

ROAD LEVEL

Free draining backfill

Filter fabric as directed by the engineer

500

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

ADDITIONAL SPECIFICATIONS:

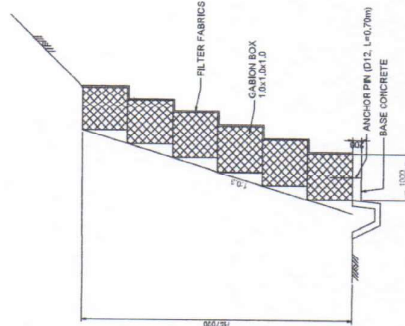
- THE REQUIREMENT OF BREAST WALL IS EITHER AS SHOWN IN THE DRAWINGS OR AS DIRECTED BY THE ENGINEER ON SITE.
- THE CONTRACTOR SHALL FURNISH AN APPROVED WORKMANSHIP BRAND OF GABION CRATES WITH THE TECHNICAL SPECIFICATIONS FOR GABIONS CONTAINED IN THE TECHNICAL SPECIFICATIONS. THE GABION CRATES SHALL BE MANUFACTURED IN ACCORDANCE WITH THE CASE TOP OF THE TECHNICAL SPECIFICATIONS.
- THE CONTRACTOR SHALL FURNISH AN APPROVED WORKMANSHIP BRAND OF GABION CRATES AND GROUNDWATER FABRIC UPON APPROVAL OF THE WORKING DRAWINGS BY THE ENGINEER.
- STONES SHALL BE OF HIGH SPECIFIC GRAVITY, WEATHER-RESISTANT AND SUFFICIENTLY HARD. THE GABION CRATES SHALL BE FILLED WITH STONES OF APPROXIMATELY EQUAL SIZE AND THE MAX. SIZE OF 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 THE TECHNICAL SPECIFICATIONS. DISPOSAL OF UNSUITABLE OR EXCESSIVE MATERIAL SHALL BE CARRIED OUT IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN NECESSARY PERMISSIONS FOR SUCH REMOVAL DUE TO HIS NEGLIGENCE.
- FOUNDATION SHALL BE TAKEN DEEP ENOUGH TO REST ON SOUND MATERIALS. SAFE GROUND LEVELS SHALL BE ESTABLISHED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES.
- IF ROCK STRATA IS ENCOUNTERED, THE ROCK SHALL BE EXCAVATED TO A DEPTH OF 300mm MINIMUM AND TYPED TO THE REQUIRED LINE GRADE AND LEVELS. THE EXCAVATION SHALL BE BACKFILLED WITH GRAVEL OR GRANULAR SUBGRADE MATERIAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES.
- EXTREME CARE SHALL BE TAKEN TO ENSURE THAT THE WHOLE WORK IS PROPERLY EXECUTED AND THAT WHEN IT IS COMPLETED, THE EXPOSED FACE OF THE WALL IS PLUMB AND THE TOP OF THE WALL IS LEVEL WITH THE FINISHED GROUND 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 804.37 OF THE TECHNICAL SPECIFICATIONS.

CLIENT: GOVERNMENT OF MIZORAM PUBLIC WORKS DEPARTMENT MINISTRY OF ROAD TRANSPORT & HIGHWAYS DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS		CONSULTANT: CM ENGINEERING & SOLUTION MARUTI VIHAR, HOUSE NO. 1473A, SECTOR 14, INDUSTRIAL AREA, GATE NO. 1, E-11, NEW DELHI-110028 Email - cmesolutions@gmail.com Phone 9811405386, 9811052286, 01244255138		PROJECT: Widening to 2-lane of NH-54 Between Km 431/00 To Km 562/00 in The State of Mizoram.	
DATE 15/08/2018		ISSUED AND/OR REFERENCES (N/A) (SHEED)		REV. SHEET 1/01	
DATE 15/08/2018		ISSUED AND/OR REFERENCES (N/A) (SHEED)		REV. SHEET 1/01	
DATE 15/08/2018		ISSUED AND/OR REFERENCES (N/A) (SHEED)		REV. SHEET 1/01	

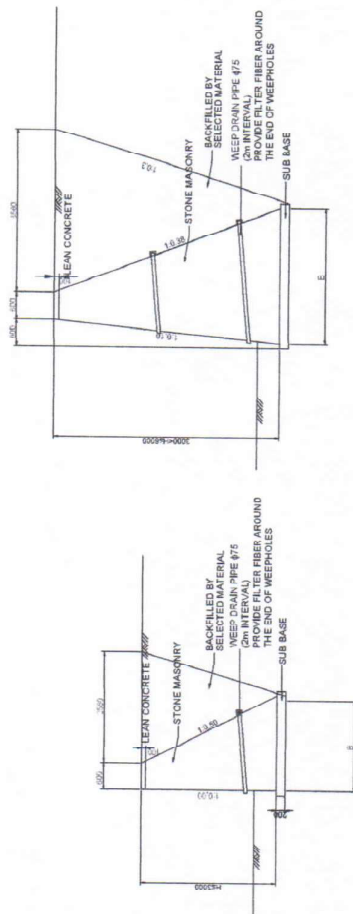
W.L.

