TYPE OF WORK : LEANING WALL (CONCRETE TYPE) FORM

LOCATION : WF.105R ~ WF.110R+22.0

CALCULATION	RESULT

Table. Calculation for Form(Front and Back)

	front							back					total T1(m2)
block	H1	H2	distance	A1	H3	distance	A2	H4	H5	distance	A3	A4	A1+A2+A3+A4
L1	6.373	6.484	14.500	93.213	1.000	15.000	706.599	5.951	6.055	14.500	87.044	706.599	1593.456
L2	6.484	6.484	10.000	64.844	1.000	10.000	329.220	6.055	6.055	10.000	60.552	329.220	783.836
L3	6.484	6.484	10.000	64.844	1.000	10.000	329.220	6.055	6.055	10.000	60.552	329.220	783.836
L4	6.484	6.373	10.000	64.285	1.000	10.000	326.425	6.055	5.951	10.000	60.030	326.425	777.165
L5	6.373	6.373	10.000	63.726	1.000	10.000	323.630	5.951	5.951	10.000	59.508	323.630	770.494
L6	6.373	6.373	10.000	63.726	1.000	10.000	323.630	5.951	5.951	10.000	59.508	323.630	770.494
L7	6.373	6.261	10.000	63.167	0.950	10.000	320.585	5.951	5.846	10.000	58.986	320.585	763.323
L8	6.261	6.149	10.000	62.049	0.950	10.000	314.995	5.846	5.742	10.000	57.942	314.995	749.981
L9	6.149	6.037	10.000	60.931	0.950	10.000	309.405	5.742	5.638	10.000	56.898	309.405	736.639
L10	6.037	5.925	10.000	59.813	0.900	15.000	455.348	5.638	5.533	10.000	55.854	455.348	1026.362
L11	5.925	5.814	10.000	58.695	0.900	16.000	476.760	5.533	5.429	10.000	54.810	476.760	1067.025
L12	5.814	5.702	10.000	57.577	0.900	17.000	497.055	5.429	5.324	10.000	53.766	497.055	1105.452
L13	5.702	5.478	10.000	55.900	0.900	18.000	511.200	5.324	5.116	10.000	52.200	511.200	1130.500
L14	5.478	5.366	10.000	54.223	0.850	19.000	523.194	5.116	5.011	10.000	50.634	523.194	1151.244
L15	5.366	5.255	10.000	53.105	0.850	20.000	539.550	5.011	4.907	10.000	49.590	539.550	1181.795
L16	5.255	5.031	10.000	51.428	0.850	21.000	548.919	4.907	4.698	10.000	48.024	548.919	1197.290
L17	5.031	4.807	10.000	49.192	0.800	22.000	549.912	4.698	4.489	10.000	45.936	549.912	1194.952
L18	4.807	4.584	10.000	46.936	0.800	23.000	549.194	4.489	4.280	10.000	43.848	549.194	1189.193
L19	4.584	4.360	10.000	44.720	0.800	24.000	546.240	4.280	4.072	10.000	41.760	546.240	1178.960
L20	4.360	4.137	10.000	42.484	0.750	25.000	540.425	4.072	3.863	10.000	39.672	540.425	1163.006
L21	4.137	4.248	10.000	41.925	0.750	26.000	554.775	3.863	3.967	10.000	39.150	554.775	1190.625
L22	4.248	4.472	10.000	43.602	0.800	27.000	599.427	3.967	4.176	10.000	40.716	599.427	1283.172
L23	4.472	4.696	10.000	45.838	0.800	28.000	652.932	4.176	4.385	10.000	42.804	652.932	1394.506
L24	4.696	4.919	10.000	48.074	0.800	29.000	708.673	4.385	4.594	10.000	44.892	708.673	1510.312
L25	4.919	5.031	10.000	49.751	0.800	30.000	758.265	4.594	4.698	10.000	46.455	758.265	1612.739
L26	5.031	5.087	4.500	22.765	0.850	31.000	366.037	4.698	4.750	4.500	21.258	366.037	776.097
													28082.453

Table. Calculation for Form(Sides)

section	L1	L2	H1	A1	L3	H2	A2	total T2(m2)
1	0.450	1.650	5.700	5.985	2.550	1.000	2.550	8.535
2	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
3	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
4	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
5	0.450	1.650	5.700	5.985	2.550	1.000	2.550	8.535
6	0.450	1.650	5.700	5.985	2.550	1.000	2.550	8.535
7	0.450	1.560	5.700	5.729	2.450	0.950	2.328	8.056
8	0.450	1.560	5.600	5.628	2.450	0.950	2.328	7.956
9	0.450	1.560	5.500	5.528	2.450	0.950	2.328	7.855
10	0.450	1.470	5.400	5.184	2.300	0.900	2.070	7.254
11	0.450	1.470	5.300	5.088	2.300	0.900	2.070	7.158
12	0.450	1.470	5.200	4.992	2.300	0.900	2.070	7.062
13	0.450	1.470	5.100	4.896	2.300	0.900	2.070	6.966
14	0.450	1.380	4.900	4.484	2.150	0.850	1.828	6.311
15	0.450	1.380	4.800	4.392	2.150	0.850	1.828	6.220
16	0.450	1.380	4.700	4.301	2.150	0.850	1.828	6.128
17	0.450	1.290	4.500	3.915	2.000	0.800	1.600	5.515
18	0.450	1.290	4.300	3.741	2.000	0.800	1.600	5.341
19	0.450	1.290	4.100	3.567	2.000	0.800	1.600	5.167
20	0.450	1.200	3.900	3.218	1.850	0.750	1.388	4.605
21	0.450	1.200	3.700	3.053	1.850	0.750	1.388	4.440
22	0.450	1.290	3.800	3.306	2.000	0.800	1.600	4.906
23	0.450	1.290	4.000	3.480	2.000	0.800	1.600	5.080
24	0.450	1.290	4.200	3.654	2.000	0.800	1.600	5.254
25	0.450	1.290	4.400	3.828	2.000	0.800	1.600	5.428
26	0.450	1.380	4.500	4.416	2.150	0.850	1.828	5.915
27	0.450	1.380	4.550	4.163	2.150	0.850	1.828	5.991
								180.162

le. Calculation for Form(Top Conc)

block	distance	L	w	A(m2)
L1	14.500	14.500	0.150	2.175
L2	10.000	10.000	0.150	1.500
L3	10.000	10.000	0.150	1.500
L4	10.000	10.000	0.150	1.500
L5	10.000	10.000	0.150	1.500
L6	10.000	10.000	0.150	1.500
L7	10.000	10.000	0.150	1.500
L8	10.000	10.000	0.150	1.500
L9	10.000	10.000	0.150	1.500
L10	10.000	10.000	0.150	1.500
L11	10.000	10.000	0.150	1.500
L12	10.000	10.000	0.150	1.500
L13	10.000	10.002	0.150	1.500
L14	10.000	10.000	0.150	1.500
L15	10.000	10.000	0.150	1.500
L16	10.000	10.002	0.150	1.500
L17	10.000	10.002	0.150	1.500
L18	10.000	10.002	0.150	1.500
L19	10.000	10.002	0.150	1.500
L20	10.000	10.002	0.150	1.500
L21	10.000	10.000	0.150	1.500
L22	10.000	10.002	0.150	1.500
L23	10.000	10.002	0.150	1.500
L24	10.000	10.002	0.150	1.500
L25	10.000	10.000	0.150	1.500
L26	4.500	4.500	0.150	0.675
		259.024		38.854

