NovoSPT 3.0.2020.601
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Following correlations are calculated for: N60=13 @ 3.05 m; Corrected SPT N1(60)~16 after Peck and Bazaraa, 1969

Table i : Input data and assumptions.

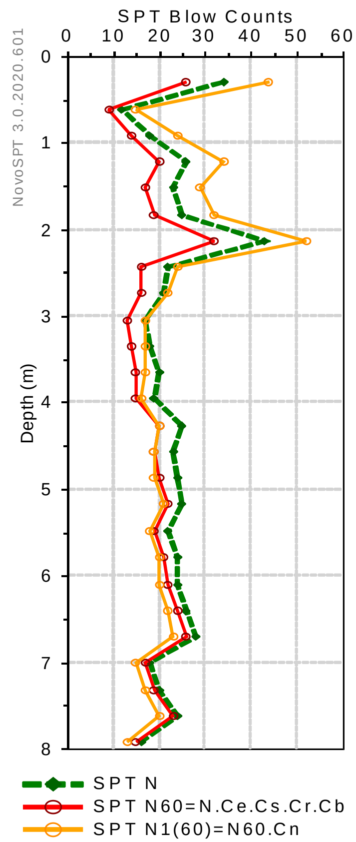
Input Parameter	Value
Footing B (m):	0.6
Footing L (m):	0.9
Footing Df (m):	0.6
Footing P (kPa):	100
Safety Factor FoS	3
Apply Groundwater Cor	No
Groundwater Level (m)	-
Pile Length	3.05
Pile Diameter (m):	0.3

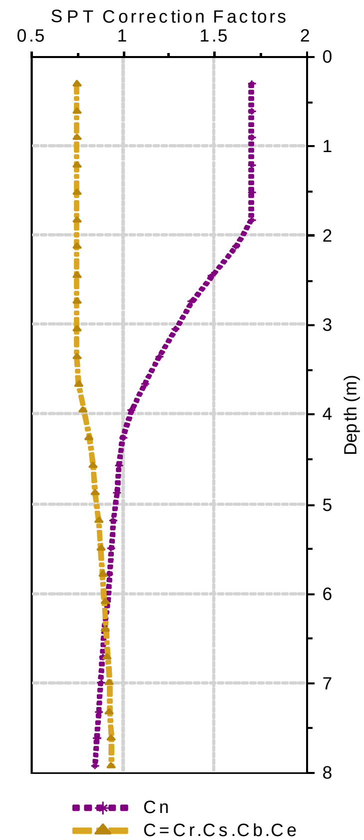
Table ii : Soil layers from existing ground.

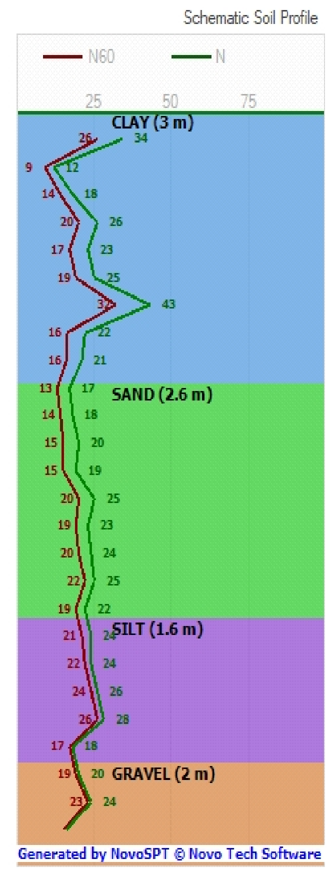
Thickness (m)	Unit Weight (kN/m3)	Soil Type	D50 (mm)	OCR
3	16.5	Clay	0.002	2
2.6	18.7	Sand	1.03	1
1.6	17.5	Silt	0.033	1
2	21	Gravel	34	1

Table iii : In-situ SPT test results.

Depth (m)	SPT Blow Counts (N)	N60	Cn	C	N1(60)
0.3	34	26	1.7	0.75	44
0.61	12	9	1.7	0.75	15
0.91	18	14	1.7	0.75	24
1.22	26	20	1.7	0.75	34
1.52	23	17	1.7	0.75	29
1.83	25	19	1.7	0.75	32
2.13	43	32	1.62	0.75	52
2.44	22	16	1.49	0.75	24
2.74	21	16	1.38	0.75	22
3.05	17	13	1.29	0.75	17
3.35	18	14	1.2	0.75	17
3.66	20	15	1.12	0.76	17
3.96	19	15	1.05	0.79	16
4.27	25	20	1	0.82	20
4.57	23	19	0.98	0.84	19
4.88	24	20	0.97	0.85	19
5.18	25	22	0.95	0.87	21
5.49	22	19	0.94	0.88	18
5.79	24	21	0.93	0.89	20
6.1	24	22	0.92	0.9	20
6.4	26	24	0.9	0.91	22
6.71	28	26	0.89	0.92	23
7.01	18	17	0.88	0.93	15
7.32	20	19	0.87	0.93	17
7.62	24	23	0.86	0.94	20
7.92	16	15	0.85	0.94	13







.: List of SPT Correlations For Overburden Correction Factor (Cn) :.