SCALE 1:100

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



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



H (m)	B (m)
1.5	1.16
2.4	1.50
3.8	2.16

H (m)	B (m)
3.0	2.74
4.0	2.52
5.0	3.03
6.0	3.43

 National Highways & Infrastructure Development Corporation Limited	REMARKS: 1. ALL DIMENSION IN MM.										WIDENING AND UPGRADATION TO 2 LANE WITH PAVED SHOULDER CONFIGURATION AND GEOMETRIC IMPROVEMENTS IN THE STATE OF MIZORAM										Drawing Title - NH-54 P-7 TYPICAL DETAILS OF RETAINING WALL						
																					Drawing No., NH-54-C-2		Sheet No., 2 OF 3				
																				Designed,		Checked		Approval,		Drawing No.,	

5

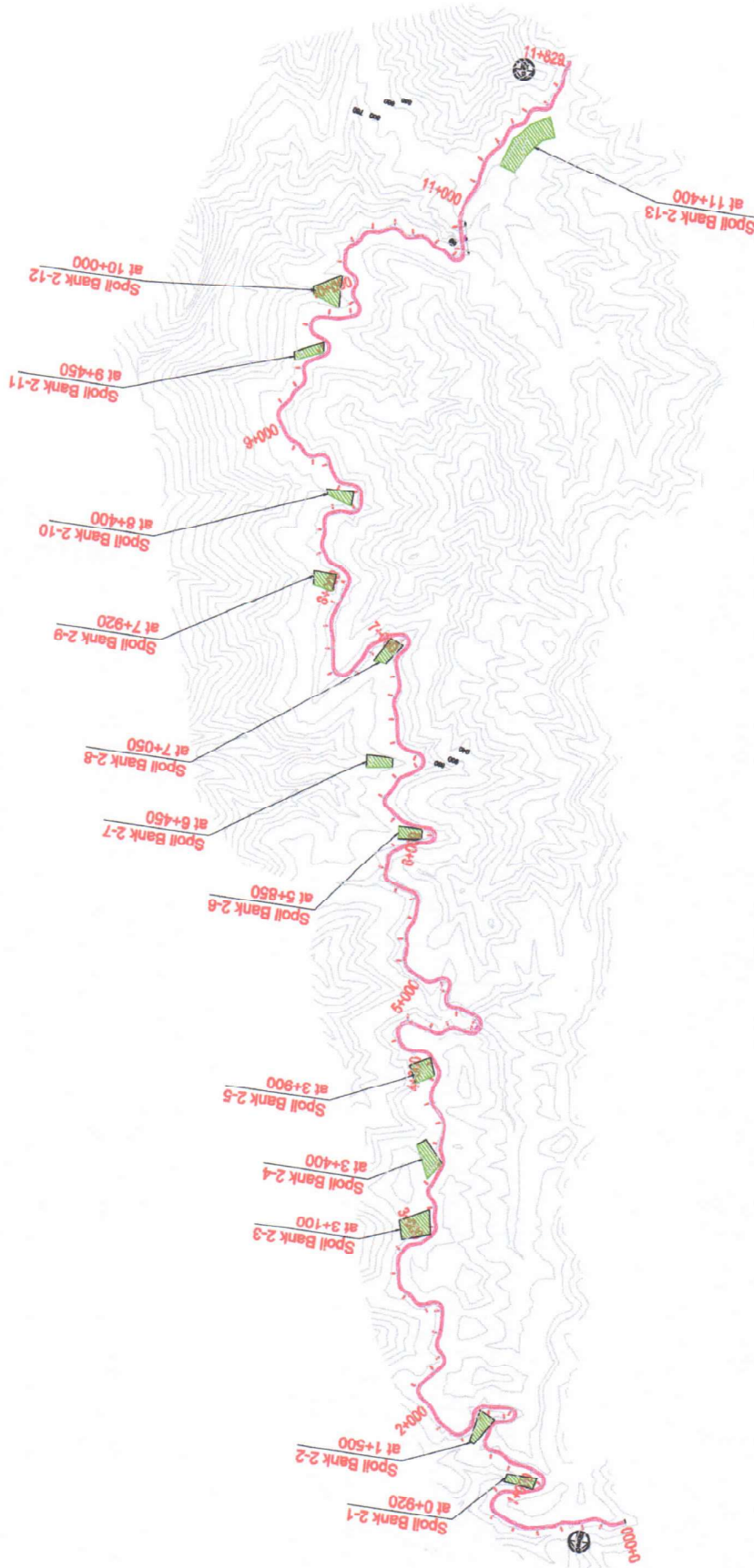
Chhiahtlang & Serchhip Bypass on NH-54 Aizawl-Tuipang Road (Package-1)

