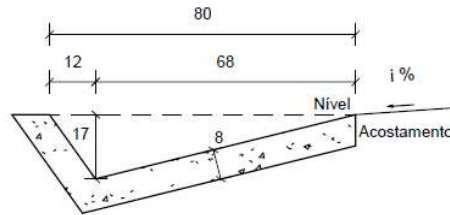
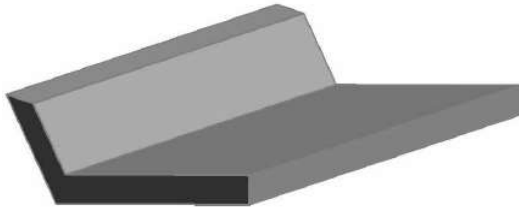


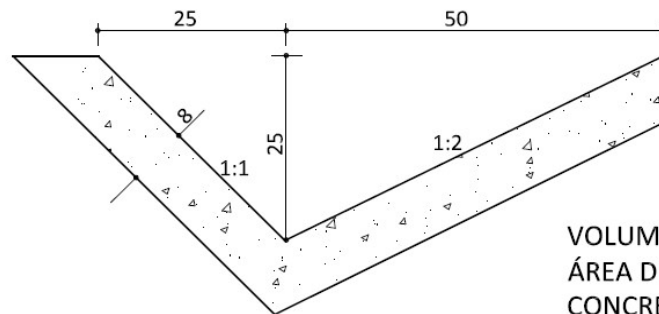
SARJETA TRIANGULAR EM CONCRETO DNIT 80-17 E DEINFRA TIPO 1 / TRANSPOSIÇÃO DE SEG. DE SARJETA

STC 80-17



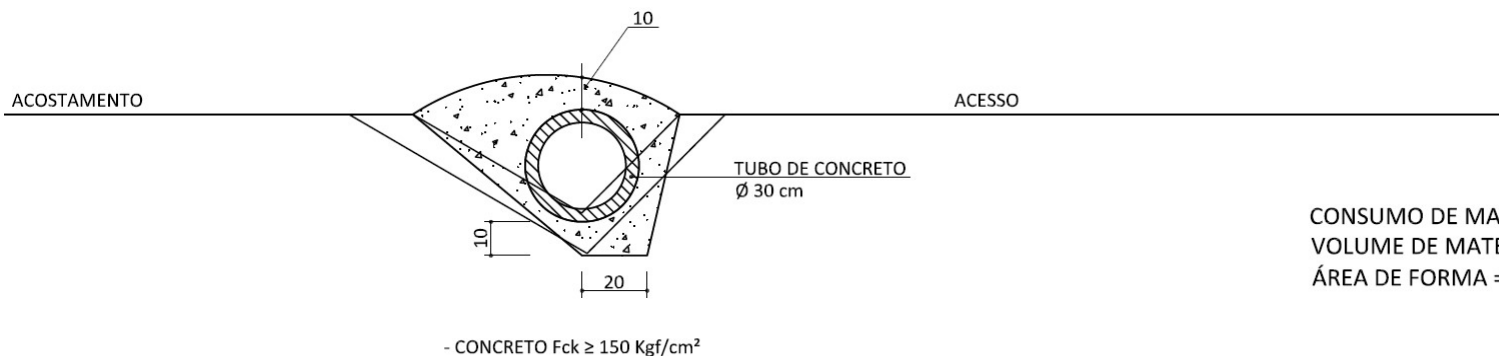
Consumos médios ³		Método executivo ⁴	
		Convencional	Extrusão
Escavação	m ³ /m	0,1466	0,1466
Apiloamento	m ² /m	1,0551	1,0551
Concreto fck ≥ 20 MPa	m ³ /m	0,0786	0,0786
Guia de madeira	m/m	0,5276	-
Argamassa de cimento e areia ^{5 e 6}	m ³ /m	0,0001	-

SARJETA TRIANGULAR PARA CORTE EM SOLO - TIPO I



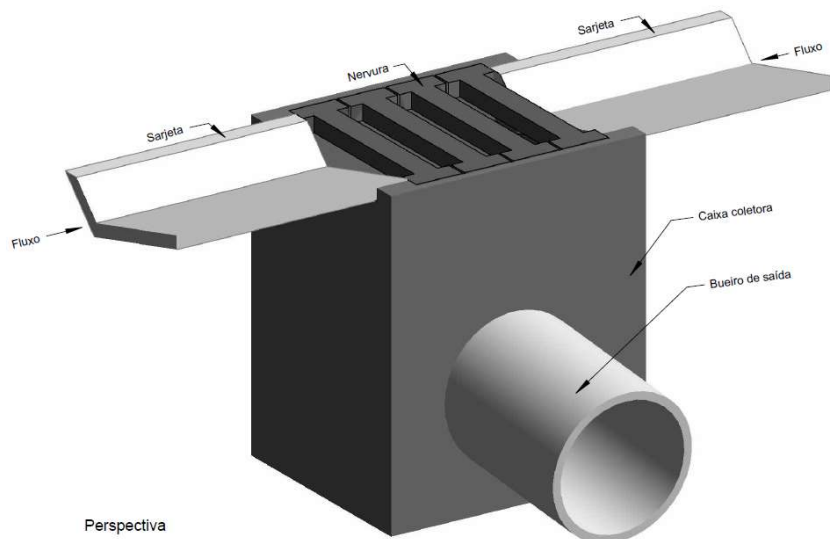
VOLUME DE CONCRETO = 0,079 m³/m
 ÁREA DE FORMA = 0,027 m²/m
 CONCRETO Fck ≥ 150 Kgf/cm²

TRAVESSIA SOBRE SARJETA EM ACESSO SECUNDÁRIO

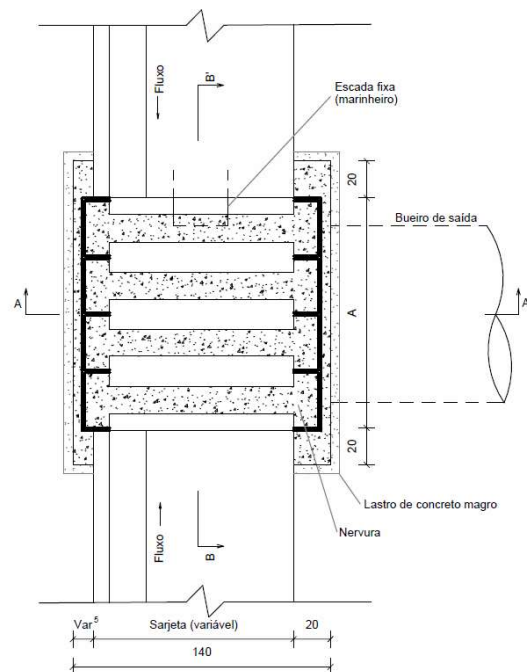


CONSUMO DE MATERIAL:
 VOLUME DE MATERIAL Fck ≥ 150 Kgf/cm² = 0,210 m³/m
 ÁREA DE FORMA = 0,16 m²/m

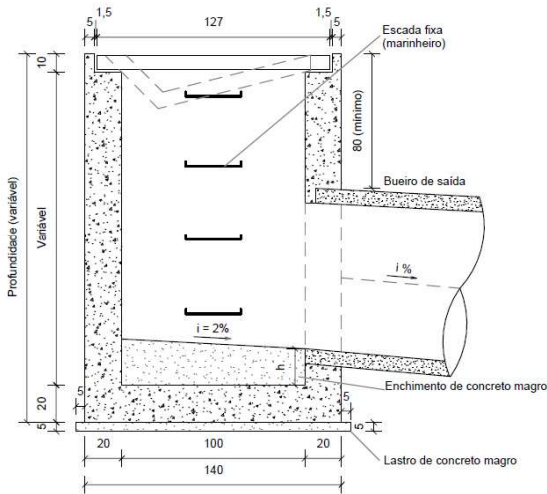
CAIXAS COLETORAS DE SARJETA COM GRELHA DE CONCRETO - CCS (DNIT 1.22)