Overburden Correction Factor (Cn)		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Canadian Foundation Engineering Manual, 2006	1.22	*				4th Edition	17	$C_N = 0.77\,Log\frac{1920}{\sigma'_v}$
Gibbs and Holtz, 1957	1.7	*				equation by Teng, 1962		$C_N = \frac{50}{\left(10+\sigma'_v\right)}$
Liao and Whitman, 1986	1.39	*					51	$C_N = \sqrt{\frac{98.07}{\sigma'_v}}$
Peck and Bazaraa, 1969	1.29	*						$C_N = \frac{4}{1+2\sigma'_v} for \sigma'_v \leqslant 1500psf \leftrightarrow \frac{4}{3.25+0.5\sigma'_v} for \sigma'_v > 1500psf$
Peck, Hanson and Thornburn, 1974	1.22	*					51	$C_N = 0.77 \times Log\frac{20}{\sigma'_v}$
Samson et al., 1986	1.38	*						$C_N = \sqrt{\frac{95.76}{\sigma'_v}}$
Seed, 1976	1.36	*					51	$C_N = 1\text{-}1.25 \times Log\frac{\sigma'_v}{98.07}$
Skempton, 1986	1.32	*					51	$function of Dr = 12.4 \times \sqrt{N6o}$
Tokimatsu and Yoshimi, 1983	1.4	*						$C_N = \frac{1.7}{0.7+\frac{\sigma'_v}{98.07}}$

.: List of SPT Correlations For Other Correction Factors :.

Other Correction Factors		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Skempton, 1986	1	*				Borehole Diameter Factor, Cb	52	$C_B=1^{<150mm}\leftrightarrow 1.05^{150mm}\leftrightarrow 1.15^{200mm}$
Skempton, 1986	1	*				Sampling Method Factor, Cs	52	$C_S=1^{Stand}\leftrightarrow 1.2^{NoLiner}$
Skempton, 1986	0.75	*				Rod Length Factor, Cr	52	$C_R=\frac{1}{\left(0.99+\frac{4.3166}{L^2}\right)}$
Skempton, 1986	1	*				Energy Ratio Factor, Ce	52	$C_E=\frac{E}{60}$

.: List of SPT Correlations For Consistency :.

Consistency		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
AASHTO, 1988	Medium Dense (Compact)			*		for coarse-grained soils	55	see reference #55 for details
Terzaghi and Peck, 1948	Medium Dense (Compact)			*		for coarse-grained soils	3	see reference #3 for details

.: List of SPT Correlations For Young's Modulus (Es) :.

Young's Modulus (Es) MPa		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
AASHTO, 1996	11.5			*		Clean fine to medium sands and slightly silty sands	55	$E_s=\frac{700\times N1_{60}}{1000}$
AASHTO, 1996	16.4			*		Coarse sands and sands with little gravel	55	$E_s=\frac{1000\times N1_{60}}{1000}$
Bowles, 1996	76.5			*		Sand (normally consolidated)	25	$E_s=\frac{6000\times N60}{1000}$
Bowles, 1996	47.1			*		Sand (normally consolidated)	25	$E_s=\frac{18500\times Log N60}{1000}$
Bowles, 1996	6.9			*		Sand (saturated)	25	$E_s=\frac{250\times(N60+15)}{1000}$
Bowles, 1996	35.1			*		Sands (all normally consolidated): average value	25	$E_s=\frac{2750\times N60}{1000}$
Bowles, 1996	53.4			*		Sand (over consolidated) OCR=1	25	$E_s=\frac{(40000+1050\times N60)\times\sqrt{OCR}}{1000}$
Bowles, 1996	22.5			*		Gravelly sand	25	$E_s=\frac{1200\times(N60+6)}{1000}$
Bowles, 1996 and Denver, 1982	25			*		Sand (normally consolidated)	25	$E_s=\frac{7000\times\sqrt{N60}}{1000}$
Chaplin, 1963	11			*		Sand	74	$E_s=(44\times N60)^{0.75}\times\frac{95.76}{1000}$
Clayton et al., 1980	~ 44.6 to 510			*		Sand	74	$E_s=(3.5\leftrightarrow 40)\times N60$
D'Appolonia et al., 1970	38.4			*		Sand (normally consolidated)	41	$E_s=\left(220+11\times N1_{60}\right)\times\frac{100}{1000}$
D'Appolonia et al., 1970	24			*		Sand (normally consolidated)	66	$E_s=\left(194+8\times N60_{ave}\right)\times\left(1-0.35^2\right)\times\frac{95.76}{1000}$
D'Appolonia et al., 1970	45			*		Sand (over consolidated)	66	$E_s=\left(420+10\times N60_{ave}\right)\times\left(1-0.35^2\right)\times\frac{95.76}{1000}$
Denver, 1982	25			*		Sand	74	$E_s=7\times\sqrt{N60}$
Farrent, 1963	8.1			*		Based on Terzaghi & Peck loading curves	74	$E_s=\frac{7.5\times\frac{8}{9}\times N60\times 95.76}{1000}$
Kulhawy and Mayne, 1990	6.4			*		Sands with fines		$E_s=\frac{5\times N60\times 100}{1000}$
Kulhawy and Mayne, 1990	12.8			*		Clean sands (normally consolidated)		$E_s=\frac{10\times N60\times 100}{1000}$
Kulhawy and Mayne, 1990	19.1			*		Clean sands (over consolidated)		$E_s=\frac{15\times N60\times 100}{1000}$
Mezenbach, 1961	9.4			*		Fine-grained sand (above water level)	25	$E_s=\frac{100\times(52+3.3\times N60)}{1000}$
Mezenbach, 1961	13.3			*		Fine-grained sand (below water level)	25	$E_s=\frac{100\times(71+4.9\times N60)}{1000}$
Mezenbach, 1961	9.6			*		Sand (medium)	25	$E_s=\frac{100\times(39+4.5\times N60)}{1000}$
Mezenbach, 1961	17.2			*		Coarse-grained sand	25	$E_s=\frac{100\times(38+10.5\times N60)}{1000}$
Mezenbach, 1961	19.3			*		Sand and gravel	25	$E_s=\frac{100\times(43+11.8\times N60)}{1000}$
Mezenbach, 1961	9.2			*		Silty sand	25	$E_s=\frac{100\times(24+5.3\times N60)}{1000}$
Papadopoulos, 1992	17.7			*		Sands	25	$E_s=\frac{(75+8\times N60)\times 100}{1000}$
Schultze and Muhs, 1967	45			*		Sand	41	$E_s=\left(0.00231839\times N1_{60}^{3}-0.489236\times N1_{60}^{2}+34.619\times N1_{60}+2.78904\right)\times$
Skempton, 1986	20.7	~	~	~	~			$E_s=4.8+1.25\times N60$
Stroud, 1988	~ 6.4 to 25.5	~	~	~	~	Weak rocks	47	$E_s=\frac{(500\leftrightarrow 2000)\times N60}{1000}$
Tan et al., 1991	13.9			*		Sand (normally consolidated)		$E_s=\frac{500\times(N60+15)}{1000}$
Tan et al., 1991	11.2			*		Gravelly sand		$E_s=\frac{600\times(N60+6)}{1000}^{for N\leqslant 15}\leftrightarrow\frac{600\times(N60+6)+2000}{1000}^{for N>15}$
Tan et al., 1991	8.9			*		Clayey sand		$E_s=\frac{320\times(N60+15)}{1000}$
Trofimenkov, 1974	~ 37.9 to 54.2			*		Sand (USSR practice)	74	$E_s=(350\leftrightarrow 500)(Log N60)\times\frac{98.067}{1000}$
Webb, 1969	13.3			*		Sand, below water table	74	$E_s=\frac{5\times(N60+15)\times 95.76}{1000}$
Webb, 1969	5.7			*		Clayey Sand, below water table	74	$E_s=\frac{3.33\times(N60+5)\times 95.76}{1000}$
Webb, 1969	9.5	*				Average profile, below water table	74	$E_s=\frac{4\times(N60+12)\times 95.76}{1000}$

