

HOW TO PROCEED TO DESIGN FOUNDATIONS

SUMMARY

1. Study the structural system, dead loads, live loads, earthquake, wind loads (study the load groups), calculate column loads, moments
2. Select a trial foundation system, size, depth etc.
3. Calculate total (gross) and net foundation pressures
4. A soil (subsurface) investigation study and associated geotechnical report is a must to start a design work. Soil and/or rock profile and soil and/or rock properties should be determined based on borings, field tests, laboratory tests on disturbed and undisturbed samples

A site investigation study of sufficient quality is required. Ideally a civil engineer (geotechnical) should plan the exploration programme namely ;

- i) the location, number, depth of borings
- ii) field tests to be conducted (type, number, depths)
- iii) samples to be taken (type, number, depths)
- iv) laboratory tests to be conducted and any special tests required
- v) geotechnical instrumentation

Otherwise lacking information and parameters in the analyses and final foundation design are unavoidable. Having information about the structure to be built the civil engineer will most probably give special considerations to the programme.

5. Study the site investigation report, borehole logs, field tests (SPT, CPT, PM etc.), laboratory tests (index and engineering properties), and decide on an idealized soil profile together with all soil properties

6. What geotechnical design parameters are required to design “the works”?

$c', \phi', E_u, E', \nu, \nu', c_u, \gamma, \gamma', K_a, K_p, K_o, k_h, C_r, \sigma'_c, \sigma_{ult}, \sigma_{all}, \alpha, q_s, q_p, V_s, G_o, G, \dots$

$k_v, k, m_v, c_v, c_h, C_c, C_r, \sigma'_c, \sigma_{ult}, \sigma_{all}, \alpha, q_s, q_p, V_s, G_o, G, \dots$

The geotechnical parameters needed in the analyses should be specified and obtained from the site investigation-geotechnical engineering report. All parameters in every detail may not appear in the report but can be found based on the data and the literature.

7. Next step is to specify the required calculations and analyses to be conducted. Each civil engineering structure may require different analyses.

