Sri Lanka
National Building Research
Organization (NBRO)

The Democratic Socialist Republic of Sri Lanka

Technical Cooperation for Landslide Mitigation Project

Final Report
Appendix (2/2)

September 2018

Japan International Cooperation Agency (JICA)

Earth System Science Co., Ltd.
Nippon Koei Co., Ltd.

GE
JR
18-114

Sri Lanka
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Completion report of the pilot sites

PILOT PROJECT FOR LANDSLIDE AND ROCKFALL MITIGATION WORKS IN BADULLA, NUWARAELIYA AND MATALE

LOT 1-Badulusirigama in Badulla District

PROJECT COMPLETION REPORT

EMPLOYER

Japan International Cooperation Agency (JICA) Sri Lanka Office

Engineer

National Building Research Organization (NBRO)

Earth System Science Co., LTD

Nippon Koei Co., LTD

Contractor

ELS CONSTRUCTION (PVT) LTD

Neelammahara Road, Katuwawala, Borelesgamuwa

Tel. +94 11 430 94 94 Fax : +94 112 509 806

E-mail : els@elslanka.com Web: www.elslanka.com

PREFACE

'ELS' is happy and appreciative about the contract being awarded to them and the confidence placed in them in the execution of such a challenging job. 'ELS' takes pride in successful completion of the entire job as per the design and in conformity with the standards. The output and the experience arising from this job will induce the community to appreciate and protect nature and environment and seek measures at their level to prevent landslides in the future.

This is one objective of this project and we hope this objective will be realized. We also hope that the output of this project will help mitigate the occurrence of future landslides in this area and enhance the safety of the community.

'ELS' owes its gratitude to JICA for the design of this highly important job. 'ELS' owes its gratitude in the same measure to NBRO for their keen interest in this job and for the valuable guidance and instructions given to us in the execution of difficult tasks we encountered.

We are finally happy that the Sri Lankan community will benefit at large from the output of the projects of this nature.

'ELS' was always concerned about the quality of the works and impact of the works to the community.

Our sincere thanks should go to the following for their cooperation, generous assistance given to us, their commitment and working relationship with us during the entire project.

Mr.Hiroki HASHIMOTO

Mr.HARA Ryuchi

Mr.Akira OHKAWARA

Mr.Kawakami kyoichi

Ms.Megumi Rupasinghe

Ms.Kishani Tennekoon

Mr.Irshad Abdul Latheef

Dr.Asiri Karunawardena

Mr.R M S Bandara

Dr. Pathmakumara Jayasingha

Mr. Kelum Senevirathana

Mr.Palitha Madurasingha

Ms. Harshani Perera

Staff from Uva Wellassa University

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- MONTHLY PROGRESS REPORT – JULY 2017

1. INTRODUCTION

The project was designed by JICA to minimize infiltration of storm water and seepage water and drain out ground water and thereby mitigate the occurrence of sliding and heaving up the ground. Surface drains are constructed down the sloping ground for runoff water from the rain to flow down to the outlet at the culvert on Budulusirigama road. The absorption of water to the surface soil layer is thus minimized and gravity force down the slip planes is kept to a minimum (reduced). Also the reinforced concrete walls of surface drains help retain the soil beside the drains.
The ultimate purpose of the project is to mitigate the risk of landslide at Badulusirigama and make the houses and people living there safe.

The Pilot Project for Landslide and Rock fall Mitigation Works Lot 1 at Badulla was funded by Japan International Cooperation Agency (JICA) and contracted to ELS Construction (Pvt) Ltd. The contract period is one year. The construction works started on 22nd June 2016.

Due to additional drains and catch pits being included to the contract, the contract period was extended by 45 days and the date of completion is 28th July 2017.
The initial contract sum is Rs. 38,900,000 (including 10% contingencies).

The scope of work includes horizontal drains at six locations, installation of perforated PVC pipes in the holes drilled, construction of gabion works and water collecting pits just in front of gabion structures, laying 90mm dia. type 1000 PVC pipes underground from water collecting pits to the surface drains, construction of surface drains and catch pits.

2. MOBILIZATION

Site office and other facilities, machinery and equipment were mobilized to the site in February 2016 and drilling and drain construction started on 22nd June 2016 after the approval of the construction plan by JICA.

Site Office

Atlas Copco Compressor stationed at the site

Laboratory, storage facilities, excavator at site

Bathing and washing facility at site

Power supply from CEB

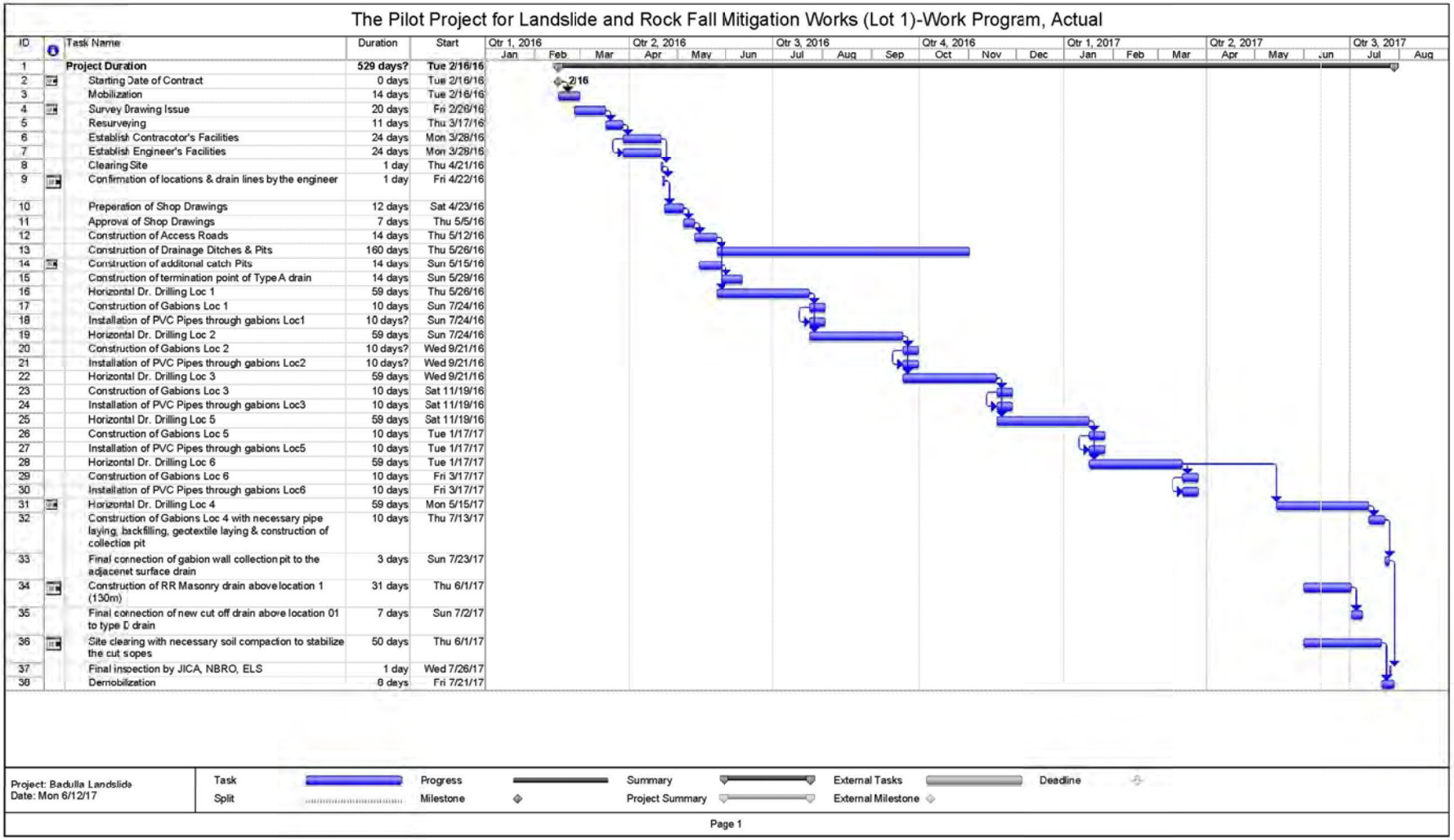
Litter bin placed at the site

Sanitary facilities at site

Resting place for labourers

Dust screen and safety for sun burn

3. THE AMENDED CONSTRUCTION PROGRAM



ID	Task Name	Duration	Start
1	Project Duration	529 days?	Tue 2/16/16
2	Starting Date of Contract	0 days	Tue 2/16/16
3	Mobilization	14 days	Tue 2/16/16
4	Survey Drawing Issue	20 days	Fri 2/26/16
5	Resurveying	11 days	Thu 3/17/16
6	Establish Contracotor's Facilities	24 days	Mon 3/28/16
7	Establish Engineer's Facilities	24 days	Mon 3/28/16
8	Clearing Site	1 day	Thu 4/21/16
9	Confirmation of locations & drain lines by the engineer	1 day	Fri 4/22/16
10	Preperation of Shop Drawings	12 days	Sat 4/23/16
11	Approval of Shop Drawings	7 days	Thu 5/5/16
12	Construction of Access Roads	14 days	Thu 5/12/16
13	Construction of Drainage Ditches & Pits	160 days	Thu 5/26/16
14	Construction of additonal catch Pits	14 days	Sun 5/15/16
15	Construction of termination point of Type A drain	14 days	Sun 5/29/16
16	Horizontal Dr. Drilling Loc 1	59 days	Thu 5/26/16
17	Construction of Gabions Loc 1	10 days	Sun 7/24/16
18	Installation of PVC Pipes through gabions Loc1	10 days?	Sun 7/24/16
19	Horizontal Dr. Drilling Loc 2	59 days	Sun 7/24/16
20	Construction of Gabions Loc 2	10 days?	Wed 9/21/16
21	Installation of PVC Pipes through gabions Loc2	10 days?	Wed 9/21/16
22	Horizontal Dr. Drilling Loc 3	59 days	Wed 9/21/16
23	Construction of Gabions Loc 3	10 days	Sat 11/19/16
24	Installation of PVC Pipes through gabions Loc3	10 days	Sat 11/19/16
25	Horizontal Dr. Drilling Loc 5	59 days	Sat 11/19/16
26	Construction of Gabions Loc 5	10 days	Tue 1/17/17
27	Installation of PVC Pipes through gabions Loc5	10 days	Tue 1/17/17
28	Horizontal Dr. Drilling Loc 6	59 days	Tue 1/17/17
29	Construction of Gabions Loc 6	10 days	Fri 3/17/17
30	Installation of PVC Pipes through gabions Loc6	10 days	Fri 3/17/17
31	Horizontal Dr. Drilling Loc 4	59 days	Mon 5/15/17
32	Construction of Gabions Loc 4 with necessary pipe laying, backfilling, geotextile laying & construction of collection pit	10 days	Thu 7/13/17
33	Final connection of gabion wall collection pit to the adjacenet surface drain	3 days	Sun 7/23/17
34	Construction of RR Masonry drain above location 1 (130m)	31 days	Thu 6/1/17
35	Final connection of new cut off drain above location 01 to type D drain	7 days	Sun 7/2/17
36	Site clearing with necessary soil compaction to stabilize the cut sopes	50 days	Thu 6/1/17
37	Final inspection by JICA, NBRO, ELS	1 day	Wed 7/26/17
38	Demobilization	8 days	Fri 7/21/17

4. HEALTH AND SAFETY MEASURES DURING CONSTRUCTION

Safety is a very important concept which should be applied to any work in all spheres of life. Safety mindedness should therefore be inculcated in the minds of workers as an essential element for the wellbeing of their own and others. This concept is stressed in regular safety meetings held in the mornings before starting work.

There has never been any work related accident during the entire contract period, nor has there been any complaint from the community about the discipline of the workers or about damage caused to their property or environment.

- Project name boards were fixed at four places within and around the site. Safety sign boards were also fixed within the site premises.

Project name boards erected at the site

Safety sign boards

- Safety meetings were held at the site before the commencement of work for workers to realize the importance of safety at work.

Safety awareness meeting held at the site in the morning

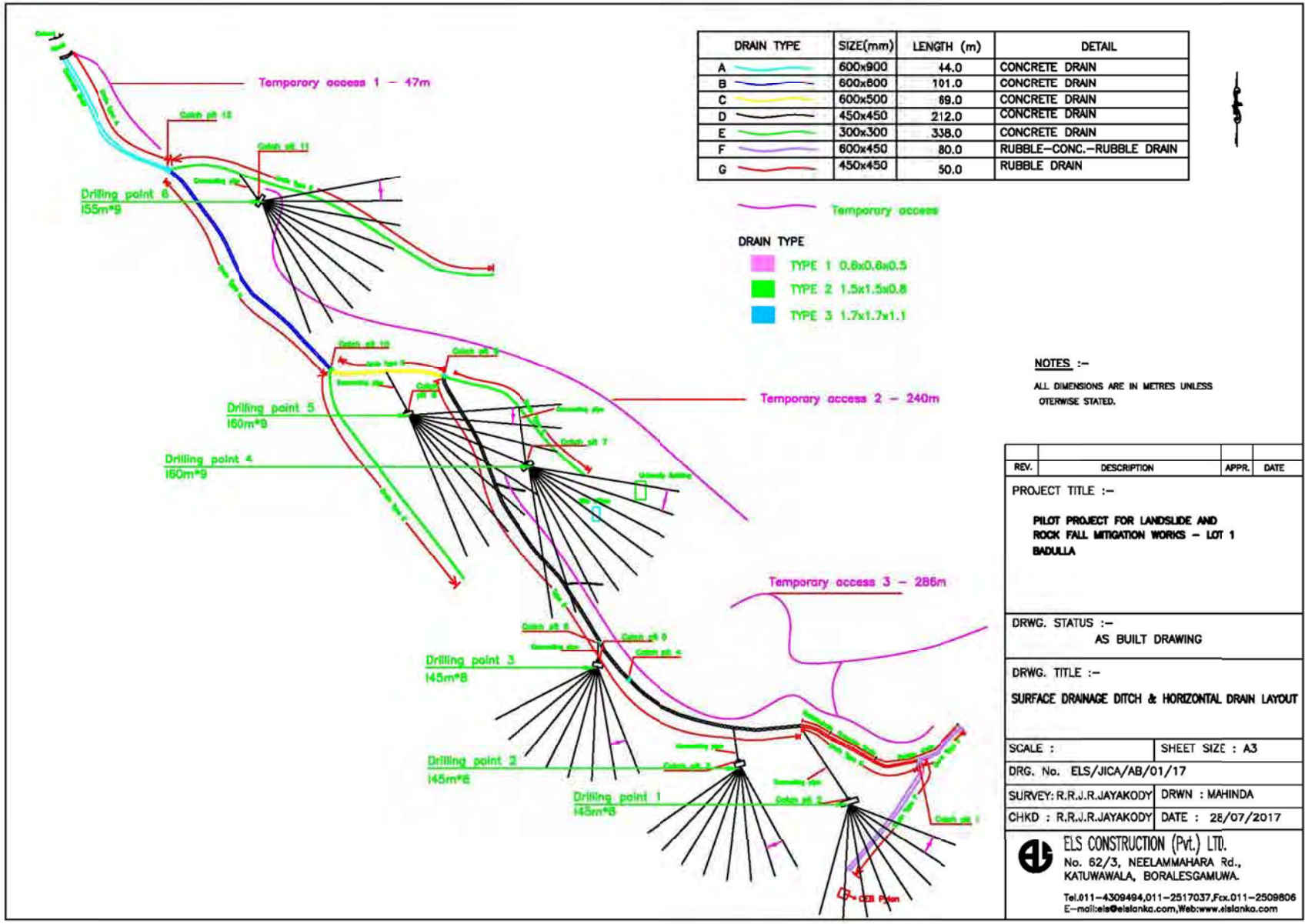
A First Aid Box was maintained at the site office for basic treatment for common ailments or accidents before rushing the patient to hospital or a medical officer. Drugs that were available in the first aid box are:

1.Paracetamol
2.Piriton
3.Prednisolon
4.Citrazine
5.Diclorofenac Sodium
6.Plaster, gauze
7.Omeprazole
8.Domperidon
9.Famotadine
10.Salbutamole
11.Surgical spirit
12.Betadine

First aid box

Safety at work

5.AS BUILT DRAWING OF THE DRAIN LAYOUT PLAN MADE BY A LICENCED SURVEYOR



DRAIN TYPE	SIZE(mm)	LENGTH (m)	DETAIL
A	600x900	44.0	CONCRETE DRAIN
B	600x600	101.0	CONCRETE DRAIN
C	600x500	89.0	CONCRETE DRAIN
D	450x450	212.0	CONCRETE DRAIN
E	300x300	338.0	CONCRETE DRAIN
F	600x450	80.0	RUBBLE–CONC.–RUBBLE DRAIN
G	450x450	50.0	RUBBLE DRAIN

6. HORIZONTAL DRILLING

There are six locations for drilling as per the design made by JICA. Locations 1,2 and 3 had 8 numbers of holes each and each hole was 45m in length. . Locations 4 and 5 had 9 numbers of holes each and each hole was 60m in length. . Locations 6 had 9 numbers of holes and each hole was 55m in length.

At locations 1,2 and 3, horizontal angle between two consecutive holes was 12° and at locations 3,4 and 6, horizontal angle between two consecutive holes was 10°. Inclination to the horizontal at locations 1,2 and 3, is 5° and at locations 3,4 and 6, the angle of inclination to the horizontal is 3°. Percussion rotary drilling was adopted at all 6 locations. Drilling machines were mounted and anchored to temporary concrete platforms of size 3000x3000×275mm constructed at the base of each drilling location to facilitate the movement and rotation of the machine.

Ground above location 1 and 4 was heavily unstable and earth collapse and sliding occurred during drilling. This earth collapse and sliding was induced by vibration caused by air drilling. Soil we had to drill through at locations 1 and 4 was of dense clay interspersed with boulders and therefore cuttings could not be blown out by compressed air. Mud drilling was largely used at these locations to avoid vibration and accompanying earth collapse. Also because medium size and small boulders tended to move, subside or drop as drilling progresses, the casing pipes do not remain firm in position and they lean down at the farthest end posing difficulties in drilling, washing and installation of PVC pipes.

We sometimes had to wash the same hole several times as mud and stone pellets came through the casing pipes.

Another apparent problem we had to face was the horizontal PVC pipes inserted into the hole getting entangled to the casing end and PVC pipes coming off along with the casing pipes when pulling back. One other difficulty we encountered was casing disengaging at threaded joints due to heavy friction force resulting from thick dense clay gripping the outer wall of the casing pipes.

Generally we had to ream the holes at least once to clear the holes of mud and stone.

Drilling Summary				
Location	**Hole No**	**Design Length (m)**	**Status**	**Measured Length (m)**
1	8	45	PVC Pipes installed	45
	7	45	PVC Pipes installed	45
	6	45	PVC Pipes installed	45
	5	45	PVC Pipes installed	45
	4	45	PVC Pipes installed	45
	3	45	PVC Pipes installed	45
	2	45	PVC Pipes installed	45
	1	45	PVC Pipes installed	45
2	8	45	PVC Pipes installed	45
	7	45	PVC Pipes installed	45
	6	45	PVC Pipes installed	45
	5	45	PVC Pipes installed	45

Location	Hole No	Design Length (m)	Status	Measured Length (m)
	4	45	PVC Pipes installed	45
	3	45	PVC Pipes installed	45
	2	45	PVC Pipes installed	45
	1	45	PVC Pipes installed	45
3	8	45	PVC Pipes installed	45
	7	45	PVC Pipes installed	45
	6	45	PVC Pipes installed	45
	5	45	PVC Pipes installed	45
	4	45	PVC Pipes installed	45
	3	45	PVC Pipes installed	45
	2	45	PVC Pipes installed	45
	1	45	PVC Pipes installed	45
4	9	60	PVC Pipes installed	60
	8	60	PVC Pipes installed	60
	7	60	PVC Pipes installed	60
	6	60	PVC Pipes installed	60
	5	60	PVC Pipes installed	60
	4	60	PVC Pipes installed	60
	3	60	PVC Pipes installed	60
	2	60	PVC Pipes installed	60
	1	60	PVC Pipes installed	60
5	9	60	PVC Pipes installed	60
	8	60	PVC Pipes installed	60
	7	60	PVC Pipes installed	60
	6	60	PVC Pipes installed	60
	5	60	PVC Pipes installed	60
	4	60	PVC Pipes installed	60
	3	60	PVC Pipes installed	60
	2	60	PVC Pipes installed	60
	1	60	PVC Pipes installed	60
6	9	55	PVC Pipes installed	55
	8	55	PVC Pipes installed	55
	7	55	PVC Pipes installed	55
	6	55	PVC Pipes installed	55
	5	55	PVC Pipes installed	55
	4	55	PVC Pipes installed	55
	3	55	PVC Pipes installed	55
	2	55	PVC Pipes installed	55
	1	55	PVC Pipes installed	55

Drilling completed at location 5

Water flowing down PVC pipes to catch pit at location 4

Drilling completed and PVC pipes routed to catch pit at location 4

Holes being drilled at location 6

PVC pipes with geotextile cloth wrapped before installation

Drilling machine stationed at location 4

Installation of PVC pipes with end cap fixed to the to the end of first one

Stone filling behind gabion walls

Gabion work at location 5

Gabion work completed at location 4

PVC pipes driven into holes through casing

Stone filling behind and beside gabion wall


PVC pipes prepared and numbered before installation


PVC pipes being installed in order

PVC pipes numbered before installation

PVC pipes installed in to holes



Evidence of installation of PVC pipes by photographs

Gabion work at point location 6

Drill machine being serviced

Watering the plants put at location 6

Drilling completed at location 5

7. SURFACE DRAINS

There are basically 5 types of drains namely A, B,C,D and E which decrease in size and constructed in the respective order from the terminal at the road culvert to the designed starting point at the top. Types A, B,C and D are trapezoidal in shape and type E is of rectangular shape. Types A, B,C and D also has apron of 500mm width. The base and walls of every drain is constructed in grade 25 concrete and apron is constructed in grade 15 concrete. All drains are reinforced with 10mm dia. tor steel. Mix proportion for grade 25 concrete was 1:1.5:3 cement, sand and aggregate by volume and for aprons we used grade 20 concrete of mix proportion 1:2:4 cement, sand and aggregate by volume for better strength and durability though we had to use grade 15 concrete as per the design. Formwork and casting was done to ensure neat and smooth finish and very good quality.

DRAIN TYPE	SIZE(mm)	LENGTH (m)	DETAIL
A	600x900	44.0	CONCRETE DRAIN
B	600x600	101.0	CONCRETE DRAIN
C	600x500	69.0	CONCRETE DRAIN
D	450x450	212.0	CONCRETE DRAIN
E	300x300	338.0	CONCRETE DRAIN
F	600x450	80.0	RUBBLE-CONC.-RUBBLE DRAIN
G	450x450	50.0	RUBBLE DRAIN

Site before construction

Concreting the surface drains

Formwork for concrete drains

Type E drain when formwork removed

Type E, D and C drains jointing together

Type G and cascade drain

Type F drain

Underground PVC pipe connecting catch pit to the drain

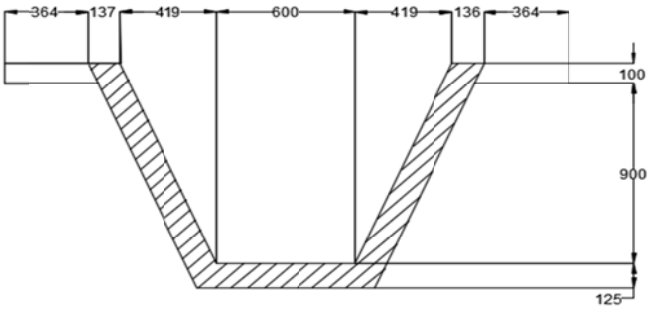
Drains additionally constructed

Additional cut off drain

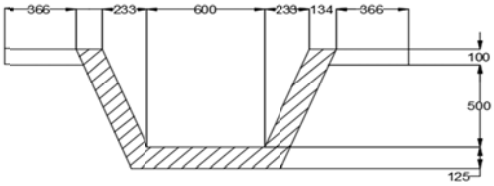
Cascaded drain

Type E drain (141m)

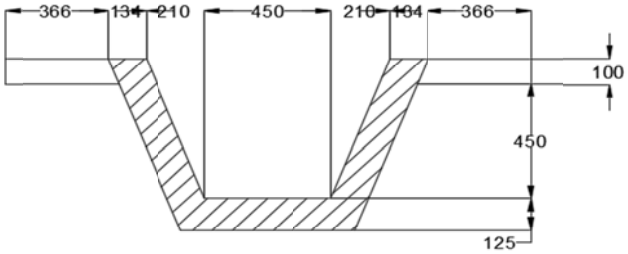
Type E drain (141m) starting point



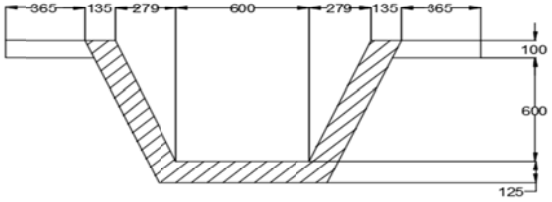
TYPE A DRAIN



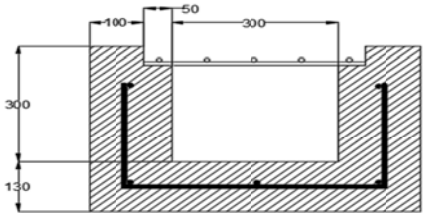
TYPE C DRAIN



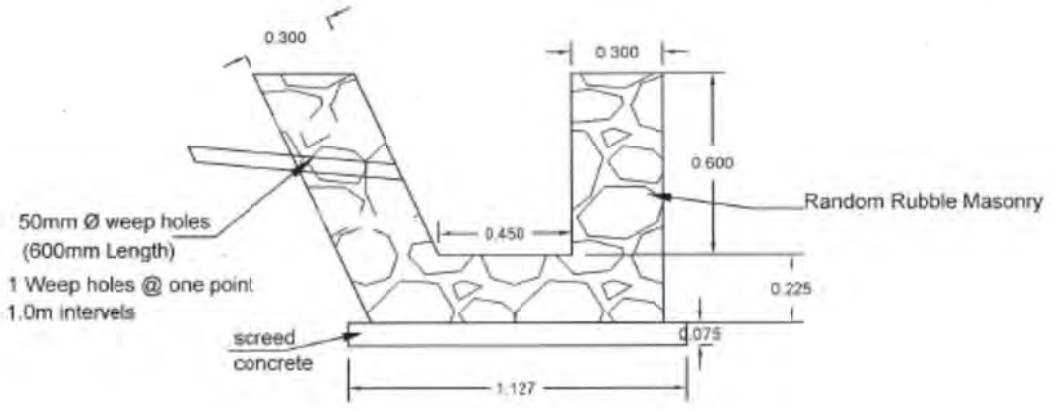
TYPE D DRAIN



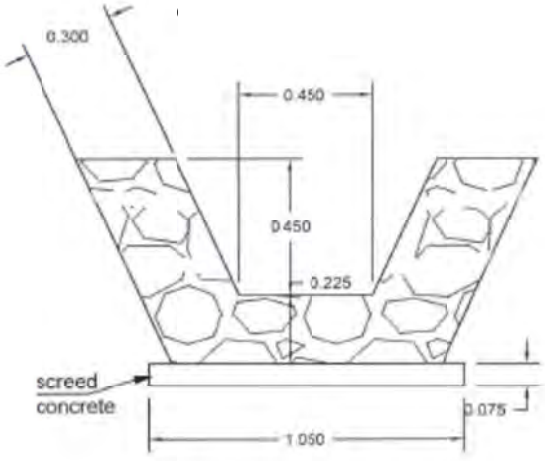
TYPE B DARIN



Type E Drain



DRAIN TYPE F



DRAIN TYPE G

8. Catch Pits

There are three types of catch pits which vary in size. Type 1 catch pit is 600×600×500mm in size. Type 2 and 3 catch pits are 1200×1200×800mm and 1700×1700×1100mm respectively

Type 1 catch pit which is the smallest of the three has been constructed in front of the gabion structures at the six drilling locations to collect water from the horizontal drains.

Type 2 and 3 catch pits constructed along the drain which act as energy absorbers and thereby reduce the velocity flow and scouring the drain bed. There are also catch pits where two types of drains join together to smooth out the flow of the two streams.

The water drained into the water collecting pit is conveyed to the concrete surface drain by 90mm dia. type 1000 PVC pipe.

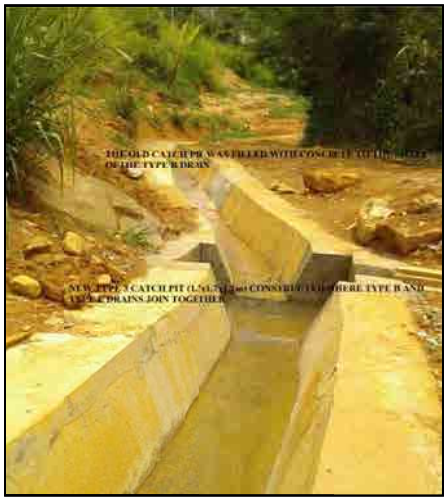
Dimension of the catch pit	Unit	Qty as in BOQ
0.6*0.6*0.5m	Nos	6
1.5*1.5*0.8m	Nos	4
1.7*1.7*1.1m	Nos	1

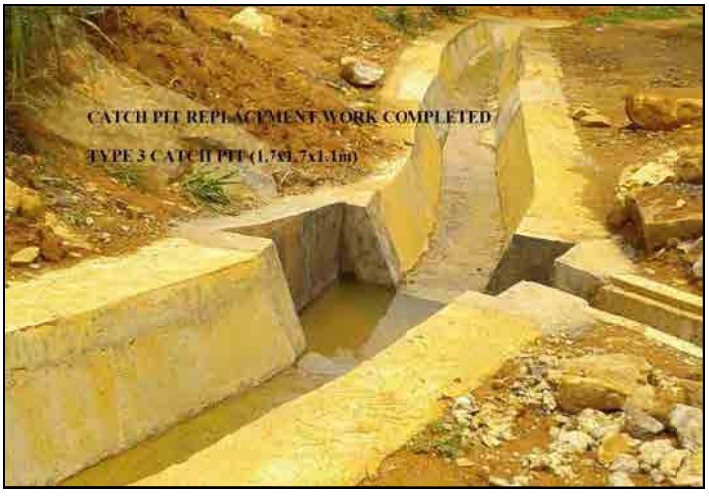
Type 1 catch pit constructed in front of gabion wall

Type 1 catch pit constructed at location 4

ype 2 catch pit constructed mid down the drain where types D and E drains join together

Type 3 catch pit constructed far down the drain where types B and E drains join together





Catch pit type 3 replacement work completed

9. MEASUREMENT SHEET

Measurement Sheet

Folio no :

Contract Title Landslide Mitigation Works (Lot 1)

Contractor : ELS Construction (Pvt.) Ltd.

Bill No. :

Work Done Upto : 22/06/2016 to 28/08/2017

Expense Item	Construction Work	Nos.	Length(m)	Breadth	Depth	Qty	Total(m)
HORIZONTAL DRAINAGE DRILLING							
	Temporary platform	6	5.00	4.00	0.20	24.00	24.00
	100mm dia horizontal drains through any type of soil	L1-L6	2407.50	-	-	2407.50	
	Ditto - do - but through fresh bedrock.	L1-L6	247.50	-	-	247.50	
	63mm dia long drains with perforated type 1000 PVC pipes	L1-L6	2655.00	-	-	2655.00	
	90mm dia Polyethylene pipes Type 1000	L1-L6	111.00	-	-	111.00	
	Temporary road construction	1	450.00	-	-	450.00	
GABION WORK							
	Gabion wall boxes of size 1.0 x 1.0 x 1.0m, filling dry rubble 6" x 9"	58	1.00	1.00	1.00	58.00	-
SURFACE DRAINAGE DITCH							
	B300 H300 (141m)	1	338.00	-	-	338.00	338.00
	B450 H450	1	212.00			212.00	212.00
	B600 H500	1	69.00			69.00	69.00
	B600 H600	1	101.00			101.00	101.00
	B600 H900	1	44.00	-	-	44.00	44.00
	Type F		80.00			80.00	80.00
	Type G		40.50			40.50	40.50
	Cascade drain		9.50			9.50	9.50
WATER COLLECTING PIT							
	1.7 x 1.7 x 1.1m	1	-	-	-	1.00	1.00
	1.5 x 1.5 x 0.8m	4				4.00	4.00
	0.6 x0.6 x0.5m	6				6.00	6.00

10. RESHAPING AT POINT 1 & 4

All earth which had collapsed at location 1 & 4 or earth heaved up or destabilized by cracks was immediately terraced and additional earth was removed.

Finally the terraced area was cut and made to a gentle slope and compacted to minimize erosion and further sliding. The toe of the sliding area at former location 04, has a line of boulders buried as instructed by JICA and NBRO to prevent mass sliding there.

We also have planted the species recommended by NBRO at slopes above the drilling locations to cover the exposed ground with plant growth and prevent soil erosion and to ensure slope stabilization. Plant growth is very slow due to prevailing dry weather condition.

Earth collapse at location 1

Location 1 after reshaping

Reshaping work done at Location 1

Earth removed from location 4 in countermeasure

Old location 4 after reshaping

New location 4 after reshaping

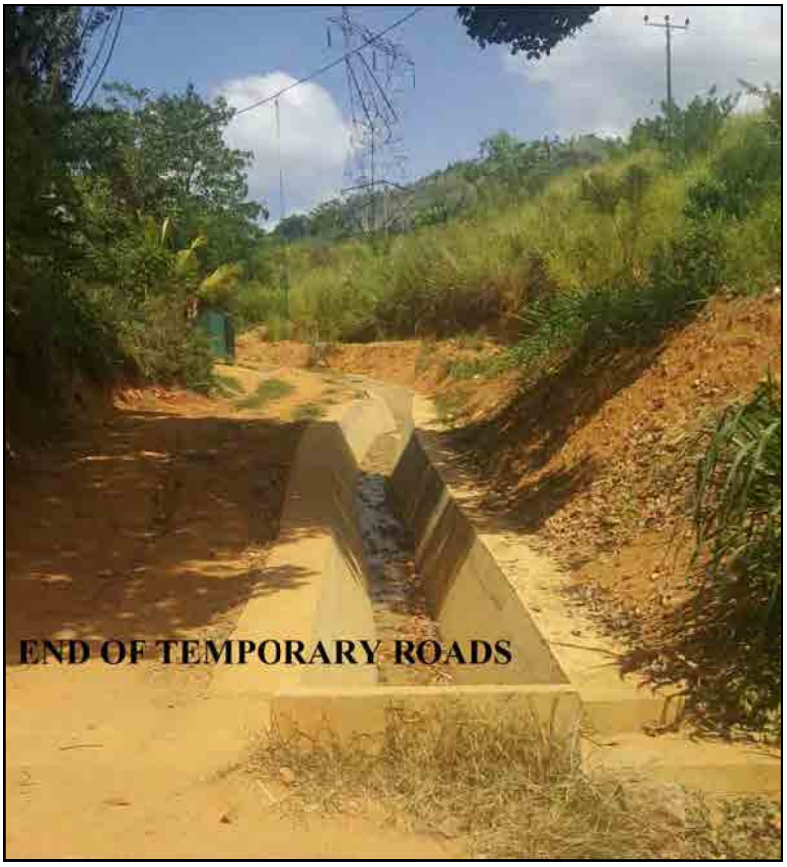
Reshaping completed at new location 4

Reshaping around surface drains

10. TEMPORORY ACCESS ROADS

Temporary roads for construction

Starting point of temporary drain



End point of temporary drain

11. INSPECTIONS FOR MEASUREMENT

The lengths of PVC inserted in to the holes were checked during monthly inspections by JICA or NBRO with 0.5 inch and 1 inch diameter GI or PVC pipes joined together by fastening the ends to the threaded sockets. The length of a PVC pipe is normally 4m and the length of a GI pipes is 6m. By counting the number of pipes inserted through the hole and measuring the remaining part, length of the hole is measured.

JICA representative checked the holes at locations 1,2,3,4 and 5 and NBRO representatives checked the holes at Location no.06.

All catch pits were checked by measuring the dimensions of the catch pits and the gabion works were checked by measuring the length, width and height of the gabion walls.

The lengths of the drains and cross section dimensions were checked by measuring the details of cross sections at every 20m along the drain.

Checking the hole lengths at point 3 by JICA

Length of surface drain type E being checked

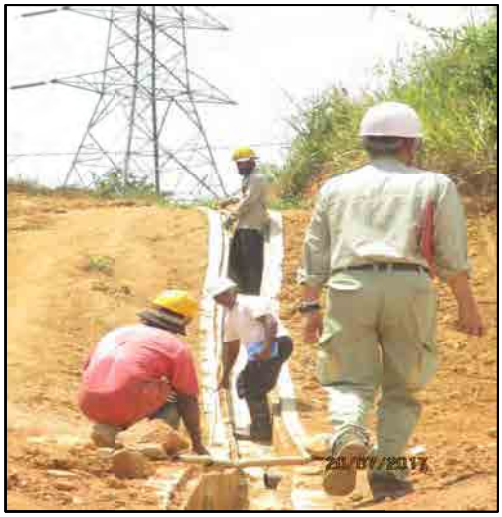
Length of PVC pipes laid underground being checked

Inspection of additional drains by NBRO

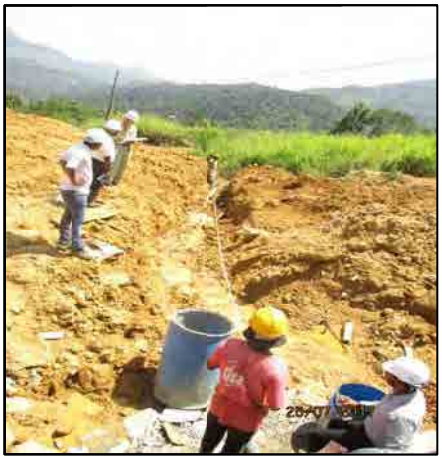
JICA checking holes at point 3

Hole lengths and Gabion work being measured and checked by JICA

Horizontal drainage work being measured by JICA



Measurement of quantities during JICA inspection



JICA inspection in July 2017

12. QUALITY ASSURANCE

Test cubes of all major concrete works were sent to ELS accredited laboratory for testing. All test results were delivered to JICA representative at site and NBRO resident representative for their reference and necessary forwarding.

Materials used were those recommended and of the best quality. Water cement ratio was maintained at 0.5 and concrete was machine mixed to a homogeneous mixture.

Concrete was well compacted with a poker vibrator for a smooth finish.

Concrete compacted with poker vibrator

Test cubes cast for testing

Neat and smooth finish of the drain

13. SITE CLEANING

Site office area cleared of debris, cleaned after reshaping work

Site cleaned after completion of the work

14. EXTRA WORK

During inspections to the site, the importance of energy drop of water flow during heavy showers And cut off drains proposed from the starting point of type D drain to catch all run off water was pointed out. Following other necessary justification following additional works were proposed and approved.

1. Changing the number of catch pits
2. 75mm thk concrete strip for gabion works
3. 6''x 9'' stone filling behind & beneath the gabion wall
4. supply and laying of geotextile cloth
5. 90mm dia type 1000 PVC pipes to encase 63mm dia PVC pipes
6. construction of wing walls
7. Stabilization of drilling points No.01 & 04 (Earth cutting, Hauling earth, compaction and reshaping)
8. Type F Drain – RR masonry drain
9. Type G Drain – RR masonry drain
10. Construction of wing walls at termination point of Type A drain

The initial contract price including 10% contingencies was Rs.38,900,000.00 and the amended contract price with the additional work is Rs.38,268,930.00. Therefore the total contract value at the end is within the original budget.

15. CONTRACT PERIOD

The original contract period was 18 months from 15th February 2016 and construction work was commenced in mid June 2016. Original deadline for completion of work was 15th June 2017.