.: List of SPT Correlations For Friction Angle :.

Friction Angle deg		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Ayuthaya	35.2	~	~	~	~		24	$\Phi=\sqrt{12\times N60}+22.8$
Ayuthaya	36.4	~	~	~	~		24	$\Phi=\sqrt{12\times N1_{60}}+22.4$
Chonburi	34.4	~	~	~	~		24	$\Phi=\sqrt{12\times N60}+22$
Chonburi	37.4	~	~	~	~		24	$\Phi=\sqrt{12\times N1_{60}}+23.4$
Duncan, 2004	41.2			*		Sand, Cu<6	45	$\Phi=34+\frac{10\times Dr}{100}-\left(3+\frac{2\times Dr}{100}\right)\times Log\frac{\sigma'_v}{100}$
Duncan, 2004	45			*		Sand, Cu>6	45	$\Phi=39+\frac{10\times Dr}{100}-\left(3+\frac{2\times Dr}{100}\right)\times Log\frac{\sigma'_v}{100}$
Dunham, 1954	37.4			*		Angular and well-graded soils	4	$\Phi=\sqrt{12\times N60}+25$
Dunham, 1954	32.4			*		Round and well-graded OR Angular and uniform-graded soils	4	$\Phi=\sqrt{12\times N60}+20$
Dunham, 1954	27.4			*		Round and uniform-garded soils	4	$\Phi=\sqrt{12\times N60}+15$
Hatanaka and Uchida, 1996	36.5	~	~	~	~		2	$\Phi=3.5\times\sqrt{N1_{60}}+22.3$
Hatanaka and Uchida, 1996	38.1	~	~	~	~		30,51	$\Phi=\sqrt{20\times N1_{60}}+20$
Hatanaka and Uchida, 1996	35.1	~	~	~	~		25	$\Phi=\sqrt{20\times N1_{60}}+17$
Hettiarachchi and Brown, 2009	29.5			*		for loose sand	63	$\Phi=0.383\times\tan^{-1}\left(\frac{0.2\times N60}{\frac{\sigma'_v}{100}}-0.68\right)\times\frac{180}{PI}$
Hettiarachchi and Brown, 2009	32.3			*		for dense sand	63	$\Phi=0.383\times\tan^{-1}\left(\frac{0.2\times N60}{\frac{0.5\sigma'_v}{100}}-0.68\times0.25\right)\times\frac{180}{PI}$
JRA, 1990	28.8	~	~	~	~	for N60>5 , Fi<=45	4	$\Phi=\sqrt{15\times N60}+15$
Kampengsen	35.7	~	~	~	~		24	$\Phi=\sqrt{12\times N60}+23.3$
Kampengsen	40	~	~	~	~		24	$\Phi=\sqrt{12\times N1_{60}}+26$
Meyerhof, 1959	35.6	~	~	~	~	Dr from Yoshida, 1988		$\Phi=28+0.15\times Dr\leftrightarrow Dr=25\times{\sigma'_v}^{-0.12}\times N60^{0.46}$
Moh, Chin, Lin and Woo, 1989	33.1			*		granular soils in Taipei	33	$\Phi=28+1.3\times\sqrt{0.77\times N60\times Log\frac{195\times9.807}{\sigma'_v}}$
Ohsaki et al., 1959 and Kishida, 1967	31	~	~	~	~		4	$\Phi=\sqrt{20\times N60}+15$
Peck et al., 1953	29	~	~	~	~		4	$\Phi=27+\sqrt{0.3\times N60}$
Peck, Hanson and Thornburn, 1974	31	~	~	~	~	is not recommended for shallow depths (less than 1 to 2 metres)	12,51	$\Phi=53.881-27.6034\times e^{-0.0147\times N1_{60}}$
Schmertmann, 1975	39.5	~	~	~	~	also recommended by Kulhawy and Mayne, 1990	51	$\Phi=\tan^{-1}\left(\frac{N60}{\left(12.2+\frac{20.3\times\sigma'_v}{100}\right)^{0.34}}\right)\times\frac{180}{PI}$
Shioi and Fukui, 1954	24.9	~	~	~	~	in general	1	$\Phi=20+0.45\times N70$
Shioi and Fukui, 1954	29	~	~	~	~	for roads and bridges	1	$\Phi=\sqrt{18\times N70}+15$
Shioi and Fukui, 1954	30.9	~	~	~	~	for buildings	1	$\Phi=27+0.36\times N70$
Terzaghi, Peck and Mesri, 1996	34.2			*		Fine-grained sands	23,27	$\Phi=30+\frac{N60}{3}$
Terzaghi, Peck and Mesri, 1996	31.2			*		Coarse-grained sands	23,27	$\Phi=28+\frac{N60}{4}$
Wolff, 1989	31.9	~	~	~	~	an approximation based on Peck et al., 1974	30	$\Phi=27.1+0.3\times N1_{60}-0.00054\times {N1_{60}}^2$
Wolff, 1989	30.8	~	~	~	~	an approximation based on Peck et al., 1974	63	$\Phi=27.1+0.3\times N60-0.00054\times N60^2$

