

INTERNSHIP AS A JUNIOR STRUCTURAL ENGINEER IN SUMMER 2018

Introduction:

This report presents the design of a steel roof for a low-rise building that I involved in design as a team of four during my professional work experience in the summer of 2018 as an intern junior structural engineer. I was involved in designing a roof for a building located at the Aegean coast of Turkey, an area which is known for its earthquakes. Structural design consisted of developing an application model of the roof on computer environment based on the architectural drawing provided by the architect. We divided the roof into four. I was responsible for the modeling and analysis of the south-western part of the roof. The goal of the design was to be as cost and material efficient as possible without compromising structural safety.

The design had to satisfy the requirements of the Turkish Building-Earthquake Code 2007 and Turkish Standards 500 as required by the provincial municipality. The model was done in a worldwide verified structural analysis software called SAP2000 and it was also used for the analysis. I cannot present the models in this entry due to the company policy.

Almost all of Turkey experiences earthquakes. During my previous undergraduate years, I had not taken any courses in which a structure experiences time dependent loading. In Steel and Timber Design course we did wind loads but we considered them as a constant load. This was a great opportunity for me to learn structural dynamics and practice the knowledge from my courses.

This was also a great opportunity for me to see a professional work environment and work on a real project. I have learned the differences between theory and practice and how theory applies to real life.

My team:



COMPANY FİRMA : YAPI AKADEMİSİ MUH. DAN. LTD. STI.

26-07-2018

PROJECT PROJE : BLOK-4-C

BLOK-4C-D01.ST4)

EARTHQUAKE REPORT (FIRST PAGE)

DEPREM RAPORU

DEPREM STANDARDI CODEUSED : TDY2007 CODE
 DEPREM ANALİZİ EARTHQUAKE ANALYSIS : MOD SUPERPOZİSYONU YONTEMIYLE LINEER ANALİZ
 DEPREM BÖLGE KATSAYISI EARTHQUAKE LOCATION COEFFICIENT : 0.30 LINEAR ANALYSIS USING MODAL SUPERPOSITION METHOD
 YAPI DAVRANIŞ KATSAYISI BUILDING RESPONSE COEFFICIENT : 7.00
 YAPI ÖNEM KATSAYISI BUILDING IMPORTANCE FACTOR : 1.00
 Dinamik Analiz min. deprem yükü oranı β : 0.9 DYNAMIC ANALYSIS MINIMUM EARTHQUAKE LOAD FACTOR
 Deprem yükü eksantrisitesi : 0.050 ECCENTRICITY OF DYNAMIC LOAD
 BODRUM KAT DEPREM OPSİYONLARI : BASEMENT FLOOR EARTHQUAKES OPTIONS (NO BASEMENTS IN THIS)
 Eşdeğer deprem analizi davranış katsayısı Rb : 1.5 EQUIVALENT EARTHQUAKE ANALYSIS RESPONSE COEFFICIENT
 Modal Analiz davranış katsayısı Rb : 1.5 MODAL ANALYSIS RESPONSE COEFFICIENT

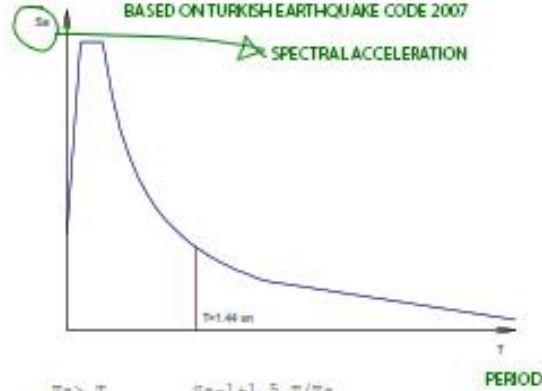
DİNAMİK ANALİZ BİLGİLERİ DYNAMIC ANALYSIS INFORMATION

TASARIM SPECTRUM BİLGİSİ (TDY2007 SPECTRUM)