The construction of cut off drains, drilling at new location No.04 remained to be completed by then. All works were completed by 28th July 2017. A time extension of 43 days for completion of works was granted by JICA on the request from the contractor and based on the additional work identified.

16. CONCLUSION

As we reach the completion of this project, we have already begun to feel and experience the impact of this project. We believe that alongside such projects, community awareness is very important for the achievements of the benefits to the full. The community around the site used to visit the site during construction period and they were very eager to know how the different components of works help mitigate landslides.

They are now out of fear about the occurrence of any landslides in the future and the safety of their lives.

The awareness is also important for the sustainability of the project.

FINAL BOQ WITH AMMENDMENTS

BADULLA LOT 1- Breakdwon of Bill of Quantities with ammendment

Change in BOQ

Item	Description	Original BOQ				Ammended BOQ				Remarks
		Unit	Qty	Rate	Amount	Unit	Qty	Rate	Amount	
7.4	90mm dia long drains with perforated type 1000 PVC pipes and geotextile wrapping. Rate shall include for any other associated work as directed by the Engineer.	m	2655	2,000.00	5,310,000.00	m	2655	1,700.00	4,513,500.00	Variation Request Reference No.ELS CON P 679-13
	Construction of RCC pits including Excavation for structures in soil, backfilling with existing soil, and disposal of excess materials away from the site within 5km distance as directed by the Engineer, planking and strutting if necessary, Supply and laying Grade 15 concrete prepared at site using mixer nd vibrator, Tor steel reinforcement, Supply and fabricate, installing removing of formwork (ply wood) to sides of walls and siffits and cost of curing continuously. Specification: SCA 05-302, SCA/5/1001, SCA/5/1002, SCA/5/1008 Pay: SCA 05-302(1), SCA/5/1001(2), SCA/5/1002(1), SCA/5/1008(1)									Variation Request Reference No.ELS CON P 679-26
10	0.6 x 0.6 x 0.5m	nos	1	19,000.00	19,000.00	nos	6	19,000.00	114,000.00	
10	1.7 x 1.7 x 1.1m	nos	1	112,000.00	112,000.00	nos	1	112,000.00	112,000.00	
7.5	Supplying and placing of 90mm dia Polyethylene pipes Type 1000. Rate shall include for connecting the pipes to the PVC pipes and any other associated work as directed by the Engineer.	m	127	2,000.00	254,000.00	m	127	2,000.00	254,000.00	Variation Request Reference No.ELS CON P 679-27 only replacing polyethylene pipes with PVC pipes. Rate is same
	90mm dia type 1000 PVC pipes to encase 63mm dia PVC pipes (1m*8 holes*6 locations)					m	48	2,000.00	96,000.00	
	Supply & laying of Geotextile (10m2*6 locations)					m2	60	530.00	31,800.00	
	TOTAL				**5,695,000.00**				**5,121,300.00**	

Extra work by contingency

New	Variations identified in gabion wall work									Variation Request Reference No.ELS CON P 679-28
	75mm thk concrete strip (5m*6 locations)					m	30	2,649.00	79,470.00	
	6''x 9'' stone filling behind & beneath the gabion wall (summary table attached)					m3	126	6,564.00	826,407.60	
	Stabilization of drilling points									
	Earth cutting, Hauling earth, compaction and reshaping					m3	400	1,200.00	480,000.00	
New	Type F Drain – RR masonry drain (please refer attached drawing for more information)					m	80	11,691.00	935,280.00	
	Type G Drain – RR masonry drain, (please refer attached drawing for more information)					m	40.5	9,388.00	380,214.00	
	Type G Drain – RR masonry drain, (please refer attached drawing for more information)					m	9.5	16,440.00	156,180.00	
10	1.5 x 1.5 x 0.8m	nos	2	80,000.00	160,000.00	nos	4	80,000.00	320,000.00	
New	Construction of wing walls at termination point of Type A drain					Sum			261,163.00	Variation Request Reference No.ELS CON P 679-24
	TOTAL								**3,438,714.60**	

	Contract amount	Original	after Ammendment
1	LOT 1: Total of Bill of Quantities	35,363,636.36	34,789,936.36
2	Contingencies - 10% of Total BOQ	3,536,363.64	3,478,993.64
3	Total Contract Price (1+2)	38,900,000.00	38,268,930.00

INSURANCE POLICY

POLICY SCHEDULE

Name(s) and Addrss(es) of Insured

Policy No : FCAR160101000142

(a) Name of the Principal : Japan International Corporation Agency (JACA),
10th & 13th Floors,
DHPL Building,
No 42,Nawam Mw,
Colombo 02.

(b) Contractor : M/s. E L S Construction (Pvt) Ltd,
No 62/3,
Neelammahara Road,
Katuwawala,
Boralesgamuwa.

Title of the Contract : The Pilot project for Landslide and Rock Fall Mitigation works under the Technical Corporation for Landslide Mitigation Project (Lot 1)

Site of Contract : Badulla

Agent Name : MR. N.D. MURAGE

Agent Code : 901380

Section I – MATERIAL DAMAGE

	Insured Items		Sum Insured
1.	Contract Price	Rs.	42,790,000.00
2.	Principal's Existing property	Rs.	7,780,000.00
	Total Sum Insured under Section 1	**Rs.**	**50,570,000.00**

Special Natural Perils	Limits of Indemnity (I)	Deductible
Earthquake, Volcanism, Tsunami, Storm, Cyclone,	Rs.50,570,000.00	10% with a minimum of Rs.500,000.00 on each & every loss.

Sub limit of Landslide cover

	Insured Items	Limits of Indemnity (2)		Per Event Value		For the Period
1.	Landslide/Rock slide/Earth slip		Rs.	5,000,000.00	Rs.	5,000,000.00

Excess/Deductibles : Flood & Inundation ,Land slide & any kind of water damages - 20% with a minimum of Rs.1, 000,000.00 on each & every loss.
All other Act of God - 10% with a minimum of Rs.500,000.00 - on each & every loss.
Other causes – 10% with a minimum of Rs. 50,000/- on e.e.l.

1) Limit of Indemnity in respect of each and every loss or/ and or series of losses or damage arising out of any one event.

Net Premium	Rs.	141,026.00
Admin Fee	Rs.	4935.91
Policy Fee	Rs.	300.00
NBT	Rs.	2,894.25
VAT	Rs.	21,707.07
Total Payable	**Rs.**	**166420.92**

Condition - This policy is issued subject to

1. Compliance of Risk survey Recommendation attached herewith.

In witness whereof the undersigned being duly authorized by the Insurers and behalf of the Insurers has/have hereunto set his/their hand(s) this Tuesday, May 31, 2016

Authorized officer

SRI LANKA INSURANCE CORPORATION LTD
FIRE DEPARTMENT

Examined by:

Recommendations:

1) Any deviation(s) to the already approved designs & soil treatment methods should be informed to the insurer with immediate effect. (With the approvals related to the said deviations.)
2) It is highly recommended to clearly demarcate the site area including the followings;
   - Vehicles and people not belongs to the piling site should not be allowed to enter the proposed piling site area during the piling period.
   - Properly use/display adequate nos. of barricades, luminous warning tapes, warning signs, warning lamps, etc... where necessary to avoid any third-party people, vehicle, etc... (Including client's employees and vehicles) knocking/falling against piling/construction work areas.
3) It is recommended to carry out a construction audit (I.e. pre-crack survey) at the surrounding existing properties to identify and highlight the existing damages, cracks etc... in the said structures/buildings.
4) It is recommended to provide and maintain adequate water drain facilities to the proposed site.
5) It is recommended to erect a safety fence surrounding the proposed site to a reasonably adequate height since there were vehicle & people movements in the premises.
6) It is recommended to provide direct supervision of qualified person(s) throughout soil treatment & nailing work. (Specially near to the boundary wall & existing properties)
7) It is recommended to provide direct supervision of qualified person(s) during the vehicle and heavy machinery movements.
8) It is recommended to appoint safety person(s) for site. (For road traffic control especially during the machinery/vehicle movements during in & out the proposed piling site area, etc...)
9) It is recommended to verify with the client regarding any underground & overhead installations. (I.e. Hi tension power lines/communication cables & drainage, etc...)

Sri Lanka Insurance
Corporation Ltd

CONTRACTOR'S ALL RISKS POLICY

No: ...FCAR160101000142....

WHEREAS THE INSURED NAMED IN THE SCHEDULE HERETO MADE TO THE

SRI LANKA INSURANCE CORPORATION LTD. (hereinafter called "the insurer") a written proposal by completing a Questionnaire which together with any other statements made in writing by the Insured for the purpose of this Policy is deemed to be incorporated herein.

Now this Policy Of Insurance Witnesses that subject to the Insured having paid to the Insurer the premium mentioned in the schedule and subject to the terms, exclusions, provisions and conditions contained herein or endorsed hereon the Insurers will indemnify the Insured in the manner and to the extent hereinafter provided.

General Exclusions

The Insurers will not indemnify the Insured in respect of loss, damage or liability directly or indirectly caused by or arising out or aggravated by

(a) War, invasion, act of foreign enemy, hostilities (whether war be declared or not) civil war, rebellion, revolution, insurrection, mutiny, riot, lock-out, civil commotion, military or usurped power, a group of malicious persons or persons acting on behalf of or in connection with any political organization, conspiracy, confiscation commandeering, requisition or destruction or damage by order of any government de jure or de facto or by any public authority ;

(b) nuclear reaction, nuclear radiation, or radioactive contamination;

(c) wilful act or wilful negligence of the Insured or of his representatives;

(d) cessation of work whether total or partial.

In any action, suit or other proceeding where the Insurers allege that by reason of the provisions of Exclusion (a) above any loss, destruction, damage or liability is not covered by this insurance the burden of proving that such loss, destruction, damage or liability is covered, shall be upon the insured.

Period of Cover

The liability of the Insurers shall commence notwithstanding any date to the contrary specified in the schedule, directly, upon, commencement of work or after the unloading of the items entered in the Schedule at the site. The Insurers liability expires for parts of the Insured contract work taken over or put into service.

At the latest the Insurance shall expire on the date specified in the Schedule. Any extensions of the period of Insurance are subject to the prior written consent of the Insurers.

SRI LANKA INSURANCE CORPORATION LTD., IS PROUD TO HAVE YOU AS A POLICYHOLDER AND WE TAKE THIS OPPORTUNITY TO RECOMMEND THAT YOU THOROUGHLY EXAMINE THIS DOCUMENT AND STORE IT IN A SAFE PLACE.

SHOULD YOU HAVE ANY QUERIES, PLEASE CONTACT YOUR AGENT OR THE NEAREST REGIONAL/ BRANCH OR HEAD OFFICE.

General Conditions

1. The due observance and fulfilment of the terms of this policy in so far as they relate to anything to be done or complied with by the Insured and the truth of the statements and answers in the questionnaire and proposal made by the Insured shall be a condition precedent to any liability of the Insurers.

2. The Schedule and the Section(s) Shall be deemed to be incorporated in and form part of this policy and the expression "this policy" wherever used in this contract shall be read as including the schedule and the Section(s). Any word or expression to which a specific meaning has been attached in any part of this policy or of the schedule or of the Section(s) shall bear such meaning wherever it may appear,

3. The Insured shall at his own expense take all reasonable precautions and comply with all reasonable recommendations of the Insurer to prevent loss, damage or liability and comply with statutory requirements and manufacturers' recommendations.

4. (a) Representatives of the Insurer shall at any reasonable time have the right to inspect and examine the risk and the Insured shall provide the representatives of the Insurers with all details and information necessary for the assessment of the risk.

   (b) The Insured shall immediately notify the insurers by telegram and in writing of any material change in the risk and cause at his own expense such additional precautions to be taken as circumstances may require, and the scope of cover and / or premium shall, if necessary, be adjusted accordingly.

No material alteration shall be made or admitted by the Insured whereby the risk is increased, unless the continuance of the Insurance is confirmed in writing by the Insurers.

5. In the event of any occurrence which might give rise to a claim under this Policy, the Insured shall

(a) Immediately notify the Insurers by telephone or telegram as well as in writing, giving an indication as to the nature and extent of loss or damage.

(b) take all steps within his power to minimize the extent of the loss or damage;

(c) preserve the parts affected and make them available for inspection by a representative or surveyor of the Insurers;

(d) furnish all such information and documentary evidence as the insurers may require;

(e) inform the police authorities in case of loss or damage due to theft or burglary.

The Insurers shall not in any case be liable for loss, damage or liability of which no notice has been received by the Insurers within 14 days of its occurrence.

Upon Notification being given to the Insurers under this condition, the Insured may carry out the repair or replacement of any minor damage; in all other cases a representative of the Insurer shall have the opportunity of inspecting the loss or damage before any repair or alterations are effected. If a representative of the Insurers does not carry out the inspection within a period of time which could be considered adequate under the circumstances the Insured is entitled to proceed with the repairs or replacement.

The liability of the Insurers under this policy in respect of any item sustaining damage shall cease if said iter not repaired properly without delay.

6. The Insured shall at the expense of the Insurers do and concur in doing and permit to be done all such acts and things as may be necessary or required by the Insurers in the interest of any rights or remedies, or of obtaining relief of indemnity from parties (other than those Insured under this policy) to which the Insurers are or would become entitled or which is/or would to be subrogated to them upon their paying for or making good any loss or damage under this policy whether such acts and things shall be or become necessary or required before or after the Insured's indemnification by the Insurers.

7. If any difference arise as to the amount to be paid under this policy (liability being otherwise admitted) such difference shall be referred to the decision of an Arbitrator to be appointed in writing by the parties in difference or if they cannot agree upon single Arbitrator to the decision of two Arbitrators, one to be appointed in writing by each of the parties, within one calendar month after having been required in writing so to do by either of the parties, or, in case the Arbitrators do not agree, of an Umpire to be appointed in writing by the Arbitrators before the latter enter upon the reference. The Umpire shall sit with the Arbitrators and preside at their meetings. The making of an award shall be a condition precedent to any right of action against the Insurers.

8 If a claim is in any respect fraudulent, or if any false declaration is made or used in support thereof, or if any fraudulent means or devices are used by the Insured or anyone acting on his behalf to obtain any benefit under this policy, or if a claim is made and rejected and no action or suit

is commenced within three months after such rejection or, in case of Arbitration taking place as provided here within three months after the Arbitrator, Arbitrators or Umpire, have made their award, all benefits under this policy shall be forfeited.

9. If at the time any claim arises under the policy there is any other insurance covering the same loss, damage or liability, the Insurers shall not be liable to pay or contribute more than their rateable proportion of any claim for such loss, damage or liability.

Section 1 - Material Damage

The Insurers hereby agree, with the Insured that if at any time during the period of cover the items or any part thereof entered in the schedule shall suffer any unforseen and sudden physical loss or damage from any cause, other than those specifically excluded, in a manner necessitating repair or replacement, the Insurer will indemnify the Insured in respect of such loss or damage as hereinafter provided by the payment in cash, replacement or repair (at their own option) up to an amount not exceeding in respect of each of the item specified in the schedule the sum set opposite thereto and exceeding in any one event the limit of indemnity where applicable and not exceeding in all the total sum expressed in the Schedule as insured hereby.

The Insurer will also reimburse the Insured for the cost of clearance debris following upon any event giving rise to a claim under this policy provided a separate sum therefore has been entered in the Schedule.

Special Exclusions to Section 1

The Insurers shall not, however, be liable for,

(a) the deductible stated in the Schedule to be borne by the insured in any consequential;

(b) consequential loss of any kind or description whatsoever including penalties, losses due to delay, lack of performance, loss of contract;

(c) loss or damage due to faulty design;

(d) the cost of replacement, repair or rectification of defective material and / or workmanship, but this exclusion shall be limited to the items immediately affected and shall not be deemed to exclude loss or damage to correctly executed items resulting from an accident due to such defective material and / or workmanship;

(e) wear and tear, corrosion, oxidation, deterioration due to lack of use and normal atmospheric conditions;

(f) loss or damage to construction plant, equipment and construction machinery due to electrical or mechanical breakdown, failure, breakage or derangement, freezing of coolant or other fluid, defective lubrication or lack of oil or coolant, but if as a consequence an accident occurs causing external damage, such consequential damage shall be indemnifiable;

(g) loss or damage to vehicles licensed for general road use or water borne vessels or aircraft;

(h) loss or damage to files, drawings, accounts, bills, currency, stamps, deeds, evidences of debt, notes, securities, cheques

(i) loss or damage discovered only at the time of taking an inventory.

Provisions Applying to Section 1

Memo 1 – Sums Insured: It is a requirement of this insurance that the sums Insured stated in the schedule shall not be less than,

for item 1: the full value of the contract works at the completion of the construction, inclusive of all materials, wages, freight custom duties, dues and materials or items supplied by the principal;

for item 2&3: the replacement value of construction plant, equipment and construction machinery, which shall mean the cost of replacement of the insured items by new items of the same kind and same capacity.

and the Insured undertakes to increase or decrease the amounts of insurance in the event of any material fluctuation in wages or prices provided always that such increase or decrease shall take effect only after the same has been recorded on the policy by the Insurers. If in the event of loss or damage, it is found that the sums insured are less than the amounts required to be insured, then the amount recoverable by the insured under this policy shall reduced in such proportion as the sums insured bear to the amounts required to be insured. Every object and cost item is subject to this condition separately.

Memo 2- Basis of Loss Settlement:

In the event of any loss or damage the basis of any settlement under this Policy shall be;

(a) In the case of damage which can be repaired the cost of repairs necessary to restore the items to its condition immediately before the occurrence of the damage less salvage, or

(b) in the case of a total loss the actual value of the items immediately before the occurrence of the loss less salvage.

however, only to the extent the costs claimed had to be borne by the Insured and to the extent they are included in the sums insured and provided always that the provisions and conditions have been complied with.

The insurer will make payments only after being satisfied by production of the necessary bills and document that the repairs have been effected or replacement has taken place, as the case may be. All damages which can be repaired shall be repaired, but if the cost of repairing any damage equals or exceeds the value of the items immediately before the occurrence of the damage, the settlement shall be made on the basis provided for in (b) above.

The cost of any provisional repairs will be borne by the Insurers if such repairs constitute part of the final repairs and do not increase the total repair expenses.

The cost of any alterations, additions, and/or improvements shall not be recoverable under this policy.

Memo 3 - Extension Cover :

Extra charges for overtime, night work, work on public holidays, express freight are covered by this insurance only if previously agreed upon in writing.

Section 2- Third Party Liability

The Insurer will indemnify the insured up to but not exceeding the amounts specified in the Schedule against such sums which the Insured shall become legally liable to pay as damage consequent upon.

(a) accidental bodily injury to or illness of third parties (whether fatal or not);

(b) accidental loss or damage to property belonging to third parties,

occurring in direct connection with the construction or erection of the items insured under Section 1 and happening on or in the immediate vicinity of the site during the Period of Cover.

In respect of a claim for compensation to which the indemnity provided herein applies, the Insurers will in addition indemnify the Insured against.

(a) all costs and expenses of litigation recovered by any claimant from the Insured, and;

(b) all costs and expenses incurred with the written consent of the Insurers.

Provided always that the liability of the Insurers under this section shall not exceed the limits of indemnity stated in the Schedule.

Special Exclusions to Section 2

The Insurers will not indemnify the Insured in respect of,

1. The deductible stated in the Schedule to be borne by the Insured in any one occurrence;

2. The expenditure incurred in doing or redoing or making good or repairing or replacing anything covered or coverable under section 01 of this Policy.

3. Damage to any property or land or building caused by vibration or by the removal or weakening of support or injury or damage to any person or property occasioned by or resulting from any such damage (unless especially agreed upon by endorsement).

4. Liability Consequent Upon

   (a) bodily injury to or illness of employees or workmen of the Contractor (s) or the Principal(s) or any other firm connected with the project which or part of which is insured under Section 1 or members of their families;

   (b) loss of or damage to property belonging to or held in care, custody or control of the contractor(s), principal(s), or any other firm connected with the project which or part of which is insured under section 1, or an employee or workman of one of the aforesaid;

   (C) any accident caused by vehicles licensed for general road use or by waterborne vessels or aircraft;

   (d) any agreement by the Insured to pay any sum by way to indemnity or otherwise unless such liability would have attached also in the absence of such agreement

Special Conditions Applying to Section 2

1. No admission, offer promise, payment or indemnity shall be made or given by or on behalf of the Insured without the written consent of the Insurers who shall be entitled, if they so desire to take over and conduct in the name of the Insured the defence or settlement of any claim or to prosecute for their own benefit in the name of the Insured any claim for indemnity or damages or otherwise and shall have full discretion in the conduct of any proceedings or in the settlement of any claim and the Insured shall give all such information and assistance as the Insurers may require.

2. The Insurers may so far as any accident is concerned pay to the Insured the limit of indemnity for any one accident (but deducting therefrom in such case any sum or sums already paid as compensation in respect there of) or any lesser sum for which the claim or claims arising from such accident can be settled and the Insurers shall thereafter by under no further liability in respect of such accident under this section.

The following Endorsements only apply in this policy when specifically mentioned in the Schedule, and are subject otherwise to the terms, conditions and exceptions of this policy.

SRCC Endorsement

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon and subject to the Insured having paid the agreed extra premium, this Policy shall be extended to cover loss or damage due to Strike, Riot and Civil Commotion which for the purpose of this Endorsement shall mean (subject always to the Special Conditions hereinafter contained) loss of or damage to the property insured directly caused by

1. the act of any person taking part together with others in any disturbance of the public peace (whether in connection with a strike or lockout or not) being an occurrence in condition 2 of the Special Conditions hereof;

2. the action of any lawfully constituted authority in suppressing or attempting to suppress any such disturbance or in minimizing the consequences of any such disturbance;

3. the wilful act of any strike or lockout worker performed in furtherance of a strike or in resistance to lock-out.

4. the action of any lawfully constituted authority in preventing or attempting to prevent any such act or in minimizing the consequences of any such act.

Provided that it is hereby expressly agreed and declared that

1. all the terms, exclusions, provisions and conditions of the policy shall apply in all respects to the insurance granted by this extension save in so far as the same are expressly varied by the following Special conditions and any reference to loss or damage in the wording of the policy shall be deemed to include the perils hereby insured against.

2. the following Special Conditions shall apply only to the insurance granted by this extension and the wording of the Policy shall apply in all respects to the Policy as if this Endorsement had not been made thereon.

Special Conditions

1. This insurance shall not cover

   a) loss or damage resulting from total or partial cessation of work or the retarding, interruption or cessation of any process or operation.

   b) loss or damage occasioned by permanent or temporary dispossession resulting from confiscation, commandeering or requisition by any lawfully constituted authority.

   c) loss or damage occasioned by permanent or temporary dispossession of any building resulting from the unlawful occupation by any person of such building.

   d) consequential loss or liability of any kind or description, any payments over and above the indemnity for the material damage as provided herein.

Provided nevertheless that the Insurers are not relieved under (b) or (c) above of any liability to the insured in respect of physical damage to the property insured occurring before dispossession or during temporary dispossession,

2. This insurance shall not cover any loss or damage occasioned by or through or inconsequence, directly or indirectly or any of the following occurrence namely.

   a) war, invasion, act of foreign enemy, hostilities or warlike operations (whether war be declared or not) civil war,

   b) mutiny, civil commotion assuming the proportions of or amounting to a popular rising, military rising, insurrection, rebellion, revolution, military, or usurped power, martial law or state of siege or any of the events or causes which determine the proclamation or maintenance of martial law or state of siege

c) any act of terrorism which means an act, including but not limited to the use of force or violence and/or the threat thereof, of any person or group(s) of persons, whether acting alone or on behalf of or in connection with any organization(s) or Government(s),committed for political, religious, ideological or ethnic purposes or reasons including the intention to influence any government and/or to put the public, or any section of the public in fear

Further any loss, damage, cost or expense of whatsoever nature directly or indirectly caused by, or resulting from any action taken in controlling, preventing, suppressing action during any engagement between Government forces and any group as defined about on land, sea, or air shall be regarded as falling within the definition of Terrorism below.

Provided that it is hereby further expressly agreed and declared that:

(1) This insurance may at any time be terminated by the Insurers on notice to that effect being given by registered post to the Insured's last known address, in which case the Insurers shall be liable to repay a rateable proportion of the premium for the unexpired term from the date of termination If the Insurance be terminated at the request of the Insured the Company shall not be liable to repay the premium or any part thereof.

(2). The amount recoverable under this endorsements:

i. for Contractor's or Erection All Risks Policies in respect of loss/damage to any property of the same principal forming part of a single construction project/erection work under all policies (if more than one policy has been obtained in respect of any work relating to such project/work, either by the principal or by a Contractor or by a sub contractor) shall not exceed Rs..... or the Sum Insured whichever is less any one loss/occurrence.

ii. for Contractor's Plant and Machinery or Machinery All Risks in respect of loss/ damage to any property of the same Insured in all locations under all policies shall not exceed Rs..... or the sum insured whichever is less any one loss/occurrence.

For this purpose an "occurrence" shall mean all losses attributable directly or indirectly to one cause or to one of a series of similar causes.

(3) The cover granted by this endorsement is subject to an excess of 10% in respect of each and every loss/occurrence.

(4) Upon the occurrence of an event giving rise to a claim hereunder, the limit of cover provided shall stand reduced by the amount of the claim paid or payable and shall be reinstated by the Insured by payment of an additional premium calculated at 100% pro-rata only to the amount reinstated.

It is further declared and agreed that this extension is subject to the following exclusions:

A. INSTITUTE RADIOACTIVE CONTAMINATION, CHEMICAL, BIOLOGICAL, BIOCHEMICAL AND ELECTROMAGNETIC WEAPONS EXCLUSION CLAUSE.

This clause shall be paramount and shall override anything contained in this insurance inconsistent herewith.

1 In no case shall this insurance cover loss, damage, liability or expense directly or indirectly caused by or contributed to by or arising from

1.1 Ionising radiations from or contamination by radioactivity from any nuclear fuel or from any nuclear waste or from the combustion of nuclear fuel

1.2 the radioactive, toxic, explosive or other hazardous or contaminating properties of any nuclear installation, reactor or other nuclear assembly or nuclear component thereof

1.3 any weapon or device employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter

1.4 the radioactive, toxic, explosive or other hazardous or contaminating properties of any radioactive matter. The exclusion in this sub clause does not extend to radioactive isotopes, other than nuclear fuel, when such isotopes are being prepared, carried, stored, or used for commercial, agricultural, medical, scientific, or other similar peaceful purposes.

1.5 any chemical, biological, bio chemical, or electromagnetic weapon.

B. INSTITUTE CYBER ATTACK EXCLUSION CLAUSE

1.1 Subject only to clause 1.2 below, in no case shall this insurance cover loss, damage liability or expense directly or indirectly caused by or contributed to by or arising from the use or operation, as a means for inflicting harm, of any computer, computer system, computer software programme, malicious code, computer virus or process or any other electronic system.

1.2 Where this clause is [illegible] covering risks of war, civil war, revolution, rebellion, insurrection, [illegible] thereof, or any act of [illegible] belligerent power [illegible] person acting from a political motive, Clause 1.1 shall not operate to exclude losses (which would otherwise be covered) arising from the use of any computer, computer system or computer software programme of any other electronic system in the launch and / or guidance system and / or firing mechanism of any weapon or missile.

This extension is granted for and on behalf of the National Insurance Trust Fund and any liabilities whatsoever under this specific extension shall devolve solely upon the said fund. If any action, suit or proceeding where it is alleged that any loss or damage is not covered by this Endorsement, the burden of proving that such loss or damage is covered shall be upon the insured.

Subject otherwise to the terms, conditions, exclusions and exceptions of the policy

TERRORISM ENDORSEMENT

In consideration of a payment of an additional premium it is hereby declared and agreed that the cover provided by the SRCC Endorsement attached to the policy;

a. is extended to include loss or damage other than Consequential Losses of any kind directly relating to or caused by any act of terrorism which means an act, including but not limited to the use of force or violence and/or the threat there of any person or group(s) of persons, whether acting alone or on behalf of or in connection with any organization(s) or Government(s) committed for political, religious, ideological or ethnic purposes or reasons including the intention to influence any government and/or to put the public, or any section of the public in fear

   Further any loss, damage, cost or expense of whatsoever nature directly or indirectly caused by, or resulting from any action taken in controlling, preventing, suppressing action during any engagement between Government forces and any group as defined about on land, sea, or air shall be regarded as falling within the definition of Terrorism above;

b. the amount payable in terms of cover provided as per 'a' above in respect of loss/damage to any property of the same Principal forming part of a single construction project/erection work under all policies (if more than one policy has been obtained) in respect of any work relating to such project/work, either by the Principal or by a Contractor or by a Sub-contractor shall not exceed Rs. ..... or the Sum Insured whichever is less any one loss/occurrence. For this purpose an "Occurrence" shall mean all losses attributable directly or indirectly to one cause or to one of a series of similar causes;

c. is subject to an excess of 10% in respect of each and every loss/occurrence.

Notwithstanding what is stated to the contrary in the policy if the Terrorism extension to the Policy is being cancelled by the Insurer a pro-rata refund will be allowed to the Insured. However, no return of premium shall be granted if this cover is cancelled at the request of the insured.

In the event of any loss/losses arising out of the same occurrence affecting more than one policy, the apportionment of the National Insurance Trust Fund subject however to the limits and deductibles specified in this Endorsement.

Upon the occurrence of an event giving rise to a claim hereunder, the limit of cover provided shall stand reduced by the amount of the claim paid or payable and shall be reinstated by the Insured by payment of an additional premium calculated at 100% pro-rata only to the amount reinstated.

It is further declared and agreed that this extension is subject to the following exclusions

A. INSTITUTE RADIOACTIVE CONTAMINATION, BIOLOGICAL, BIOCHEMICAL AND ELECTROMAGNETIC WEAPONS EXCLUSION CLAUSE

This clause shall be paramount and shall override anything contained in this insurance inconsistent herewith

1. In no case shall this insurance cover loss, damage, liability or expense directly or indirectly caused by or contributed to by or arising from

1.1 ionising radiations from or contamination by radioactivity from any nuclear fuel or from any nuclear waste or from the combustion of nuclear fuel

1.2 the radioactive, toxic, explosive or other hazardous or contaminating properties of any nuclear installation, reactor or other nuclear assembly or nuclear component thereof

1.3 any weapon or device employing atomic or nuclear fission and / or fusion or other like reaction or radioactive force or matter

1.4 the radioactive, toxic, explosive or other hazardous or contaminating properties of any radioactive matter. The exclusion in this sub clause does not extend to radioactive isotopes, other than nuclear fuel, when such isotopes are being prepared, carried, stored, or used for commercial, agricultural, medical, scientific, or other similar peaceful purposes

any chemical, biological, bio chemical, or electromagnetic weapon.

B. INSTITUTE CYBER ATTACK EXCLUSION CLAUSE

1.1 Subject only to clause 1.2 below, in no case shall this insurance cover loss, damage, liability or expense directly or indirectly caused by or contributed to by or arising from the use or operation, as a means for inflicting harm, of any computer, computer system, computer software programme, malicious code, computer virus or process or any other electronic system,

1.2 Where this clause is endorsed on policies covering risks of war, civil war, revolution, rebellion, insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power, or terrorism or any person acting from a political motive, Clause 1.1 shall not operate to exclude losses (which would otherwise be covered) arising from the use of any computer, computer system or computer software programme of any other electronic system in the launch and / or guidance system and / or firing mechanism of any weapon or missile.

This extension is granted for and on behalf of the National Insurance Trust Fund and any liabilities whatsoever under this specific extension shall devolve solely upon the said fund. If any action, suit or proceeding where it is alleged that any loss or damage is not covered by this Endorsement, the burden of proving that such loss or damage is covered shall be upon the Insured.

Subject otherwise to the terms, conditions, exclusions and exceptions of the policy

CROSS LIABILITY

It is agreed and understood that otherwise subject to the terms, exclusion, provisions and conditions contained in the policy or endorsed thereon and subject to the Insured having paid the agreed extra premium, the Third Party Liability cover of the Policy shall apply to the insured parties named in the Schedule as if a separate policy had been issued to each party, provided that the insurers shall not indemnify the insured under this Endorsement in respect of liability for

Loss or damage to items insured or insurable under Section 1 of the Policy, even if not recoverable due to an excess or any limit.

Fatal or non-fatal injury or illness of employees or workmen who are or could have been insured under Workmen's Compensation and / or Employer's liability Insurance.

The Insurer's total liability in respect of the insured parties shall not however exceed in the aggregate for any one accident or series of accident arising out of one event the limit of indemnity stated in the Schedule.

MAINTENANCE VISITS COVER

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon and subject to the Insured having paid the agreed extra premium, this insurance shall be extended for the maintenance period specified hereunder to cover solely loss of or damage to the contract works caused by the Insured contract or (s) in the course of the operations carried out for the purpose of complying with the obligations under the maintenance provisions of the contract.

EXTENDED MAINTENANCE

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon and subject to the Insured having paid the agreed extra premium this insurance shall be extended for the maintenance period specified hereunder to cover loss of or damage to the contract works:

- caused by the insured contractor(s) in the course of the operations carried out for the purpose of complying with obligations under the maintenance provisions of the contract.

- occurring during the maintenance period provided such loss or damage was caused on the site during the construction period before the certificate of completion for the loss or damage section was issued.

Principal's Existing Property or Property Belonging to or Held In Care, Custody or Control by the Insured

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon and subject to the Insured having paid the agreed extra premium, Section 01 of this insurance shall be extended to cover loss of or damage to the existing property or property belonging to or held in care, custody or control by the Insured caused by or arising out of the construction or erection of the items insured under section 1.

The Insurers will only indemnify the Insured for loss of or damage to the insured property provided that prior to the commencement of construction its condition is sound and the necessary safety measures have been taken.

In respect of loss or damage caused by vibration or by the removal or weakening of support Insurers will only indemnify the Insured for loss or damage as a result of a total or partial collapse of the insured property, and not for superficial damage which neither impairs the stability of the insured property nor endangers its users.

The Insurers will not indemnify the insured for

- Loss or damage which is foreseeable having regard to the nature of the construction work or the manner of its execution,

The costs of loss prevention or minimization measures which become necessary during the period of insurance.

indemnify the Insured for loss, damage or liability directly or indirectly caused to construction plant, equipment and machinery by flood and inundation if, after the execution of works or in case of any interruption, such construction plant, equipment and machinery are kept in an area not endangered by 20 year floods.

MR 109 Warranty Concerning Construction Material

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss, damage or liability directly or indirectly caused to construction material by flood or inundation if such construction material does not exceed three days demand and the exceeding quantities are kept in areas not endangered by 10 years floods.

MR 110 Special Conditions Concerning Safety Measures with Respect to Precipitation, Flood and Inundation

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss, damage or liability caused directly or indirectly by precipitation, flood or inundation if adequate safety measures have been taken in designing and executing the project involved.

Adequate safety measures shall mean that allowance is made for precipitation, flood and inundation up to a return period of 10 years for the location insured and the entire policy period on the basis of the statistics prepared by the meteorological agencies.

Loss, damage or liability resulting from the Insured's not immediately removing obstructions (eg: sand, trees) from watercourses within the construction site, whether carrying water or not, in order to maintain free water flow shall not be indemnifiable.

MR 112 Special Conditions concerning Fire – Fighting Facilities and Fire Safety on Construction Sites

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss or damage directly or indirectly caused by or resulting from fire or explosion, provided always that:

1. With regard to the progress of work adequate fire-fighting equipment and sufficient extinguishing agents are available and operative at all times.

   Fully operative wet riser hydrants are installed up to one level below the

highest current work level and are sealed by temporary end caps.

2. The cabinets containing hose reels and portable fire extinguishing are inspected at regular intervals but at least twice a week.
3. Fire compartments as required by local regulations are installed as soon as possible after the removal of formwork.

Openings for lift shafts, service ducts and other voids are provisionally closed as soon as possible but not later than at the commencement of fit out work.

4. Waste material is removed regularly. All floors undergoing fit out are cleared of combustible waste at the end of each working day.
5. A "permit to work" system is implemented for all contractors engaged in "hot work" of any kind such as but not limited to

- grinding, cutting or welding operations,
- use of blow lamps and torches,
- application of hot bitumen,

or any other heat producing operation.
"Hot work" is carried out only in the presence of at least one worker equipped with a fire extinguisher and trained in fire fighting.
The area of any "hot work" is examined one hour after the work has finished.

6. Storage of material for the construction or erection shall be subdivided into storage units not exceeding the value stated below per storage unit. The individual storage units shall be either at least 50 m apart or separated by fire proof walls.
   All inflammable material and especially all inflammable liquids and gases shall be stored at a sufficiently large distance from the property under construction or erection and any hot work.
7. A Site Safety Coordinator is appointed.
   A reliable fire alarm system is installed and whenever possible a direct communication link maintained with the nearest fire brigade.

   A Fire Protection Plan and a Site Fire Action Plan are implemented and updated regularly.
   The contractor's personnel are trained in fire-fighting and fire-fighting drills carried out weekly.
   The nearest fire brigade is familiarized with the site and immediate access maintained for it at all times.
8. The site is fenced off and access controlled.

MR 113 Inland Transit

It is agreed and understood that, otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon and subject to the insured having paid the agreed extra premium, Section 1 of this insurance shall be extended to cover loss of or damage to the property insured whilst in transit to the contract site other than on waterways or by air within the territorial limits of **Sri Lanka** provided that the maximum amount payable under this Endorsement does not exceed .... per conveyance.
(Rs. 1Mn per transit and in aggregate for the period)

MR 119 **Existing Property or property belonging to or held in care custody or control by the insured**

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon and subject to the insured having paid the agreed extra premium, section 1 of this insurance shall be extended to cover loss of or damage to the existing property or property belonging to or held in care, custody or control by the Insured caused by or arising out of the construction or erection of the items insured under section 1.

Insured property : Existing Buildings

Sum Insured : Rs. 7,780,000/-

The Insurers will only indemnity the Insured for loss of or damage to the insured property provided that prior to the commencement of construction its condition is sound and the necessary safety measures have been taken.

In respect of loss or damage caused by vibration or by the removal or weakening of support insurers will only indemnity the Insured for loss or damage as a result of a total or partial collapse of the insured property, and not for superficial damage which neither impairs the stability of the insured property nor endangers its users.

The insurers will not indemnity the insured for

- loss or damage which is foreseeable having regard to the nature of the construction work or the manner of its execution,

- the costs of loss prevention or minimization measures which become necessary during the period of insurance.

MR 120 Vibration, Removal or weakening of Support

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon and subject to the insured having paid the agreed extra premium section II of this insurance shall be extended to cover liability consequent upon loss or damage caused by vibration or by the removal or weakening of support.

Provided always that

- the insurers will indemnify the Insured in respect of liability for loss or damage to any property or land or building only if such loss or damage results in the total or partial collapse;
- the insurers will indemnify the Insured in respect of liability for loss or damage to any property or land or building only if prior to the commencement of construction its condition is sound and the necessary loss prevention measures have been taken.
- the Insured if required shall before commencement of construction and at his own expense prepare a report on the condition of any endangered property or land or building.

The Insurers will not indemnify the Insured in respect of liability for

- loss or damage which is foreseeable having regard to the nature of the

- **MARINE LIABILITY EXCLUSION** - It is understood and agreed that the Insurers shall not indemnify the Insured in respect of any Marine liability arising out of the use or ownership of waterborne vessel or craft

- **SUBSIDENCE AND SETTLEMENT EXCLUSION CLAUSE** - It is agreed and understood that in the event of physical loss or damage to any of the property described in the schedule due to subsidence or settlement of landfill or soil exchange areas, Insurers shall indemnify the Insured only if:

  - settlement or subsidence is the direct result of an insured hazard other than defective workmanship, materials or fault, defect, error or omission in design plan or specification.

  - occurs within a period of 24 hours and

  - exceeds the maximum settlement by 100%

- **PIERS QUAY WALL PRECAUTION CLAUSE** - It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, this insurance shall not indemnify the Insured for loss or damage to the Piers and Quay Walls by storm or tidal action until full completion of the Breakwater.