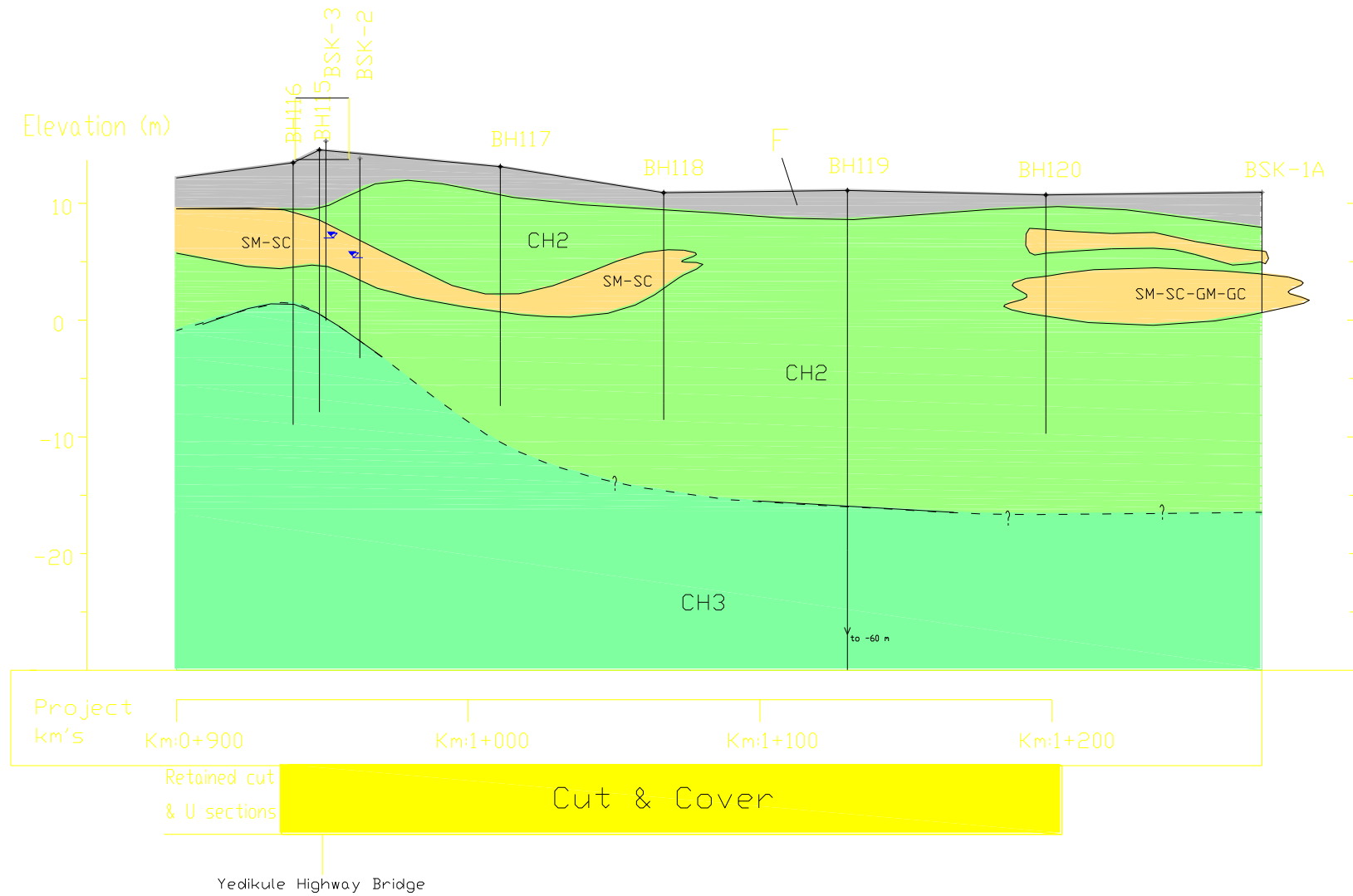
8. Analyses and decision making process usually starts from shallow foundation considerations (assume that the structure is a building-the most common case). Individual, combined, one or two-way continuous footings, raft (mat) foundations should be considered in the order for an economical design. Conventional calculation procedure is in form of checking bearing capacity of the foundation (ultimate, safe, allowable) and settlements (immediate, consolidation, differential, allowable, total).

SONDAJ LOGU
BOREHOLE LOG

SONDAJ NO / BOREHOLE NO : SK1
SAYFA NO / PAGE NO : 1 of 2

PROJE ADI / PROJECT	EKOL 9996 Ada 33 Parsel Zemin Etüdü		
KOORDINATLAR / COORDINATES	X:	Y:	
SONDAJ KOTU / ELEVATION (m)	24.69	YERELİTİ BULGURİBULĞURUNDU ZATIN DATI	
SONDAJ DERİNLİĞİ / BORING DEPTH (m)	07.05.2014	DERİNLİK / DEPTH (m)	TARİH / DATE
BİTLİŞ TARİHİ / DATE STARTED	08.05.2014	SÜRE / DURATION	ADILANLAR / REMARKS
BİTLİŞ TARİHİ / DATE COMPLETED			
SONDAJ MAKİNESİ / DRILLING RIG	MOBILE DRILL B-53		
SONDÖR / FOREMAN	Y.KAYNAR		
MÜHENDİS / ENGINEER	M. DİRİĞER		