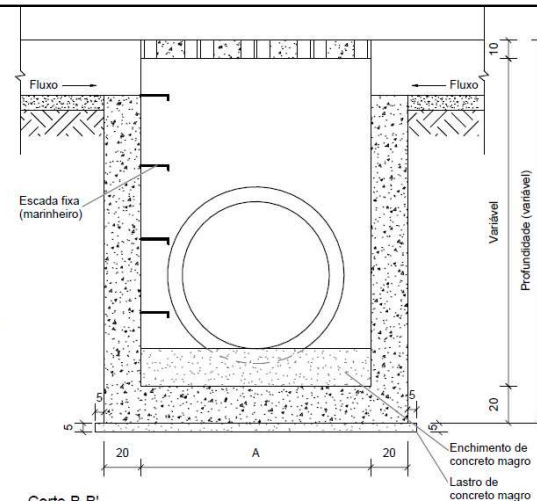
Perspectiva



Planta Sem escala

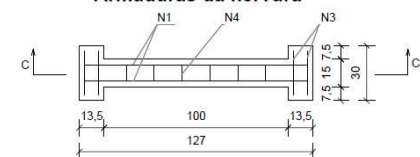


Corte A-A' Sem escala

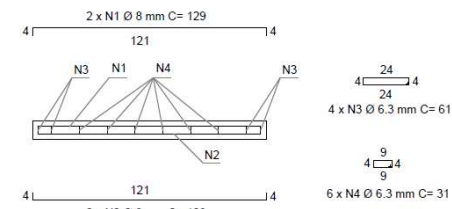


Corte B-B' Sem escala

Armaduras da nervura



Planta Sem escala



Corte C-C' Sem escala

Consumos médios da caixa coletora ²									
Dispositivo	Profundidade (cm)	A (cm)	Diâmetro do bueiro de saída (cm)	h (cm)	Escavação (m ³ /und)	Concreto magro (m ³ /und)	Fôrma (m ² /und)	Aço CA-50 (kg/und)	Concreto fck ≥ 20 MPa (m ³ /und)
CCS 200-60 A	200	125	60	10	14,8200	0,2688	19,9304	112,1610	2,2760
CCS 200-80 A		125	80	10	14,8200	0,2688	19,7984	112,1610	2,2320
CCS 250-60 A	250	125	60	20	18,5250	0,3938	25,2304	137,2294	2,8060
CCS 250-80 A		125	80		18,5250	0,3938	25,0984	137,2294	2,7620
CCS 250-100 A		125	100	18,5250	0,3938	24,9288	137,2294	2,7054	
CCS 250-120 A		160	120	20,8000	0,4935	28,0814	154,6048	3,0458	
CCS 300-60 A	300	125	60	20	22,2300	0,3938	30,5304	162,2978	3,3360
CCS 300-80 A		125	80		22,2300	0,3938	30,3984	162,2978	3,2920
CCS 300-100 A		125	100	22,2300	0,3938	30,2288	162,2978	3,2354	
CCS 300-120 A		160	120	24,9600	0,4935	34,0814	182,5544	3,6458	
CCS 350-60 A	350	125	60	20	25,9350	0,3938	35,8304	183,4266	3,8660
CCS 350-80 A		125	80		25,9350	0,3938	35,6984	183,4266	3,8220
CCS 350-100 A		125	100	25,9350	0,3938	35,5288	183,4266	3,7654	
CCS 350-120 A		160	120	29,1200	0,4935	40,0814	206,2116	4,2458	
CCS 400-60 A	400	125	60	20	29,6400	0,3938	41,1304	208,4950	4,3960
CCS 400-80 A		125	80		29,6400	0,3938	40,9984	208,4950	4,3520
CCS 400-100 A		125	100	29,6400	0,3938	40,8288	208,4950	4,2954	
CCS 400-120 A		160	120	33,2800	0,4935	46,0814	234,1612	4,8458	

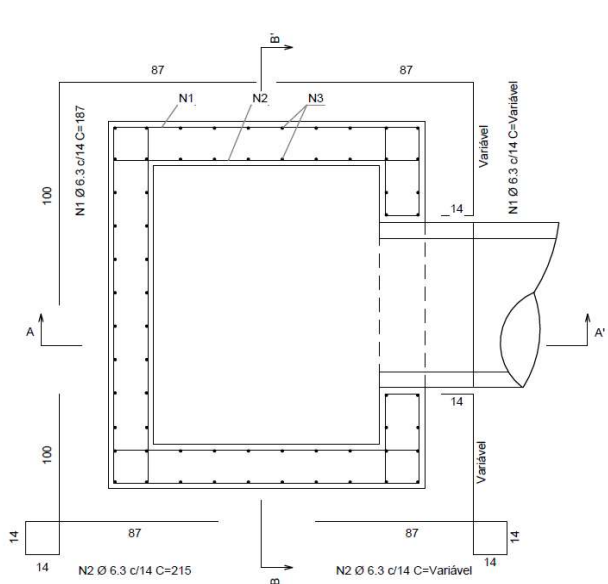
Consumos médios da grelha (A = 125 cm) ²		
Fôrma	m ² /und	2,3000
Aço CA-50	kg/und	12,3668
Concreto fck ≥ 25 MPa	m ³ /und	0,0924

Consumos médios da grelha (A = 160 cm) ²		
Fôrma	m ² /und	2,8750
Aço CA-50	kg/und	15,4585
Concreto fck ≥ 25 MPa	m ³ /und	0,1155

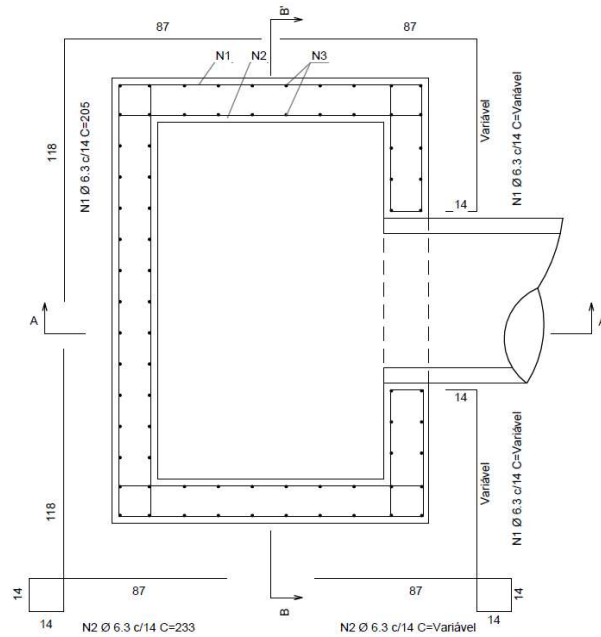
Projeto de drenagem – Detalhamentos

OBRAS DE DRENAGEM DO MUNICÍPIO DE CHAPECÓ

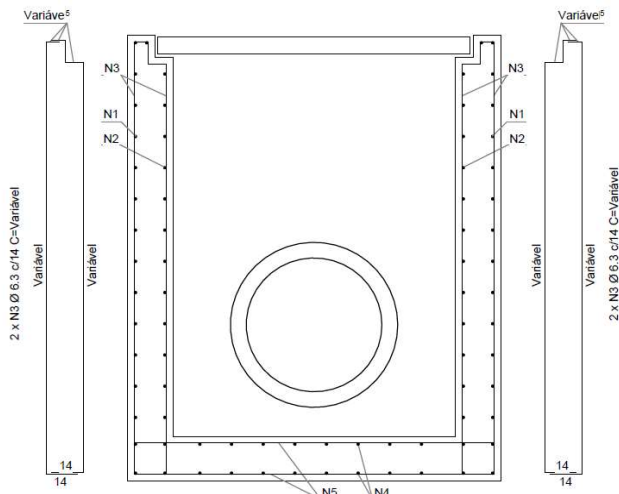
CAIXAS COLETORAS DE SARJETA - CCS(DNIT 1.23 (b))



