

G. FIELD SURVEY OF TRUNK SEWER



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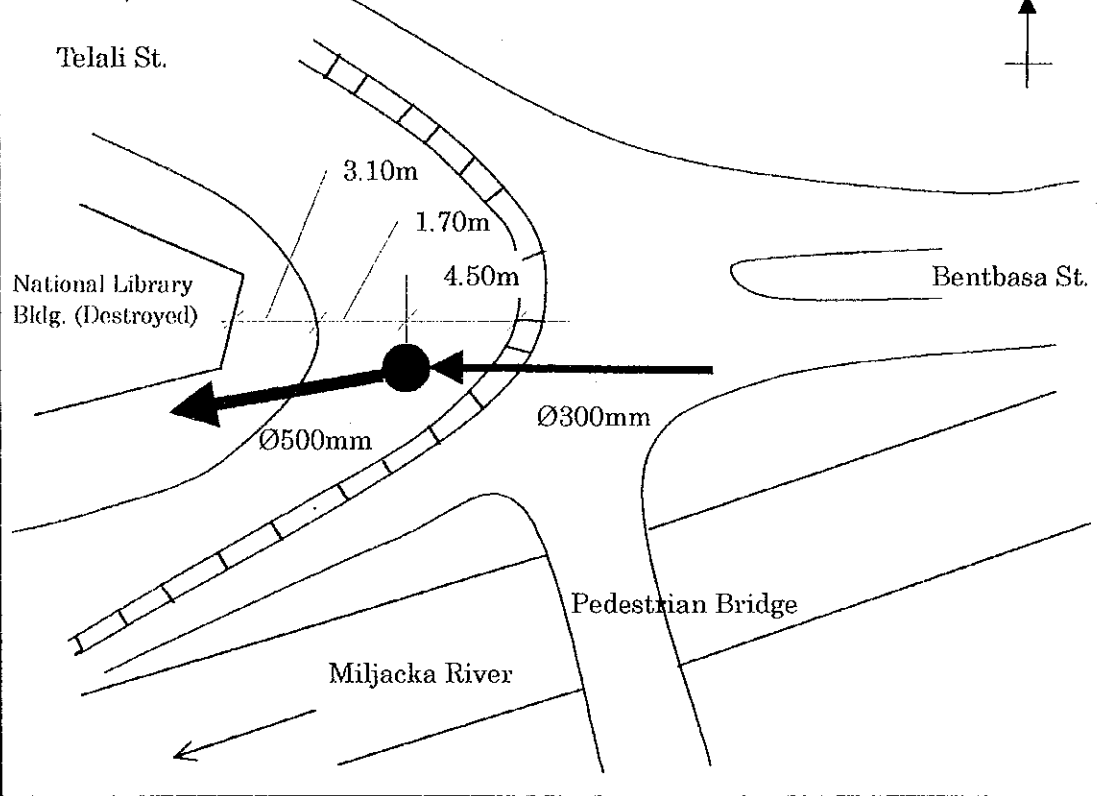
1. SEWER SURVEY SHEET

Figure G. 1 SEWER SURVEY SHEET

SEWER SURVEY SHEET

DATE: March 16, 1999

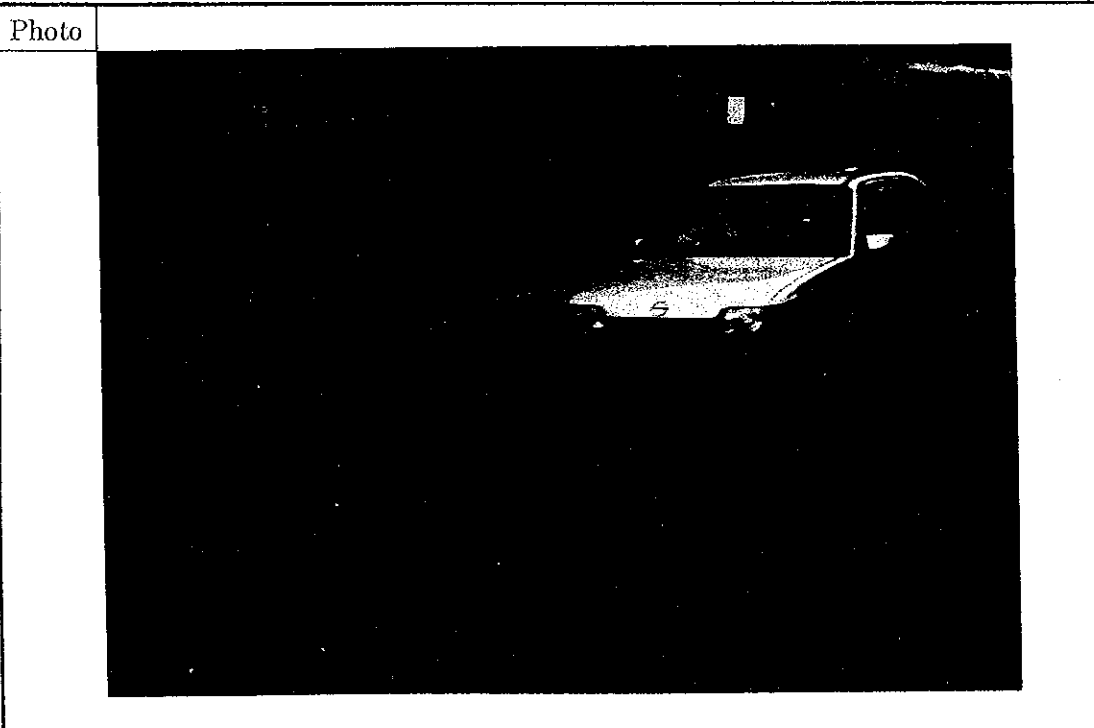
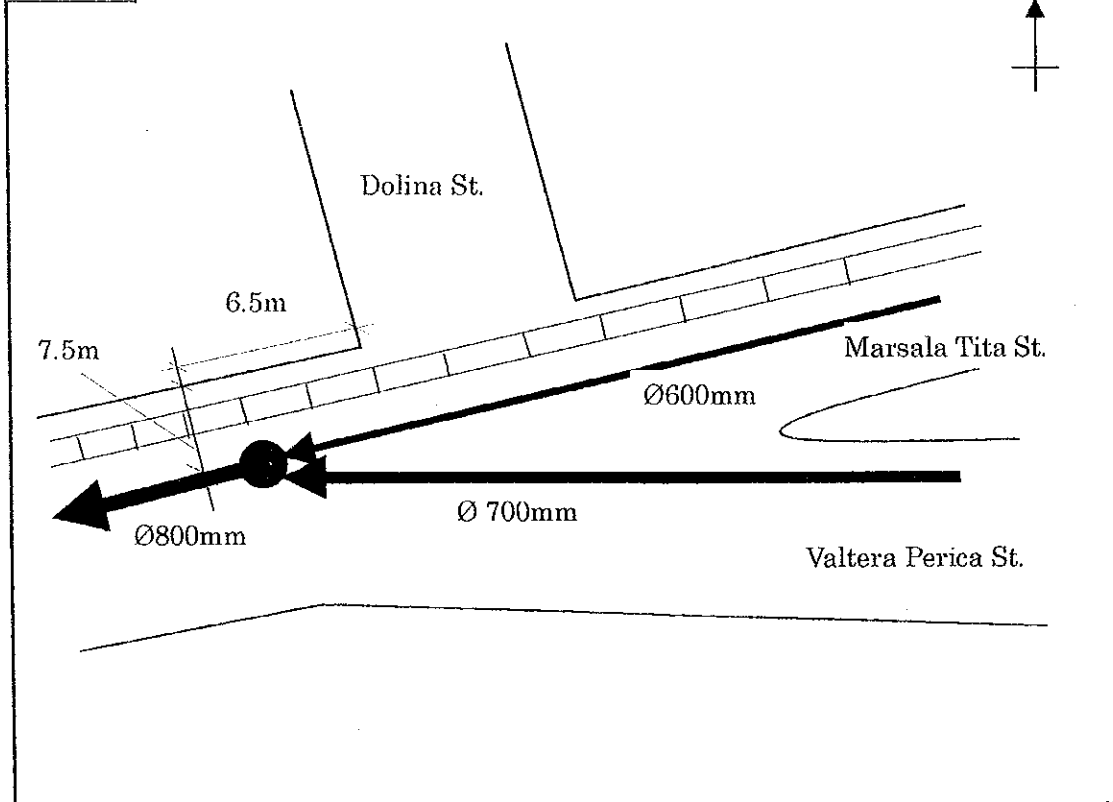
MANHOLE NO.	No. A0-1
LOCATION	Bascarsija, Old Town (Stari Grad)
STREET	Obala Kunina Bana
OFFSET	



SEWER SURVEY SHEET

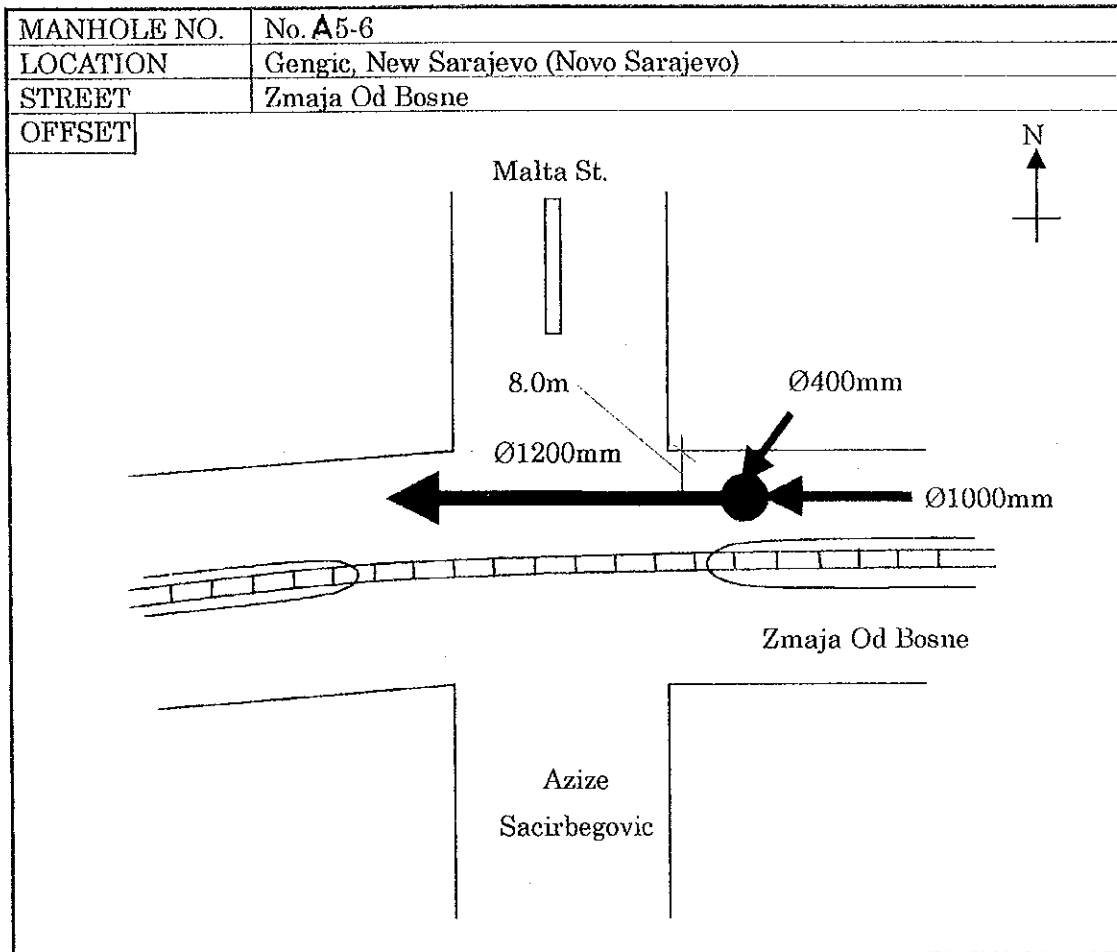
DATE: March 16, 1999

MANHOLE NO.	No. A3-4
LOCATION	Marindvor, Center
STREET	Marsala Tita St.
OFFSET	

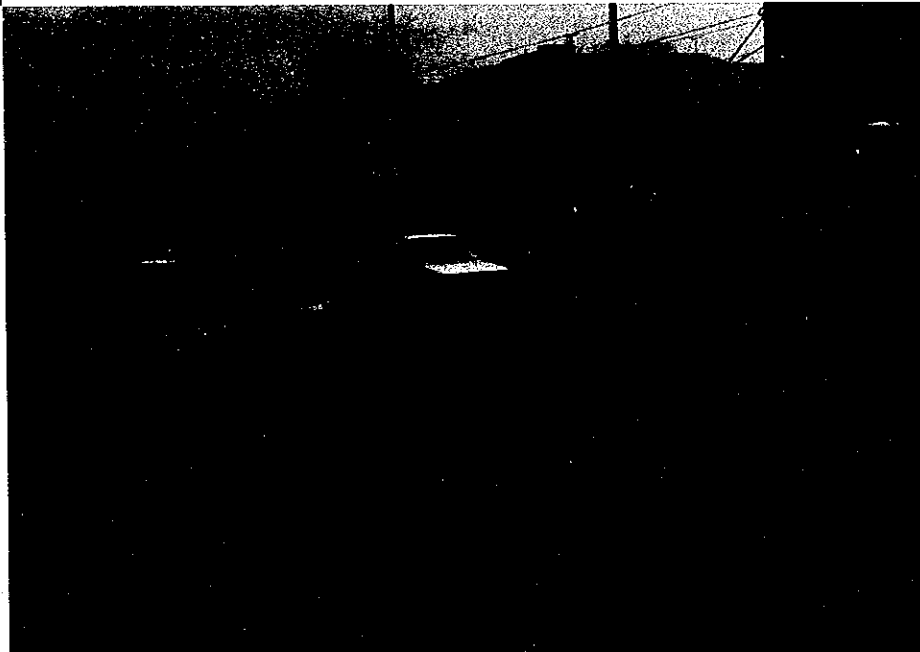


SEWER SURVEY SHEET

DATE: March 16, 1999

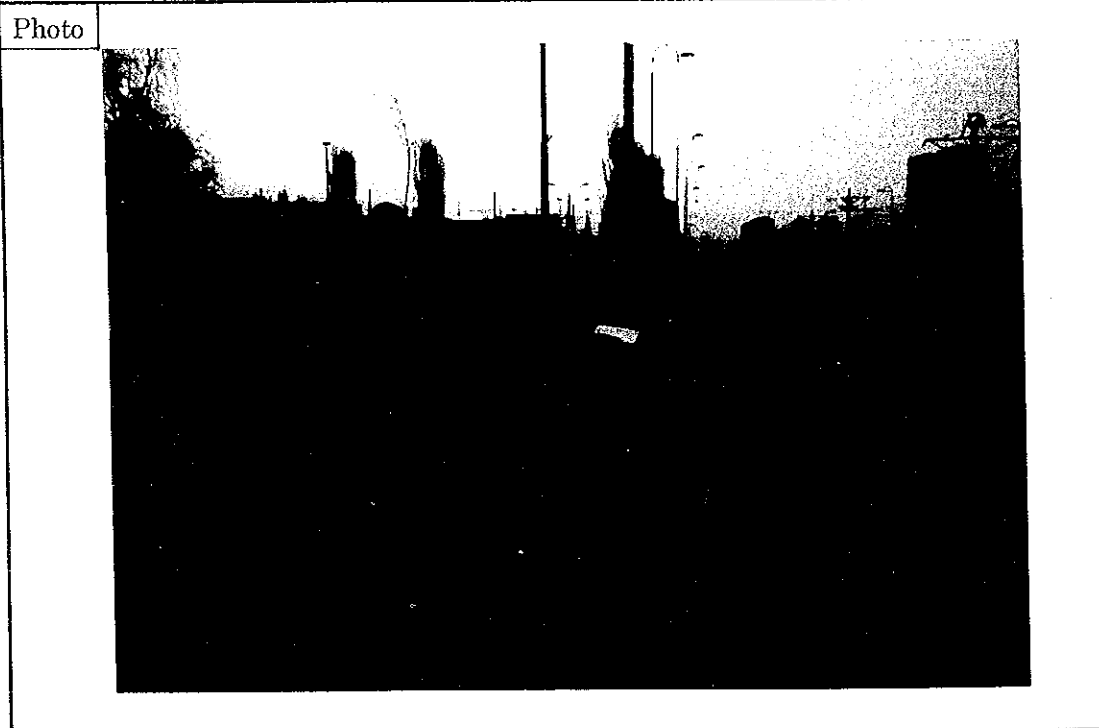
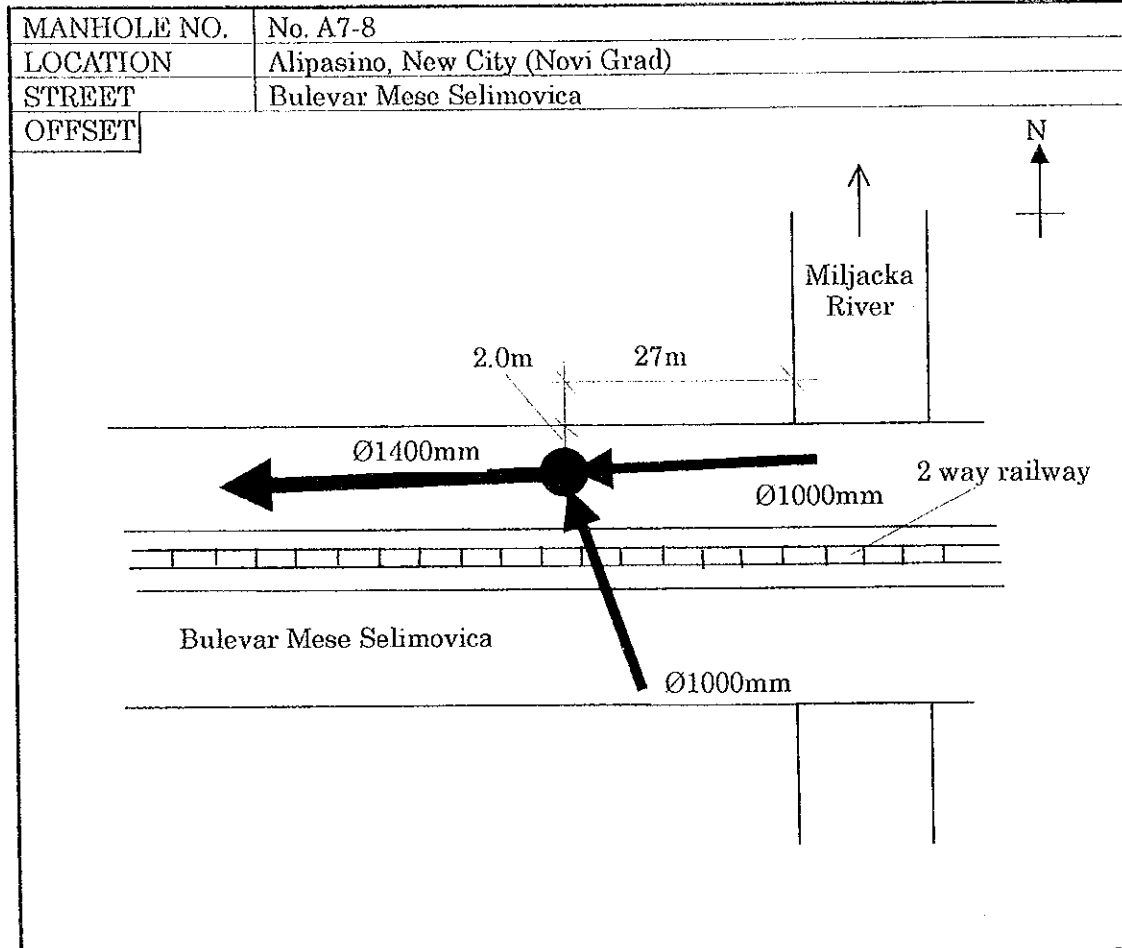


Photo



SEWER SURVEY SHEET

DATE: March 18, 1999



SEWER SURVEY SHEET

DATE: March 17, 1999

MANHOLE NO.	No. A8-9		
LOCATION	Stup, Ilidza		
STREET	Bulevar Mese Selimovica		
OFFSET			
Photo			

SEWER SURVEY SHEET

DATE: March 17, 1999

MANHOLE NO.	No. A11-12
LOCATION	Butila, New City (Novi Grad)
STREET	Bojnicka St.
OFFSET	

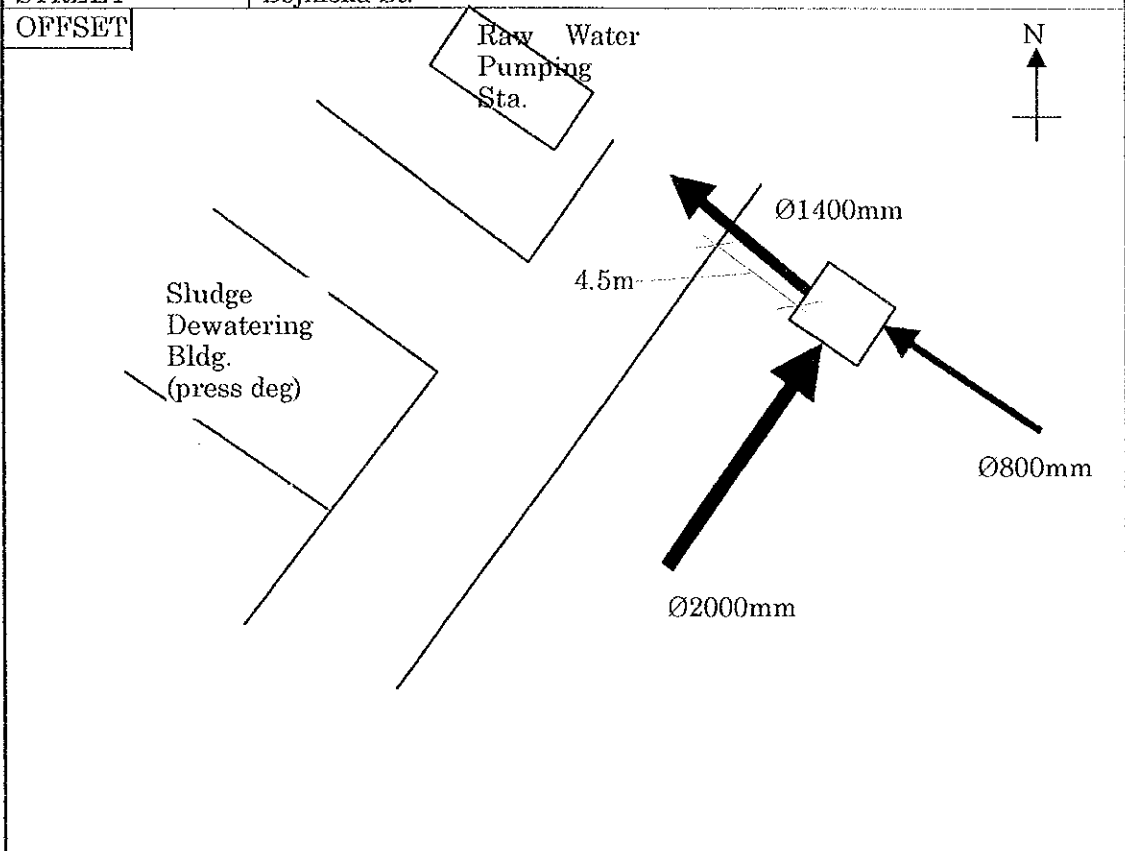
The diagram illustrates the sewer network layout. A central manhole (No. A11-12) is located at the intersection of Bojnicka St and a sewer line. The sewer line has a diameter of Ø2000mm and runs towards the WWTP. Two other sewer lines are shown: one with a diameter of Ø1100mm and another with a diameter of Ø1800mm. A 7m offset is indicated from the manhole to the Ø1100mm line. The area is labeled 'Farm Land' and includes a north arrow.