.: List of SPT Correlations For Relative Density (Dr) of Sand :.

Relative Density (Dr) of Sand %		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Cubrinovski and Ishihara, 1999	64.9			*		All sands	42	$D_r(\%)=100\sqrt{\frac{N_{1(60)}}{39}}$
Cubrinovski and Ishihara, 1999	56.7			*		Clean sands	42	$D_r(\%)=100\sqrt{\frac{N_{1(60)}}{51}}$
Cubrinovski and Ishihara, 1999	79.5			*		Silty sands	42	$D_r(\%)=100\sqrt{\frac{N_{1(60)}}{26}}$
Cubrinovski and Ishihara, 1999	58.2			*		function of D50	51	$D_r(\%)=100\sqrt{\frac{N60\times\left(0.23+\frac{0.06}{D50}\right)^{1.7}}{9\times\frac{100}{\sigma_v}}}$
Gibbs and Holtz, 1957	65.6			*			53	$D_r(\%)=100\sqrt{\frac{N60}{\left(\frac{12\times\sigma_v}{47.88}+17\right)}}$
Idriss and Boulanger, 2003	59.7			*			19	$D_r(\%)=100\sqrt{\frac{N_{1(60)}}{46}}$
Jamiolkowski, 1988 & Skempton, 1986	48.1			*		Fine sands	54	$D_r(\%)=13.48\sqrt{N60}$
Jamiolkowski, 1988 & Skempton, 1986	44.3			*		Coarse sands	54	$D_r(\%)=12.4\sqrt{N60}$
Meyerhof, 1957	65.9			*				$D_r(\%)=20.41\sqrt{\frac{N60}{\left(\frac{\sigma_v}{98}+0.708\right)}}$
Yoshida et al., 1988	50.4			*		with Co=25, C1=0.12, C2=0.46	1	$D_r(\%)=25\times\sigma_v^{-0.12}\times N60^{0.46}$

.: List of SPT Correlations For Undrained Shear Strength (Su) of Clay/Silt :.

Undrained Shear Strength (Su) of Clay/Silt	kPa	Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Sowers, 1979	~ 31.88 to 58.44		*			Clayey sands (SC) and Silts (ML)		$S_u = 150\frac{N60}{60} \leftrightarrow 275\frac{N60}{60}$

.: List of SPT Correlations For Shear Wave Velocity (Vs) :.