Planta (Caixa coletora, A = 125 cm)
Sem escala

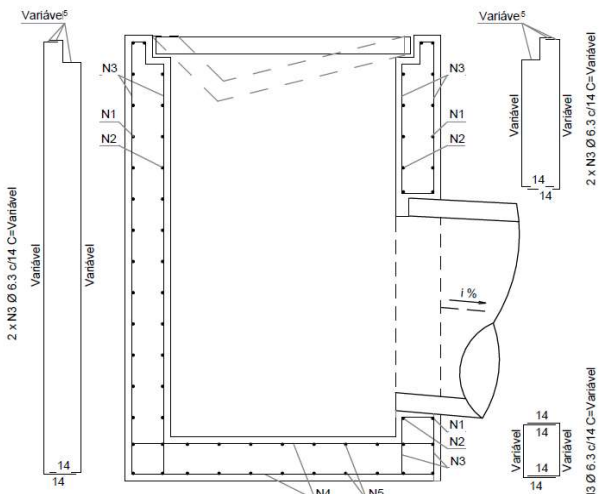


Planta (Caixa coletora, A = 160 cm)
Sem escala



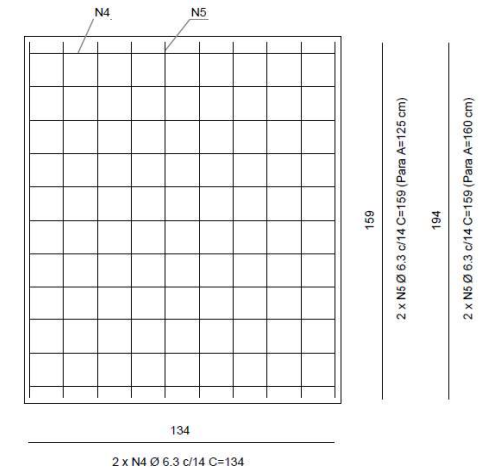
Corte A-A'
Sem escala

2 x N5 Ø 6.3 c/14 C=159 (Para A=125 cm)
2 x N5 Ø 6.3 c/14 C=194 (Para A=160 cm)



Corte B-B'
Sem escala

2 x N4 Ø 6.3 c/14 C=140



Planta (Laje de fundo)
Sem escala

CAIXAS COLETORAS DE SARJETA - CCS(DNIT 1.23 (c))

Quadro de armaduras ⁴											
Dispositivo	Altura (cm)	Largura A (cm)	Tubo (cm)	Posição	φ (mm)	Quantidade (un)	Comp. unitário (cm)	Espaçamento (cm)	Comp. total (cm/un)	Peso total (kg/un)	
CCS 200 x 60 A CCS 200 x 60 B	200	125	60	N1 ⁵	6,3	56	187	14	10.472	25,6564	
						N2 ⁵	56		215	12.040	29,4980
						N3 ⁵	76		222	16.872	41,3364
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 200 x 80 A CCS 200 x 80 B	200	125	80	N1 ⁵	6,3	56	187	14	10.472	25,6564	
						N2 ⁵	56		215	12.040	29,4980
						N3 ⁵	76		222	16.872	41,3364
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 250 x 60 A CCS 250 x 60 B	250	125	60	N1 ⁵	6,3	72	187	14	13.464	32,9888	
						N2 ⁵	72		215	15.480	37,9260
						N3 ⁵	76		272	20.672	50,6464
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 250 x 80 A CCS 250 x 80 B	250	125	80	N1 ⁵	6,3	72	187	14	13.464	32,9888	
						N2 ⁵	72		215	15.480	37,9260
						N3 ⁵	76		272	20.672	50,6464
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 250 x 100 A CCS 250 x 100 B	250	125	100	N1 ⁵	6,3	72	187	14	13.464	32,9888	
						N2 ⁵	72		215	15.480	37,9260
						N3 ⁵	76		272	20.672	50,6464
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 250 x 120 A CCS 250 x 120 B	250	160	120	N1 ⁵	6,3	72	205	14	14.780	36,1620	
						N2 ⁵	72		233	16.776	41,1012
						N3 ⁵	88		272	23.936	58,6432
						N4	28		134	3.752	9,1924
						N5	20		194	3.880	9,5060
CCS 300 x 60 A CCS 300 x 60 B	300	125	60	N1 ⁵	6,3	88	187	14	16.456	40,3172	
						N2 ⁵	88		215	18.920	46,3540
						N3 ⁵	76		322	24.472	59,9564
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 300 x 80 A CCS 300 x 80 B	300	125	80	N1 ⁵	6,3	88	187	14	16.456	40,3172	
						N2 ⁵	88		215	18.920	46,3540
						N3 ⁵	76		322	24.472	59,9564
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 300 x 100 A CCS 300 x 100 B	300	125	100	N1 ⁵	6,3	88	187	14	16.456	40,3172	
						N2 ⁵	88		215	18.920	46,3540
						N3 ⁵	76		322	24.472	59,9564
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910

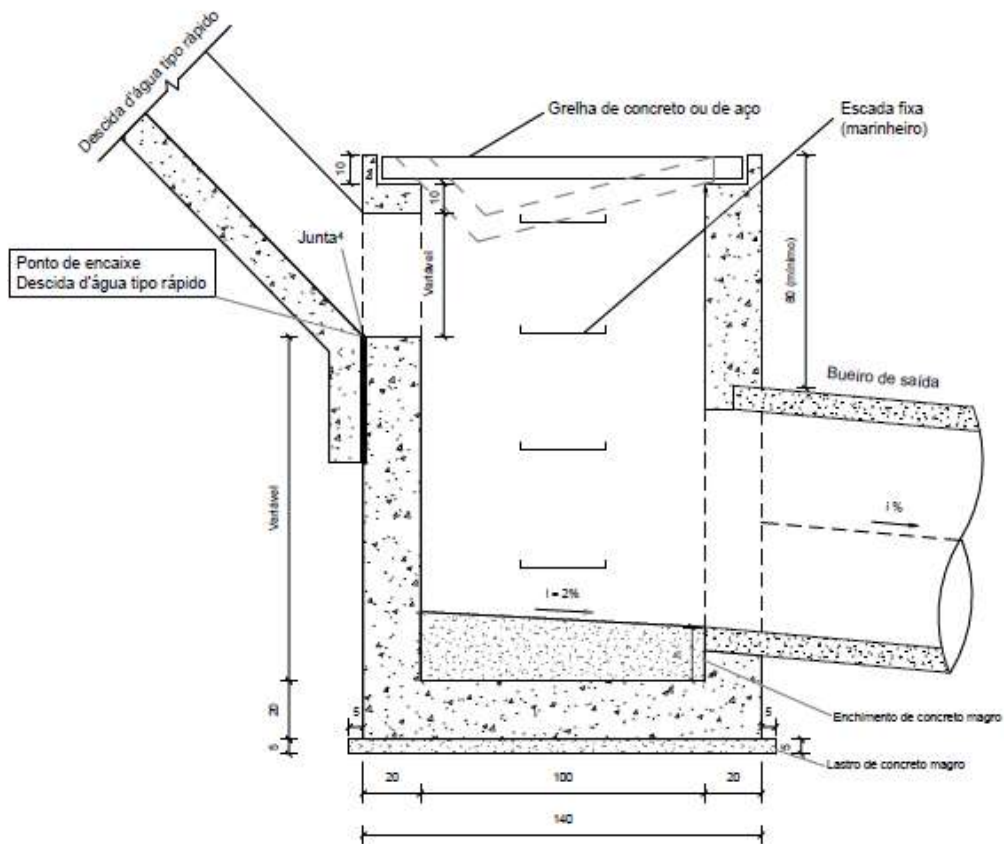
Quadro de armaduras ⁴											
Dispositivo	Altura (cm)	Largura A (cm)	Tubo (cm)	Posição	φ (mm)	Quantidade (un)	Comp. unitário (cm)	Espaçamento (cm)	Comp. total (cm/un)	Peso total (kg/un)	
CCS 300 x 120 A CCS 300 x 120 B	300	160	120	N1 ⁵	6,3	88	205	14	18.040	44,1980	
						N2 ⁵	88		233	20.504	50,2348
						N3 ⁵	88		322	28.336	69,4232
						N4	28		134	3.752	9,1924
						N5	20		194	3.880	9,5060
CCS 350 x 60 A CCS 350 x 60 B	350	125	60	N1 ⁵	6,3	100	187	14	18.700	45,8150	
						N2 ⁵	100		215	21.500	52,6750
						N3 ⁵	76		372	28.272	69,2664
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 350 x 80 A CCS 350 x 80 B	350	125	80	N1 ⁵	6,3	100	187	14	18.700	45,8150	
						N2 ⁵	100		215	21.500	52,6750
						N3 ⁵	76		372	28.272	69,2664
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 350 x 100 A CCS 350 x 100 B	350	125	100	N1 ⁵	6,3	100	187	14	18.700	45,8150	
						N2 ⁵	100		215	21.500	52,6750
						N3 ⁵	76		372	28.272	69,2664
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 350 x 120 A CCS 350 x 120 B	350	160	120	N1 ⁵	6,3	100	205	14	20.500	50,2250	
						N2 ⁵	100		233	23.300	57,0850
						N3 ⁵	88		372	32.736	80,2032
						N4	28		134	3.752	9,1924
						N5	20		194	3.880	9,5060
CCS 400 x 60 A CCS 400 x 60 B	400	125	60	N1 ⁵	6,3	116	187	14	21.692	53,1454	
						N2 ⁵	116		215	24.940	61,1030
						N3 ⁵	76		422	32.072	78,5764
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 400 x 80 A CCS 400 x 80 B	400	125	80	N1 ⁵	6,3	116	187	14	21.692	53,1454	
						N2 ⁵	116		215	24.940	61,1030
						N3 ⁵	76		422	32.072	78,5764
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 400 x 100 A CCS 400 x 100 B	400	125	100	N1 ⁵	6,3	116	187	14	21.692	53,1454	
						N2 ⁵	116		215	24.940	61,1030
						N3 ⁵	76		422	32.072	78,5764
						N4	24		134	3.216	7,8792
						N5	20		159	3.180	7,7910
CCS 400 x 120 A CCS 400 x 120 B	400	160	120	N1 ⁵	6,3	116	205	14	23.780	58,2610	
						N2 ⁵	116		233	27.028	66,2186
						N3 ⁵	88		422	37.136	90,9832
						N4	28		134	3.752	9,1924
						N5	20		194	3.880	9,5060