Photo	<p>A black and white photograph showing a landscape view, likely the area around the manhole and street intersection. The image is mostly dark with some light areas, possibly representing the ground and sky.</p>
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SEWER SURVEY SHEET

DATE: March 17, 1999

MANHOLE NO.	No. A12-WWTP
LOCATION	WWTP, Butila, New City
STREET	Bojnicka St.
OFFSET	



SEWER SURVEY SHEET

DATE: March 16, 1999

MANHOLE NO.	No. B0-1
LOCATION	Ciglane, Center
STREET	Alipasno St.
OFFSET	

Overhead Bridge

Ø300mm

Residential Bldgs.

Ø500mm

Alipasno St.

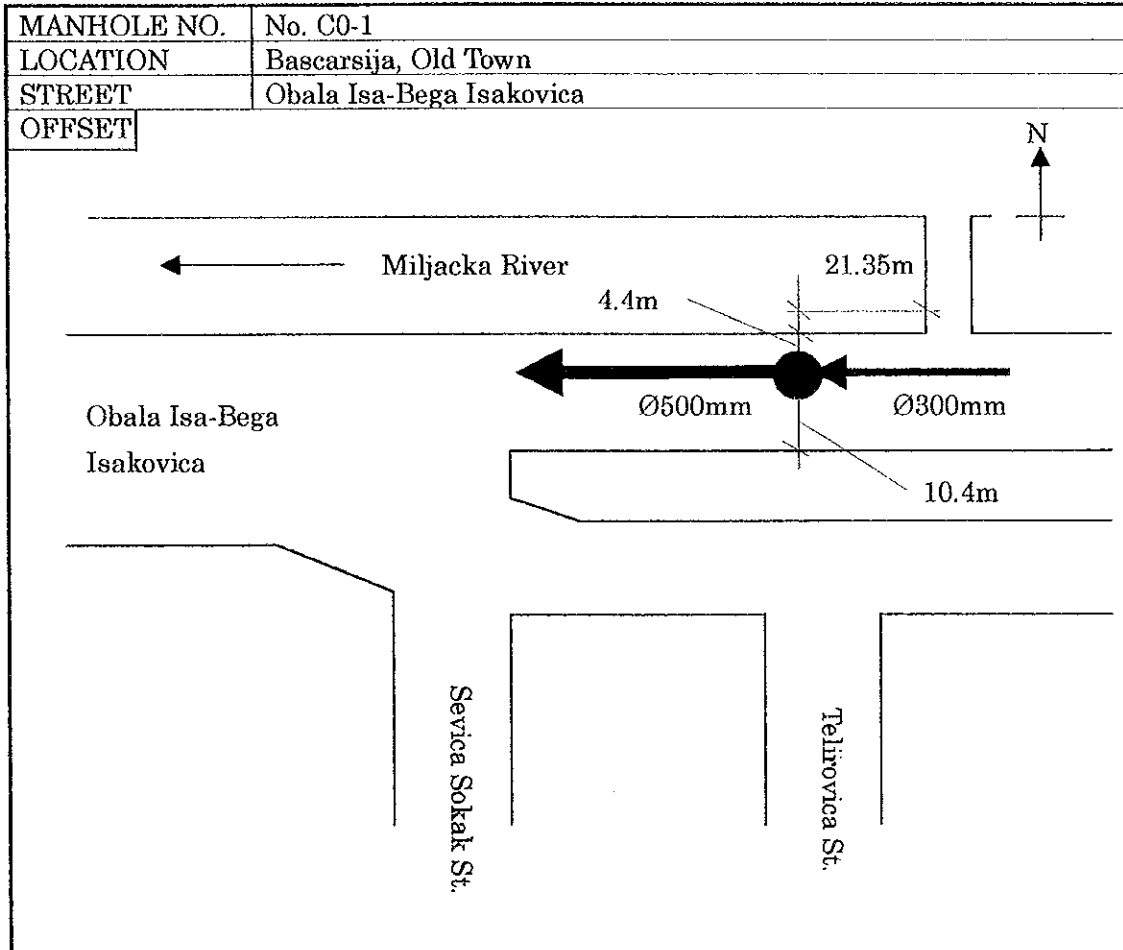
7.2m

N

Photo	<p>Photo</p>
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SEWER SURVEY SHEET

DATE: March 16, 1999

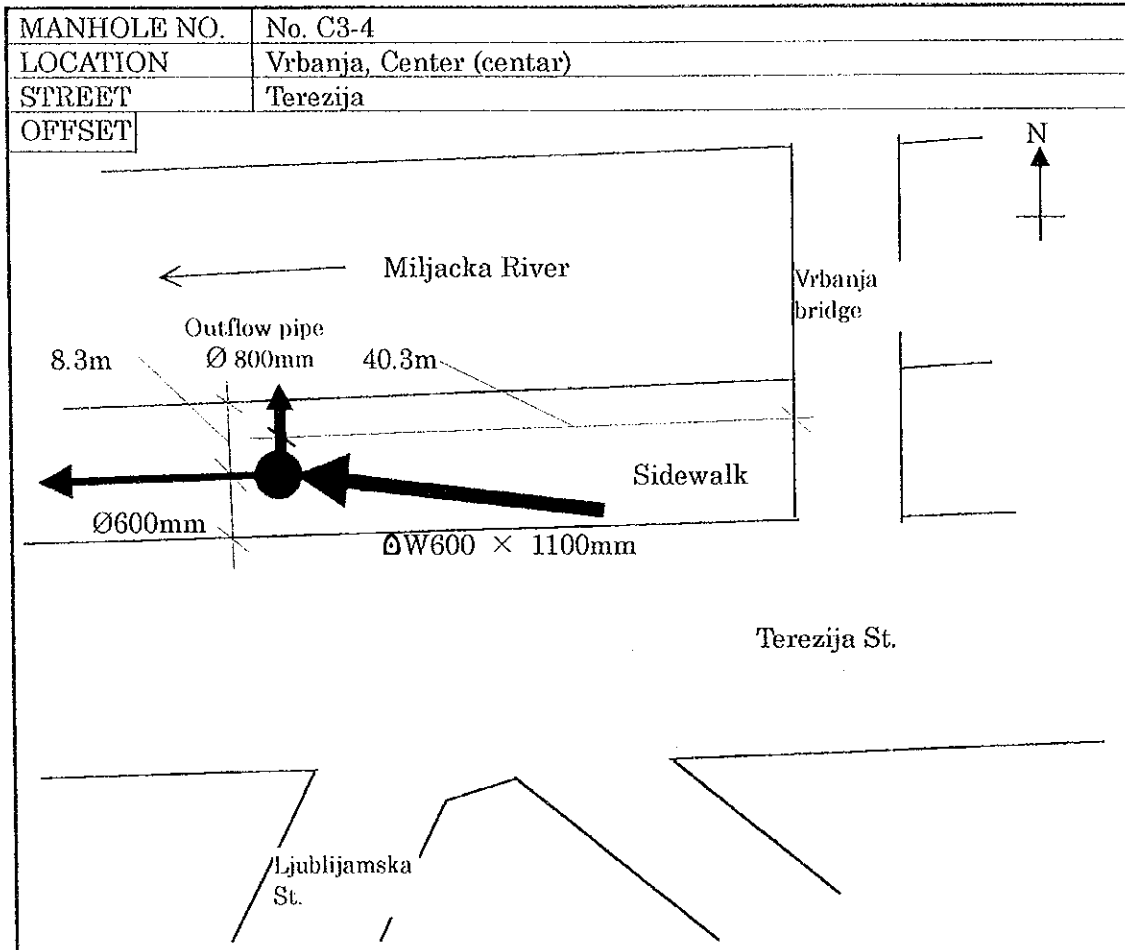


Photo



SEWER SURVEY SHEET

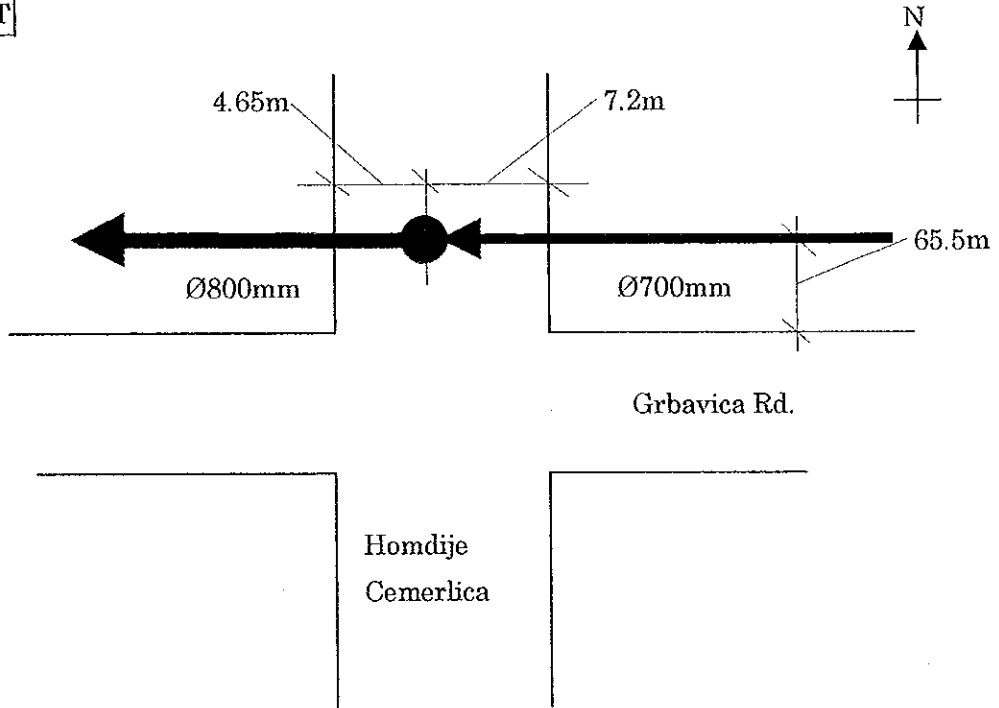
DATE: March 16, 1999



SEWER SURVEY SHEET

DATE: March 16, 1999

MANHOLE NO.	No. C5-6
LOCATION	Grbavica, New Sarajevo (Novo Sarajevo)
STREET	Hombije Cemerlica
OFFSET	

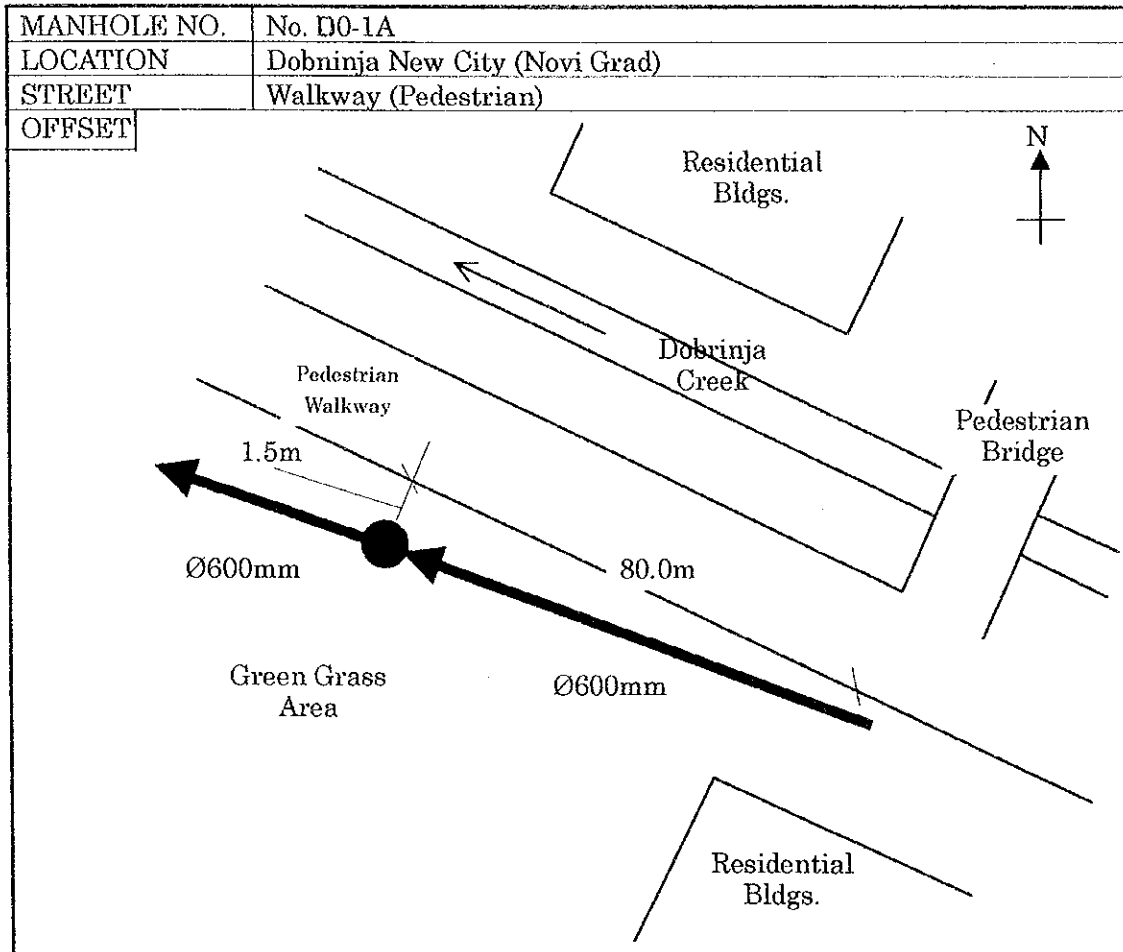


Photo



SEWER SURVEY SHEET

DATE: March 17, 1999



Photo



SEWER SURVEY SHEET

DATE: March 18, 1999

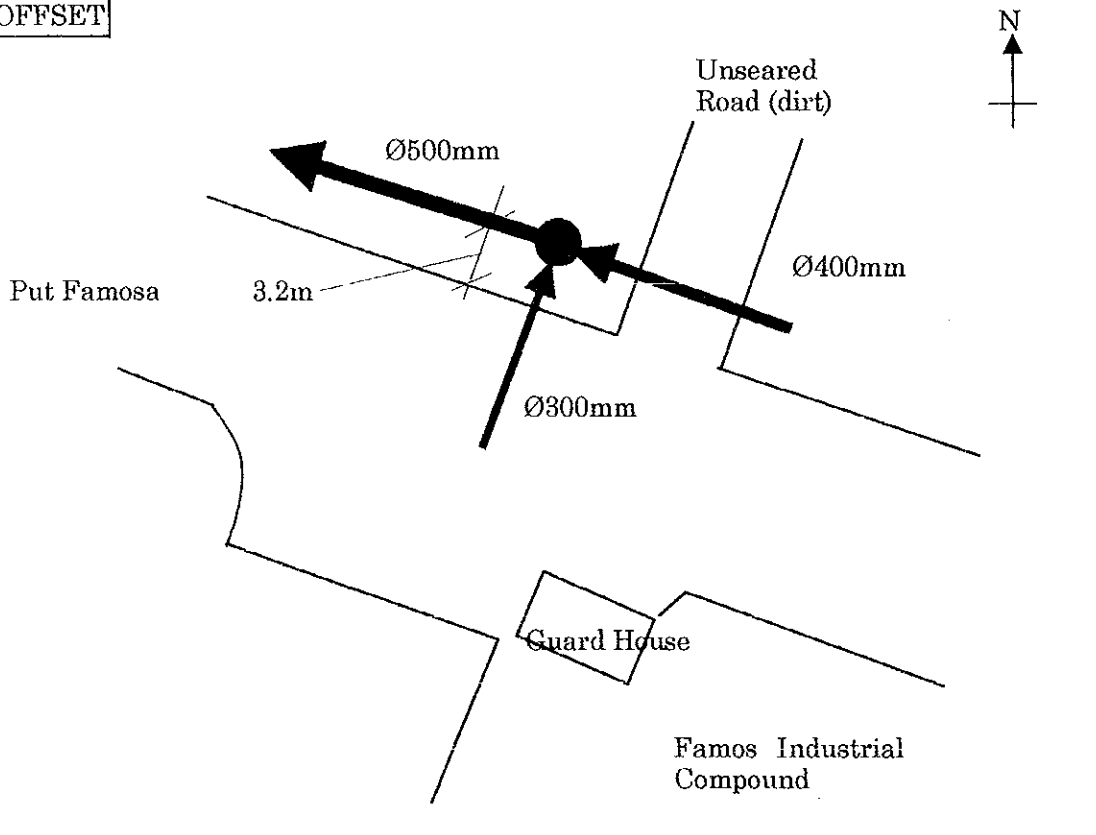
MANHOLE NO.	No. E0-1
LOCATION	Butmir, Ilidza
STREET	Butmirska Cesta
OFFSET	<div style="text-align: right; margin-bottom: 10px;">N ↑</div>
Photo	