- **DAMAGE TO SUBMARINE CABLE EXCLUSION** – it is agreed and understood that any damages or losses arising to the Submarine cables are excluded

72 Hours Clause

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon, that any loss of or damage to the insured property arising during any one period of 72 consecutive hours, caused by storm, tempest, flood or earthquake, shall be deeded as a single event and therefore to constitute one occurrence with regard to the Excesses provided for herein. For the purpose of the foregoing, the commencement of any such 72 hour period shall be decided at the discretion of the Insured it being understood and agreed, however, that there shall be no overlapping in any two or more such 72 hours periods in the event of damage occurring over a more extended period of time.

LABORATORY TEST RESULTS

ELS CONSTRUCTION (PVT) LTD.

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Hot Line : (+94)-ll- 4309494 Fax : (+94) 11 2509806 E-mail : els@elslanka.com
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Factory II : Morahena Estate, Bemmulla, Gampaha.
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Tel : (+94) 33-2288900
E-mail : precast@elslanka.com

08th August 2017
Our Ref: ELS/CON/P/679-42

Mr.R.M.S.Bandara,
Director - Landslide Research & Risk Management Division,
National Building Research Organization,
99/1, Jawatta Road,Colombo 5.

Dear Sir,

REF.: THE PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS-LOT 1 - BADULLA
Subject: Test Results –Concrete

This letter has reference to the above subject and we are submitting herewith the test results of concrete, available to date for your kind reference.

Sample Description	Date of Sampling	Test Results	
		7 days	28 days
Concrete Cubes	20.01.2017 Type A Base (00-11)m Type A Wall (11-22)m	Submitted	Submitted
	19.01.2017 Type A Base (11-22)m	Submitted	Submitted
	09.01.2017 Type A Base (22-44)m	Submitted	Submitted
	24.10.2016 Type B Base (20-40)m	Submitted	Submitted
	28.10.2016 Type B Base (40-60)m	Submitted	Submitted
	10.11.2016 Type B Base (60-80)m	Submitted	Submitted
	28.01.2017 Type B Base (90.3-101.3)m	Submitted	Submitted
	14.09.2016 Type C Base (20-40)m	Submitted	Submitted
	21.09.2016 Type C Wall (20-40)m	Submitted	Submitted
	29.06.2016 Type D Base, (00-10)m	Submitted	Submitted
	01.07.2016 Type D Base, (10-20)m	Submitted	Submitted
	04.07.2016 Type D Base, (40-70)m	Submitted	Submitted
	05.11.2016 Type D Base, (73-100)m	Submitted	Submitted
	06.07.2016 Type D Base, (100-120)m	Submitted	Submitted
	09.07.2016 Type D Base, (140-160)m	Submitted	Submitted
	14.07.2016 Type D Base, (160-180)m	Submitted	Submitted
	13.08.2016 Type D Base, (180-200)m	Submitted	Submitted
	15.03.2017 Type D Base, (200-211)m	Attached	Attached
	22.08.2016 Type E Base, (0-20)m	Submitted	Submitted
	26.08.2016 Type E Base, (20-40)m	Submitted	Submitted
	31.08.2016 Type E(1) Base, (40-60)m	Submitted	Submitted
	31.08.2016 Type E(2) Base, (0-20)m	Submitted	Submitted
	05.09.2016 Type E(2) Base, (20-31)m	Submitted	Submitted
	02.09.2016 Type E(2) Wall, (40-54)m Type E(2) Base, (60-70)m	Submitted	Submitted
	08.09.2016 Type E(2) Wall, (0-20)m, Type E(2) Base (31-40)m	Submitted	Submitted

Sample Description	Date of Sampling	Test Results	
		7 days	28 days.
Concrete Cubes	12.09.2016 Type E(2) Wall (20-40)m	Submitted	Submitted
	23.09.2016 Type E(2) Wall (40-60)m	Submitted	Submitted
	21.09.2016 Type E(2) Base (40-60)m	Submitted	Submitted
	24.09.2016 Type E(2) Base (60-80)m	Submitted	Submitted
	19.02.2017 Type E(3) Base (00-12)m	Attached	Attached
	25.10.2016 Type E(3) Base (12-22)m	Submitted	Submitted
	20.10.2016 Type E(3) Base (62-82)m	Submitted	Submitted
	22.10.2016 Type E(3) Base (82-91)m	Submitted	Submitted
	21.02.2017 Type E(3) Wall (00-12)m	Attached	Attached
	26.10.2016 Type B Wall (20-30)m Type E(3) Wall (12-22)m	Submitted	Submitted
	25.10.2016 Type B Wall (30-40)m	Submitted	Submitted
	26.01.2017 Type A Wall (00-11)m	Submitted	Submitted
	11.01.2017 Type A Wall (22-32)m	Submitted	Submitted
	10.01.2017 Type A Wall (32-44)m	Submitted	Submitted
	31.10.2016 Type B Wall (40-50)m	Submitted	Submitted
	02.11.2016 Type B Wall (50-60)m	Submitted	Submitted
	21.11.2016 Type B Wall (60-70)m	Submitted	Submitted
	18.11.2016 Type B Wall (70-80)m	Submitted	Submitted
	21.10.2016 Type E(3) Wall (62-82)m	Submitted	Submitted
	23.10.2016 Type E(3) Wall (82-91)m	Submitted	Submitted
	03.07.2016 Type D Wall, (00-12)m	Submitted	Submitted
	06.07.2016 Type D Wall, (12-20)m	Submitted	Submitted
	09.11.2016 Type D Wall, (20-40)m	Submitted	Submitted
	10.08.2016 Type D Wall, (40-46)m	Submitted	Submitted
	09.08.2016 Type D Wall, (46-58.5)m	Submitted	Submitted
	08.08.2016 Type D Wall, (58.5-73)m	Submitted	Submitted
	07.11.2016 Type D Wall, (80-100)m	Submitted	Submitted
	08.11.2016 Type D Base (20-40)m, Type D Wall (73-80)m	Submitted	Submitted
	08.07.2016 Type D Base (120-140)m, Type D Wall (101-113)m	Submitted	Submitted
	10.07.2016 Type D Wall (113-120)m	Submitted	Submitted
	12.07.2016 Type D Wall (120-131)m	Submitted	Submitted
	11.07.2016 Type D Wall (131-140)m	Submitted	Submitted
	22.07.2016 Type D Wall (140-151)m	Submitted	Submitted
	29.07.2016 Type D Wall (151-161.5)m	Submitted	Submitted
	01.08.2016 Type D Wall (161.5-173.5)m	Submitted	Submitted
	02.08.2016 Type D Wall (173.5-178.5)m, Type D Wall (100-101)m	Submitted	Submitted
	19.08.2016 Type D Wall (178.5-188.5)m	Submitted	Submitted
	20.08.2016 Type D Wall (180.5-200)m	Submitted	Submitted
	17.03.2017 Type D Wall (200-211)m	Attached	Attached
	25.08.2016 Type E Wall (0-3)m	Submitted	Submitted
	24.08.2016 Type E Wall (3-20)m	Submitted	Submitted
	28.08.2016 Type E Wall (20-34)m	Submitted	Submitted
	29.08.2016 Type E Wall (34-40)m	Submitted	Submitted
	05.09.2016 Type E(1) Wall (54-70)m	Submitted	Submitted
	29.01.2017 Type B Catch pit base (88m)	Submitted	Submitted
	30.01.2017 Type B Catch pit wall (88m) Type B Wall (90.3-101.3)m	Submitted	Submitted

Sample Description	Date of Sampling	Test Results	
		7 days	28 days
	23.11.2016 Type D Catch pit base (76m), Type D Catch pit base (96m)	Submitted	Submitted
	24.11.2016 Type D Catch pit manhole (76m), Type D Catch pit manhole (96m)	Submitted	Submitted
Concrete cubes	04.01.2017 Type A Drain End Culvert Base	Submitted	Submitted
	07.01.2017 Type A Drain End Culvert Wall 1st Step	Submitted	Submitted
	13.01.2017 Type A Drain End Culvert Wall 2nd Step	Submitted	Submitted
	28.01.2017 Drilling point No.01 Catch pit Base	Submitted	Submitted
	29.01.2017 Drilling point No.01 Catch pit Wall	Submitted	Submitted
	21.01.2017 Drilling point No.02 Catch pit Base	Submitted	Submitted
	25.01.2017 Drilling point No.02 Catch pit Wall	Submitted	Submitted
	15.01.2017 Drilling point No.03 Catch pit Base	Submitted	Submitted
	16.01.2017 Drilling point No.03 Catch pit Wall	Submitted	Submitted
	16.12.2016 Type 01 Drain Wall Ch.(30-24)m	Submitted	Submitted
	26.01.2017 Type 02 Drain Base Ch.(78-84)m	Submitted	Submitted
	31.01.2017 Type 02 Drain Wall Ch.(78-84)m	Submitted	Submitted
	18.12.2016 Type 02 Drain Wall Ch.(00-24)m	Submitted	Submitted
	19.12.2016 Type 02 Drain Wall Ch.(00-24)m	Submitted	Submitted
	22.12.2016 Type 03 Drain Base Ch.(60-78)m	Submitted	Submitted
	23.12.2016 Type 03 Drain Wall Ch.(54-66)m	Submitted	Submitted
	24.12.2016 Type 03 Drain Wall Ch.(66-78)m	Submitted	Submitted

Thanking You,
Yours Faithfully,

G Dilupa P De Zoysa
Geotechnical Engineer
ELS Construction (Pvt) Ltd.

DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 - TL-049-01

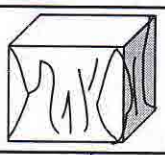
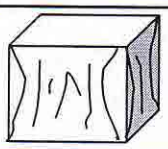
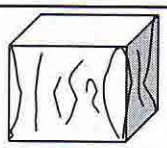
Project details:

Client:	Japan International Cooperation Agency (JICA)
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)
Contractor:	ELS Construction (Pvt) Ltd

Sample description:

Samples Received Date:	24.03.2017				**Job Ref. No.**	ML/CON/CC/503
Samples received Condition:	Dry				**Document Ref. No.**	503/25G/9D
No of Samples received:	12	**Samples Tested:**	7/12 - 9/12		**Date of Testing:**	24.03.2017
Casting date:	15.03.2017				**Date of Report:**	25.04.2017
Concrete Grade:	25 N/mm^2					
Sample tested Condition:	Specimen wet with surface moisture wiped out					
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C					
Location:	Type -D Base (200m-211m)					

Test Data:

Cube Identification		ELS/UCP/C/09301	ELS/UCP/C/09302	ELS/UCP/C/09303
Date of Cast		15.03.2017	15.03.2017	15.03.2017
Date of Test		24.03.2017	24.03.2017	24.03.2017
Age at Test	Days	9 Days	9 Days	9 Days
Sectional Area	cm^2	228	228	226
Specimen Width (Average)	cm	15.07	15.10	15.01
Specimen Length (Average)	cm	15.15	15.12	15.07
Specimen Height (Average)	cm	15.07	15.03	15.06
Volume of Specimen	cm^3	3438	3432	3407
Mass of Specimen	g	8228	8156	8151
Density at SSD Condition	g/cm^3	2.393	2.376	2.393
Failure Load	kN	569.7	478.8	499.6
Compressive Strength	N / mm^2	25.0	21.0	22.1
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:

This report refers specifically to the sample analyzed

The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
B.L.Kumara	**K.M.B.Susil Kumara**	**J.M.S.T.W.Jayasinghe**
Senior Lab Technician	Assis.Technical Manager	Laboratory Engineer

ENGINEERING & LABORATORY SERVICES (PVT) LTD
62/3, Neelammahara Road, Katuwawala, Boralesgamuwa, Sri Lanka.
Telephone : 0094 011 4309494/ 2517037 / 2517365, Fax : 0094 01 2509806, E-Mail : els@elslanka.com.

DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 - TL-049-01

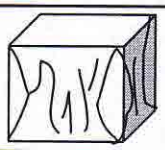
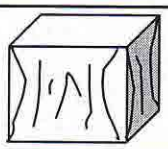
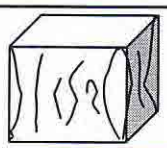
Project details:

Client:	Japan International Cooperation Agency (JICA)
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)
Contractor:	ELS Construction (Pvt) Ltd

Sample description:

Samples Received Date:	24.03.2017				**Job Ref. No.**	ML/CON/CC/503
Samples received Condition:	Dry				**Document Ref. No.**	503/25G/33D
No of Samples received:	12	**Samples Tested:**	10/12 - 12/12		**Date of Testing:**	17.04.2017
Casting date:	15.03.2017				**Date of Report:**	25.04.2017
Concrete Grade:	25 N/mm^2					
Sample tested Condition:	Specimen wet with surface moisture wiped out					
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C					
Location:	Type -D Base (200m-211m)					

Test Data:

Cube Identification		ELS/UCP/C/09304	ELS/UCP/C/09305	ELS/UCP/C/09306
Date of Cast		15.03.2017	15.03.2017	15.03.2017
Date of Test		17.04.2017	17.04.2017	17.04.2017
Age at Test	Days	33 Days	33 Days	33 Days
Sectional Area	cm^2	226	227	227
Specimen Width (Average)	cm	15.05	15.08	15.07
Specimen Length (Average)	cm	15.04	15.06	15.04
Specimen Height (Average)	cm	15.04	15.05	15.03
Volume of Specimen	cm^3	3405	3417	3407
Mass of Specimen	g	8090	8301	8156
Density at SSD Condition	g/cm^3	2.376	2.430	2.394
Failure Load	kN	840.0	929.9	926.6
Compressive Strength	N / mm^2	37.1	41.0	40.9
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:

This report refers specifically to the sample analyzed

The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
B.L.Kumara	**K.M.B.Susil Kumara**	**J.M.S.T.W.Jayasinghe**
Senior Lab Technician	Assis.Technical Manager	Laboratory Engineer

ENGINEERING & LABORATORY SERVICES (PVT) LTD
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Telephone : 0094 011 4309494/ 2517037 / 2517365, Fax : 0094 01 2509806, E-Mail : els@elslanka.com.

DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 - TL-049-01

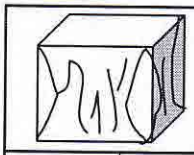
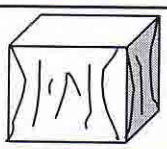
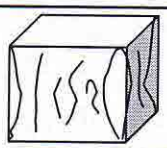
Project details:

Client:	Japan International Cooperation Agency (JICA)
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)
Contractor:	ELS Construction (Pvt) Ltd

Sample description:

Samples Received Date:	24.03.2017				**Job Ref. No.**	ML/CON/CC/503
Samples received Condition:	Dry				**Document Ref. No.**	503/25G/7D
No of Samples received:	12	**Samples Tested:**	1/12 - 3/12		**Date of Testing:**	24.03.2017
Casting date:	17.03.2017				**Date of Report:**	25.04.2017
Concrete Grade:	25 N/mm^2					
Sample tested Condition:	Specimen wet with surface moisture wiped out					
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C					
Location:	Type -D Wall (200m-211m)					

Test Data:

Cube Identification		ELS/UCP/C/094 01	ELS/UCP/C/094 02	ELS/UCP/C/094 03
Date of Cast		17.03.2017	17.03.2017	17.03.2017
Date of Test		24.03.2017	24.03.2017	24.03.2017
Age at Test	Days	7 Days	7 Days	7 Days
Sectional Area	cm^2	227	229	226
Specimen Width (Average)	cm	15.03	15.05	14.96
Specimen Length (Average)	cm	15.11	15.21	15.08
Specimen Height (Average)	cm	15.04	15.02	15.03
Volume of Specimen	cm^3	3414	3438	3390
Mass of Specimen	g	8099	8123	8137
Density at SSD Condition	g/cm^3	2.372	2.363	2.400
Failure Load	kN	602.7	613.4	526.5
Compressive Strength	N / mm^2	26.5	26.8	23.3
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:

This report refers specifically to the sample analyzed

The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
.....	.....	.....
B.L.Kumara	**K.M.B.Susil Kumara**	**J.M.S.T.W.Jayasinghe**
Senior Lab Technician	Assis.Technical Manager	Laboratory Engineer

ENGINEERING & LABORATORY SERVICES (PVT) LTD
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DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 - TL-049-01

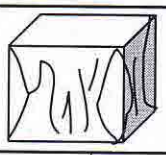
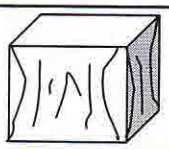
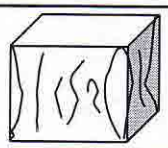
Project details:

Client:	Japan International Cooperation Agency (JICA)
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)
Contractor:	ELS Construction (Pvt) Ltd

Sample description:

Samples Received Date:	24.03.2017				**Job Ref. No.**	ML/CON/CC/503
Samples received Condition:	Dry				**Document Ref. No.**	503/25G/31D
No of Samples received:	12	**Samples Tested:**	4/12 - 6/12		**Date of Testing:**	17.04.2017
Casting date:	17.03.2017				**Date of Report:**	25.04.2017
Concrete Grade:	25 N/mm^2					
Sample tested Condition:	Specimen wet with surface moisture wiped out					
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C					
Location:	Type -D Wall (200m-211m)					

Test Data:

Cube Identification		ELS/UCP/C/09404	ELS/UCP/C/09405	ELS/UCP/C/09406
Date of Cast		17.03.2017	17.03.2017	17.03.2017
Date of Test		17.04.2017	17.04.2017	17.04.2017
Age at Test	Days	31 Days	31 Days	31 Days
Sectional Area	cm^2	227	226	227
Specimen Width (Average)	cm	15.05	15.06	15.05
Specimen Length (Average)	cm	15.06	15.04	15.06
Specimen Height (Average)	cm	15.05	15.03	15.05
Volume of Specimen	cm^3	3409	3404	3409
Mass of Specimen	g	8225	8167	8250
Density at SSD Condition	g/cm^3	2.413	2.399	2.420
Failure Load	kN	877.9	891.0	931.5
Compressive Strength	N / mm^2	38.7	39.3	41.1
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:

This report refers specifically to the sample analyzed

The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
B.L.Kumara	**K.M.B.Susil Kumara**	**J.M.S.T.W.Jayasinghe**
Senior Lab Technician	Assis.Technical Manager	Laboratory Engineer

ENGINEERING & LABORATORY SERVICES (PVT) LTD
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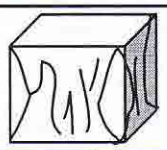
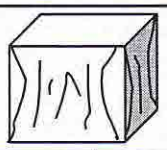
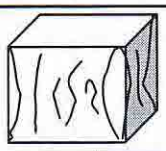
DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ISO/IEC 17025

Project details:					
Client:	Japan International Cooperation Agency (JICA)				
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)				
Contractor:	ELS Construction (Pvt) Ltd				
Sample description:					
Samples Received Date:	07.03.2017			**Job Ref. No.**	ML/CON/CC/497
Samples received Condition:	Dry			**Document Ref. No.**	497/25G/16D
No of Samples received:	12	**Samples Tested:**	1/12 - 3/12	**Date of Testing:**	07.03.2017
Casting date:	19.02.2017			**Date of Report:**	08.03.2017
Concrete Grade:	25 N/mm^2				
Sample tested Condition:	Specimen wet with surface moisture wiped out				
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C				
Location:	Type E Base (0m-12m) Total Length (141m)				

Test Data:

Cube Identification		**ELS/UCP/C/09101**	**ELS/UCP/C/09102**	**ELS/UCP/C/09103**
Date of Cast		19.02.2017	19.02.2017	19.02.2017
Date of Test		07.03.2017	07.03.2017	07.03.2017
Age at Test	Days	16 Days	16 Days	16 Days
Sectional Area	cm^2	227	228	228
Specimen Width (Average)	cm	15.02	15.08	15.05
Specimen Length (Average)	cm	15.08	15.12	15.14
Specimen Height (Average)	cm	15.04	15.08	15.14
Volume of Specimen	cm^3	3407	3439	3448
Mass of Specimen	g	8229	8246	8253
Density at SSD Condition	g/cm^3	2.415	2.397	2.393
Failure Load	kN	869.4	923.4	909.3
Compressive Strength	N / mm^2	38.4	40.5	39.9
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:
This report refers specifically to the sample analyzed
The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
M.A.K.Chathuranga	**J.M.S.T.W.Jayasinghe**	**R.M.Rathnasiri**
Technical Manager	Laboratory Engineer	General Manager

ENGINEERING & LABORATORY SERVICES (PVT) LTD
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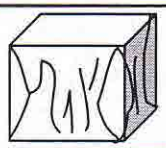
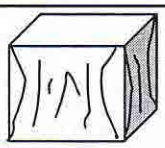
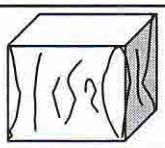
DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ISO/IEC 17025
TL-049-01

Project details:						
Client:	Japan International Cooperation Agency (JICA)					
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)					
Contractor:	ELS Construction (Pvt) Ltd					
Sample description:						
Samples Received Date:	07.03.2017				**Job Ref. No.**	ML/CON/CC/497
Samples received Condition:	Dry				**Document Ref. No.**	497/25G/28D
No of Samples received:	12	**Samples Tested:**	4/12 - 6/12		**Date of Testing:**	19.03.2017
Casting date:	19.02.2017				**Date of Report:**	22.03.2017
Concrete Grade:	25 N/mm^2					
Sample tested Condition:	Specimen wet with surface moisture wiped out					
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C					
Location:	Type E Base (0m-12m) Total Length (141m)					

Test Data:

Cube Identification		ELS/UCP/C/09104	ELS/UCP/C/09105	ELS/UCP/C/09106
Date of Cast		19.02.2017	19.02.2017	19.02.2017
Date of Test		19.03.2017	19.03.2017	19.03.2017
Age at Test	Days	28 Days	28 Days	28 Days
Sectional Area	cm^2	227	228	231
Specimen Width (Average)	cm	15.11	15.16	15.23
Specimen Length (Average)	cm	15.00	15.07	15.15
Specimen Height (Average)	cm	15.00	15.03	15.20
Volume of Specimen	cm^3	3399	3433	3507
Mass of Specimen	g	8171	8206	8421
Density at SSD Condition	g/cm^3	2.404	2.391	2.401
Failure Load	kN	912.4	759.0	853.9
Compressive Strength	N / mm^2	40.2	33.2	37.0
Failure pattern				
	Satisfactory	√	√	√
	Unsatisfactory	-	-	-

Remarks:
This report refers specifically to the sample analyzed
The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
M.A.K.Chathuranga	**J.M.S.T.W.Jayasinghe**	**R.M.Rathnasiri**
Technical Manager	Laboratory Engineer	General Manager

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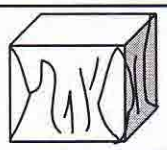
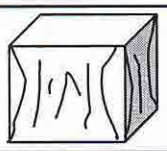
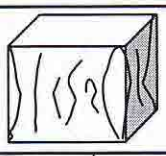
DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 EC-049-01

Project details:					
Client:	Japan International Cooperation Agency (JICA)				
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)				
Contractor:	ELS Construction (Pvt) Ltd				
Sample description:					
Samples Received Date:	07.03.2017			**Job Ref. No.**	ML/CON/CC/497
Samples received Condition:	Dry			**Document Ref. No.**	497/25G/14D
No of Samples received:	12	**Samples Tested:**	7/12 - 9/12	**Date of Testing:**	07.03.2017
Casting date:	21.02.2017			**Date of Report:**	08.03.2017
Concrete Grade:	25 N/mm^2				
Sample tested Condition:	Specimen wet with surface moisture wiped out				
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C				
Location:	Type E Wall (0m-12m) Total Length (141m)				

Test Data:

Cube Identification		ELS/UCP/C/09201	ELS/UCP/C/09202	ELS/UCP/C/09203
Date of Cast		21.02.2017	21.02.2017	21.02.2017
Date of Test		07.03.2017	07.03.2017	07.03.2017
Age at Test	Days	14 Days	14 Days	14 Days
Sectional Area	cm^2	228	228	228
Specimen Width (Average)	cm	15.10	15.13	15.10
Specimen Length (Average)	cm	15.09	15.10	15.07
Specimen Height (Average)	cm	15.10	15.14	15.08
Volume of Specimen	cm^3	3439	3459	3433
Mass of Specimen	g	8185	8160	8264
Density at SSD Condition	g/cm^3	2.380	2.359	2.408
Failure Load	kN	722.2	748.7	679.5
Compressive Strength	N / mm^2	31.7	32.8	29.9
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:
This report refers specifically to the sample analyzed
The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
M.A.K.Chathuranga	**J.M.S.T.W.Jayasinghe**	**R.M.Rathnasiri**
Technical Manager	Laboratory Engineer	General Manager

ENGINEERING & LABORATORY SERVICES (PVT) LTD
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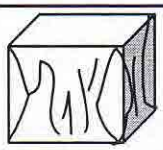
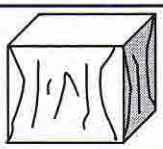
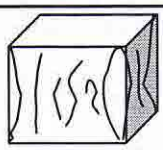
DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE SPECIMENS
TEST METHOD BS EN 12390-3:2009

Test Format No : ELS-ML-27 | **Revision No. 01**

ilac-MRA SLAB ACCREDITED ISO/IEC 17025 TL-049-01

Project details:					
Client:	Japan International Cooperation Agency (JICA)				
Project:	The Pilot Project for Landslide and rock fall Mitigation works (Lot-01)				
Contractor:	ELS Construction (Pvt) Ltd				
Sample description:					
Samples Received Date:	07.03.2017			**Job Ref. No.**	ML/CON/CC/497
Samples received Condition:	Dry			**Document Ref. No.**	497/25G/28D
No of Samples received:	12	**Samples Tested:**	10/12 - 12/12	**Date of Testing:**	21.03.2017
Casting date:	21.02.2017			**Date of Report:**	22.03.2017
Concrete Grade:	25 N/mm^2				
Sample tested Condition:	Specimen wet with surface moisture wiped out				
Curing Condition at Laboratory:	In water at a Temperature of 20 ± 2 °C				
Location:	Type E Wall (0m-12m) Total Length (141m)				

Test Data:

Cube Identification		ELS/UCP/C/09201	ELS/UCP/C/09202	ELS/UCP/C/09203
Date of Cast		21.02.2017	21.02.2017	21.02.2017
Date of Test		21.03.2017	21.03.2017	21.03.2017
Age at Test	Days	28 Days	28 Days	28 Days
Sectional Area	cm^2	227	227	228
Specimen Width (Average)	cm	14.99	15.11	15.04
Specimen Length (Average)	cm	15.17	15.04	15.17
Specimen Height (Average)	cm	15.10	15.05	15.01
Volume of Specimen	cm^3	3433	3420	3425
Mass of Specimen	g	8198	8242	8291
Density at SSD Condition	g/cm^3	2.388	2.410	2.421
Failure Load	kN	788.9	801.4	790.7
Compressive Strength	N / mm^2	34.7	35.3	34.7
Failure pattern				
Satisfactory		√	√	√
Unsatisfactory		-	-	-

Remarks:

This report refers specifically to the sample analyzed

The test was carried out in accordance with the BS EN 12390-3 : 2009 standard test method

Tested by	Checked by	Certified by
M.A.K.Chathuranga	**J.M.S.T.W.Jayasinghe**	**R.M.Rathnasiri**
Technical Manager	Laboratory Engineer	General Manager

ENGINEERING & LABORATORY SERVICES (PVT) LTD
62/3, Neelammahara Road, Katuwawala, Boralesgamuwa, Sri Lanka.
Telephone : 0094 011 4309494/ 2517037 / 2517365, Fax : 0094 01 2509806, E-Mail : els@elslanka.com.

SAMPLE INSPECTION SHEETS FOR DRILLING, DRAINS & CATCH PITS

PILOT PROJECT FOR LANDSLIDE AND ROCKFILL MITIGATION WORKS LOT 1

Client: JAPAN INTERNATIONAL CORPORATION AGENCY (JICA)

Contractor: ELS Construction (Pvt) Ltd.

Drilling Location: 4

Drill Hole No: 1

Drilling Starting Date: 30/04/2017

In Charge: L.J.M. Bandara

Drilling completed Date: 09/05/2017

Machine Operator: R.P. Kumar

Date	Depth m		Weather Condition	Remarks	Logged by (Contractor)	Checked by (Client)
	Soil	Rock				
30/04/2017	0.00-07.00				K.M. Cafwall	PSP
01/05/2017	07.00-19.00				K.M. Cafwall	PSP
02/05/2017	19.00-24.00	24.00-25.50			K.M. Cafwall	PSP
03/05/2017	25.50-33.00	33.00-33.50			K.M. Cafwall	PSP
04/05/2017	33.50-41.00				K.M. Cafwall	PSP
05/05/2017		41.00-43.00			K.M. Cafwall	PSP
06/05/2017	43.00-50.00				K.M. Cafwall	PSP
07/05/2017	50.00-54.00				K.M. Cafwall	PSP
08/05/2017		54.00-56.00			K.M. Cafwall	PSP
09/05/2017	56.00-60.00			Pipe installation	K.M. Cafwall	PSP

K.M. Cafwall

Prepared by

Contractor (ELS)

Checked by

Engineer (NBRO) MEDHUSO

PSP

Certified by

Engineer (JICA)

E1

Surface Drainage Ditch Thickness T1, T2 Type E(70.-) Date : Time :

	Inspection Point	Design thickness (mm)	Tolerance (mm)	Measured thickness T1(mm)	Measured height (mm)	Check (The Engineer)	Check (The Contractor)	Measured thickness T2(mm)	Measured height (mm)	Check (The Engineer)	Check (The Contractor)
1	0.00	150	-20	150	300			150	300		
2	10.00	"		155	300			165	300		
3	20.00	"		165	290			150	300		
4	30.00	"		145	300			155	300		
5	40.00	"		170	330			150	290		
6	50.00	"		145	325			150	300		
7	60.00	"		150	330			145	300		
8	70.00	"		145	310			145	300		
9											
10											

Water Collecting Pit

Mix propotion of concrete

Date:

Time:

	Inspection Point	Reference height (mm)	Tolerance (mm)	Measured weight of cement(mm)	Check (The Engineer)	Check (The Contractor)	Measured weight of sand (mm)	Check (The Engineer)	Check (The Contractor)	Measured weight of aggregate (mm)	Check (The Engineer)	Check (The Contractor)
1	A	1700	±30	1100						1700		
2	B											
3	C											
4	D											
5	E											
6	F											
7	G											
8	H											
9	I											
10	J											

Water Collecting Pit

Reference height

	Pit	Reference height (mm)	Tolerance (mm)	Measured height (mm)	Check (The Engineer)	Check (The Contractor)
1	A	1700	±30	1750		
2	B					
3	C					
4	D					
5	E					
6	F					
7	G					
8	H					
9	I					
10	J					

MEASUREMENT SHEET FOR TEMPORARY PLATFORM AND RESHAPING WORK AT LOCATION 1 AND 4

Measurement Sheet

Contract Title : Landslide Mitigation Works (Lot 1) Folio No :

Contractor : ELS Construction (Pvt.) Ltd.

Bill No. : Work Done from : 22/06/2017 to 28/07/2017

Expense Item	Construction Work	Nos.	Length(m)	Breadth	Depth	Qty	Total
HORIZONTAL DRAINAGE DRILLING							
Temporary platform							
	Temporary platform in concrete for placing and moving drilling machine on at six locations	6	5.00	4	0.2	24	24
Reshaping at location 1 (upside and downside the gabion structures)	Cutting, hauling and filling at location 1	0.5	12.00	6	(0+1)	36	
		0.5	8.00	4	(0+1)	16	52
Reshaping at new location 4 (upside and downside the gabion structures)	Cutting, hauling and filling at new location 4	0.5	12.00	5	(0+2)	60	
		1	12	4	1	48	108
Reshaping at new location 4 (upside and downside the gabion structures)	Cutting, hauling and filling at old location 4	0.5	15.00	6	(0+5)	225	
		0.5	12.00	4	(0+3)	72	297

K. M. Cafewell

NBRO

MEASUREMENT SHEET FOR STONE FILLING BEHIND AND BENEATH GABION WALL

Measurement Sheet

Contract Title : Landslide Mitigation Works (Lot 1) Folio No :

Contractor : ELS Construction (Pvt.) Ltd.

Bill No. : Work Done from : 22/06/2017 to 28/07/2017

Expense Item	Construction Work	Nos.	Length(m)	Breadth	Depth	Qty	Total
6"x9" stone filling behind and beneath gabion wall							
Location 1	6"x9" stone filling behind and beneath gabion	1	8.00	2	2	32	
		1	8.00	1.5	0.3	3.6	
Location 2	6"x9" stone filling behind and beneath gabion	1	5.00	2	2	20	
		1	5	1.5	0.3	2.25	
Location 3	6"x9" stone filling behind and beneath gabion wall	1	5.00	2	2	20	
		1	5	1.5	0.3	2.25	
Location 4	6"x9" stone filling behind and beneath gabion	1	7.00	2	2	28	
		1	7	1.5	0.3	3.15	
Location 5	behind and beneath gabion wall	1	7.00	2	2	28	
		1	7	1.5	0.3	3.15	
Location 5	behind and beneath gabion wall	1	8.00	2	2	32	
		1	8	1.5	0.3	3.6	178.0

NBRO

MONTHLY PROGRESS REPORT – JULY 2017

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Management for Quantity（July/2017)

26/7/2017

Company name:
ELS Construction (Pvt) Ltd.

Item	Expense Item		Construction work	Unit	Contract quantity (A)	Amount (Rps,)	Composition ratio (B)%	Quantity up to this time ©	Volume ratio (D=C/A) %	Total ratio of quantuty E=D×B/100） %	Remarks (instruction/inspection)
1	CONTRACTOR'S SITE ESTABLISHMENT	1.1	Establishment, maintenance, and removal of contractor's site facilities such as office, stores, services, security, etc…	LS	1	754,136.36	2.17	1.00	100.00	2.17	
		1.2	Mobilization and de-mobilization of plant, equipment, and machinery	LS	1	1,000,000.00	2.87	1.00	100.00	2.87	
2	HEALTH, SAFETY AND ENVIRONMENT	2.1	Health and safety measures during construction confirming to the latest industrial standards	LS	1	200,000.00	0.57	1.00	100.00	0.57	
		2.2	Environmental protection and precaution during construction (hording and dust screens shall be provided to control dust escaping to surrounding areas).	LS	1	500,000.00	1.44	1.00	100.00	1.44	
3	INSURANCE, BONDS AND SECURITIES	3.1	Insurance of works, contractor's equipment, third party, and workmen's compensation	LS	1	400,000.00	1.15	1.00	100.00	1.15	
		3.2	Performance security	LS	1	75,000.00	0.22	1.00	100.00	0.22	
		3.3	Advance payment security	LS	1	300,000.00	0.86	1.00	100.00	0.86	
4	PROJECT SIGN BOARDS	4.1	Provide and maintain project signboards	Item	1	50,000.00	0.14	1.00	100.00	0.14	
5	SITE INVESTIGATION / TESTING	5.1	Site investigation and Testing as directed by the Engineer (Not included in contractors quality control/assurance plane)	PS	1	100,000.00	0.29	1.00	100.00	0.29	
6	QUALITY STANDARD AND PROGRESS	6.1	Provision for monthly progress reports and photographs and etc	Month	16	160,000.00	0.46	16.00	100.00	0.46	
		6.2	Provide as built drawings, Quality assurance reports	LS	1	50,000.00	0.14	1.00	100.00	0.14	
7	HORIZONTAL DRAINAGE	7.1	Temporary working	m^3	24.00	600,000.00	1.72	24.00	100.00	1.72	
		7.2	Drilling for 100mm dia horizontal drains through any type of soil an intermittent rock and disposal of drilled material away from site as directed by Engineer	m	2,400.00	12,000,000.00	34.49	2,407.50	100.31	34.60	
		7.3	Ditto - do - but through fresh bedrock.	m	255.00	1,912,500.00	5.50	247.50	97.06	5.34	
		7.4	63mm dia long drains with perforated type 1000 PVC pipes and geotextile wrapping. Rate shall include for any other associated work as directed by the Engineer.	m	2,655.00	4,513,500.00	12.97	2,655.00	100.00	12.97	

`

Management for Quantity（July/2017)

26/7/2017

Company name:
ELS Construction (Pvt) Ltd.

Item	Expense Item		Construction work	Unit	Contract quantity (A)	Amount (Rps,)	Compositio n ratio (B)%	Quantity up to this time ©	Volume ratio (D=C/A) %	Total ratio of quantuty E=D× B/100）%	Remarks (instruction/inspec tion)
		7.5	Supplying and placing of 90mm dia Polyethylene pipes Type 1000. Rate shall include for connecting the pipes to the PVC pipes and any other associated work as directed by the Engineer.		127.00	254,000.00	0.73	111.00	87.40	0.64	
		7.6	Temporary road for construction	m	450	1,350,000.00	3.88	450.00	100.00	3.88	
8	GABION WORK	8.1	Supplying, assembling and placing of PVC coated Gabion wall boxes of size 1.0 x 1.0 x 1.0m, filling dry rubble 6" x 9" at toe region of the surface drain outlet including provision of excavation & trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications, drawings and instructed by the Engineer.	m^3	60	750,000.00	2.16	58.00	96.67	2.08	
		8.1.1	90mm dia type 1000 PVC pipes to encase 63mm dia PVC pipes (1m*8 holes*6 locations)	m	48	-	0.00	48.00	100.00	0.00	
		8.1.2	Supply & laying of Geotextile (10m2*6 locations)	m2	60	-	0.00	60.00	100.00	0.00	
9	SURFACE DRAINAGE		Construction of RCC drains								
		9.1	B300 H300	m	380.00	3,040,000.00	8.74	338.00	88.95	7.77	
		9.2	B450 H450	m	225.00	2,925,000.00	8.41	212.00	94.22	7.92	
		9.3	B600 H500	m	69	931,500.00	2.68	69.00	100.00	2.68	
		9.4	B600 H600	m	103	1,596,500.00	4.59	101.00	98.06	4.50	
		9.5	B600 H900	m	44	814,000.00	2.34	44.00	100.00	2.34	
10	WATER COLLECT ING PIT		Construction of Collecting Pits								
		10.1	0.6 x0.6 x0.5m	nos.	6	19,000.00	0.05	6.00	100.00	0.05	
		10.2									
		10.3	1.7 x 1.7 x 1.1m	nos.	1	112,000.00	0.32	1.00	100.00	0.32	
	Direct construction costs		sub total of Item7～			34,407,136.36	1.00			97.14	
	Common temporary costs		sub total of Item1～Item6			382,800.00					
	subtotal					34,789,936.36				33,795,386.36	
	Contingencies(10 %)					3,478,993.64					
	Total Bid Price					38,268,930.00					

PILOT PROJECT FOR LANDSLIDE AND ROCKFALL MITIGATION WORKS IN BADULLA, NUWARAELIYA & MATALE

LOT 02- Udamadura in Nuwara Eliya District

PROJECT COMPLETION REPORT

Employer:

Japan International Cooperation Agency (JICA) Sri Lanka Office

Engineer:

National Building Research Organization (NBRO)

Contractor:

GEO ENGINEERING CONSULTANTS (PVT) LTD

Geotechnical Investigation, Geological Surveys, Ground Improvement & Laboratory Testing

No.929/18, Kahandawala Road, Thalangama North, Malabe
Sri Lanka.
HOTLINE: 0113 093377
Tel: +94 11 2 077844 (Accounts Dept.)
+94 11 2 077900 (Eng. Dept.)
+94 11 2 077908 (Lab)
+94 71 2 843843 (Mobile)
Fax: +94 11 2 077845

E-mail: geoeng2009@gmail.com, geoeng2009@sltnet.lk

16th March 2017

CONTENT

Prepared by;

.....

Dilum Wanigasekara *B.Sc(Hons), M.Sc(Eg.Geo), MGSSL*

Project Manager.

1.0 INTRODUCTION

Japan International Cooperation Agency (JICA) extends its Pilot project for Landslide and Rock fall mitigation works for the Democratic Socialist Republic of Sri Lanka, on the basis of the Record of Discussion for "The Technical Cooperation for Landslide Mitigation Project" signed on the 07th of March 2014 agreed between the Democratioc Socialist Republic of Sri Lanka and JICA.

The Pilot project for Landslide and Rock fall Mitigation work at Lot-02 Udamadura in Nuwara Eliya was awarded to Geo Engineering Consultant Pvt Ltd on 21st January 2016 and the contract agreement was signed on 02nd day of February 2016.

The basic scope of work was Horizontal Drainage Drilling, Gabion Works,Surface drainage ditch works and small dam.

The time for completion of the work was within Nine (9) months from the commencement date that is 15th November 2016. But we were encountered more difficulties and constraints delaying completion of the project. Time extension request letters were sent to JICA through NBRO clarifying the causes for the delay and the approval was granted for further four (04) months period in two stages. First extension was 15th November 2016 to 15th February 2017 and the second extension was 15th February 2017 to 15th March 2017.

Contract Price was Twelve Million Nine Hundred Thousand Only (Rs.12,900,000.00).

2.0 MOBILIZATION

Mobilization to the site was done on 08th March 2017. Initially establishment of Site office and fixing of safety sign boards were done. Then the drilling machine, Compressor, generator and all the other machines and equipments with labors were mobilized.

Horizontal drainage drilling work was started on 07th May 2016 after the approval of construction plan with several revisions.

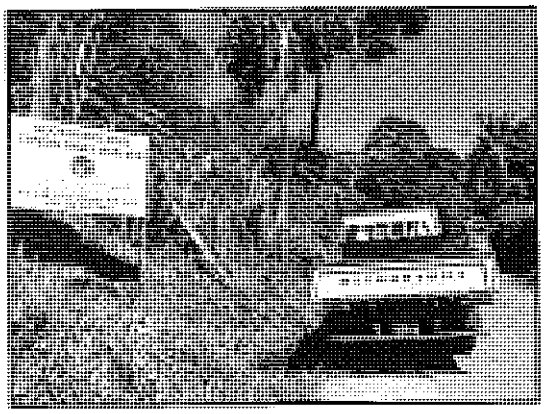


Fig 01: Mobilization to the site

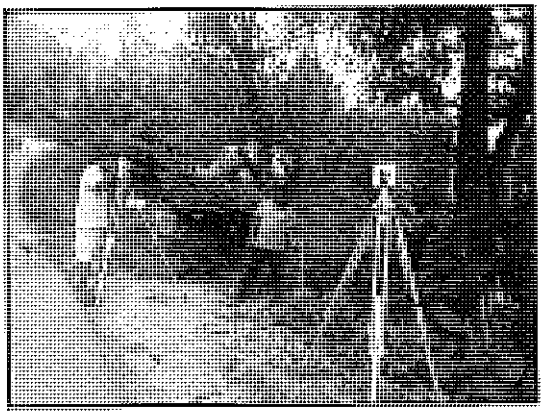


Fig 02: Pre surveying work

Fig 03: Fixing of safety sign boards

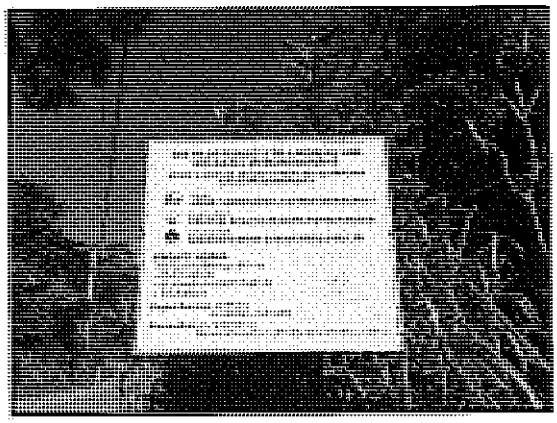


Fig 04: Main project name board

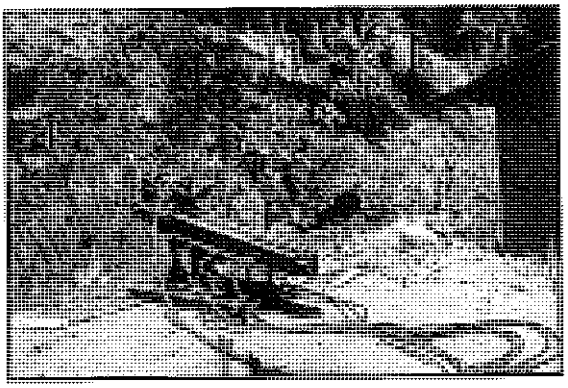


Fig 05: Mobilization of percussion drilling machine

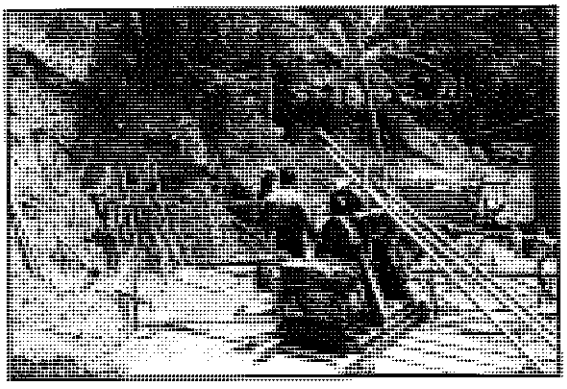
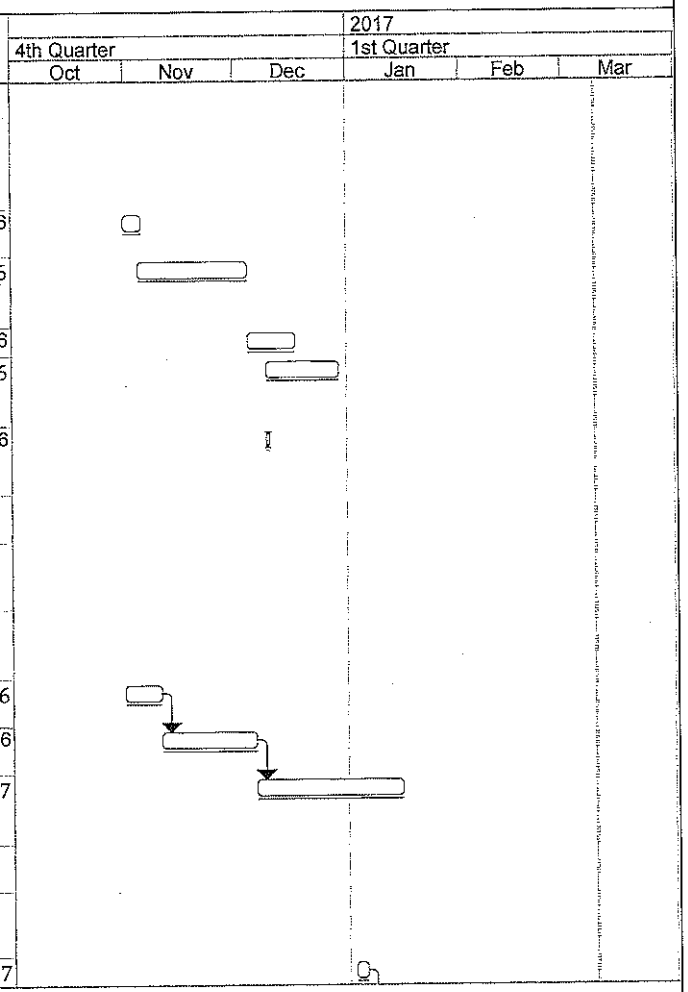


Fig 06: Mobilization of new rotary drilling machine

Master working program was revised according to the Time extension up to 15th March 2017 and it is shown below.

WORK EXTENSION PROGRAM
PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS AT NUWARA ELIYA

ID	Task Name	Duration	Start	Finish
1	**Drainage Ditch D-H :**			
2	**80.0m Length completed with Defects . Minimum 04 days will require to complete 10m length of drainage ditch**			
3	Demolishing of defects part from CH 20 +00-CH 40+00 with JICA and NBRO Supervision	5 days	Tue 11/1/16	Sat 11/5/16
4	Rectification & Reconstruction of Defects of CH 20+00-CH 40+00 m	30 days	Sat 11/5/16	Sun 12/4/16
5	Construction of CH 40+000 to CH 80+000	13 days	Mon 12/5/16	Sat 12/17/16
6	Construction of CH 80 - CH 131 up to water correcting pit type-02	20 days	Sat 12/10/16	Thu 12/29/16
7	Submission of Second Quarterly Progress Report with the Invoice	1 day	Sat 12/10/16	Sat 12/10/16
8	***Resources: Mason-01, Skilled Labours-05, Unskilled Labours-06***			
9	**Drainage Ditch C-D**			
10	**Base concrete completed with minor defects from CH 90-CH 216**			
11	Construction of base concrete from CH 0-90 m	10 days	Tue 11/1/16	Thu 11/10/16
12	Construction of Side walls and completion from CH 0+000-CH90+000	26 days	Fri 11/11/16	Tue 12/6/16
13	Rectification of defects and construction of side walls from CH 90-216 m.	40 days	Wed 12/7/16	Sun 1/15/17
14	***Resources: Mason-02, Skilled Labours-05, Unskilled Labours-06***			
15	**Drainage Ditch G-D**			
16	Rock Demolishion	3 days	Tue 1/3/17	Thu 1/5/17



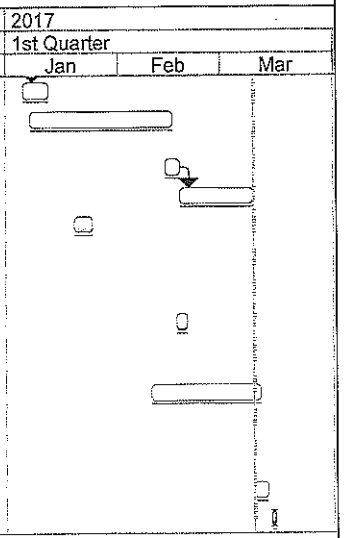
Land Slide Mitigation Project
Nuwaraeliya

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External MileTask
Split

Geo Engineering Consultants (Pvt.) Ltd., No. 929/18, Kahandawala Road, Thalangama North, Malabe. Hotline: 011 3093377, 011 2077900, Fax: 011 2077845

WORK EXTENSION PROGRAM
PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS AT NUWARA ELIYA

ID	Task Name	Duration	Start	Finish
17	Soil excavation along the ditch of 100m length	7 days	Fri 1/6/17	Thu 1/12/17
18	Construction of drainage ditch of 100m length	39 days	Sun 1/8/17	Wed 2/15/17
19	soil excavation along the ditch of 35m length	4 days	Tue 2/14/17	Fri 2/17/17
20	Construction of drainage ditch 35m length	20 days	Sat 2/18/17	Thu 3/9/17
21	**Construction of Gabion walls in the drilling point and upper small dam**	5 days	Fri 1/20/17	Tue 1/24/17
22	Reconstruction of Gabion wall and Polyethilen connecting pipe according to the engineer's comments	3 days	Fri 2/17/17	Sun 2/19/17
23	**Construction of lower Small dam with new drainage ditch**	30 days	Fri 2/10/17	Sat 3/11/17
24	Construction of Water collecting pits and upper small dam	4 days	Fri 3/10/17	Mon 3/13/17
25	Submission of Project Completion Report	1 day	Wed 3/15/17	Wed 3/15/17



Land Slide Mitigation Project
Nuwaraeliya

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External MileTask
Split

Geo Engineering Consultants (Pvt.) Ltd., No. 929/18, Kahandawala Road, Thalangama North, Malabe. Hotline: 011 3093377, 011 2077900, Fax: 011 2077845

According to the contract and the design drawings the quantities of the main work items are as follows.

01) Horizontal Drainage drilling : 10 Holes up to 50.0m length

02) Surface Drainage ditch type-A : Length 106.0 m

03) Surface Drainage ditch type-B : Length 230.0 m

04) Surface Drainage ditch type-C : Length 149.0 m

05) Water Collecting Pits : 03 Nos.

06) Small Dam (Gabion) : 01

07) Small Dam (Concrete) : 01

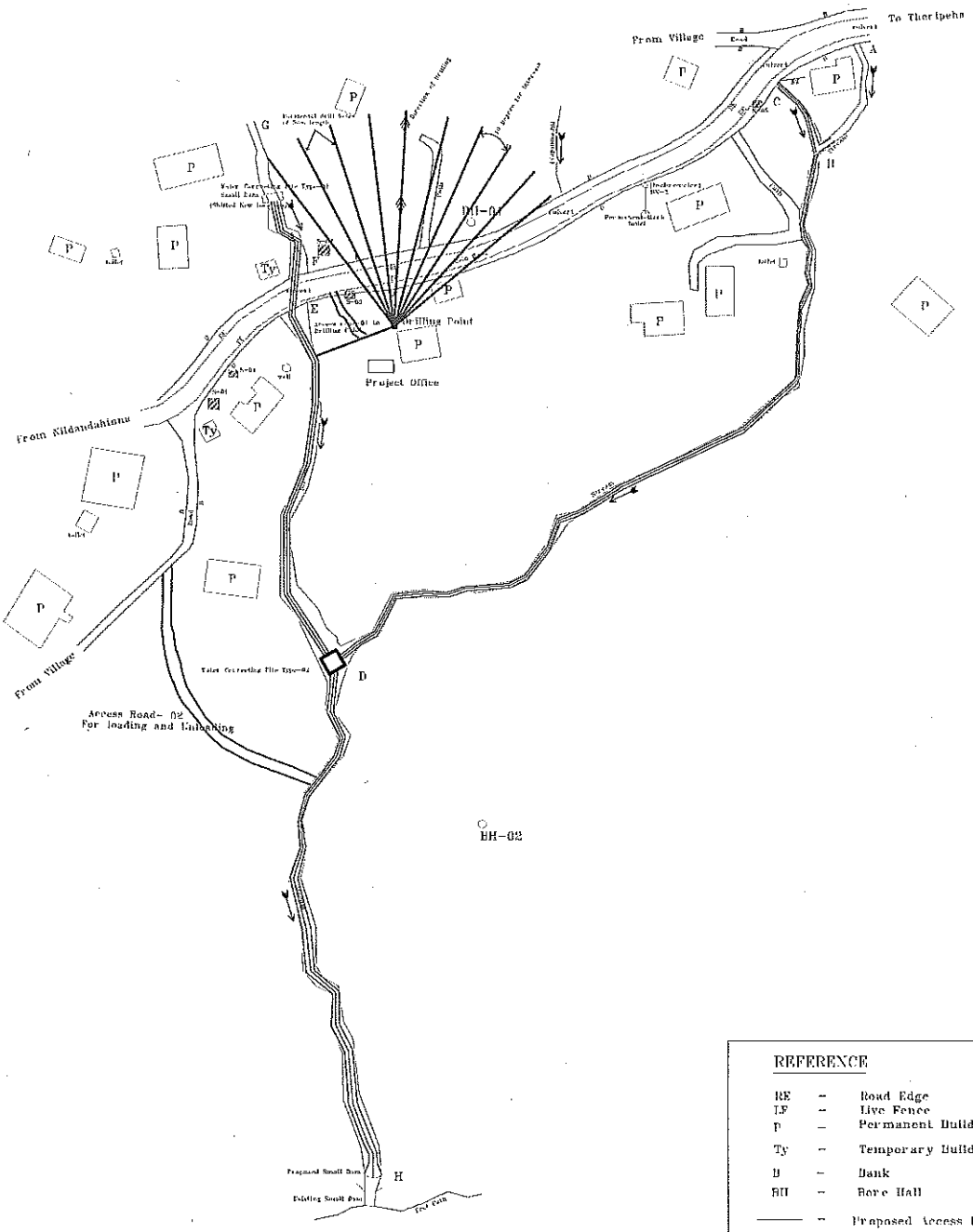
08) Gabion wall for cut slope : 01

Survey plan of the project area having the proposed structure locations are shown below.

G.K.N.Thilakasiri
Licensed Surveyor & Leveller
No.172/1
Bandarawatta
Mandawala

Detail Survey Plan-Landslide Mitigation Project at Nuwara Eliya

Topographic Construction Plan



REFERENCE

RE	–	Road Edge
LF	–	Live Fence
P	–	Permanent Building
Ty	–	Temporary Building
D	–	Dank
BH	–	Bore Hall
———	–	Proposed Access Roads
▨	–	Sign Board Locations
▭	–	Project Office
———	–	Existing Drainage Path
═══	–	Proposed ditch line

Surveyed on 20.03.2016

G.K.N.Thilakasiri
Licensed Surveyor & Leveller,

3.0 HEALTH AND SAFETY MEASURES DURING CONSTRUCTION

Related BOQ Item No. : 2.1

i. Safety sign boards were fixed in close to the main road and within the site so that clearly visible to all workers and third parties.

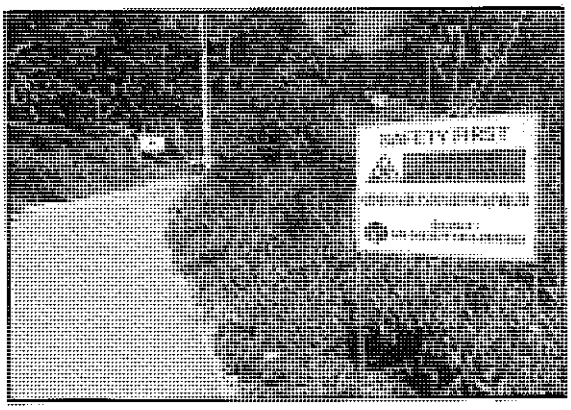


Fig 07: Safety Sign Board on the road

Fig 08: Safety Sign Board on the road

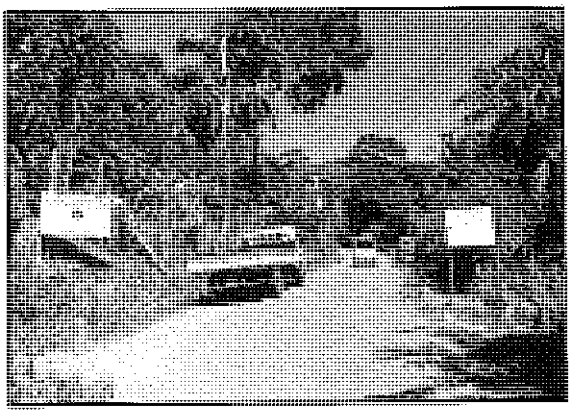


Fig 10: Safety Sign Board outside the site

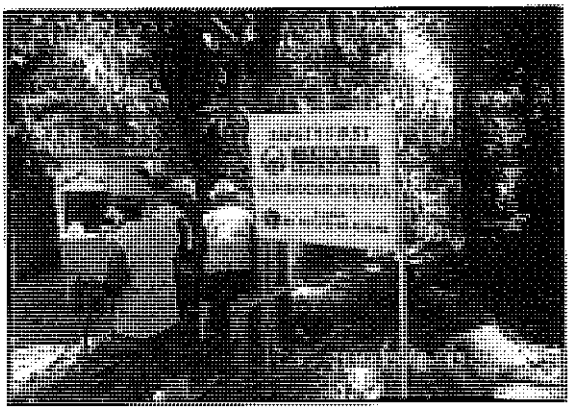


Fig 11: Safety Sign Board within the site

ii. Workers wear helmet, shoes, clothes with long sleeves, trousers and reflective jacket for the safety.

Fig 12: Workers with safety wears

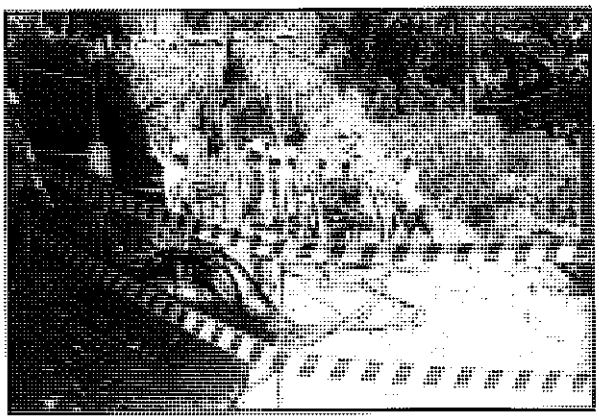
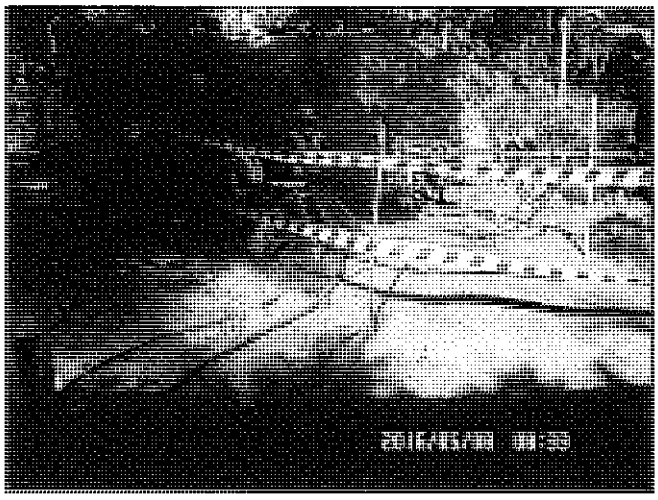


Fig 13: Safety of the workers

iii. Temporary fence were properly set up around site to keep third parties off.



iv. Safety instructions are carried out every weekly for all the workers.

v. Safety Manual is available in the site and the manual was checked by JICA on 15/03/2017 during the site inspection.

vi. Site visit was done by JICA on 08th & 09th August 2016 for the safety measures and the instructions were given to all workers regarding the maintaining of project safety.

4.0 ENVIRONMENTAL PROTECTION AND PRECAUTIONS

Related BOQ item: 2.2

We have taken all possible precautions for the environmental protection. Construction works were carried out to minimize the environmental damages.

Environmental Officer from NBRO visited the site from time to time and the necessary instructions were given on site. Copy of his Log notes are attached in the annexure- 01.

According to the environmental officer's instructions, project office was maintained well clean and a First Aid box was installed.

Soil erosion was noticed on one embankment of the drain during heavy rainy season. Rubble filing was done on that embankment in order to stabilize the filling.

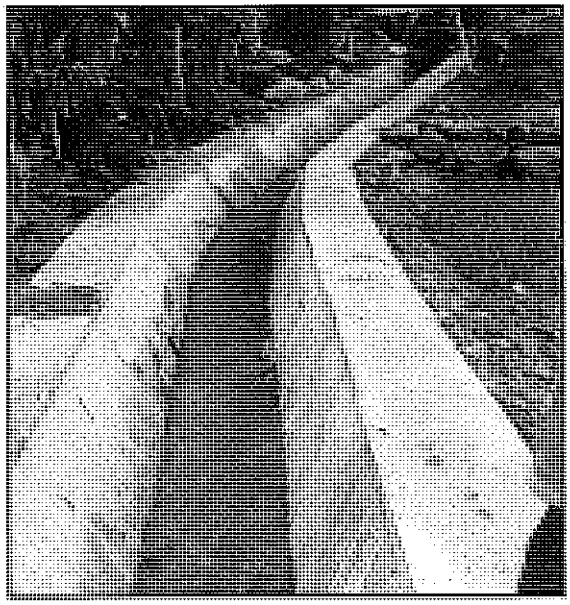


Fig 14: Rubble pitching on embankments to minimize soil erosion

Dust screens/Mud covers were used to protect the environment during horizontal drilling works.

Fig 15: Using of mud covers close to the drilling point

Drainage Ditch excavations were done in order to minimize tree cutting. Therefore large trees were remained on the path and the ditch line was diverted to bypass them.

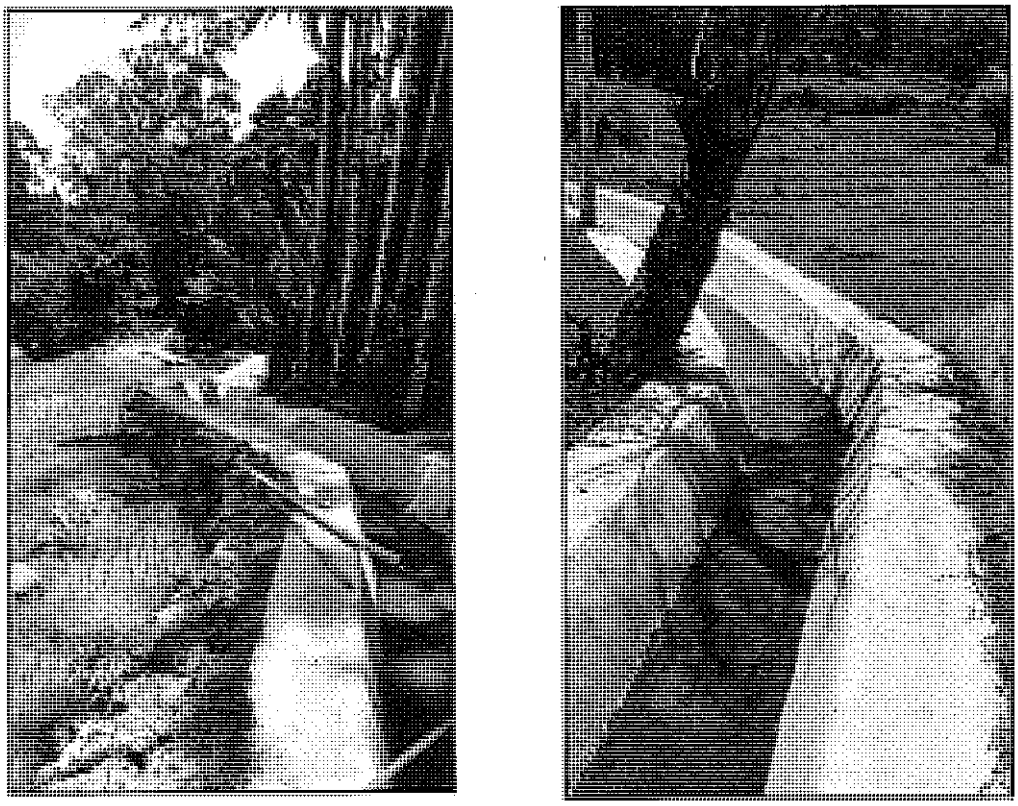


Fig 16: Constructions were done to save the existing trees

5.0 INSURANCE, BOND AND SECURITIES

Related BOQ Item: 3.1

All the documents, Contractors all risks policy and copy of the Insurance policy is attached in the Annexure-02. Original documents have been submitted to JICA.

6.0 PROJECT SIGN BOARDS

Related BOQ Item: 4.1

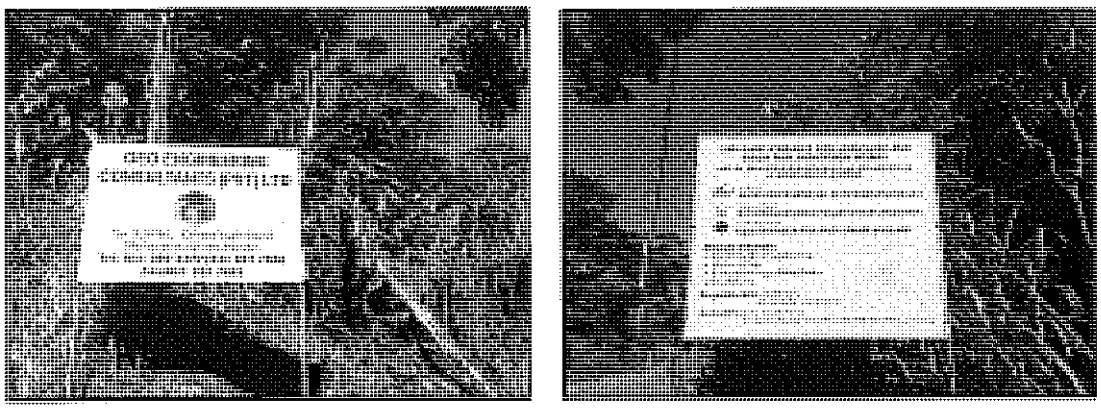


Fig 17: Project sign boards

7.0 SITE INVESTIGATION/ TESTING

Related BOQ item : 5.1

Site investigation and Testing as directed by the Engineer.

Compressive Strength of the concrete was tested for all the concrete works. 06 samples were collected from each batch for 07 days and 28 days test as 03 samples per each.

Designed concrete grade was Grade 15 with mix proportion cement:sand:aggregate 1:3:6

As this grade was not suitable for the construction works, a new mix proportion cement:sand:aggregate 1:3:4 was used by our own cost with the approval of Engineer.

Test results are attached in the annexure-03.

8.0 PROVIDE AS BUILT DRAWINGS

Related BOQ item: 6.2

As built drawings were prepared after the post surveying of the area and the structures. The structural drawings were certified by the engineer.

As built drawings with the signatures are attached in the annexure-04.

9.0 WORKING PLATFORM FOR HORIZONTAL DRILLING WORKS

Related BOQ items : 7.1 and 7.1.1

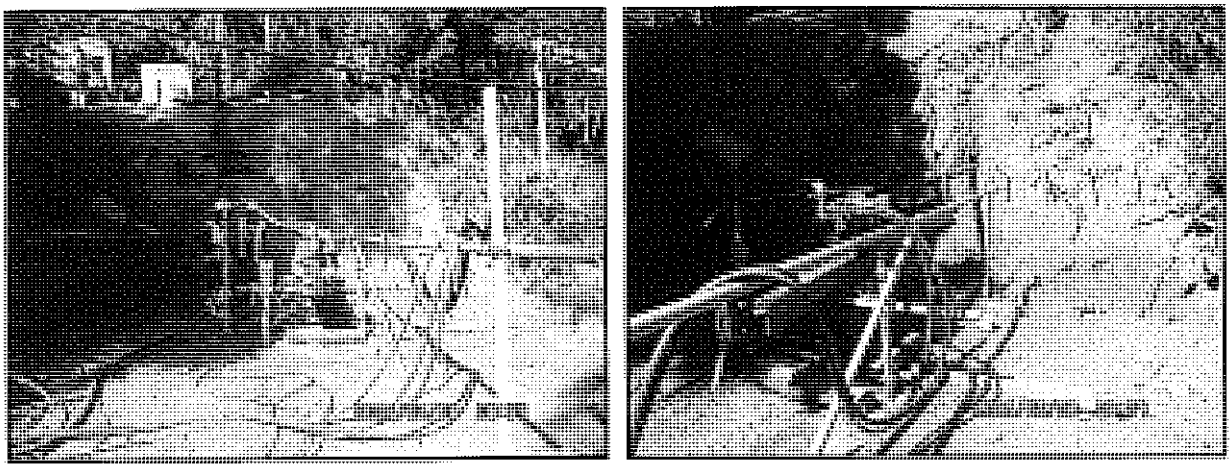


Fig 18: Temporary working platform by GI Pipes for Percussion Drilling machine

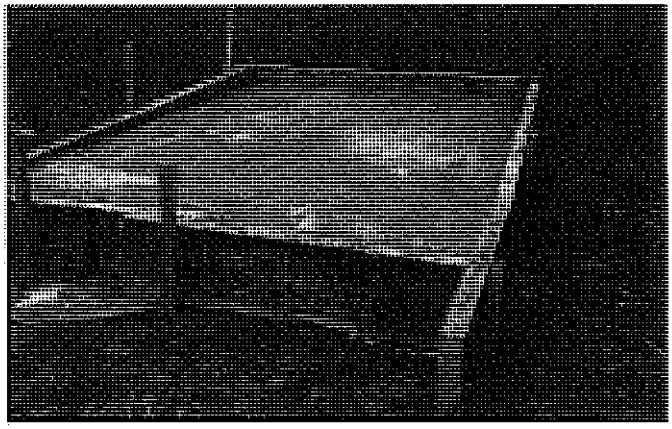


Fig 19: Construction of Solid concrete platform for rotary drilling machine

Temporary working platform for the initial Percussion drilling machine was erected by GI pipes. Pipes were properly tied and fixed with clamps.

Solid concrete platform for rotary drilling machine was constructed by using Grade 15 concrete in the bottom of drilling point.

10.0 HORIZONTAL DRAINAGE DRILLING WORK

Scope of work was Drilling and Installation of PVC for 10 Nos. of 100mm dia. Horizontal drains up to 50m length.

Drilling was started on 07th May 2015 at H-05 hole and Completed on 12th October 2016. All the drilled holes are having the designed 50.0m length.

Joint site inspection was done by JICA, NBRO and the contractor on 14th October 2016 and drilling length was confirmed to meet the design requirements of 50.0m.

Fig 20: Proposed Drilling Point

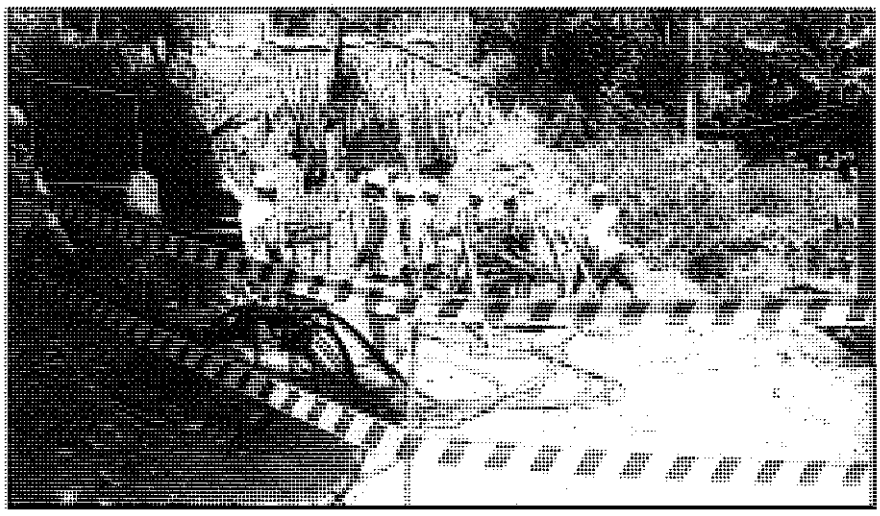


Fig 21: Commencement of drilling

Related BOQ item: 7.2 to 7.5.

Horizontal drilling photographs of the holes are shown in below figures. The certificate issued by NBRO confirming the work completion is attached in Annexure-05.

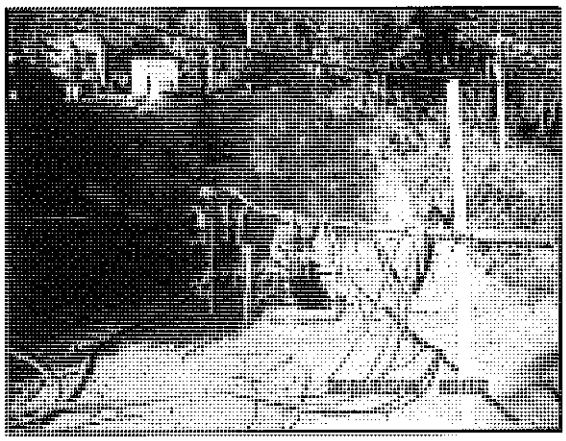


Fig 22: Drilling of first hole

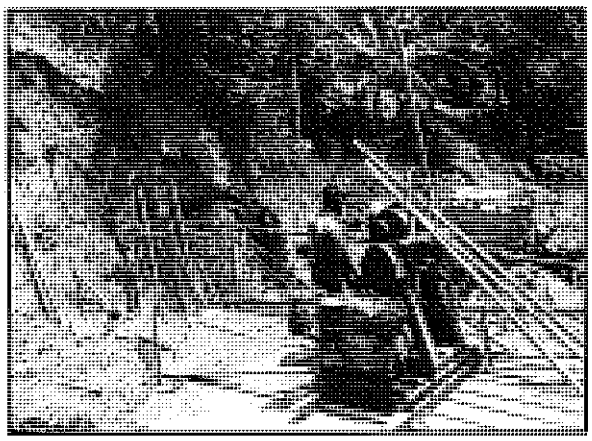


Fig 23: Drilling of 05th hole

Conducting horizontal drilling using percussion and rotary drilling machines.

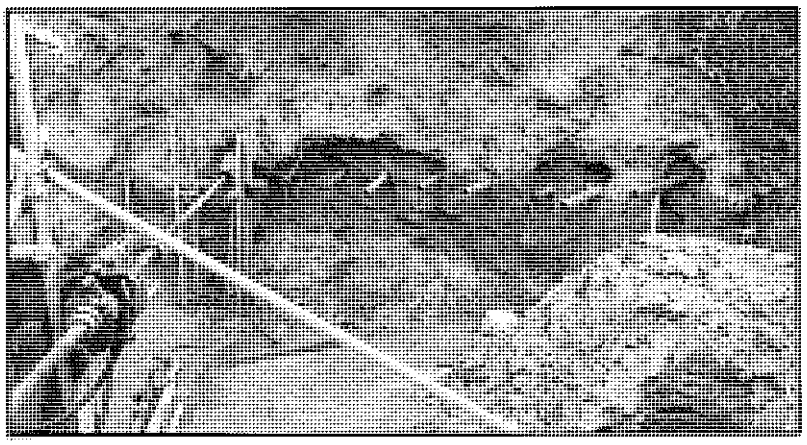


Fig 24: Drilling of last 10th Hole

Fig 24: Installation of Geotextile wrapped PVC

Summary of the drilling records of soil and rock certified by the engineer is also attached in Annexure-05.

11.0 SURFACE DRAINAGE DITCH WORK

The total length of the ditches was varied with the initial design lengths. Summary of the final measurements are shown in the following table.

Ditch Type	Contracted Length	Actual Measured length	Completed Length	Progress ratio
Type A	106 m	134.2 m	134.2 m	100 %
Type B	230 m	217.4 m	217.4 m	100%
Type C	149 m	114.1 m	114.1m	100 %

BOQ Item 9.1: Excavation for structures in Soil and backfilling

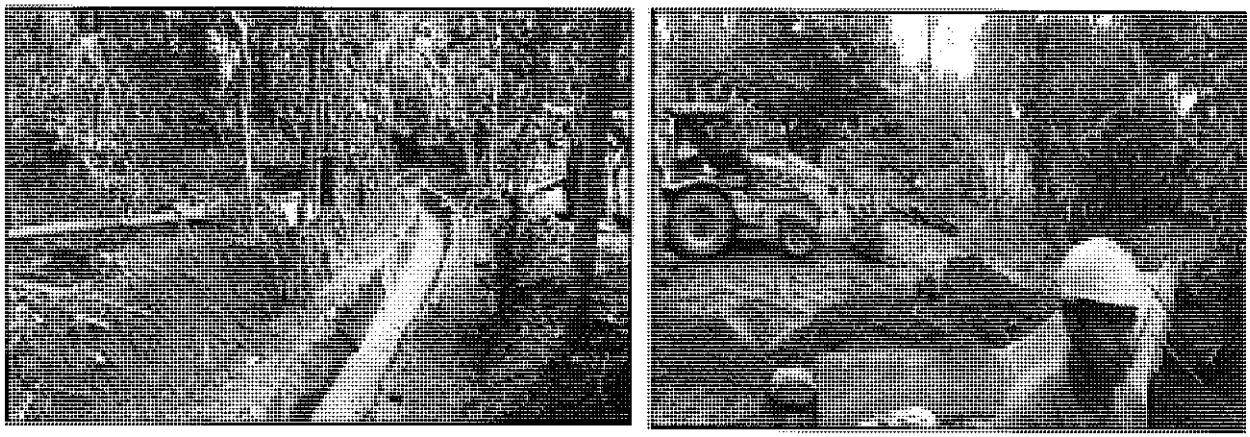


Fig 25: Excavation and Backfilling

11.1 Type-A Drainage Ditch

There were many transported boulders were observed within the proposed drainage line. Therefore rock excavations and demolitions were required for the excavations. Few photographs of each stage of the ditch construction is shown below.

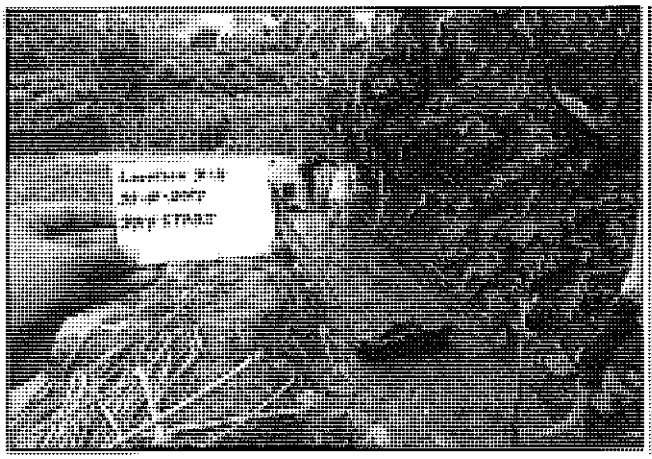


Fig 26: Preparation of foundation

Fig 26: Placing of concrete

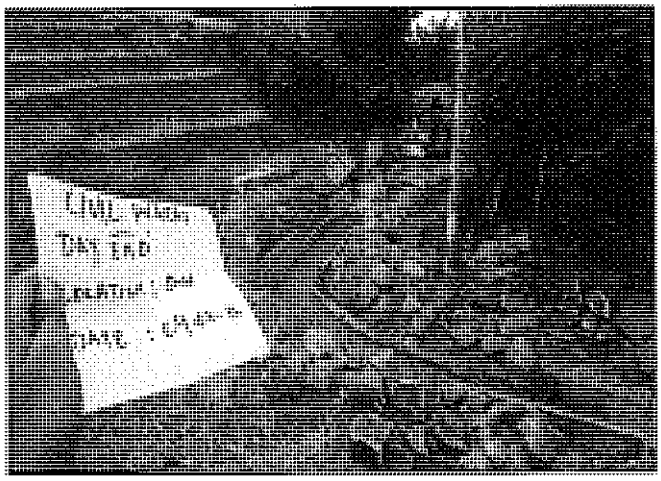


Fig 27: Rock excavation

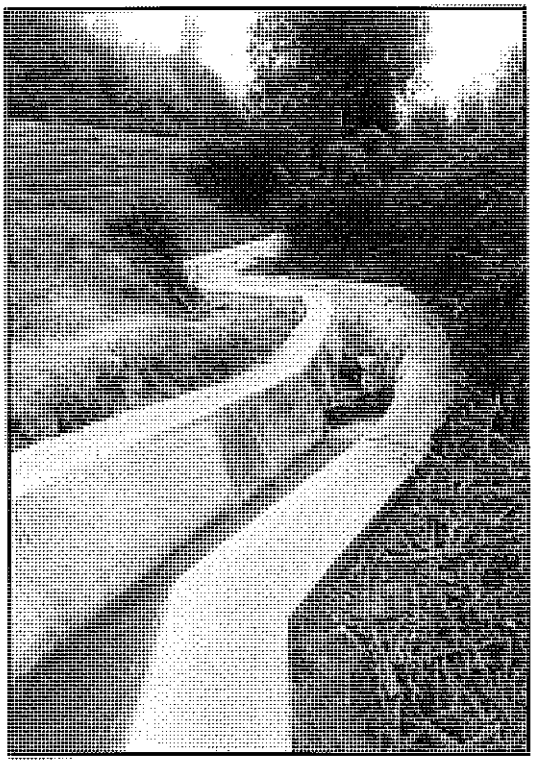


Fig 29: Completed drain section

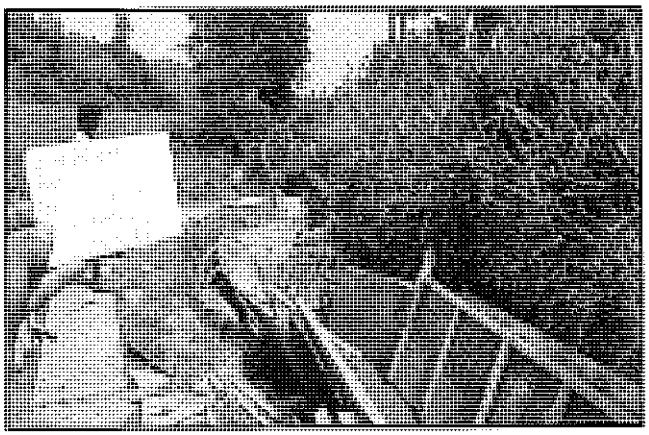


Fig 28: Fixing of formwork

11.2 Type-B Drainage Ditch

This was the longest drainage ditch having 216m length, 600mm base width and 500mm height. One water collecting pit was proposed at the top beginning point of the ditch. Construction of drainage ditch and the water collecting pit was completed.

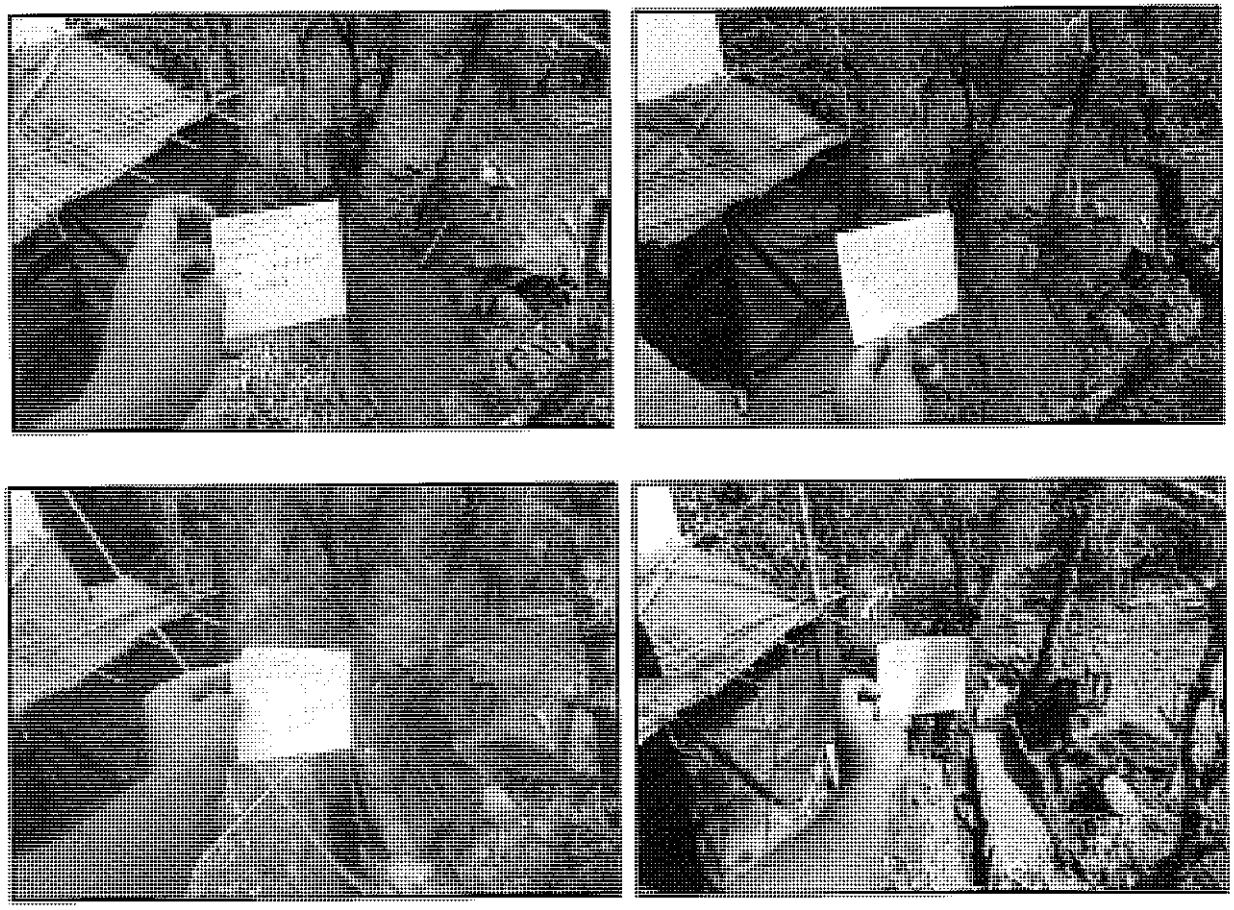


Fig 30: Progress of the construction work from the same location

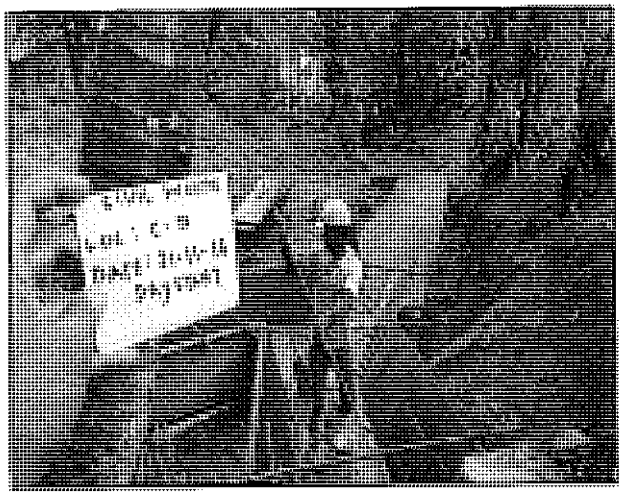


Fig 31: Form working in the "Y" Junction

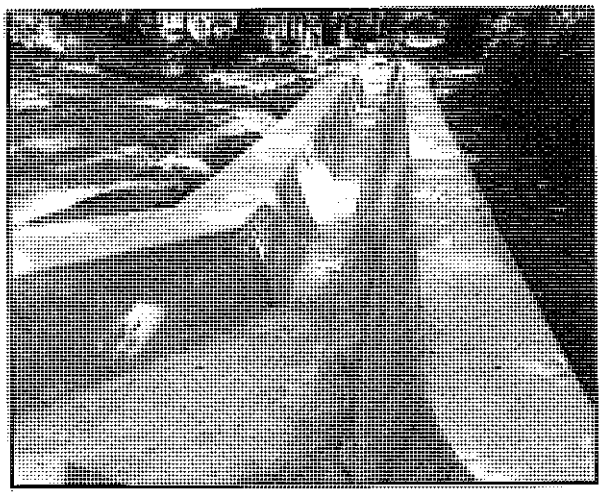


Fig 32: Completion of the work

11.3 Type-C Drainage Ditch

Construction of this ditch was started after the completion of both Type-A and Type-B ditches. The ditch is starting from a upper small dam constructed by Gabion boxes and a water collecting pit.

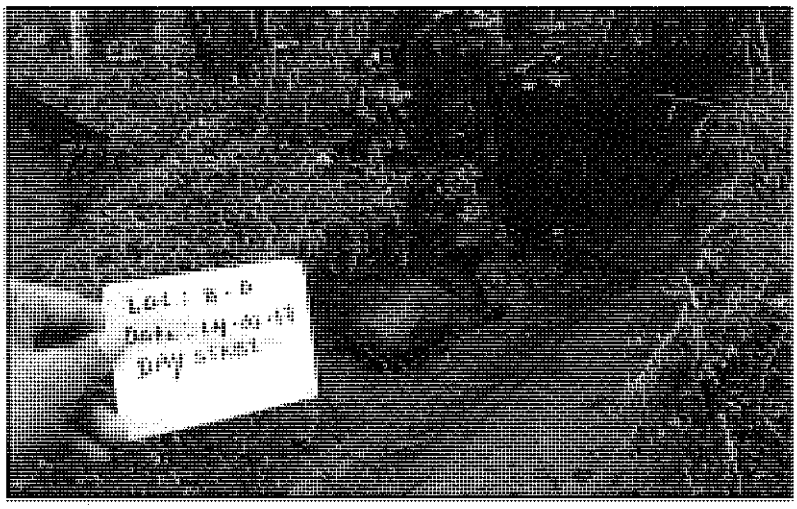


Fig 33: Excavation and foundation preparation

Fig 34: Concreting of the ditch

Measurement sheet of the Concrete works certified by the engineer is attached in annexure-06. Compressive strength test report conducted for the concrete works are also shown in Annexure-03.

12.0 WATER COLLECTING PITS

Three (03) water collecting pits were proposed in the project as shown in the construction survey plan. Two of them are at the starting points of Drainage Type-C and Type-B. The other one is at the connecting point of the all three drains. The pits are 225mm thick Brick masonry using cement: sand motor 1:5 and with 25mm thick plastering work finishing semi rough.

Measurement sheet of the Water collecting Pit works certified by the engineer is attached in annexure-06.

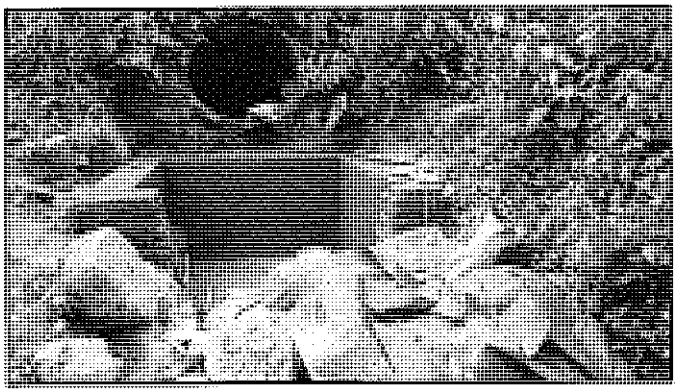
BOQ Item :10.1 Excavation

Fig 35: Excavation at Upper dam Pit

Fig 36: Excavation at Type-B ditch starting point

BOQ Item: 10.2 Supply and lying of 200mm thick crushed stone base

BOQ Item:10.3 & 10.4 Construction of 225mm thick brick masonry work and Plastering



PILOT PROJECT FOR LANDSLIDE AND ROCKFALL MITIGATION WORKS IN BADULLA, NUWARAELIYA & MATALE

LOT 02- Udamadura in Nuwara Eliya District

PROJECT COMPLETION REPORT

Employer:

Japan International Cooperation Agency (JICA) Sri Lanka Office

Engineer:

National Building Research Organization (NBRO)

Contractor:

GEO ENGINEERING CONSULTANTS (PVT) LTD

Geotechnical Investigation, Geological Surveys, Ground Improvement & Laboratory Testing

No.929/18, Kahandawala Road, Thalangama North, Malabe
Sri Lanka.
HOTLINE: 0113 093377
Tel: +94 11 2 077844 (Accounts Dept.)
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Fax: +94 11 2 077845

E-mail: geoeng2009@gmail.com, geoeng2009@sltnet.lk

16th March 2017

CONTENT

Prepared by;

.....

Dilum Wanigasekara *B.Sc(Hons), M.Sc(Eg.Geo), MGSSL*

Project Manager.

1.0 INTRODUCTION

Japan International Cooperation Agency (JICA) extends its Pilot project for Landslide and Rock fall mitigation works for the Democratic Socialist Republic of Sri Lanka, on the basis of the Record of Discussion for "The Technical Cooperation for Landslide Mitigation Project" signed on the 07th of March 2014 agreed between the Democratioc Socialist Republic of Sri Lanka and JICA.

The Pilot project for Landslide and Rock fall Mitigation work at Lot-02 Udamadura in Nuwara Eliya was awarded to Geo Engineering Consultant Pvt Ltd on 21st January 2016 and the contract agreement was signed on 02nd day of February 2016.

The basic scope of work was Horizontal Drainage Drilling, Gabion Works,Surface drainage ditch works and small dam.

The time for completion of the work was within Nine (9) months from the commencement date that is 15th November 2016. But we were encountered more difficulties and constraints delaying completion of the project. Time extension request letters were sent to JICA through NBRO clarifying the causes for the delay and the approval was granted for further four (04) months period in two stages. First extension was 15th November 2016 to 15th February 2017 and the second extension was 15th February 2017 to 15th March 2017.

Contract Price was Twelve Million Nine Hundred Thousand Only (Rs.12,900,000.00).

2.0 MOBILIZATION

Mobilization to the site was done on 08th March 2017. Initially establishment of Site office and fixing of safety sign boards were done. Then the drilling machine, Compressor, generator and all the other machines and equipments with labors were mobilized.

Horizontal drainage drilling work was started on 07th May 2016 after the approval of construction plan with several revisions.

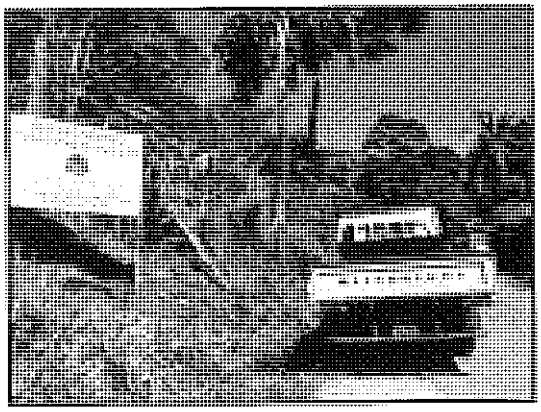


Fig 01: Mobilization to the site

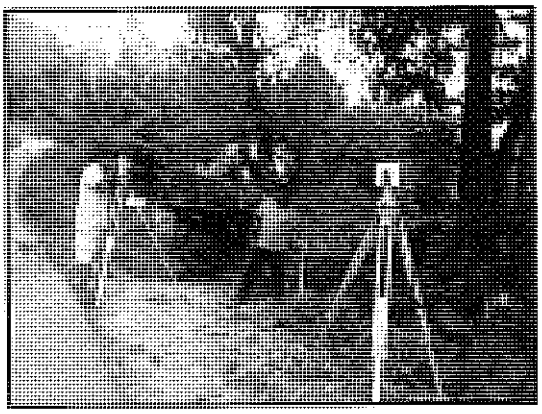


Fig 02: Pre surveying work

Fig 03: Fixing of safety sign boards

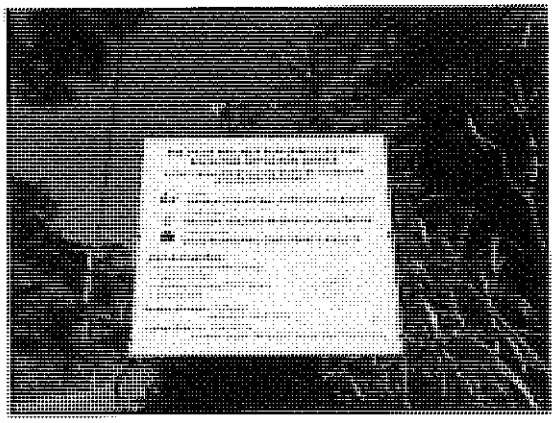


Fig 04: Main project name board

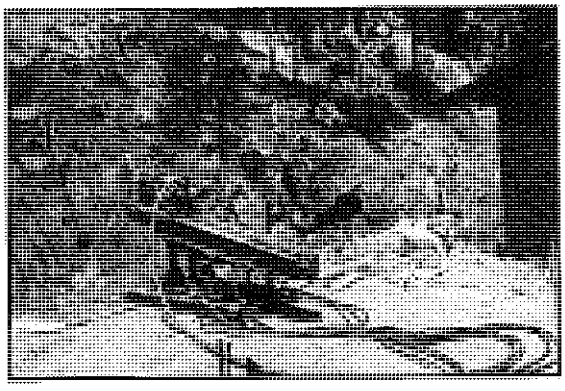


Fig 05: Mobilization of percussion drilling machine

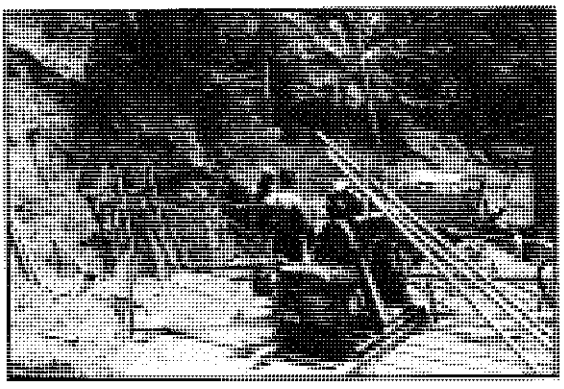
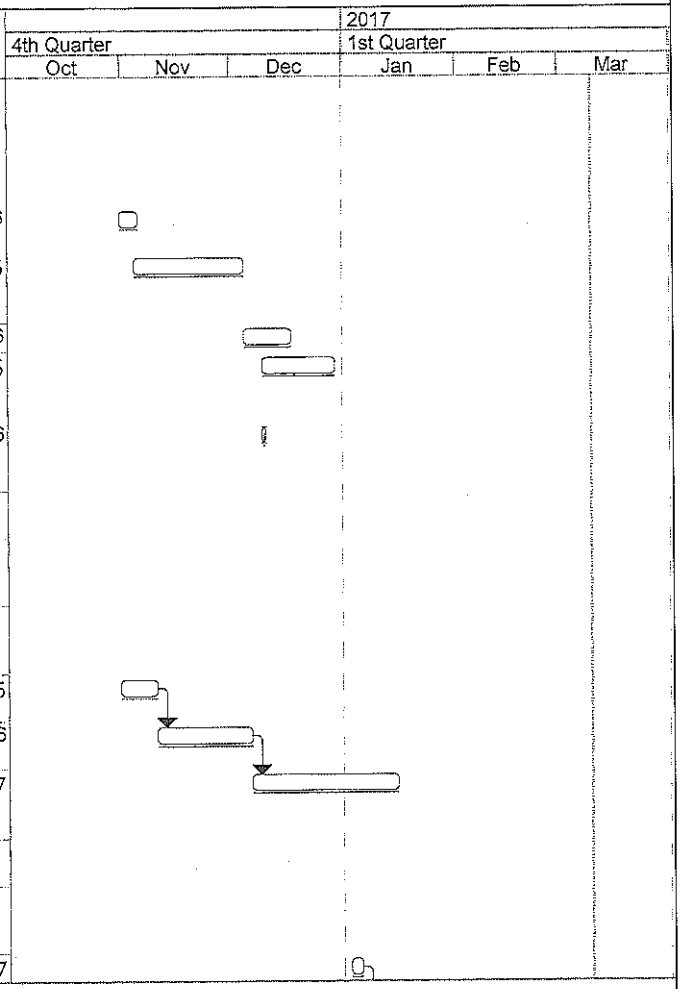


Fig 06: Mobilization of new rotary drilling machine

Master working program was revised according to the Time extension up to 15th March 2017 and it is shown below.

WORK EXTENSION PROGRAM
PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS AT NUWARA ELIYA

ID	Task Name	Duration	Start	Finish
1	**Drainage Ditch D-H :**			
2	**80.0m Length completed with Defects . Minimum 04 days will require to complete 10m length of drainage ditch**			
3	Demolishing of defects part from CH 20 +00-CH 40+00 with JICA and NBRO Supervision	5 days	Tue 11/1/16	Sat 11/5/16
4	Rectification & Reconstruction of Defects of CH 20+00-CH 40+00 m	30 days	Sat 11/5/16	Sun 12/4/16
5	Construction of CH 40+000 to CH 80+000	13 days	Mon 12/5/16	Sat 12/17/16
6	Construction of CH 80 - CH 131 up to water correcting pit type-02	20 days	Sat 12/10/16	Thu 12/29/16
7	Submission of Second Quarterly Progress Report with the Invoice	1 day	Sat 12/10/16	Sat 12/10/16
8	*Resources: Mason-01, Skilled Labours-05, Unskilled Labours-06*			
9	**Drainage Ditch C-D**			
10	**Base concrete completed with minor defects from CH 90-CH 216**			
11	Construction of base concrete from CH 0-90 m	10 days	Tue 11/1/16	Thu 11/10/16
12	Construction of Side walls and completion from CH 0+000-CH90+000	26 days	Fri 11/11/16	Tue 12/6/16
13	Rectification of defects and construction of side walls from CH 90-216 m.	40 days	Wed 12/7/16	Sun 1/15/17
14	*Resources: Mason-02, Skilled Labours-05, Unskilled Labours-06*			
15	**Drainage Ditch G-D**			
16	Rock Demolishion	3 days	Tue 1/3/17	Thu 1/5/17



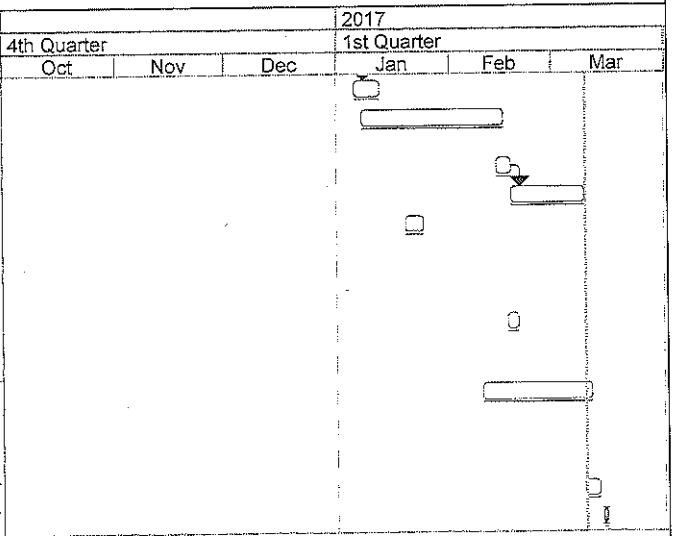
Land Slide Mitigation Project
Nuwaraeliya

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External MileTask
Split

Geo Engineering Consultants (Pvt.) Ltd., No. 929/18, Kahandawala Road, Thalangama North, Malabe. Hotline: 011 3093377, 011 2077900, Fax: 011 2077845

WORK EXTENSION PROGRAM
PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS AT NUWARA ELIYA 2

ID	Task Name	Duration	Start	Finish
17	Soil excavation along the ditch of 100m length	7 days	Fri 1/6/17	Thu 1/12/17
18	Construction of drainage ditch of 100m length	39 days	Sun 1/8/17	Wed 2/15/17
19	soil excavation along the ditch of 35m length	4 days	Tue 2/14/17	Fri 2/17/17
20	Construction of drainage ditch 35m length	20 days	Sat 2/18/17	Thu 3/9/17
21	**Construction of Gabion walls in the drilling point and upper small dam**	5 days	Fri 1/20/17	Tue 1/24/17
22	Reconstruction of Gabion wall and Polyethilen connecting pipe according to the engineer's comments	3 days	Fri 2/17/17	Sun 2/19/17
23	**Construction of lower Small dam with new drainage ditch**	30 days	Fri 2/10/17	Sat 3/11/17
24	Construction of Water collecting pits and upper small dam	4 days	Fri 3/10/17	Mon 3/13/17
25	Submission of Project Completion Report	1 day	Wed 3/15/17	Wed 3/15/17



Land Slide Mitigation Project
Nuwaraeliya

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External MileTask
Split

Geo Engineering Consultants (Pvt.) Ltd., No. 929/18, Kahandawala Road, Thalangama North, Malabe. Hotline: 011 3093377, 011 2077900, Fax: 011 2077845

According to the contract and the design drawings the quantities of the main work items are as follows.

01) Horizontal Drainage drilling : 10 Holes up to 50.0m length

02) Surface Drainage ditch type-A : Length 106.0 m

03) Surface Drainage ditch type-B : Length 230.0 m

04) Surface Drainage ditch type-C : Length 149.0 m

05) Water Collecting Pits : 03 Nos.

06) Small Dam (Gabion) : 01

07) Small Dam (Concrete) : 01

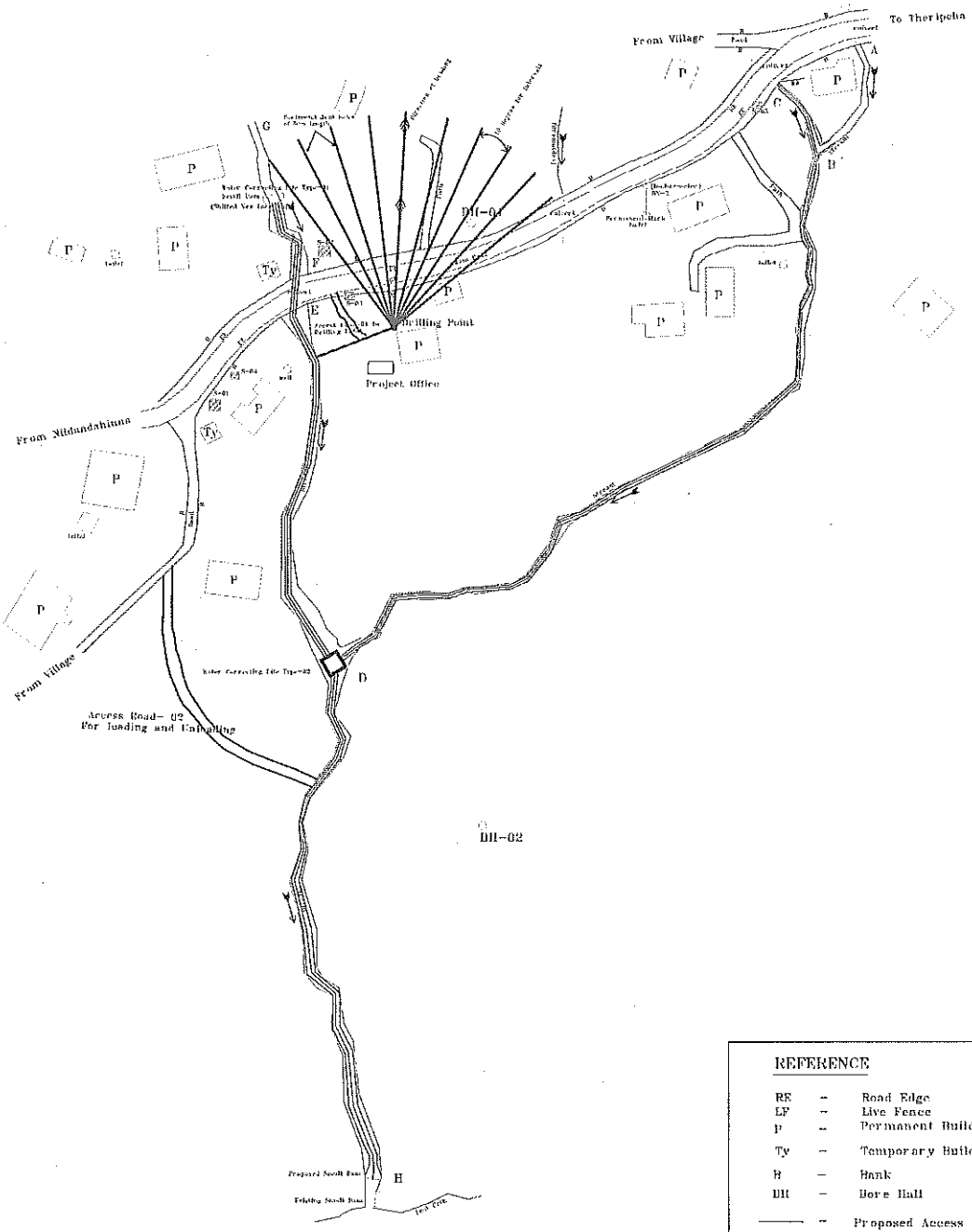
08) Gabion wall for cut slope : 01

Survey plan of the project area having the proposed structure locations are shown below.

C.K.N.Thilakasiri
Licensed Surveyor & Leveller,
No.172/1
Bandarawatta
Mandawala

Detail Survey Plan-Landslide Mitigation Project at Nuwara Eliya

Topographic Construction Plan



REFERENCE

RE	–	Road Edge
LF	–	Live Fence
P	–	Permanent Building
Ty	–	Temporary Building
B	–	Bank
BH	–	Bore Hall
———	–	Proposed Access Roads
▨	–	Sign Board Locations
□	–	Project Office
———	–	Existing Drainage Path
═══	–	Proposed ditch line

Surveyed on 20.03.2016

C.K.N.Thilakasiri
Licensed Surveyor & Leveller,

3.0 HEALTH AND SAFETY MEASURES DURING CONSTRUCTION

Related BOQ Item No. : 2.1

i. Safety sign boards were fixed in close to the main road and within the site so that clearly visible to all workers and third parties.

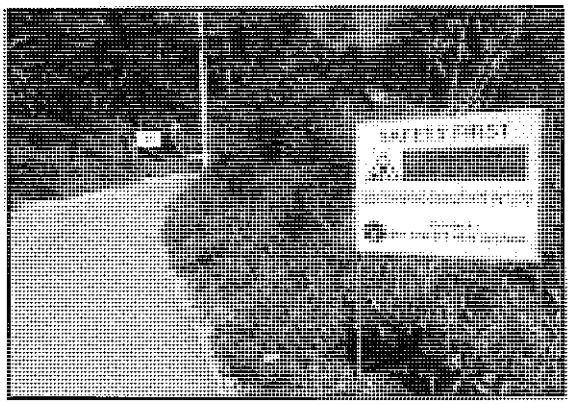


Fig 07: Safety Sign Board on the road

Fig 08: Safety Sign Board on the road

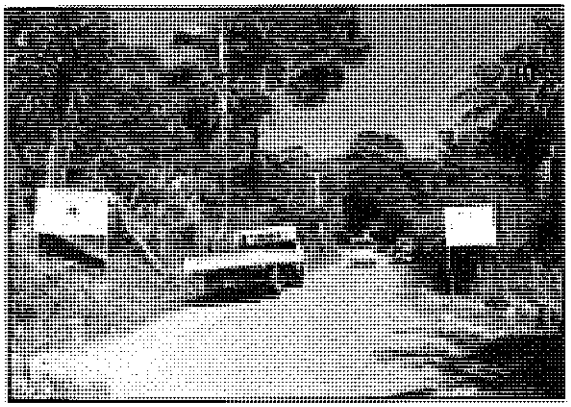


Fig 10: Safety Sign Board outside the site

Fig 11: Safety Sign Board within the site

ii. Workers wear helmet, shoes, clothes with long sleeves, trousers and reflective jacket for the safety.

Fig 12: Workers with safety wears

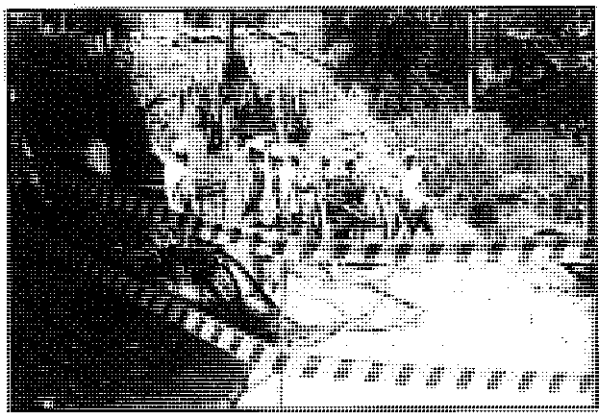
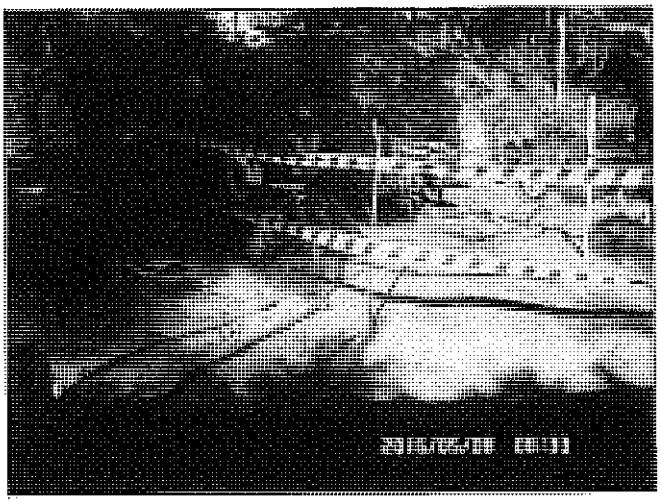
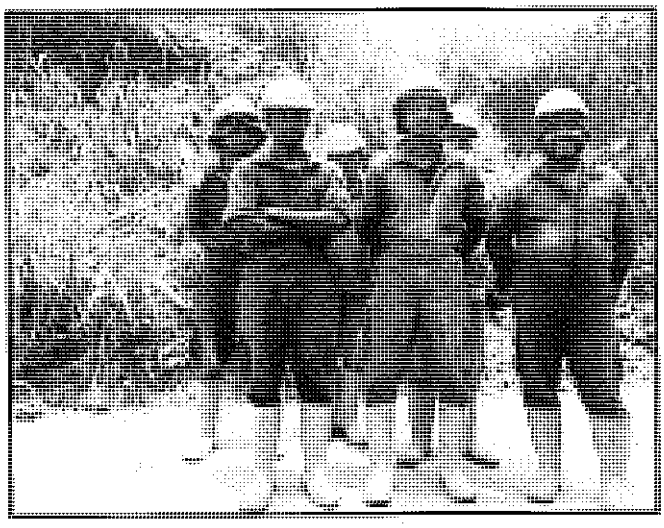


Fig 13: Safety of the workers

iii. Temporary fence were properly set up around site to keep third parties off.



iv. Safety instructions are carried out every weekly for all the workers.



v. Safety Manual is available in the site and the manual was checked by JICA on 15/03/2017 during the site inspection.

vi. Site visit was done by JICA on 08th & 09th August 2016 for the safety measures and the instructions were given to all workers regarding the maintaining of project safety.

4.0 ENVIRONMENTAL PROTECTION AND PRECAUTIONS

Related BOQ item: 2.2

We have taken all possible precautions for the environmental protection. Construction works were carried out to minimize the environmental damages.

Environmental Officer from NBRO visited the site from time to time and the necessary instructions were given on site. Copy of his Log notes are attached in the annexure- 01.

According to the environmental officer's instructions, project office was maintained well clean and a First Aid box was installed.

Soil erosion was noticed on one embankment of the drain during heavy rainy season. Rubble filing was done on that embankment in order to stabilize the filling.

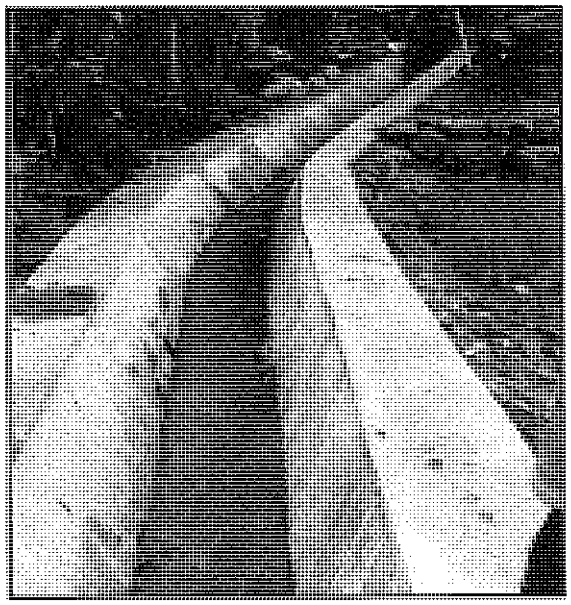


Fig 14: Rubble pitching on embankments to minimize soil erosion

Dust screens/Mud covers were used to protect the environment during horizontal drilling works.

Fig 15: Using of mud covers close to the drilling point

Drainage Ditch excavations were done in order to minimize tree cutting. Therefore large trees were remained on the path and the ditch line was diverted to bypass them.