DESIGN SPECTRUM INFORMATION

BASED ON TURKISH EARTHQUAKE CODE 2007

T (s)	Sa (m/s ²) A0.1.S(t)
0.00	3.000
0.15	7.500
0.40	7.500
0.50	6.273
0.60	5.421
0.70	4.794
0.80	4.308
0.90	3.921
1.00	3.603
1.10	3.339
1.20	3.114
1.30	2.922
1.40	2.754
1.50	2.604
1.60	2.475
1.70	2.358
1.80	2.253
1.90	2.157
2.00	2.070
2.10	1.989
2.20	1.917
5.00	0.993



$$T_a > T \quad S_a = 1 + 1.5 \frac{T}{T_a}$$

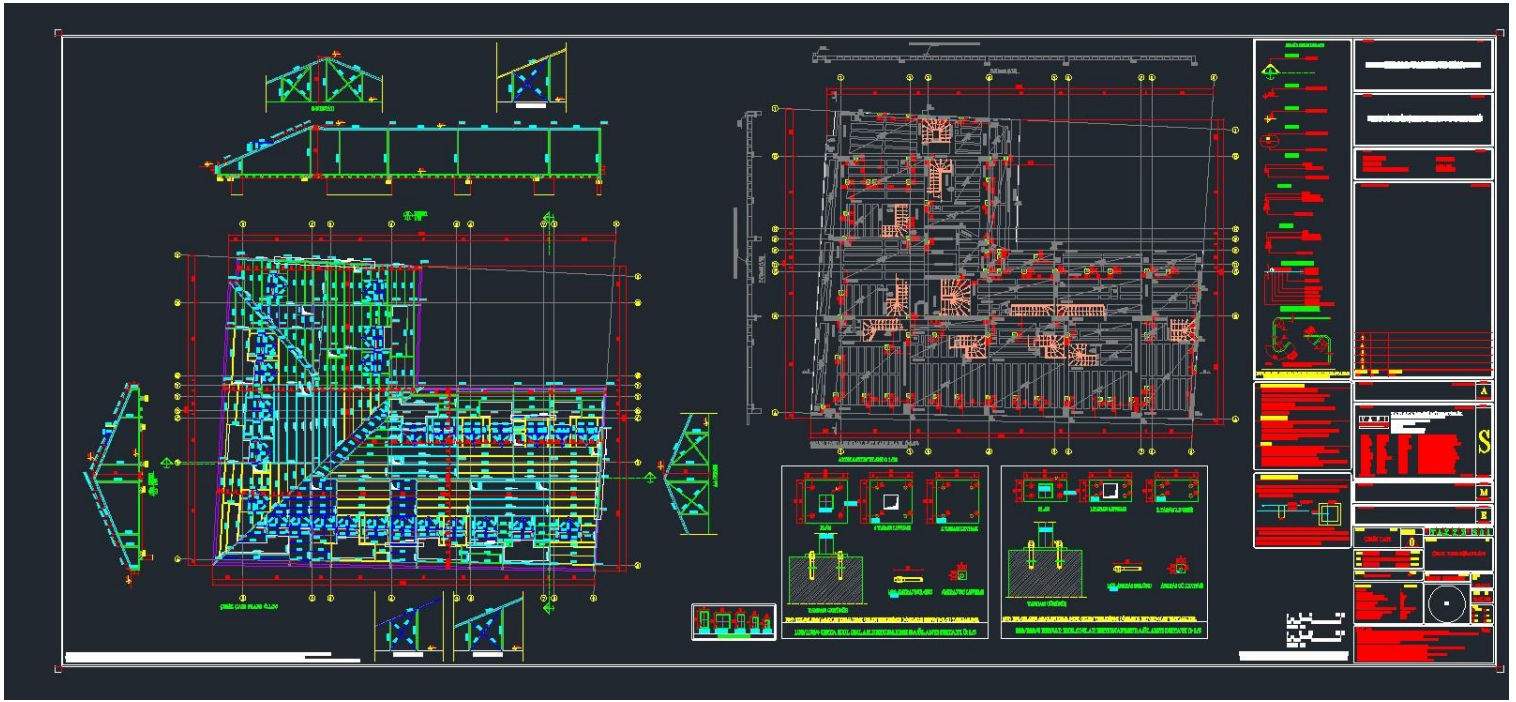
$$T_a < T < T_b \quad S_a = 2.5 \quad 0.6$$

