69	4.03
q_b (tsf)	234	234

FIG_100: Axial Load Distribution, Mobilized Skin Friction, and End-Bearing Resistance from PDA Tests Site No. 2, Indicator Pile IP-11; RestrikeTest

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_100

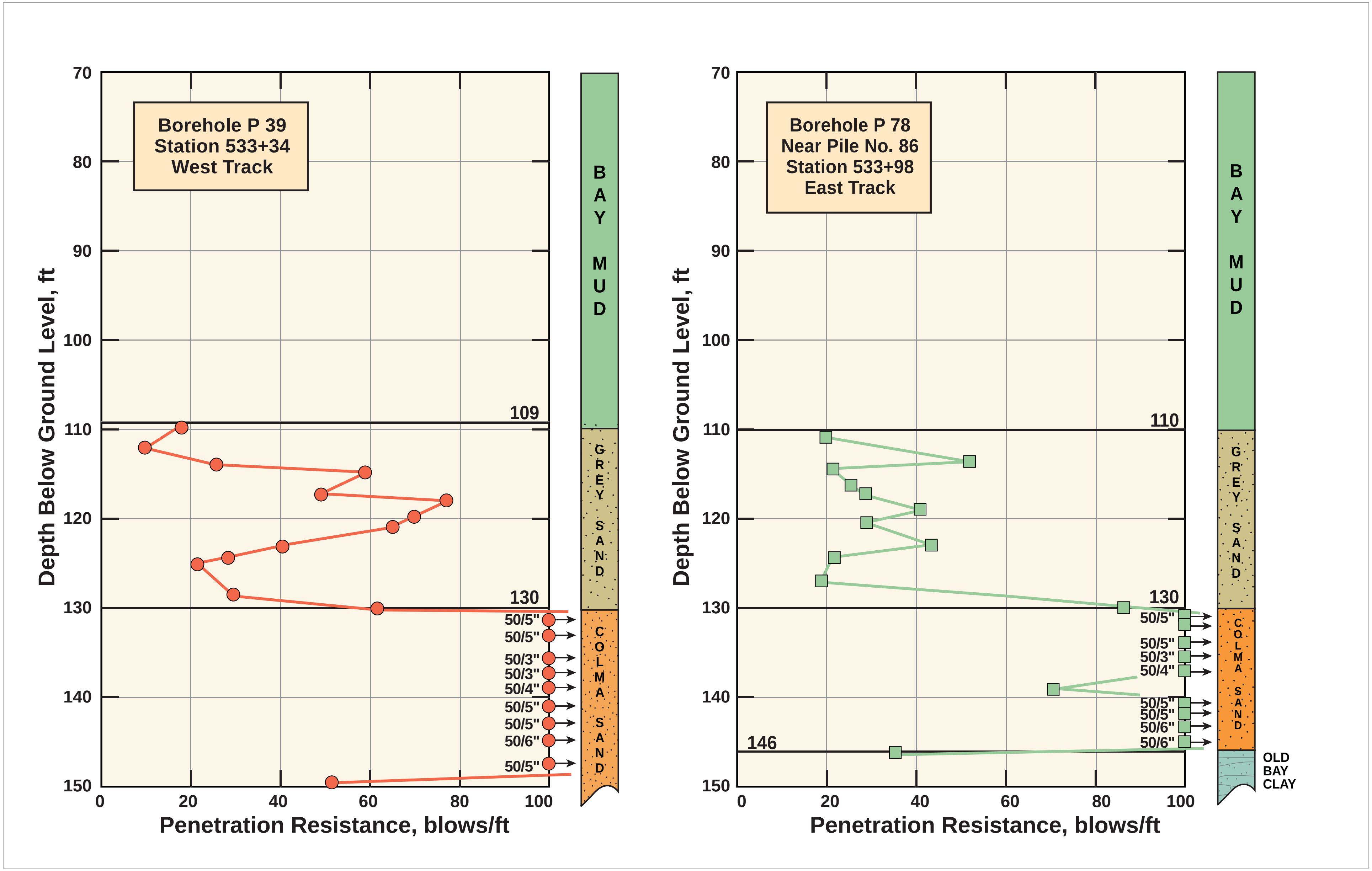


FIG_101: Standard Penetration Resistance Muni Metro Turnback Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)FIG_101