Shear Wave Velocity (Vs) m/s		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Akin, Kramer and Topal, 2011	126	*				for all alluvial soils	71	$Vs=59.44\times N_{60}^{0.109}\times Z^{0.426}$
Akin, Kramer and Topal, 2011	103			*		for all alluvial sands	71	$Vs=38.55\times N_{60}^{0.176}\times Z^{0.481}$
Akin, Kramer and Topal, 2011	200	*				for all Pliocene soils	71	$Vs=121.75\times N_{60}^{0.101}\times Z^{0.216}$
Akin, Kramer and Topal, 2011	158			*		for all Pliocene sands	71	$Vs=52.04\times N_{60}^{0.359}\times Z^{0.177}$
Anbazhagan and Sitharam, 2008	239	~	~	~	~	based on 162 data points in Bangalore	43,50	$Vs=78\times N_1(60)^{0.4}$
Andrés Alfaro, 2007	291	~	~	~	~	function of N60	49	$Vs=99.783\times N_1(60)^{0.383}$
Andrés Alfaro, 2007	291	~	~	~	~	function of N60 and depth	49	$Vs=91.44\times Z^{0.291}\times N_1(60)^{0.298}$
Athanasopoulos, 1995	295	*				for all soils	57	$Vs=107.6\times N_1(60)^{0.36}$
Baziar, Fallah, Razeghi and Khorasani, 1998	328	*				for all soils in Iran (function of depth)	58	$Vs=134\times N_1(60)^{0.2}\times Z^{0.3}$
Fujiwara, 1972	236	*				for all soils	57	$Vs=92.1\times N_1(60)^{0.337}$
Hasancebi and Ulusay, 2007	214	*				for all soils	57	$Vs=90\times N_1(60)^{0.309}$
Hasancebi and Ulusay, 2007	222			*		for sands	57	$Vs=90.82\times N_1(60)^{0.319}$
Imai and Tonouchi, 1982	208	*				for all soils	57,69	$Vs=97\times N_{67}^{0.314}$
Imai and Yoshimura, 1970	176	*				for all soils	57,49	$Vs=76\times N_{60}^{0.33}$
Imai and Yoshimura, 1975	213	~	~	~	~	from 192 samples	31	$Vs=92.1\times N_{60}^{0.329}$
Imai et al., 1975	214	*				for all soils	57	$Vs=89.9\times N_{60}^{0.341}$
Imai, 1977	215	*				for Quaternary and Pleistocene alluvium	57,69	$Vs=91\times N_{60}^{0.337}$
Imai, 1977	187			*		for sands	57	$Vs=80.6\times N_{60}^{0.331}$
Iyisan	192	*				for all soils	13,57	$Vs=51.5\times N_{60}^{0.516}$
Jafari et al., 1997	191	*				for all soils	57,35	$Vs=22\times N_{60}^{0.85}$
Jinan, 1987	195	*				for soft Holocene deposits	57,69	$Vs=116.1\times(N_{60}+0.3185)^{0.202}$
JRA, 1980	187			*		for sands	40	$Vs=80\times N_{60}^{0.3333}$
Kanai et al., 1966	88	*				for all soils	57	$Vs=19\times N_{60}^{0.6}$
Kiku et al., 2001	144	*				for all soils	57,69	$Vs=63.8\times N_1(60)^{0.292}$
Lee, 1990	200			*		for sands	57	$Vs=57.4\times N_{60}^{0.49}$
Maheswari, Boominathan and Dodagoudar, 2008	286	*				for all soils	73	$Vs=95.64\times N_{60}^{0.301}$
Naresh Bellana, 2009	223	*				for all soils	70	$Vs=126.395\times N_{60}^{0.223}$
Naresh Bellana, 2009	215			*		for sands	70	$Vs=124.051\times N_{60}^{0.216}$
National Center for Research on Earthquake Eng. (NCREE)	185	~	~	~	~	200 boreholes in Taiwan, function of Z and N	56	$Vs=139.1+4.09\times Z+2.0415\times N_1(60)$
Ohba and Toriuma, 1970	185	~	~	~	~	for all soils	49,57,70	$Vs=84\times N_{60}^{0.31}$
Ohsaki and Iwazaki, 1973	195			*		for coarse-grained soils		$Vs=81.4\times N_{60}^{0.39}$
Ohsaki and Iwazaki, 1973	220	*				for all soils	57	$Vs=59\times N_{60}^{0.47}$
Ohta and Goto, 1978	88			*		for Holocene sands	34	$Vs=53.5\times N_{60}^{0.17}\times Z^{0.193}\times 1\times 1.07$
Ohta and Goto, 1978	95			*		for Holocene sands and gravels	34	$Vs=53.5\times N_{60}^{0.17}\times Z^{0.193}\times 1\times 1.15$
Ohta and Goto, 1978	115			*		for Pleistocene sands	34	$Vs=53.5\times N_{60}^{0.17}\times Z^{0.193}\times 1.3\times 1.07$
Ohta and Goto, 1978	123			*		for Pleistocene sands and gravels	34	$Vs=53.5\times N_{60}^{0.17}\times Z^{0.193}\times 1.3\times 1.15$

.: List of SPT Correlations For Shear Wave Velocity (Vs) :. ... continued

Shear Wave Velocity (Vs) m/s		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Ohta et al., 1972	218			*		for sands	57	$Vs=87.2\times N60^{0.36}$
Okamoto et al., 1989	268			*		for Pleistocene sand	49,57	$Vs=125\times N60^{0.3}$
Pitilakis, 1999	228		*			for alluvium material	69	$Vs=145\times N60^{0.178}$
Schmertmann, 1978	191			*		for sands	57	$Vs=15\times N60$
Seed and Idriss, 1981	219	*				for all soils	57	$Vs=61.4\times N60^{0.5}$
Seed et al., 1983	200			*		for sands		$Vs=56\times N60^{0.5}$
Shibata, 1970	125			*		for sands	57,70	$Vs=31.7\times N60^{0.54}$
Sisman, 1995	137	*				for all soils	57,69	$Vs=32.8\times N_1(60)^{0.51}$
Sykora and Stokoe, 1983	210			*		for sands	57	$Vs=100.5\times N60^{0.29}$
Tamura and Yamazaki, 2002	218	~	~	~	~	function of depth		$Vs=105.8\times N_1(60)^{0.187}\times Z^{0.179}$
Tomio Inazaki, 2006	240	~	~	~	~	Public Works Research Institute of Japan	36	$Vs=\left(\frac{N60}{0.0000016}\right)^{0.3448}$
Unal Dikmen (Ankara University), 2008	173	*				for all soils	57	$Vs=58\times N_1(60)^{0.39}$
Unal Dikmen (Ankara University), 2008	184			*		for sands	57	$Vs=73\times N_1(60)^{0.33}$
Wair and DeJong, PEER 2012/08	152	*				for all soils	76	$Vs=30\times N60^{0.215}\times \sigma_v^{0.275}$
Wair and DeJong, PEER 2012/08	133			*		for sands	76	$Vs=30\times N60^{0.23}\times \sigma_v^{0.23}$
Yokota et al., 1991	241	*				for all soils		$Vs=121\times N60^{0.27}$

.: List of SPT Correlations For Shear Modulus (Gmax) :.

