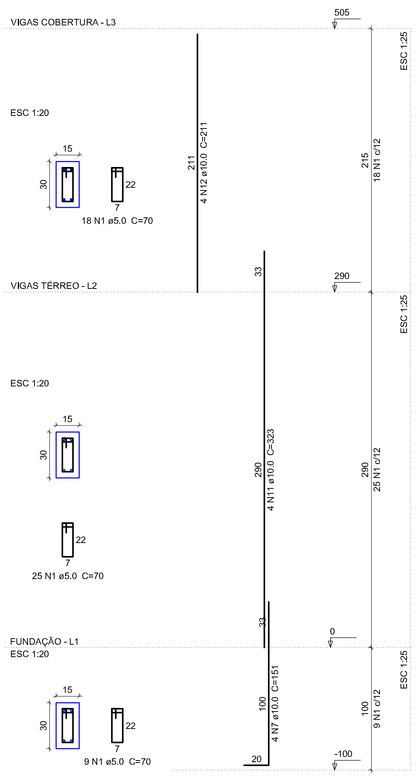
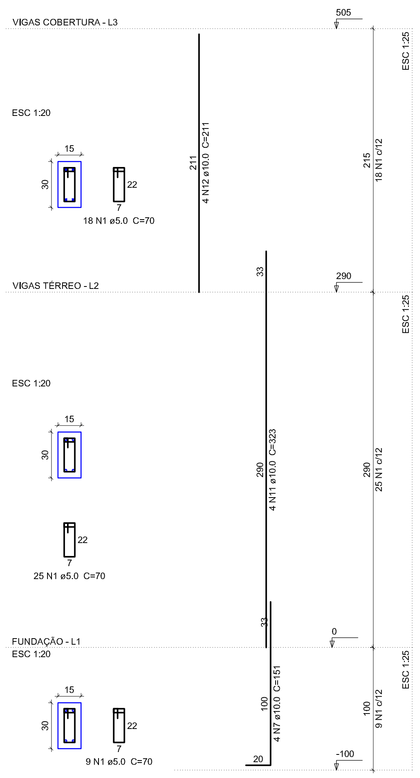
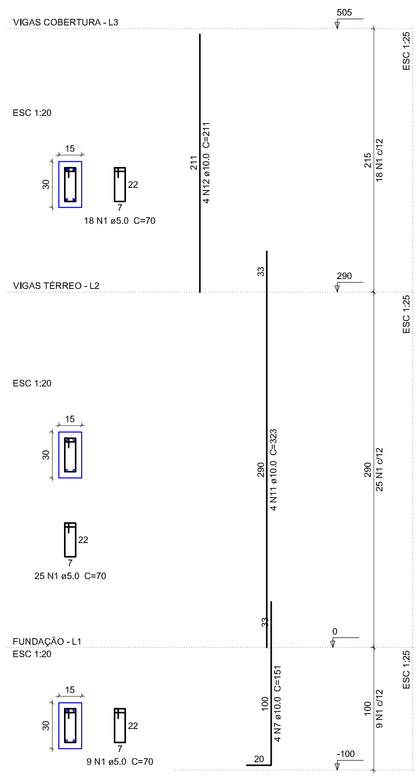
P64