Projeto de drenagem – Detalhamentos

OBRAS DE DRENAGEM DO MUNICÍPIO DE CHAPECÓ

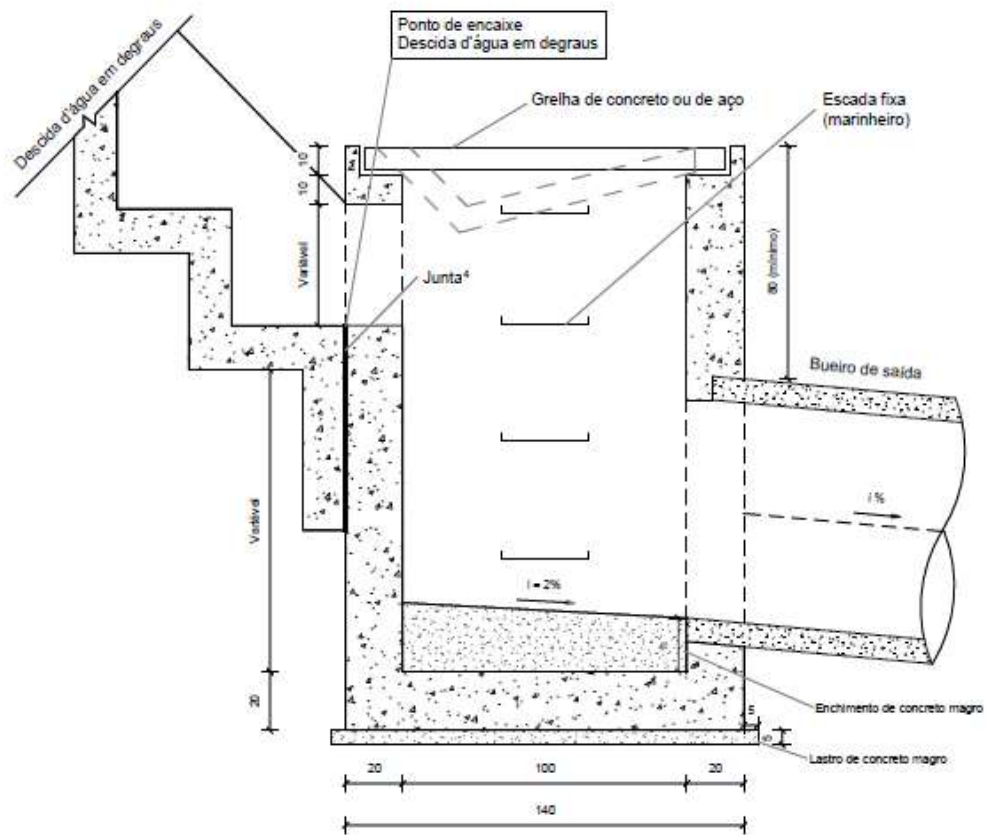
CAIXAS COLETORAS DE SARJETA - CCS(DNIT 1.23 (c))

Seção típica adaptável à descida d'água tipo rápido



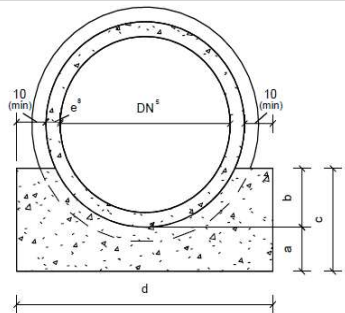
Seção transversal
Sem escala

Seção típica adaptável à descida d'água de corte em degraus

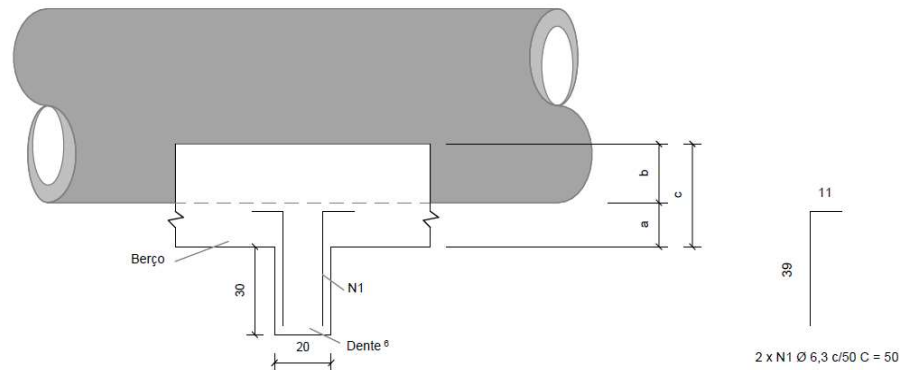


Seção transversal
Sem escala

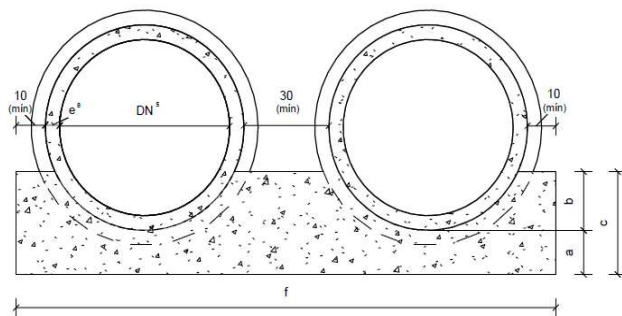
BERÇO DE CONCRETO PARA ASSENTAMENTO DE BUEIROS (DNIT 6.1 (a))



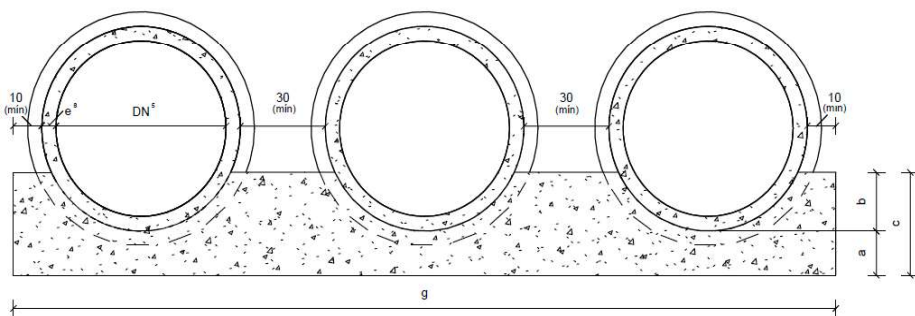
Seção transversal do berço - Linha simples
Sem escala