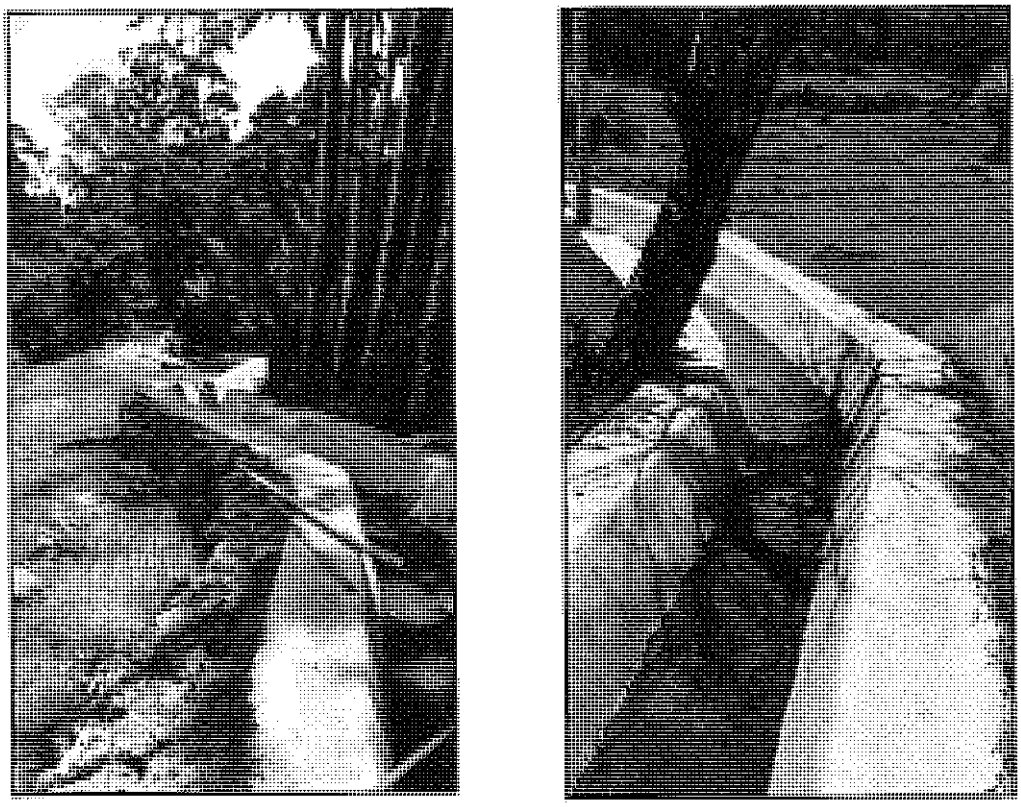


Fig 16: Constructions were done to save the existing trees

5.0 INSURANCE, BOND AND SECURITIES

Related BOQ Item: 3.1

All the documents, Contractors all risks policy and copy of the Insurance policy is attached in the Annexure-02. Original documents have been submitted to JICA.

6.0 PROJECT SIGN BOARDS

Related BOQ Item: 4.1

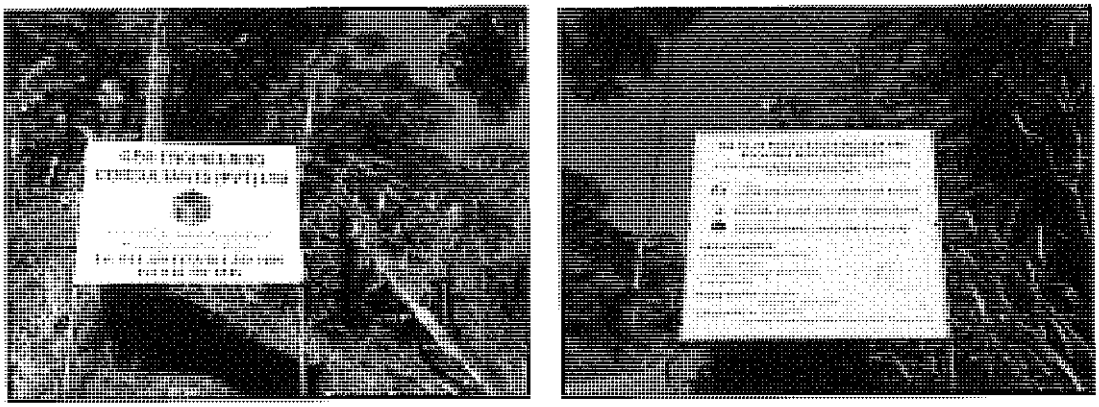


Fig 17: Project sign boards

7.0 SITE INVESTIGATION/ TESTING

Related BOQ item : 5.1

Site investigation and Testing as directed by the Engineer.

Compressive Strength of the concrete was tested for all the concrete works. 06 samples were collected from each batch for 07 days and 28 days test as 03 samples per each.

Designed concrete grade was Grade 15 with mix proportion cement:sand:aggregate 1:3:6

As this grade was not suitable for the construction works, a new mix proportion cement:sand:aggregate 1:3:4 was used by our own cost with the approval of Engineer.

Test results are attached in the annexure-03.

8.0 PROVIDE AS BUILT DRAWINGS

Related BOQ item: 6.2

As built drawings were prepared after the post surveying of the area and the structures. The structural drawings were certified by the engineer.

As built drawings with the signatures are attached in the annexure-04.

9.0 WORKING PLATFORM FOR HORIZONTAL DRILLING WORKS

Related BOQ items : 7.1 and 7.1.1

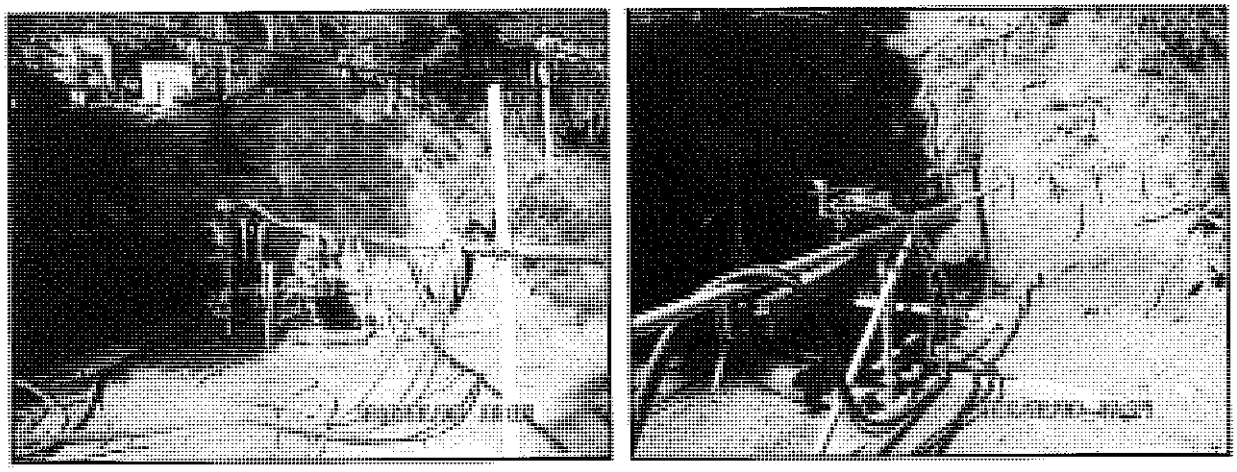


Fig 18: Temporary working platform by GI Pipes for Percussion Drilling machine

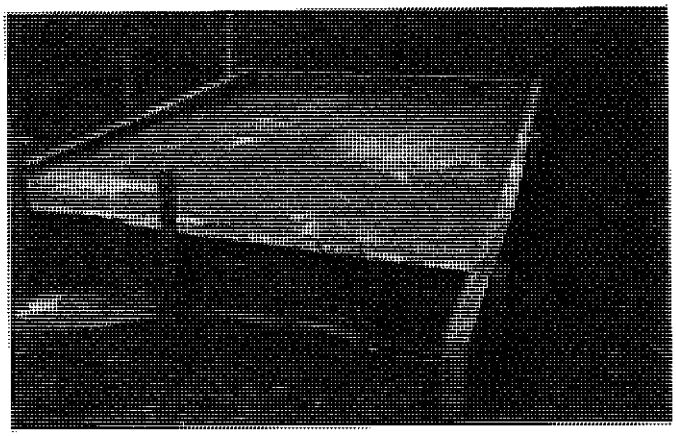


Fig 19: Construction of Solid concrete platform for rotary drilling machine

Temporary working platform for the initial Percussion drilling machine was erected by GI pipes. Pipes were properly tied and fixed with clamps.

Solid concrete platform for rotary drilling machine was constructed by using Grade 15 concrete in the bottom of drilling point.

10.0 HORIZONTAL DRAINAGE DRILLING WORK

Scope of work was Drilling and Installation of PVC for 10 Nos. of 100mm dia. Horizontal drains up to 50m length.

Drilling was started on 07th May 2015 at H-05 hole and Completed on 12th October 2016. All the drilled holes are having the designed 50.0m length.

Joint site inspection was done by JICA, NBRO and the contractor on 14th October 2016 and drilling length was confirmed to meet the design requirements of 50.0m.

Fig 20: Proposed Drilling Point

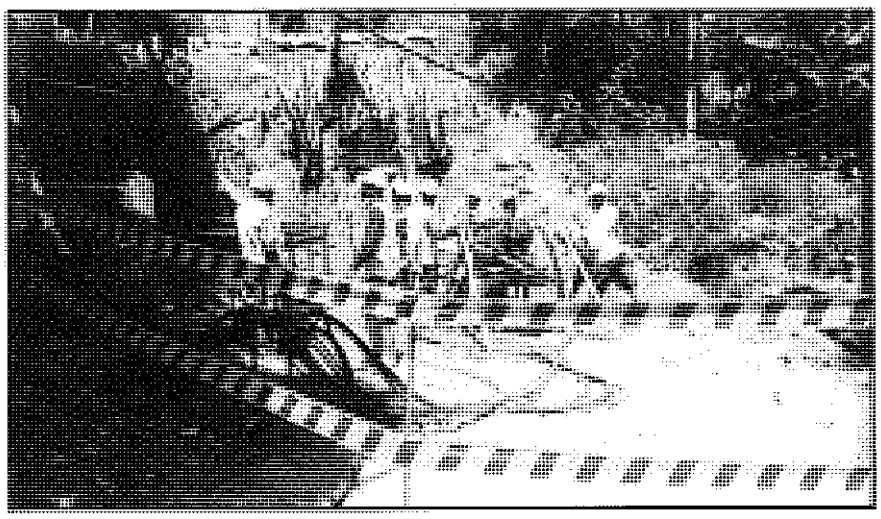


Fig 21: Commencement of drilling

Related BOQ item: 7.2 to 7.5.

Horizontal drilling photographs of the holes are shown in below figures. The certificate issued by NBRO confirming the work completion is attached in Annexure-05.

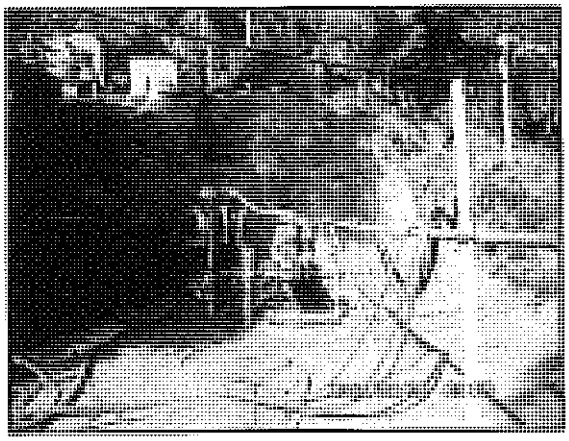


Fig 22: Drilling of first hole

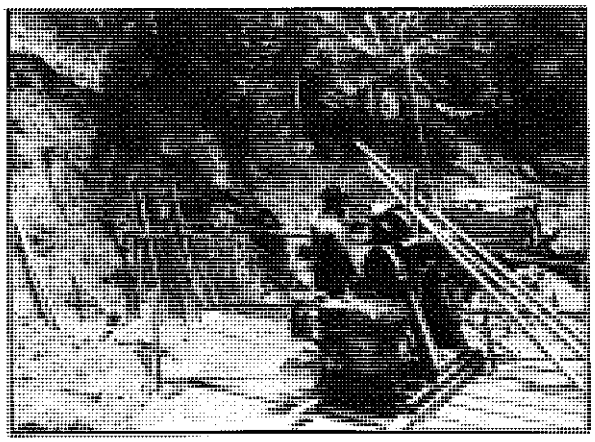


Fig 23: Drilling of 05th hole

Conducting horizontal drilling using percussion and rotary drilling machines.

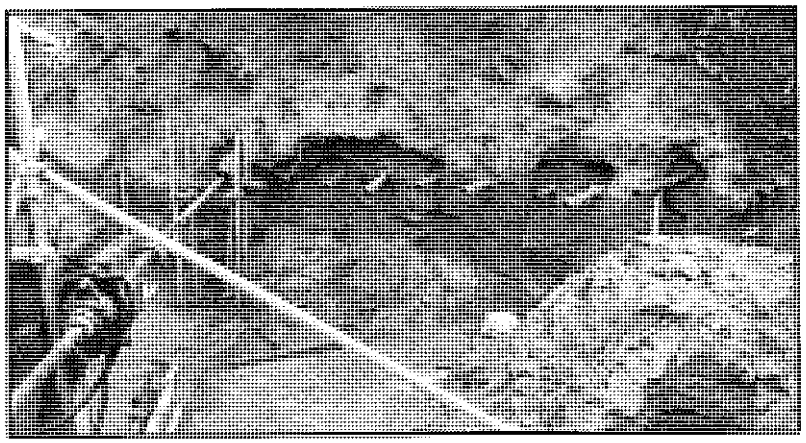


Fig 24: Drilling of last 10th Hole

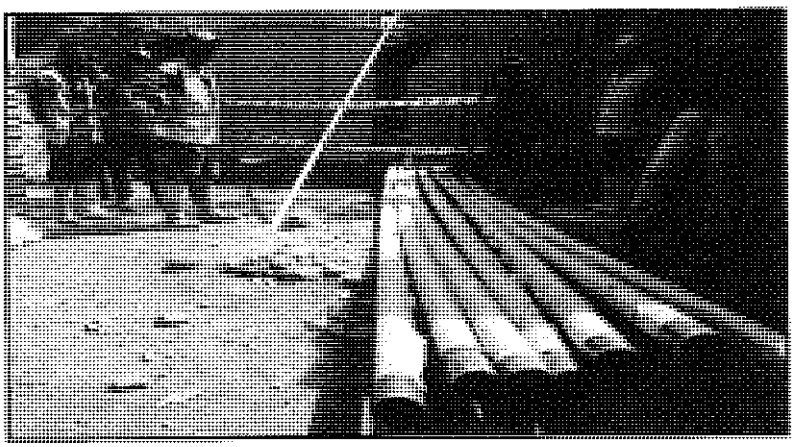


Fig 24: Installation of Geotextile wrapped PVC

Summary of the drilling records of soil and rock certified by the engineer is also attached in Annexure-05.

11.0 SURFACE DRAINAGE DITCH WORK

The total length of the ditches was varied with the initial design lengths. Summary of the final measurements are shown in the following table.

Ditch Type	Contracted Length	Actual Measured length	Completed Length	Progress ratio
Type A	106 m	134.2 m	134.2 m	100 %
Type B	230 m	217.4 m	217.4 m	100%
Type C	149 m	114.1 m	114.1m	100 %

BOQ Item 9.1: Excavation for structures in Soil and backfilling

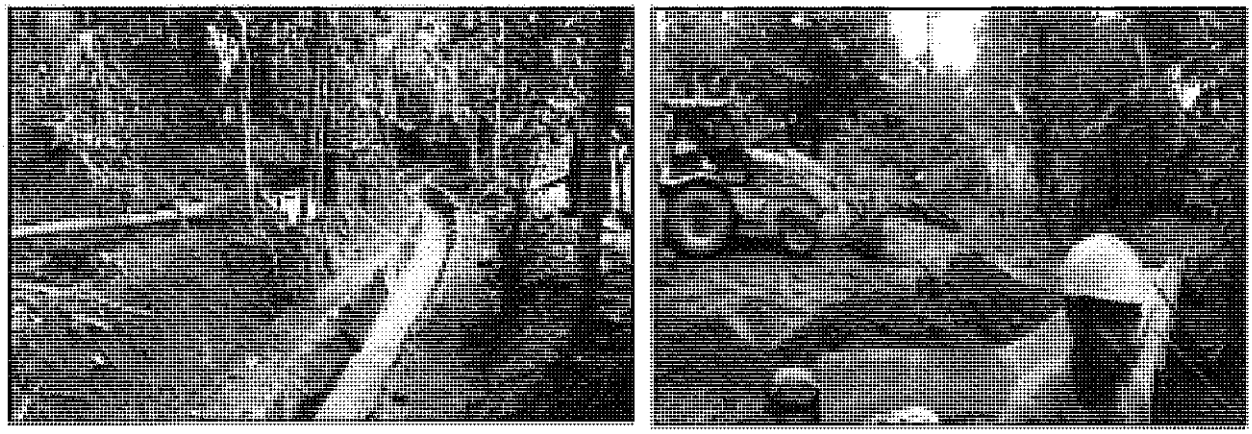


Fig 25: Excavation and Backfilling

11.1 Type-A Drainage Ditch

There were many transported boulders were observed within the proposed drainage line. Therefore rock excavations and demolitions were required for the excavations. Few photographs of each stage of the ditch construction is shown below.

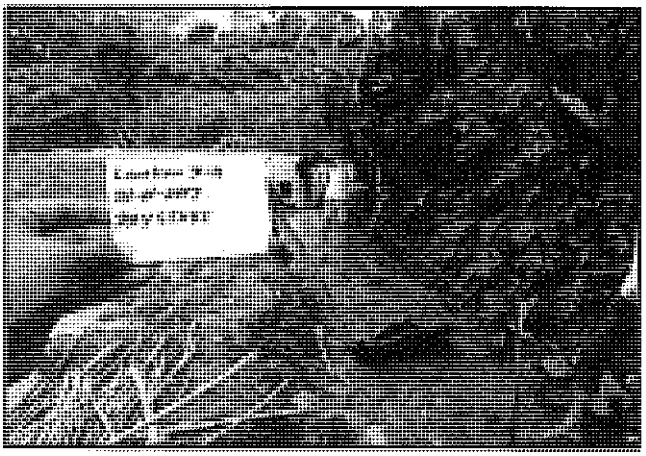


Fig 26: Preparation of foundation

Fig 26: Placing of concrete

Fig 27: Rock excavation

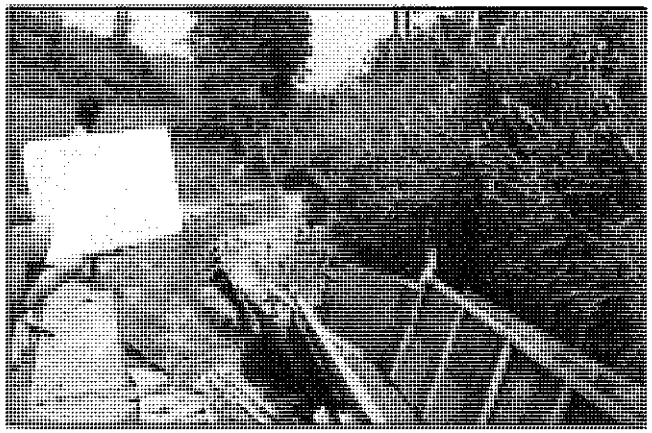


Fig 28: Fixing of formwork

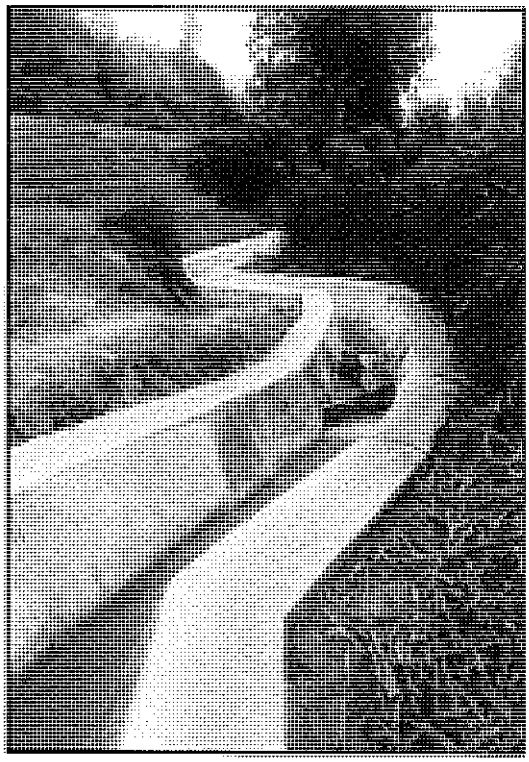


Fig 29: Completed drain section

11.2 Type-B Drainage Ditch

This was the longest drainage ditch having 216m length, 600mm base width and 500mm height. One water collecting pit was proposed at the top beginning point of the ditch. Construction of drainage ditch and the water collecting pit was completed.

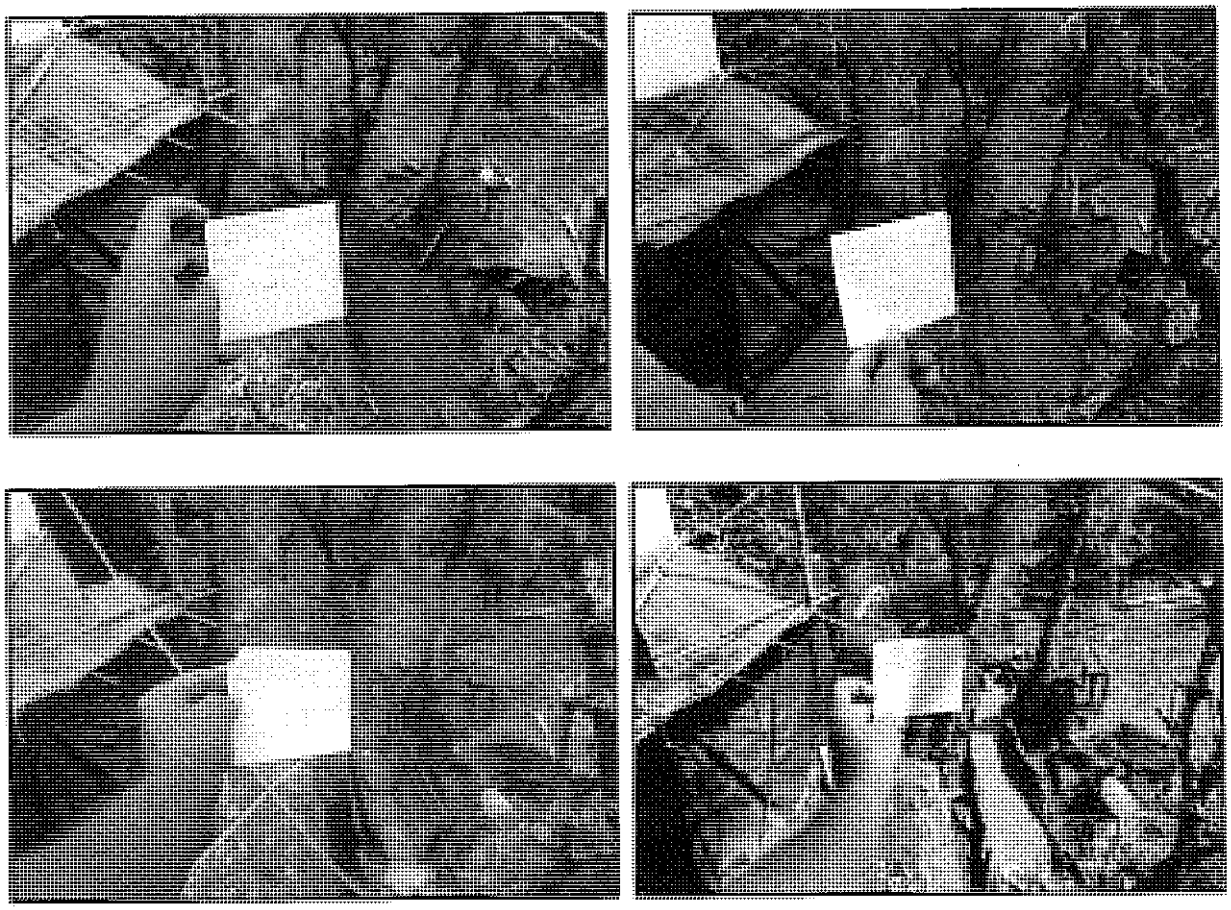


Fig 30: Progress of the construction work from the same location

Fig 31: Form working in the "Y" Junction

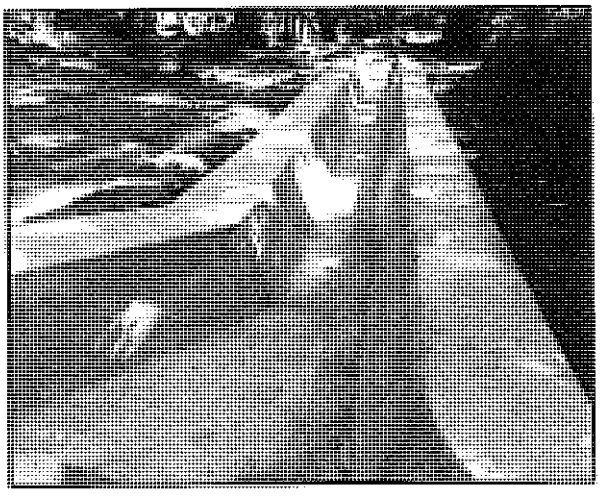


Fig 32: Completion of the work

11.3 Type-C Drainage Ditch

Construction of this ditch was started after the completion of both Type-A and Type-B ditches. The ditch is starting from a upper small dam constructed by Gabion boxes and a water collecting pit.

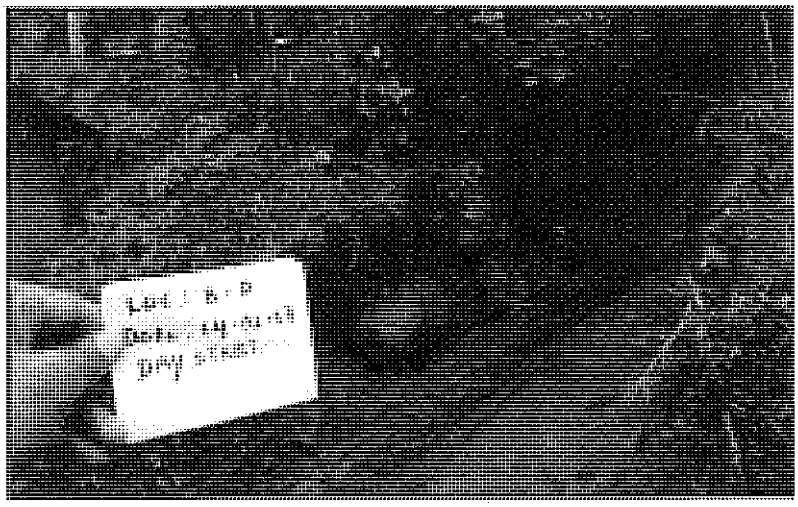


Fig 33: Excavation and foundation preparation

Fig 34: Concreting of the ditch

Measurement sheet of the Concrete works certified by the engineer is attached in annexure-06. Compressive strength test report conducted for the concrete works are also shown in Annexure-03.

12.0 WATER COLLECTING PITS

Three (03) water collecting pits were proposed in the project as shown in the construction survey plan. Two of them are at the starting points of Drainage Type-C and Type-B. The other one is at the connecting point of the all three drains. The pits are 225mm thick Brick masonry using cement: sand motor 1:5 and with 25mm thick plastering work finishing semi rough.

Measurement sheet of the Water collecting Pit works certified by the engineer is attached in annexure-06.

BOQ Item :10.1 Excavation

Fig 35: Excavation at Upper dam Pit

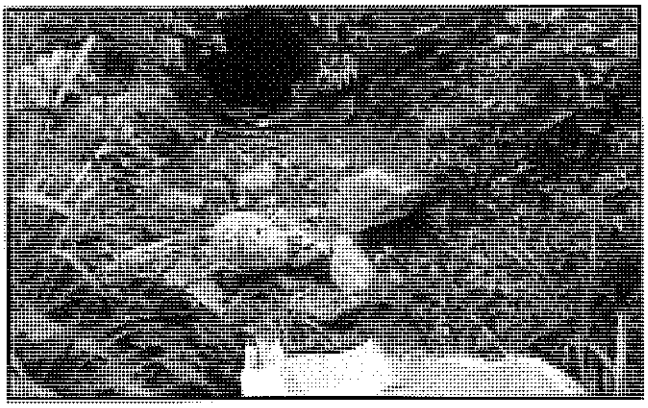


Fig 36: Excavation at Type-B ditch starting point

BOQ Item: 10.2 Supply and lying of 200mm thick crushed stone base

BOQ Item:10.3 & 10.4 Construction of 225mm thick brick masonry work and Plastering

13.0 GABION WORK

Related BOQ Item: 8.1

Gabion wall was constructed at the drilling point in order to stabilize the existing vertical cut. The dimensions of the wall are L=5.0m, H=2.0m, Width=1.0m

All the construction works were done with the direct supervision and instructions of the engineer.

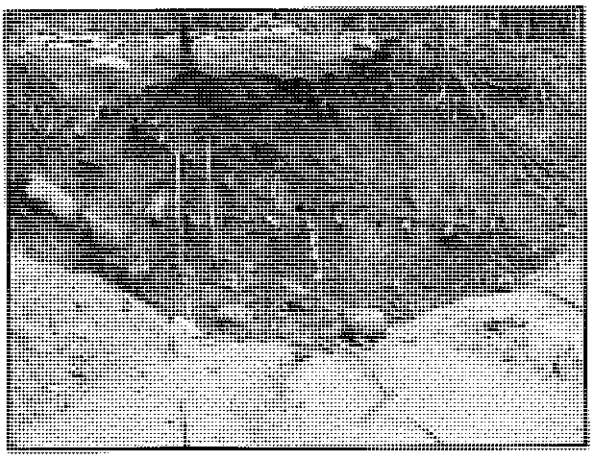


Fig 37: After drilling completed

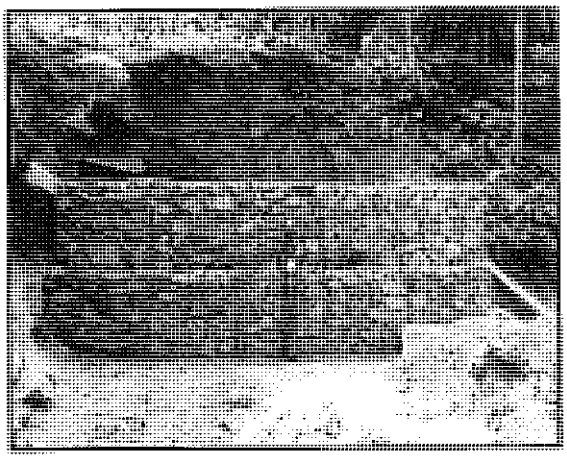


Fig 38: After construction of the gabion wall

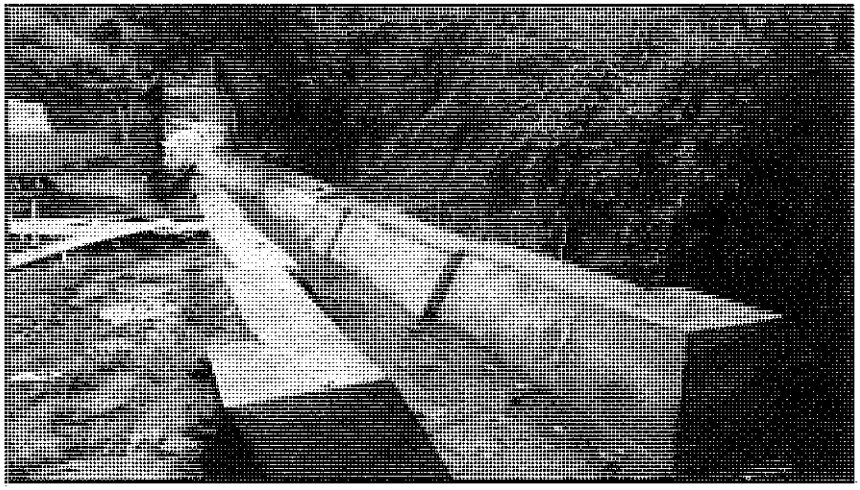
Measurement sheet of the Gabion works certified by the engineer is attached in annexure-06.

14.0 SMALL DAM

Related BOQ item: 11.1 Upper small Dam

Total size of the dam is 6.0 m^3. Measurement sheet of the Upper small dam certified by the engineer is attached in annexure-06.

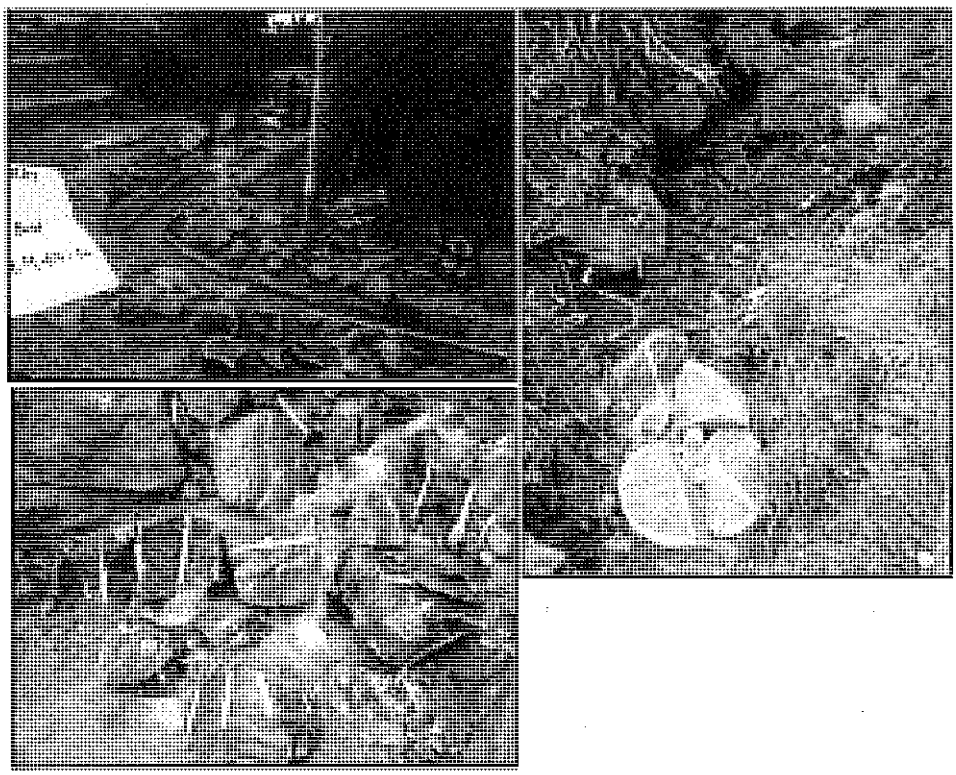
Related BOQ Item: 11.2 Lower Concrete Dam



Total size of the dam is 10.0 m^3. Measurement sheet of the Lower small dam certified by the engineer is attached in annexure-06.

15.0 ADDITIONAL WORKS

1.) Rock Demolishing and Removal



Measurement sheet for Rock demolishing certified by the engineer is attached in Annexure-06 and the JICA & NBRO approval letter for the item variation is attached in Annexure-07.

02.) Construction of Water collecting pit, open man hole and Supplying and placing of 160mm HDPE pipe

Fig : Water collecting pit and Laying of HDPE pipe

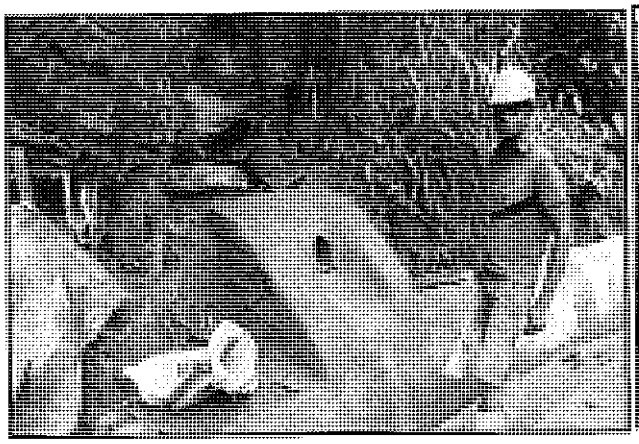


Fig : Outlet of HDPE pipe

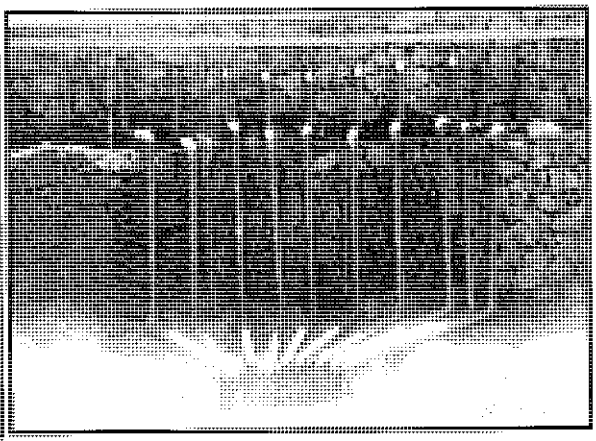


Fig : Front view of Gabion wall with Pipes

Measurement sheet for water collecting pit and Polyethylene pipe certified by the engineer is attached in Annexure-06 and the JICA & NBRO approval letter for the item variation is attached in Annexure-08.

16.0 PROJECT PROGRESS

Cumulative project progress up to 15th March 2017 is as follows

Month/ Year	Type of Work	Planning progress of the work %	Actual progress of the work %
JUNE/2016	Horizontal Drilling	15.00%	10.12%
JULY/2016	Horizontal Drilling	30.00%	32.14%
AUGUST/2016	Horizontal Drilling & Civil Construction	15.00%	11.06%
SEPTEMBER/2016	Horizontal Drilling	15.00%	11.83%
OCTOBER/2016	Civil Construction	5.00%	1.55%
NOVEMBER/2016	Civil Construction	5.00%	2.76%
DECEMEBER/2016	Civil Construction	5.00%	14.59%
JANUARY/ 2017	Civil Construction	4.00%	3.09%
FEBRUARY/ 2017	Civil Construction	4.00 %	4.27 %
MARCH UP TO 15TH	Civil Construction	2.00 %	7.71%
Cumulative Progress on Project completion		**99.12%**	**99.12%**

❖ **The Actual Progress of the work did not reach to 100 % due to following reasons.**

01) Item 7.5 HDPE pipe was removed from the original BOQ and added as an amendment

02) Item 11.3 Demolition and removal was cancelled by the engineer and removed from the BOQ

03) Item 11.1 Upper small gabion dam was contracted to 10 m^3. But the actual constructed quantity was 6 m^3 according to design drawings.

❖ Project progress of the major work items are as follows

Item	Work Item	Unit	Contract Qty	Completed Qty	Progress ratio
01.	Horizontal Drainage Drilling through soil	m	450	500	111 %
	Installation of 63mm dia. PVC Pipes	m	500	500	100%
02.	Gabion Works	m^3	10	10	100%
03.	Surface drainage ditch works				
	Excavation	m^3	262	262	100%
	Concreting	m^3	173	174	100%
	Reinforcement	Kg	5300	5300	100%
	Formwork	m^2	1253	1253	100%
	Expansion joints	m	35	35	100%
04.	Small Dam (Gabion)	m^3	10	06	60 %
	Small Dam (Concrete)	m^3	10	10	100 %
05.	Water Collecting Pit	m^2	17	17	100%

❖ Financial Progress of the work up to 15th March 2017

Quarterly Period	Progress of the work	Work Value	Total Project Value	Financial Progress ratio
May-July/2016	42.26%	5,375,003.00	12,900,000.00	69.57 %
Aug-Nov / 2016	27.31%	3,473,907.00		

❖ BOQ Comparison table with the Original BOQ items and the Amendment items are shown in the following Annexure-09.