SEWER SURVEY SHEET

DATE: March 18, 1999

MANHOLE NO.	No. F0-1
LOCATION	Famos Industrial, Hrasnica
STREET	Put Famosa

OFFSET



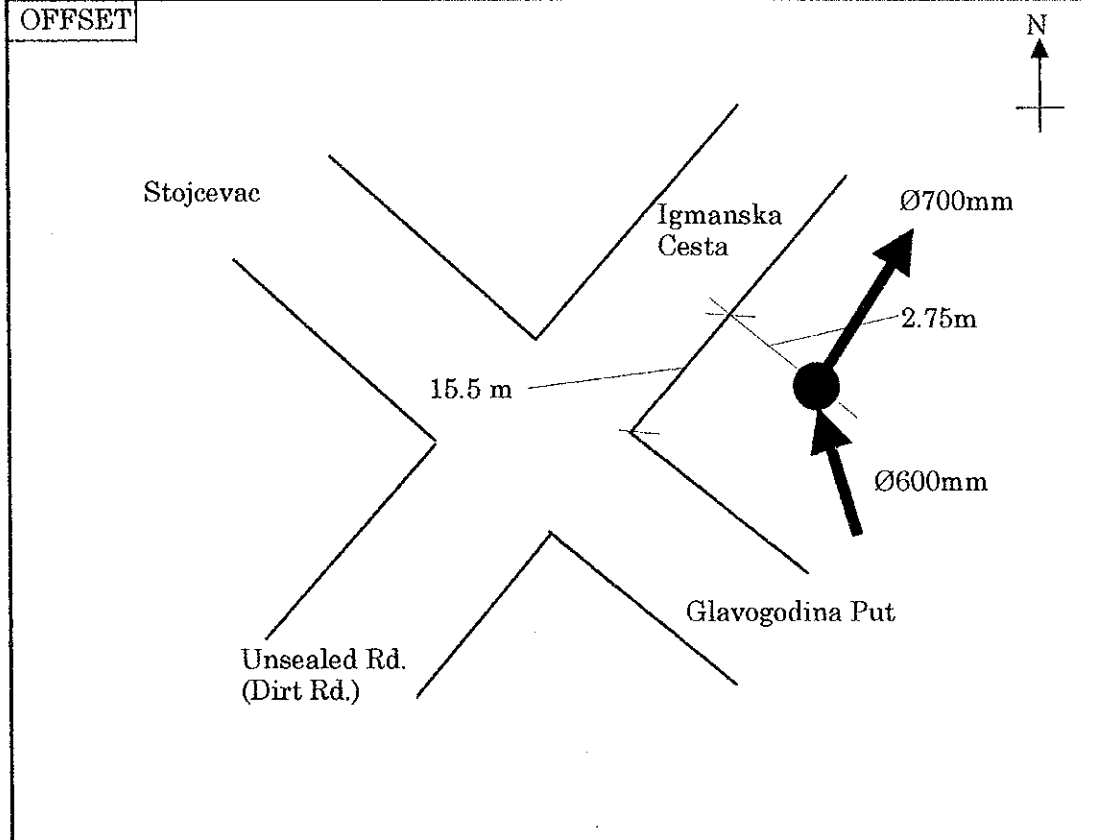
Photo



SEWER SURVEY SHEET

DATE: March 18, 1999

MANHOLE NO.	No. F2-3
LOCATION	Glavogodina, Ilidza
STREET	Igmanska, Cesta
OFFSET	



Photo

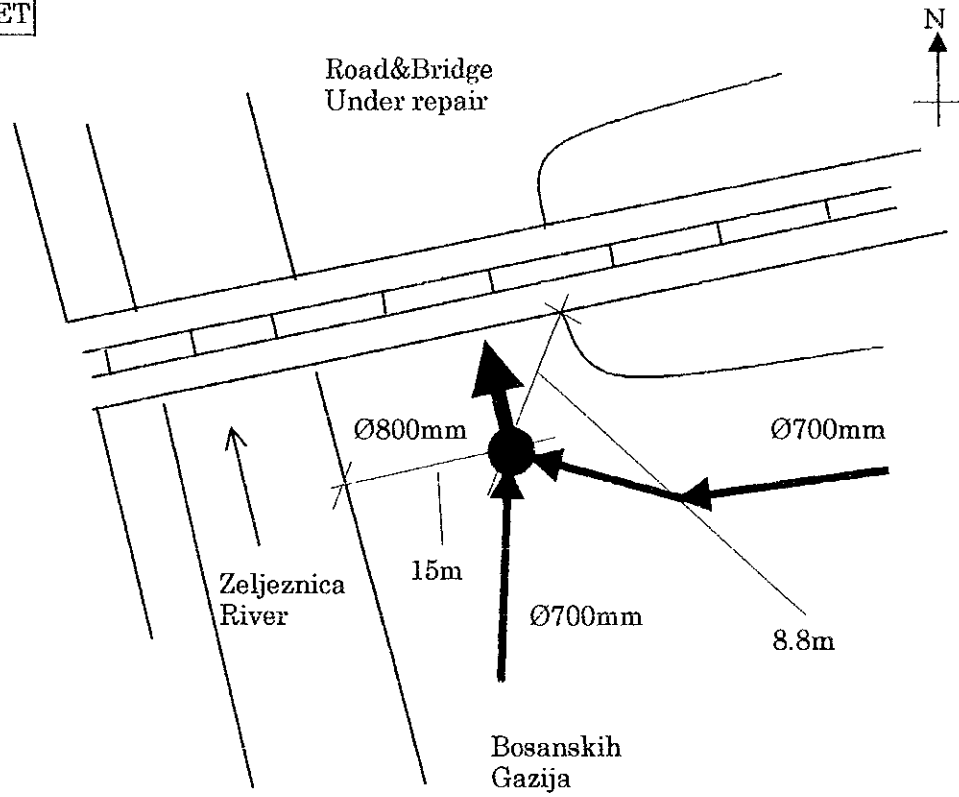


SEWER SURVEY SHEET

DATE: March 18, 1999

MANHOLE NO.	No. F3-4
LOCATION	Ilidza
STREET	Bosanskin Gazija

OFFSET

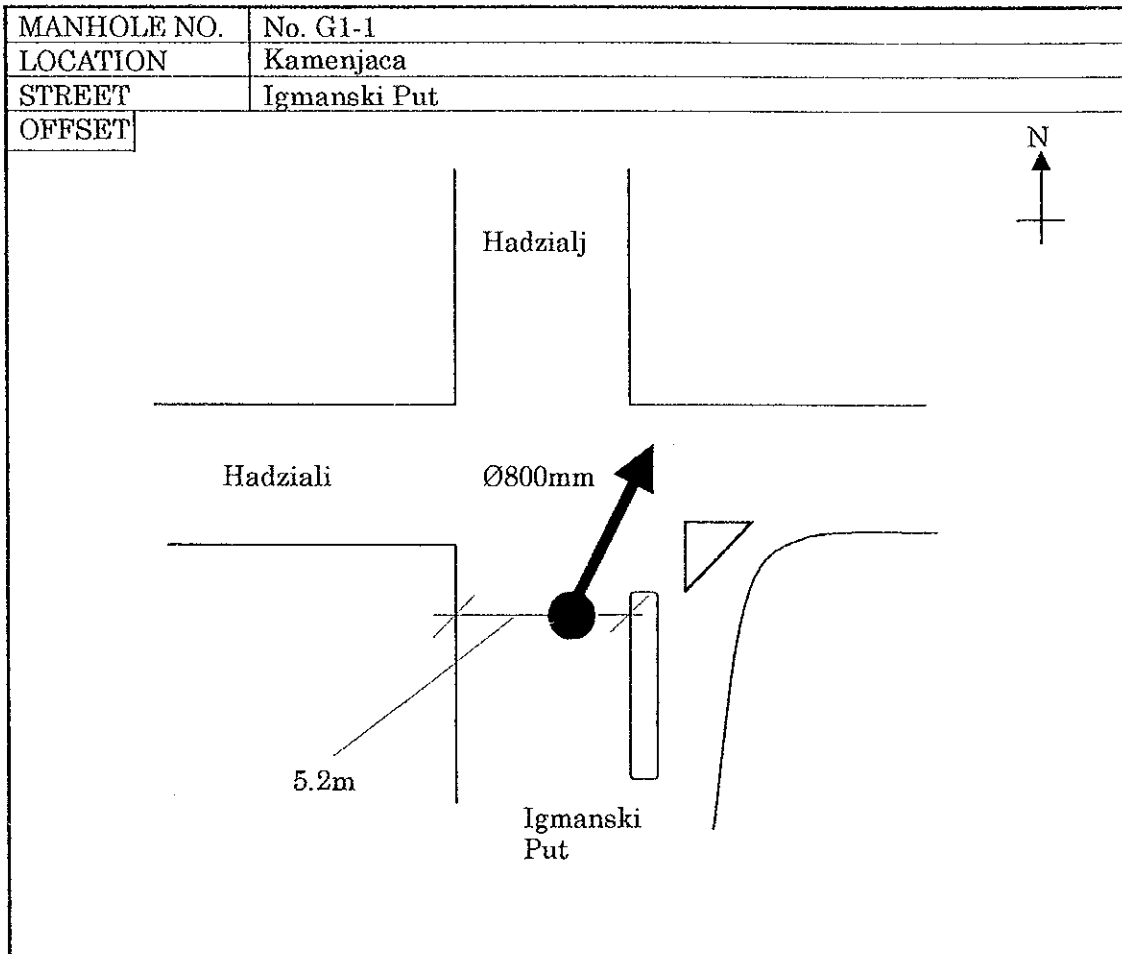


Photo



SEWER SURVEY SHEET

DATE: March 18, 1999

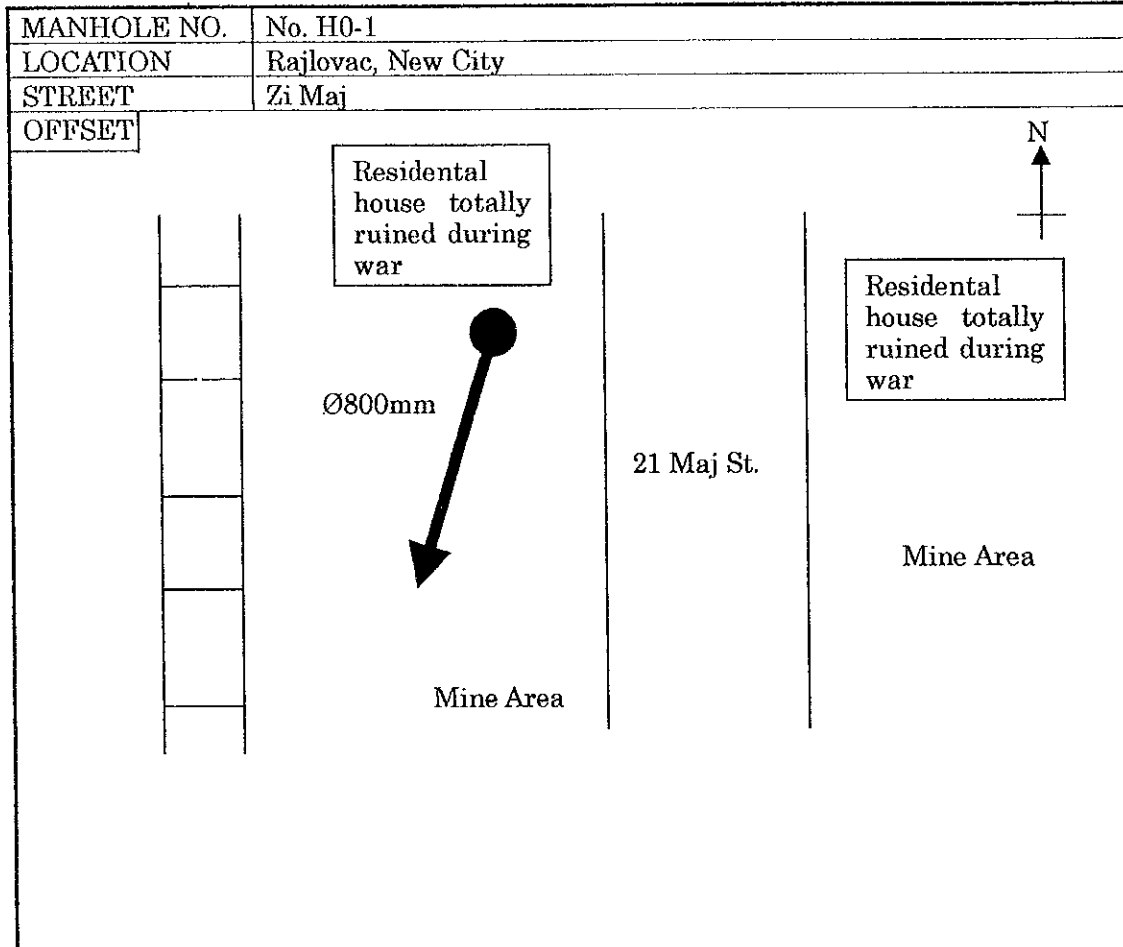


Photo

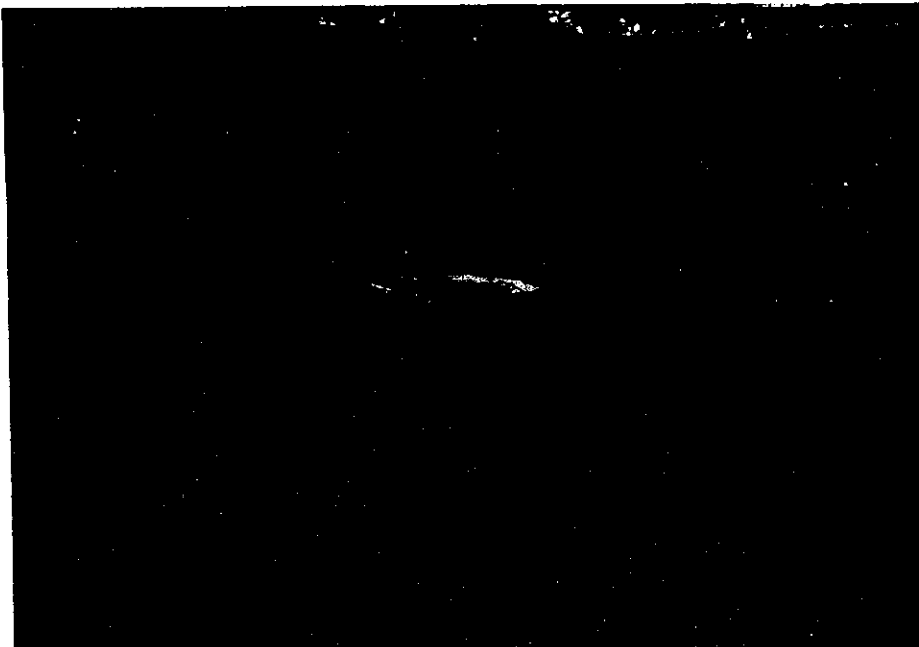


SEWER SURVEY SHEET

DATE: March 18, 1999



Photo



2. LONGITUDINAL PROFILE FOR TRUNK SEWER

NO.1

FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - A

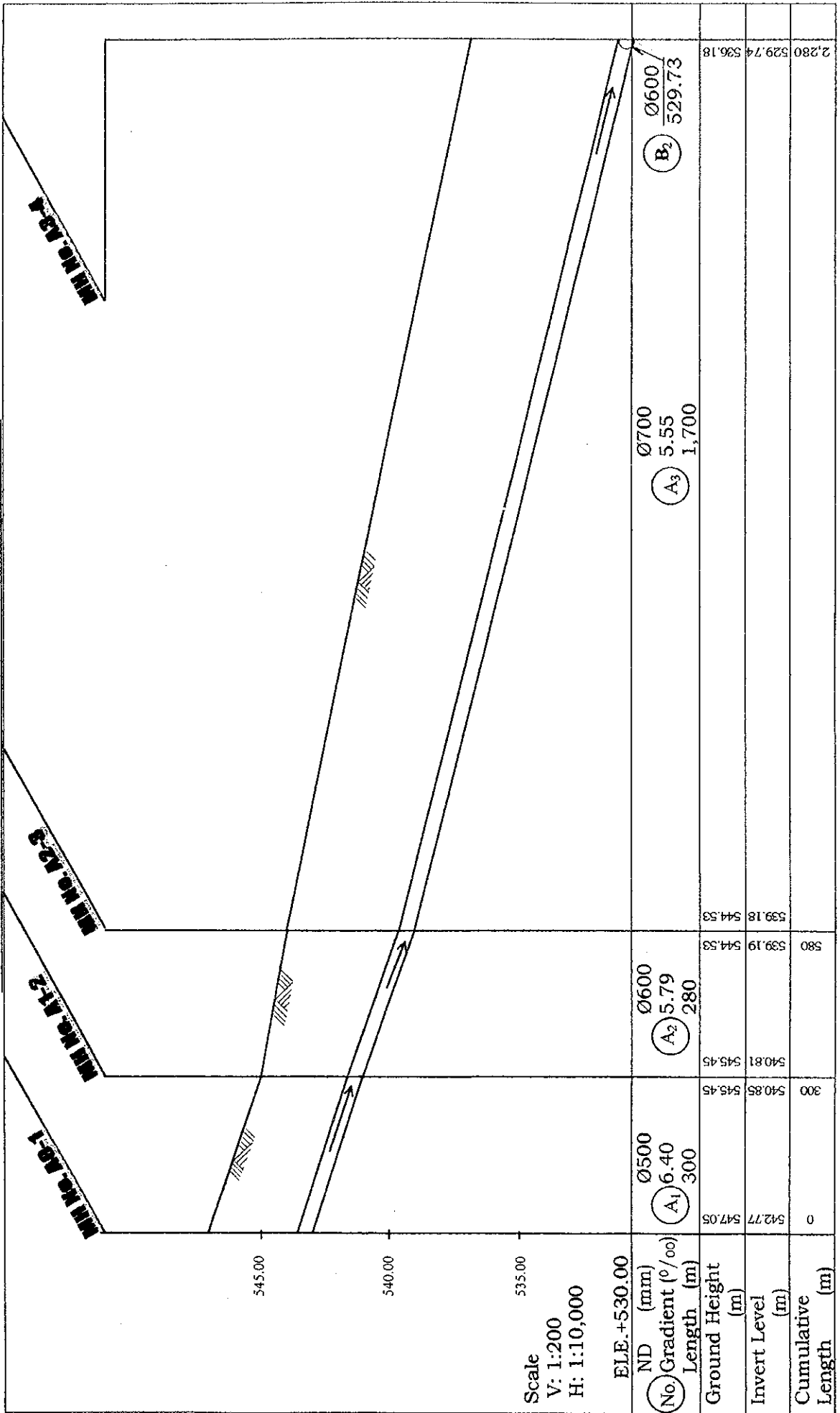
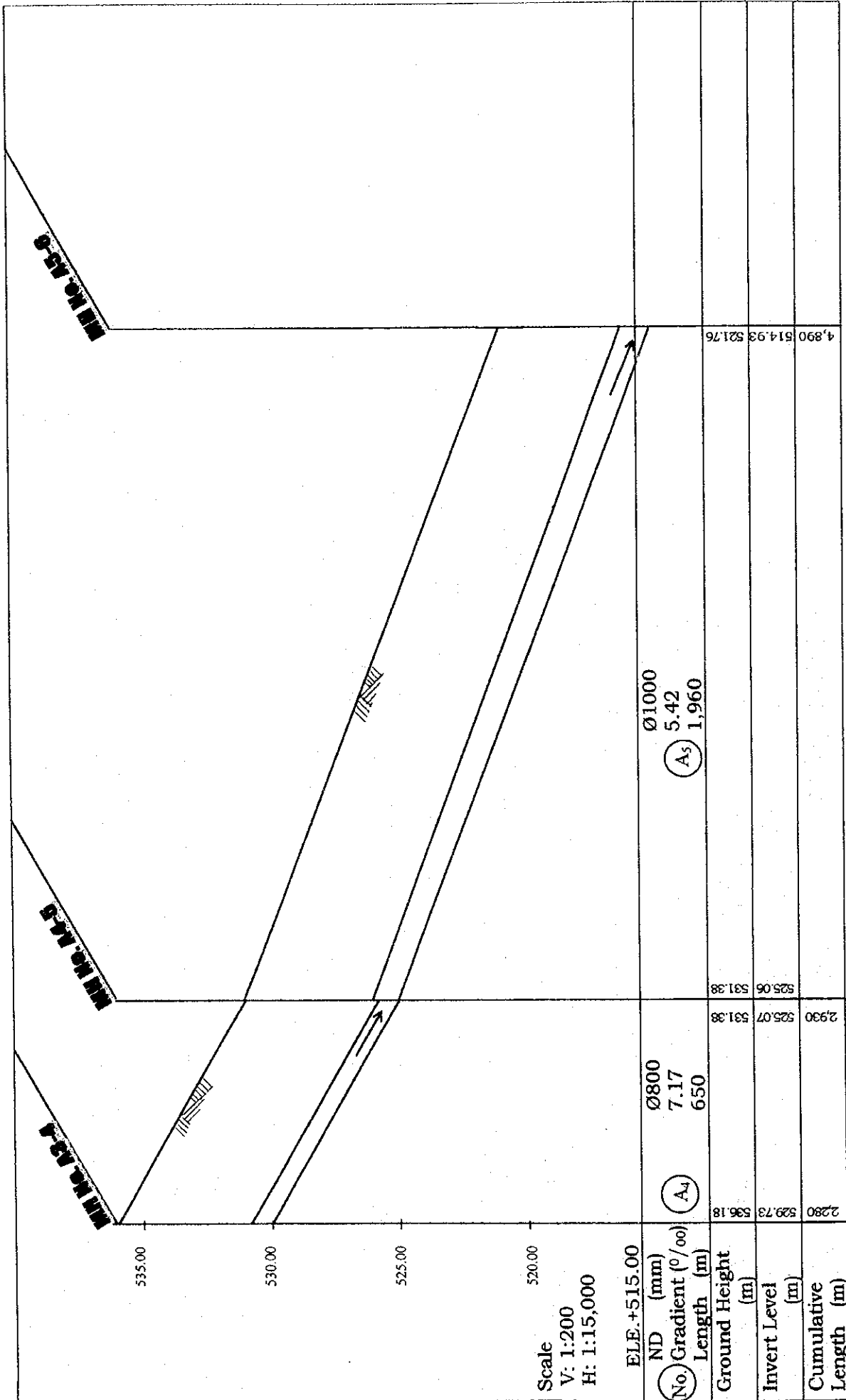
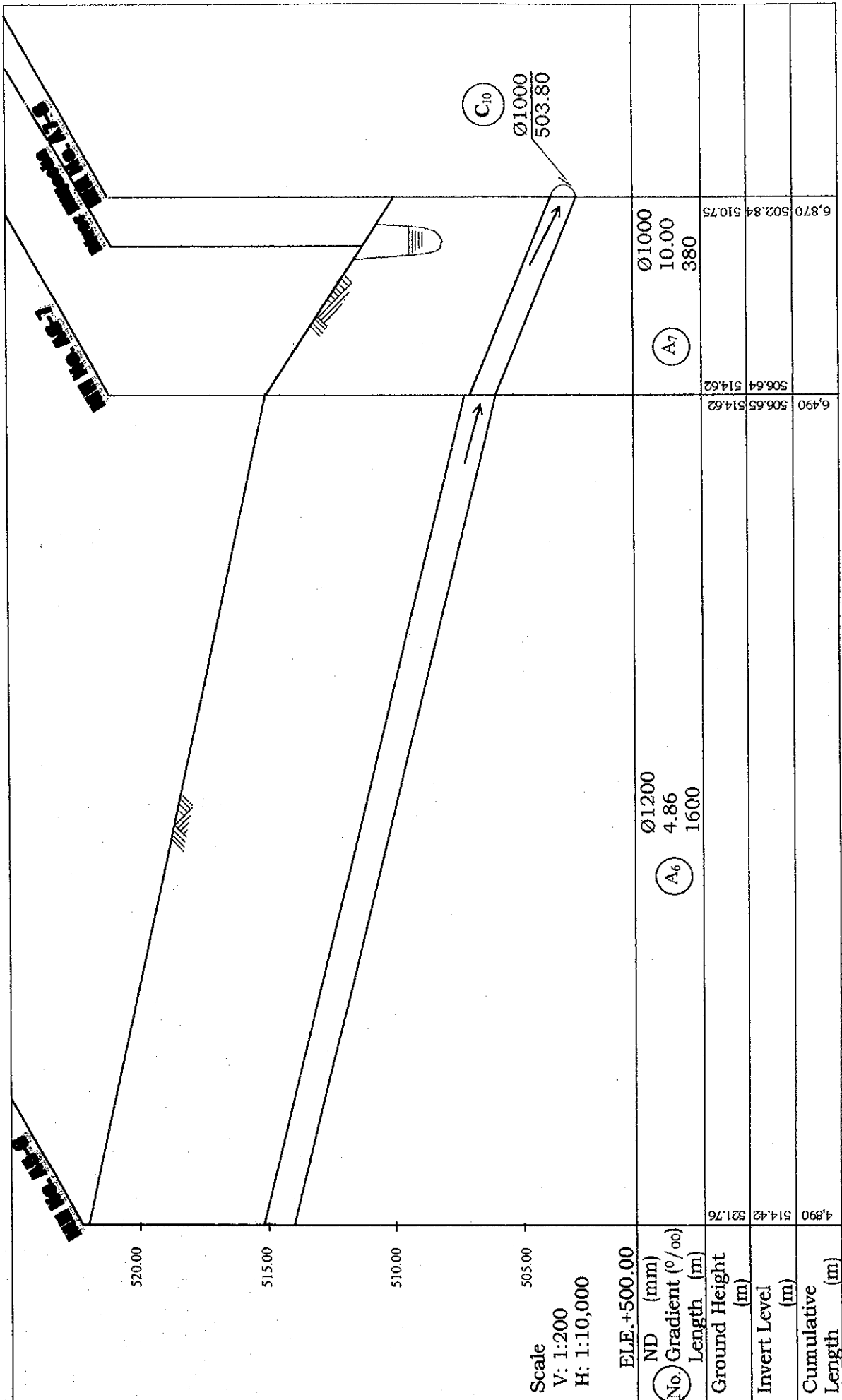
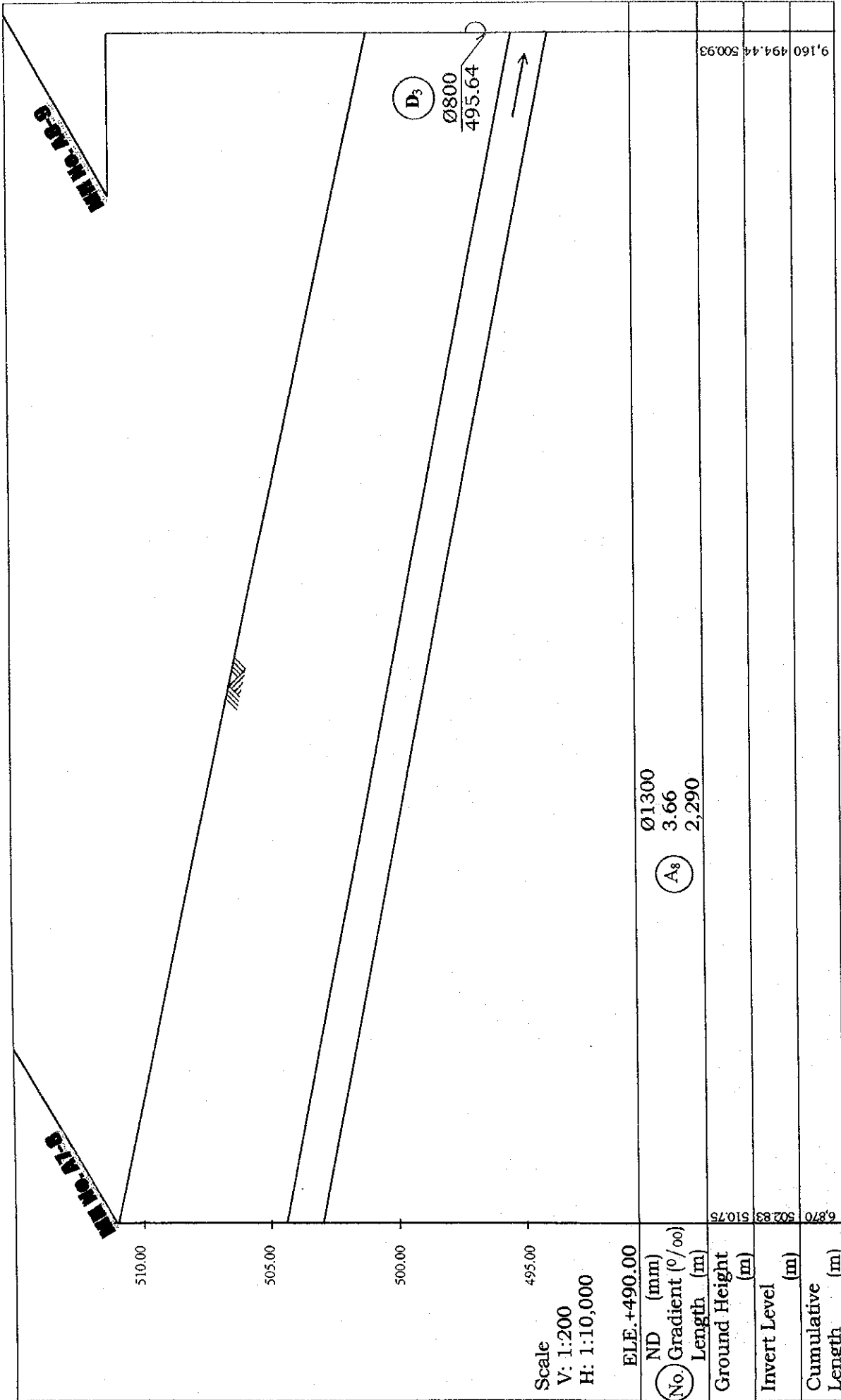