TOTAL(m2)	
Front,Back	28082.453
Sides	180.162
Top Concrete	38.854
	28301.468

28301.468m²

TYPE OF WORK : LEANING WALL (CONCRETE TYPE)

LOCATION : JOINT FILLER

: WF. 105R ~ WF. 110R+22.0

CALCULATION	RESULT

Table. Calculation for Joint Filler

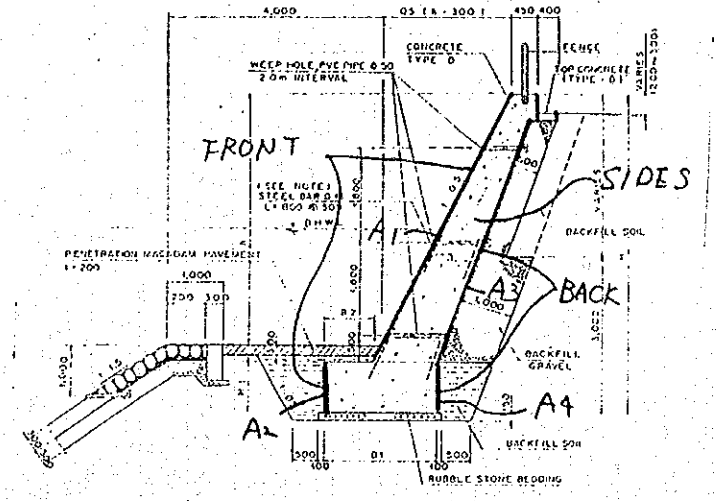
section	L1	L2	H1	A1	L3	H2	A2	total T2(m2)
1	0.450	1.650	5.700	5.985	2.550	1.000		-
2	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
3	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
4	0.450	1.650	5.800	6.090	2.550	1.000	2.550	8.640
5	0.450	1.650	5.700	5.985	2.550	1.000	2.550	8.535
6	0.450	1.650	5.700	5.985	2.550	1.000	2.550	8.535
7	0.450	1.560	5.700	5.729	2.450	0.950	2.328	8.056
8	0.450	1.560	5.600	5.628	2.450	0.950	2.328	7.956
9	0.450	1.560	5.500	5.528	2.450	0.950	2.328	7.855
10	0.450	1.470	5.400	5.184	2.300	0.900	2.070	7.254
11	0.450	1.470	5.300	5.088	2.300	0.900	2.070	7.158
12	0.450	1.470	5.200	4.992	2.300	0.900	2.070	7.062
13	0.450	1.470	5.100	4.896	2.300	0.900	2.070	6.966
14	0.450	1.380	4.900	4.484	2.150	0.850	1.828	6.311
15	0.450	1.380	4.800	4.392	2.150	0.850	1.828	6.220
16	0.450	1.380	4.700	4.301	2.150	0.850	1.828	6.128
17	0.450	1.290	4.500	3.915	2.000	0.800	1.600	5.515
18	0.450	1.290	4.300	3.741	2.000	0.800	1.600	5.341
19	0.450	1.290	4.100	3.567	2.000	0.800	1.600	5.167
20	0.450	1.200	3.900	3.218	1.850	0.750	1.388	4.605
21	0.450	1.200	3.700	3.053	1.850	0.750	1.388	4.440
22	0.450	1.290	3.800	3.306	2.000	0.800	1.600	4.906
23	0.450	1.290	4.000	3.480	2.000	0.800	1.600	5.080
24	0.450	1.290	4.200	3.654	2.000	0.800	1.600	5.254
25	0.450	1.290	4.400	3.828	2.000	0.800	1.600	5.428
26	0.450	1.380	4.500	4.118	2.150	0.850	1.828	5.945
27	0.450	1.380	4.550	4.163	2.150	0.850	1.828	5.991
								171.627

171.627 m²

TYPE OF WORK : LEANING WALL (CONCRETE)

LOCATION : WF. 105R ~ WF. 110R+22.0

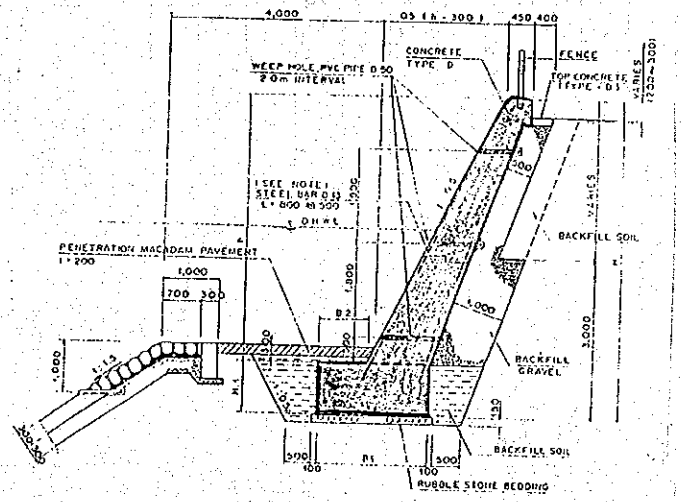
EXPLANATORY DRAWING



STANDARD CROSS SECTION OF LEANINGWALL (RINGHT BANK)

SCALE C

FOR FORM

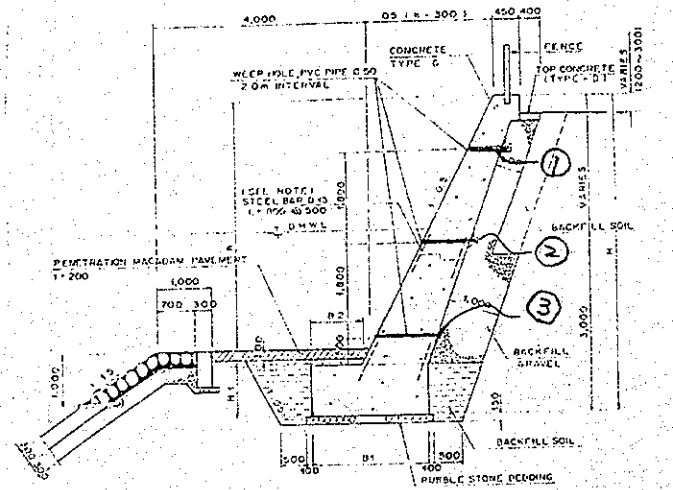


STANDARD CROSS SECTION OF LEANINGWALL (RINGHT BANK)

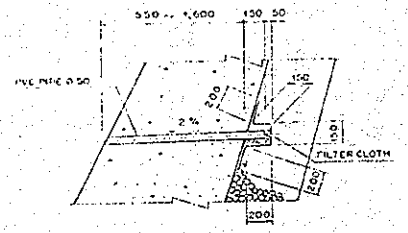
SCALE C

FOR JOINT FILLER

TYPE OF WORK :	WEEP HOLE
LOCATION :	