Spoil Bank Location

SN	Spoil Bank	Bypass	GPS Coordinate (Point No.1)		GPS Coordinate (Point No.2)		GPS Coordinate (Point No.3)		GPS Coordinate (Point No.4)		Design Chainage (km)	Estimated Capacity (Cum)
1	SB-1-1	Chhiahtlang	23° 23' 25.101"	92° 50' 36.962"	23° 23' 22.587"	92° 50' 39.826"	23° 23' 21.385"	92° 50' 38.726"	23° 23' 23.602"	92° 50' 35.527"	0+350	19,654
2	SB-1-1	Chhiahtlang	23° 23' 6.845"	92° 50' 24.784"	23° 23' 5.69"	92° 50' 24.094"	23° 23' 6.954"	92° 50' 19.771"	23° 23' 8.203"	92° 50' 20.725"		79,764
3	SB-1-3	Chhiahtlang	23° 22' 57.39"	92° 50' 52.578"	23° 22' 52.079"	92° 50' 51.536"	23° 22' 51.635"	92° 50' 50.378"	23° 22' 55.684"	92° 50' 47.213"		76,650
4	SB-2-1	Serchhip	23° 20' 47.977"	92° 51' 13.879"	23° 20' 47.521"	92° 51' 18.457"	23° 20' 46.413"	92° 51' 18.198"	23° 20' 46.356"	92° 51' 13.499"	0+920	35,534
5	SB-2-2	Serchhip	23° 20' 42.88"	92° 51' 23.915"	23° 20' 42.581"	92° 51' 24.686"	23° 20' 37.864"	92° 51' 23.724"	23° 20' 38.907"	92° 51' 21.296"	1+500	50,297
6	SB-2-3	Serchhip	23° 20' 15.333"	92° 51' 39.527"	23° 20' 12.491"	92° 51' 40.406"	23° 20' 10.173"	92° 51' 36.046"	23° 20' 13.962"	92° 51' 35.271"	3+100	91,194
7	SB-2-4	Serchhip	23° 20' 5.853"	92° 51' 37.011"	23° 20' 1.36"	92° 51' 39.382"	23° 20' 0.423"	92° 51' 38.108"	23° 20' 3.453"	92° 51' 35.176"	3+400	63,524
8	SB-2-5	Serchhip	23° 19' 52.683"	92° 51' 41.054"	23° 19' 50.226"	92° 51' 42.356"	23° 19' 48.662"	92° 51' 39.33"	23° 19' 51.168"	92° 51' 38.255"	3+900	24,428
9	SB-2-6	Serchhip	23° 19' 18.217"	92° 51' 49.248"	23° 19' 16.386"	92° 51' 49.45"	23° 19' 16.343"	92° 51' 45.769"	23° 19' 17.81"	92° 51' 45.702"	5+850	20,805
10	SB-2-7	Serchhip	23° 19' 8.729"	92° 51' 55.802"	23° 19' 6.846"	92° 51' 56"	23° 19' 6.817"	92° 51' 51.974"	23° 19' 8.174"	92° 51' 51.831"	6+450	28,764
11	SB-2-8	Serchhip	23° 18' 53.201"	92° 51' 57.07"	23° 18' 49.81"	92° 51' 54.953"	23° 18' 50.496"	92° 51' 52.964"	23° 18' 53.343"	92° 51' 55.179"	7+050	32,542
12	SB-2-9	Serchhip	23° 18' 43.777"	92° 52' 8.186"	23° 18' 41.73"	92° 52' 8.404"	23° 18' 41.896"	92° 52' 4.8"	23° 18' 44.164"	92° 52' 5.063"	7+920	20,377
13	SB-2-10	Serchhip	23° 18' 30.557"	92° 52' 7.95"	23° 18' 29.776"	92° 52' 8.302"	23° 18' 29.663"	92° 52' 4.041"	23° 18' 31.71"	92° 52' 4.044"	8+400	27,548
14	SB-2-11	Serchhip	23° 18' 12.096"	92° 52' 16.208"	23° 18' 11.01"	92° 52' 16.491"	23° 18' 8.992"	92° 52' 12.101"	23° 18' 10.422"	92° 52' 11.894"	9+450	35,533
15	SB-2-12	Serchhip	23° 18' 2.425"	92° 52' 14.746"	23° 18' 1.21"	92° 52' 14.937"	23° 17' 59"	92° 52' 10.708"	23° 18' 3.784"	92° 52' 10.481"	10+000	63,121
16	SB-2-13	Serchhip	23° 17' 40.243"	92° 51' 48.971"	23° 17' 32.473"	92° 51' 42.445"	23° 17' 35.453"	92° 51' 41.15"	23° 17' 40.98"	92° 51' 46.627"	11+400	248,922
Total Capacity of Spoil Bank (cum)												918,658
Total Quantity of Cutting (cum)												1,186,310
Total Quantity of filling (cum)												136,717
Total Quantity of muck to be disposed (cum)												1,049,594