Vista lateral
Sem escala



Seção transversal do berço - Linha dupla
Sem escala



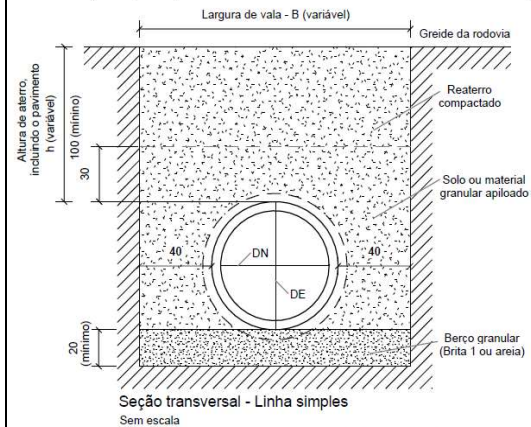
Seção transversal do berço - Linha tripla
Sem escala

Consumos médios do berço de concreto ³															
DN ⁵ (cm)	a (cm)	b (cm)	c (cm)	d (cm)	f (cm)	g (cm)	Linha simples			Linha dupla			Linha tripla		
							Fôrma (m ² /m)	Concreto fck ≥ 20 MPa (m ³ /m)	Compensado resinado (m ² /m)	Fôrma (m ² /m)	Concreto fck ≥ 20 MPa (m ³ /m)	Compensado resinado (m ² /m)	Fôrma (m ² /m)	Concreto fck ≥ 20 MPa (m ³ /m)	Compensado resinado (m ² /m)
60	15	20	35	95	-	-	0,7239	0,2387	0,0119	-	-	-	-	-	-
80	20	25	45	120	250	-	0,9387	0,3874	0,0194	0,9820	0,8197	0,0410	-	-	-
100	25	30	55	145	300	450	1,1573	0,5732	0,0287	1,2201	1,2013	0,0601	1,2802	1,8020	0,0901
120	30	40	70	170	350	525	1,4815	0,8147	0,0407	1,5699	1,6994	0,0850	1,6549	2,5492	0,1275
150	40	45	85	205	415	630	1,8242	1,2418	0,0621	1,9526	2,5260	0,1263	2,0853	3,8528	0,1926

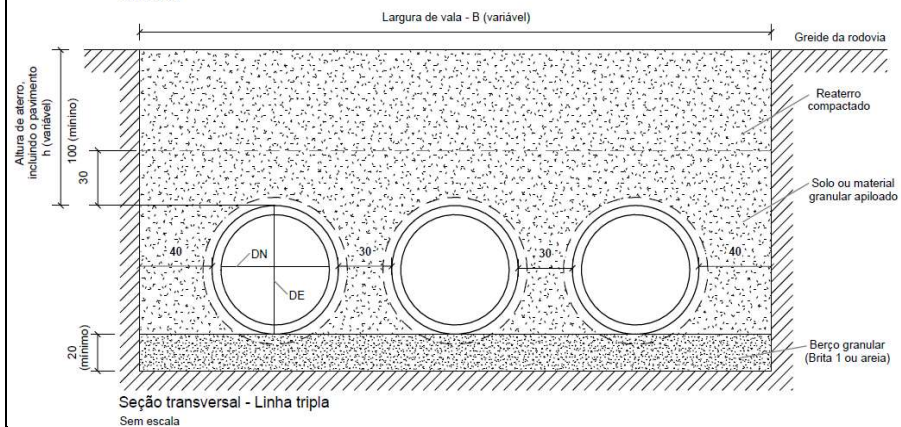
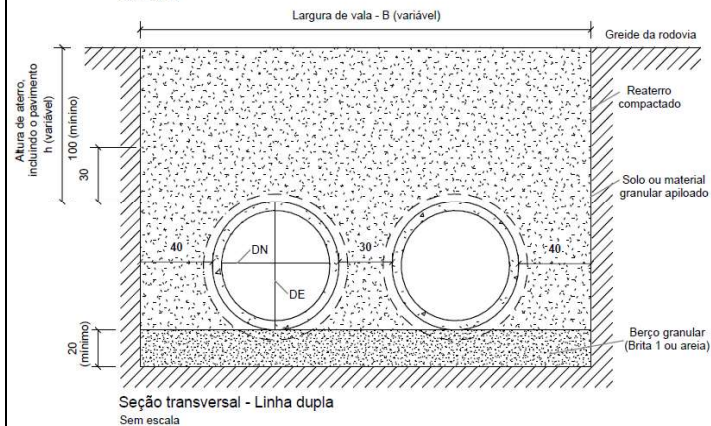
Consumos médios do dente ³						
DN ⁵ (cm)	Linha simples		Linha dupla		Linha tripla	
	Concreto fck ≥ 20 MPa (m ³ /un)	Aço CA-50 (kg/un)	Concreto fck ≥ 20 MPa (m ³ /un)	Aço CA-50 (kg/un)	Concreto fck ≥ 20 MPa (m ³ /un)	Aço CA-50 (kg/un)
60	0,0570	0,7350	-	-	-	-
80	0,0720	0,7350	0,1500	1,4700	-	-
100	0,0870	0,9800	0,1800	1,7150	0,2700	2,4500
120	0,1020	0,9800	0,2100	1,9600	0,3150	2,6950
150	0,1230	1,2250	0,2490	2,2050	0,3780	3,1850

SEÇÕES TÍPICAS PARA BUEIROS EM VALAS (DNIT 6.3 (a))

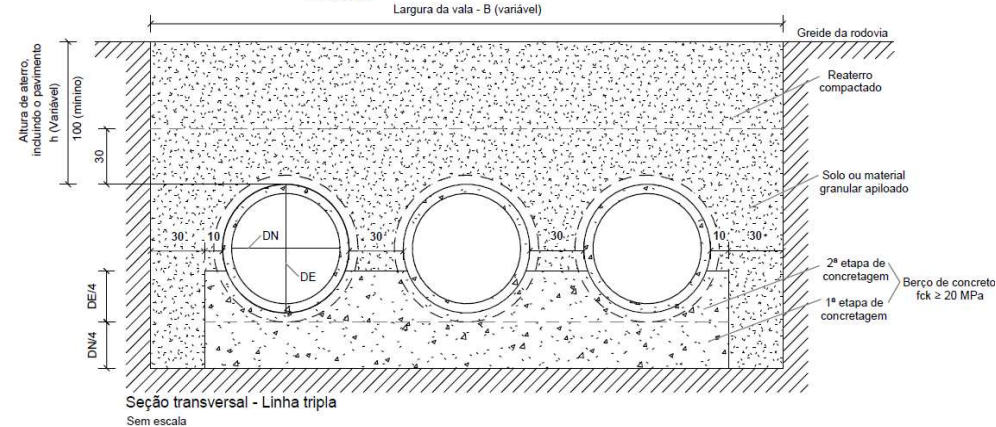
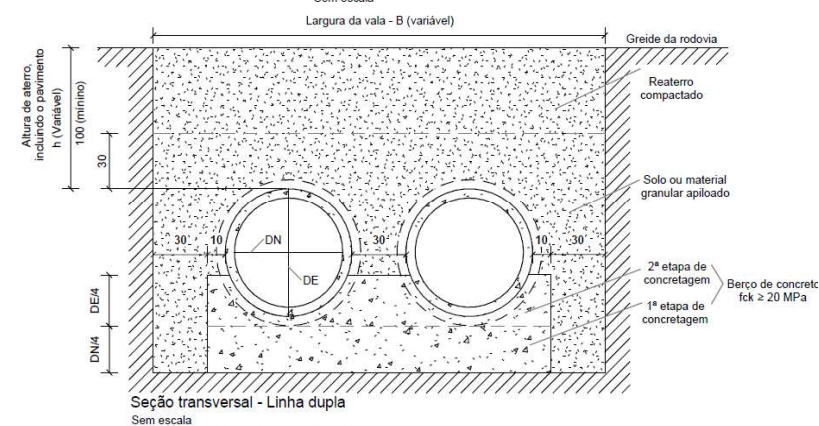
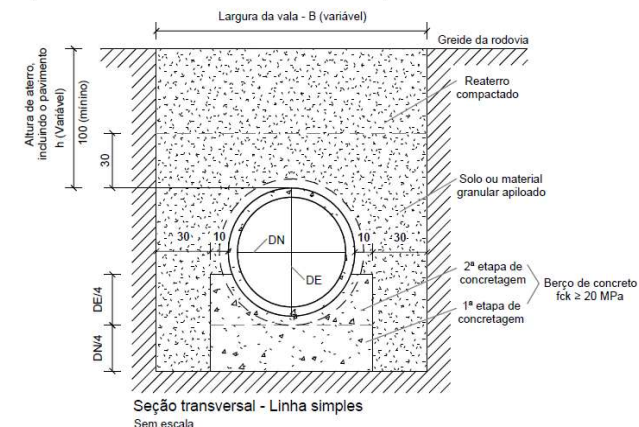
Seções típicas para bueiros tubulares assentados em vala com berço granular (Brita 1 ou areia)