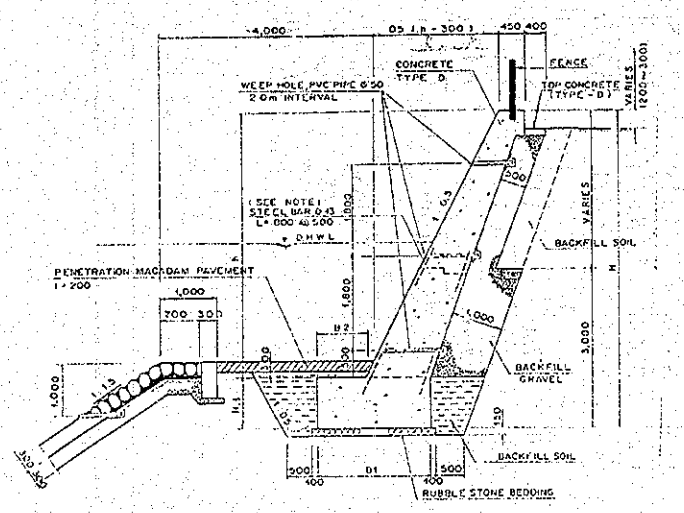
STANDARD CROSS SECTION OF LEANINGWALL (RINGHT BANK)
SCALE C



DETAIL OF WEEP HOLE
SCALE D

CALCULATION	RESULT
• PCV ϕ50	
① ℓ_1 = 0.8 m / place	
② ℓ_2 = 1.1 m / place	
③ ℓ_3 = 1.3 m / place	
$\ell = \ell_1 + \ell_2 + \ell_3 = 3.2$ m	
$N = (4.5 + 240.0 + 14.5) \div 2 + 1 = 259$	
$L = 259 \times 3.2$ m $= 828.8$ m	828.800 m
• FILTER CLOTH	
$A = 0.640$ m^2/place $\times 259 = 165.760$	163.760 m^2

TYPE OF WORK :	STEEL FENCE	CALCULATION	RESULT
LOCATION :			



STANDARD CROSS SECTION OF LEANINGWALL (RINGHT BANK)
SCALE C

L = 486.012 m

486.012 m

2.6 LEANING WALL (WET STONE MASONRY)

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-1

CALCULATION	RESULT
STRUCTURAL EXCAVATION	

section	L1	L2	H1	A1	L3	L4	H2
1	1.285	1.905	3.100	4.945	3.555	2.835	0.900
2	1.285	2.000	3.574	5.871	3.650	2.930	0.900
3	1.285	2.067	3.908	6.550	3.717	2.997	0.900
section	A2	L5	L6	H3	A3	A1+A2+A3	
1	2.876	1.650	1.950	0.300	0.540	8.361	
2	2.961	1.650	1.950	0.300	0.540	9.372	
3	3.021	1.650	1.950	0.300	0.540	10.111	
section	ave	distance(m)	volume(m^3)				
1							
2	8.866	10.158	90.063				
3	9.741	7.158	69.728				
		17.316	159.791				

V = 159.791 — 159.791 m^3

BACKFILL WITH SELECTED SOIL

section	L1	L2	H1	A1	L3	L4	H2
1	1.285	1.905	3.100	4.945	3.555	2.835	0.900
2	1.285	2.000	3.574	5.871	3.650	2.930	0.900
3	1.285	2.067	3.908	6.550	3.717	2.997	0.900
section	A2	L5	L6	H3	A3	L7	H4
1	0.653	1.650	1.750	0.100	0.170	0.418	2.000
2	0.653	1.650	1.750	0.100	0.170	0.418	2.000
3	0.653	1.650	1.750	0.100	0.170	0.418	2.000
section	A4	A1+A2+A3+A4	ave	distance(m)	volume(m^3)		
1	0.835	2.288					
2	0.835	2.288	2.288	10.158	23.240		
3	0.835	2.288	2.288	7.158	16.377		
					39.617		

V = 39.617 — 39.617 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-1

CALCULATION	RESULT

BACKFILL WITH GRAVEL

section	L1	H1	A1	L2	H2	A2
1	0.418	1.850	0.773	0.835	1.100	0.919
2	0.418	1.850	0.773	0.835	1.574	1.315
3	0.418	1.850	0.773	0.835	1.908	1.594

section	A1+A2	ave	distance(m)	volume(m^3)
1	1.691			
2	2.087	1.889	10.158	19.191
3	2.366	2.227	7.158	15.938
				35.129

V = 35.129 → 35.129 m^3

CONCRETE TYPE D

section	elevation	distance(m)	L	t	w	V(m^3)
1	4.475					
2	4.945	10.158	10.169	0.150	0.450	0.686
3	5.276	7.158	7.166	0.150	0.450	0.484
						1.170

CONCRETE : V = 1.170 → 1.170 m^3

section	elevation	distance(m)	L	t	A1(m^2)
1	4.475				
2	4.945	10.158	10.169	0.150	1.525
3	5.276	7.158	7.166	0.150	1.075
			17.335		2.600

A2= 0.150 * 0.450 * 2.000 places = 0.135

Total=A1+A2= 2.735 m^2

FORM : A = 2.735 → 2.735 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-1

CALCULATION	RESULT

GRAVEL BEDDING

section	B1	t	A	Ave	distance(m)	V(m^3)
1	1.770	0.100	0.197			
2	1.865	0.100	0.206	0.202	10.158	0.914
3	1.932	0.100	0.213	0.210	7.158	0.644
					17.316	1.558

V = 1.558 → 1.558 m^3

WET STONE MASONRY

section	L1	L2	H1	A1	L3	H2
1	0.450	1.070	3.100	2.356	1.770	0.800
2	0.450	1.165	3.574	2.886	1.865	0.800
3	0.450	1.232	3.908	3.286	1.932	0.800

section	A2	A1+A2	Ave	distance(m)	V2(m^3)	
1	1.416	3.772				
2	1.492	4.377	4.075	10.158	41.391	
3	1.545	4.831	4.604	7.158	32.958	
				total	74.349	

V = 74.349 → 74.349 m^3

CEMENT MORTAR POINTING

	front			Top			A1+A2
section	L1	distance(m)	A1	L2	distance(m)	A2	
1	3.466						
2	3.996	10.158	37.897	0.450	10.158	4.571	42.468
3	4.369	7.158	29.938	0.450	7.158	3.221	33.159
							75.627

A = 75.627 → 75.627 m^2

JOINT FILLER

section	L1	L2	H1	A1	L3	H2	A2	A1+A2
1	0.450	1.070	3.100	2.356	1.770	0.800	1.416	-
2	0.450	1.165	3.574	2.886	1.865	0.800	1.492	4.377
3	0.450	1.232	3.908	3.286	1.932	0.800	1.545	4.831
								9.209

A = 9.209 → 9.209 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-1

CALCULATION		RESULT
WEEP HOLE		
PVC PIPE ø 50		
n_1 = 17.316 / 3.0	= 6	
n_1 = 17.316 / 3.0	= 6	2.550 m
L_1 = 6 x 0.8	= 4.800	
L_2 = 6 x 1.15	= 6.900	
L = $L_1 + L_2$	= 11.700	11.700 m
FILTER CLOTH		
A = 0.640 m^2 / place x 6 x 2	= 7.680	7.680 m^2
STEEL FENCE		
L = 17.335 m		17.335 m
SCAFFOLDING		

	front		
section	L1	distance(m)	A1
1	3.466		
2	3.996	10.158	37.897
3	4.369	7.158	29.938
			67.835

A = 67.835	67.835 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-2

CALCULATION	RESULT

STRUCTURAL EXCAVATION

section	L1	L2	H1	A1	L3	L4
3	1.285	1.793	2.540	3.910	3.268	2.668
4	1.285	1.819	2.671	4.146	3.294	2.694
5	1.285	1.819	2.671	4.146	3.294	2.694
section	H2	A2	L5	L6	H3	A3
3	0.750	2.226	1.475	1.775	0.300	0.488
4	0.750	2.246	1.475	1.775	0.300	0.488
5	0.750	2.246	1.475	1.775	0.300	0.488
section	A1+A2+A3	ave	distance(m)	volume(m3)		
3	6.623					
4	6.879	6.751	2.684	18.121		
5	6.879	6.879	5.000	34.397		
				52.518		

V = 52.518 — 52.518 m^3

BACKFILL WITH SELECTED SOIL

section	L1	L2	H1	A1	L3	L4	H2
3	0.835	0.610	0.750	0.542	0.875	0.500	0.750
4	0.835	0.610	0.750	0.542	0.875	0.500	0.750
5	0.835	0.610	0.750	0.542	0.875	0.500	0.750
section	A2	L5	L6	H3	A3	L7	
3	0.516	1.475	1.775	0.300	0.488	0.418	
4	0.516	1.475	1.775	0.300	0.488	0.418	
5	0.516	1.475	1.775	0.300	0.488	0.418	
section	H4	A4	A1+A2+ A3+A4	ave	distance(m)	volume(m^3)	
3	2.000	0.835	2.380				
4	2.000	0.835	2.380	2.380	2.684	6.389	
5	2.000	0.835	2.380	2.380	5.000	11.902	
						18.291	

V = 18.291 — 18.291 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-2

CALCULATION	RESULT

BACKFILL WITH GRAVEL

section	L1	H1	A1	L2	H2
3	0.418	1.850	0.773	0.835	0.540
4	0.418	1.850	0.773	0.835	0.671
5	0.418	1.850	0.773	0.835	0.671
section	A2	A1+A2	ave	distance(m)	volume(m^3)
3	0.451	1.224			
4	0.560	1.333	1.278	2.684	3.431
5	0.560	1.333	1.333	5.000	6.665
					10.096

V = 10.096 — 10.096 m^3

CONCRETE TYPE D

block	h1	h2	distance	L	t	w	V(m^3)
L1	2.540	2.671	2.684	2.687	0.150	0.450	0.181
L2	2.671	2.671	5.000	5.000	0.150	0.450	0.338
							0.519

CONCRETE : V = 0.519 — 0.519 m^3

section	elevation	distance	L	t	A1(m^2)
4	5.276				
5	5.400	2.684	2.719	0.150	0.408
6	5.400	5.000	5.019	0.150	0.753
			7.738		1.161

A2= 0.150 * 0.450 * 3.000 places = 0.203

Total=A1+A2= 1.363 m^2

FORM : A = 1.363 — 1.363 m^2

GRAVEL BEDDING

block	B1	t	A	distance(m)	V(m^3)
3	1.658	0.100	0.186	2.684	0.499
4	1.684	0.100	0.188	5.000	0.942
				7.684	1.441

V = 1.441 — 1.441 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-2

CALCULATION	RESULT

WET STONE MASONRY

section	L1	L2	H1	A1	L3	H2
3	0.450	0.958	2.540	1.788	1.558	0.650
4	0.450	0.984	2.671	1.915	1.584	0.650
5	0.450	0.984	2.671	1.915	1.584	0.650

section	A2	A1+A2	Ave	distance(m)	V2(m^3)	
3	1.013	2.801				
4	1.030	2.945	2.873	2.684	7.711	
5	1.030	2.945	2.945	5.000	14.726	
				total	22.437	

V = 22.437 — 22.437 m^3

CEMENT MORTAR POINTING

	front			Top			A1+A2
section	L1	distance(m)	A1	L2	distance(m)	A2	
3	2.840						
4	2.986	2.684	7.818	0.450	2.684	1.208	9.026
5	2.986	5.000	14.931	0.450	5.000	2.250	17.181
							26.207

A = 26.207 — 26.207 m^2

JOINT FILLER

section	L1	L2	H1	A1	L3	H2	A2	A1+A2
3	0.450	0.958	2.540	1.788	1.558	0.650	1.013	2.801
4	0.450	0.984	2.671	1.915	1.584	0.650	1.030	2.945
5	0.450	0.984	2.671	1.915	1.584	0.650	1.030	2.945
								8.691

A = 8.691 — 8.691 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF. 65L + 3.0 m ~ WF. 65L + 28.0 m
: LEANING WALL-2

CALCULATION		RESULT
WEEP HOLE		
PVC PIPE ø 50		
n = 7.684 / 3.0	= 3	
L = 3 x 0.85	= 2.550	2.550 m
FILTER CLOTH		
A = 0.640 m^2 / place x 3	= 1.920	1.920 m^2
STEEL FENCE		
L = 7.738 m		7.738 m
SCAFFOLDING		

	front		
section	L1	distance(m)	A1
3	2.840		
4	2.986	2.684	7.818
5	2.986	5.000	14.931
			22.749

A = 22.749	22.749 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.64R + 14.61 m ~ WF.65R + 38.0 m
: LEANING WALL-1

CALCULATION	RESULT
STRUCTURAL EXCAVATION	
See Attached Table	
V = 237.682	237.682 m^3
BACKFILL WITH SELECTED SOIL	
See Attached Table	
V = 61.951	61.951 m^3
BACKFILL WITH GRAVEL	
See Attached Table	
V = 50.113	50.113 m^3
CONCRETE TYPE D	
See Attached Table	
CONCRETE : V = 1.830	1.830 m^3
FORM : A = 4.201	4.201 m^2
GRAVEL BEDDING	
See Attached Table	
V = 2.437	2.437 m^3
WET STONE MASONRY	
See Attached Table	
V = 109.007	109.007 m^3
CEMENT MORTAR POINTING	
See Attached Table	
A = 111.810	111.810 m^2
JOINT FILLER	
See Attached Table	
A = 8.153	8.153 m^2
WEEP HOLE	
PVC PIPE ø 50	
n_1 = 27.110 / 3.00 m = 9	
n_2 = 27.110 / 3.00 m = 9	

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.64R + 14.61 m ~ WF.65R + 38.0 m
: LEANING WALL-1

CALCULATION		RESULT
L_1 = 9 x 0.85	= 7.650	
L_2 = 9 x 1.15	= 10.350	
L = $L_1 + L_2$	= 18.000 m	18.000 m
FILTER CLOTH		
A = 0.640 m^2 / place x 9 x 2	= 11.520	11.520 m^2
STEEL FENCE		
L = 27.110 m		27.110 m
SCAFFOLDING		
See Attached Table		
A = 99.625		99.625 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.64R + 14.61 m ~ WF.65R + 38.0 m
: LEANING WALL-2

CALCULATION	RESULT
STRUCTURAL EXCAVATION	
See Attached Table	
V = 54.108	54.108 m^3
BACKFILL WITH SELECTED SOIL	
See Attached Table	
V = 18.857	18.857 m^3
BACKFILL WITH GRAVEL	
See Attached Table	
V = 10.393	10.393 m^3
CONCRETE TYPE D	
See Attached Table	
CONCRETE : V = 0.535	0.535 m^3
FORM : A = 1.398	1.398 m^2
GRAVEL BEDDING	
See Attached Table	
V = 1.485	1.485 m^3
WET STONE MASONRY	
See Attached Table	
V = 23.111	23.111 m^3
CEMENT MORTAR POINTING	
See Attached Table	
A = 26.998	26.998 m^2
JOINT FILLER	
See Attached Table	
A = 8.685	8.685 m^2
WEEP HOLE	
PVC PIPE ø 50	
n = 7.922 / 3.00 m = 3	
L = 0.90 / 3.00 m = 2.700 m	

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.64R + 14.61 m ~ WF.65R + 38.0 m
: LEANING WALL-2

CALCULATION	RESULT
FILTER CLOTH	
A = 0.640 m^2 / place x 3 places = 1.920	1.920 m^2
STEEL FENCE	
L = 7.973 m	7.973 m
SCAFFOLDING	
See Attached Table	
A = 23.433	23.433 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 20.0 m ~ WF.70L + 13.00 m
:

CALCULATION		RESULT
STRUCTURAL EXCAVATION		
L_1 = 1.50 + 0.60 x 2	= 2.700	
L_2 = 2.700 + 1.10 x 0.30 + 1.10 x 0.50	= 3.580	
L_3 = 0.45 + 0.80 / 1.044	= 1.216	
L_4 = $L_2 - L_5$ = 3.850 – 1.500	= 2.300	
L_5 = 0.60 + 0.60 + 0.30	= 1.500	
1. A_1 = (2.700 + 3.580) x 1.10 / 2	= 3.454	
2. A_2 = (1.216 + 2.300) x 2.65 / 2	= 4.659	
3. A_3 = 0.316 x 0.20 / 2	= 0.032	
TOTAL A	= 8.145	
V = 8.145 x (260.00 – 25.00)	= 1914.075	1914.075 m^3
BACKFILL WITH SELECTED SOIL		
1. A_1 = (0.60 + 0.60 + 0.80 x 0.30) x 0.80 / 2	= 0.576	
2. A_2 = (0.60 + 0.60 + 0.80 x 0.50) x 0.80 / 2	= 0.640	
3. l_1 = 0.60 + 0.60 + 0.80 x 0.50	= 1.600	
l_2 = l_1 + 0.10 = 1.600 + 0.10	= 1.700	
A_3 = (1.600 + 1.700) x 0.10 / 2	= 0.165	
4. A_4 = 0.4 / 1.044 x (1.75 + 0.15) + 0.40 / 1.044 x 0.20	= 0.805	
TOTAL A	= 2.186	
V = 2.186 x (260.00 – 25.00)	= 513.710	513.710 m^3
BACKFILL GRAVEL		
1. A_1 = 0.40 / 1.044 x 1.750	= 0.670	

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 20.0 m ~ WF.70L + 13.00 m
:

CALCULATION			RESULT
2. A_2 = 0.80 / 1.044 x 1.20	=	0.920	
TOTAL A	=	1.590	
V = 1.590 x (260.00 – 25.00)	=	373.650	373.650 m^3
GRAVEL BEDDING			
V = 0.15 x 1.70 x (260.00 – 25.00)	=	59.925	59.925 m^3
WET STONE MASONRY			
A = (0.45 + 0.90) x 3.10 / 2 + 0.65 x 1.50	=	3.068	
V = 3.068 x (260.00 – 25.00)	=	720.980	720.980 m^3
CEMENT MORTAR POINTING			
L = 3.10 x 1.118 + 0.45	=	3.916	
A = 3.916 x (260.00 – 25.00)	=	920.260	920.260 m^2
CONCRETE TYPE D			
CONCRETE			
V = 0.45 x 0.15 x (260.00 – 25.00)	=	15.863	15.863 m^3
FORM			
A_1 = 0.15 x (260.00 – 25.00)	=	35.250	
A_2 = 0.15 x 0.45 x 23 places	=	1.553	
TOTAL A	=	36.803	36.803 m^2
JOINT FILLER			
a = (0.45 + 0.90) x 3.10 / 2 + 1.50 x 0.65	=	3.068	
A = 3.068 x 23 places	=	70.564	70.564 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 20.0 m ~ WF.70L + 13.00 m
:

CALCULATION		RESULT
WEEP HOLE		
PVC PIPE ø 50		
n = (260.00 – 25.00) / 1.800	= 131	
L_1 = 131 x 0.75	= 98.250	
L_2 = 131 x 0.80	= 104.800	
L = $L_1 + L_2$	= 203.050	203.050 m
FILTER CLOTH		
A = 0.640 m^2 / place x 131 x 2	= 167.680	167.680 m^2
STEEL FENCE		
L = 260.00 – 25.00	= 235.000	235.000 m
SCAFFOLDING		
A = 3.10 x 1.118 x (260.00 – 25.00)	= 814.463	814.463 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 35.0 m ~ WF.72R + 32.00 m
:

CALCULATION			RESULT
STRUCTURAL EXCAVATION			
1. H = 2.365 m			
L_1 = 0.45 + 0.80 / 1.044	=	1.216	
L_2 = 3.580 – 0.60 x 2 – 0.30 x 0.50 x 2	=	2.080	
L_3 = 2.700 + 1.10 x 0.50 + 1.10 x 0.30	=	3.580	
L_4 = (0.50 + 0.10) x 2 + 1.50	=	2.700	
A_1 = (1.216 + 2.080) x 2.365 / 2	=	3.898	
A_2 = (3.580 + 2.700) x 1.100 / 2	=	3.454	
TOTAL A	=	7.352	
2. H = 2.557 m			
A_1 = (1.216 + 2.080) x 2.557 / 2	=	4.214	
A_2 = (3.580 + 2.700) x 1.100 / 2	=	3.454	
TOTAL A	=	7.668	
V = (7.352 + 7.668) / 2 x (390.00 – 35.00)	=	2666.050	2666.050 m^3
BACKFILL WITH SELECTED SOIL			
1. A = (0.60 + 0.60 + 0.80 x 0.30) x 0.80 / 2	=	0.576	
2. A = (0.60 + 0.60 + 0.80 x 0.50) x 0.80 / 2	=	0.640	
3. l_1 = 0.60 + 0.80 x 0.50	=	1.000	
l_2 = 1.000 + 0.10 x 0.5 x 2	=	1.100	
A = (1.000 + 1.100) x 0.10 / 2	=	0.105	
4. A_1 = 0.40 / 1.044 x (1.315 + 0.15)	=	0.561	
A_2 = 0.40 / 1.044 x (1.507 + 0.15)	=	0.635	
A = (A_1 + A_2) / 2	=	0.598	
TOTAL A	=	1.919	
V = 2.186 x (260.00 – 25.00)	=	681.245	681.245 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 35.0 m ~ WF.72R + 32.00 m
:

CALCULATION			RESULT
BACKFILL GRAVEL			
1. A_1 = 0.40 / 1.044 x 1.315	=	0.504	
A_2 = 0.40 / 1.044 x 1.507	=	0.577	
A = (A_1 + A_2) / 2	=	0.541	
2. A = 0.80 / 1.044 x (2.00 – 0.80)	=	0.920	
TOTAL A	=	1.461	
V = 1.461 x (390.00 – 35.00)	=	518.655	518.655 m^3
GRAVEL BEDDING			
V = 0.15 x 1.70 x (390.00 – 35.00)	=	90.525	90.525 m^3
WET STONE MASONRY			
1. A_1 = (0.45 + 0.90) x (1.315 + 2.00 – 0.80) / 2	=	1.698	
A_2 = (0.45 + 0.90) x (1.507 + 2.00 – 0.80) / 2	=	1.827	
A = (A_1 + A_2) / 2	=	1.763	
2. A = 0.65 x 1.50	=	0.975	
TOTAL A	=	2.738	
V = 2.738 x (390.00 – 35.00)	=	971.990	971.990 m^3
CEMENT MORTAR POINTING			
L_1 = (2.365 + 0.30) x 1.118	=	2.979	
L_2 = (2.557 + 0.30) x 1.118	=	3.194	
A_1 = (2.979 + 3.194) x (390.00 – 35.00) / 2	=	1095.701	
A_2 = (390.00 – 35.00) x 0.45	=	159.750	
TOTAL A	=	1255.451	1255.451 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : RAILWAY BRIDGE + 35.0 m ~ WF.72R + 32.00 m
:

CALCULATION			RESULT
CONCRETE TYPE D			
CONCRETE			
$V = 0.45 \times 0.15 \times (390.00 - 35.00)$		= 23.963	23.963 m^3
FORM			
$A_1 = 0.15 \times (390.00 - 35.00)$		= 53.250	
$A_2 = 0.15 \times 0.45 \times 34$ places		= 2.295	
	TOTAL A	= 55.545	55.545 m^2
JOINT FILLER t = 10, ELASTIC MATERIAL			
1. $A_1 = (0.45 + 0.90) \times (1.315 + 2.00 - 0.80) / 2$		= 1.698	
$A_2 = (0.45 + 0.90) \times (1.507 + 2.00 - 0.80) / 2$		= 1.827	
$A = (A_1 + A_2) / 2$		= 1.763	
2. $A = 0.65 \times 1.50$		= 0.975	
	TOTAL A	= 2.738	
$A = 2.738 \times 34$ places		= 93.092	93.092 m^2
WEEP HOLE			
PVC PIPE ø 50			
$n = (390.00 - 35.00) / 1.800$		= 197	
$L_1 = 197 \times 0.75$		= 147.750	
$L_2 = 197 \times 0.90$		= 177.300	
$L = L_1 + L_2$		= 325.050	325.050 m
FILTER CLOTH			
$A = 0.640\ m^2$ / place $\times 197 \times 2$		= 252.160	252.160 m^2
STEEL FENCE			
$L = 390.00 - 35.00$		= 355.000	355.000 m
SCAFFOLDING			
$A = (2.979 + 3.194) \times (390.00 - 35.00) / 2$		= 1095.701	1095.701 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.74R + 20.0 m ~ WF.78R + 40.0 m
:

CALCULATION	RESULT
STRUCTURAL EXCAVATION	
See Attached Table	
V = 1828.115	1828.115 m^3
BACKFILL WITH SELECTED SOIL	
See Attached Table	
V = 514.512	514.512 m^3
BACKFILL WITH GRAVEL	
See Attached Table	
V = 508.832	508.832 m^3
CONCRETE TYPE D	
See Attached Table	
CONCRETE : V = 14.608	14.608 m^3
FORM : A = 32.461	32.461 m^2
GRAVEL BEDDING	
See Attached Table	
V = 58.430	58.430 m^3
WET STONE MASONRY	
See Attached Table	
V = 770.957	770.957 m^3
CEMENT MORTAR POINTING	
See Attached Table	
A = 944.192	944.192 m^2
JOINT FILLER	
See Attached Table	
A = 71.250	71.250 m^2
WEEP HOLE	
PVC PIPE ø 50	
n_1 = 216.409 / 1.8 m = 390	
n_2 = 216.409 / 1.8 m = 390	
l_1 = 0.8 m / place	
l_2 = 1.0 m / place	

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.74R + 20.0 m ~ WF.78R + 40.0 m
:

CALCULATION		RESULT
L_1 = 390 x 0.8	= 312.0 m	
L_2 = 390 x 1.0	= 390.0 m	
L = $L_1 + L_2$	= 702.000 m	702.000 m
FILTER CLOTH		
N = $n_1 + n_2$	= 780	
A = 0.640 m^2 / place x 780	= 499.200	499.200 m^2
STEEL FENCE (GALVANIZED)		
L = 216.409 m		216.409 m
SCAFFOLDING		
See Attached Table		
A = 846.808		846.808 m^2

LEANING WALL (WET STONE MASONRY TYPE)

LOCATION: WF.74R+20m～ WF.78R+40m

TABLE. CALCULATION FOR STRUCTURAL EXCAVATION

section	L1	L2	H1	A1	L3	L4	H2	A2	L5	L6	H3	A3	A1+A2+A3	ave	distance(m)	volume(m^3)
1	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448			
2	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	12.829	108.373
3	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
4	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
5	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
6	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
7	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
8	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
9	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
10	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
11	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
12	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
13	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
14	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
15	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
16	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
17	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
18	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
19	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
20	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
21	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	10.000	84.475
22	1.250	1.700	3.500	5.163	3.500	2.600	0.900	2.745	1.650	1.950	0.300	0.540	8.448	8.448	13.580	114.717
																1828.115

TABLE. CALCULATION FOR BACKFILL WITH SELECTED SOIL

section	L1	L2	H1	A1	L3	L4	H2	A2	L5	L6	H3	A3	L7	H4	A4	A1+A2+A3+A4	ave	distance(m)	volume(m^3)
1	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378			
2	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	12.829	30.501
3	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
4	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
5	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
6	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
7	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
8	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
9	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
10	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
11	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
12	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
13	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
14	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
15	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
16	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
17	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
18	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
19	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
20	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
21	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	10.000	23.775
22	0.950	0.500	0.900	0.653	0.950	0.500	0.900	0.653	1.650	1.750	0.100	0.170	0.475	1.900	0.903	2.378	2.378	13.580	32.286
																			514.512

LEANING WALL (WET STONE MASONRY TYPE)
LOCATION: WF.74R+20m ~ WF.78R+40m

TABLE. CALCULATION FOR BACLFILL WITH GRAVEL

section	L1	H1	A1	A1	L2	H2	A2	A1+A2	ave	distance(m)	volume(m^3)
1	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351			
2	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	12.829	30.164
3	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
4	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
5	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
6	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
7	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
8	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
9	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
10	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
11	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
12	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
13	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
14	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
15	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
16	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
17	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
18	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
19	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
20	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
21	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	10.000	23.513
22	0.475	1.750	0.831	0.831	0.950	1.600	1.520	2.351	2.351	13.580	31.930
											508.832

TABLE. CALCULATION FOR RUBBLE STONE BEDDING

block	t	distance	V(m^3)
L1	0.15	12.829	3.464
L2	0.15	10.000	2.700
L3	0.15	10.000	2.700
L4	0.15	10.000	2.700
L5	0.15	10.000	2.700
L6	0.15	10.000	2.700
L7	0.15	10.000	2.700
L8	0.15	10.000	2.700
L9	0.15	10.000	2.700
L10	0.15	10.000	2.700
L11	0.15	10.000	2.700
L12	0.15	10.000	2.700
L13	0.15	10.000	2.700
L14	0.15	10.000	2.700
L15	0.15	10.000	2.700
L16	0.15	10.000	2.700
L17	0.15	10.000	2.700
L18	0.15	10.000	2.700
L19	0.15	10.000	2.700
L20	0.15	10.000	2.700
L21	0.15	13.580	3.667
		216.409	58.430

TABLE. CALCULATION FOR WET STONE MASONRY

section	L1	L2	H1	A1	ave	distance(m)	V1(m^3)	L3	H2	A2	distance(m)	V2(m^3)	V1+V2(m^3)
1	0.450	0.900	3.500	2.363				1.600	0.750	1.200			
2	0.450	0.900	3.500	2.363	2.363	12.829	30.309	1.600	0.750	1.200	12.829	15.395	45.703
3	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
4	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
5	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
6	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
7	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
8	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
9	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
10	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
11	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
12	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
13	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
14	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
15	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
16	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
17	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
18	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
19	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
20	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
21	0.450	0.900	3.500	2.363	2.363	10.000	23.625	1.600	0.750	1.200	10.000	12.000	35.625
22	0.450	0.900	3.500	2.363	2.363	13.580	32.083	1.600	0.750	1.200	13.580	16.296	48.379
							511.266				total	259.691	770.957

LEANING WALL (WET STONE MASONRY TYPE)
LOCATION: WF.74R+20m ~ WF.78R+40m

Table. Calculation for Cement Mortal Pointing

				Top			A1+A2
block	H2	distance	A1	L1	distance	A2	
L1	3.913	12.829	50.200	0.450	12.829	5.773	55.973
L2	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L3	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L4	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L5	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L6	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L7	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L8	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L9	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L10	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L11	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L12	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L13	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L14	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L15	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L16	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L17	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L18	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L19	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L20	3.913	10.000	39.130	0.450	10.000	4.500	43.630
L21	3.913	13.580	53.139	0.450	13.580	6.111	59.250
							944.192

Table. Calculation for Concrete(Top Concrete)

block	L	t	w	V(m3)
L1	12.829	0.150	0.450	0.866
L2	10.000	0.150	0.450	0.675
L3	10.000	0.150	0.450	0.675
L4	10.000	0.150	0.450	0.675
L5	10.000	0.150	0.450	0.675
L6	10.000	0.150	0.450	0.675
L7	10.000	0.150	0.450	0.675
L8	10.000	0.150	0.450	0.675
L9	10.000	0.150	0.450	0.675
L10	10.000	0.150	0.450	0.675
L11	10.000	0.150	0.450	0.675
L12	10.000	0.150	0.450	0.675
L13	10.000	0.150	0.450	0.675
L14	10.000	0.150	0.450	0.675
L15	10.000	0.150	0.450	0.675
L16	10.000	0.150	0.450	0.675
L17	10.000	0.150	0.450	0.675
L18	10.000	0.150	0.450	0.675
L19	10.000	0.150	0.450	0.675
L20	10.000	0.150	0.450	0.675
L21	13.580	0.150	0.450	0.917
				14.608

LEANING WALL (WET STONE MASONRY TYPE)
LOCATION: WF.74R+20m ~ WF.78R+40m

Table. Calculation for Form
(Top Concrete)

block	distance	L	w	A(m2)
L1	12.829	12.829	0.150	1.924
L2	10.000	10.000	0.150	1.500
L3	10.000	10.000	0.150	1.500
L4	10.000	10.000	0.150	1.500
L5	10.000	10.000	0.150	1.500
L6	10.000	10.000	0.150	1.500
L7	10.000	10.000	0.150	1.500
L8	10.000	10.000	0.150	1.500
L9	10.000	10.000	0.150	1.500
L10	10.000	10.000	0.150	1.500
L11	10.000	10.000	0.150	1.500
L12	10.000	10.000	0.150	1.500
L13	10.000	10.000	0.150	1.500
L14	10.000	10.000	0.150	1.500
L15	10.000	10.000	0.150	1.500
L16	10.000	10.000	0.150	1.500
L17	10.000	10.000	0.150	1.500
L18	10.000	10.000	0.150	1.500
L19	10.000	10.000	0.150	1.500
L20	10.000	10.000	0.150	1.500
L21	13.580	13.580	0.150	2.037
		216.409		32.461

Table. Calculation for Joint Filler

section	L1	L2	H1	A1	L3	H2	A2	total T2(m2)
1	0.450	0.900	3.500	2.363	1.600	0.750		-
2	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
3	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
4	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
5	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
6	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
7	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
8	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
9	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
10	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
11	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
12	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
13	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
14	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
15	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
16	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
17	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
18	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
19	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
20	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
21	0.450	0.900	3.500	2.363	1.600	0.750	1.200	3.563
22	0.450	0.900	3.500	2.363	1.600	0.750	-	-
								71.250

Table. Calculation for Scaffolding

	front			
block	H1	H2	distance	A1
L1	3.913	3.913	12.829	50.200
L2	3.913	3.913	10.000	39.130
L3	3.913	3.913	10.000	39.130
L4	3.913	3.913	10.000	39.130
L5	3.913	3.913	10.000	39.130
L6	3.913	3.913	10.000	39.130
L7	3.913	3.913	10.000	39.130
L8	3.913	3.913	10.000	39.130
L9	3.913	3.913	10.000	39.130
L10	3.913	3.913	10.000	39.130
L11	3.913	3.913	10.000	39.130
L12	3.913	3.913	10.000	39.130
L13	3.913	3.913	10.000	39.130
L14	3.913	3.913	10.000	39.130
L15	3.913	3.913	10.000	39.130
L16	3.913	3.913	10.000	39.130
L17	3.913	3.913	10.000	39.130
L18	3.913	3.913	10.000	39.130
L19	3.913	3.913	10.000	39.130
L20	3.913	3.913	10.000	39.130
L21	3.913	3.913	13.580	53.139
				846.808

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.91R + 25.0 m ~ WF.94R + 22.0 m
:

CALCULATION		RESULT
STRUCTURAL EXCAVATION		
A = (3.50 + 5.305) x ½ x 1.35 + (1.55 + 2.20)		
x ½ x 4.30	= 14.006	
V = 14.01 x (150.00 + 6.00 + 1.50)	= 2206.600	2206.600 m^3
BACKFILL WITH SELECTED SOIL		
A = (0.70 + 1.85) x ½ x 1.15 + (0.70 + 1.054)		
x ½ x 1.05 + (0.50 x 2.795)	= 3.785	
V = 3.785 x (150.00 + 6.00 + 1.50)	= 596.138	596.138 m^3
BACKFILL GRAVEL		
A_1 = (0.50 x 2.795) + (1.00 x 2.236)	= 3.634	
V_1 = 3.634 x 150.00	= 545.100	
A_2 = (0.50 x 2.795)	= 1.398	
V_2 = (3.634 + 1.398) x ½ x 6.00	= 15.096	
V_3 = 1.398 x 1.50	= 2.097	
TOTAL ($V_1 + V_2 + V_3$)	= 562.293	562.293 m^3
GRAVEL BEDDING		
V = 0.15 x 2.30 x (150.00 + 6.00 + 1.50 + 0.10 x 2)	= 54.407	54.407 m^3
WET STONE MASONRY		
A_1 = (0.45 + 1.20) x ½ x 4.60 + 0.90 x 2.10	= 5.685	
V_1 = 5.685 x 150.00	= 852.750	
A_2 = (0.45 + 1.20) x ½ x 3.50 + 0.90 x 2.10	= 4.778	
V_2 = (5.685 + 4.778) x ½ x 6.00	= 31.389	
V_3 = 4.778 x 1.50	= 7.167	
TOTAL ($V_1 + V_2 + V_3$)	= 891.306	891.306 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.91R + 25.0 m ~ WF.94R + 22.0 m
:

CALCULATION			RESULT
CEMENT MORTAR POINTING			
A_1 = (0.45 + 5.143) x 150.00	=	838.950	
A_2 = (5.143 + 3.913) x ½ x 6.00 + 0.45 x 6.00	=	29.868	
A_3 = (3.913 + 0.45) x 1.50	=	6.545	
TOTAL A	=	875.363	875.363 m^2
CONCRETE TYPE D			
CONCRETE			
V = 0.15 x 0.60 x (150.00 + 6.00 + 1.50)	=	14.175	14.175 m^3
FORM (H < 4.0 m)			
A_1 = 0.15 x (150.00 + 6.00 + 1.50)	=	23.625	
A_2 = 0.15 x 0.60 x 18 places	=	1.620	
TOTAL A	=	25.245	25.245 m^2
JOINT FILLER t = 10, ELASTIC MATERIAL			
A = {(0.45 + 1.20) x ½ x 4.60 + 0.90 x 2.10} x 15 places	=	82.275	82.275 m^2
WEEP HOLE			
PVC PIPE ø 50			
Upper side (L = 0.75 m/pipe)			
L_1 = 6 pipes / 10.00 m x 150.00 x 0.75 m/pipe	=	67.500	
Middle side (L = 1.00 m/pipe)			
L_2 = 5 pipes / 10.00 m x 150.00 x 1.00 m/pipe	=	75.00	
Lower side (L = 1.20 m/pipe)			
L_3 = 6 pipes / 10.00 m x 150.00 x 1.20 m/pipe	=	108.00	
TOTAL L	=	250.500	250.500 m

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.91R + 25.0 m ~ WF.94R + 22.0 m
:

CALCULATION			RESULT
FILTER CLOTH			
n = 255 places			
A = 0.640 m^2 / place x 255	=	163.200	163.200 m^2
STEEL FENCE (GALVANIZED)			
L = 150.00 + 6.00 + 1.50	=	157.500	157.500 m
SCAFFOLDING			
A_1 = 4.807 x 150.00	=	721.050	
A_2 = (4.807 + 3.913) x ½ x 6.00	=	26.160	
A_3 = 3.913 x 1.50	=	5.870	
TOTAL A	=	753.080	753.080 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.148L + 22.02 ~ WF.149L

CALCULATION				RESULT
STRUCTURAL EXCAVATION				
A_1 = {(2.85 + (0.625 + 2.85 + 0.444)} x ½ x 1.25		=	4.231 m^2	
A_2 = (2.444 + 1.30) x ½ x 3.50		=	6.552 m^2	
	A	=	10.783 m^2	
V = 10.783 x (60.00 + 11.03 x 2)		=	884.853	884.9 m^3
BACKFILL WITH SELECTED SOIL				
A_1 = (0.60 + 1.125) x ½ x 1.05		=	0.906 m^2	
A_2 = (0.75 + 0.80) x ½ x 0.10		=	0.078 m^2	
A_3 = (0.50 + 0.838) x ½ x 0.95		=	0.636 m^2	
	A	=	2.460 m^2	
V = 2.460 x (60.00 + 11.03 x 2)		=	201.868	201.868 m^3
BACKFILL WITH GRAVEL				
A_1 = 0.40 x 2.10 + 0.80 x 1.55		=	2.080 m^2	
V = 2.08 x (60.00 + 11.03 x 2)		=	170.685	170.685 m^3
RUBBLE STONE BEDDING				
A = 0.15 x (1.75 + 0.10 x 2)		=	0.293 m^2	
V = 0.293 x (60.00 + 11.03 x 2)		=	24.044	24.044 m^3

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.148L + 22.02 ~ WF.149L

CALCULATION			RESULT
WET STONE MASONRY			
A_1 = (0.45 x 1.00) x ½ + 3.80 + (0.80 x 1.75)	=	4.155 m^2	
V = 4.155 x (60.00 + 11.03 x 2)	=	340.595	340.959 m^3
SCAFFOLDING			
A = 1.118 x 3.80 x (60.000 + 11.03 x 2)	=	348.624	348.624 m^2
CEMENT MORTAR POINTING			
A = (1.118 x 3.50 + 0.45) x (60.000 + 11.03 x 2)	=	358.028	358.028 m^2
CONCRETE			
• CONCRETE (TYPE – D)			
A = 0.45 X 0.15	=	0.068 m^2	
V = 0.068 x (60.00 + 11.03 x 2)	=	5.580	5.580 m^3
• FORM (H < 4.0 m)			
A_1 = 0.15 x (60.00 + 11.03 x 2)	=	12.309	
A_2 = 0.15 x 0.45 x 9 places	=	0.608	
TOTAL	=	12.917	12.917 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.148L + 22.02 ~ WF.149L

CALCULATION			RESULT
JOINT FILTER			
t = 10 , ELASTIC MATERIAL			
A = {(0.45 + 1.00) x ½ x 3.80 + (0.80 x 1.75)} x 7 places			
	=	29.085	29.085 m^3
WIPE HOLE			
• PVC Pipe Ø 50			
Upper side (L_1 = 0.75 m /pipe)			
L_1 = 6 pipes x 0.75 x 8 places	=	36.000	
Middle side (L_2 = 0.90 m / pipe)			
L_2 = 5 pipes x 0.90 x 8 places	=	36.000	
Lower side (L_3 = 1.05 m / pipe)			
L_3 = 6 pipes x 1.05 x 8 places	=	50.400	
TOTAL	=	122.400	122.400 m
• Filter Cloth			
A = 0.64 m^2/place x 136 places	=	87.040	87.040 m^2
STEEL FENCE			
L = 60.00 + 11.03 X 2	=	82.060	82.060 m

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.175R + 16.94 m ~ WF.178R
:

CALCULATION			RESULT
STRUCTURAL EXCAVATION			
1. A_1 = (1.50 + 2.20) x 3.40 / 2	=	6.290	
2. A_2 = (2.90 + 4.15) x 1.20 / 2	=	4.230	
TOTAL A	=	10.520 m^2	
V = 10.520 x 130.00	=	1367.600	1367.600 m^3
BACKFILL WITH SELECTED SOIL			
1. A_1 = 0.50 x 2.00	=	1.000	
2. A_2 = (0.80 + 1.04) x 0.90 / 2	=	0.828	
3. A_3 = (0.50 + 0.95) x 0.90 / 2 + (0.95 + 1.75) x 0.10 / 2	=	0.788	
TOTAL A	=	2.616 m^2	
V = 2.616 x 130.00	=	340.080	340.080 m^3
BACKFILL GRAVEL			
1. A_1 = 0.510 x 1.850	=	0.944	
2. A_2 = 1.020 x 1.800	=	1.836	
TOTAL A	=	2.780 m^2	
V = 2.780 x 130.00	=	361.400	361.400 m^3
GRAVEL BEDDING			
A = 0.10 x 2.10	=	0.210	
V = 0.210 x 130.00	=	27.300	27.300 m^3
WET STONE MASONRY			
1. A_1 = (0.45 + 1.20) x 3.80 / 2	=	3.135	

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.175R + 16.94 m ~ WF.178R
:

CALCULATION			RESULT
2. A_2 = 1.90 x 0.80	=	1.520	
TOTAL A	=	4.655 m^2	
V = 4.655 x 130.00	=	605.150	605.150 m^3
CEMENT MORTAR POINTING			
A = (0.45 + 3.801) x 130.00	=	552.630	552.630 m^2
CONCRETE TYPE D			
CONCRETE TYPE D			
A = 0.150 x 0.60	=	0.090	
V = 0.09 x 130.00	=	11.700	11.700 m^3
FORM			
A_1 = 0.15 x 130.00	=	19.500	
A_2 = 0.15 x 0.60 x 15 places	=	1.350	
TOTAL A	=	20.850	20.850 m^2
JOINT FILLER t = 10, ELASTIC MATERIAL			
1. A_1 = (0.45 + 1.20) x 3.80 / 2	=	3.135	
2. A_2 = 1.90 x 0.80	=	1.520	
$A_1 + A_2$	=	4.655 m^2	
A = 4.655 x 12 places	=	55.860	55.860 m^2
STEEL FENCE			
L = 130.0			130.000 m
SCAFFOLDING			
A = 4.137 x 130.0	=	537.810	537.810 m^2

TYPE OF WORK : LEANING WALL (WET STONE MASONRY TYPE)
LOCATION : WF.175R + 16.94 m ~ WF.178R
:

CALCULATION			RESULT
WEEP HOLE			
1. UPPER SIDE (l = 0.8 m)			
L_1 = 1 pipe / 3.0 m x 130 m x 0.8 m / pipe	=	34.667	
2. LOWER SIDE (l = 1.10 m)			
L_2 = 1 pipe / 3.0 m x 130 m x 1.10 m / pipe	=	47.667	
TOTAL L	=	82.334	82.334 m
3. FILTER CLOTH			
n = 130 / 3 x 2	=	87	
A = 0.64 m^2/ place x 87	=	55.680	55.680 m^2