Handwritten signature/initials in blue ink.

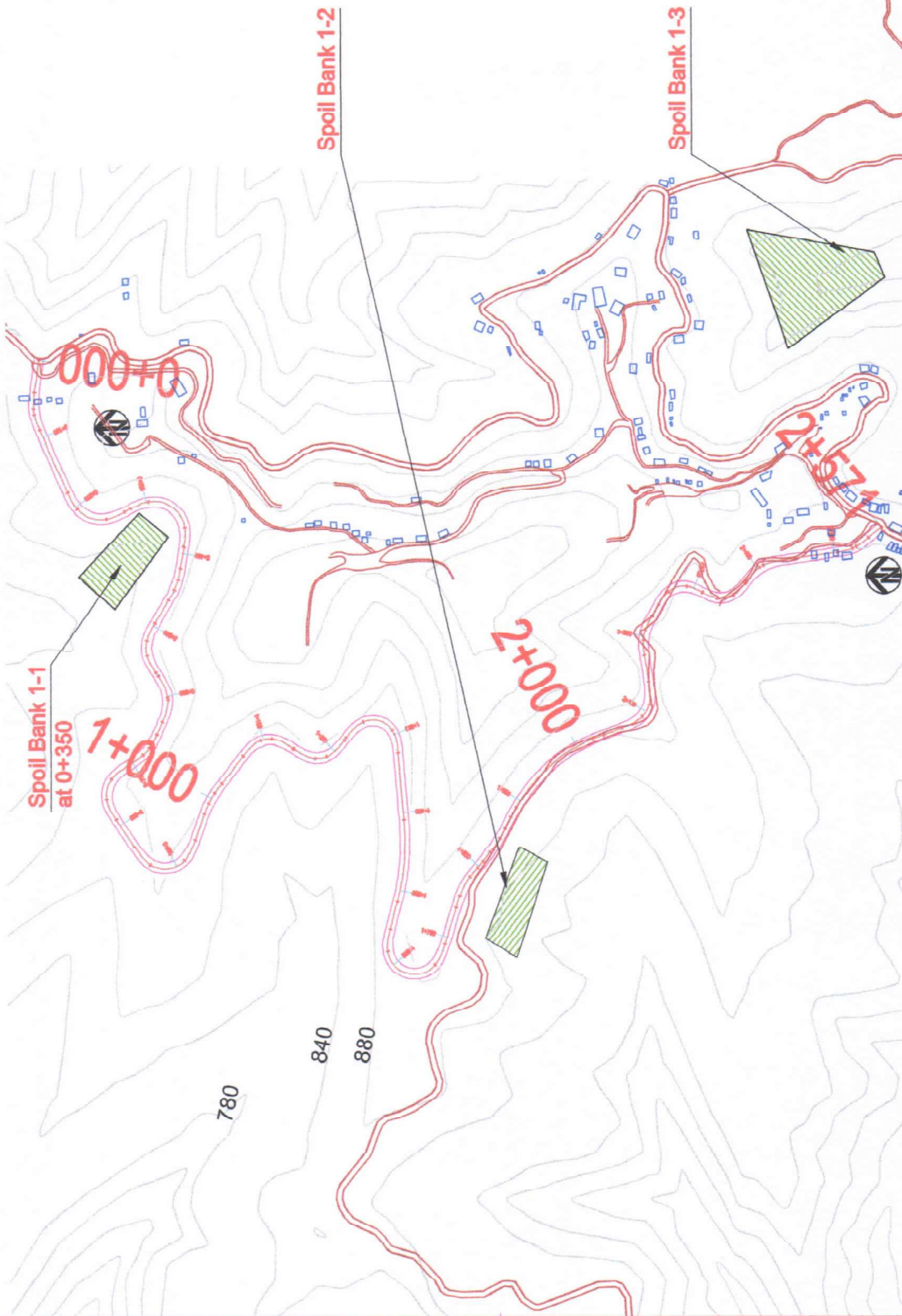
PLAN FOR SPOIL BANK OF NH54 BYPASS-2



CLIENT: NATIONAL HIGHWAY & INFRASTRUCTURE MARUTI UHAR, HOUSE NO. 1473A, 3rd FLOOR, PITHAMPUR, PARLAMENT STREET, NEW DELHI-110001 MINISTRY OF ROAD, TRANSPORT & HIGHWAYS, GOVERNMENT OF INDIA		CONSULTANT: CM ENGINEERING & SOLUTION MARUTI UHAR, HOUSE NO. 1473A, 3rd FLOOR, PITHAMPUR, PARLAMENT STREET, NEW DELHI-110001 Phone: 9811406386, 9911052268, 0124255138 Email: cmesolutions@gmail.com		PROJECT: Draft Detailed Project Report PLAN FOR SPOIL BANK OF NH54 BYPASS-2																																									
LEGEND <table border="1"> <tr> <td>ISSUED AND/OR REFERENCES</td> <td>DATE</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ISSUED AND/OR REFERENCES	DATE							REVISIONS <table border="1"> <tr> <td>DATE</td> <td>ISSUED AND/OR REFERENCES</td> <td>DATE</td> <td>CHANGED</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		DATE	ISSUED AND/OR REFERENCES	DATE	CHANGED													<table border="1"> <tr> <td>DATE</td> <td>SCALE</td> <td>DATE</td> <td>SCALE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		DATE	SCALE	DATE	SCALE												
ISSUED AND/OR REFERENCES	DATE																																												
DATE	ISSUED AND/OR REFERENCES	DATE	CHANGED																																										
DATE	SCALE	DATE	SCALE																																										

W.T.

PLAN FOR SPOIL BANK OF NH54 BYPASS-1