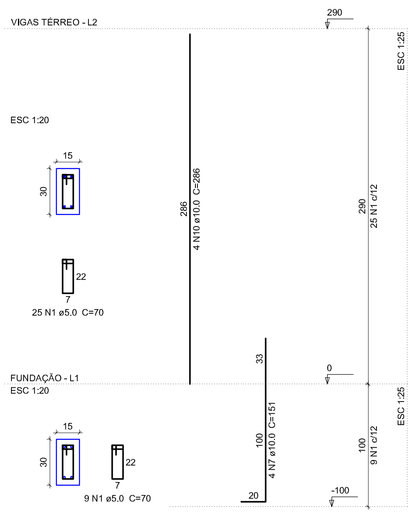
P65



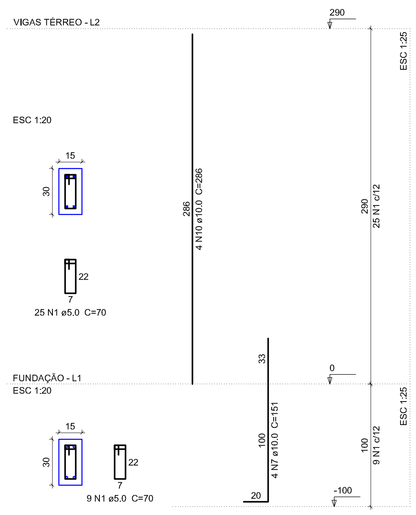
P66



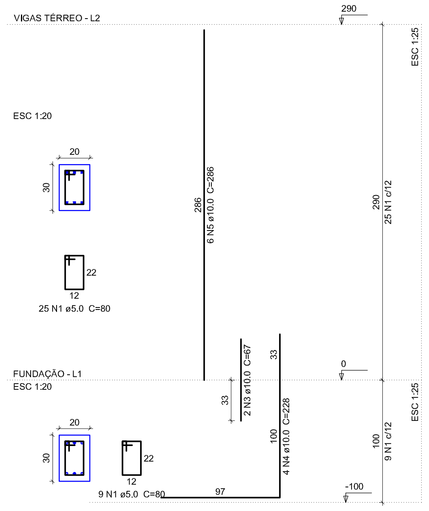
P67



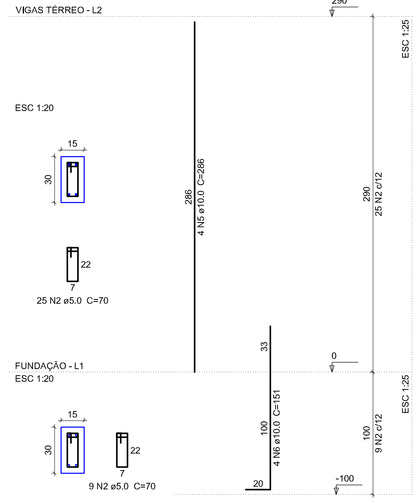
P68



P69



P70



P71

P72

P73

P74

P75

Relação do aço

P1	P2	P3
P4	P5	P6
P7	P8	P9
P10	P11	P12
P13	P14	P15
P16	P17	P18
P19	P20	P21
P22	P23	P24
P25	P26	P27
P28	P29	P30
P31	P32	P33
P34	P35	P36
P37	P38	P39
P40	P41	P42
P43	P44	P45
P46	P47	P48
P49	P50	P51
P52	P53	P54
P55	P56	P57
P58	P59	P60
P61	P62	P63
P64	P65	P66
P67	P68	

Relação do aço

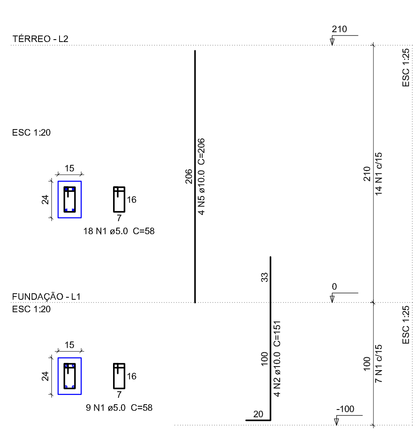
FUNDAÇÃO: P69, P70, P71, P72, P73, P74, P75

AÇO	N	DIAM	Q	UNIT (cm)	C.TOTAL (cm)
CA60	1	5,0	34	80	2720
	2	5,0	169	70	11830
CA50	3	10,0	2	67	134
	4	10,0	4	228	912
	5	10,0	10	286	2860
	6	10,0	4	151	604
	7	10,0	18	248	4464
	8	10,0	18	101	1818
	9	10,0	2	211	422
	10	12,5	4	159	636
	11	12,5	4	286	1144

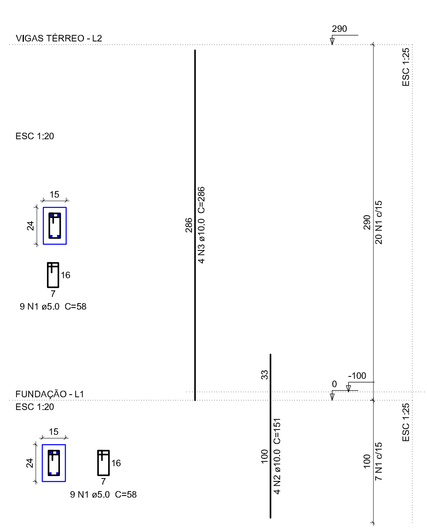
AÇO	N	DIAM	Q	UNIT (cm)	C.TOTAL (cm)
CA60	0	5,0	75	27	1875
	1	5,0	1619	70	113330
	2	5,0	418	80	33440
	3	5,0	95	58	5510
	4	5,0	52	90	4680
	5	5,0	61	76	4636
	6	5,0	27	80	2160
CA50	7	10,0	194	151	29294
	8	10,0	20	206	4120
	9	10,0	8	228	1824
	10	10,0	150	286	42900
	11	10,0	70	323	22610
	12	10,0	52	211	10972
	13	10,0	18	248	4464
	14	10,0	18	101	1818
	15	10,0	32	114	3648
	16	10,0	12	141	1692
	17	10,0	8	198	1584
	18	10,0	4	121	484
	19	10,0	4	216	864
	20	10,0	8	253	2024
	21	12,5	52	159	8268
	22	12,5	58	286	16588
	23	12,5	2	220	440
	24	12,5	6	266	1596
	25	12,5	18	332	5976
	26	12,5	12	211	2532
	27	12,5	16	129	2064
	28	12,5	2	83	166
	29	12,5	4	160	640
	30	12,5	6	206	1236
	31	12,5	6	257	1542
	32	12,5	6	101	606