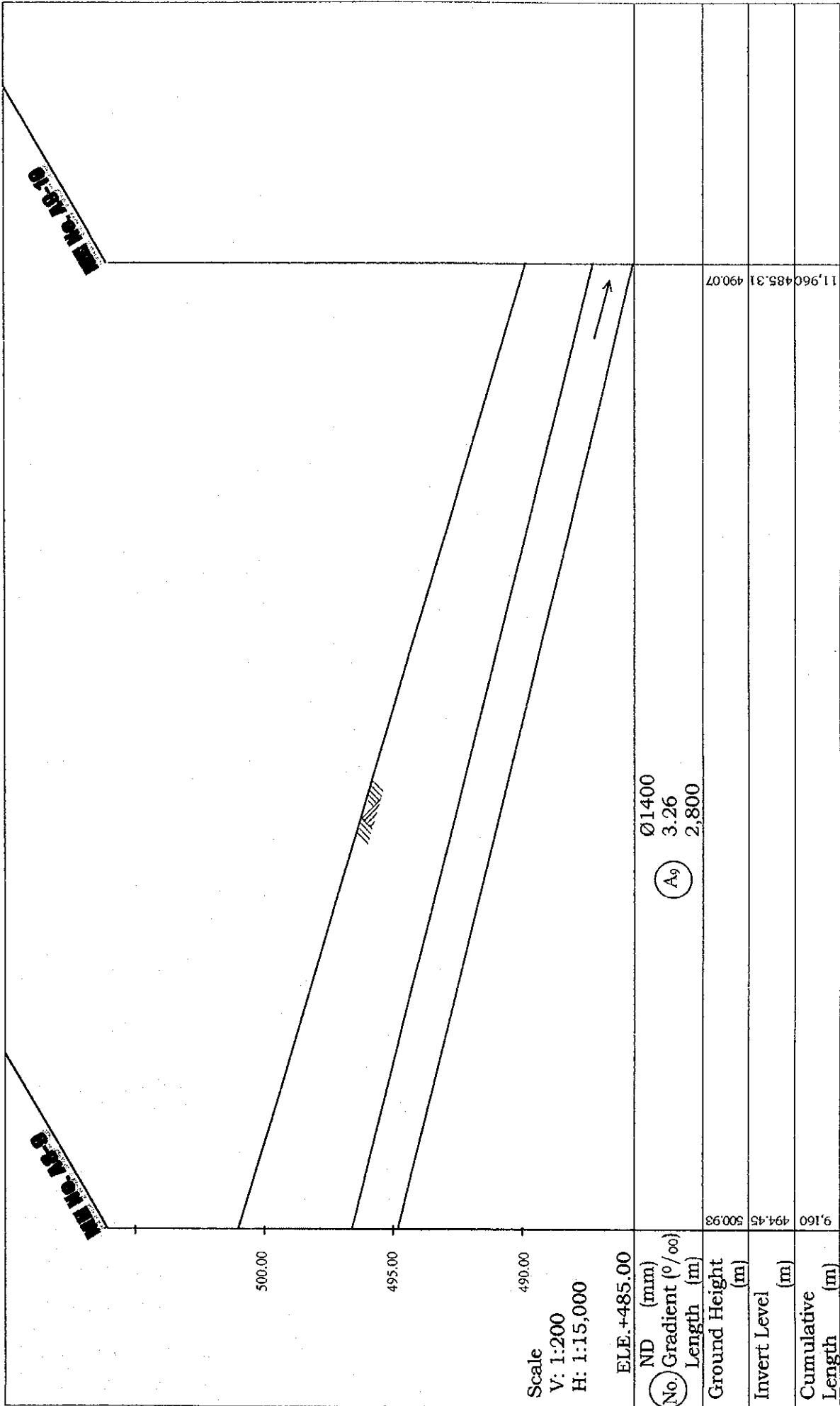
Figure G. 2 LONGITUDINAL PROFILE FOR TRUNK SEWER







NO.5



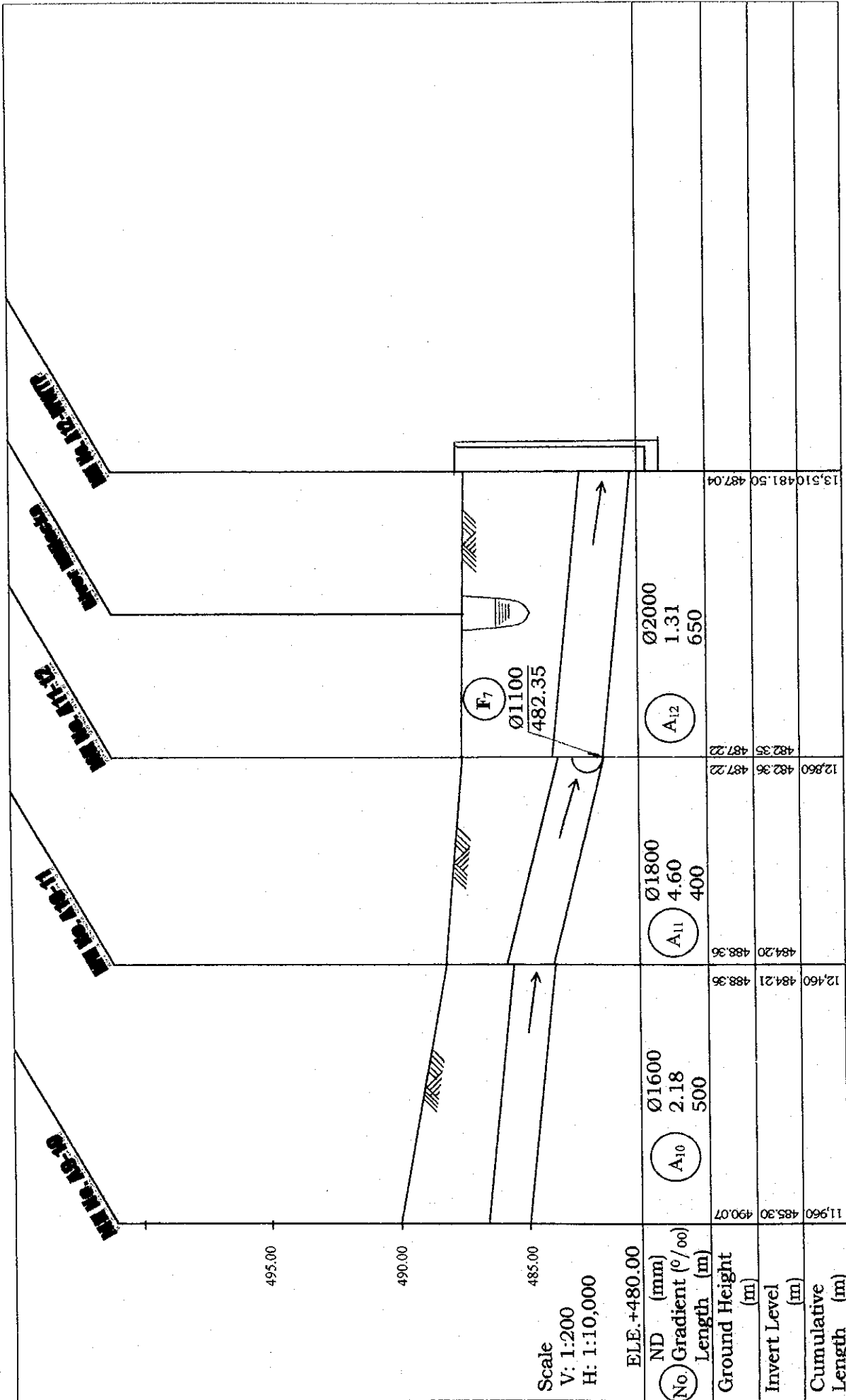


FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - B

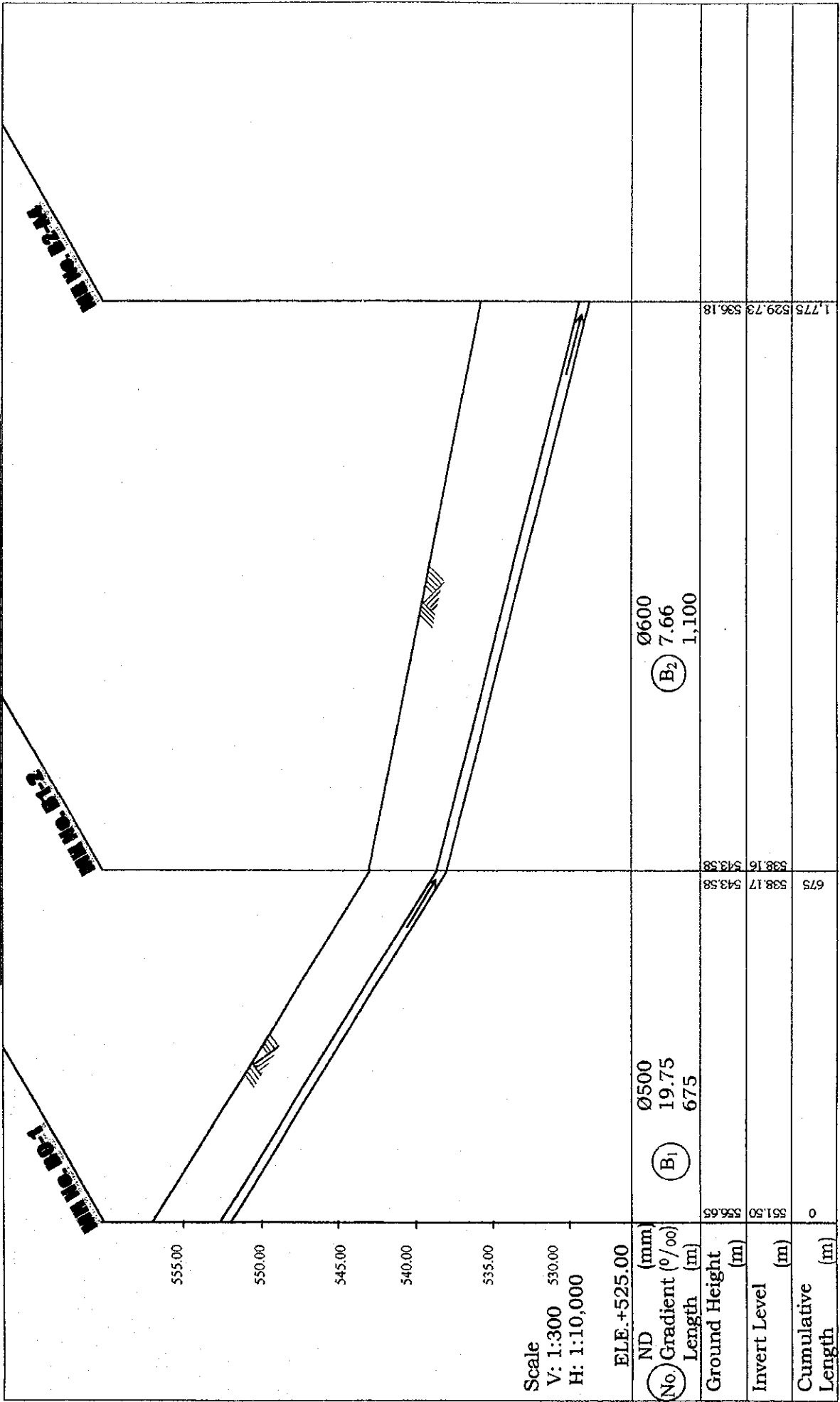
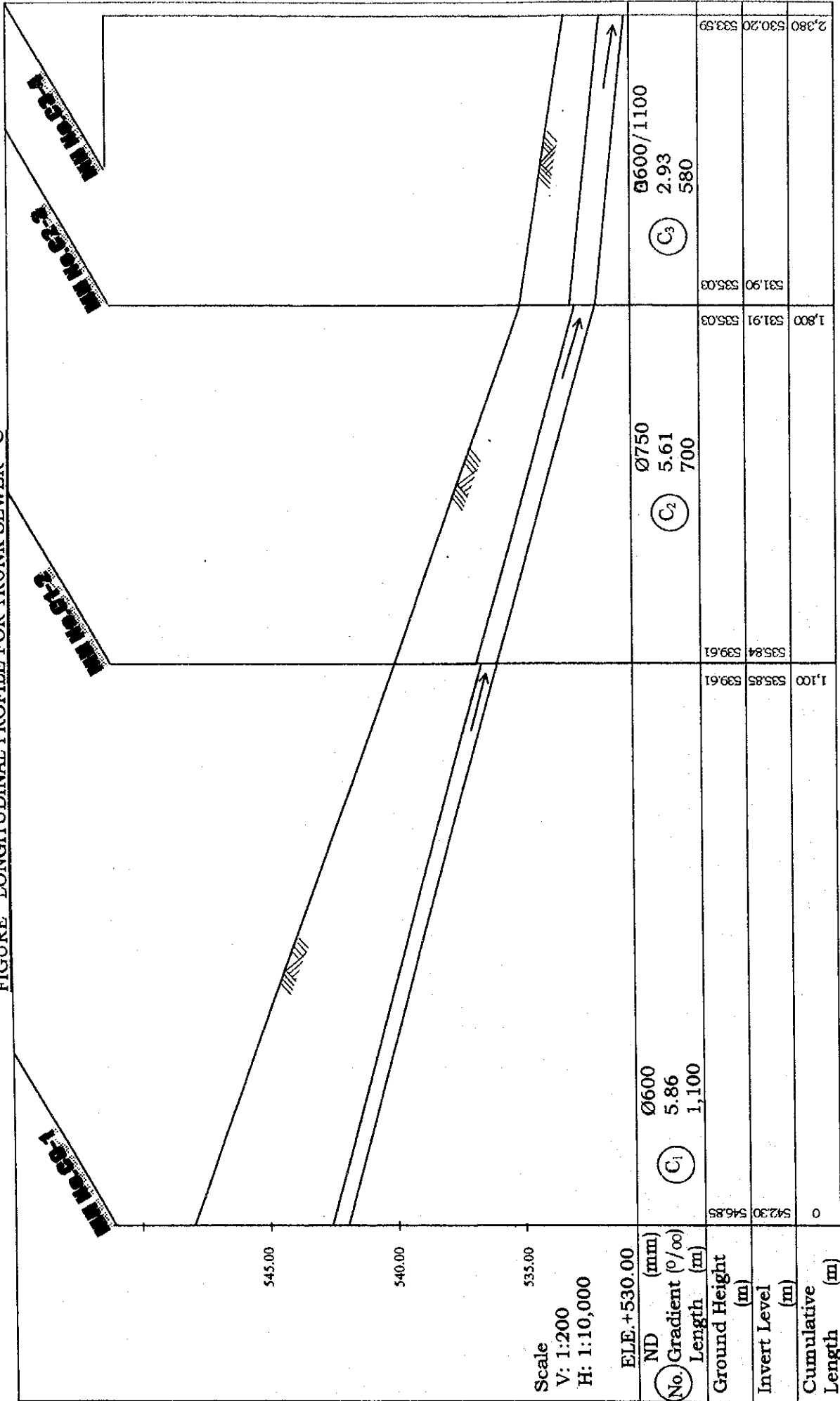
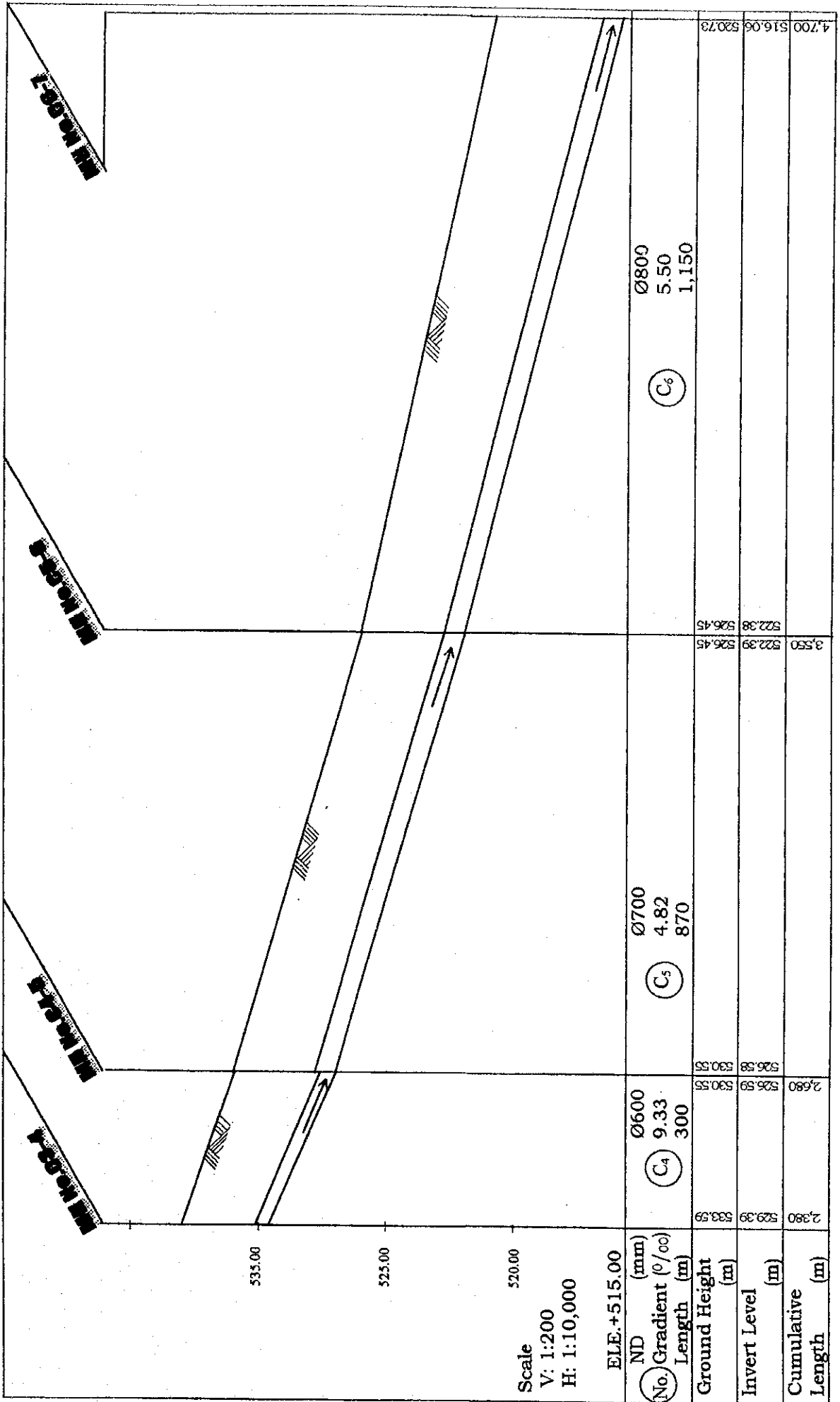


FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - C

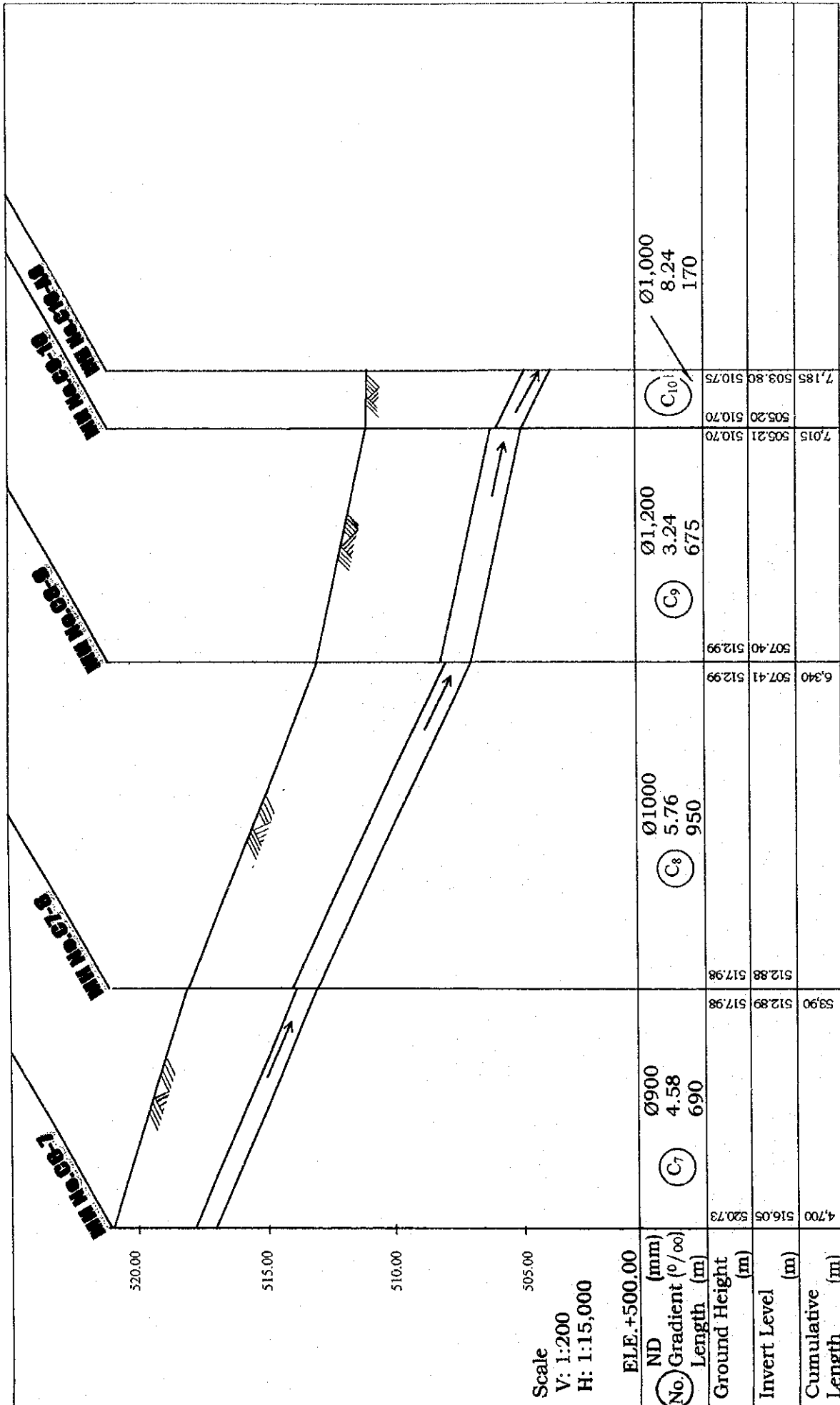




Scale
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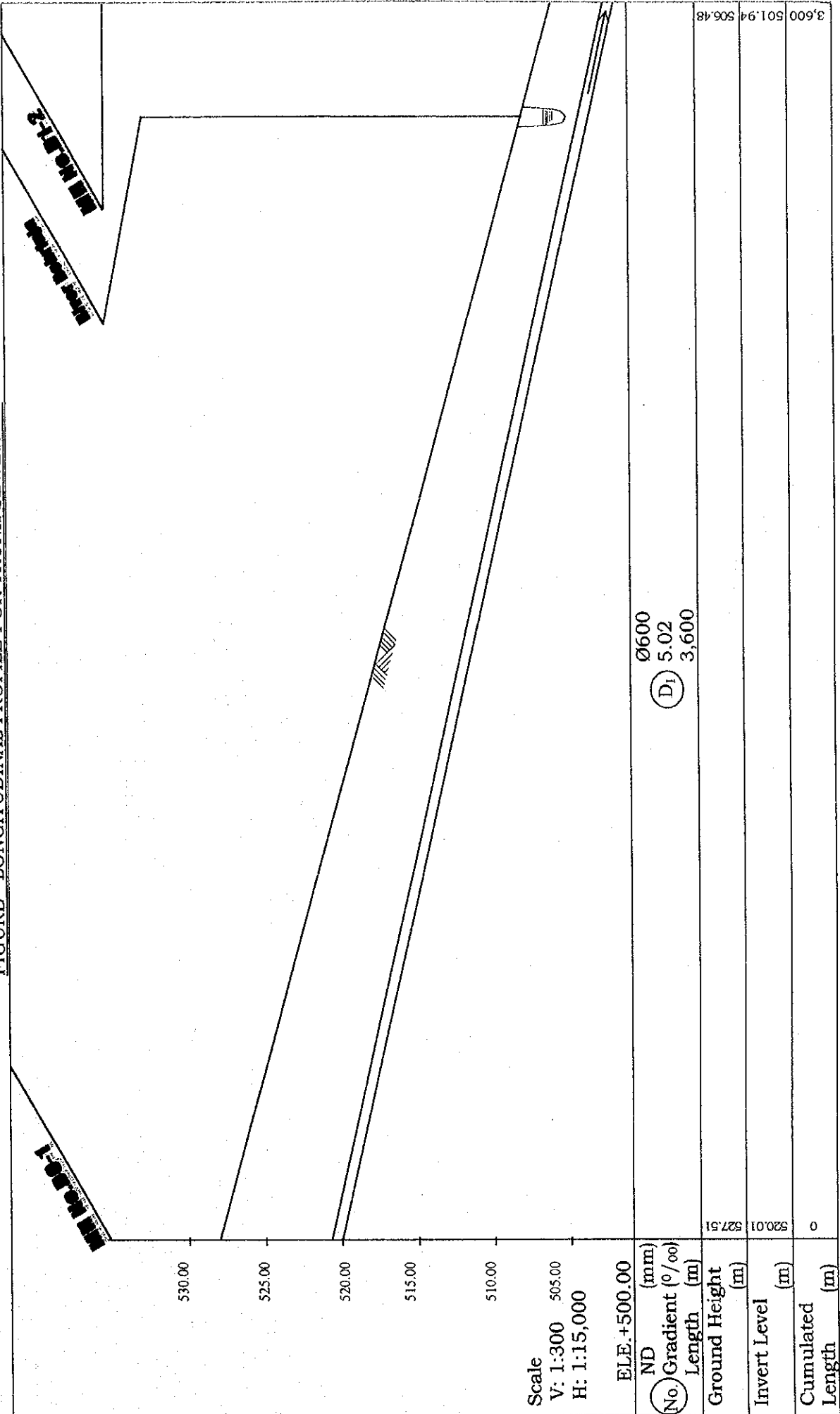
ELE.+515.00

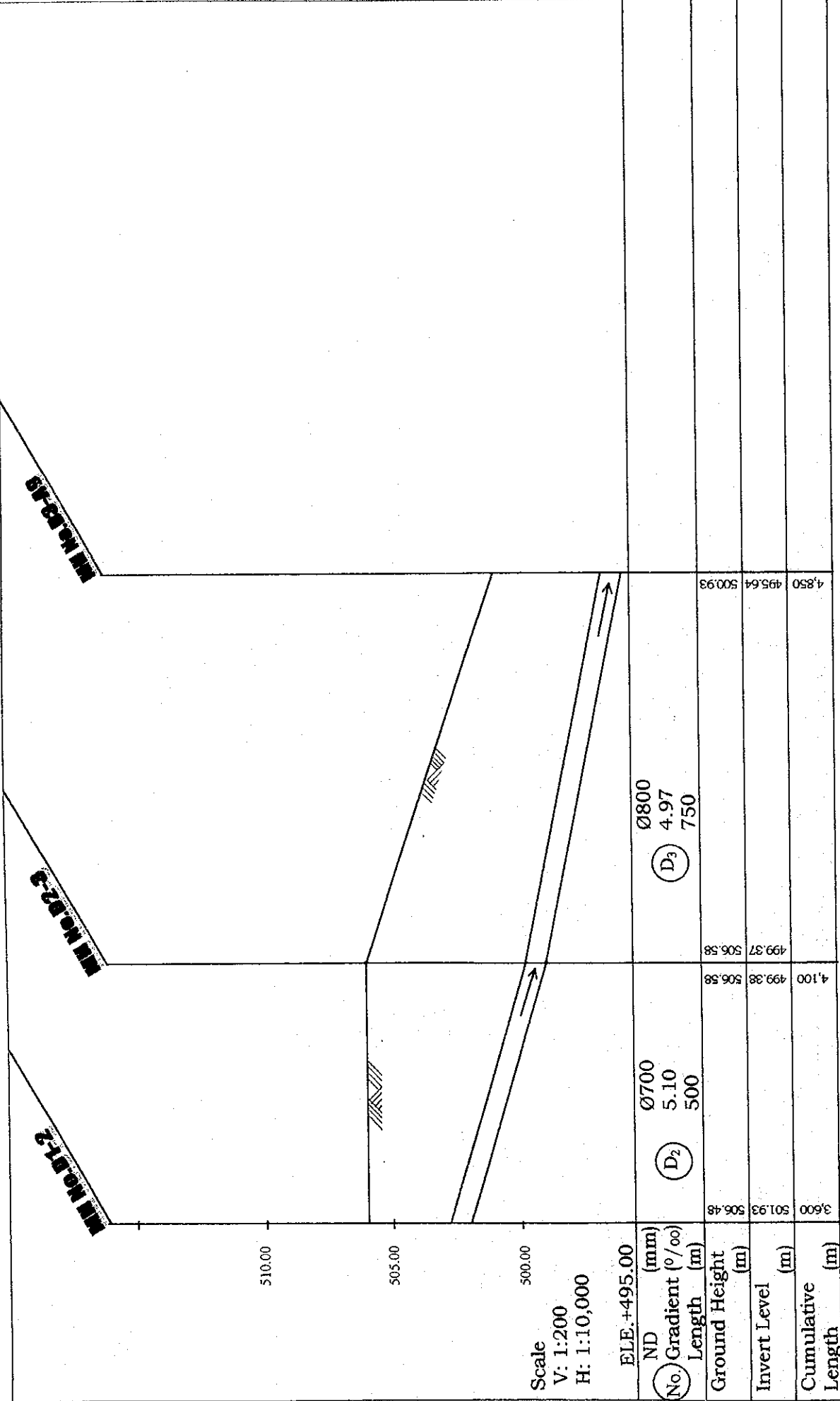
ND (mm)	Ø600	Ø700	Ø800
(No.)	(C4)	(C5)	(C6)
Gradient (‰)	9.33	4.82	5.50
Length (m)	300	870	1,150
Ground Height (m)	533.59	530.55	526.45
Invert Level (m)	529.39	526.59	522.39
Cumulative Length (m)	2,380	2,680	3,550
			4,700



NO.11

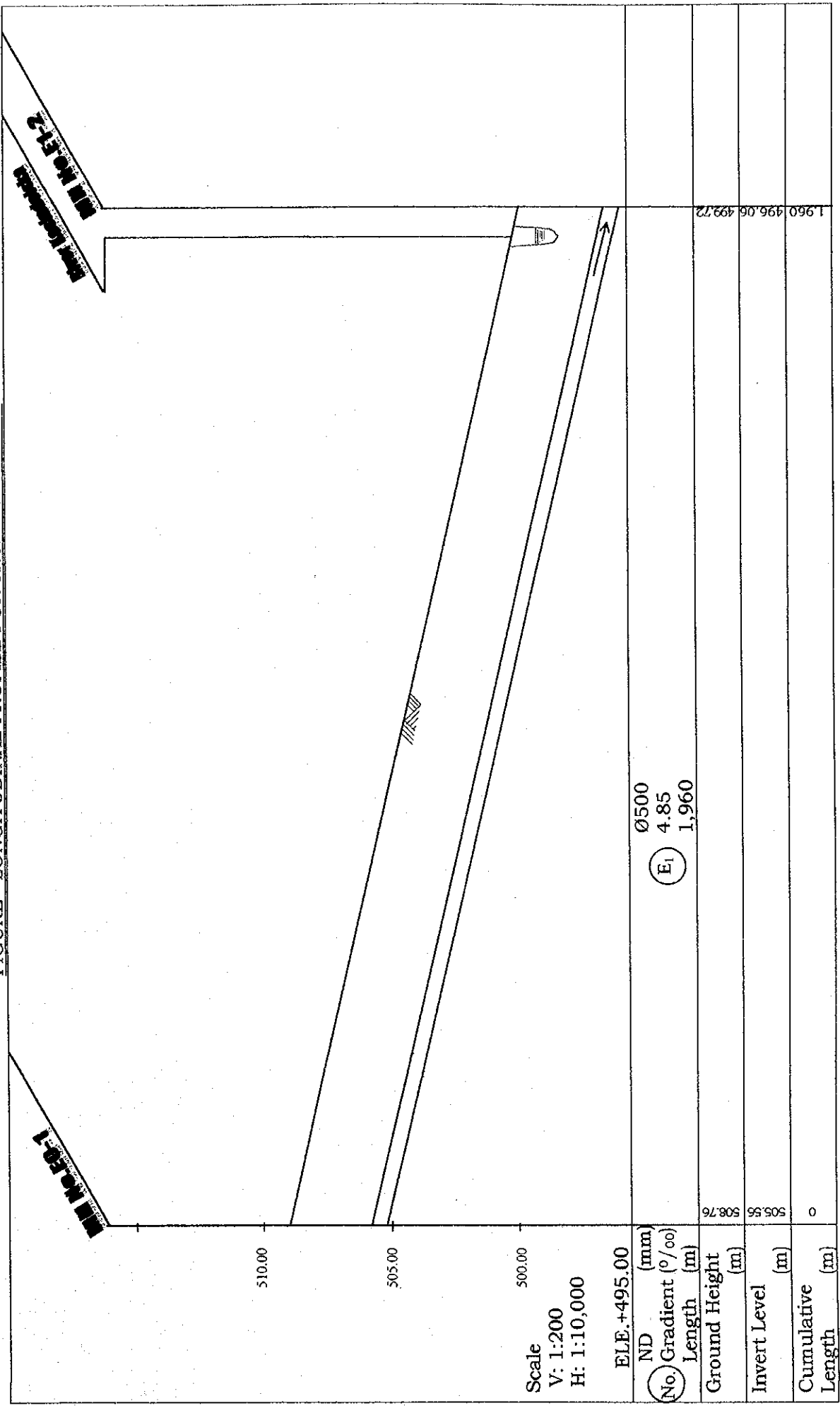
FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - D





ND (mm)	Ø800
No. Gradient (°/100)	D ₃ 4.97
Length (m)	750
Ground Height (m)	
Invert Level (m)	
Cumulative Length (m)	

FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - E



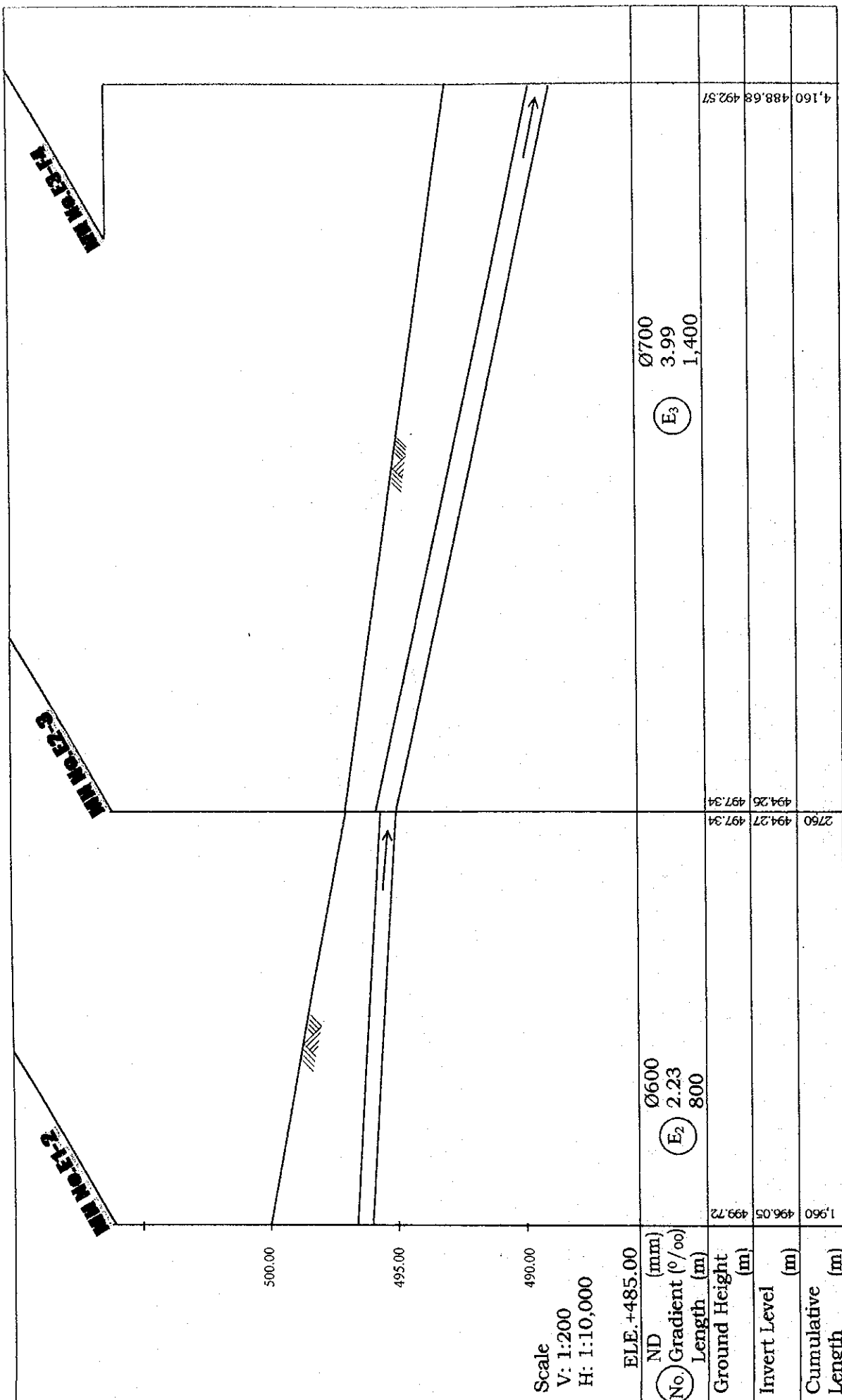
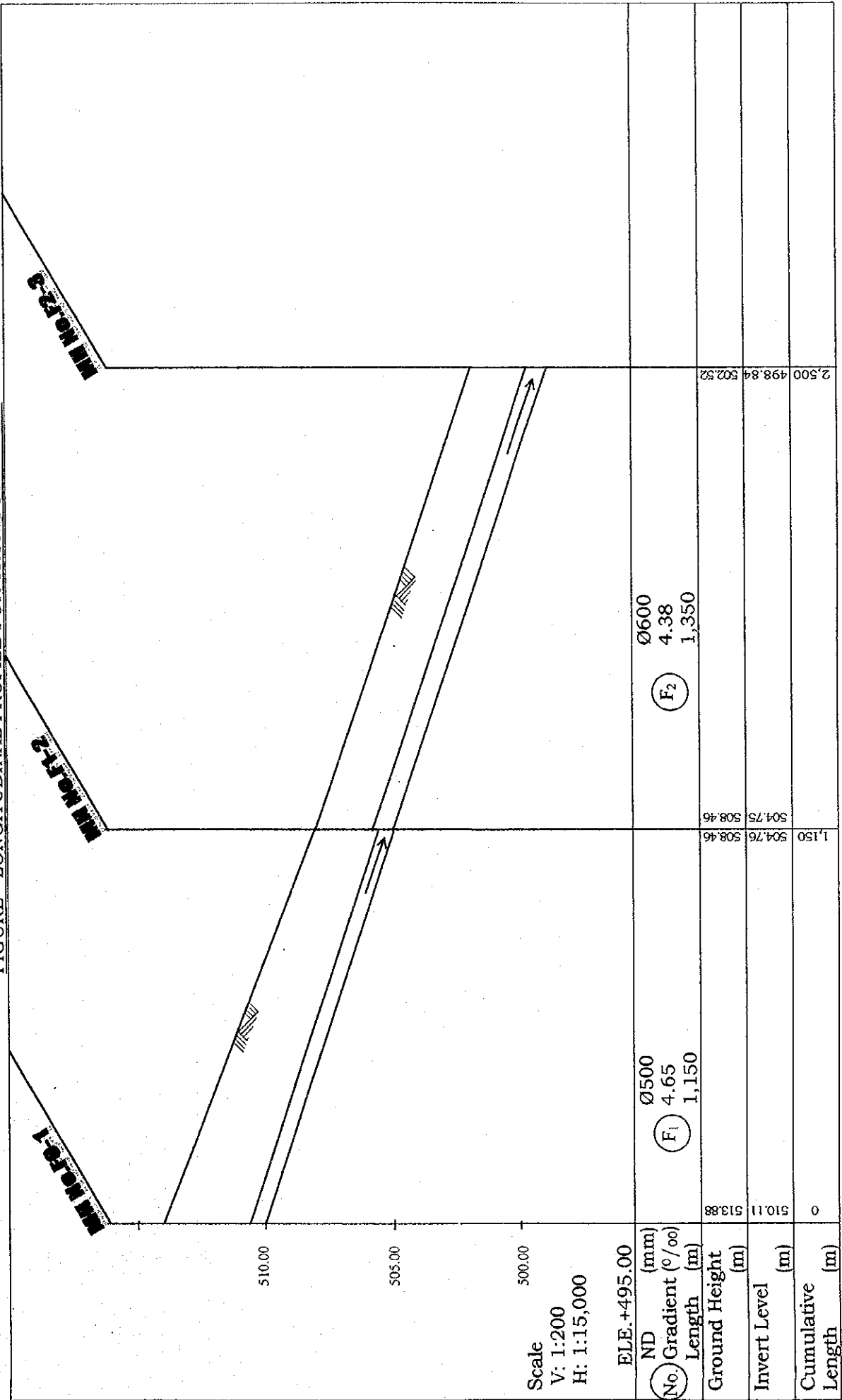
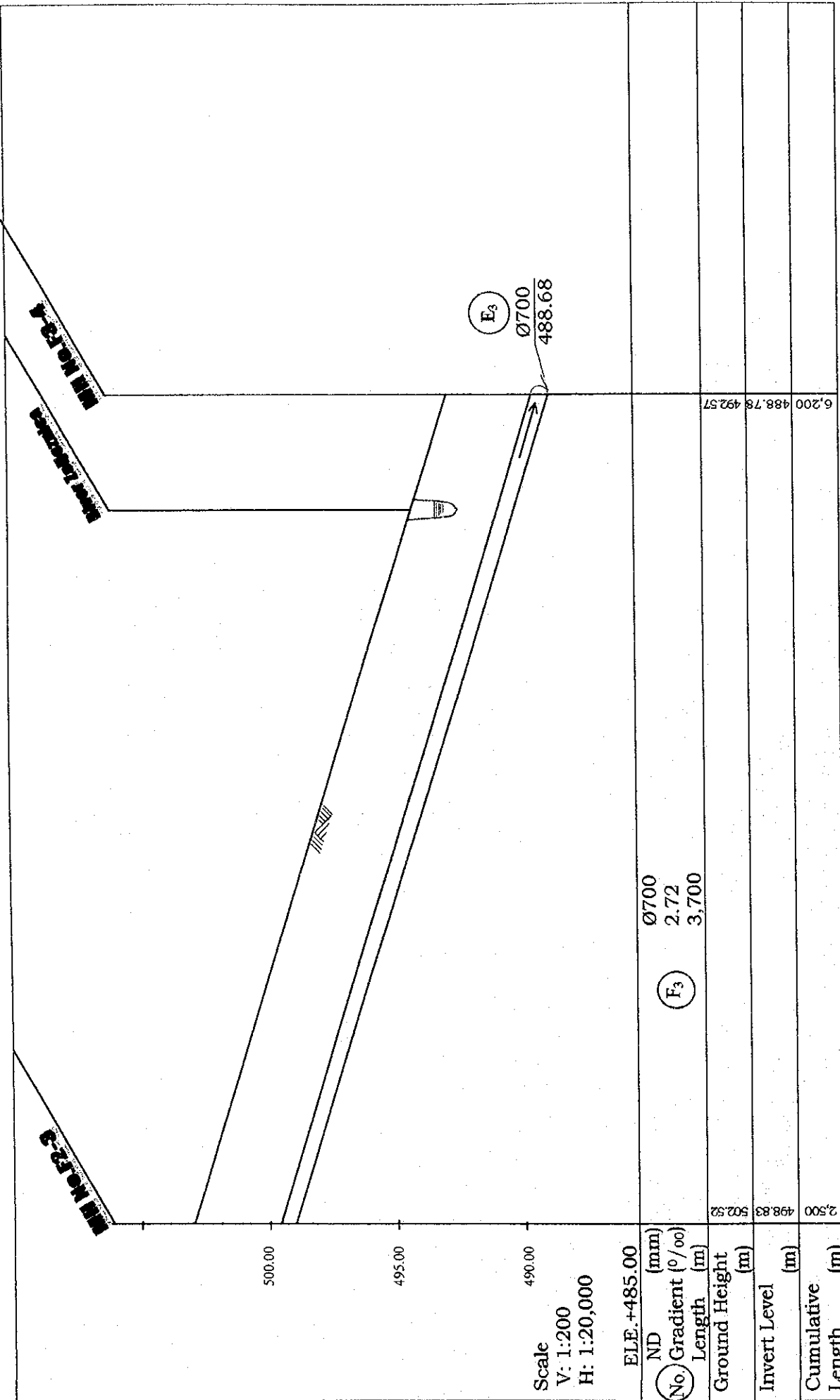
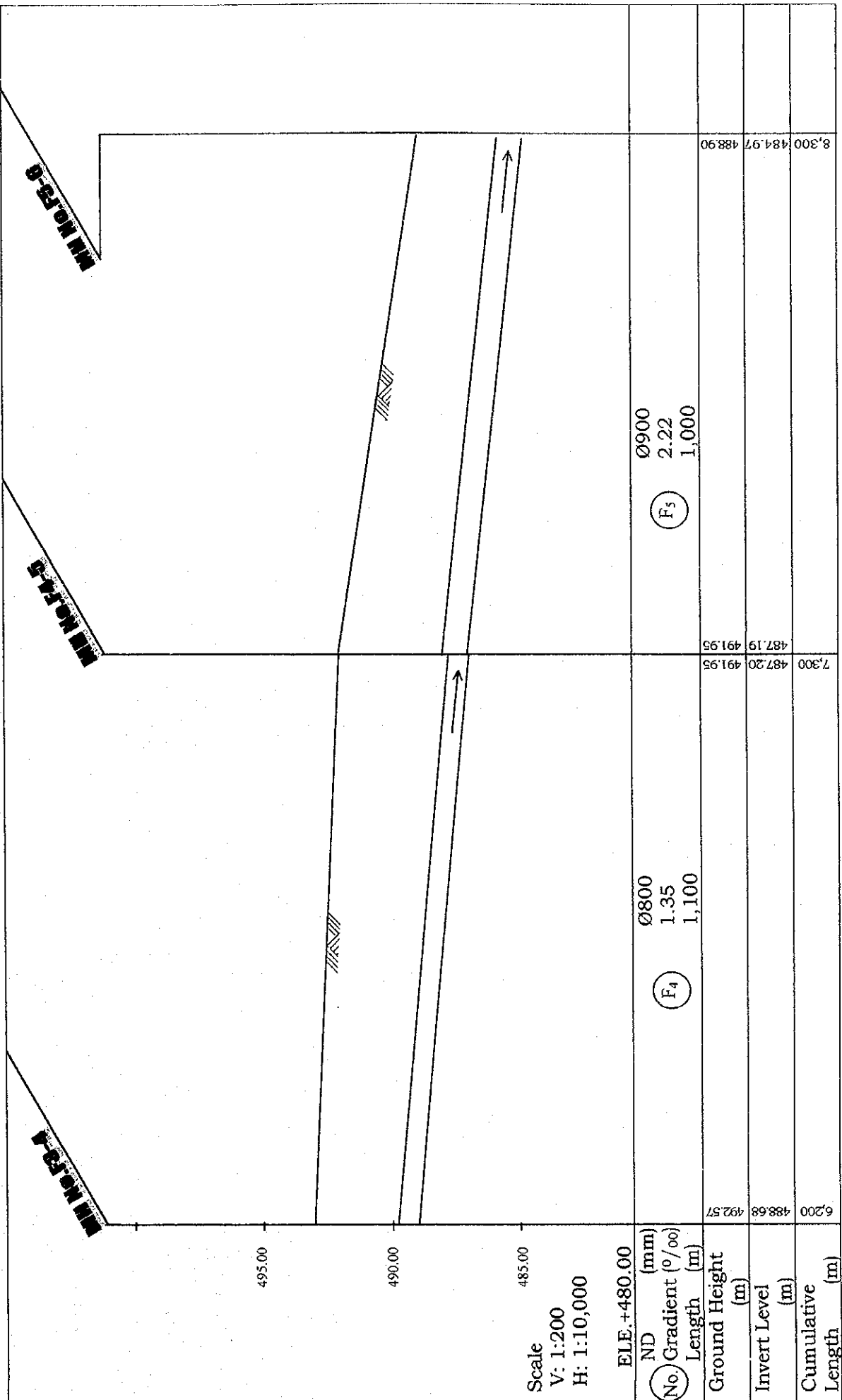


FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - F





NO.17



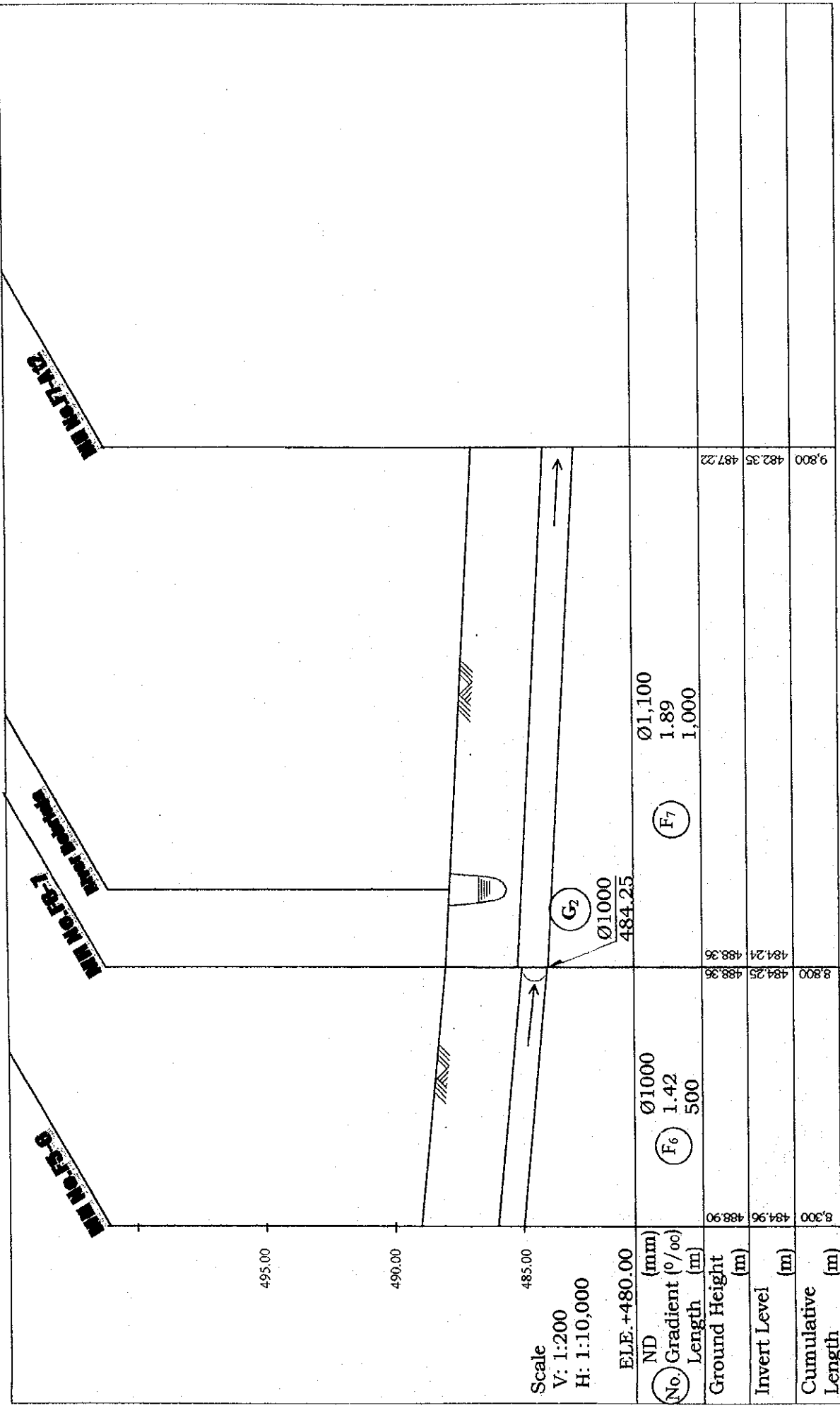


FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - G

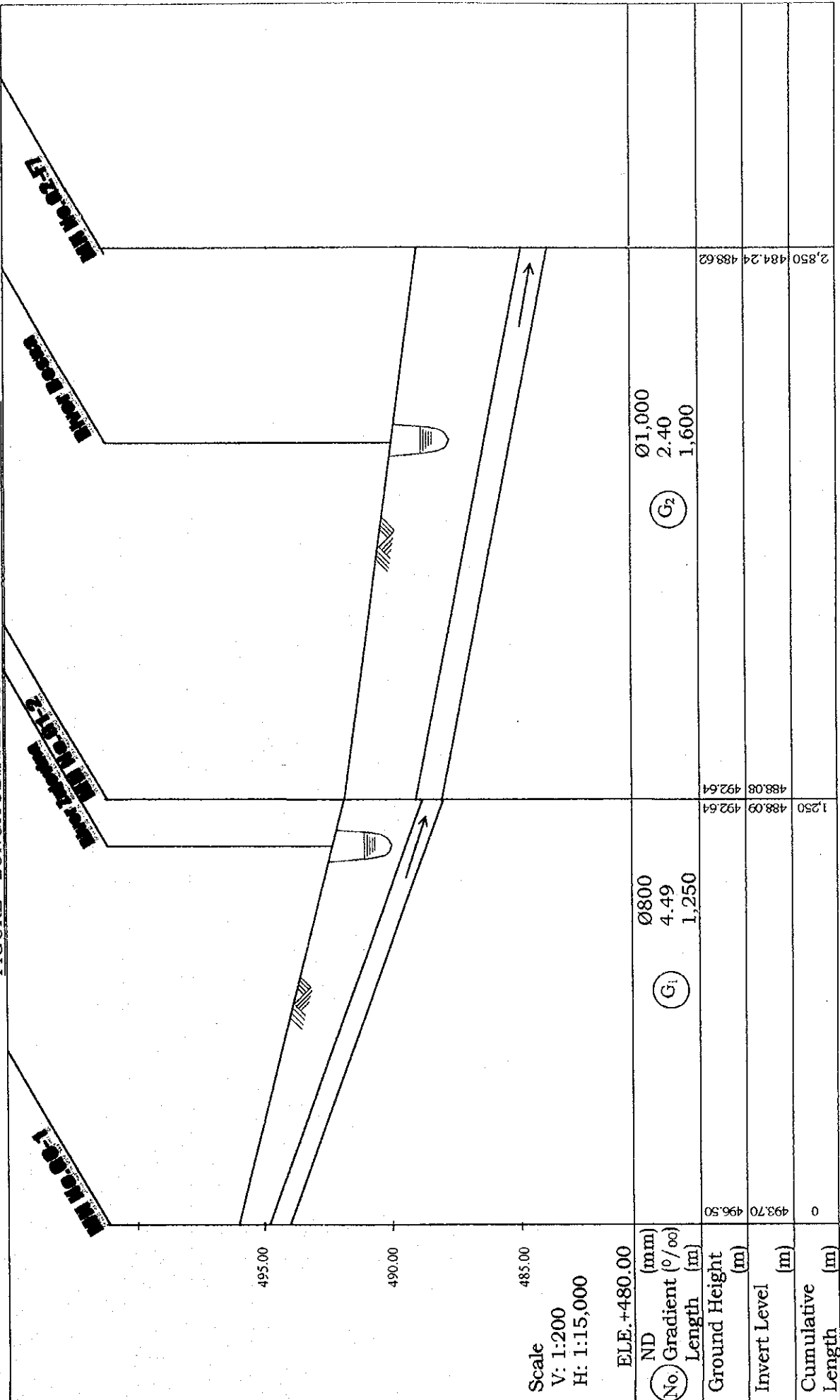
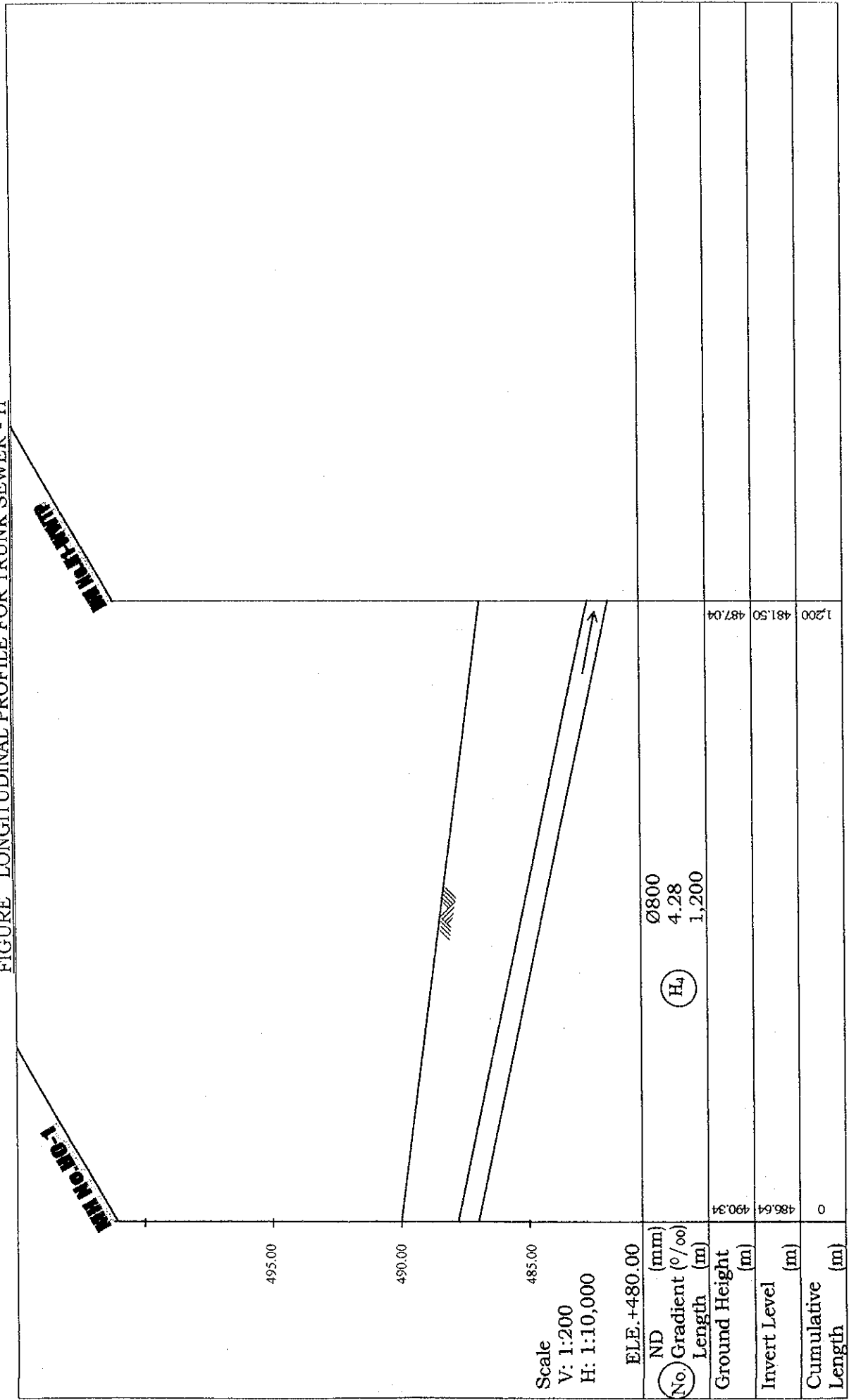


FIGURE LONGITUDINAL PROFILE FOR TRUNK SEWER - H



3. UNIT FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE, YEAR 2015

Table G.1 UNIT FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE FOR YEAR 2015

Sewerage Sub-zone	Flow, 2015 (m3/day)	Sewerage Area (ha.)	Unit Flow per ha. (m3/day/ha)	Remarks
①	②	③	④ = ② / ③	⑤
1. Stari Grad	32,585	1,085	30.03	
2. Centar	51,776	1,245	41.59	
3. Novo Sarajevo	53,209	1,365	38.98	
4. Novi Grad	90,923	2,985	30.46	
5. Ilidza	33,524	2,680	12.51	
6. Hadzici	17,714	4,590	3.86	
TOTAL	279,731	13,950		

Table G.2 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (1/14)

Trunk Sewer A1	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	530	30.03	15,916
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	530		15,916

Trunk Sewer A2 (Flow from A1)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	695	30.03	20,871
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	695		20,871

Table G.3 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (2/14)

Trunk Sewer A3 (Flow from A2)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	760	30.03	22,823
2. Centar	190	41.59	7,902
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	950		30,725

Trunk Sewer A4 (Flow from A3, B2)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	760	30.03	22,823
2. Centar	1,080	41.59	44,917
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	1,840		67,740

Trunk Sewer A5 (Flow from A4)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	760	30.03	22,823
2. Centar	1,080	41.59	44,917
3. Novo Sarajevo	400	38.98	15,592
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	2,240		83,332

Table G.4 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (3/14)

Trunk Sewer A6 (Flow from A5)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ②* ③
1. Stari Grad	760	30.03	22,823
2. Centar	1,080	41.59	44,917
3. Novo Sarajevo	540	38.98	21,049
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	2,380		88,789

Trunk Sewer A7 (Flow from A6)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ②* ③
1. Stari Grad	760	30.03	22,823
2. Centar	1,080	41.59	44,917
3. Novo Sarajevo	540	38.98	21,049
4. Novi Grad	55	30.46	1,675
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	2,435		90,464

Trunk Sewer A8 (Flow from A7, C10)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ②* ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	820	38.98	31,964
4. Novi Grad	1220	30.46	37,161
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	4370		153,486

Table G.5 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (4/14)

Trunk Sewer A9 (Flow from A8, D3)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	1,365	38.98	53,208
4. Novi Grad	1,885	30.46	57,417
5. Ilidza	360	12.51	4,504
6. Hadzici	0	3.86	0
TOTAL	5,940	-	199,490

Trunk Sewer A10 (Flow from A9)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	1,365	38.98	53,208
4. Novi Grad	1,885	30.46	57,417
5. Ilidza	410	12.51	5,129
6. Hadzici	0	3.86	0
TOTAL	5,990	-	200,115