Shear Modulus (Gmax) MPa		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Anbazhagan and Sitharam, 2007	93	~	~	~	~	data gathered from Bangalore	50	$Gmax(kPa)=13860\times N_1(60)^{0.68}$
Anbazhagan, Parihar and Tashmi, 2012	120			*		Sandy soils	75	$Gmax(kPa)=15090\times N_1(60)^{0.74}$
Anbazhagan, Sitharam and Diryac, 2007	79	~	~	~	~	data gathered from India	37	$Gmax(kPa)=11800\times N_1(60)^{0.68}$
Hara et al., 1974	85			*		Alluvial, diluvial and tertiary deposits	75	$Gmax(kPa)=15490\times N60^{0.668}$
Imai and Tonouchi, 1982	80	*				for all soils	75	$Gmax(kPa)=14120\times N60^{0.68}$
Imai and Tonouchi, 1982	58			*		Alluvial sand	75	$Gmax(kPa)=12260\times N60^{0.611}$
Imai and Tonouchi, 1982	87			*		Diluvial Sand	75	$Gmax(kPa)=17360\times N60^{0.631}$
Imai and Yoshimura, 1970	71	~	~	~	~	Mixed soil type	75	$Gmax(kPa)=9810\times N60^{0.78}$
Kramer, 1996	88			*		Sandy soils	75	$Gmax(kPa)=15560\times N60^{0.68}$
Ohba and Toriumi, 1970	58	*		*		Alluvial sand and clay	75	$Gmax(kPa)=11960\times N60^{0.62}$
Ohsaki and Iwasaki, 1973	87	*				for all soils	75	$Gmax(kPa)=11940\times N60^{0.78}$
Ohsaki and Iwasaki, 1973	90	*				for all soils	75	$Gmax(kPa)=11770\times N60^{0.8}$
Ohsaki and Iwasaki, 1973	70			*		Sandy soils	75	$Gmax(kPa)=6370\times N60^{0.94}$
Ohsaki and Iwasaki, 1973	80	~	~	~	~	Intermediate soils	75	$Gmax(kPa)=11590\times N60^{0.76}$
Randolph, 1981	13	~	~	~	~	conservative results (for horizontally loaded)	44	$Gmax(kPa)=1000\times N60$
Seed et al., 1983	79	~	~	~	~		75	$Gmax(kPa)=6220\times N60$
Seed et al., 1986	79	~	~	~	~	using Japanese data (function of S'v)		$Gmax(kPa)=(20000\times 0.04788)\times\sqrt[3]{N_1(60)}\times\sqrt{(20.88546\sigma'_v)}$
Seed et al., 1986	64	~	~	~	~	(function of S'v)	46	$Gmax(kPa)=(35000\times 0.04788)\times\sqrt[3]{N60}\times(20.88546\sigma'_v)^{0.4}$
Seed, Idriss and Arango, 1983	83	~	~	~	~			$Gmax(kPa)=6500\times N60$
Wroth et al., 1979	92	~	~	~	~	based on Ohsaki and Iwasaki, 1973	44	$Gmax(kPa)=100\times 120\times N60^{0.8}$

.: List of SPT Correlations For Liquefaction (CRR) :.

Liquefaction (CRR)		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Chinese Code	0.28			*		based on 0.833*N1(60)		$CRR=f\left(N1_{60}\right)$
Idriss and Boulanger, 2004 (UC Davis)	0.17			*			19	$CRR=\frac{N1_{60}}{14.1}+\left(\frac{N1_{60}}{126}\right)^2-\left(\frac{N1_{60}}{23.6}\right)^3+\left(\frac{N1_{60}}{25.4}\right)^4-2.8$
Kokusho	0.28			*		based on 0.833*N1(60)		$CRR=f\left(N1_{60}\right)$
NCEER 1997 Workshop Report	0.17			*		for clean sand	53	$CRR=\frac{1}{\left(34-N1_{60}\right)}+\frac{N1_{60}}{135}+\frac{50}{\left(10\times N1_{60}+45\right)^2}-\frac{1}{200}$
Seed	0.3			*		based on 0.833*N1(60)		$CRR=f\left(N1_{60}\right)$
Shibata	0.29			*		based on 0.833*N1(60)		$CRR=f\left(N1_{60}\right)$
Tokimatsu	0.28			*		based on 0.833*N1(60)		$CRR=f\left(N1_{60}\right)$

.: List of SPT Correlations For Becker Hammer Test (BPT) :.