PILARES REFORMA INTERNA

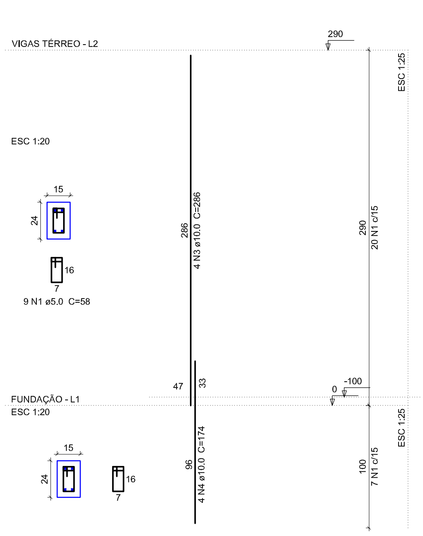
P78=P79



P80=P81=P82=P83=P84=P87=P92=P94=P98



P85=P86=P88=P89=P90=P91=P93=P95=P96=P97=P99



Relação do aço

P78	P79	P80
P81	P82	P83
P84	P85	P86
P87	P88	P89
P90	P91	P92
P93	P94	P95
P96	P97	P98
P99		

AÇO	N	DIAM	Q	UNIT (cm)	C.TOTAL (cm)
CA60	1	5,0	1122	58	65076
CA50	2	10,0	44	151	6444
	3	10,0	80	283	22640
	4	10,0	24	174	2736
	5	10,0	8	206	1648

RESUMO MATERIAIS TOTAL PILARES

AÇO	DIAM	C.TOTAL (m)	PESO + 10 % (kg)
CA50	10,0	1428,69	970,16
	12,5	434,40	460,91
CA60	5,0	2452,61	416,36
PESO TOTAL			
CA50	1431,07		
CA60	416,36		

Vol. de concreto total (C-30) = 15,73 m³
Área de forma total = 304 m²

NOTAS

A. Confrontar medidas do projeto estrutural com projeto arquitetônico
B. Executar passagem de tubulação de água, esgoto e eletricidade
C. Molhar as formas antes da concretagem
D. Conservar úmida as peças concretadas durante o tempo de cura
E. Executar limpeza de formas ou partes da estrutura em contato com a concretagem
F. Usar apoio do tipo caranguejo para manter armaduras negativas em posição durante a concretagem

COBRIMENTO DAS ARMADURAS

ELEMENTOS ESTRUTURAIS	COBRIMENTO NOMINAL
Pilares	4,0 cm
Vigas	4,0 cm
Lajes	3,5 cm
Sapatas	4,0 cm
CLASSE DE AGRESSIVIDADE	III (FORTE) - CONTROLE RIGOROSO DAS DIMENSÕES

CARACTERÍSTICAS DO CONCRETO

Classe de Resistência	C-30
Módulo de Elasticidade	280 tf/cm²
Fator a/c	< 0,55

ENGEON ENGENHARIA
(65) engeonengenharia@gmail.com
9806-6661

CMEI
NOSSA SENHORA DOS VALADARES

PROJETO ESTRUTURAL

PROJETO: ENGENHEIRO CIVIL
JEFFERSON MICAEL VALADANOVER CREA/PR 19.637/D
EXECUÇÃO:

PROPRIETÁRIO: PREFEITURA MUNICIPAL DE PARANAGUÁ
CNPJ: 76.017.458/0001-15

ESCALA: INDICADA	CONTEÚDO: PILARES	CATEGORIA INSTITUCIONAL
DATA: OUTUBRO/2018		PRANCHA: 09/19
DESENHO: MATHEUS L. SANTOS	LOCAL: ILHA DOS VALADARES - VILA BELA PARANAGUÁ - PR	