DERİNLİK (m)	SPT	SPT-1	SPT-2	SPT-3	SPT-4	SPT-5	SPT-6	SPT-7	SPT-8	SPT-9	SPT-10	SPT-11	SPT-12	SPT-13	SPT-14	SPT-15	SPT-16	SPT-17	SPT-18	SPT-19	SPT-20	SPT-21	SPT-22	SPT-23	SPT-24	SPT-25	SPT-26	SPT-27	SPT-28	SPT-29	SPT-30	SPT-31	SPT-32	SPT-33	SPT-34	SPT-35	SPT-36	SPT-37	SPT-38	SPT-39	SPT-40	SPT-41	SPT-42	SPT-43	SPT-44	SPT-45	SPT-46	SPT-47	SPT-48	SPT-49	SPT-50	SPT-51	SPT-52	SPT-53	SPT-54	SPT-55	SPT-56	SPT-57	SPT-58	SPT-59	SPT-60	SPT-61	SPT-62	SPT-63	SPT-64	SPT-65	SPT-66	SPT-67	SPT-68	SPT-69	SPT-70	SPT-71	SPT-72	SPT-73	SPT-74	SPT-75	SPT-76	SPT-77	SPT-78	SPT-79	SPT-80	SPT-81	SPT-82	SPT-83	SPT-84	SPT-85	SPT-86	SPT-87	SPT-88	SPT-89	SPT-90	SPT-91	SPT-92	SPT-93	SPT-94	SPT-95	SPT-96	SPT-97	SPT-98	SPT-99	SPT-100	SPT-101	SPT-102	SPT-103	SPT-104	SPT-105	SPT-106	SPT-107	SPT-108	SPT-109	SPT-110	SPT-111	SPT-112	SPT-113	SPT-114	SPT-115	SPT-116	SPT-117	SPT-118	SPT-119	SPT-120	SPT-121	SPT-122	SPT-123	SPT-124	SPT-125	SPT-126	SPT-127	SPT-128	SPT-129	SPT-130	SPT-131	SPT-132	SPT-133	SPT-134	SPT-135	SPT-136	SPT-137	SPT-138	SPT-139	SPT-140	SPT-141	SPT-142	SPT-143	SPT-144	SPT-145	SPT-146	SPT-147	SPT-148	SPT-149	SPT-150	SPT-151	SPT-152	SPT-153	SPT-154	SPT-155	SPT-156	SPT-157	SPT-158	SPT-159	SPT-160	SPT-161	SPT-162	SPT-163	SPT-164	SPT-165	SPT-166	SPT-167	SPT-168	SPT-169	SPT-170	SPT-171	SPT-172	SPT-173	SPT-174	SPT-175	SPT-176	SPT-177	SPT-178	SPT-179	SPT-180	SPT-181	SPT-182	SPT-183	SPT-184	SPT-185	SPT-186	SPT-187	SPT-188	SPT-189	SPT-190	SPT-191	SPT-192	SPT-193	SPT-194	SPT-195	SPT-196	SPT-197	SPT-198	SPT-199	SPT-200	SPT-201	SPT-202	SPT-203	SPT-204	SPT-205	SPT-206	SPT-207	SPT-208	SPT-209	SPT-210	SPT-211	SPT-212	SPT-213	SPT-214	SPT-215	SPT-216	SPT-217	SPT-218	SPT-219	SPT-220	SPT-221	SPT-222	SPT-223	SPT-224	SPT-225	SPT-226	SPT-227	SPT-228	SPT-229	SPT-230	SPT-231	SPT-232	SPT-233	SPT-234	SPT-235	SPT-236	SPT-237	SPT-238	SPT-239	SPT-240	SPT-241	SPT-242	SPT-243	SPT-244	SPT-245	SPT-246	SPT-247	SPT-248	SPT-249	SPT-250	SPT-251	SPT-252	SPT-253	SPT-254	SPT-255	SPT-256	SPT-257	SPT-258	SPT-259	SPT-260	SPT-261	SPT-262	SPT-263	SPT-264	SPT-265	SPT-266	SPT-267	SPT-268	SPT-269	SPT-270	SPT-271	SPT-272	SPT-273	SPT-274	SPT-275	SPT-276	SPT-277	SPT-278	SPT-279	SPT-280	SPT-281	SPT-282	SPT-283	SPT-284	SPT-285	SPT-286	SPT-287	SPT-288	SPT-289	SPT-290	SPT-291	SPT-292	SPT-293	SPT-294	SPT-295	SPT-296	SPT-297	SPT-298	SPT-299	SPT-300	SPT-301	SPT-302	SPT-303	SPT-304	SPT-305	SPT-306	SPT-307	SPT-308	SPT-309	SPT-310	SPT-311	SPT-312	SPT-313	SPT-314	SPT-315	SPT-316	SPT-317	SPT-318	SPT-319	SPT-320	SPT-321	SPT-322	SPT-323	SPT-324	SPT-325	SPT-326	SPT-327	SPT-328	SPT-329	SPT-330	SPT-331	SPT-332	SPT-333	SPT-334	SPT-335	SPT-336	SPT-337	SPT-338	SPT-339	SPT-340	SPT-341	SPT-342	SPT-343	SPT-344	SPT-345	SPT-346	SPT-347	SPT-348	SPT-349	SPT-350	SPT-351	SPT-352	SPT-353	SPT-354	SPT-355	SPT-356	SPT-357	SPT-358	SPT-359	SPT-360	SPT-361	SPT-362	SPT-363	SPT-364	SPT-365	SPT-366	SPT-367	SPT-368	SPT-369	SPT-370	SPT-371	SPT-372	SPT-373	SPT-374	SPT-375	SPT-376	SPT-377	SPT-378	SPT-379	SPT-380	SPT-381	SPT-382	SPT-383	SPT-384	SPT-385	SPT-386	SPT-387	SPT-388	SPT-389	SPT-390	SPT-391	SPT-392	SPT-393	SPT-394	SPT-395	SPT-396	SPT-397	SPT-398	SPT-399	SPT-400	SPT-401	SPT-402	