$$T > T_b \quad S_a = 2.5 \left(\frac{T_b}{T} \right)$$

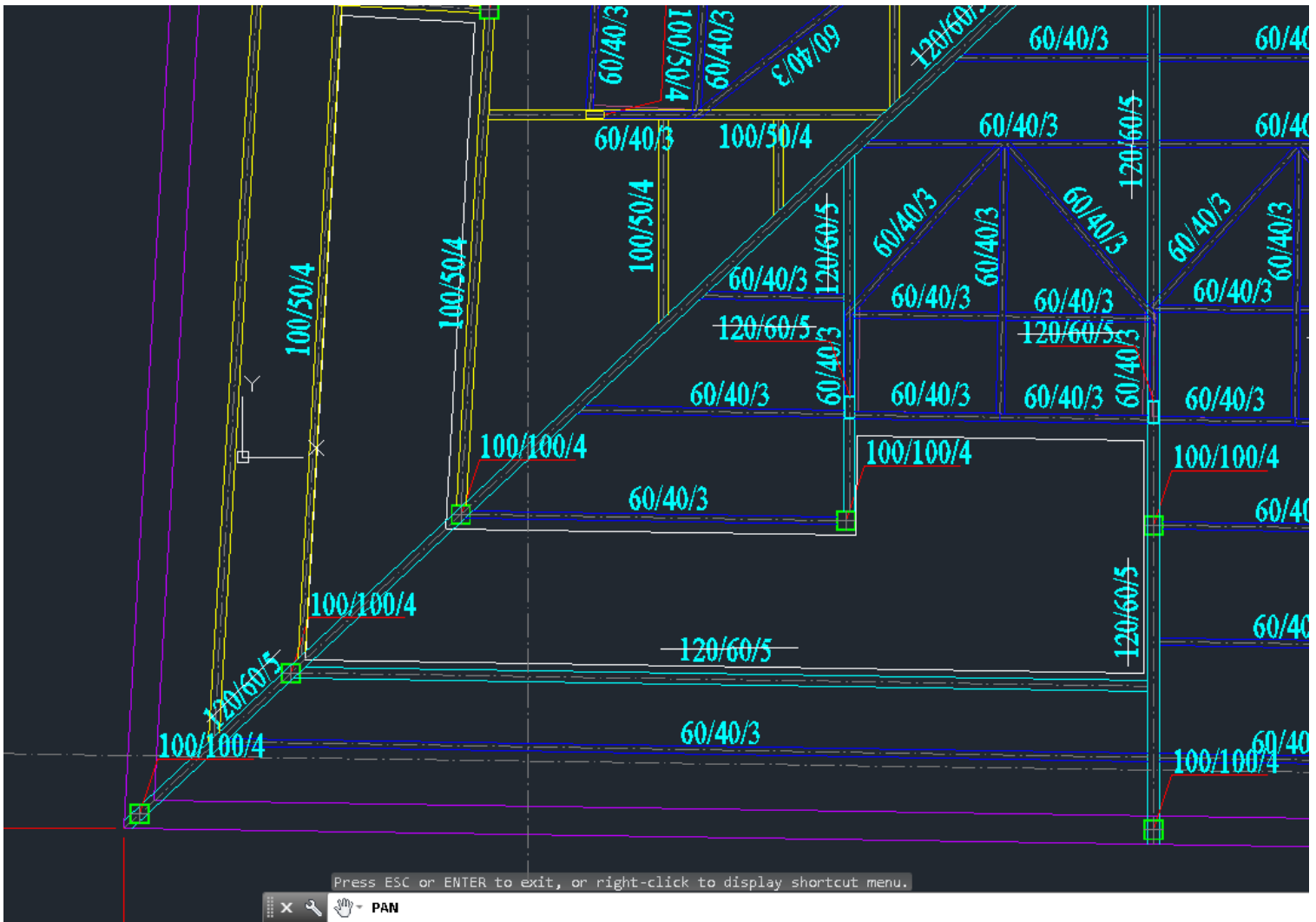


AutoCAD Drawings:

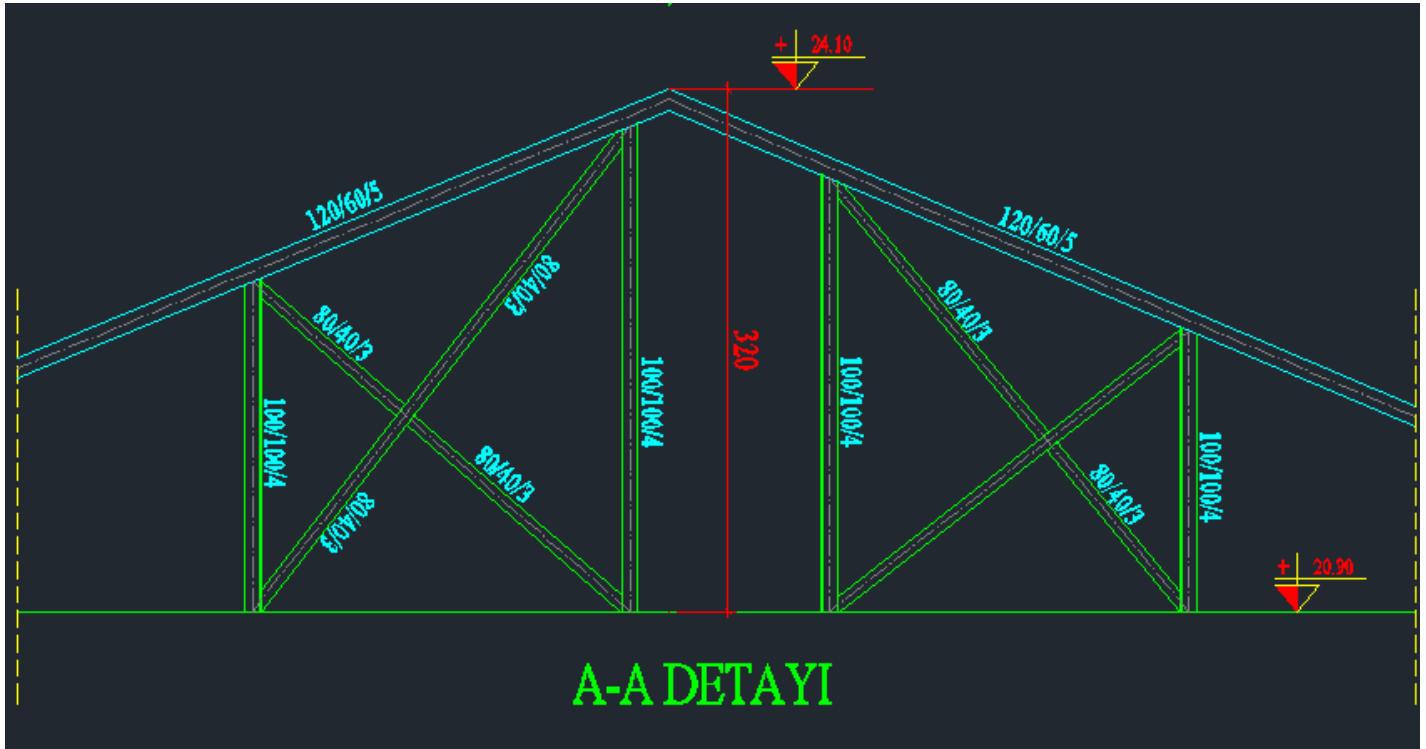
-Finished Roof drawing:



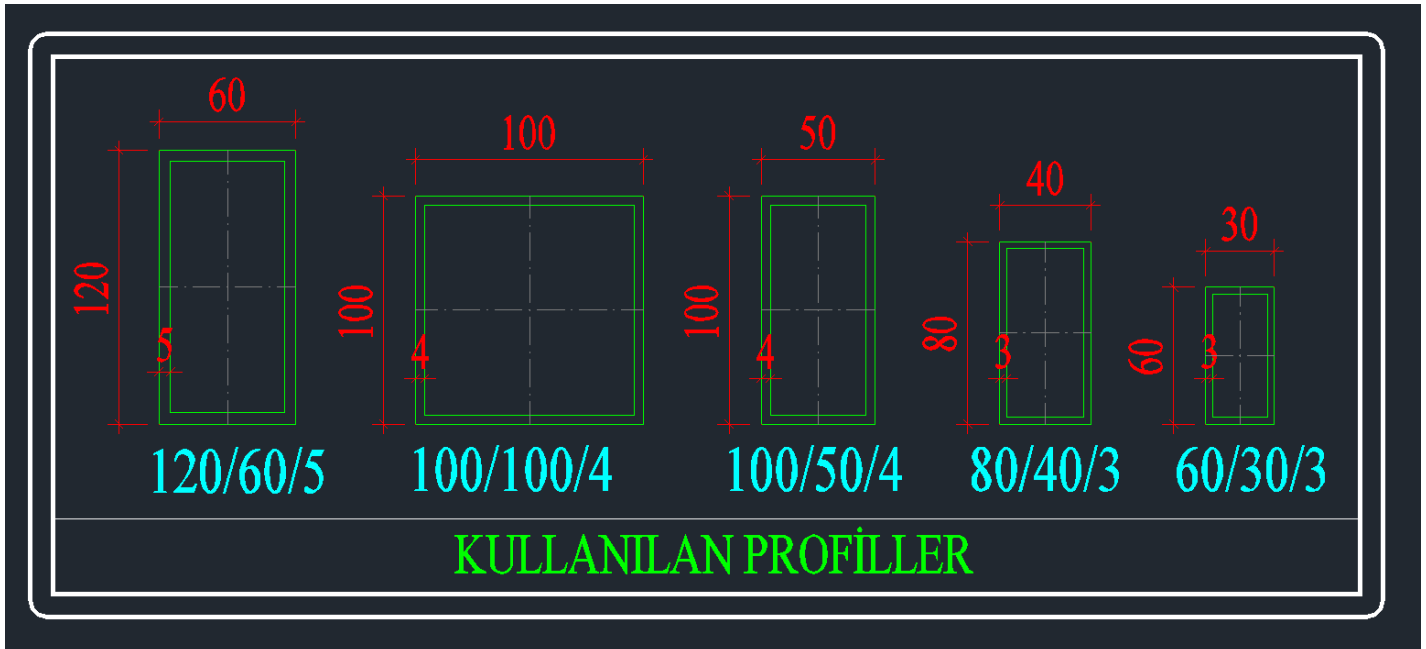
-Roof Detail 1 (Southwest corner):



-Roof Detail 2 (Elevation view from A-A):



-Roof Detail 3 (Used sections):



-Example quantity takeoff done on Microsoft Excel for the sections above:

Kesit	Boy	birim ağırlık	Toplam ağırlık	Kesit	Boy	birim ağırlık	Toplam ağırlık	Kesit	Adet	birim ağırlık
120x60x5	3,25	12,8	41,6	120x60x5	4,86	12,8	62,208	120x120x4	98	14,2
120x60x5	1,63	12,8	20,864	120x60x5	4,85	12,8	62,08	GENEL TOPLAM		1391,6
120x60x5	5,57	12,8	71,296	120x60x5	4,86	12,8	62,208	Kesit	Adet	
120x60x5	5,57	12,8	71,296	120x60x5	2,02	12,8	25,856	30x15	36	
120x60x5	5,57	12,8	71,296	120x60x5	6,13	12,8	78,464	30x30	62	
120x60x5	5,57	12,8	71,296	120x60x5	0,68	12,8	8,704	KOLONLAR		
120x60x5	6,38	12,8	81,664	120x60x5	0,68	12,8	8,704			
120x60x5	0,55	12,8	7,04	120x60x5	0,68	12,8	8,704			
120x60x5	6,5	12,8	83,2	120x60x5	0,68	12,8	8,704			
120x60x5	6,56	12,8	83,968	120x60x5	0,68	12,8	8,704			
120x60x5	6,32	12,8	80,896	120x60x5	1,55	12,8	19,84			
120x60x5	2	12,8	25,6	120x60x5	7,34	12,8	93,952			
120x60x5	6,29	12,8	80,512	120x60x5	6,36	12,8	81,408			
120x60x5	4,51	12,8	57,728	120x60x5	4,25	12,8	54,4			
120x60x5	6,47	12,8	82,816	120x60x5	4,85	12,8	62,08			
120x60x5	5,11	12,8	65,408	120x60x5	5,45	12,8	69,76			
120x60x5	1,87	12,8	23,936	120x60x5	6,64	12,8	84,992			
120x60x5	4,5	12,8	57,6	120x60x5	4,74	12,8	60,672			
120x60x5	9,65	12,8	123,52	120x60x5	5,54	12,8	70,912			
120x60x5	19,32	12,8	247,296	120x60x5	5,54	12,8	70,912			
120x60x5	1,17	12,8	14,976	120x60x5	5,54	12,8	70,912			
120x60x5	2,23	12,8	28,544	120x60x5	1,16	12,8	14,848			
120x60x5	2,02	12,8	25,856	120x60x5	0,73	12,8	9,344			
120x60x5	2,04	12,8	26,112	120x60x5	0,73	12,8	9,344			
120x60x5	6,37	12,8	81,536	120x60x5	5,54	12,8	70,912			
120x60x5	0,68	12,8	8,704	120x60x5	1,9	12,8	24,32			
120x60x5	0,68	12,8	8,704	120x60x5	2	12,8	25,6			
120x60x5	0,68	12,8	8,704	120x60x5	1,28	12,8	16,384			
120x60x5	0,68	12,8	8,704	120x60x5	1,28	12,8	16,384			
120x60x5	0,68	12,8	8,704	120x60x5	3,81	12,8	48,768			
120x60x5	0,68	12,8	8,704	120x60x5	2,05	12,8	26,24			
120x60x5	0,68	12,8	8,704	120x60x5	6,67	12,8	85,376			
120x60x5	0,68	12,8	8,704	120x60x5	4,84	12,8	61,952			
120x60x5	0,68	12,8	8,704	120x60x5	6,85	12,8	87,68			
120x60x5	2,02	12,8	25,856	120x60x5	4,73	12,8	60,544			
120x60x5	0,55	12,8	7,04	120x60x5	13,07	12,8	167,296			
120x60x5	6,38	12,8	81,664	120x60x5	7,98	12,8	102,144			
120x60x5	6,33	12,8	81,024	120x60x5	8,75	12,8	111,2			
120x60x5	6,33	12,8	81,024	120x60x5	8,92	12,8	114,176			
120x60x5	2,47	12,8	31,616	120x60x5	0,47	12,8	6,016			
120x60x5	2,1	12,8	26,88	120x60x5	3,11	12,8	39,808			
120x60x5	0,91	12,8	11,648	120x60x5	3,12	12,8	39,936			
120x60x5	0,91	12,8	11,648	120x60x5	0,68	12,8	8,704			
120x60x5	0,91	12,8	11,648	120x60x5	0,68	12,8	8,704			
120x60x5	2	12,8	25,6							
120x60x5	4,2	12,8	53,76	GENEL TOPLAM			2238,976			
120x60x5	0,55	12,8	7,04							
120x60x5	0,55	12,8	7,04							

-Connections to concrete:

