

Muck Disposal Plan

At the time of Execution, a large volume of muck will be generated and the same will be dumped, levelled and compacted at the proposed location of dumping ground.

In view of above, the project being on the EPC Mode of contract, the actual volume to be generated will be assessed at the time of execution and the same will be approved by the Authority engineers deployed by the user agency i.e. NHIDCL.

Design of the Muck/Spoil Bank at site:

At the disposal site on valley side, the care will taken at the time of selection of site so that there is minimum damage to the flora & fauna and the environmental conditions.

When unsuitable material below sub-grade level in cut or below embankment foundation level is planned to be removed, the soil left in place after the removal of the unsuitable material shall be compacted to a depth of 20 cm and a density of 90 percent of the maximum dry density determined according to the relevant specifications.

Unsuitable Material shall be removed and disposed of in Spoil Banks in such a manner as to have a neat appearance and not to obstruct drainages to the highway and not to cause injury to highway works or property. If it becomes necessary to locate or relocate any Spoil Bank, the Contractor shall obtain prior approval from the Authority Engineer.

The relevant and applicable provisions "Environmental Control and Protection" shall be adhered during planning of muck disposal and its hauling.

The Spoil-Banks shall be design in accordance with the requirements shown in **Table-1** and the typical arrangement shown in **Figure-1**.



Table-1: Requirements for Design and Construction Spoil Banks

<u>Design Conditions:</u>		
Item	Description	Criteria
- Topography	Depression or hilly	Prevention against disasters due to landslide and collapse
- Ground Inclination	Less than 22°	ditto
- Embankment' Size	Embankment length shall be 30m or less	ditto
- Land's Use	Land is not urbanized	Environmental protection
- Environment	Not considered as environmental nature reservation. Residential areas (if any) shall not be located at downstream of spoil bank.	ditto
<u>Design Requirements:</u>		
Item		Remarks
- Installation of open drain or canal		Drain is treated from upstream
- Installation of surface drainage system		Slope feet and berms
- Installation of underground drainage		Swamps and Valley
- Installation of internal-horizontal drainage of embankment		Reduction of water filtration in the embankment and prevention against superficial collapse
- Implementation of the works for Slope Protection		Turfing or Seeding
- Construction of retaining wall in the lower edge		Prevention against collapse
- Installation of check dam structure on the upstream inlets		Concrete Wall
- Implementation of the works for scouring prevention along downstream outlet		Gabion Mat
<u>Special Provisions on the Specifications:</u>		
Item	Description	Special Provision
- Drainage	Works for channels drainages	50 years return period
	Gutters	25 years return period Minimum 40cm x 40cm
	Horizontal drainage sheet (50cm width, 2m interval)	Every 5m height; L=20m
- French Drain	Large Drain Basin	Perforated pipes of 300mm minimum diameter shall be applied
	Small Drain Basin	Perforated pipes of 100mm minimum diameter shall be applied
- Slope Protection	Sodding	As the standards
- Retaining Wall	Retaining wall by Gabion or Gravity Type	As the standards
- Embankment	Compaction and layer thickness	Compaction of embankment equal or higher than 90% shall be secured. Layer thickness same than road embankment.

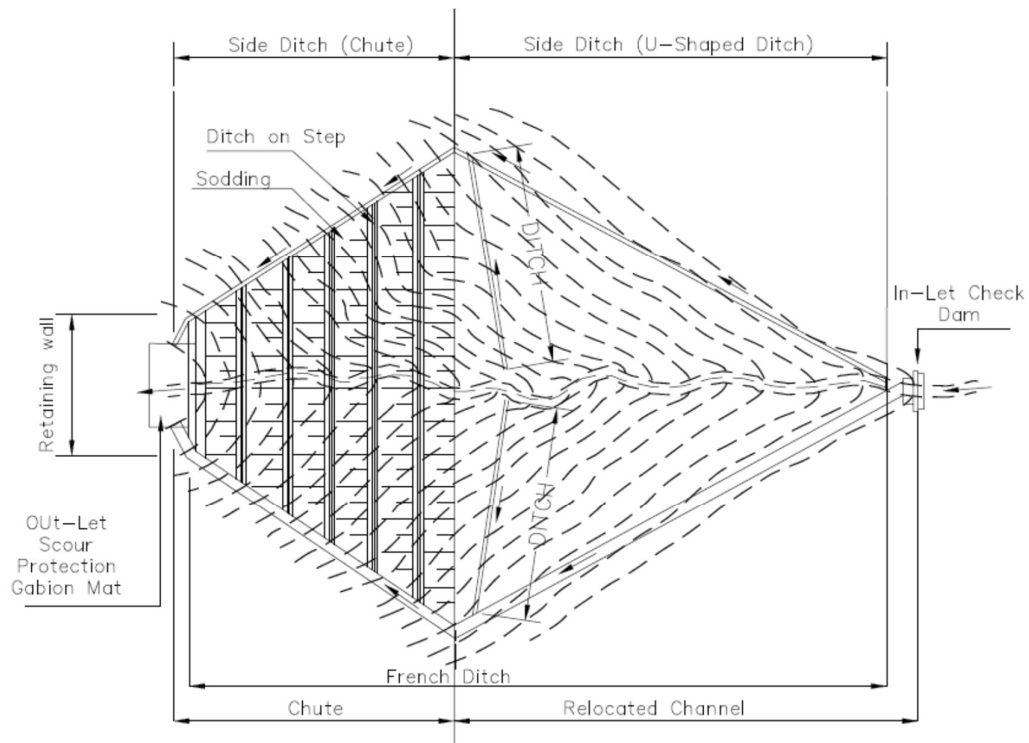


Figure-1(a): Typical Arrangement for Spoil Banks: Plan

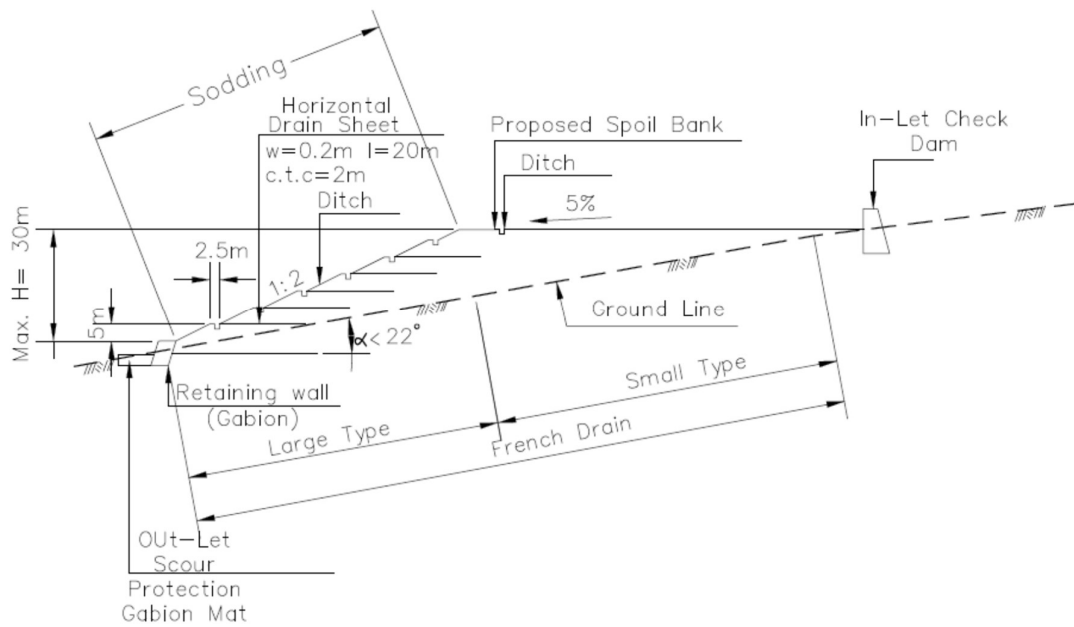


Figure-1(b): Typical Arrangement for Spoil Banks: Profile

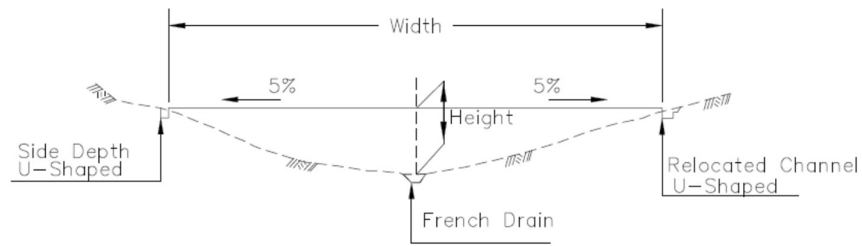


Figure-1(c): Typical Arrangement for Spoil Banks: Cross Section of French Drain

The Gabion wall and retaining wall has been proposed to protect the slope on valley side and the same shall be compacted and levelled properly, so that Playground and other community places can be developed for the public purposes. The details of dumping ground and the GPS Coordinates has been attached at **Enclosure-I**.

The Typical drawing for the construction of Gabion and retaining wall has been attached at **Enclosure-II**.

The Linear Plan of Muck Disposal Site/Spoil Banks has been attached at **Enclosure-III**.

NH-54(SECTION-3)					
Spoil Bank Location					
SN	Spoil Bank	Easting (X)	Northing (Y)	Latitude (DMS System)	Longitude (DMS System)
1	SB-74	484086	2514757	-22° -44' -24.338" S	-92° -50' -42.032" W
2	SB-75	483419	2514193	-22° -44' -5.972" S	-92° -50' -18.667" W
3	SB-76	483318	2512985	-22° -43' -26.683" S	-92° -50' -15.172" W
4	SB-77	483344	2512335	-22° -43' -5.545" S	-92° -50' -16.109" W
5	SB-78	483753	2511546	-22° -42' -39.9" S	-92° -50' -30.476" W
6	SB-79	483811	2510916	-22° -42' -19.413" S	-92° -50' -32.533" W
7	SB-80	483533	2510460	-22° -42' -4.574" S	-92° -50' -22.805" W
8	SB-81	483608	2509810	-22° -41' -43.438" S	-92° -50' -25.459" W
9	SB-82	484188	2507193	-22° -40' -18.348" S	-92° -50' -45.883" W
10	SB-83	484824	2506910	-22° -40' -9.166" S	-92° -51' -8.181" W
11	SB-84	485042	2504350	-22° -38' -45.917" S	-92° -51' -15.908" W
12	SB-85	486587	2504684	-22° -38' -56.826" S	-92° -52' -10.031" W
13	SB-86	486451	2502900	-22° -37' -58.803" S	-92° -52' -5.321" W
14	SB-87	486768	2501552	-22° -37' -14.973" S	-92° -52' -16.467" W
15	SB-88	487058	2499796	-22° -36' -17.873" S	-92° -52' -26.678" W
16	SB-89	487847	2493454	-22° -32' -51.639" S	-92° -52' -54.491" W
17	SB-90	488025	2492647	-22° -32' -25.398" S	-92° -53' -0.745" W
18	SB-91	489599	2491677	-22° -31' -53.888" S	-92° -53' -55.875" W
19	SB-92	489116	2490656	-22° -31' -20.672" S	-92° -53' -38.991" W
20	SB-93	488518	2483592	-22° -27' -30.92" S	-92° -53' -18.242" W
21	SB-94	488876	2483360	-22° -27' -23.383" S	-92° -53' -30.774" W
22	SB-95	491328	2483035	-22° -27' -12.864" S	-92° -54' -56.575" W
23	SB-96	491404	2482020	-22° -26' -39.855" S	-92° -54' -59.254" W
24	SB-97	491917	2481816	-22° -26' -33.23" S	-92° -55' -17.206" W
25	SB-98	492609	2480355	-22° -25' -45.725" S	-92° -55' -41.441" W
26	SB-99	493126	2478850	-22° -24' -56.786" S	-92° -55' -59.551" W
27	SB-100	494095	2478571	-22° -24' -47.726" S	-92° -56' -33.449" W
28	SB-101	495074	2477415	-22° -24' -10.14" S	-92° -57' -7.707" W
29	SB-102	495304	2483856	-22° -27' -39.621" S	-92° -57' -15.683" W
30	SB-103	496669	2482299	-22° -26' -48.995" S	-92° -58' -3.457" W
31	SB-104	496265	2481729	-22° -26' -30.454" S	-92° -57' -49.327" W
32	SB-105	496813	2480511	-22° -25' -50.846" S	-92° -58' -8.508" W
33	SB-106	498491	2479337	-22° -25' -12.672" S	-92° -59' -7.214" W
34	SB-107	503575	2474664	-22° -22' -40.682" S	-93° -2' -5.018" W
35	SB-108	504482	2470574	-22° -20' -27.655" S	-93° -2' -36.695" W
36	SB-109	504290	2469704	-22° -19' -59.362" S	-93° -2' -29.974" W
37	SB-110	503408	2468853	-22° -19' -31.692" S	-93° -1' -59.133" W
38	SB-111	501837	2468447	-22° -19' -18.496" S	-93° -1' -4.214" W
39	SB-112	501827	2468225	-22° -19' -11.276" S	-93° -1' -3.864" W
40	SB-113	502021	2467835	-22° -18' -58.591" S	-93° -1' -10.643" W
41	SB-114	502486	2467517	-22° -18' -48.247" S	-93° -1' -26.896" W
42	SB-115	502671	2467052	-22° -18' -33.122" S	-93° -1' -33.359" W