Becker Hammer Test (BPT)		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Alex Sy and Campanella, 1994	31			*		friction Rs = 0 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	16			*		friction Rs = 45 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	9			*		friction Rs = 90 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	4			*		friction Rs = 135 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	3			*		friction Rs = 180 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	2			*		friction Rs = 225 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	1			*		friction Rs = 270 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	1			*		friction Rs = 315 kN	15,18	see reference #15, #18 for details
Alex Sy and Campanella, 1994	1			*		friction Rs = 360 kN	15,18	see reference #15, #18 for details
Harder and Seed, 1986	13			*		does not consider friction of casing	15	see reference #15, #18 for details

.: List of SPT Correlations For Pressure-meter Test :.

Pressure-meter Test MPa		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Bozbey and Togrol, 2009	9.44			*		Modulus (Epmt) in sand in Turkey	60	$E_{pmt}=1.33\times N60^{0.77}$
Bozbey and Togrol, 2009	1.21			*		Limit pressure (Pl) in sand in Turkey	60	$P_L=0.33\times N60^{0.51}$
Ohya et al., 1982	4.87			*		Modulus (Epmt) in sand	64	$E_{pmt}=0.908\times N60^{0.66}$
Y.C. Chiang and Y.M. Ho, 1980	6.91			*		Modulus (Epmt) in weathered granitic soils in Hong Kong	61	$E_{pmt}=0.6\times N60^{0.96}$
Y.C. Chiang and Y.M. Ho, 1980	1.1			*		Limit pressure (Pl) in weathered granitic soils in Hong Kong	61	$P_L=0.17\times N60^{0.734}$

.: List of SPT Correlations For Bearing Capacity of Deep Foundations (Piles) :.

Bearing Capacity of Deep Foundations (Piles)	kPa	Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Detta et al., 1980	~ 2136.6 to 7122.1			*		Ult. qp in calcareous sands	39	$q_{pu}=\frac{95.76\times140}{80}\times N6o \leftrightarrow \frac{95.76\times140}{25}\times N6o$
GEO, 1996 and Yau 2000	13.3	~	~	~	~	Ult. fs for bored piles in saprolites	10	pile_1
Hassan and O'Neill, 1994	191.5	~	~	~	~	Ult. fs for drilled piles (modified beta method, function of depth)	46	$f_{su}=95.76\beta\sigma_v\leftrightarrow0.25\leqslant\beta=\frac{N6o}{15}\left(1.5\text{-}0.135\times\sqrt{\frac{L}{0.3048}}\right)\leqslant1.2$
Meyerhof, 1976	17.6	~	~	~	~	Ult. fs for small displacement piles (bored)	28	$f_{su}=N6o_{Ave}$
Meyerhof, 1976	35.2	~	~	~	~	Ult. fs for large displacement piles (driven)	28	$f_{su}=2N6o_{Ave}$
Meyerhof, 1976	1969.9	~	~	~	~	Ult. qp for small displacement piles (bored) with upper limit cut-of	28	$q_{pu}=12\times N1_{(60)}\frac{L}{D}\leftrightarrow for\ \frac{L}{D}\leqslant10$
Meyerhof, 1976	6566.4	~	~	~	~	Ult. qp for large displacement piles (driven) with upper limit cut-o	28	$q_{pu}=40\times N1_{(60)}\frac{L}{D}\leftrightarrow for\ \frac{L}{D}\leqslant10$
Quiros and Reese, 1977	43.8	~	~	~	~	Ult. fs for drilled piles	46	$f_{su}=2.49\times N6o_{ave}\geqslant191.5$
Reese and O'Neill, 1988	191.5	~	~	~	~	Ult. fs for drilled piles (beta method, function of depth)	46	$f_{su}=95.76\beta\sigma_v\leftrightarrow0.25\leqslant\beta=1.5\text{-}0.135\times\sqrt{\frac{L}{0.3048}}\leqslant1.2$
Reese and O'Neill, 1988	765	~	~	~	~	Ult. qp with upper limit of 4300 KPa in drilled shafts	46	$q_{pu}=60\times N6o\geqslant4300$
Reese and Wright, 1977	35.9	~	~	~	~	Ult. fs for drilled piles	46	$f_{su}=95.76\frac{N6o}{34}\leftrightarrow N6o\leqslant53 \quad 95.76\frac{(N6o\text{-}53)}{450}+1.6\leftrightarrow N6o>53$
Reese and Wright, 1977	814	~	~	~	~	Ult. qp for drilled piles	46	$q_{pu}=95.76\frac{2}{3}\times N6o\leqslant95.76\times40$
Yves Robert, 1997	24.2			*		Ult. fs in granular soil	28	$f_{su}=1.9N6o$
Yves Robert, 1997	1887.8			*		Ult. qp for bored piles in granular soil	28	$q_{pu}=115\times N1_{60}$
Yves Robert, 1997	3119			*		Ult. qp for driven piles in granular soil	28	$q_{pu}=190\times N1_{60}$

.: List of SPT Correlations For Bearing Capacity of Shallow Footings (qa) :.

Bearing Capacity of Shallow Footings (qa)	kPa	Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Bowles (after Meyerhof), 1976	364.65	~	~	~	~	for 25mm settlement	1	
Burland and Burbidge, 1985	838.86			*		T=2.23, for 25mm settlement	2	
Parry, 1977	-			*		in cohesionless soils (valid for Df<B) for 25mm settlement	1	
Peck et al., 1974	104.41			*		in cohesionless soils (valid for B<1 m)		
Terzaghi	757.94			*		Ng from Brinch and Hansen 1970, Nq from Bowles 1996, Phi from Hatanaka and Uchida, 1996		

.: List of SPT Correlations For Settlement of Footings on Sand (S) :.