Annexure 01:

Copy of Site Log Notes of Environmental Officer

Date	Name & Designation	Description / Comments	Signature
09/11/2016	M. Richard Eng. Geologist	A boulder and a wedge of soil has collapsed at horizontal drilling Location.	Richard Smith
09/11/2016	M. Richard Eng. Geologist	Works started at the D-H section (surface Dromage Ditch type A) Had an inspection on D-H (050-090) by NBRO all reinforcement spacings along the chainage (050-090) was fixed and approved by NBRO.	Richard Smith.
10/11/2016	VDW Samarasekera (Scientist) CGSD NBRO	✓ Please care personal safty shoes, helmet and others should be care. ✓ Keep clean the office ✓ Install firstaid box in the office	

RICHARD

Date.................. No.......

|07|2017	V Das Sumanasekara Scientist ESD / NBRO	I visited the site with Mr Samantha & Mr Rahal. During my visit construction work [illegible] observed. ~~Gabion~~ wall construction work finished [illegible] [illegible] [illegible] ~~[illegible]~~ [illegible] cleared.	[signature]
4/01/2017	TCLMP Kyoichi Kawakami	Check the site progress and monthly progress report of December	K. Kawakami (stamp)
2/01/2017	Mr. Samantha Bogahapitiya Geologist D/D. N.E NBRO Mr Malaka Hettiarachchi Geologist - NBRO N/E.	- Visit the site & checked the progress of drainage construction - Advised to ~~not~~ ~~[illegible]~~ fill gabion wall small holes with rock particles - investigated the access problem to the drain constructing area at the lower area of the slope.	[signature] [signature]
13/01/2017 2.30pm	R.M.S. Bandara Director / Landslide NBRO	Visit the site. [illegible] progress [illegible] [illegible] [illegible]. It is advised to expedite the work with more crews. Otherwise [illegible] work could not be [illegible] on time. (Sgd)	[signature] 13/01/2017

RICHARD

Date.......... No..........

09/03/2017	Eng. H. R. Maduranga NBRO.	I inspect the site. Type A and Type C drains construction work in progress. Subsurface drain connect as per the drawing received by 30/01/2017. However, this type of connection can't observed each subsurface drain water flow (function) therefore, I suggest it is need to be design/change. * Water connecting pit type-2. It is arrange to construct using Brick masonry work. However, Brick work is not suitable to this location it should be a concrete structure or concrete pitching base with dry rubble wall to water collecting without erosion.	[signature] [signature] [signature]
03/03/2017	VDW Sumanasekara Scientist ESSD NBRO	I visited the site I was observed that some places were eroded to the drainage path. Water flows out site the drainage. I was instructed to mr Susantha these water path directe to the drainage path. also, observed health and safety precautions are well practiced.	[signature]
04/03/2017 Subsurface NBRO		Mr Maduranga was bade found compile a for report	[signature]

Annexure 02:

Insurance Documents

CEYLINCO GENERAL INSURANCE LIMITED

CONTRACTORS ALL RISKS POLICY

WHEREAS the insured named in the schedule hereto by a proposal and declaration which shall be the basis of this contract, and is deemed to be incorporated herein has applied to the CEYLINCO GENERAL INSURANCE LIMITED (hereafter called "the Company") for the insurance hereinafter contained, and has paid or agreed to pay the premium as consideration for such insurance.

NOW THIS POLICY WITNESSETH THAT subject to the terms, exclusion, provision and conditions contained herein or endorsed hereon the Company will indemnify the Insured in the manner and to the extent hereinafter provided.

IN WITNESS WHEREOF this policy has been signed on behalf of CEYLINCO GENERAL INSURANCE LIMITED at Colombo on this 01st day of Jan two thousand and 2016

Authorised Signature on behalf of
CEYLINCO GENERAL INSURANCE LIMITED

GENERAL EXCLUSIONS

The Company will not indemnify the Insured in respect of loss, damage or liability directly or indirectly caused by or arising out of or aggravated by

(a) war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution insurrection, mutiny, riot, strike, lock-out, civil commotion, military or usurped power, a group of malicious person or persons acting on behalf of or in connection with any political organisation, conspiracy, confiscation, commandeering, requisition or destruction or damage by order of any government *de jure or delacto* or by public authority;

(b) nuclear reaction, nuclear radiation or radioactive contamination;

(c) wilful act or wilful negligence of the Insured or of his representatives;

(d) cessation of work whether total or partial.

In any action, suit or other proceeding where the Company allege that by reason of the provision of Exclusion a) above any loss, destruction, damage or liability is not covered by this insurance the burden of proving that such loss, destruction, damage or liability is covered shall be upon the Insured.

PERIOD OF COVER

The liability of the Company shall commence notwithstanding any date to the contrary specified in the schedule, directly upon commencement of work or after the unloading of the items entered in the Schedule at the site, the Company's liability expires for parts of the insured contract works taken over or put into service.

At the latest the insurance shall expire on the date specified in the Schedule. Any extension of the period of Insurance are subject to the prior written consent of the Company.

GENERAL CONDITIONS

1. The due observance and fulfilment of the terms of this Policy in so far as they relate to anything to be done or complied with by the Insured and the truth of the statements and answers in the questionnaire and proposal made by the Insured shall be a condition precedent to any liability of the Company.

2. The Schedule and the Section(s) shall be deemed to be incorporated in and form part of this Policy and the expression "this Policy" wherever used in this contract shall be read as including the Schedule and the Section(s). Any word or expression to which a specific meaning has been attached in any part of this Policy or of the schedule or of the Section(s) shall bear such meaning wherever it may appear.

3. The Insured shall at his own expense take all reasonable precautions and comply with all reasonable recommendations of the Company to prevent loss, damage or liability and comply with statutory requirements and manufacturer's recommendations.

4. a) Representatives of the Company shall at any reasonable time have the right to inspect and examine the risk and the Insured shall provide the representatives of the Company with all details and information necessary for the assessment of the risk.

   b) The Insured shall immediately notify the Company by telegram and in writing of any material change in the risk and cause at his own expense such additional precautions to be taken as circumstances may require, and the scope of cover and / or premium shall, if necessary, be adjusted accordingly.

   No material alteration shall be made or admitted by the Insured whereby the risk is increased, unless the continuance of the insurance be confirmed in writing by the Company.

5. In the event of any occurance which might give rise to a claim under this Policy, the Insured shall:

   a) immediately notify the Company by telephone or telegram as well as in writing, giving an indication as to the nature and extent of loss or damage.

   b) take all steps within his power to minimize the extent of the loss or damage.

   c) preserve the parts affected and make them available for inspection by a representative or surveyor of the Company.

   d) furnish all such information and documentary evidence as the Company may require.

   e) inform the Police authorities in case of loss or damage due to theft or burglary.

   The Company shall not in any case be liable for loss, damage or liability of which no notice has been received by the Company within 14 days of its occurrence.

   Upon notification being given to the Company under this condition, the Insured may carry out the repairs or replacement of any minor damage; in all other cases a representative of the Company shall have the opportunity of inspecting the loss or damage before any repairs or alterations are effected. If a representative of the Company does not carry out the inspection within a period of time which could be considered as adequate under the circumstances the Insured is entitled to proceed with the repairs or replacement.

   The liability of the Company under this Policy in respect of any item sustaining damage shall cease if said item is not repaired properly without delay.

6. The Insured shall at the expense of the Company do and concur in doing and permit to be done all such acts and things as may be necessary or required by the Company in the interest of any rights or remedies, or obtaining relief or indemnity from parties (other than those insured under this Policy) to which the Company shall be or would become entitled or subrogated upon their paying for or making good any loss or damage under this Policy, whether such acts and things shall be or become necessary or required before or after the Insured's indemnification by the Company.

7. If any difference shall arise as to the amount to be paid under this Policy (liability being otherwise admitted) such difference shall be referred to the decision of an Arbitrator to be appointed in writing by the parties in difference or if they cannot agree upon a single Arbitrator to the decision of two Arbitrators, one to be appointed in writing by each of the parties, within one calendar month after having been required in writing so to do by either of the parties, or, in case the Arbitrators do not agree, of an Umpire to be appointed in writing by the Arbitrators before entering upon the reference. The Umpire shall sit with the Arbitrators and preside at their meetings. The making of an award shall be a condition precedent to any right of action against the Company.

Section II
Third Party Liability

Insured Items	Limits of Indemnity * 2)	Deductibles
1. Bodily Injury 1.1 Anyone person	Rs. 5,000,000.00	
1.2 Total	Rs. 5,000,000.00	
2. Property	Rs. 5,000,000.00	10% or Rs.25,000/- whichever is higher on each & every Claim
Total Limit of Indemnity in the aggregate	Rs. 1,500,000.00	

* 2) Limit of Indemnity in respect of any one accident or series of accidents arising out of one event

Period of Insurance :
(subject to the provisions concerning period of cover)

Construction	From :02.02.2016	To :15.11.2016
Maintenance	From :16.11.2016	To :15.11.2017

The following endorsements are attached to and form part of this Policy :

MR 109 - Warranty Concerning Construction Material
MR 111 - Special Conditions concerning removal of debris from landslides
- Premium Payment Warranty
- Political Risks Exclusion Endorsement
- Radioactive Contamination, Chemical, Biological, Bio-Chemical and Electromagnetic Weapons Exclusion Clause).

Total Premium : Rs. 35,475.00

(Inclusive of extra premium for the above mentioned endorsements)

Ceylinco General Insurance Limited

In witness whereof the Undersigned being duly authorised by the Company and on behalf of the Company has/have hereunto set his/their hands (s)

at Colombo on this 01st day of February 2016.

pb

Policy No. CO1316NC0019314

Schedule

Name & Address of Insured		**Title of Contract :**	The Pilot project for landslide and Rock Fall mitigation works under the technical cooperation for Landslide Mitigation Project (Lot 2)
(a) Principal :	Japan International Cooperation Agency 10th and 13th Floors, DHPL Building No.42, Nawam Mawatha, Colombo 02.	**Site of Construction :**	
(b) Contractor (s) :	Geo-Engineering Consultants (Pvt) Ltd No.929/18, Kahadawala Road, Thalangama North, Malabe.		

Section 1 - Material Damage	Insured Items	Sum Insured (Rs.)	Deductible
	1. Contract Work (Permanent and Temporary work including all materials to be incorporated herein	14,190,000.00	10% or Rs.75,000/- whichever is higher on each & every Claim
	1.1 Contract Price		
	1.2 Materials or items supplied by the Principal (s)		
	2. Construction Plant and Equipment	Nil	
	3. Construction Machinery according to attached list	Nil	
	4. Clearance of Debris	Nil	
	5. Existing building(s) and / or structures on or adjacent to the construction site, owned by or held in the care/custody of the contractor and / or principal	Nil	
		14,190,000.00	

Risk	Limits of Indemnity * 1)	Deductibles
Earthquake, Volcanism Tsunami, Storm, Cyclone, Flood, Inundation (Acts of God)	As per section I	10% or Rs.200,000/- whichever is higher on each & every Claim

* 1) Limits of indemnity in respect of each and every loss or damage and / or series of losses or damages arising out of any one event

ENDORSEMENTS ATTACHING TO AND FORMING PART OF
POLICY NO. CO1316NC0019314

MR 109 WARRANTY CONCERNING CONSTRUCTION MATERIAL

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the insured for loss, damage or liability directly or indirectly caused to construction material by flood and inundation if such construction material does not exceed three days demand and the exceeding quantities are kept in areas not endangered by 10 years floods.

MR 111 SPECIAL CONDITIONS CONCERNING REMOVAL OF DEBRIS FROM LANDSLIDES

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall not indemnify the Insured in respect of :

- Expenses incurred for the removal of debris from landslides in excess of the costs of excavating the original material from the area affected by such landslides.
- Expenses incurred for the repair of eroded slopes or other graded areas if the insured has failed to take the measures required or to take them in time

Deductible : 15% or Rs. 1,000,000.00 whichever is higher on each & every claim

Special Exclusion:

Earth slips and Mud slips are excluded.

CEYLINCO GENERAL INSURANCE LIMITED

Authorized Officer

PREMIUM PAYMENT WARRANTY

1. Notwithstanding anything herein contained but subject to clause 2 and 3 hereof, it is hereby agreed and declared that the full premium due and payable in respect of this insurance is required to be settled to the Insurer (The Company) on or before the premium due date specified in the Schedule of this Policy, Renewal Certificate, Endorsement or Cover Note (which shall be a date not exceeding 60 days from the date of inception of the policy) and in the absence of any such premium due date, the full settlement of the premium is required to be made or effected on or before the expiry of the 60th day from the date of inception of this Policy, Renewal Certificate, Endorsement or Cover Note (hereinafter referred to as the "due date").

   For the purpose of this warranty the "due date" shall be recognized from the date of inception or commencement of the coverage.

2. It is also declared and agreed that the settlement of the full premium on or before the due date shall operate as a condition precedent to the insurer's (The Company's) liability or an obligation to settle a claim under this Policy, Renewal Certificate, Endorsement or Cover Note.

   In the event any claim arises between date of commencement of this insurance and the "due date" for the settlement of premium, the insurer (The Company) may defer any decision on liability or postpone the settlement of any such claim until full settlement of the premium is effected on or before the "due date".

3. It is also declared and agreed that where the full premium payable hereunder remains outstanding as at the closure of business of the insurer on the "due date", then the cover under this insurance and any obligations assumed or imputed under this insurance shall stand to be cancelled, ceased and revoked immediately.

   However such cancellation will not prejudice the rights of the insurer (The Company) to invoke any legal defenses or to recover the full or any part of the defaulted premium attributable to the expired period of the insurance.

Subject otherwise to the terms, conditions and exceptions of the policy.

CEYLINCO GENERAL INSURANCE LIMITED

Authorised Officer

PREMIUM PAYMENT WARRANTY

1. Notwithstanding anything herein contained but subject to clause 2 and 3 hereof, it is hereby agreed and declared that the full premium due and payable in respect of this insurance is required to be settled to the Insurer (The Company) on or before the premium due date specified in the Schedule of this Policy, Renewal Certificate, Endorsement or Cover Note (which shall be a date not exceeding 60 days from the date of inception of the policy) and in the absence of any such premium due date, the full settlement of the premium is required to be made or effected on or before the expiry of the 60th day from the date of inception of this Policy, Renewal Certificate, Endorsement or Cover Note (hereinafter referred to as the "due date").

   For the purpose of this warranty the "due date" shall be recognized from the date of inception or commencement of the coverage.

2. It is also declared and agreed that the settlement of the full premium on or before the due date shall operate as a condition precedent to the insurer's (The Company's) liability or an obligation to settle a claim under this Policy, Renewal Certificate, Endorsement or Cover Note.

   In the event any claim arises between date of commencement of this insurance and the "due date" for the settlement of premium, the insurer (The Company) may defer any decision on liability or postpone the settlement of any such claim until full settlement of the premium is effected on or before the "due date".

3. It is also declared and agreed that where the full premium payable hereunder remains outstanding as at the closure of business of the insurer on the "due date", then the cover under this insurance and any obligations assumed or imputed under this insurance shall stand to be cancelled, ceased and revoked immediately.

   However such cancellation will not prejudice the rights of the insurer (The Company) to invoke any legal defenses or to recover the full or any part of the defaulted premium attributable to the expired period of the insurance.

Subject otherwise to the terms, conditions and exceptions of the policy.

CEYLINCO GENERAL INSURANCE LIMITED

Authorised Officer

CLAUSE 1

RADIOACTIVE CONTAMINATION, CHEMICAL, BIOLOGICAL, BIO-CHEMICAL AND ELECTROMAGNETIC WEAPONS EXCLUSION CLAUSE

This clause shall be paramount and shall override anything contained in this insurance inconsistent therewith.

1. In no case shall this insurance cover loss damage liability or expense directly or indirectly caused by or contributed to by or arising from.

1.1 ionising radiations from or contamination by radioactivity from any nuclear fuel or from any nuclear waste or from the combustion of nuclear fuel.

1.2 the radioactive, toxic, explosive or other hazardous or contaminating properties of any nuclear installation, reactor or other nuclear assembly or nuclear component thereof.

1.3 any weapon or device employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.

1.4 the radioactive, toxic, explosive or other hazardous or contaminating properties of any radioactive matter. The exclusion in this sub-clause does not extend to radioactive isotopes, other than nuclear fuel, when such isotopes are being prepared, carried, stored or used for commercial, agricultural, medical, scientific or other similar peaceful purposes./;

1.5 any chemical, biological, bio-chemical release or exposure of any kind, or electromagnetic weapon.

CYBER ATTACK EXCLUSION CLAUSE

1.1 Subject only to clause 1.2 below, in no case shall this insurance cover loss damage liability or expense directly or indirectly caused by or contributed to by or arising from the use or operation, as a means for inflicting harm, of any computer, computer system, computer software programme, malicious code, computer virus or process or any other electronic system.

1.2 Where this clause is endorsed on policies covering risks of war, civil war, revolution, rebellion, insurrection, or civil strike arising therefrom, or any hostile act by or against a belligerent power, or terrorism or any person acting from a political motive, Clause 1.1 shall not operate to exclude losses (which would otherwise be covered) arising from the use of any computer, computer system or computer software programme or any other electronic system in the launch and/or guidance system and/or firing mechanism of any weapon or missile

CEYLINCO GENERAL INSURANCE LIMITED

AUTHORISED OFFICER

8. If a claim is in any respect fraudulent, or if any false declaration is made or used in support thereof, or if any fraudulent means or devices are used by the Insured or anyone acting on his behalf to obtain any benefit under this Policy, or if a claim is made and rejected, and no action or suit is commenced within three months after such rejection or, in case of arbitration taking place as provided hereinwithin three months after the Arbitrator/or Arbitrators or Umpire have made their award, all benefit under this Policy shall be forfeited.

9. If at the time any claim arises under this Policy there be any other insurance covering the same loss, damage or liability the Company shall not be liable to pay or contribute more than their rateable proportion of any claim for such loss, damage or liability.

Section 1 - Material Damage - Policy No.

The Company hereby agree with the Insured that if at any time during the period of cover the items or any part thereof entered in the Schedule shall suffer any unforeseen and sudden physical loss or damage from any cause, other than those specifically excluded, in a manner necessitating repair or replacement, the Company will indemnify the Insured in respect of such loss or damage as hereinafter provided by payment in cash, replacement, or repair (at their own option) up to an amount not exceeding in respect of each of the items specified in the Schedule the sum set opposite thereto and not exceeding in any one event the limit of indemnity where applicable and not exceeding in all the total sum expressed in the schedule as insured hereby.

The Company will also reimburse the Insured for the cost of clearance of debris following upon any event giving rise to a claim under this policy provided a separate sum therefore has been entered in the Schedule.

SPECIAL EXCLUSIONS TO SECTION 1

The Company shall not, however be liable for;

a) the deductible stated in the Schedule to be borne by the Insured in any one occurrence;

b) Consequential loss of any kind or description whatsoever including penalties, losses due to delay, lack of performance, loss of contract;

c) loss or damage due to the faulty design;

d) the cost of replacement, repair or rectification of defective material and/or workmanship, but this exclusion shall be limited to the items immediately affected and shall not be deemed to exclude loss of or damage to correctly executed items resulting from an accident due to such defective material and / or workmanship;

e) wear and tear, corrosion, oxidation, deterioration due to lack of use and normal atmospheric conditions;

f) mechanical and / or electrical breakdown or derangement of construction plant, equipment and construction machinery;

g) loss of or damage to vehicles licensed for general road use or water borne vessels or aircraft;

h) loss of or damage to files, drawings, accounts, bills, currency, stamps, deeds, evidences of debt, notes, securities, cheques;

i) loss or damage discovered only at the time of taking an inventory;

j) buildings constructed of cadjan (cadjan walls and/or cadjan roofs) and materials stored in buildings of same or similar construction, if an;

Provisions applying to Section 1

MEMO 1- SUMS INSURED: It is a requirement of this insurance that the sums insured stated in the Schedule shall not be less than for Items 1: the full value of the contract works at the completion of the construction, inclusive of all materials, wages, freight, customs duties, dues, and materials or items supplied by the Principal.

for items 2 and 3: the replacement value of construction plant, equipment and construction machinery; which shall mean the cost of replacement of the insured items by new items of the same kind and same capacity.

and the insured undertakes to increase or decrease the amounts of insurance in the event of any material fluctuation in wages or prices provided always that such increase or decrease shall take effect only after the same has been recorded on the Policy by the Company.

If, in the event of loss or damage, it is found that the sums insured are less than the amounts required to be insured, then the amount recoverable by the Insured under this Policy shall be reduced in such proportions as the sums insured bear to the amounts required to be insured. Every object and cost item is subject to this condition separately.

MEMO 2- BASIS OF LOSS SETTLEMENT:In the event of any loss or damage the basis of any settlement under this Policy shall be

a) in the case of damage which can be repaired - the cost of repairs necessary to restore the items to their condition immediately before the occurrence of the damage less salvage, or

b) in the case of a total loss - the actual value of the items immediately before the occurrence of the loss less salvage, however, only to the extent the costs claimed had to be borne by the Insured and to the extent they are included in the sums insured and provided always that the provisions and conditions have been complied with.

The Company will make payments only after satisfied by production of the necessary bills and documents that the repairs have been effected or replacement has taken place, as the case may be. All damage which can be repaired shall be repaired, but if the cost of repairing any damage equals or exceeds the value of the items immediately before the occurrence of the damage, the settlement shall be made on the basis provided for in (b) above.

The cost of any provisional repairs will be borne by the Company, if such repairs constitute part of the final repairs and do not increase the total repair expenses.

The cost of any alterations, additions and / or improvements shall not be recoverable under this Policy.

MEMO 3 - EXTENSION OF COVER: Extra charges for overtime, nightwork, work on public holidays, express freight are covered by this insurance only if previously and specifically agreed upon in writing.

Section II - Third Party Liability - Policy No.

The Company will indemnify the Insured up to but not exceeding the amounts specified in the Schedule against such sums which the Insured shall become legally liable to pay as damages consequent upon

a) accidental bodily injury to or illness of third parties (whether fatal or not)

b) accidental loss or damage to property belonging to third parties

Occurring in direct connection with the construction or erection of the items insured under section 1 and happening on or in the immediate vicinity of the site during the Period of Cover.

In respect of a claim for compensation to which the indemnity provided herein applies, the Company will in addition indemnify the Insured against.

a) All costs and expenses of litigation recovered by any claimant from the Insured, and

b) All costs and expenses incurred with the written consent of the Company.

provided always that the liability of the Company under this section shall not exceed the limits of indemnity stated in the Schedule.

Special Exclusions to Section II

The Company will not indemnify the Insured in respect of

1. the deductible stated in the Schedule to be borne by the Insured in any on occurrence;

2. the expenditure incurred in doing or redoing or making good or repairing or replacing anything covered or coverable under Section I of this Policy.

3. damage to any property or land or building caused by vibration or by the removal or weakening of support or injury or damage to any person or property occasioned by or resulting from any such damage (unless especially agreed upon by endorsement).

4. liability consequent upon

a) bodily injury to or illness of employees or workmen of the Contractor(s) or the Principal(s) or any other firm connected with the project which or part of which is insured under Section I, or members of their families;

b) loss of or damage to property belonging to or held in care, custody or control of the Contractor(s) the Principal(s) or any other firm connected with the project which or part of which is insured under Section I, or an employee or workman of one of the aforesaid;

c) any accident caused by vehicles licensed for general road use or by water borne vessels or aircraft,

d) any agreement by the Insured to pay any sum by way of indemnity or otherwise unless such liability would have attached also in the absence of such agreement.

Special Conditions Applying to Section II

1. No admission, offer, promise, payment of indemnity shall be made or given by or on behalf of the Insured without the written consent of the Company who shall be entitled, if they so desire, to take over and conduct in the name of the Insured the defence or settlement of any claim or to prosecute for their own benefit in the name of the Insured any claim for indemnity or damages or otherwise and shall have full discretion in the conduct of any proceedings or in the settlement of any claim and the Insured shall give all such information and assistance as the Company may require.

2. The Company may so far as any accident is concerned pay to the Insured the limit of indemnity for any one accident (but deducting therefrom in such case any sum or sums already paid as compensation in respect thereof) or any lesser sum for which the claim or claims arising from such accident can be settled and the Company shall thereafter by under no further liability in respect of such accident under this section.

CEYLINCO GENERAL INSURANCE LIMITED

RENEWAL - MISCELLANEOUS DEPT
PERSONAL ACCIDENT

POLICY NO : COMS11AP0004382 ENDORSEMENT NO : CO1317APN0000108 DATE : 02-FEB-201

INSURED : GEO ENGINEERING CONSULTANTS (PVT) LTD

It is hereby declared and agreed that the cover granted by the within written policy is renewed for a further period of one year with effect from 11-FEB-17, as per details appearing in the schedule attached.

In consequence of the above a Renewal Premium of Rs.17,437.58 is hereby charged to the insured.

Subject otherwise to the terms, conditions and exceptions of the within written policy.

CEYLINCO GENERAL INSURANCE LIMITED

Ceylinco General Insurance Limited

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AUTHORISED OFFICER

Debit Note No : CO1317D0014813 of 02-FEB-2017

Sri Lanka, We Believe

CEYLINCO VIP ON THE SPOT

CEYLINCO GENERAL INSURANCE LIMITED PB 5184

PREMIUM PAYMENT WARRANTY

1. Notwithstanding anything herein contained but subject to clause 2 and 3 hereof, it is hereby agreed and declared that the full premium due and payable in respect of this insurance is required to be settled to the Insurer (The Company) on or before the premium due date specified in the Schedule of this Policy, Renewal Certificate, Endorsement or Cover Note (which shall be a date not exceeding 60 days from the date of inception of the policy) and in the absence of any such premium due date, the full settlement of the premium is required to be made or effected on or before the expiry of the 60th day from the date of inception of this Policy, Renewal Certificate, Endorsement or Cover Note (hereinafter referred to as the "due date").

   For the purpose of this warranty the "due date" shall be recognized from the date of inception or commencement of the coverage.

2. It is also declared and agreed that the settlement of the full premium on or before the due date shall operate as a condition precedent to the insurer's (The Company's) liability or an obligation to settle a claim under this Policy, Renewal Certificate, Endorsement or Cover Note.

   In the event any claim arises between date of commencement of this insurance and the "due date" for the settlement of premium, the insurer (The Company) may defer any decision on liability or postpone the settlement of any such claim until full settlement of the premium is effected on or before the "due date".

3. It is also declared and agreed that where the full premium payable hereunder remains outstanding as at the closure of business of the insurer on the "due date", then the cover under this insurance and any obligations assumed or imputed under this insurance shall stand to be cancelled, ceased and revoked immediately.

   However such cancellation will not prejudice the rights of the insurer (The Company) to invoke any legal defenses or to recover the full or any part of the defaulted premium attributable to the expired period of the insurance.

Subject otherwise to the terms, conditions and exceptions of the policy.

CEYLINCO GENERAL INSURANCE LIMITED

Authorised Officer

CEYLINCO GENERAL INSURANCE LIMITED FB5184

02-FEB-17 04:50 PM

UREKA

Schedule attaching & forming part of Policy No: COMS11AP0004382

Endorsement No: CO1317APN0000108

Item No	Name of Insured	Capital Benefit	Temporary Total Disable't (Per Week)	Temporary Partial Disable't (Per Week)	Initial Premium	Strike,Riots & Civil Commotion Premium	Terrorism Premium	Annua Premiu (Include S & RS)
		Rs.	Rs.	Rs	Rs.	Rs.	Rs.	Rs.
1	P.P.K.M.C.B. KULATHUNGA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
2	K.A.JAYANTHA UPUL KUMARA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
3	K.M. CHANDRASIRI	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
4	E.H.G. DAMITH NUWAN WIJERATHNE	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
5	J. A. S. SENARATHNE	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
6	D.T. CHAMINDA BANDARA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
7	E.D.P. SANDARUWAN WICKRAMASOORIYA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
8	K.M.CHAMINDA DAYASIRI	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
9	G.D.S. WASANTHA KUMARA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
10	D.G.G.S.JAYASINGHE	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
11	M.A.SANATH PIYATHILAKE	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
12	S.A.D. SAMAN INDRASENA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
13	O. K. J. PATHMASIRI	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
14	KUDAGAMAGE CHANDRASIRI	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
15	UDAKANDAGE GAMINI	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
16	M. I. S. JAYAWARDENA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
17	R.M.K.MAHINDA BANDARA	500,000.00	1,500.00	450.00	750.00	187.50	0.00	937.5
		Total				3,187.50	0.00	15,937

Yours faithfully,
CEYLINCO GENERAL INSURANCE LIMITED.

Authorized Officer.

CEYLINCO GENERAL INSURANCE LIMITED PB 5184

02 FEB 2017

Dear Sir(s)/Madam

PERSONAL ACCIDENT INSURANCE POLICY NO : COMS11AP0004382
INSURED : GEO ENGINEERING CONSULTANTS (PVT) LTD

We thank you for having placed your insurance business with us and are pleased to forwa herewith your policy documents / renewal endorsements. (policy terms and conditions anc the schedule ect,) with the details of the coverage.

THE POLICY COVERS THE FOLLOWING:

Death or total disablement and/or partial disablement as a result of an accident caused to the insured person on a 24hour worldwide basis.

EXTENSION WHICH CAN BE OBTAIN BY PAYMENT OF AN ADDITIONAL PREMIUM

1) Terrorism (This coverage is provided by National Insurance Trust Fund for Terrorism).

Perils	Coverd	Not Covered
STRIKE, RIOT'S & CIVIL COMMOTION	X	
TERRORISM		X
MOTOR CYCLING COVER	X	
TEMPORARY TOTAL DISABLEMENT	X	
TEMPORARY PARTIAL DISABLEMENT	X	
ACCIDENTIAL HOSPITAL BENEFIT		X
TRAVELLING ALLOWANCES		X

Weekly Benefits

Weekly benefits are payable in the event of temporary total disablement and temporary partial disablement .In both instances the maximum payable is for 52 weeks, if the injury exceeds 52 week. compensation but yet an employee is not fit for work a Specialist's Opinion is obtained for final the claim on a percentage recommended by him deducting whatever compensation already paid to the claimant during the period of 52 weeks. No payment shall be made under weekly benefits due to Str Riot & Civil Commotion and Terrorism.

For Exclusions please refer the Policy Document.

Please note that the contents of this letter do not in any manner supersede the terms and conditi of the policy issued to you.

Note:
Please find the "Premium payment warranty" attached herewith for your necessary information.

Whilst thanking you, please sign and return the copy of this letter and retain the original for y records

Ceylinco General Insurance

.... 09/02/17 .....

01st February 2016

Dear Sir,

CONTRACTORS ALL RISKS POLICY NO. CO1316NC0019314
INSURED : GEO ENGINEERING CONSULTANTS (PVT) LTD

THE POLICY WILL COVER THE FOLLOWING :

Loss or damage to the works and materials due to explosion , fire, lightning , water damage, flood, storm & tempest, collapse, collision, impact, accidental damages during construction, burglary , theft..

Section 1 - Material Damage

At any time during the period of cover due to any unforeseen and sudden physical loss or damage from any cause other than those specifically excluded. This will not exceed in any one event the limit of indemnity where applicable and not exceeds in all the total sum expressed in the Schedule as insured hereby.

Section II - Third Party Liability

The Company will indemnify the insured up to but not exceeding the amounts specified in the Schedule against such sums which the Insured shall become legally liable to pay as damages consequent upon

a) accidental bodily injury to or illness of third parties (whether fatal or not)
b) accidental loss or damage to property belong to third parties

Occurring in direct connection with the construction or erection of the items insured under Section I and happening on or in the immediate vicinity of the site during the Period of Cover

Excess :

a)10% or Rs. 200,000/- whichever is higher on each & every claim (On Acts of God)
b)10% or Rs. 75,000/- whichever is higher on each & every claim (On Others)
c)10% or Rs. 25,000/- whichever is higher on each & every claim (On Third Party Property Damage)

FOLLOWING COVERS ARE AVAILABLE BY PAYMENT OF AN ADDITIONAL PREMIUM

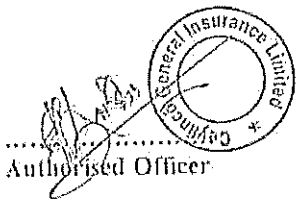
01) Strike, Riot & Civil Commotion and Terrorism (these two coverages are provided by National Insurance Trust Fund for Strike, Riot and Civil Commotion and Terrorism limits of which are indicated in the Endorsement.)
02) Extended Maintenance
03) Cover for Extra Charges for Overtime Night Work & Express freight (Excluding Air Freight)
04) Cover for Extra Charges for Air freight
05) Cover for Existing Structure and/or Surrounding Property
06) Cover for Designer's Risk
07) Principals existing property or property belonging to or held in care, custody or control by the insured
08) Vibration, Removal or weakening of support
09) Clearance of debris

For exclusions please refer the policy documents.

If you insured your property less than the adequate price, accordingly you will have to bear a portion of each and every claim (condition of Average)

Please note that the contents of this letter do not in any manner supersede the terms & conditions of the Policy issued to you.

Whilst thanking you, please sign and return one copy of this letter and retain the other copy for your records.



.....
Authorised Officer

.....
Signature of Insured
With Rubber Stamp

01/04/16
.....
Date

Annexure 03:

Concrete test results

[redacted]

CLIENT : GEO ENGINEERING CONSULTANT PVT LTD

ENGINEER : NATIONAL BUILDING RESEARCH ORGANIZATION

DETERMINATION OF COMPRESSIVE STRENGTH OF TEST CUBES

Test No	Cube no	Structure/ Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
SDB/01	CD/21	C-D (07-17)	Base Concrete	15	5-Nov-16	12-Nov-16	7	8515	2.523	2.530	342.6	15.2	15.5	15.0
	CD/22							8536	2.529		357.5	15.9		
								8581	2.528		341.6	15.2		
SDB/01	CD/23	C-D (07-17)	Base Concrete	15	5-Nov-16	3-Dec-16	28	8574	2.540	2.570	466.0	20.4	20.5	
	CD/24							8623	2.555		456.0	20.3		
								8671	2.628		465.2	20.7		
SDB/02	CD/25	C-D (07-17)	Wall Concrete	15	10-Nov-05	16-Nov-16	7	8412	2.493	2.490	307.8	13.7	13.5	15.0
	CD/26							8356	2.479		294.9	13.1		
								8410	2.492		310.5	13.8		
SDB/03	CD/27	C-D (07-17)	Wall Concrete	15	10-Nov-16	7-Dec-16	28	8485	2.514	2.520	462.2	20.5	20.5	
	CD/28							8452	2.504		451.2	20.1		
								8550	2.533		475.1	21.1		
SDA/01	DH/11	D-H (85-90)	Wall Concrete	15	12-Nov-16	19-Nov-16	7	8539	2.530	2.520	320.7	14.3	14.5	15.0
	DH/12							8510	2.521		333.7	14.8		
	DH/13							8457	2.506		336.6	15.0		
SDA/02	DH/14	D-H (85-90)	Wall Concrete	15	12-Nov-16	9-Dec-16	7	8650	2.565	2.560	306.1	13.6	14.5	
	DH/15							8526	2.526		334.0	14.8		
	DH/16							8725	2.585		354.0	15.7		
SDA/03	DH/17	D-H (80-85)	Wall Concrete	15	14-Nov-16	20-Nov-16	28	8222	2.436	2.450	506.1	22.5	23.5	15.0
	DH/18							8218	2.435		543.0	24.1		
	DH/19							8325	2.467		554.0	24.6		
SDA/04	DH/20	D-H (80-85)	Wall Concrete	15	14-Nov-16	11-Dec-16	7	8134	2.410	2.439	346.6	15.4	15.0	
	DH/21							8232	2.439		336.6	15.0		
	DH/22							8205	2.431		341.6	15.2		
SDA/05	DH/23	D-H (75-80)	Wall Concrete	15	17-Nov-16	20-Nov-16	28	8328	2.466	2.460	464.0	20.6	21.0	15.0
	DH/24							8287	2.455		484.0	21.5		
	DH/25							8307	2.461		476.0	21.2		
SDA/06	DH/26	D-H (75-80)	Wall Concrete	15	17-Nov-16	14-Dec-16	7	8397	2.488	2.440	315.3	14.0	14.5	
	DH/27							8239	2.441		336.2	14.9		
	DH/28							8113	2.404		319.3	14.2		

Prepared by : Rishad
(Eng. Geologist/Site Eng.)