LINEAR PLAN OF NH - 54 (SECTION - III)

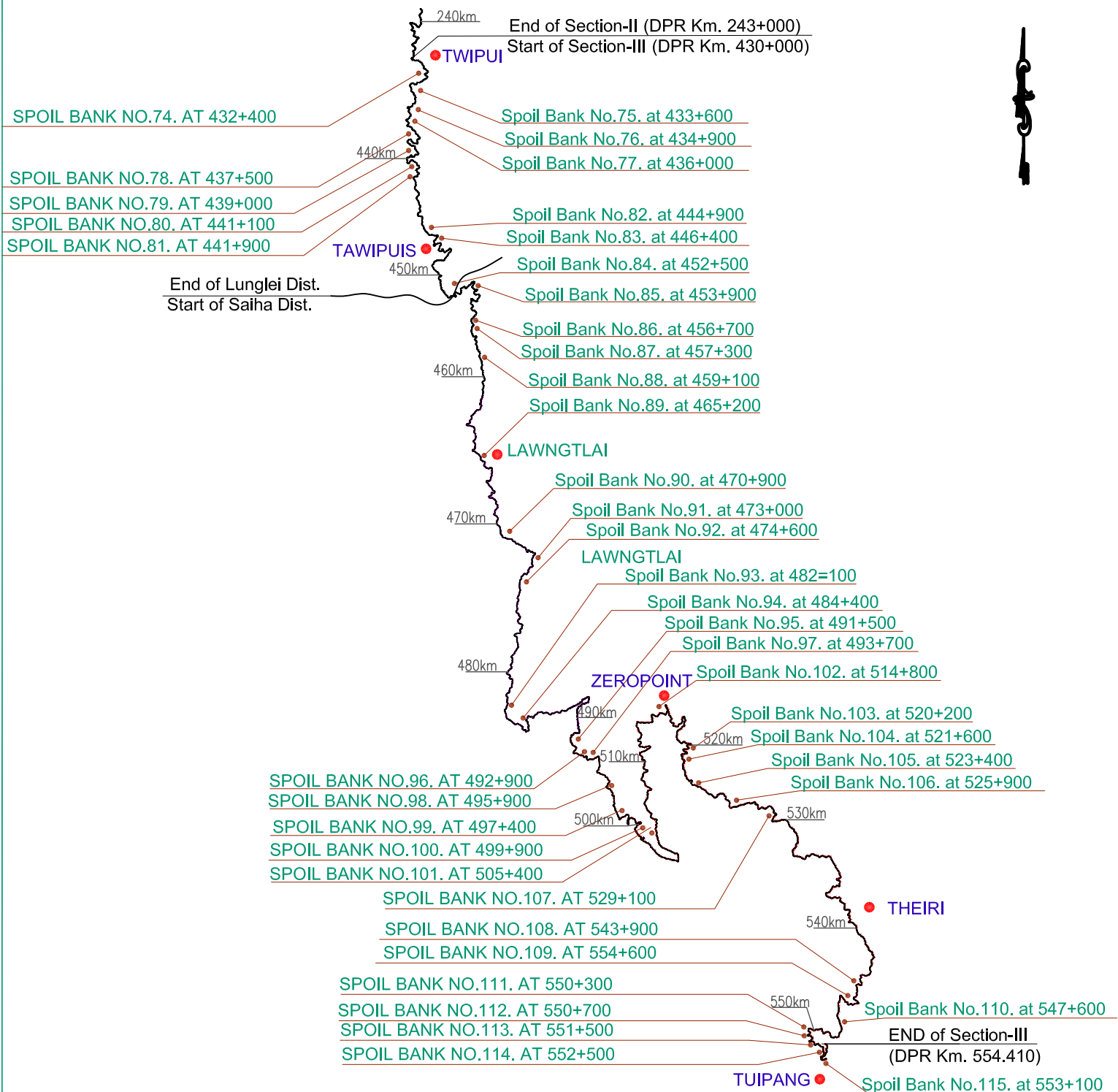
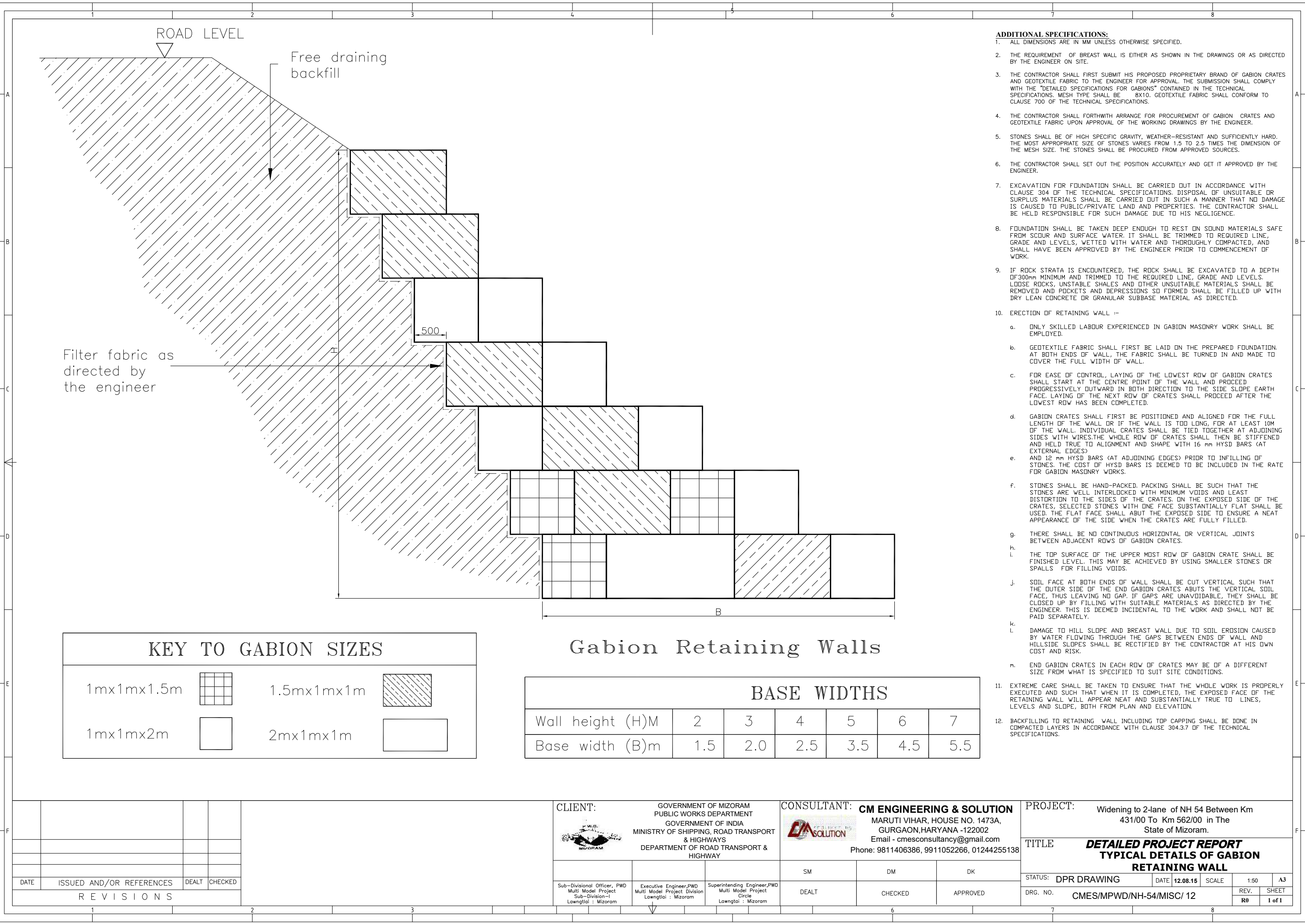


Figure 7 : LINEAR PLAN OF SECTION - III



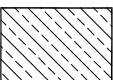
- ADDITIONAL SPECIFICATIONS:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - THE REQUIREMENT OF BREAST WALL IS EITHER AS SHOWN IN THE DRAWINGS OR AS DIRECTED BY THE ENGINEER ON SITE.
 - THE CONTRACTOR SHALL FIRST SUBMIT HIS PROPOSED PROPRIETARY BRAND OF GABION CRATES AND GEOTEXTILE FABRIC TO THE ENGINEER FOR APPROVAL. THE SUBMISSION SHALL COMPLY WITH THE "DETAILED SPECIFICATIONS FOR GABIONS" CONTAINED IN THE TECHNICAL SPECIFICATIONS. MESH TYPE SHALL BE 8X10. GEOTEXTILE FABRIC SHALL CONFORM TO CLAUSE 700 OF THE TECHNICAL SPECIFICATIONS.
 - THE CONTRACTOR SHALL FORTHWITH ARRANGE FOR PROCUREMENT OF GABION CRATES AND GEOTEXTILE FABRIC UPON APPROVAL OF THE WORKING DRAWINGS BY THE ENGINEER.
 - STONES SHALL BE OF HIGH SPECIFIC GRAVITY, WEATHER-RESISTANT AND SUFFICIENTLY HARD. THE MOST APPROPRIATE SIZE OF STONES VARIES FROM 1.5 TO 2.5 TIMES THE DIMENSION OF THE MESH SIZE. THE STONES SHALL BE PROCURED FROM APPROVED SOURCES.
 - THE CONTRACTOR SHALL SET OUT THE POSITION ACCURATELY AND GET IT APPROVED BY THE ENGINEER.
 - EXCAVATION FOR FOUNDATION SHALL BE CARRIED OUT IN ACCORDANCE WITH CLAUSE 304 OF THE TECHNICAL SPECIFICATIONS. DISPOSAL OF UNSUITABLE OR SURPLUS MATERIALS SHALL BE CARRIED OUT IN SUCH A MANNER THAT NO DAMAGE IS CAUSED TO PUBLIC/PRIVATE LAND AND PROPERTIES. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR SUCH DAMAGE DUE TO HIS NEGLIGENCE.
 - FOUNDATION SHALL BE TAKEN DEEP ENOUGH TO REST ON SOUND MATERIALS SAFE FROM SCOUR AND SURFACE WATER. IT SHALL BE TRIMMED TO REQUIRED LINE, GRADE AND LEVELS, WETTED WITH WATER AND THOROUGHLY COMPACTED, AND SHALL HAVE BEEN APPROVED BY THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.
 - IF ROCK STRATA IS ENCOUNTERED, THE ROCK SHALL BE EXCAVATED TO A DEPTH OF 300mm MINIMUM AND TRIMMED TO THE REQUIRED LINE, GRADE AND LEVELS. LOOSE ROCKS, UNSTABLE SHALES AND OTHER UNSUITABLE MATERIALS SHALL BE REMOVED AND POCKETS AND DEPRESSIONS SO FORMED SHALL BE FILLED UP WITH DRY LEAN CONCRETE OR GRANULAR SUBBASE MATERIAL AS DIRECTED.
 - ERECTION OF RETAINING WALL i-
 - ONLY SKILLED LABOUR EXPERIENCED IN GABION MASONRY WORK SHALL BE EMPLOYED.
 - GEOTEXTILE FABRIC SHALL FIRST BE LAID ON THE PREPARED FOUNDATION. AT BOTH ENDS OF WALL, THE FABRIC SHALL BE TURNED IN AND MADE TO COVER THE FULL WIDTH OF WALL.
 - FOR EASE OF CONTROL, LAYING OF THE LOWEST ROW OF GABION CRATES SHALL START AT THE CENTRE POINT OF THE WALL AND PROCEED PROGRESSIVELY OUTWARD IN BOTH DIRECTION TO THE SIDE SLOPE. EARTH FACE LAYING OF THE NEXT ROW OF CRATES SHALL PROCEED AFTER THE LOWEST ROW HAS BEEN COMPLETED.
 - GABION CRATES SHALL FIRST BE POSITIONED AND ALIGNED FOR THE FULL LENGTH OF THE WALL OR IF THE WALL IS TOO LONG, FOR AT LEAST 10M OF THE WALL. INDIVIDUAL CRATES SHALL BE TIED TOGETHER AT ADJOINING SIDES WITH WIRES. THE WHOLE ROW OF CRATES SHALL THEN BE STIFFENED AND HELD TRUE TO ALIGNMENT AND SHAPE WITH 16 mm HYSD BARS (AT EXTERNAL EDGES) AND 12 mm HYSD BARS (AT ADJOINING EDGES) PRIOR TO INFILLING OF STONES. THE COST OF HYSD BARS IS DEEMED TO BE INCLUDED IN THE RATE FOR GABION MASONRY WORKS.
 - STONES SHALL BE HAND-PACKED. PACKING SHALL BE SUCH THAT THE STONES ARE WELL INTERLOCKED WITH MINIMUM VOIDS AND LEAST DISTORTION TO THE SIDES OF THE CRATES. ON THE EXPOSED SIDE OF THE CRATES, SELECTED STONES WITH ONE FACE SUBSTANTIALLY FLAT SHALL BE USED. THE FLAT FACE SHALL ABUT THE EXPOSED SIDE TO ENSURE A NEAT APPEARANCE OF THE SIDE WHEN THE CRATES ARE FULLY FILLED.
 - THERE SHALL BE NO CONTINUOUS HORIZONTAL OR VERTICAL JOINTS BETWEEN ADJACENT ROWS OF GABION CRATES.
 - THE TOP SURFACE OF THE UPPER MOST ROW OF GABION CRATE SHALL BE FINISHED LEVEL. THIS MAY BE ACHIEVED BY USING SMALLER STONES OR SPALLS FOR FILLING VOIDS.
 - SOIL FACE AT BOTH ENDS OF WALL SHALL BE CUT VERTICAL SUCH THAT THE OUTER SIDE OF THE END GABION CRATES ABUTS THE VERTICAL SOIL FACE, THUS LEAVING NO GAP. IF GAPS ARE UNAVOIDABLE, THEY SHALL BE CLOSED UP BY FILLING WITH SUITABLE MATERIALS AS DIRECTED BY THE ENGINEER. THIS IS DEEMED INCIDENTAL TO THE WORK AND SHALL NOT BE PAID SEPARATELY.
 - DAMAGE TO HILL SLOPE AND BREAST WALL DUE TO SOIL EROSION CAUSED BY WATER FLOWING THROUGH THE GAPS BETWEEN ENDS OF WALL AND HILLSIDE SLOPES SHALL BE RECTIFIED BY THE CONTRACTOR AT HIS OWN COST AND RISK.
 - END GABION CRATES IN EACH ROW OF CRATES MAY BE OF A DIFFERENT SIZE FROM WHAT IS SPECIFIED TO SUIT SITE CONDITIONS.
 - EXTREME CARE SHALL BE TAKEN TO ENSURE THAT THE WHOLE WORK IS PROPERLY EXECUTED AND SUCH THAT WHEN IT IS COMPLETED, THE EXPOSED FACE OF THE RETAINING WALL WILL APPEAR NEAT AND SUBSTANTIALLY TRUE TO LINES, LEVELS AND SLOPE, BOTH FROM PLAN AND ELEVATION.
 - BACKFILLING TO RETAINING WALL INCLUDING TOP CAPPING SHALL BE DONE IN COMPACTED LAYERS IN ACCORDANCE WITH CLAUSE 304.3.7 OF THE TECHNICAL SPECIFICATIONS.

KEY TO GABION SIZES

1mx1mx1.5m



1.5mx1mx1m



1mx1mx2m



2mx1mx1m





Gabion Retaining Walls

BASE WIDTHS

Wall height (H)M	2	3	4	5	6	7
Base width (B)m	1.5	2.0	2.5	3.5	4.5	5.5

DATE	ISSUED AND/OR REFERENCES	DEALT	CHECKED
REVISIONS			

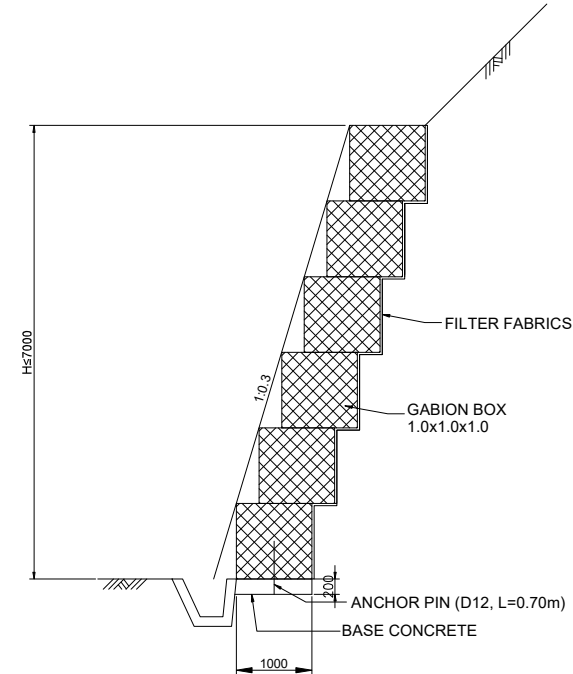
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Sub-Divisional Officer, PWD Multi Model Project Sub-Division-I Lawngtlai : Mizoram	Executive Engineer,PWD Multi Model Project Lawngtlai : Mizoram	Superintending Engineer,PWD Multi Model Project Circle Lawngtlai : Mizoram