Settlement of Footings on Sand (S) cm		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Alpan, 1964	1.04	~	~	~	~		6	see reference #6 for details
Anagnostropoulos et al., 1991	0.44	~	~	~	~	database of 150 cases	6	see reference #6 for details
Burland and Burbidge, 1985	0.35			*		for normally consolidated sands	6	see reference #6 for details
Burland and Burbidge, 1985	0.04			*		for over consolidated sands	6	see reference #6 for details
Duncan and Buchignani, 1976	1.44	~	~	~	~	modified from Meyerhof 1965, for 1 year time effect		see reference #6 for details
modified Meyerhof (based on Terzaghi and Peck)	-			*		for sands, B>1.2 m	6	see reference #6 for details
modified Meyerhof, 1965	0.61			*		revised method after Meyerhof, 1956	6	see reference #6 for details
Peck and Bazaraa, 1969	0.26	~	~	~	~		6	see reference #6 for details
Peck, Hanson and Thornburn, 1974	-	~	~	~	~	valid for B>0.9 m	6	see reference #6 for details
Terzaghi and Peck, 1967	0.96	~	~	~	~			see reference #6 for details

.: List of SPT Correlations For Other Soil Parameters :.

Other Soil Parameters		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
{source}	23	~	~	~	~	DCPI (mm/blow)		$DCPI = 116.436 - 14.941 \times N60 + 0.86 \times N60^2$ -0.025
Ajayi and Balogun, 1988	4.66	~	~	~	~	CPT tip resistance (qc MPa), data from Nigeria (above groundwater)	65	$q_c = 0.49 \times N60 - 1.59$
Ajayi and Balogun, 1988	7.68	~	~	~	~	CPT tip resistance (qc MPa), data from Nigeria (below groundwater)	65	$q_c = 0.19 \times N60 + 5.26$
Chang, 1988	2.93	~	~	~	~	CPT tip resistance (qc MPa), data from Singapore in Jurong formation	65	$q_c = 0.23 \times N60$
Chang, 1988	2.3	~	~	~	~	CPT tip resistance (qc MPa), data from Singapore in Bukit formation	65	$q_c = 0.18 \times N60$
D. Roy, J. Hughes and R.G. Campanella	8.8	~	~	~	~	normalized dilation angle (deg)	62	$\psi = 10^{0.25} \times {N1_{60}}^{0.57}$
FHWA, 2002	87.9	~	~	~	~	initial shear modulus (Go), in MPa	55	$G_0 = 15.56 \times N60^{0.68}$
J. Fred Triggs and Paul D. Simpson, 1990	15	*				Wildcat Dynamic Penetrometer blow counts /10cm	26	$N = 3.615 \frac{N60}{\alpha} \leftrightarrow 1.89 \leqslant \alpha \leqslant 4.44$
Kulhawy and Mayne, 1990	17.3			*		Saturated unit weight for Sands, in kN/m3	46	$\gamma = 15.7 \leftrightarrow 19.6 \quad function of N60$
Meyerhof, 1965	5.1	~	~	~	~	CPT tip resistance (qc MPa)		$q_c = 0.4 \times N60$
Muayed Ismail, 2008	0			*		D10 for granular soil near Baghdad N60<35, in mm	32	$D_{10} = 0.001 \times N60^{0.0858}$
Rocha Filho and Carvalho , 1989	5.1	~	~	~	~	CPT tip resistance (qc MPa), data from Brazil (average in Gnessic residual soil)	65	$q_c = 0.4 \times N60$
Schnaid et al., 2004	~ 37.2 to 83.6			*		initial stiffness modulus (Go) for un-cemented soils, in MPa	47	$G_0 = 200 \sqrt[3]{10000 \times N60 \times \sigma'_v} \leftrightarrow 450 \sqrt[3]{10000 \times N60 \times \sigma'_v}$
Seed et al., 1986	17.3	~	~	~	~	initial shear modulus (Go), in MPa	48	$G_0 = 20000 \frac{\sqrt[3]{N1_{60}} \times \sqrt{\sigma'_v} \times 0.04788}{1000}$

.: List of SPT Correlations For California Bearing Ratio (CBR) :.

California Bearing Ratio (CBR)		Clay	Silt	Sand	Grvl	Comments	Ref#	Equation
Coosne, 1999	9	~	~	~	~	Piedmont residual soil	67	$CBR=2.53\text{-}1.14\times Log\left(DCPI_{(N60)}\right)$
Ese et al., 1995	10			*		aggregate base course	67	$CBR=2.44\text{-}1.07\times Log\left(DCPI_{(N60)}\right)$
Harison, 1987	10	*				granular and cohesive	67	$CBR=2.55\text{-}1.14\times Log\left(DCPI_{(N60)}\right)$
Kleyn, 1975	8	~	~	~	~		67	$CBR=2.62\text{-}1.27\times Log\left(DCPI_{(N60)}\right)$
Livneh et al., 1992	8	*				granular and cohesive	67	$CBR=2.45\text{-}1.12\times Log\left(DCPI_{(N60)}\right)$
Livneh, 1987	10	*				granular and cohesive	67	$CBR=2.56\text{-}1.16\times Log\left(DCPI_{(N60)}\right)$
NCDOT, 1998	14	*				aggregate base course and cohesive	67	$CBR=2.6\text{-}1.07\times Log\left(DCPI_{(N60)}\right)$
Webster et al., 1992	9	*				various soil types	67	$CBR=2.46\text{-}1.12\times Log\left(DCPI_{(N60)}\right)$