Largura da vala - B (m)					
DN (cm)	60	80	100	120	150
Linha simples	1,55	1,80	2,05	2,30	2,65
Linha dupla	-	3,10	3,60	4,05	4,75
Linha tripla	-	-	5,10	5,90	6,90



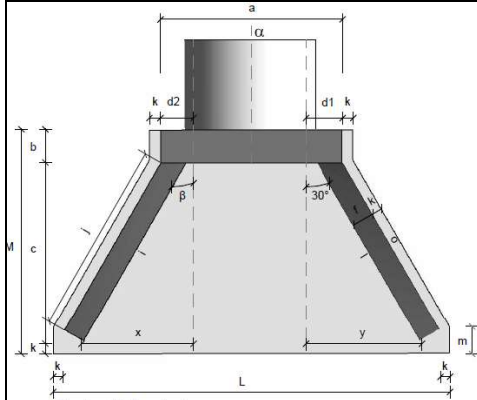
Seções típicas para bueiros tubulares assentados em vala com berço de concreto



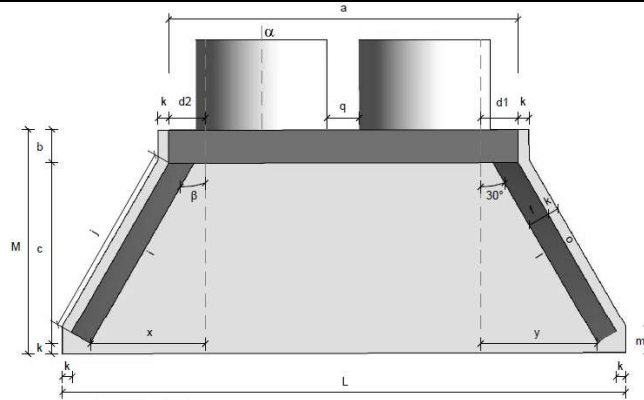
Projeto de drenagem – Detalhamentos

OBRAS DE DRENAGEM DO MUNICÍPIO DE CHAPECÓ

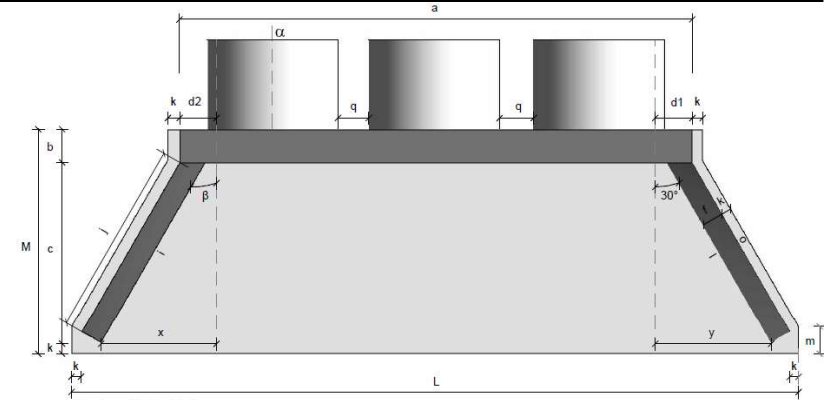
BOCAS NORMAIS COM ALAS ABERTAS (DNIT 6.5 (a))