SPT-403	SPT-404	SPT-405	SPT-406	SPT-407	SPT-408	SPT-409	SPT-410	SPT-411	SPT-412	SPT-413	SPT-414	SPT-415	SPT-416	SPT-417	SPT-418	SPT-419	SPT-420	SPT-421	SPT-422	SPT-423	SPT-424	SPT-425	SPT-426	SPT-427	SPT-428	SPT-429	SPT-430	SPT-431	SPT-432	SPT-433	SPT-434	SPT-435	SPT-436	SPT-437	SPT-438	SPT-439	SPT-440	SPT-441	SPT-442	SPT-443	SPT-444	SPT-445	SPT-446	SPT-447	SPT-448	SPT-449	SPT-450	SPT-451	SPT-452	SPT-453	SPT-454	SPT-455	SPT-456	SPT-457	SPT-458	SPT-459	SPT-460	SPT-461	SPT-462	SPT-463	SPT-464	SPT-465	SPT-466	SPT-467	SPT-468	SPT-469	SPT-470	SPT-471	SPT-472	SPT-473	SPT-474	SPT-475	SPT-476	SPT-477	SPT-478	SPT-479	SPT-480	SPT-481	SPT-482	SPT-483	SPT-484	SPT-485	SPT-486	SPT-487	SPT-488	SPT-489	SPT-490	SPT-491	SPT-492	SPT-493	SPT-494	SPT-495	SPT-496	SPT-497	SPT-498	SPT-499	SPT-500	SPT-501	SPT-502	SPT-503	SPT-504	SPT-505	SPT-506	SPT-507	SPT-508	SPT-509	SPT-510	SPT-511	SPT-512	SPT-513	SPT-514	SPT-515	SPT-516	SPT-517	SPT-518	SPT-519	SPT-520	SPT-521	SPT-522	SPT-523	SPT-524	SPT-525	SPT-526	SPT-527	SPT-528	SPT-529	SPT-530	SPT-531	SPT-532	SPT-533	SPT-534	SPT-535	SPT-536	SPT-537	SPT-538	SPT-539	SPT-540	SPT-541	SPT-542	SPT-543	SPT-544	SPT-545	SPT-546	SPT-547	SPT-548	SPT-549	SPT-550	SPT-551	SPT-552	SPT-553	SPT-554	SPT-555	SPT-556	SPT-557	SPT-558	SPT-559	SPT-560	SPT-561	SPT-562	SPT-563	SPT-564	SPT-565	SPT-566	SPT-567	SPT-568	SPT-569	SPT-570	SPT-571	SPT-572	SPT-573	SPT-574	SPT-575	SPT-576	SPT-577	SPT-578	SPT-579	SPT-580	SPT-581	SPT-582	SPT-583	SPT-584	SPT-585	SPT-586	SPT-587	SPT-588	SPT-589	SPT-590	SPT-591	SPT-592	SPT-593	SPT-594	SPT-595	SPT-596	SPT-597	SPT-598	SPT-599	SPT-600	SPT-601	SPT-602	SPT-603	SPT-604	SPT-605	SPT-606	SPT-607	SPT-608	SPT-609	SPT-610	SPT-611	SPT-612	SPT-613	SPT-614	SPT-615	SPT-616	SPT-617	SPT-618	SPT-619	SPT-620	SPT-621	SPT-622	SPT-623	SPT-624	SPT-625	SPT-626	SPT-627	SPT-628	SPT-629	SPT-630	SPT-631	SPT-632	SPT-633	SPT-634	SPT-635	SPT-636	SPT-637	SPT-638	SPT-639	SPT-640	SPT-641	SPT-642	SPT-643	SPT-644	SPT-645	SPT-646	SPT-647	SPT-648	SPT-649	SPT-650	SPT-651	SPT-652	SPT-653	SPT-654	SPT-655	SPT-656	SPT-657	SPT-658	SPT-659	SPT-660	SPT-661	SPT-662	SPT-663	SPT-664	SPT-665	SPT-666	SPT-667	SPT-668	SPT-669	SPT-670	SPT-671	SPT-672	SPT-673	SPT-674	SPT-675	SPT-676	SPT-677	SPT-678	SPT-679	SPT-680	SPT-681	SPT-682	SPT-683	SPT-684	SPT-685	SPT-686	SPT-687	SPT-688	SPT-689	SPT-690	SPT-691	SPT-692	SPT-693	SPT-694	SPT-695	SPT-696	SPT-697	SPT-698	SPT-699	SPT-700	SPT-701	SPT-702	SPT-703	SPT-704	SPT-705	SPT-706	SPT-707	SPT-708	SPT-709	SPT-710	SPT-711	SPT-712	SPT-713	SPT-714	SPT-715	SPT-716	SPT-717	SPT-718	SPT-719	SPT-720	SPT-721	SPT-722	SPT-723	SPT-724	SPT-725	SPT-726	SPT-727	SPT-728	SPT-729	SPT-730	SPT-731	SPT-732	SPT-733	SPT-734	SPT-735	SPT-736	SPT-737	SPT-738	SPT-739	SPT-740	SPT-741	SPT-742	SPT-743	SPT-744	SPT-745	SPT-746	SPT-747	SPT-748	SPT-749	SPT-750	SPT-751	SPT-752	SPT-753	SPT-754	SPT-755	SPT-756	SPT-757	SPT-758	SPT-759	SPT-760	SPT-761	SPT-762	SPT-763	SPT-764	SPT-765	SPT-766	SPT-767	SPT-768	SPT-769	SPT-770	SPT-771	SPT-772	SPT-773	SPT-774	SPT-775	SPT-776	SPT-777	SPT-778	SPT-779	SPT-780	SPT-781	SPT-782
--------------	-----	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------



