Table 29. Recommended resistance factors for drilled shafts

Shaft Resistance	Soil Type	Design Method	Construction Method	ϕ (resistance Factors)		ϕ/λ	
				Redundant	Non-Redundant	Redundant	Non-Redundant
Total Resistance	Sand	R&W	All	0.50	0.40	0.36	0.29
		FHWA				0.38	0.31
	Clay	FHWA	All	0.40	0.30	0.43	0.31
	Sand + Clay	FHWA	Slurry & Dry	0.85	0.70	0.63	0.52
			Casing	0.65	0.50	0.63	0.52
		R&W	Slurry & Dry	0.75	0.60	0.65	0.52
			Casing	0.50	0.35	0.47	0.36
	Rock	C&K	All	0.60	0.45	0.48	0.37
		IGM	All	0.75	0.60	0.56	0.44
Skin Resistance	All Soils	FHWA	All	0.45	0.35	0.48	0.40
		R&W				0.42	0.33
	Rock	C&K	All	0.50	0.35	0.43	0.32
		IGM		0.65	0.50	0.53	0.41

Notes: ϕ/λ = efficiency factor, evaluating the relative economic performance of each method (higher ratios indicate a more economical solution); ϕ/λ values relate to the exact calculated ϕ and λ and not to the assigned ϕ values in the table.

Redundant = Five piles or more under one pile cap.($\beta = 2.33$ $p_f = 1.0\%$)

Non-Redundant = Four or less piles under one pile cap ($\beta = 3.0$ $p_f = 0.1\%$)

λ = bias = K_{SX} = mean of measured/predicted

FHWA = Reese and O'Neill (1988); R&W = Reese and Wright (1977);

C&K = Carter and Kulhawy (1988); IGM = O'Neill and Reese (1999).

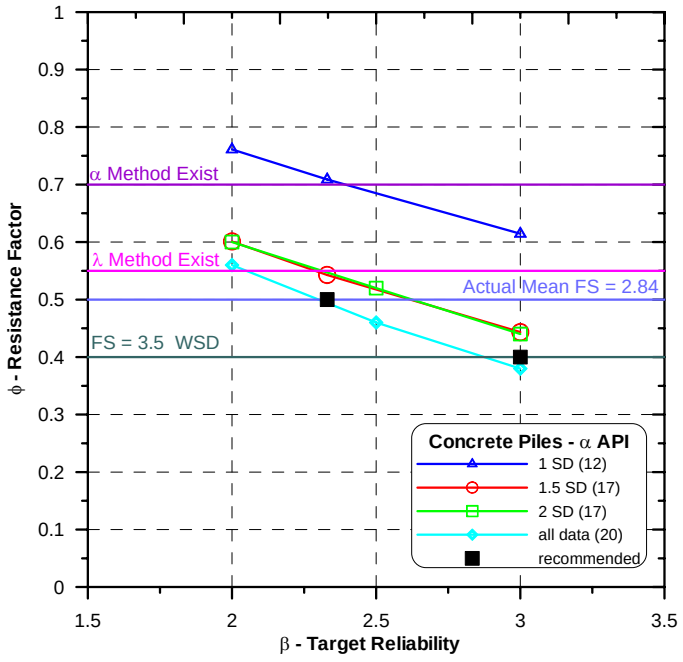

Figure 47. Sensitivity analysis examining the recommended parameters for the design of concrete piles in clay using α API method.