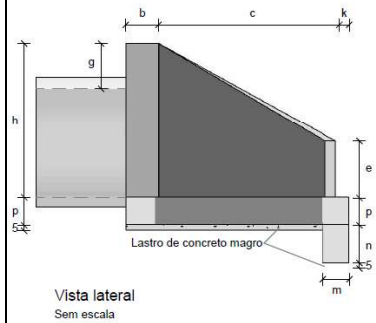
Planta - Linha simples
Sem escala



Planta - Linha dupla
Sem escala



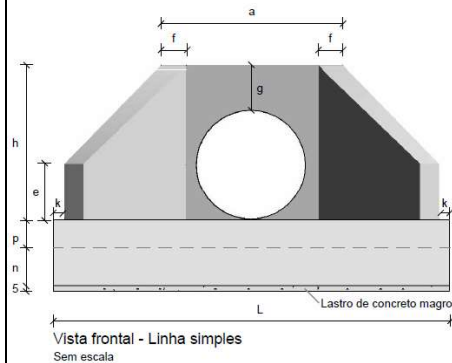
Planta - Linha tripla
Sem escala



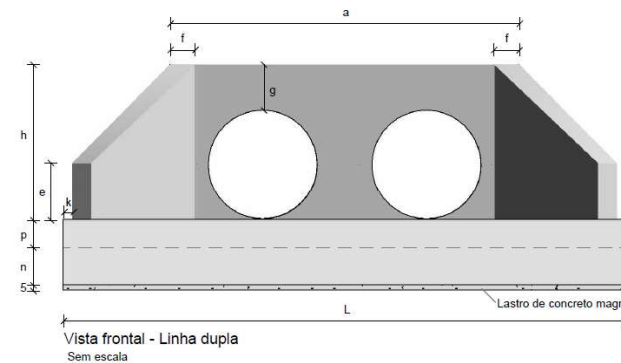
Vista lateral
Sem escala

Consumos médios³

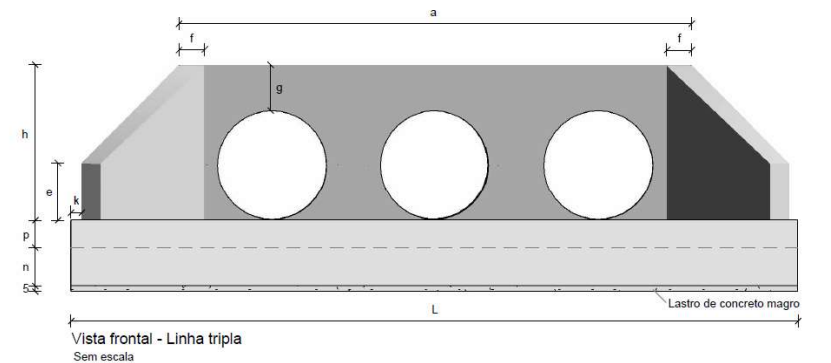
Dispositivo	Adaptável em	α	β	a (cm)	b (cm)	c (cm)	d1 (cm)	d2 (cm)	e (cm)	f (cm)	g (cm)	h (cm)	i (cm)	j (cm)	k (cm)	l (cm)	m (cm)	n (cm)	o (cm)	p (cm)	q (cm)	x (cm)	y (cm)	L (cm)	M (cm)	Concreto magro (m ³ /un)	Fôrma (m ² /un)	Concreto fck \geq 20 MPa (m ³ /un)	Aço CA-50 (kg/un)	
Linha simples	BNAA 01	BSTC 60	0°	30°	110	20	125	25	25	15	15	28	88	144	136	10	144	20	30	136	20	-	80	80	263	155	0,1541	5,8241	1,1335	58,3771
	BNAA 02	BSTC 80	0°	30°	140	25	145	30	30	20	15	40	120	167	159	10	167	20	30	159	20	-	96	96	316	180	0,2143	8,9188	1,6919	92,6928
	BNAA 03	BSTC 100	0°	30°	170	30	165	35	35	25	20	42	142	191	179	10	191	25	40	179	25	-	107	107	366	205	0,2841	12,2661	2,9132	160,5759
	BNAA 04	BSTC 120	0°	30°	200	40	180	40	40	30	20	43	163	208	196	10	208	25	40	196	25	-	121	121	414	230	0,3584	15,5901	3,8599	227,7687
	BNAA 05	BSTC 150	0°	30°	245	50	260	47	47	35	20	44	194	300	289	10	300	25	40	289	30	-	175	175	551	320	0,6368	25,0787	7,2389	412,0149
Linha dupla	BNAA 06	BDTC 100	0°	30°	315	30	165	31	31	30	20	42	142	191	179	10	191	25	40	179	25	30	103	103	511	205	0,4327	15,7433	4,2025	235,7858
	BNAA 07	BDTC 120	0°	30°	370	40	180	36	36	35	20	43	163	208	196	10	208	25	40	196	25	30	117	117	584	230	0,5539	19,9421	5,6843	358,5260
	BNAA 08	BDTC 150	0°	30°	440	50	260	39	39	35	20	44	194	300	289	10	300	25	40	289	30	30	166	166	746	320	0,9488	30,4435	10,3139	581,3341
Linha tripla	BNAA 09	BTTC 100	0°	30°	470	30	165	32	32	35	20	42	142	191	179	10	191	25	40	179	25	30	104	104	666	205	0,5916	19,5545	5,5957	318,0973
	BNAA 10	BTTC 120	0°	30°	540	40	180	32	32	40	20	43	163	208	196	10	208	25	40	196	25	30	113	113	754	230	0,7494	24,2941	7,5086	478,6310
	BNAA 11	BTTC 150	0°	30°	650	50	260	38	38	40	20	44	194	300	289	10	300	25	40	289	30	30	165	165	956	320	1,2848	36,6318	13,7233	766,0683



Vista frontal - Linha simples
Sem escala



Vista frontal - Linha dupla
Sem escala



Vista frontal - Linha tripla
Sem escala

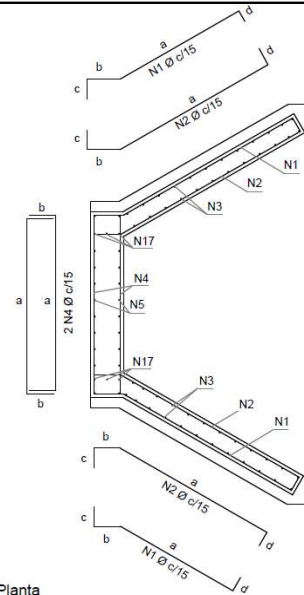
Projeto de drenagem – Detalhamentos

OBRAS DE DRENAGEM DO MUNICÍPIO DE CHAPECÓ

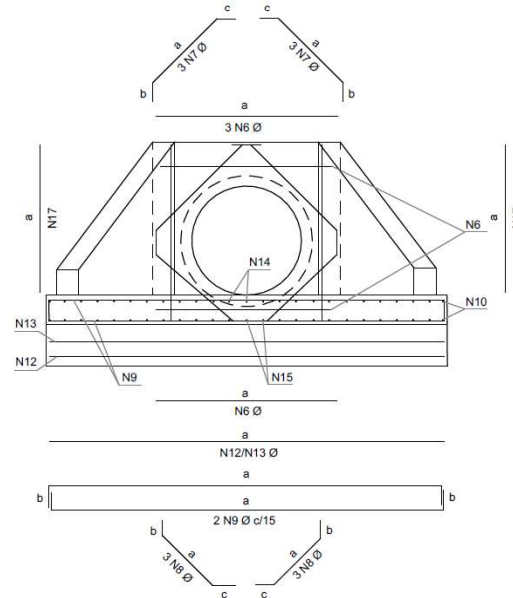
BOCAS NORMAIS COM ALAS ABERTAS (DNIT 6.5 (b/c))

Dispositivo	Adaptável em	Posição	Ø (mm)	Quantidade (un)	Espaçamento (cm)	Quadro de armaduras				Comp. Unitário (cm)	Comp. Total (cm)	Peso Total (kg)
						Dobra (cm)						
						a	b	c	d			
BNAA 01	BSTC 60	N1	6,3	10	15	VAR	17	8	9	VAR	1238	3,0331
		N2	6,3	10	15	VAR	22	8	9	VAR	1311	3,2120
		N3	6,3	40	15	VAR	-	-	-	VAR	2576	6,3112
		N4 ⁶	6,3	26	15	VAR	14	-	-	VAR	1738	4,2581
		N5 ⁶	6,3	24	15	VAR	14	-	-	VAR	1584	3,8808
		N6	6,3	6	7	104	-	-	-	104	624	1,5288
		N7	6,3	6	7	73	15	15	-	103	618	1,5141
		N8	6,3	6	7	62	15	15	-	92	552	1,3524
		N9	6,3	16	15	VAR	14	-	-	VAR	3402	8,3349
		N10	6,3	28	15	VAR	14	-	-	VAR	3938	9,6481
		N11	5,0	14	20	44	14	9	-	134	1876	2,8890
		N12	8,0	6	-	257	-	-	-	257	1542	6,0909
		N13	5,0	2	-	257	-	-	-	257	514	0,7916
		N14	6,3	2	15	129	14	-	-	157	314	0,7693
		N15	6,3	2	15	149	7	14	14	184	368	0,9016
		N16	6,3	4	-	164	16	15	30	241	964	2,3618
		N17	6,3	6	7	102	-	-	-	102	612	1,4994

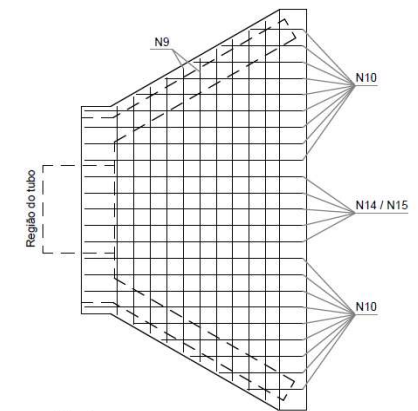
Resumo aço total	Dispositivo	Adaptável em	Ø (mm)	Comprimento (cm)	Peso (kg/un)	Peso Total (kg/un)
	BNAA 01	BSTC 60	5,0	2390	3,6806	58,3771
			6,3	19839	48,6056	
			8,0	1542	6,0909	
	BNAA 02	BSTC 80	5,0	2764	4,2566	92,6928
			6,3	19774	48,4464	
			8,0	10124	39,9898	
BNAA 03	BSTC 100	6,3	18674	40,8514	160,5759	
		8,0	26936	106,3973		
		10,0	2160	13,3272		
BNAA 04	BSTC 120	6,3	20053	49,1300	227,7687	
		8,0	18380	72,6010		
		10,0	17186	106,0377		
BNAA 05	BSTC 150	6,3	6242	15,2929	412,0149	
		8,0	59867	236,4747		
		10,0	25972	160,2473		



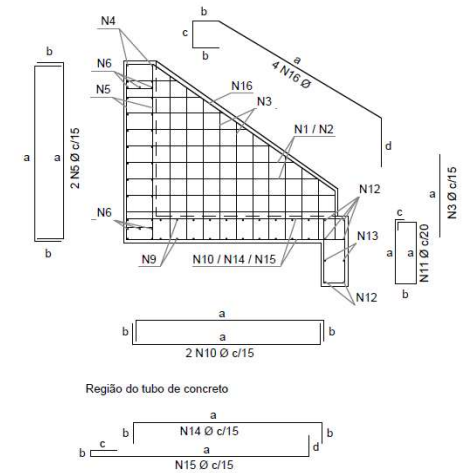
Planta
Armadura dos muros de ala e de testa
Sem escala



Vista frontal
Armadura de borda para a proteção do tubo
Armadura da laje de fundação
Sem escala