Symbol	Soil Type	N_{ave}	γ_t (kN/m³)	γ_{sat} (kN/m³)	γ_{sub} (kN/m³)	Φ (°)	c_u (kN/m²)	E_u (MPa)	V_s (m/s)
F	Man-made Fill	21	18	19	9	32	-	-	200
CH2	Clay	40	20	20	10	0	174	44	275
SM-SC GM- GC	Clayey, Silty Sand and Gravel	>41	21	21	11	42	-	-	285
CH3	Clay	63	20	20	10	0	270	68	330

Symbol	Soil Type	E' (MPa)	C'	Ø'	v_u	v'
F	Man-made Fill	19	0	32	-	0.33
CH2	Clay	33	0	22	0.45	0.30
SM-SC GM- GC	Clayey,Silty, Sand and Gravel	60	0	42	-	0.30
CH3	Clay	51	0	22	0.45	0.25

9. Calculate the ultimate bearing capacity of the soil for the trial foundation making use of B.C. formulas. Apply a factor of safety (2.5-3.0 , generally 3.0) and find safe bearing capacity which is “allowable bearing capacity” (*zemin emniyet gerilmesi*) if settlements are acceptable. Review the allowable total, differential settlements of various types of foundations on cohesive and cohesionless soils. If settlements are not acceptable then reduce the safe bearing capacity to satisfy the settlement criteria

10. Compare the foundation pressure (gross or net, preferably net) with the allowable bearing capacity. If not satisfied make another trial for the foundation and, follow the same procedure. Here it should be reminded that Turkey is in a seismically active area and consider dynamic loading.