Trunk Sewer A11 (Flow from A10)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	1,365	38.98	53,208
4. Novi Grad	1,885	30.46	57,417
5. Ilidza	440	12.51	5,504
6. Hadzici	0	3.86	0
TOTAL	6,020	-	200,490

Table G.6 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (5/14)

Trunk Sewer A12 (Flow From A11, F7)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	1,365	38.98	53,208
4. Novi Grad	1,885	30.46	57,417
5. Ilidza	2,680	12.51	33,527
6. Hadzici	4,590	3.86	17,717
TOTAL	12,850	-	246,230

WWTP (Flow From A12, H1)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	1,085	30.03	32,582
2. Centar	1,245	41.59	51,779
3. Novo Sarajevo	1,365	38.98	53,208
4. Novi Grad	2,985	30.46	90,923
5. Ilidza	2,680	12.51	33,527
6. Hadzici	4,590	3.86	17,717
TOTAL	13,950	-	279,736

Trunk Sewer B1	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	475	41.59	19,755
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	475	-	19,755

Table G.7 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (6/14)

Trunk Sewer B2 (Flow from B1)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	545	41.59	22,666
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	545	-	22,666

Trunk Sewer C1	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	275	30.03	8,258
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	275	-	8,258

Trunk Sewer C2 (Flow from C1)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	65	41.59	2,703
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	390	-	12,463

Table G.8 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (7/14)

Trunk Sewer C3 (Flow from C2)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	125	41.59	5,199
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	450		14,959

Trunk Sewer C4 (Flow from C3)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	490		16,622

Trunk Sewer C5 (Flow from C4)	Sewerage Area (ha.)	Unit Flow per Area (m³/day/ha.)	Total Flow (m³/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	120	38.98	4,798
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	610		21,420

Table G.9 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (8/14)

Trunk Sewer C6 (Flow from C5)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	215	38.98	8,381
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	705		25,003

Trunk Sewer C7 (Flow from C6)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	280	38.98	10,914
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	770		27,536

Trunk Sewer C8 (Flow from C7)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	280	38.98	10,914
4. Novi Grad	85	30.46	2,589
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	855		30,125

Table G.10 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (9/14)

Trunk Sewer C9 (Flow from C8)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	280	38.98	10,914
4. Novi Grad	185	30.46	5,635
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	955	-	33,171

Trunk Sewer C10 (Flow from C9)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	325	30.03	9,760
2. Centar	165	41.59	6,862
3. Novo Sarajevo	280	38.98	10,914
4. Novi Grad	245	30.46	7,463
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	1,015	-	34,999

Trunk Sewer D1	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	545	38.98	21,244
4. Novi Grad	500	30.46	15,230
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	1,045	-	36,474

Table G.11 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (10/14)

Trunk Sewer D2 (Flow from D1)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	545	38.98	21,244
4. Novi Grad	500	30.46	15,230
5. Ilidza	165	12.51	2,064
6. Hadzici	0	3.86	0
TOTAL	1,210		38,538

Trunk Sewer D3 (Flow from D2)	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	545	38.98	21,244
4. Novi Grad	500	30.46	15,230
5. Ilidza	275	12.51	3,440
6. Hadzici	0	3.86	0
TOTAL	1,320		39,914

Trunk Sewer E1	Sewerage Area (ha.)	Unit Flow per Area (m ³ /day/ha.)	Total Flow (m ³ /day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	680	12.51	8,507
6. Hadzici	0	3.86	0
TOTAL	680		8,507

Table G.12 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (11/14)

Trunk Sewer E2 (Flow from E1)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	840	12.51	10,508
6. Hadzici	0	3.86	0
TOTAL	840	-	10,508

Trunk Sewer E3 (Flow from E2)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	935	12.51	11,697
6. Hadzici	0	3.86	0
TOTAL	935	-	11,697

Trunk Sewer F1	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	420	12.51	5,254
6. Hadzici	0	3.86	0
TOTAL	420	-	5,254

Table G.13 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (12/14)

Trunk Sewer F2 (Flow from F1) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m ³ /day/ha.) ③	Total Flow (m ³ /day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	520	12.51	6,505
6. Hadzici	0	3.86	0
TOTAL	520	-	6,505

Trunk Sewer F3 (Flow from F2) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m ³ /day/ha.) ③	Total Flow (m ³ /day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	710	12.51	8,882
6. Hadzici	0	3.86	0
TOTAL	710	-	8,882

Trunk Sewer F4 (Flow from F3, E3) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m ³ /day/ha.) ③	Total Flow (m ³ /day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	1,790	12.51	22,393
6. Hadzici	0	3.86	0
TOTAL	1,790	-	22,393

Table G.14 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (13/14)

Trunk Sewer F5 (Flow from F4) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m3/day/ha.) ③	Total Flow (m3/day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	1,950	12.51	24,394
6. Hadzici	0	3.86	0
TOTAL	1,950		24,394

Trunk Sewer F6 (Flow from F5) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m3/day/ha.) ③	Total Flow (m3/day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	1,985	12.51	24,832
6. Hadzici	0	3.86	0
TOTAL	1,985		24,832

Trunk Sewer F7 (Flow from F6, G2) ①	Sewerage Area (ha.) ②	Unit Flow per Area (m3/day/ha.) ③	Total Flow (m3/day) ④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	2,205	12.51	27,584
6. Hadzici	4,590	3.86	17,717
TOTAL	6,795		45,301

Table G.15 FLOW OF TRUNK SEWER BY SEWERAGE SUB-ZONE (14/14)

Trunk Sewer G1	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	2,990	3.86	11,541
TOTAL	2,990		11,541

Trunk Sewer G2 (Flow from G1)	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	0	30.46	0
5. Ilidza	0	12.51	0
6. Hadzici	4,590	3.86	17,714
TOTAL	4,590		17,714

Trunk Sewer H1	Sewerage Area (ha.)	Unit Flow per Area (m3/day/ha.)	Total Flow (m3/day)
①	②	③	④ = ② * ③
1. Stari Grad	0	30.03	0
2. Centar	0	41.59	0
3. Novo Sarajevo	0	38.98	0
4. Novi Grad	1,100	30.46	33,506
5. Ilidza	0	12.51	0
6. Hadzici	0	3.86	0
TOTAL	1,100		33,506

H. MINE CLEARANCE PROJECT

MINE!

APPENDIX H. MINE CLEARANCE PROJECT

	Page
1. Completion of Clearance Certificate and Report	H- 2
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3. Detail of Cleared Area	H- 4
4. Coordinates of Turning Points	H- 5
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LIST OF FIGURES

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Figure H. 2 DETAIL OF CLEARED AREA	H- 4

1. Completion of Clearance Certificate and Report

TO BE READ WITH ATTACHED SITE PLAN, MAP OVERLAY AND MAP SHEET			
COMPLETION OF CLEARANCE CERTIFICATE AND REPORT			
1. MAP NAME	SARAJEVO	6. MAP REFERENCE & NAME OF CLEARED AREA	SARAJEVO
2. EDITION		POGON ZA PREČISCAVANJE OTPADNIH VODI WATER TREATMENT PLANTS (BODLE)	
3. SHEET NO.	1	Attach explanatory map(s) and/or sketch (es).	
4. SCALE	1:1000		
5. MAC ID NO.	1252		
PART 1 - DETAILS OF MINE CLEARANCE OR SURVEY			
7. Name of mine clearing organisation.	N.P.A. NORWEGIAN PEOPLE'S AID	8. Start & finish dates.	9.2.98 - 22.7.98
9. Quantity and types of mines located.		10. Clearance or survey?	CLEARANCE
		11. Methods & technologies used.	MANUAL DEMINING (PROB / DETECTOR)
12. Quantity and types of mines destroyed.		13. Depth of clearance.	4. Sq. metres of clearance
		10 CM	
15. Is area now metal free?	NOT 100%	16. Type & location of cleared area marking. (Show on attached sketch)	SEE THE SKETCH
17. Quality Assurance carried out by:	MATS ERIKSSON - U (Name & organisation) N.P.A.	18. Quality Control checks used.	ACTIVE SUPERVISION AND RANDOM CHECK
PART 2 - DECLARATION			
A. Declaration by senior representative of organisation responsible for mine clearance		B. Declaration by Responsible Authority.	
I declare that the area described in this document has been cleared in accordance with UN MAC Technical Guidelines, and that, to the best of my knowledge and belief, it is free of landmines and unexploded ordnance.		(1) This Declaration of clearance is accepted.	
		(2) The area described in this report is accepted as clear of landmines & unexploded ordnance.	
Name.		Name.	
MATS ERIKSSON - UHA			
Position in organisation.		Name of organisation.	
PROJECT MANAGER			
Signature.		Signature.	
Mats Eriksson			
Date.		Date.	
28/7-98			
THIS DOCUMENT HAS BEEN DISTRIBUTED AS SHOWN BELOW			
a. Original to:	UN MAC SARAJEVO	b. Copy to:	
b. Copy to:	N.P.A. PRO	d. Copy to:	

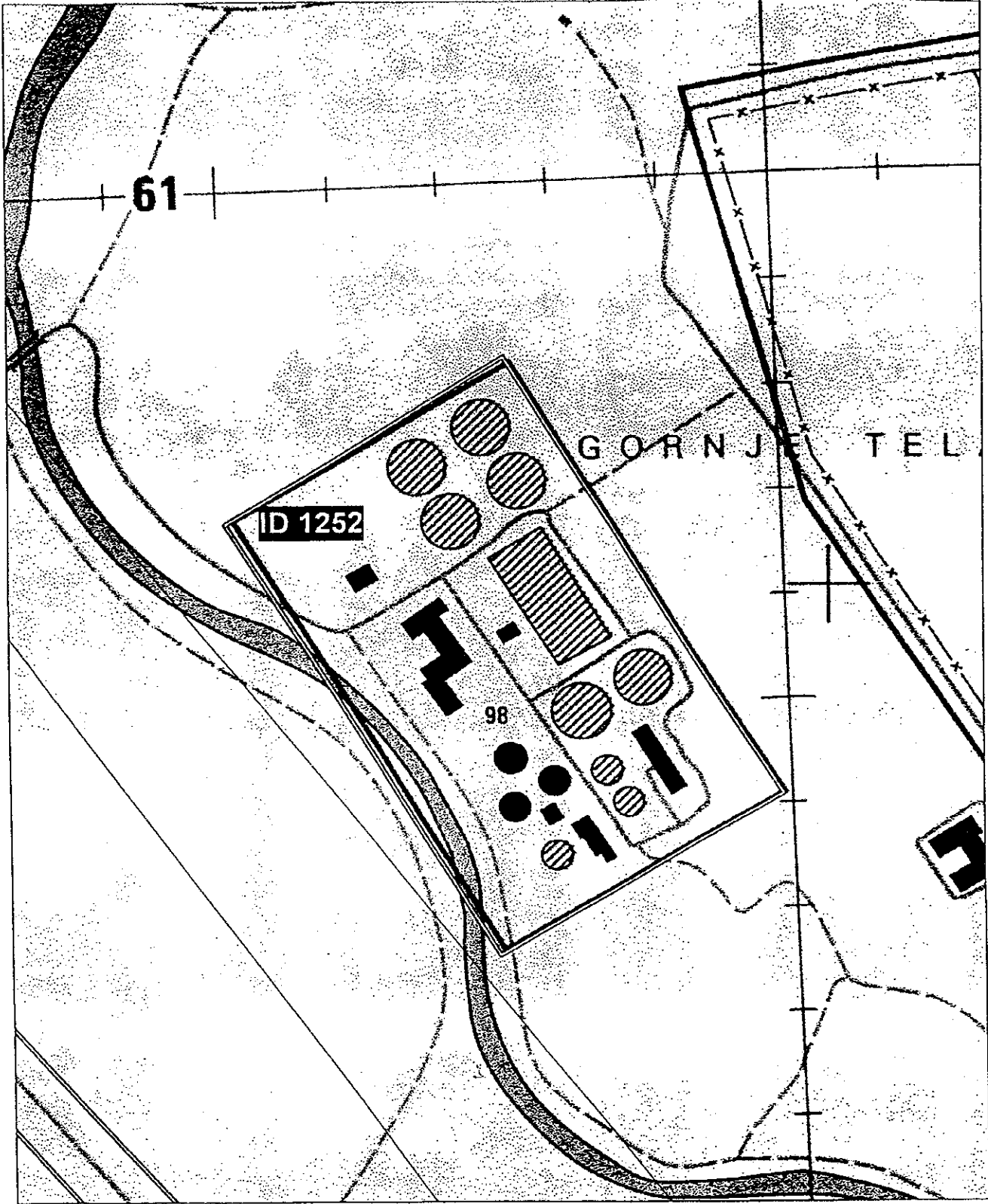
THIS FORM SHOULD BE COMPLETED IN CONJUNCTION WITH UN MINE ACTION CENTRE TECHNICAL GUIDELINES.

c:\windows\desktop\completion certificate.doc

2. Location of Cleared Area

AS AT FEBRUARY 1998.

ID: WWM / 1252



83

SCALE 1 : 5,000

Fig.H.1 LOCATION OF CLEARED AREA



PREPARED & PRINTED BY UNMAC SARAJEVO

3. Detail of Cleared Area

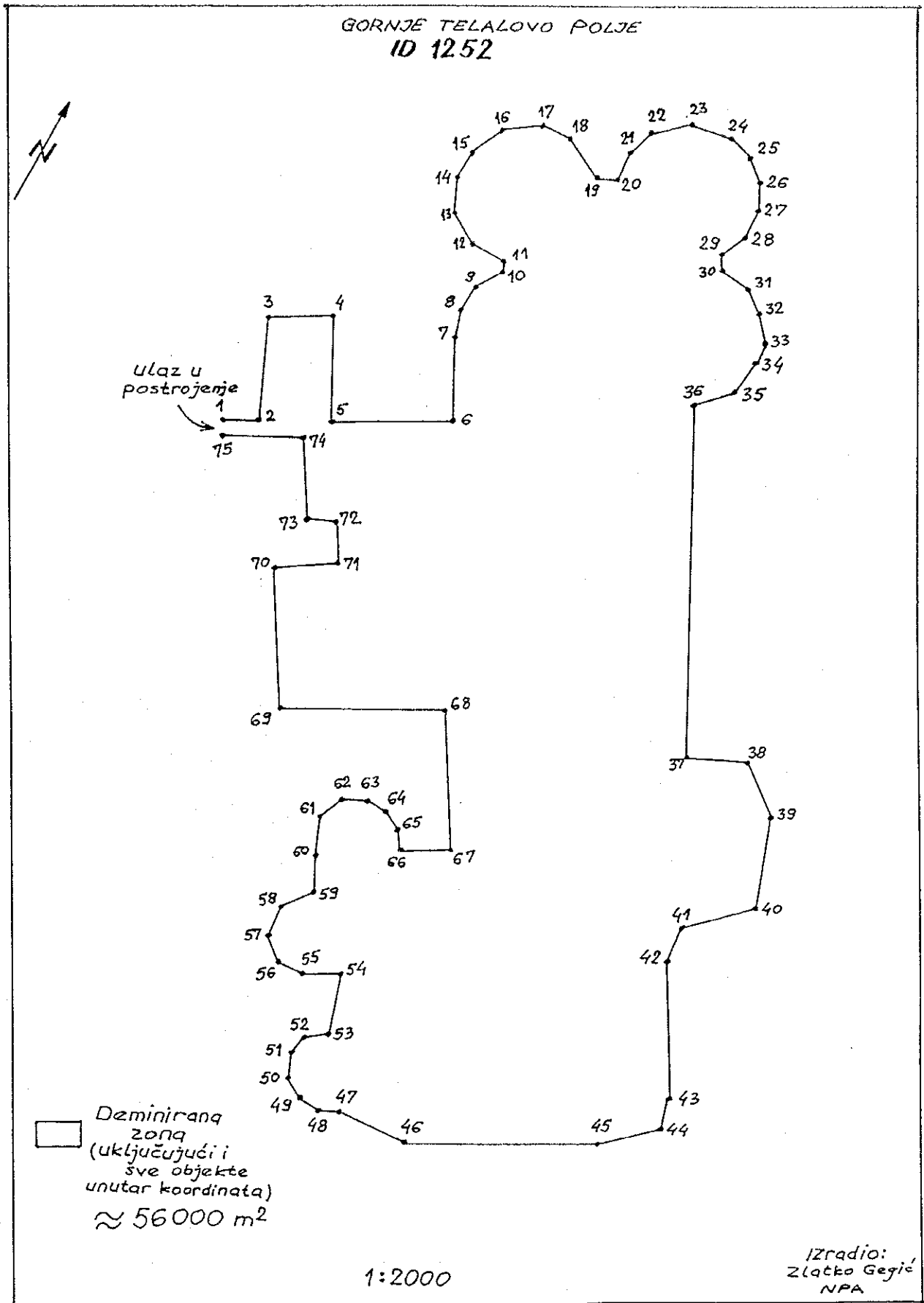


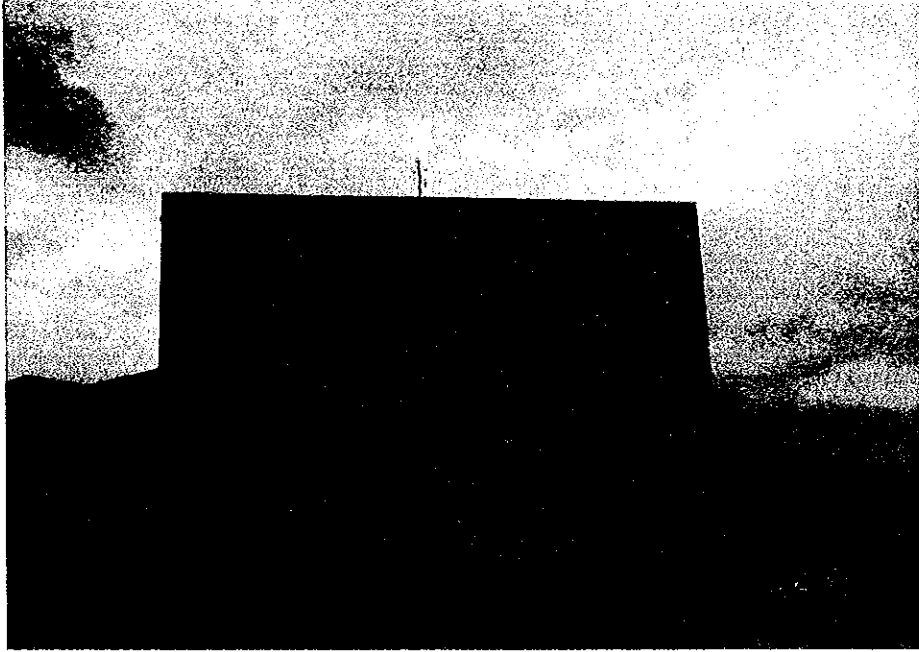
Fig.H. 2 DETAIL OF CLEARED AREA

**POGON ZA PRECISCAVANJE OTPADNIH VODA
TELALOVO POLJE
GORNJE TELALOVO POLJE
ID 1252
GRID BP 8274 6050**

KOORDINATNE TACKE DEMINIRANE ZONE:

- | | |
|--------------------|--------------------|
| 1. BP 82602 60582 | 45. BP 82902 60385 |
| 2. BP 82618 60590 | 46. BP 82831 60347 |
| 3. BP 82600 60632 | 47. BP 82801 60345 |
| 4. BP 82626 60646 | 48. BP 82790 60340 |
| 5. BP 82646 60607 | 49. BP 82781 60340 |
| 6. BP 82692 60630 | 50. BP 82771 60346 |
| 7. BP 82674 60665 | 51. BP 82769 60357 |
| 8. BP 82670 60677 | 52. BP 82769 60364 |
| 9. BP 82671 60688 | 53. BP 82777 60373 |
| 10. BP 82677 60700 | 54. BP 82773 60400 |
| 11. BP 82677 60703 | 55. BP 82755 60389 |
| 12. BP 82661 60705 | 56. BP 82743 60388 |
| 13. BP 82647 60712 | 57. BP 82735 60397 |
| 14. BP 82640 60724 | 58. BP 82733 60412 |
| 15. BP 82640 60739 | 59. BP 82745 60422 |
| 16. BP 82646 60755 | 60. BP 82737 60438 |
| 17. BP 82660 60763 | 61. BP 82728 60452 |
| 18. BP 82675 60764 | 62. BP 82733 60464 |
| 19. BP 82695 60755 | 63. BP 82743 60470 |
| 20. BP 82702 60759 | 64. BP 82755 60470 |
| 21. BP 82701 60771 | 65. BP 82760 60466 |
| 22. BP 82705 60787 | 66. BP 82767 60458 |
| 23. BP 82716 60796 | 67. BP 82787 60470 |
| 24. BP 82735 60799 | 68. BP 82755 60522 |
| 25. BP 82746 60796 | 69. BP 82689 60484 |
| 26. BP 82756 60791 | 70. BP 82655 60538 |
| 27. BP 82760 60777 | 71. BP 82630 60552 |
| 28. BP 82763 60767 | 72. BP 82670 60569 |
| 29. BP 82757 60755 | 73. BP 82659 60564 |
| 30. BP 82761 60749 | 74. BP 82639 60595 |
| 31. BP 82773 60746 | 75. BP 82604 60577 |
| 32. BP 82785 60741 | |
| 33. BP 82791 60730 | |
| 34. BP 82793 60719 | |
| 35. BP 82791 60707 | |
| 36. BP 82779 60693 | |
| 37. BP 82853 60554 | |
| 38. BP 82877 60566 | |
| 39. BP 82887 60550 | |
| 40. BP 82912 60512 | |
| 41. BP 82889 60490 | |
| 42. BP 82887 60474 | |
| 43. BP 82922 60420 | |
| 44. BP 82924 60406 | |

5. Photographs of the Site



6. Certificate of Quality Assurance

BOSNA I HERCEGOVINA
FEDERACIJA BOSNE I HERCEGOVINE
FEDERALNI CENTAR ZA UKLANJANJE MINA I
NEEKSPLODIRANIH UBOJNIH SREDSTAVA



BOSNIA AND HERZEGOVINA
FEDERATION OF BOSNIA AND HERZEGOVINA
FEDERAL MINE ACTION CENTRE

Na osnovu člana 169. Zakona o upravnom postupku ("Sl. Novine FBiH br.2/98") i člana 8.i 6.Uredbe o Osnivanju Federalnog Centra za uklanjanje mina i neeksplodiranih ubojnih sredstava ("Sl. Novine FBiH br.31/97 i 20/98"), Federalni Centar za uklanjanje mina i neeksplodiranih ubojnih sredstava izdaje:

According to the article 169 of the Law on Legal Procedures of the Federation Bosnia and Herzegovina, ("FBiH Official Gazette, No.2/98") and articles 8 and 6 of the Decree on establishment of the Federal Mine Action Centre ("FBiH Official Gazette, No.31/97 and 20/98"), Federal Mine Action Centre issues.