CLIENT: NATIONAL HIGHWAY & INFRASTRUCTURE DEVELOPMENT CORPORATION 3rd FLOOR, PLOT NO. 1473A, SECTOR-14, Gurgaon NEW DELHI-122002 Phone: 9811406386, 9911622865, 0124425138		CONSULTANT: CM ENGINEERING & SOLUTION MARUTI KHAR, HOUSE NO. 1473A GURGAON, HARYANA-122002 Phone: 9811406386, 9911622865, 0124425138		PROJECT: Feasibility Study for Construction of the proposed Road and Provision of Services for Construction of a new and Proposed Road, Section 1473A and 1473B, Gurgaon, Haryana Drawn: Detailed Project Report																	
LEGEND <table border="1"> <tr> <td>ISSUED AND/OR REFERENCES</td> <td>DATE</td> <td>ISSUED AND/OR REFERENCES</td> <td>DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		ISSUED AND/OR REFERENCES	DATE	ISSUED AND/OR REFERENCES	DATE					REVISIONS <table border="1"> <tr> <td>DATE</td> <td>ISSUED AND/OR REFERENCES</td> <td>DATE</td> <td>ISSUED AND/OR REFERENCES</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		DATE	ISSUED AND/OR REFERENCES	DATE	ISSUED AND/OR REFERENCES					STATUS: DDP DATE: 18/09/18 SCALE: 1:1 REV. NO.: CM/ENHDC/IN-54BPT-01 NO.: 01	
ISSUED AND/OR REFERENCES	DATE	ISSUED AND/OR REFERENCES	DATE																		
DATE	ISSUED AND/OR REFERENCES	DATE	ISSUED AND/OR REFERENCES																		

11/11

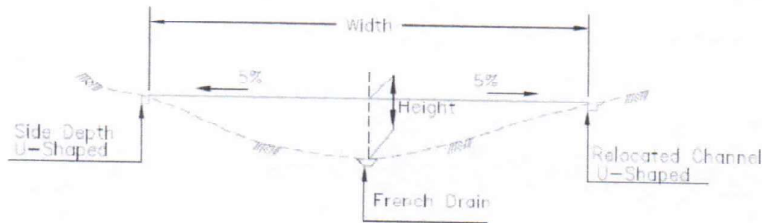


Figure-1(c): Typical Arrangement for Spoil Banks: Cross Section of French Drain

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.**

Nil.