11. Settlement calculations are significant part of a foundation design. In a trial calculation first net foundation pressure is distributed throughout the layers, and depth of analysis is specified. This may be determined by considering the depth at which increase due to foundation pressure corresponds to 20 % of overburden pressure (net). If a very stiff layer is at a shallower depth then analysis may be terminated at that depth. For cohesionless soils also see Burland and Burbidge (1985) who recommend a depth of analysis (much less).

12. The depth of analysis is divided into sublayers if required, and stress increase due to foundation loading is calculated at the center of each layer. Compressibility of each layer should be specified. This can be accomplished by field tests and/or laboratory tests conducted. In cohesionless soils field tests are used. Both lab and field tests are made use of in cohesive fine soils. Correlations for moduli (E', E_U), m_v , C_c are given in various references, and some will be given in our website including basic soil engineering properties (e.g. ϕ, c_u).

13. In cohesionless soils total settlements are calculated by using field moduli $E_s(E')$ (from field tests) and in cohesive soils either making use of effective modulus E' or E_U (undrained modulus) and coefficient of compressibility obtained in lab (C_c or m_v) (i.e. immediate settlement + consolidation settlement). Consider also rebound and reloading in deep basements.

14. Check the groundwater level, and if it interferes with the basement construction consider both construction measures and waterproofing.

15. If shallow foundations are not possible (i.e. if the loads are high and the soil is weak, and even a raft foundation is not proper) two alternatives may be considered:

1. Deep foundation design

If pile foundation alternative is studied consider a trial design with diameter, depth, type (driven, bored etc.), spacing, pattern, and calculate ultimate and allowable capacities together with group settlement if possible.

2. Ground improvement and shallow foundation design

16. Finally make comparisons of different -technically sound –alternatives.

What are the main criteria for the selection? a. Cost b. Time c. Availability d. Others

If the problem is stabilization of a landslide then mapping of the area, planning of site investigation, instrumentation, type of analyses are somewhat different than those for buildings. Ground water level determinations are more important, slope stability analyses (also back-analyses) are performed along pre-planned cross sections and parameters are correlated between laboratory, field and those from back-analyses. Solution alternatives should be considered in the order of drainage, geometrical arrangements, ground reinforcement and retaining structures for economic reasons.

17. There may be additional considerations like need for temporary retaining structures (in-situ walls, anchorages or struts), dewatering and drainage, existence of problematic soils, waterproofing etc. In some projects special (problematic) soil conditions govern the design. Such soils are mainly: 1. Swelling 2. Collapsible 3. Organic 4. Karstic, alike

Soft organic soils show secondary consolidation settlements. These are usually more than primary settlements in many organic deposits and last very long. Therefore this potential has to be investigated in detail studying the site investigation report, and additional testing and sampling should be required if not satisfied. Secondary consolidation settlement estimates should be done.

Consider collapse potential of cohesionless soils (collapsible soils) and swell potential of plastic unsaturated clays.

18. Final step is preparation of engineering drawings of the design. This is mostly drawn using CAD software. If it is a foundation plan all footings, tie beams are shown in detailed dimensioned drawings and cross sections, reinforcement details are shown.

PREPARATION OF GEOTECHNICAL SECTION OF CE 410 REPORTS

1. Prepare a page of 'Contents' after the cover page of the full report
2. Describe structure: type, no. of storeys, no. of basements, loads
3. Indicate the idealised soil profile with soil data and soil properties
4. If some soil parameters are needed calculate and present
5. Present bearing capacity calculations, shallow or deep foundations
6. Present settlement calculations:
 - a. Initial
 - b. consolidation
 - c. total
 - d. differential
 - e. allowable
7. If there are lateral load considerations and calculations present
8. If there is liquefaction potential in the soil analyse and present
9. Always give references if you use a formula, a chart etc.
10. Clearly and neatly present your final foundation design