U V J E R E N J E
O IZVRŠENOJ KONTROLI KVALITETA DEMINIRANJA
C E R T I F I C A T E
OF QUALITY ASSURANCE

- | | |
|---|--|
| 1. Ovo uvjerenje se odnosi na slijedeću lokaciju i priloženu dokumentaciju. | 1. This certificate refers to the following location and the attached documents. |
| a. Lokacija – Location | |
| Rajlovac | Sarajevo, Novi Grad |
| b. Koordinate – Grid Reference | Istočno – East Sjeverno – North |
| BI | 82700 60500 |
| c. Broj zadatka FMAC-a – FMAC ID | Agencija za implementaciju – Imp. Agency |
| 1252 | NPA |
-
- | | |
|--|--|
| 2. Radovi na čišćenju mina/NUS-a na predmetnoj lokaciji su izvedeni u skladu sa Standardima humanitarnog deminiranja koji obezbjeđuju 99,6% sigurnosti za krajnje korisnike. | 2. Mine/UXO clearance tasks are executed in accordance with a Humanitarian Demining Standards that provide 99,6% safety for the ultimate users. |
| 3. Preporučuje se korisniku da prihvati iskaz o čišćenju dat od strane organizacije za uklanjanje mina u Dijelu B priloženog Akta o čišćenju predmetne lokacije. | 3. It is recommended that the user accept the statement of clearance given by the Implementing agency at Part B of the attached Area Clearance Completion Certificate. |

PREGLED O IZVRŠENOJ KONTROLI KVALITETA
REVIEW OF QUALITY ASSURANCE CARRIED OUT

Faze kontrole kvaliteta – Quality Assurance Phases	DA YES	NE NO
Da li je organizacija akreditovana od strane BH MAC-a? Has the organization been accredited by BH MAC?	✓	
Da li je organizacija u toku rada u potpunosti primjenjivala SOP-e? Did the organization conduct the work according the SOPs?	✓	
Da li je dostavljen prihvatljiv konačni izvještaj u FMAC-u? Has an acceptable final report been delivered to FMAC-OPS?	✓	
Da li su sprovedene mjere unutrašnje kontrole kvaliteta u organizaciji? Was internal control carried out by the organization?	✓	
Da li su sprovedene inspeksijske kontrole kvaliteta FMAC-a? Were inspections carried out by FMAC?	✓	
Da li su eventualni nedostaci konstantovani od strane inspekcije F MAC-a, otklonjeni? Were eventual defects, stated in inspection reports of FMAC, corrected?	✓	

- | | |
|--|--|
| 4. Zahitjeva se od korisnika da potpiše Dio (b) na priloženom Aktu o očišćenom području, te da isti vratite F MAC-u. | 4. It is requested that the Area Clearance Completion Certificate is returned to F MAC after signature. |
| 5. Nalaže se sektoru operacija F MAC-a da konačan izvještaj o očišćenom području unese u Centralnu Bazu u BH MAC-u | 5. F MAC Operations Sector is ordered to enter the final clearance reports into the BH MAC Central Base. |

Broj O-04-49-38/99
Sarajevo, 31.05.1999 god

H - 7

DIREKTOR
Anđel Orahovac

7. Survey Report

SURVEY REPORT
IZVJEŠTAJ O IZVIĐANJU
ИЗВЕШТАЈ О ИЗВИЂАЊУ

General Information – Opšte informacije – Опште информације

Level of Survey Level 1 – Nivo 1 – Ниво 1
 Nivo izvidanja Level 2 – Nivo 2 – Ниво 2
 Ниво извиђања Combined – Kombinov. – Комбинов.

Report made by NPA Survey team
 Izvještaj pripremio
 Извештај припремио

Survey Organisation NPA
 Organizacija koja vrši izvidanje
 Организација која врши извиђање

Location/Village Gornje Telalovo polje
 Lokacija/Mjesto
 Локација/место

Nearest town Sarajevo
 Najbliži grad
 Најближи град

Reference Point D-III E-I-II N-S-C
 Referentna tačka
 Референтна тачка BP 82260 60580

Turning Point I D-III E-I-II N-S-C
 Tačka okretanja I
 Тачка окретања I

UTM – UTM JNA – JNA

MAC Task No.
 MAK zadatak br.
 МАК задатак бр.

Start and finish date 21.6.1999.
 Datum početka i završetka
 Датум почетка и завршетка 25.6.1999.

Mine Information – Informacije o minama – Информације о минама

Is surveyed area free of mines? Yes – Da – Да
 Je li pregledana površina bez mina?
 Je ли pregledana површина без мина? No – Ne – Не

Is surveyed area free of UXOs? Yes – Da – Да
 Je li pregledana površina bez NUS-a?
 Je ли pregledana површина без НУС-а? No – Ne – Не

The mines were laid by —
 Mine je postavio
 Мине је поставио

When were the mines laid? —
 Kada su postavljene mine?
 Када су постављене мине?

Did fighting take place in this area? Yes – Da – Да
 Je li bilo borbi u toj oblasti?
 Je ли било борби у тој области? No – Ne – Не

Is the minefield marked? Yes – Da – Да
 Je li minsko polje označeno?
 Je ли минско поље означено? No – Ne – Не

Type of mines and numbers
 Vrsta mina i broj
 Врста мина и број

Terrain Data – Podaci o terenu – Подаци о терену

Intended landuse – Namjena terena – Намјена терена
 Housing – stanovanje – становање Industrial – industrija – индустрија Agricultural – poljoprivreda – пољопривреда
 Development – razvoj – развој Utility – infrastruktura – инфраструкт. Other – ostalo – остало

Type of environment – Vrsta okruženja – Врста окружења
 Rural – seosko – сеоско Urban – urbano – урбано Industrial – industrijsko – индустријско
 High grass – visoka trava – висока трава Few trees – malo drveća – мало дрвећа Forest – šuma – шума
 Open – otvoreno – отворено Mixed – mješovito – мешовито Other – ostalo – остало

Soil type/ground surface – Vrsta tla/površina – Врста тла/површина
 Sand – pijesak – пјесак Clay – glina – глина Chalk – krečnjak – кречњак
 Swamp – močvara – мошара Rocky – stijeno/ito – стеновито Other – ostalo – остало

Contamination with – Zagađeno sa – Загађено са
 Metal – metalom – металом Rubble – građ. št. – грађ. шт. Tree stumps – Panjevi – Панјевима

Slope – Nagib – Наклн
 Flat – Ravno – Равно Gentle incline – Blaga nizbrd. – Блага низбра. Steep incline – Strma nizbrd. – Стрма низбра.

Drainage features – Vodeni tokovi – Водени токови
 Rivers – Rijeke – Пеке Lakes – Jezera – Језера Canals – Kanali – Канали
 Drainage ditches – Odvodni kanali – Одводни канали Others – ostalo – остало Rijeka Mijacka

Ease of burning – Mogućnost spaljivanja – Могућност спаљивања
 Yes – Da – Да No – Ne – Не

Open grass area – Otvorena travnata povr. – Отворена травната повр.
 No local habitation – Bez domaćeg stanov. – Без домићег станова.
 Water supply – Snabdjevanje vodom – Снабдевање водом
 Away from utilities – Udaljenost od infrastrukture – Удаљеност од инфраструктуре
 Other remarks – Ostale primjedbe – Остале примједбе

8. Road Access Data

Road Access Data – Podaci o pristupnom putu – Подаци о приступном путу

Name of the nearest town/MAC facility
 Име најближег града/МАК канцеларије Sarajevo

Distance to mined area (in km)
 Удалженост до минског поља (у км) 10 km

Travel time to mined area (in hours)
 Вријеме путовања до м. поља (у сатима) 20 min.

Route type: All weather hard surface All weather gravel Track Other
 Vrsta puta: Asfaltni Makadam Kamionski Ostalo
 Врста пута: Асфалтни Макадам Камionsки Остало

Max. height (in m) Max. width (in m) Max. weight (in t)
 Maks. висина (у м.) Maks. ширина (у м.) Maks. тежина (у т.)

Location of Proposed Accommodation – Lokacija predloženog smještaja – Локација предложеног смештаја

Name Име	Address Адреса	Phone/Fax Тел/Факс	Remarks Примедбе
Nearest water Најближа вода		Nearest food supply Најближе снабдевање храном	
Nearest storage facility Најближе складиште		Local fuel facility Локално снабдевање горивом	
Electrical supply facility Снабдевање струјом		Secure car park Безбедно паркиралиште	
Additional information Додатне информације			

MEDEVAC – Medicinska Evakuacija – Медицинска Евакуација

Location of nearest Локација најближе	Name / nationality Име / националност	Location (Grid Reference) Локација (Координате)	Phone (PTT/V-Sat) Тел: (ПТТ/В-Сат)	Travel time to mined area Вријеме путовања до мин. поља
SFOR Base СФОР База				
Police Station Полицијска станица				
Hospital Болница				

HF _____ VHF _____
 HF _____ VHF _____
 NGF _____ VXF _____

Nearest telephone to mined area
 Најближи телефон до мин. зоне _____
 Number of nearest telephone
 Број најближег телефона _____

Emergency helicopter landing site
 Експедитор за Медевак _____

Other demining/EOD agencies/companies working in the area
 Друге организације које деминурају на подручју/укланјају НУС _____
 Друге организације које деминурају на подручју/укланјају НЕС _____


Declaration – Izjava – Изјава

I herewith declare that the area described in this document has been surveyed in accordance with the National Technical and Safety Standards and that area(s) declared as „no risk“ is/are, to the best of my knowledge and belief, free of landmines and unexploded ordnance.
 Овим изјављујем да је на површини описаној у овом документу извршено извјештање у складу са Државним Стручним и Безбедносним Стандардима и да је/су површине декларисане као „зона/е без ризика“, према мом најбољем знању и увјеренју, не садрже мине ни неексплодирана убојна средства, другим ријечима да је/ти површине описане у овом документу извршено извјештање у складу са Државним Стручним и Безбедносним Стандардима и да је/су површине декларисане као „зона/е без ризика“, не садрже мине ни неексплодирана убојна средства.

Name _____
 Име Zlatko Gegic

Position in organization
 Позиција у организацији Survey supervisor

Signature
 Потпис _____
 Date
 Датум 25.6.'99



9. Request Letter with Norwegian People's Aid

THE JICA STUDY TEAM OFFICE
FOR THE REHABILITATION OF
THE SEWERAGE SYSTEM
OF CANTON SARAJEVO
VODOVOD I KANALIZACIJA
Tel.:++387-71-458-630
Fax:++387-71-458-630
Mobile:++387-90-160-190
Date : 14.06.99

To Mr.Fahrudin PILAVZIC
General Manager,
Canton Public Communal Company,
Vodovod i Kanalizacija
8 J. Cernija St.
Sarajevo 71000
Bosnia i Hercegovina
Tel : ++387-71-447-741
Fax :++387-71-440658

Re: Request for the Informal Meeting with "Norwegian People's Aid" (NPA) at
Sarajevo WWTP, Butila

Dear Sir,

The Study Team had commenced the second site survey for the Feasibility Study of the Sarajevo WWTP. As per our discussion during the meeting held on 26 to 28 May 1999, the activities of our team stationed in ViK office at Terezija and WWTP site at Butila, are now in full swing.

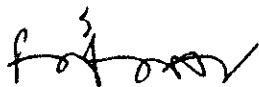
In order for us to get vital information about land mining clearance at Sarajevo WWTP site, we would like to request ViK to arrange and attend the above meeting for further schedule towards the implementation. The Team will show and explain to the NPA about our intentions and what we would like to request from them. ViK is kindly requested to ask for and in our behalf the Mine Clearance Certificate the WWTP site from the NPA. Details of the meeting is as follows:

Date and Time : Tuesday, 06 July 1999, at 10:00 a.m.
Venue : Conference Room at Sarajevo WWTP in Butila.

Awaiting for your prompt reply.

contd...../2

Sincerely yours,



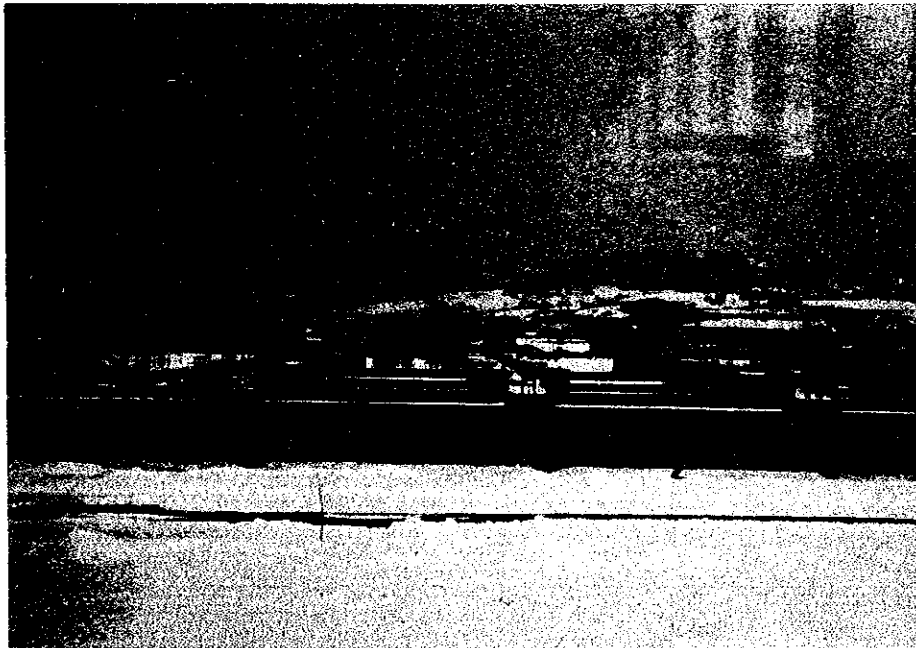
Kaoru SUZUKI
Team Leader,
JICA Study Team

c.c. 1. : Mr.Midhat BISCEVIC
Director,
Canton Public Communal Company,
"Vodovod i Kanalizacija",
Tel : ++387-71-668-260
Fax : ++387-71-204-574

c.c.2. : Mr.Radarija JASMIN
Superintendent,
Sarajevo WWTP
"Vodovod i Kanalizacija",
Tel : ++387-71-455-611
Fax : ++387-71-458-630

c.c.2. : Mr.Stephen BRYANT
Demining Programme Manager,
Norwegian People's Aid,
Zelenih Beretki 4,
71000 Sarajevo
Tel : ++387-71-665-622
Fax : ++387-71-442-164
Mobile: ++387-90-144-471

I. TERMS OF REFERENCE OF THE FIELD SURVEY AND ASSESSMENTS



APPENDIX I. TERMS OF REFERENCE OF THE FIELD SURVEY AND ASSESSMENT

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Terms of Reference (TOR) of the Field Survey and Assessments of The Sarajevo Wastewater Treatment Plant.....	I-2
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3. Scope of Works and Supply	I-3
4. Payment.....	I-7
5. Guarantees and Liabilities.....	I-7

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TERMS OF REFERENCE (TOR)
OF
THE FIELD SURVEY AND ASSESSMENTS
OF
THE SARAJEVO WASTEWATER TREATMENT PLANT

JICA STUDY TEAM

1. INTRODUCTION

Based on the JICA's Inception Report (IC/R) submitted to "Vodovod I Kanalizacija" (ViK) on the 10 February 1999, the JICA Study Team will carry out the field survey and assessment of the Sarajevo WWTP from the end of May 1999. (See page 17, 18 & 19 of IC/R)

2. SUBJECT

Subject of this TOR are services and works for carry out the field survey and assessment of the Sarajevo WWTP according to requests to the JICA Study Team and scope of works defined in this TOR.

3. SCOPE OF WORKS AND SUPPLY

The contractor, in accordance with the request, will perform activities, works and services required for the field survey and assessment of the Sarajevo WWTP to include as follows:

3.1 Aerated Grit Chamber - Stress Strength Testing, Investigation of Neutrality and Inspection of Reinforced Bar for Concrete Structure

- 3.1.1 Detailed visual inspection of the structure with the assertion of all eventual defaults and damages, including elaboration by photo-documentation;
- 3.1.2 Extraction, mechanic treatment of cylindrical core samples (kerns) of concrete $\varnothing 100\text{mm}$, testing of mechanical properties;
 - From the walls (3+3+1+1), non-damaged and eventually damaged parts, in total of 8 core samples (kerns),
 - From the floor in total of 3 core samples (kerns).
- 3.1.3 Extraction, mechanical treatment of the reinforcement specimens and testing of mechanical properties:
 - From the walls non-damaged and eventually damaged parts, in total of 2 series,
 - From the floor, in total one series (3 specimens)
- 3.1.4 Testing with the determination of pH values of concrete structure in total of 3 measurement spots.
- 3.1.5 Inspection of reinforced bar from the walls and the floor, in total of 4 samples

3.2 Aeration Tank - Stress Strength Testing, Investigation of Neutrality and Inspection of Reinforced Bar for concrete structure

- 3.2.1 Detailed visual inspection of the structure with the assertion of all eventual defaults and damages, including elaboration of photo-documentation;
- 3.2.2 Extraction, mechanical treatment by cylindrical core samples (kerns) of concrete $\varnothing 100\text{mm}$, testing of mechanical properties;
 - From the walls (9+9+6+6), non-damaged and eventually damaged parts, in total 30 core samples (kerns),
 - From the floor in total 12 core samples (kerns)
- 3.2.3 Extraction, mechanical treatment of the reinforcement specimens and testing of mechanical properties;
 - From the walls non-damaged and eventually damaged parts, in total of 2 series,
 - From the floor, in total one series (1 specimens)
- 3.2.4 Testing with the determination of pH values of structure concrete in total of 5 measurement spots.
- 3.2.5 Inspection of reinforced bar from the walls and the floor in total of 5 samples

3.3 Underground Pipelines

- 3.3.1 Excavation and detailed visual inspection of the state of technological underground pipelines up to extent dependent on the accessibility of particular locations including elaboration of photo-documentation.
- 3.3.2 Testing of mechanical properties of cast iron or steel on 4 locations (sludge treatment).
- 3.3.3 Determination of the thickness of the pipeline walls including determination of the degree of corrosion, on 4 locations.

3.4 Elaboration of the Testing

After completion of the investigation works under Items 3.1 - 3.3 and completion of all results and analyses, a corresponding elaboration on the testing will be worked-out with corresponding conclusions on the state of investigated structures. The Elaboration will be made in English in 10 copies.

Term of service and works will carry out within 40 days.

Above quoted investigation services and works will be in accordance with valid Norms and Standards of Bosnia and Herzegovina (Corresponding to DIN).

Equipment

- Extraction of cylindrical core samples (kerns) will be carried out with a corresponding electrical apparatus; diamond crown diameter of 100mm and corresponding rotational speed,
- Mechanical treatment of the specimens will be carried out with an apparatus and diamond plate for precise cutting,
- Testing of mechanically treated specimens on a press type "Amsier" of 3,000 kN capacity

3.5 Hydraulic Test Drain Test

These tests will be carried out for:

• Grit Chamber capacity	1,200 m ³
• Two Primary sedimentation tanks capacity $2 \times 7,150$ m ³	14,300 m ³
• Aeration tank capacity	24,000 m ³
• Four Final sedimentation tanks capacity $4 \times 7,400$ m ³	<u>29,600 m³</u>
Total:	69,100 m ³

Water supply will be from river Miljacka that is far from tank cca 200 m through provisional installation.

3.5.1 Provisional installation

Provisional installation for water supply include services and works as follows:

- Design,
- Municipality permission and approval of design
- Municipality taxies,
- Civil works for execution of water take off on Miljacka river,
- Improve of submersible pump capacity of cca 150 m³/h, according to the attached prospect
- PE pipeline $\varnothing 80$ mm length cca 200m,
- Improve and installation LOW VOLTAGE SWITCHBOARD,
- Supply and installation of cable 4×10 mm² from existing substation 600 kW to pump length 220m,
- Improve and installation adequate instruments for security work of pump

3.5.2 Services of supply water

These services comprise all necessary monitoring, works and electrical costs for water supply for Hydraulic Test Drain Test of Tanks in total capacity of water $59,100 \text{ m}^3 \times 1.1 = 75,900 \text{ m}^3$

Note: all above services, supplies of goods and works will be carried out duration of two months

3.6 Turbines of Aeration Tank Load Testing

Testing will be carried out through the all machines of 36 PCs power 36 kW and include as follows:

3.6.1 Material supply

- Supply and installation of mobile cable $4 \times 16 \text{ mm}^2$ from existing substation 600 kW to turbines length 150m,
- Improve and installation mobile LOW VOLTAGE SWITCHBOARD, including all other instruments for improve security testing of turbine,
- Supply of cca 160 l of oil for testing of 4 turbines in same time,
- Supply of cca 40 kg grease for machine bearings lubrication,
- Supply of electrical energy.

3.6.2 Work testing

- Unloading old oil from turbine with transport to disposal and treatment (cca $36 \times 28 \text{ l/PC} = 1008 \text{ l}$),
- Loading of 9×4 turbines with new oil (28 l/PC),
- Greasing of turbine bearings,
- Manual and visual inspection/examination of turbine before starting,
- Testing min 1 hour.

Note: all above services, supplies of goods and works will be carried out duration of two months

4. PAYMENT

- 30% Advance payment of contract price,
- 30% after one month of work,
- 40% after finish all services and works.

5. GUARANTEES AND LIABILITIES

The contractor warrants that all works, supplies and services will be fully performed in all respects, in accordance with accepted professional design and standards and in line with contract document and that work will conform with all applicable published laws, codes and regulations and will be designed in all respects e.g. volumetrically, structurally, mechanically, electrically and etc. to satisfy the requirements set forth in contract document.