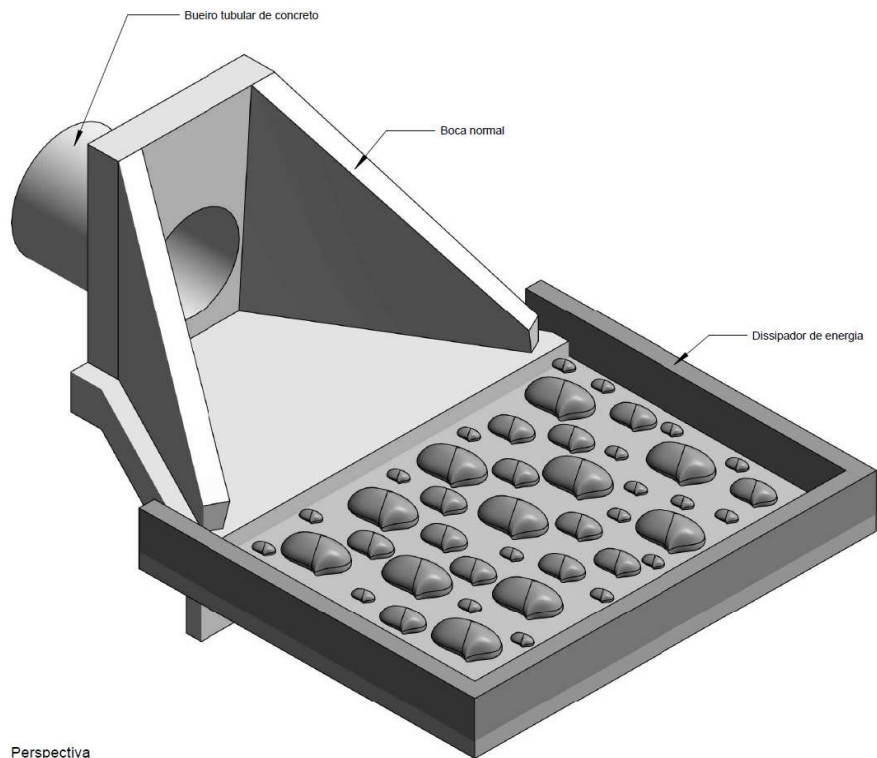
Planta
Armadura da laje de fundação
Sem escala



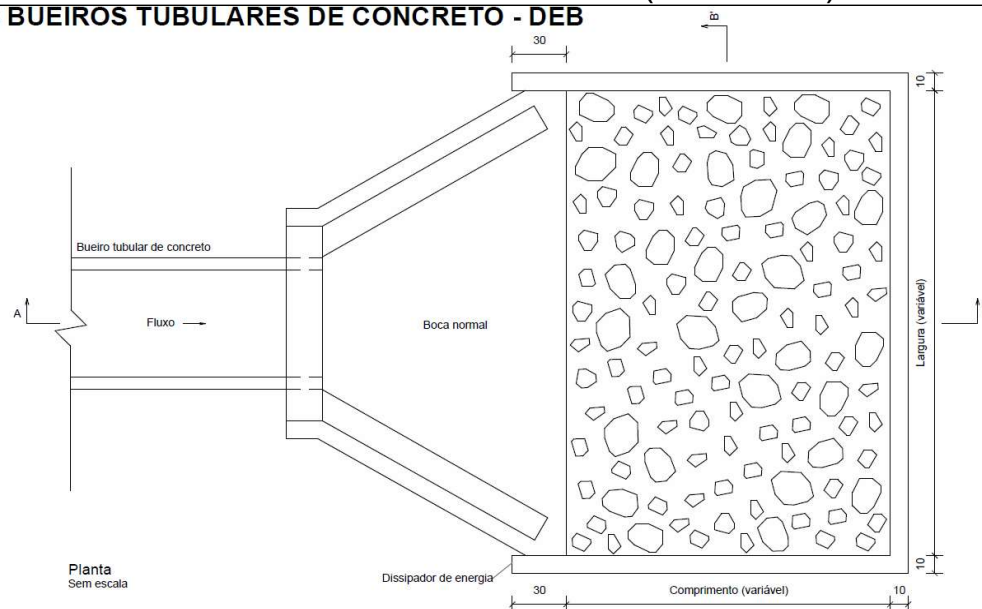
Vista lateral
Armadura dos muros de ala e de testa
Armadura da viga e da laje de fundação
Sem escala

DISSIPADORES DE ENERGIA ADAPTÁVEIS AOS BUEIROS TUBULARES DE CONCRETO – DEB (DNIT 1.20)

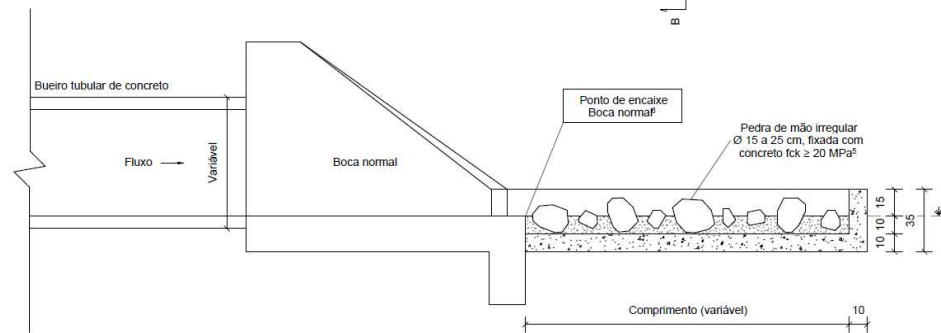
DISSIPADORES DE ENERGIA ADAPTÁVEIS AOS BUEIROS TUBULARES DE CONCRETO - DEB



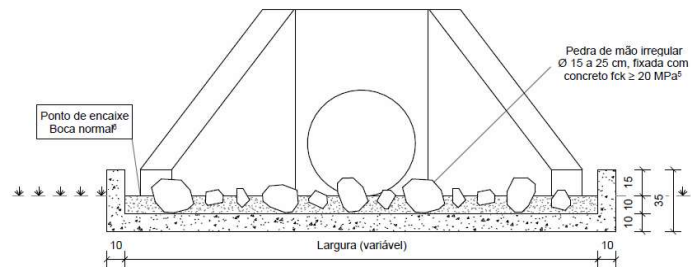
Perspectiva



Planta
Sem escala



Corte A-A'
Sem escala



Corte B-B'
Sem escala

Consumos médios³

Dispositivo	Adaptável em	Comprimento (cm)	Largura (cm)	Escavação (m ³ /un)	Aploamento (m ² /un)	Fôrma (m ² /un)	Pedra de mão (m ³ /un)	Concreto fck ≥ 20 MPa (m ³ /un)	
								Fixação das pedras de mão	Laje e paredes
DEB 180-263	BSTC 60	180	263	1,0874	5,4370	4,3680	0,3748	0,2794	0,7195
DEB 240-316	BSTC 80	240	316	1,6925	8,4623	5,4066	0,5967	0,4491	1,0652
DEB 300-366	BSTC 100	300	366	2,4071	12,0353	6,4278	0,8681	0,6489	1,4651
DEB 360-414	BSTC 120	360	414	3,2235	16,1176	7,4327	1,1815	0,8784	1,9152
DEB 450-551	BSTC 150	450	551	5,2652	26,3260	9,3360	1,9787	1,4559	3,0153
DEB 300-511	BDTC 100	300	511	3,3061	16,5303	7,2978	1,2193	0,9027	1,9509
DEB 360-584	BDTC 120	360	584	4,4788	22,3939	8,4517	1,6713	1,2359	2,5853
DEB 450-746	BDTC 150	450	746	7,0592	35,2960	10,5060	2,6746	1,9726	3,9611
DEB 300-666	BTTC 100	300	666	4,2671	21,3353	8,2278	1,5940	1,1737	2,4701
DEB 360-754	BTTC 120	360	754	5,7395	28,6976	9,4717	2,1629	1,5946	3,2582
DEB 450-956	BTTC 150	450	956	8,9912	44,9560	11,7660	3,4341	2,5252	4,9796

Projeto de drenagem – Detalhamentos

OBRAS DE DRENAGEM DO MUNICÍPIO DE CHAPECÓ