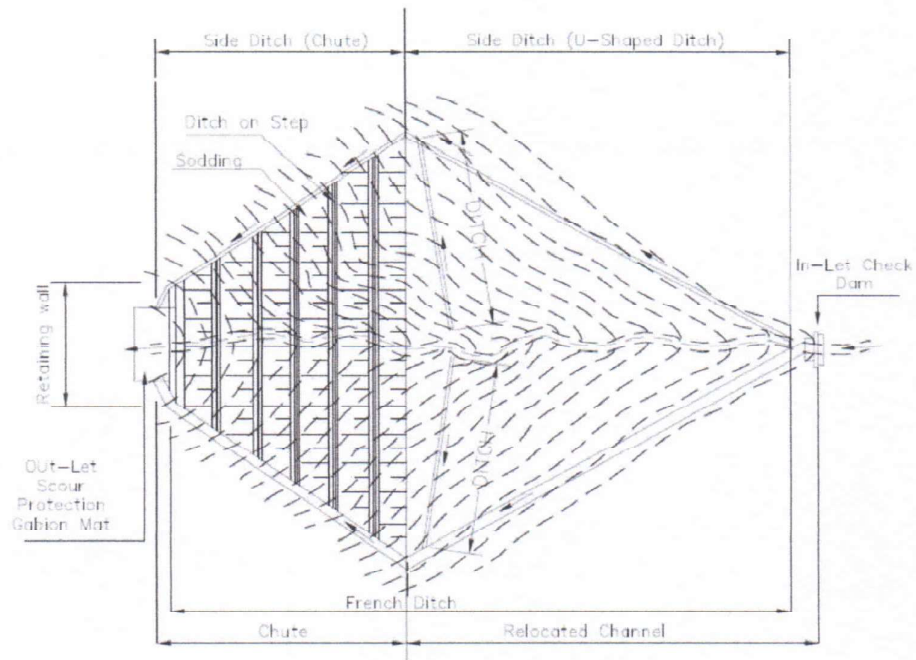


Figure-1(a): Typical Arrangement for Spoil Banks: Plan

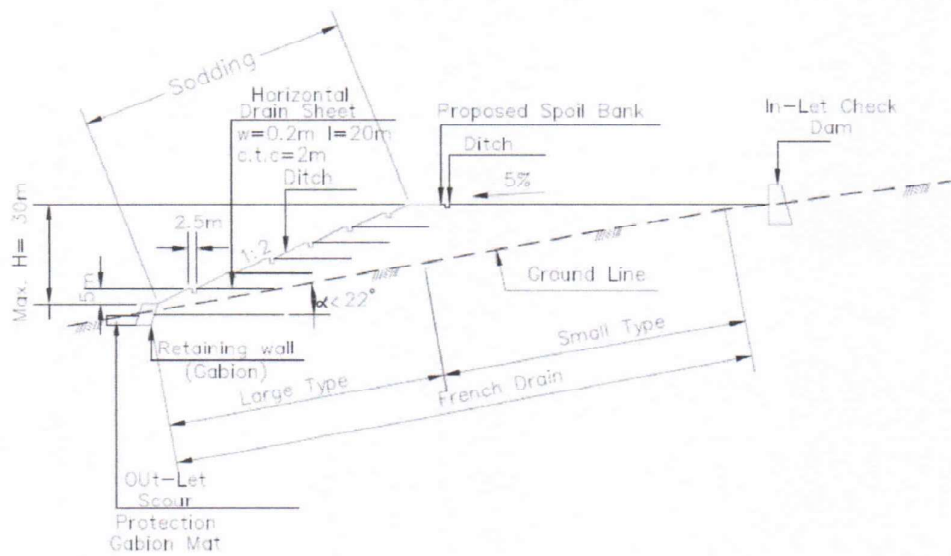


Figure-1(b): Typical Arrangement for Spoil Banks: Profile

Nil

Table-1: Requirements for Design and Construction Spoil Banks

Design Conditions:		
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
Design Requirements:		
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	Turving 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	
Special Provisions on the Specifications:		
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.

11.1

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**.

Nil