CONSULTANT:  CM ENGINEERING & SOLUTION MARUTI VIHAR, HOUSE NO. 1473A, GURGAON,HARYANA -122002 Email - cmesconsultancy@gmail.com Phone: 9811406386, 9911052266, 01244255138		
SM	DM	DK
DEALT	CHECKED	APPROVED

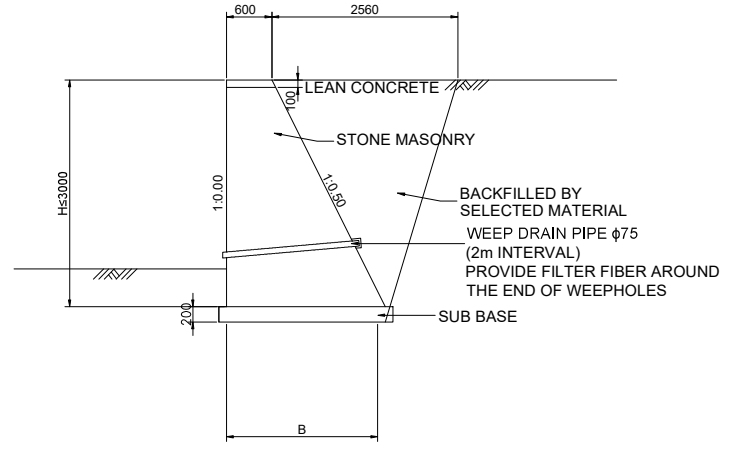
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DRG. NO. CMES/MPWD/NH-54/MISC/ 12		REV. R0	SHEET 1 of 1	

TYPICAL DETAILS OF RETAINING WALL (2/3)
GABION & GRAVITY WET MASONRY WALLS
SCALE 1:100

TYPE-A (GB-A)
FRONT GRADES 1:0.3
FOR CUT SLOPE

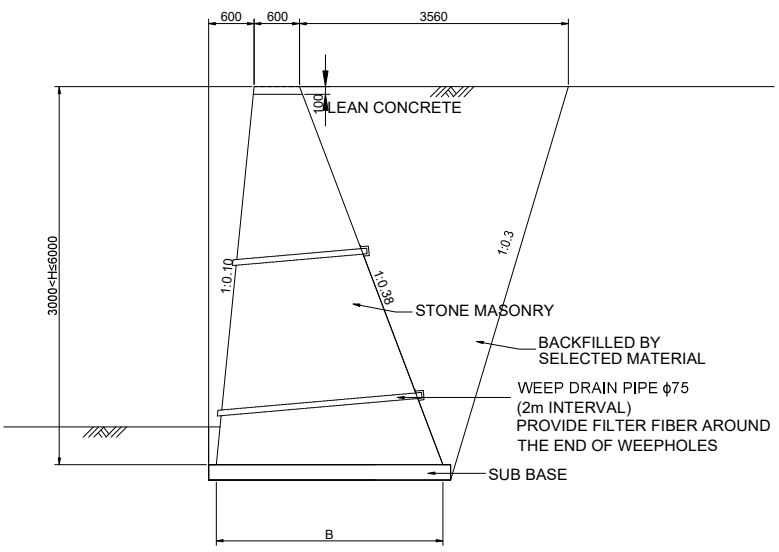


TYPE-A (GW-A)
FRONT GRADES 1:0.00
FOR EMBANKMENT SLOPE



H (m)	B (m)
1.0	1.10
2.0	1.60
3.0	2.10

TYPE-B (GW-B)
FRONT GRADES 1:0.10
FOR EMBANKMENT SLOPE



H (m)	B (m)
3.0	2.04
4.0	2.52
5.0	3.00
6.0	3.48