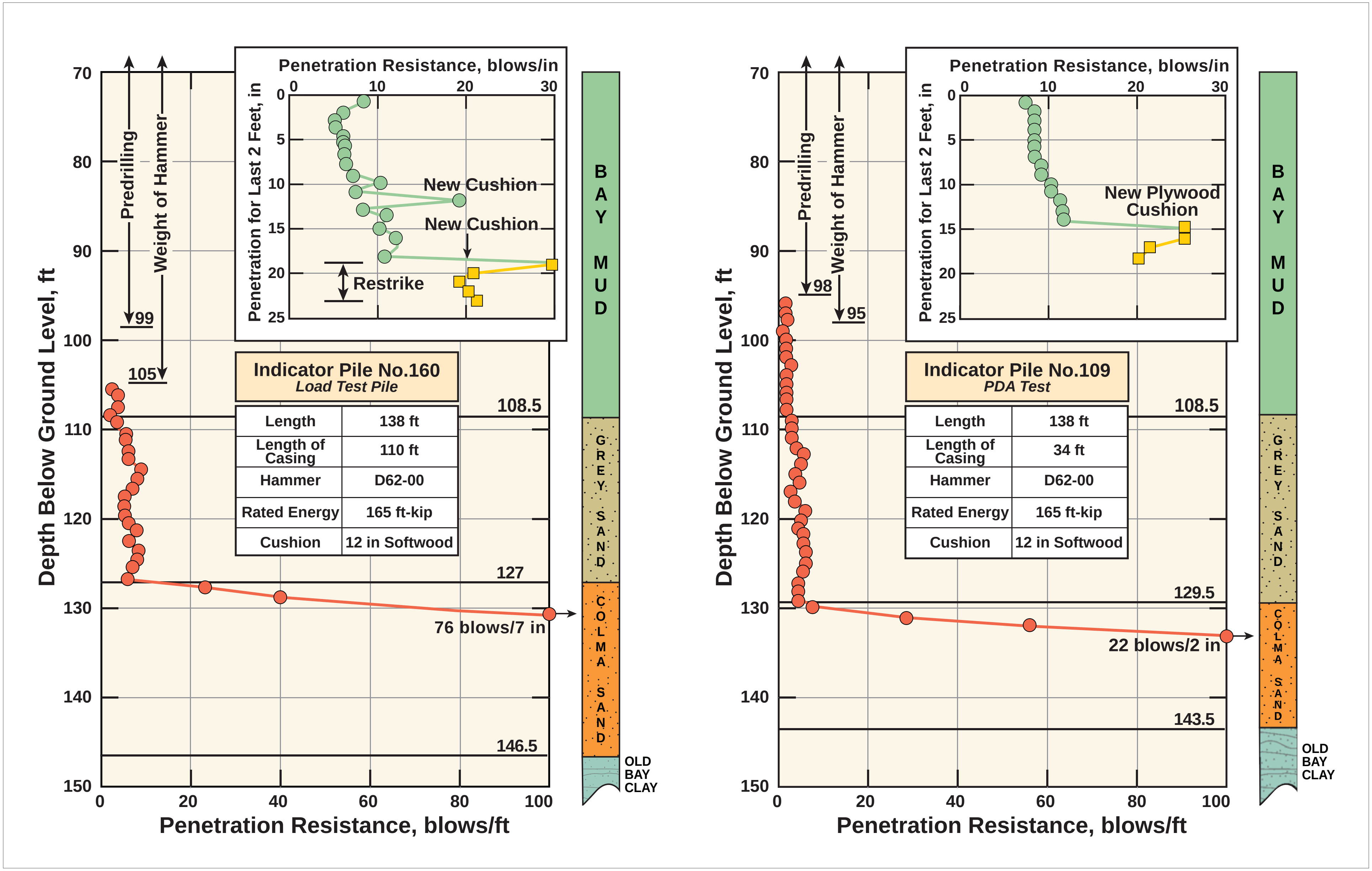
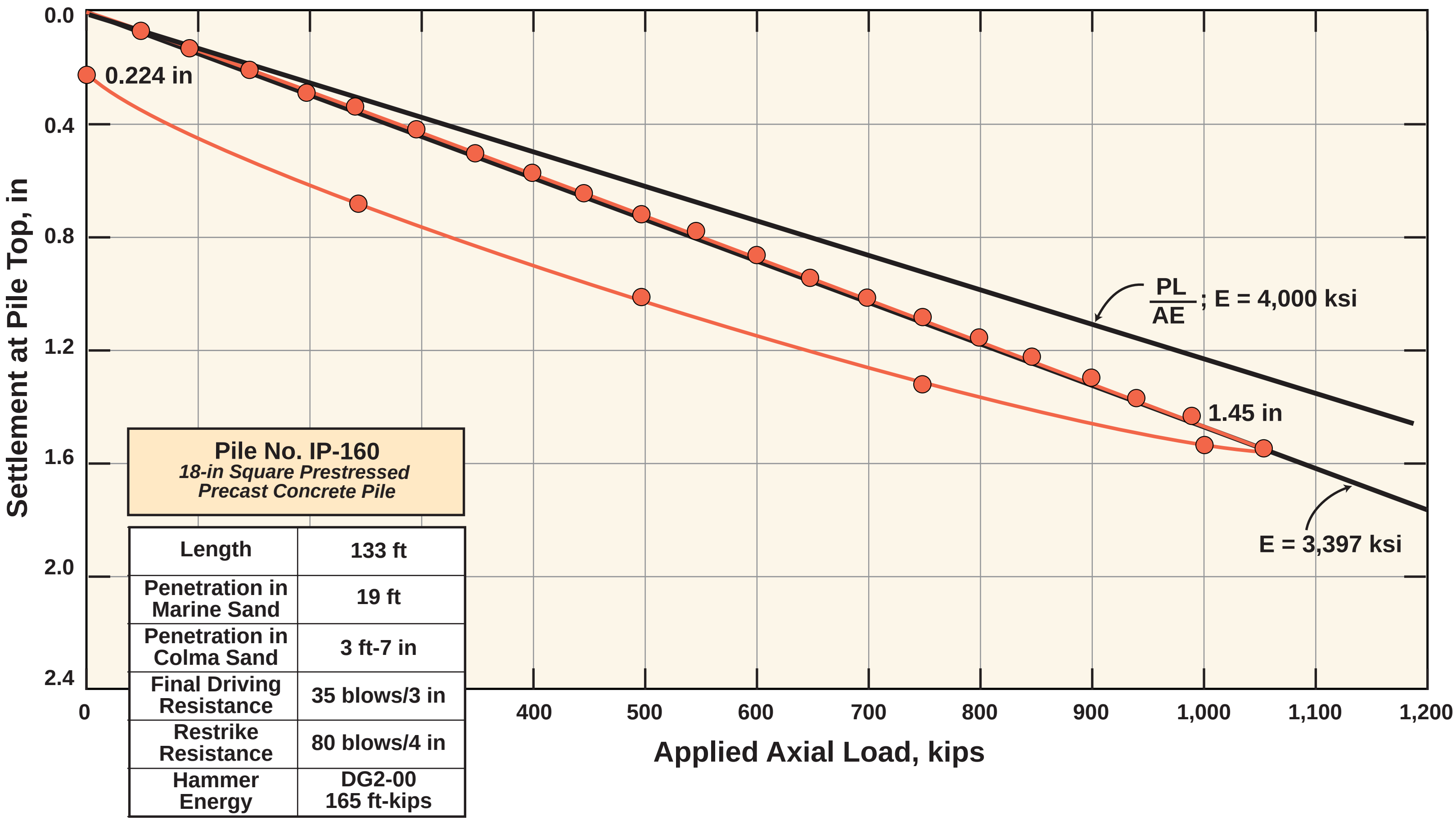


FIG_102: Penetration Resistance Versus Depth 18 Inch Concrete Piles Driven into Colma Sand Muni Metro Turnback Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_102



Length	133 ft
Penetration in Marine Sand	19 ft
Penetration in Colma Sand	3 ft-7 in
Final Driving Resistance	35 blows/3 in
Restrike Resistance	80 blows/4 in
Hammer Energy	DG2-00 165 ft-kips

FIG_103: Results of Pile Load Test on 18 Inch Concrete Pile Muni Metro Turnback Site

W:\Infrastructure\Geotech\UC Berkeley 2008 Seminar\Final Figures\04 COLMA SAND (79-103)\FIG_103