Geo Engineering Consultants (Pvt) Ltd GEC P.V. 60859

Checked and Approved by : [redacted] (Susantha/Technical officer)
(National Building research Organization)

P[redacted]T : [redacted]SLI[redacted]TIG[redacted]N PE[redacted]T AT[redacted]MA[redacted] IN [redacted]RA [redacted]A DI[redacted]T

CLIENT : GEO ENGINEERING CONSULTANT PVT LTD

ENGINEER : NATIONAL BUILDING RESEARCH ORGANIZATION

DETERMINATION OF COMPRESSIVE STRENGTH OF TEST CUBES

Test no	Cube no	Structure/ Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
SDB/01	CD/21	C-D (07-17)	Base Concrete	15	6-Nov-16	12-Nov-16	7	8515	2.523	2.530	342.6	15.2	15.5	15.0
	CD/22							8536	2.529		357.5	15.9		
								8531	2.528		341.6	15.2		
SDB/01	CD/23	C-D (07-17)	Base Concrete	15	6-Nov-16	3-Dec-16	28	8574	2.540	2.570	458.0	20.4	20.5	
	CD/24							8623	2.555		455.0	20.3		
								8871	2.628		465.2	20.7		
SDB/02	CD/25	C-D (07-17)	Wall Concrete	15	10-Nov-06	16-Nov-16	7	8412	2.492	2.490	307.8	13.7	13.5	15.0
	CD/26							8366	2.479		294.9	13.1		
								8410	2.492		310.5	13.8		
SDB/03	CD/27	C-D (07-17)	Wall Concrete	15	10-Nov-16	7-Dec-16	28	8485	2.514	2.520	462.2	20.5	20.5	
	CD/28							8452	2.504		451.2	20.1		
								8550	2.533		475.1	21.1		
SDA/01	DH/11	D-H (85-90)	Wall Concrete	15	12-Nov-16	18-Nov-16	7	8539	2.530	2.520	320.7	14.3	14.5	15.0
	DH/12							8510	2.521		333.7	14.8		
	DH/13							8457	2.506		336.6	15.0		
SDA/02	DH/14	D-H (85-90)	Wall Concrete	15	12-Nov-16	9-Dec-16	7	8660	2.566	2.550	306.1	13.6	14.5	
	DH/15							8526	2.526		334.0	14.8		
	DH/16							8725	2.585		354.0	15.7		
SDA/03	DH/17	D-H (80-85)	Wall Concrete	15	14-Nov-16	20-Nov-16	28	8222	2.435	2.450	506.1	22.5	23.5	15.0
	DH/18							8218	2.435		543.0	24.1		
	DH/19							8325	2.467		554.0	24.6		
SDA/04	DH/20	D-H (80-85)	Wall Concrete	15	14-Nov-16	11-Dec-16	7	8134	2.410	2.430	346.6	15.4	15.0	
	DH/21							8232	2.439		336.6	15.0		
	DH/22							8205	2.431		341.6	15.2		
SDA/05	DH/23	D-H (75-80)	Wall Concrete	15	17-Nov-16	23-Nov-16	28	8328	2.468	2.460	464.0	20.6	21.0	15.0
	DH/24							8287	2.455		484.0	21.5		
	DH/25							8307	2.461		478.0	21.2		
SDA/06	DH/26	D-H (75-80)	Wall Concrete	15	17-Nov-16	14-Dec-16	7	8397	2.488	2.440	315.3	14.0	14.5	
	DH/27							8239	2.441		336.2	14.9		
	DH/28							8113	2.404		319.3	14.2		

Prepared by : Rishad (Eng. Geologist / Site Eng)

GEO Engineering Consultants (Pvt) Ltd GEC P.V. 69859

Checked and Approved by : [signature] (Susantha / Technical Officer) (National Building research Organization)

Test no	Cube no	Structure/ Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
SDB/04	CD/30	C-D (17-24)	Base Concrete	15	24-Nov-16	30-Nov-16	28	8041	2.383	2.410	523.1	23.2	24.0	15.0
	CD/31							8206	2.431		519.1	23.1		
	CD/32							8109	2.403		583.0	25.9		
SDB/05	CD/35	C-D (17-24)	Base Concrete	15	24-Nov-16	21-Dec-16	7	8078	2.393	2.402	340.6	15.1	14.0	
	CD/36							8084	2.395		314.6	14.0		
	CD/37							8160	2.418		299.8	13.3		
SDB/06	CD/38	C-D (17-24)	Wall Concrete	15	26-Nov-16	2-Dec-16	28	8241	2.442	2.460	529.6	23.5	21.5	15.0
	CD/39							8255	2.446		483.5	21.5		
	CD/40							8377	2.482		440.5	19.7		
SDB/07	CD/41	C-D (17-24)	Wall Concrete	15	26-Nov-16	23-Dec-16	7	8163	2.419	2.460	295.0	13.2	13.0	
	CD/42							8287	2.455		293.9	13.1		
	CD/43							8458	2.506		292.9	13.0		
SDB/08	CD/44	C-D (02-07)	Base Concrete	15	29-Nov-16	5-Dec-16	28	8125	2.407	2.430	517.0	23.0	24.0	15.0
	CD/45							8216	2.435		568.1	25.2		
	CD/46							8274	2.452		523.0	23.2		
SDB/09	CD/47	C-D (02-07)	Base Concrete	15	29-Nov-16	26-Dec-16	7	8132	2.409	2.420	319.3	14.2	13.5	
	CD/48							8042	2.442		301.3	13.4		
	CD/49							8177	2.423		303.3	13.5		
SDB/10	CD/50	C-D (02-07)	Wall Concrete	15	2-Dec-16	8-Dec-16	28	8070	2.391	2.390	510.2	22.1	21.0	15.0
	CD/51							8103	2.401		504.0	22.4		
	CD/52							8030	2.379		400.1	17.9		
SDB/11	CD/53	C-D (02-07)	Wall Concrete	15	2-Dec-16	29-Dec-16	7	8099	2.400	2.410	322.7	14.3	14.0	
	CD/54							8110	2.403		333.0	14.8		
	CD/55							8176	2.423		294.9	13.1		
SDB/12	CD/56	C-D (34-50)	Base Concrete	15	3-Dec-16	9-Dec-16	7	8311	2.463	2.460	299.8	13.3	13.5	15.0
	CD/57							8300	2.459		294.9	13.1		
	CD/58							8331	2.471		304.8	13.5		
SDB/13	CD/59	C-D (34-50)	Base Concrete	15	3-Dec-16	30-Dec-16	28	8190	2.428	2.440	494.2	21.9	21.0	
	CD/60							8185	2.425		458.2	20.4		
	CD/61							8292	2.459		463.3	20.6		
SDB/14	CD/62	C-D (34-50)	Wall Concrete	15	4-Dec-16	10-Dec-16	7	8116	2.405	2.430	392.4	17.4	17.0	15.0
	CD/63							8298	2.459		374.5	16.6		
	CD/64							8162	2.424		382.4	17.0		
SDB/15	CD/65	C-D (34-50)	Wall Concrete	15	4-Dec-16	31-Dec-16	28	8258	2.447	2.470	562.0	25.0	24.0	
	CD/66							8356	2.479		539.6	23.9		
	CD/67							8337	2.470		546.5	24.3		

Prepared by: Rahul

GEC

Checked & approved by: Sunil

Test no	Cube No	Structure Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
SDA/09	DH/35	D-H (20-30)	Wall Concrete	15	3-Dec-16	9-Dec-16	7	8409	2.492	2.470	326.5	14.5	14.0	15.0
	DH/36							8273	2.451		310.0	13.5		
	DH/37							8345	2.473		305.7	13.6		
SDA/10	DH/38	D-H (20-30)	Wall Concrete	15	3-Dec-16	30-Dec-16	28	8165	2.425	2.410	533.0	23.7	23.5	
	DH/39							8086	2.396		515.1	22.9		
	DH/40							8110	2.403		542.0	24.1		
SDA/11	DH/41	D-H (30-40)	Wall Concrete	15	4-Dec-16	10-Dec-16	28	8268	2.450	2.430	504.1	22.4	22.5	15.0
	DH/42							8140	2.414		520.1	23.1		
	DH/42							8217	2.435		483.1	21.5		
SDA/12	DH/43	D-H (30-40)	Wall Concrete	15	4-Dec-16	31-Dec-16	7	8029	2.379	2.390	343.6	15.3	14.5	
	DH/44							8083	2.395		322.7	14.3		
	DH/45							8086	2.396		327.7	14.6		
SDA/13	DH/46	D-H (40-50)	Wall Concrete	15	6-Dec-16	16-Dec-16	7	8102	2.401	2.410	356.3	15.8	15.5	15.0
	DH/47							8076	2.393		371.3	16.5		
	DH/48							8250	2.444		312.4	13.9		
SAD/14	DH/49	D-H (40-50)	Wall Concrete	15	6-Dec-16	2-Jan-17	28	8291	2.457	2.460	581.1	25.8	24.5	
	DH/50							8125	2.407		547.1	24.3		
	DH/51							8541	2.531		536.0	23.8		
SDA/15	DH/52	D-H (54-57)	Wall Concrete	15	9-Dec-16	16-Dec-16	7	8251	2.445	2.450	365.5	16.2	15.5	15.0
	DH/53							8211	2.433		378.4	16.8		
	DH/54							8379	2.483		373.5	16.6		
SDA/16	DH/55	D-H (54-57)	Wall Concrete	15	9-Dec-16	5-Jan-17	7	8429	2.497	2.470	340.0	15.1	14.5	
	DH/56							8285	2.455		326.1	14.5		
	DH/57							8246	2.443		312.1	13.9		
SDA/17	DH/58	D-H (54-57)	Wall Concrete	15	10-Dec-16	16-Dec-16	28	8289	2.456	2.440	579.1	25.7	26.0	15.0
	DH/59							8143	2.413		578.2	25.7		
	DH/60							8270	2.450		594.4	26.4		
SDW/18	DH/61	D-H (54-57)	Wall Concrete	15	10-Dec-16	6-Jan-17	28	8370	2.480	2.470	508.1	22.6	25.0	
	DH/62							8240	2.441		574.1	25.5		
	DH/63							8295	2.488		592.4	26.3		
SDA/19	DH/64	D-H (65-75)	Wall Concrete	15	13-Dec-16	19-Dec-16	7	8494	2.517	2.490	370.5	16.5	16.5	15.0
	DH/65							8333	2.469		361.5	16.1		
	DH/66							8393	2.487		365.5	16.2		
SDA/20	DH/67	D-H (65-75)	Wall Concrete	15	13-12-2016	9-Jan-16	7	8312	2.463	2.470	365.0	16.2	16.5	
	DH/68							8362	2.478		379.0	16.8		
	DH/69							8359	2.477		372.0	16.5		
SDA/21	DH/70	D-H (60-65)	Wall Concrete	15	14-Dec-16	20-Dec-16	28	8118	2.405	2.440	471.5	21.0	21.5	15.0
	DH/71							8263	2.448		480.4	21.4		
	DH/72							8322	2.466		487.4	21.7		
SDA/22	DH/73	D-H (60-65)	Wall Concrete	15	14-Dec-16	10-Jan-17	28	8190	2.427	2.410	510.0	22.7	24.0	
	DH/74							8144	2.413		577.0	25.6		
	DH/75							8101	2.400		523.0	23.2		

Prepared by: Richard GEC Checked and Approved by: [illegible]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SDA/09	DH/35	D-H (20-30)	Wall Concrete	15	3-Dec-16	9-Dec-16	7	8409	2.482	2.470	326.6	14.5	14.0	15.0
	DH/36							8273	2.451		310.0	13.8		
	DH/37							8345	2.473		305.2	13.6		
SDA/10	DH/38	D-H (20-30)	Wall Concrete	15	3-Dec-16	30-Dec-16	28	8165	2.425	2.410	533.0	23.7	23.5	
	DH/39							8085	2.396		515.1	22.9		
	DH/40							8119	2.409		542.0	24.1		
SDA/11	DH/41	D-H (30-40)	Wall Concrete	15	4-Dec-16	10-Dec-16	28	8268	2.450	2.435	504.1	22.4	22.5	15.0
	DH/42							8149	2.414		520.1	23.1		
	DH/43							8217	2.435		483.1	21.5		
SDA/12	DH/43	D-H (30-40)	Wall Concrete	15	4-Dec-16	31-Dec-16	7	8029	2.379	2.390	343.6	15.3	14.5	
	DH/44							8083	2.396		323.7	14.3		
	DH/45							8095	2.399		327.2	14.6		
SDA/13	DH/46	D-H (40-50)	Wall Concrete	15	5-Dec-16	16-Dec-16	7	8102	2.401	2.410	356.2	15.8	15.5	
	DH/47							8076	2.393		371.3	16.5		
	DH/48							8250	2.444		312.4	13.9		
SDA/14	DH/49	D-H (40-50)	Wall Concrete	15	6-Dec-16	2-Jan-17	28	8291	2.457	2.460	581.1	25.8	24.5	
	DH/50							8125	2.407		547.1	24.3		
	DH/51							8541	2.531		535.0	23.8		
SDA/15	DH/52	D-H (54-57)	Wall Concrete	15	9-Dec-16	16-Dec-16	7	8251	2.445	2.450	365.5	16.2	15.5	15.0
	DH/53							8211	2.433		379.4	16.9		
	DH/54							8319	2.465		373.5	16.6		
SDA/16	DH/55	D-H (54-57)	Wall Concrete	15	9-Dec-16	5-Jan-17	7	8429	2.497	2.470	340.0	15.1	14.5	
	DH/56							8356	2.465		326.1	14.5		
	DH/57							8246	2.443		312.1	13.9		
SDA/17	DH/58	D-H (54-57)	Wall Concrete	15	10-Dec-16	16-Dec-16	28	8259	2.456	2.440	579.1	25.7	25.0	
	DH/59							8143	2.413		579.2	25.7		
	DH/60							8270	2.450		594.4	26.4		
SDA/18	DH/61	D-H (54-57)	Wall Concrete	15	10-Dec-16	6-Jan-17	28	8370	2.482	2.470	509.1	22.6	25.0	15.0
	DH/62							8240	2.441		574.1	25.5		
	DH/63							8395	2.488		532.4	29.3		
SDA/19	DH/64	D-H (65-75)	Wall Concrete	15	13-Dec-16	16-Dec-16	7	8494	2.517	2.490	370.5	16.5	16.5	
	DH/65							8333	2.469		391.5	16.1		
	DH/66							8283	2.487		365.5	16.2		
SDA/20	DH/67	D-H (65-75)	Wall Concrete	15	13-12-2016	9-Jan-16	7	8312	2.463	2.455	365.0	16.2	16.5	
	DH/68							8362	2.478		379.0	16.8		
	DH/69							8359	2.477		372.0	16.5		
SDA/21	DH/70	D-H (62-65)	Wall Concrete	15	14-Dec-16	28-Dec-16	28	8118	2.405	2.440	471.5	21.0	21.5	
	DH/71							8253	2.449		480.4	21.4		
	DH/72							8322	2.466		487.4	21.7		
SDA/22	DH/73	D-H (62-65)	Wall Concrete	15	14-Dec-16	10-Jan-17	28	8190	2.427	2.410	510.6	22.7	24.0	15.0
	DH/74							8144	2.413		577.0	25.6		
	DH/75							8121	2.409		523.0	23.2		

Prepared by : Richard

[redacted]

Checked and Approved by : [redacted]

Test no	Cube no	Structure/ Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specified Strength (N/mm² @ 28 Days)
SDB/16	CD/65	C-D (17-34)	Base Concrete	15	7-Dec-15	10-Dec-15	7	8061	2.394	1.600	341.1	15.2	10.5	15.0
	CD/67							8119	2.405		355.0	15.8		
									0.000			0.0		
SDB/17	CD/68	C-D (17-34)	Base Concrete	15	7-Dec-15	3-Jan-17	7	8152	2.415	1.600	330.9	14.7	10.5	
	CD/69							8050	2.385		354.0	15.7		
									0.000			0.0		
SDB/18	CD/70	C-D (50-77)	Base Concrete	15	9-Dec-15	16-Dec-15	28	8298	2.459	2.480	512.3	22.8	22.5	15.0
	CD/71							8386	2.485		534.2	23.7		
	CD/72							8409	2.492		478.0	21.2		
SDB/19	CD/73	C-D (50-77)	Base Concrete	15	9-Dec-15	5-Jan-15	28	8303	2.460	2.430	540.1	24.0	23.5	
	CD/74							8155	2.416		510.0	22.7		
	CD/75							8138	2.411		528.0	23.5		
SDB/20	CD/76	C-D (77-90)	Base Concrete	15	10-Dec-15	16-Dec-15	7	8365	2.479	2.470	358.2	15.9	15.0	15.0
	CD/77							8241	2.442		312.1	13.9		
	CD/78							8356	2.476		330.2	14.7		
SDB/21	CD/79	C-D (77-90)	Base Concrete	15	10-Dec-15	6-Jan-16	7	8541	2.531	2.480	355.8	15.8	15.0	
	CD/80							8241	2.442		344.5	15.3		
	CD/81							8356	2.475		305.8	13.6		
SDB/22	CD/82	C-D (60-70)	Wall Concrete	15	12-Dec-15	18-Dec-15	28	8412	2.492	2.500	472.1	21.0	20.5	15.0
	CD/83							8456	2.505		450.5	20.0		
	CD/84							8451	2.504		457.0	20.8		
SDB/23	CD/85	C-D (60-70)	Wall Concrete	15	12-Dec-15	8-Jan-17	28	8574	2.540	2.540	485.6	21.6	21.5	
	CD/86							8569	2.539		472.2	21.0		
	CD/87							8548	2.532		485.0	~~[illegible]~~		
SDB/24	CD/88	C-D (50-60)	Wall Concrete	15	14-Dec-15	23-Dec-16	7	8325	2.467	2.480	394.4	17.5	17.0	15.0
	CD/89							8456	2.505		379.1	16.9		
	CD/90							8321	2.465		381.0	16.9		
SDB/25	CD/91	C-D (50-60)	Wall Concrete	15	14-Dec-15	10-Jan-17	28	8455	2.505	2.500	474.5	21.1	21.0	
	CD/92							8361	2.477		476.4	21.2		
	CD/93							8450	2.504		478.7	21.3		
SDB/26	CD/94	C-D (70-90)	Wall Concrete	15	19-Dec-15	25-Dec-15	7	8256	2.446	2.450	352.4	16.1	15.0	15.0
	CD/95							8214	2.434		330.7	14.7		
	CD/96							8360	2.477		305.0	13.6		
SDB/27	CD/97	C-D (70-90)	Wall Concrete		19-Dec-15	15-Jan-17	28	8919	2.640	2.500	219.0	13.0	13.5	
	CD/98							8754	2.594		290.0	12.9		
	CD/99							8264	2.449		295.0	13.1		
SDA/23	DH/75	D-H (50-54)	Wall Concrete		15-Dec-15	21-Dec-15	7	8654	2.564	2.490	240.0	10.7	11.0	15.0
	DH/76							8235	2.440		259.0	11.3		
	DH/77							8234	2.469		260.0	11.6		
SDA/24	DH/78	D-H (50-54)	Wall Concrete		15-Dec-15	15-Jan-17	28	8910	2.640	2.550	425.0	18.9	18.5	
	DH/79							8991	2.664		415.0	18.4		
	DH/80							9001	2.667		395.0	17.6		
	DH/81							8750	2.593		255	11.3		

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Test no.	Cube ID	Structure Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specified Strength (N/mm² @ 28 Days)
SDA/25	DH/82	D-H (106-116)	wall concrete	15	1-Feb-17	7-Feb-17	7	8675	2.570	2.570	235	10.4	11.0	15.0
	DH/83							8630	2.557		245	10.9		
SDA/25	DH/84	D-H (106-116)	wall concrete	15	1-Feb-17	28-Feb-17	28	8700	2.578	2.580	480	21.3	21.0	
	DH/85							8670	2.569		460	20.4		
	DH/86							8780	2.601		470	20.9		
SDA/27	DH/87	D-H (101-106)	wall concrete	15	2-Feb-17	9-Feb-17	7	8850	2.622	2.630	245	10.9	11.0	15.0
	DH/88							8830	2.616		240	10.7		
	DH/89							8900	2.637		250	11.1		
SDA/28	DH/90	D-H (101-106)	wall concrete	15	2-Feb-17	1-Mar-17	28	8750	2.593	2.600	390	17.3	17.5	
	DH/91							8791	2.605		400	17.8		
	DH/92							8817	2.612		385	17.1		
SDA/29	DH/93	D-H (96-101.5)	wall concrete	15	4-Feb-17	10-Feb-17	7	8910	2.640	2.590	260	11.6	11.0	15.0
	DH/94							8720	2.584		245	10.9		
	DH/95							8630	2.557		230	10.2		
SDA/30	DH/96	D-H (96-101.5)	wall concrete	15	4-Feb-17	3-Mar-17	28	8725	2.585	2.510	350	15.6	15.5	
	DH/97							8530	2.527		370	16.4		
	DH/98							8140	2.412		320	14.2		
SDA/31	DH/99	D-H (96-116)	Shoulder	15	6-Feb-17	13-Feb-17	7	8734	2.588	2.570	240	10.7	10.5	15.0
	DH/100							8602	2.549		235	10.4		
	DH/101							8720	2.584		245	10.9		
SDA/32	DH/102	D-H (96-116)	Shoulder	15	6-Feb-17	6-Mar-17	28	8328	2.468	2.510	385	17.1	17.0	
	DH/103							8417	2.494		380	16.9		
	DH/104							8700	2.578		375	16.7		
SDA/33	DH/105	D-H (116-122)	Base	15	8-Feb-17	15-Feb-17	7	8135	2.410	2.459	240	10.7	10.5	15.0
	DH/106							8750	2.593		235	10.4		
	DH/107							7920	2.347		250	11.1		
SDA/34	DH/108	D-H (116-122)	Base	15	8-Feb-17	8-Mar-17	28	7920	2.347	2.380	340	15.1	15.0	
	DH/109							8112	2.404		335	14.9		
	DH/110							8050	2.385		350	15.6		
SDA/35	DH/111	D-H (116-122)	wall concrete	15	9-Feb-17	16-Feb-17	7	8340	2.471	2.440	230	10.2	10.0	15.0
	DH/112							8231	2.439		225	10.0		
	DH/113							8153	2.416		235	10.4		
SDA/36	DH/114	D-H (116-122)	wall concrete	15	9-Feb-17	9-Mar-17	28	8230	2.439	2.470	345	15.3	15.5	
	DH/115							8351	2.474		350	15.6		
	DH/116							8423	2.496		360	16.0		
SDA/37	DH/117	D-H (122-127)	Base & Shoulder	15	12-Feb-17	19-Feb-17	7	8350	2.474	2.560	240	10.7	10.5	15.0
	DH/118							8750	2.593		235	10.4		
	DH/119							8820	2.613		240	10.7		
SDA/38	DH/120	D-H (122-127)	Base & Shoulder	15	12-Feb-17	12-Mar-17	28	8452	2.504	2.520	360	16.0	17.0	
	DH/121							8325	2.467		380	16.9		
	DH/122							8782	2.602		395	17.6		
SDA/39	DH/123	D-H (122-127)	wall concrete	15	13-Feb-17	20-Feb-17	7	8750	2.593	2.560	240	10.7	11.0	15.0
	DH/124							8820	2.613		245	10.9		
	DH/125							8340	2.471		250	11.1		
SDA/40	DH/126	D-H (122-127)	wall concrete	15	13-Feb-17	13-Mar-17	28	8732	2.587	2.540	380	16.9	17.0	
	DH/127							8620	2.554		395	17.6		
	DH/128							8370	2.480		375	16.7		
SDA/41	DH/129	D-H (007-014)	Base concrete	15	17-Feb-17	24-Feb-17	7	8722	2.584	2.560	240	10.7	10.5	15.0
	DH/130							8620	2.554		235	10.4		
	DH/131							8618	2.553		240	10.7		
SDA/43	DH/135	D-H (007-014)	wall concrete	15	18-Feb-17	25-Feb-17	7	8920	2.643	2.640	240	10.7	10.5	15.0
	DH/136							8914	2.641		230	10.2		
	DH/137							8890	2.634		235	10.4		

[redacted]	[redacted]	[redacted] Location	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] (Days)	[redacted] (g)	[redacted] (g/cm³)	Average Density (g/cm³)	Load (kN)	[redacted] (N/mm²)	Average Strength (N/mm²)	[redacted] (N/mm² @ 28 Days)
SDA/46	DH/141	D-H (000-007)	wall concrete	15	20-Feb-17	27-Feb-17	7	8940	2.649	2.660	245	10.9	10.5	15.0
	DH/142							8995	2.665		230	10.2		
	DH/143							9006	2.668		250	11.1		
SDA/47	DH/147	D-H (000-003)	wall concrete	15	24-Feb-17	3-Mar-17	7	8920	2.643	2.639	240	10.7	10.5	15.0
	DH/148							8840	2.619		230	10.2		
	DH/149							8901	2.637		225	10.0		
SDA/49	DH/153	D-H (000-003)	Shoulder	15	27-Feb-17	6-Mar-17	7	8350	2.474	2.519	240	10.7	10.5	15.0
	DH/154							8470	2.510		235	10.4		
	DH/155							8520	2.524		245	10.9		
LSD/01	DM/01	Lower Slope	Base	15	23-Feb-17	2-Mar-17	7	8950	2.652	2.659	240	10.7	10.5	15.0
	DM/02							8942	2.649		225	10.0		
	DM/03							8930	2.646		230	10.2		
LSD/03	DM/07	Lower Slope	Dam	15	27-Feb-17	6-Mar-17	7	8340	2.471	2.490	225	10.0	10.5	15.0
	DM/08							8390	2.486		240	10.7		
	DM/09							8501	2.519		230	10.2		
LSD/05	DM/13	Lower Slope	Dam	15	1-Mar-17	7-Mar-17	7	8920	2.643	2.670	255	11.3	11.5	15.0
	DM/14							9010	2.670		260	11.6		
	DM/15							9120	2.702		275	12.2		
SDC/01	BD/01	B-D (000-017)	Base concrete	15	4-Feb-17	11-Feb-17	7	8250	2.444	2.489	260.0	11.6	11.5	15.0
	BD/02							8357	2.479		265.0	11.8		
	BD/03							8466	2.511		240.0	10.7		
SDC/02	BD/04	B-D (000-017)	Base concrete	15	4-Feb-17	4-Mar-17	28	8623	2.555	2.610	390.0	17.3	18.0	
	BD/05							8952	2.652		410.0	18.2		
	BD/06							8882	2.632		400.0	17.8		
SDC/03	BD/07	B-D (017-039)	Base concrete	15	5-Feb-17	12-Feb-17	7	8570	2.569	2.589	225.0	10.4	11.5	15.0
	BD/08							8560	2.536		267.0	11.9		
	BD/09							8910	2.640		285.0	12.7		
SDC/04	BD/10	B-D (017-039)	Base concrete	15	5-Feb-17	5-Mar-17	28	8502	2.519	2.540	410.0	18.2	17.5	
	BD/11							8489	2.515		360.0	16.0		
	BD/12							8695	2.576		400.0	17.8		
SDC/05	BD/13	B-D (39-70)	Base concrete	15	9-Feb-17	16-Feb-17	7	8562	2.537	2.520	245.0	10.9	10.5	15.0
	BD/14							8465	2.508		240.0	10.7		
	BD/15							8438	2.500		235.0	10.4		
SDC/06	BD/16	B-D (39-70)	Base concrete	15	9-Feb-17	9-Mar-17	28	8634	2.558	2.560	385.0	17.1	17.5	
	BD/17							8547	2.532		395.0	17.6		
	BD/18							8637	2.577		410.0	18.2		
SDC/07	BD/19	B-D (70-99)	Base concrete	15	12-Feb-17	19-Feb-17	7	8958	2.654	2.639	230.0	10.2	10.0	15.0
	BD/20							8756	2.594		225.0	10.0		
	BD/21							8902	2.638		225.0	10.0		
SDC/08	BD/22	B-D (70-99)	Base concrete	15	12-Feb-17	12-Mar-17	28	8692	2.575	2.570	390.0	17.3	17.5	
	BD/23							8637	2.559		385.0	17.1		
	BD/24							8557	2.565		415.0	18.4		
SDC/09	BD/25	B-D (100-119)	Base concrete	15	14-Feb-17	21-Feb-17	7	8551	2.583	2.550	225.0	10.0	10.5	15.0
	BD/26							8621	2.554		235.0	10.4		
	BD/27							8554	2.537		265.0	11.8		
SDC/11	BD/31	B-D (000-015)	wall concrete	15	21-Feb-17	28-Feb-17	7	8654	2.564	2.519	260.0	11.6	11.0	15.0
	BD/32							8357	2.476		235.0	10.4		
	BD/33							8425	2.495		240.0	10.7		
SDC/13	BD/37	B-D (15-35)	wall concrete	15	23-Feb-17	1-Mar-17	7	8960	2.655	2.599	245.0	10.9	10.5	15.0
	BD/38							8623	2.555		225.0	10.0		
	BD/39							8640	2.560		255.0	11.3		
SDC/15	BD/43	B-D (35-50)	wall concrete	15	24-Feb-17	3-Mar-17	7	8690	2.573	2.510	260.0	11.6	11.5	15.0
	BD/44							8420	2.495		255.0	11.3		
	BD/45							8340	2.471		265.0	11.8		
SDC/17	BD/49	B-D (50-70)	wall concrete	15	28-Feb-17	7-Mar-17	7	8650	2.563	2.599	240.0	10.7	11.0	15.0
	BD/50							8435	2.493		235.0	10.4		
	BD/51							8250	2.444		275.0	12.2		

[redacted] Test no	Co[redacted]	[redacted] ation	Desc[redacted]	C[redacted]	Date c[redacted]	Da[redacted] st	[redacted] (Days)	Wei[redacted] (g)	[redacted] Densi (g/cm³)	[redacted] verage Density (g/cm³)	[redacted] oad (kN)	[redacted] gth (N/mm²)	[redacted] re Strength (N/mm²)	[redacted] cation (N/mm² @ 28 Days)
SDC/19	BD/55	B-D (70-85)	wall concrete	15	5-Mar-17	12-Mar-17	7	8960	2.655	2.630	240.0	10.7	11.5	15.0
	BD/56							8990	2.664		265.0	11.8		
	BD/57							8572	2.589		270.0	12.0		

Remarks	Site mix concrete		
	Tested By	Checked By	Approved By
Name	M Richard	[illegible]	
Designation	[illegible]	[illegible]	
Signature	[illegible]	[illegible]	

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[redacted] : GEO ENGINEERING CONSULTANT PVT LTD

ENGINEER : NATIONAL BUILDING RESEARCH ORGANIZATION

DETERMINATION OF COMPRESSIVE STRENGTH OF TEST CUBES

Test no	Cube no	Structure/ Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weight (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
A-1	A	D-H (10-20)	Base Concrete	15	5-Aug-15	12-Aug-15	7	8515	2.523	2.530	342.0	15.2	15.5	15.0
	C							8536	2.520		357.5	15.9		
	E							8531	2.528		341.6	15.2		
A-2	B	D-H (10-20)	Base Concrete	15	5-Aug-15	2-Sep-15	28	8574	2.540	2.570	458.0	20.4	20.5	
	D							8523	2.555		456.0	20.3		
	F							8871	2.628		465.2	20.7		
B-1	A	D-H (20-30)	Base Concrete	15	5-Aug-15	12-Aug-15	7	8412	2.492	2.490	307.8	13.7	13.5	15.0
	C							8366	2.479		294.9	13.1		
	E							8410	2.492		310.5	13.8		
B-2	B	D-H (20-30)	Base Concrete	15	5-Aug-15	2-Sep-15	28	8485	2.514	2.520	462.2	20.5	20.5	
	D							8452	2.504		451.2	20.1		
	F							8550	2.533		475.1	21.1		
C-1	A	D-H (30-40)	Base Concrete	15	5-Aug-15	12-Aug-15	7	8539	2.530	2.520	320.7	14.3	14.5	15.0
	C							8510	2.521		331.7	14.8		
	E							8457	2.506		326.6	15.8		
D-1	A	D-H (10-20)	Side Wall Concrete	15	8-Aug-15	15-Aug-15	7	8660	2.566	2.560	306.1	13.6	14.5	15.0
	C							8526	2.526		334.0	14.8		
	E							8725	2.585		354.0	15.7		
D-2	B	D-H (10-20)	Side Wall Concrete	15	8-Aug-15	5-Sep-15	28	8222	2.436	2.450	506.1	22.5	23.5	
	D							8218	2.435		540.0	24.1		
	F							8325	2.467		554.0	24.5		
E-1	A	D-H (30-50)	Base Concrete	15	9-Aug-15	16-Aug-15	7	8134	2.410	2.430	346.5	15.4	15.0	15.0
	C							8232	2.439		336.6	15.0		
	E							8205	2.431		341.6	15.2		
E-2	B	D-H (30-50)	Base Concrete	15	9-Aug-15	6-Sep-15	28	8325	2.466	2.450	464.0	20.6	21.0	
	D							8287	2.455		484.0	21.5		
	F							8307	2.451		478.0	21.2		

Prepared by [illegible]
(Engineer [illegible])

Checked & Approved by [illegible]
T/O NBRO

GEC

Cube no	Location	Description	Grade	Date of Cast	Date of Test	Age (Days)	Weights (g)	Density (g/cm³)	Average Density (g/cm³)	Load (kN)	Strength (N/mm²)	Average Strength (N/mm²)	Specification (N/mm² @ 28 Days)
A	D-H (20-30)	Side Wall Concrete	15	15-Aug-16	22-Aug-16	7	8070	2.393	2.400	346.9	15.1	14.0	15.0
C							8054	2.388		314.8	14.0		
E							8150	2.418		299.6	13.3		
G	D-H (20-30)	Side Wall Concrete	15	15-Aug-16	12-Sep-16	28	8241	2.442	2.460	529.6	23.5	21.5	
D							8255	2.446		492.5	21.9		
F							8277	2.452		443.5	19.7		
A	D-H (70-80)	Base Concrete	15	15-Aug-16	22-Aug-16	7	8160	2.419	2.450	295.9	13.2	13.0	15.0
C							8287	2.455		293.9	13.1		
E							8456	2.506		292.9	13.0		
B	D-H (70-80)	Base Concrete	15	15-Aug-16	12-Sep-16	28	8125	2.407	2.430	517.0	23.0	24.0	
D							8219	2.435		568.1	25.2		
F							8274	2.452		523.0	23.2		
A	D-H (60-90)	Base Concrete	15	16-Aug-16	23-Aug-16	7	8132	2.409	2.420	319.3	14.2	13.5	15.0
C							8242	2.442		301.3	13.4		
E							8177	2.423		303.3	13.5		
B	D-H (60-90)	Base Concrete	15	16-Aug-16	13-Sep-16	28	8070	2.391	2.390	519.3	23.1	21.0	
D							8103	2.401		504.0	22.4		
F							8030	2.379		403.1	17.9		
A	D-H (20-30)	Side Wall Concrete	15	17-Aug-16	24-Aug-16	7	8099	2.400	2.410	322.7	14.3	14.0	15.0
C							8110	2.403		333.7	14.8		
E							8176	2.423		294.9	13.1		
A	D-H (60-90)	Base Concrete	15	18-Aug-16	25-Aug-16	7	8311	2.463	2.460	299.8	13.3	13.5	15.0
C							8300	2.459		284.9	12.1		
E							8338	2.471		304.8	13.5		
B	D-H (60-90)	Base Concrete	15	18-Aug-16	15-Sep-16	28	8159	2.422	2.440	484.2	21.5	21.0	
D							8185	2.425		458.2	20.4		
F							8299	2.459		463.3	20.6		
A	D-H (80-100)	Base Concrete	15	24-Aug-16	31-Aug-16	7	8116	2.405	2.430	392.4	17.4	17.0	15.0
C							8259	2.459		374.5	16.6		
E							8152	2.424		383.4	17.0		
B	D-H (80-100)	Base Concrete	15	24-Aug-16	21-Sep-16	28	8258	2.447	2.470	562.0	25.0	24.0	
D							8366	2.479		523.6	23.3		
F							8237	2.470		546.9	24.3		
A	D-H (30-40)	Wall Concrete	15	25-Aug-16	1-Sep-16	7	8031	2.380	2.400	380.4	16.9	16.5	15.0
C							8175	2.422		388.4	17.3		
F							8131	2.409		333.7	14.8		
B	D-H (30-40)	Wall Concrete	15	25-Aug-16	22-Sep-16	28	8446	2.502	2.510	484.1	21.5	22.5	
D							8513	2.522		514.1	22.8		
F							8471	2.510		512.1	22.8		

Prepared by : Rishad

Checked & Approved by : Sathi.

[redacted] no	[redacted] no	[redacted] Location	[redacted]	Gr[redacted]	[redacted] of [redacted]	Date of Test	[redacted] (Days)	Weight (g)	[redacted]nsity (g/cm³)	[redacted]nsity (g/cm³)	[redacted] (kN)	[redacted] (N/mm²)	Strength (N/mm²)	[redacted] @ 28 Day(s)
DH-06	A	D-H (30-50)	Wall Concrete	15	25-Aug-16	2-Sep-16	7	8409	2.492	2.470	328.9	14.6	14.0	15.0
	C							8273	2.451		310.0	13.8		
	E							8345	2.473		305.2	13.6		
DH-05	B	D-H (30-50)	Wall Concrete	15	25-Aug-16	23-Sep-16	28	8185	2.425	2.410	533.0	23.7	23.5	
	D							8086	2.396		515.1	22.9		
	F							8110	2.403		542.0	24.1		
DH-07	A	D-H (80-90)	Base Concrete	15	27-Aug-16	24-Sep-16	28	8268	2.450	2.430	504.1	22.4	22.5	
	C							8146	2.414		520.1	23.1		
	E							8217	2.435		493.1	21.9		
DH-08	B	D-H (80-90)	Base Concrete	15	27-Aug-16	3-Sep-16	7	8029	2.379	2.390	343.6	15.3	14.5	
	D							8083	2.395		322.7	14.3		
	F							8086	2.396		327.7	14.6		
DH-09	A	D-H (40-60)	Wall Concrete	15	30-Aug-16	6-Sep-16	7	8102	2.401	2.410	356.3	15.8	15.5	15.0
	C							8078	2.393		371.3	16.5		
	E							8250	2.444		312.4	13.9		
DH-10	B	D-H (40-60)	Wall Concrete	15	30-Aug-16	27-Sep-16	28	8291	2.457	2.460	561.1	25.0	24.5	
	D							8125	2.407		547.1	24.3		
	F							8541	2.531		535.0	23.8		
CD-01	A		Wall Concrete	15	23-Aug-16	30-Aug-16	7	8251	2.445	2.450	365.5	16.2	16.5	15.0
	C							8231	2.483		379.4	16.9		
	E							8379	2.483		373.5	16.5		
CD-02	B		Wall Concrete	15	23-Aug-16	30-Aug-16	7	8429	2.497	2.470	340.6	15.1	14.5	
	D							8286	2.455		326.1	14.5		
	F							8246	2.443		312.1	13.9		
CD-03	A		Wall Concrete	15	23-Aug-16	20-Sep-16	28	8260	2.456	2.440	579.1	25.7	25.0	
	C							8143	2.413		578.3	25.7		
	E							8270	2.450		594.4	26.4		
CD-04	B		Wall Concrete	15	23-Aug-16	20-Sep-16	28	8370	2.480	2.470	508.1	22.6	25.0	
	D							8240	2.441		574.1	25.5		
	F							8388	2.488		592.4	26.3		
CD-05	A		Wall Concrete	15	24-Aug-16	31-Aug-16	7	8494	2.517	2.490	370.5	16.5	16.5	15.0
	C							8333	2.469		361.6	16.1		
	E							8393	2.487		365.5	16.2		
CD-06	B		Base Concrete	15	24-Aug-16	31-Aug-16	7	8312	2.463	2.470	365.0	16.2	16.5	
	D							8362	2.478		379.0	16.8		
	F							8359	2.477		372.0	16.5		

Prepared by: Rishad

Checked and Approved by: Sunith.

Test no	no	[redacted] Location	Description	[redacted]	Date of Cast	Date of Test	[redacted] (Days)	Wt (g)	Density (g/cm³)	Average Density (g/cm³)	[redacted] Load (kN)	[redacted] Strength (N/mm²)	[redacted] Average Strength (N/mm²)	[redacted] Strength (N/mm² @ 28 Days)
CD-07	A		Base Concrete	15	24-Aug-16	21-Sep-16	28	8118	2.405	2.440	471.5	21.0	21.5	15.0
	C							8253	2.445		480.4	21.4		
	E							8322	2.466		487.4	21.7		
CD-08	B		Base Concrete	15	24-Aug-16	21-Sep-16	28	8190	2.427	2.410	510.0	22.7	24.0	
	D							8144	2.413		577.0	25.6		
	F							8101	2.400		533.0	23.7		
CD-09	A		Base Concrete	15	25-Aug-16	1-Sep-16	7	8081	2.394	2.400	341.1	15.2	16.0	15.0
	C							8119	2.406		356.0	15.8		
	E							8049	2.385		374.0	16.6		
CD-10	B		Wall Concrete	15	25-Aug-16	1-Sep-16	7	8152	2.415	2.400	330.9	14.7	15.0	
	D							8050	2.385		364.0	16.2		
	F							8065	2.390		306.2	13.6		
CD-11	A		Wall Concrete	15	25-Aug-16	22-Sep-16	28	8290	2.459	2.450	512.0	22.8	22.5	15.0
	C							8266	2.485		534.2	23.7		
	E							8409	2.492		478.0	21.2		
CD-12	B		Wall Concrete	15	25-Aug-16	22-Sep-16	28	8303	2.460	2.430	540.1	24.0	23.5	
	D							8155	2.416		510.0	22.7		
	F							8136	2.411		528.0	23.5		
CD-13	A		Wall Concrete	15	26-Aug-16	2-Sep-16	7	8365	2.479	2.470	356.2	15.8	15.0	15.0
	C							8241	2.442		312.1	13.9		
	E							8356	2.475		330.2	14.7		
CD-14	B		Wall Concrete	15	26-Aug-16	2-Sep-16	7	8541	2.531	2.480	358.8	15.9	15.0	
	D							8241	2.442		344.5	15.3		
	F							8356	2.476		305.8	13.6		
CD-15	A		Wall Concrete	15	26-Aug-16	23-Sep-16	28	8412	2.492	2.500	472.1	21.0	20.5	15.0
	C							8458	2.505		450.5	20.0		
	E							8451	2.504		467.0	20.8		
CD-16	B		Wall Concrete	15	26-Aug-16	23-Sep-16	28	8574	2.540	2.540	485.6	21.6	21.5	
	D							8589	2.539		472.2	21.0		
	F							8546	2.532		485.0	21.6		
CD-17	A		Wall Concrete	15	28-Aug-16	4-Sep-16	7	8326	2.467	2.480	394.4	17.5	17.0	15.0
	C							8456	2.505		379.3	16.9		
	E							8321	2.465		381.0	16.9		
CD-18	B		Wall Concrete	15	28-Aug-16	25-Sep-16	28	8456	2.505	2.500	474.5	21.1	21.0	
	D							8361	2.477		476.4	21.2		
	F							8450	2.504		478.7	21.3		

Prepared by Rizal

GEC PTE LTD

Checked & Approved by [illegible]

		Con[illegible]	13	27-Aug-15	6-Sep-15	7	8256	2.446	2.450	4		15.0	15.0
							8214	2.404		330.7	14.7		
	F						8360	2.477		306.0	13.6		

Remarks	Site mix concrete		
	Tested By:	Checked By:	Approved By:
Name :	M. Rishad L	Susantha	
Designation	Eng Geologist / Site Engineer	T/O	
Signature:	[signature]	[signature]	

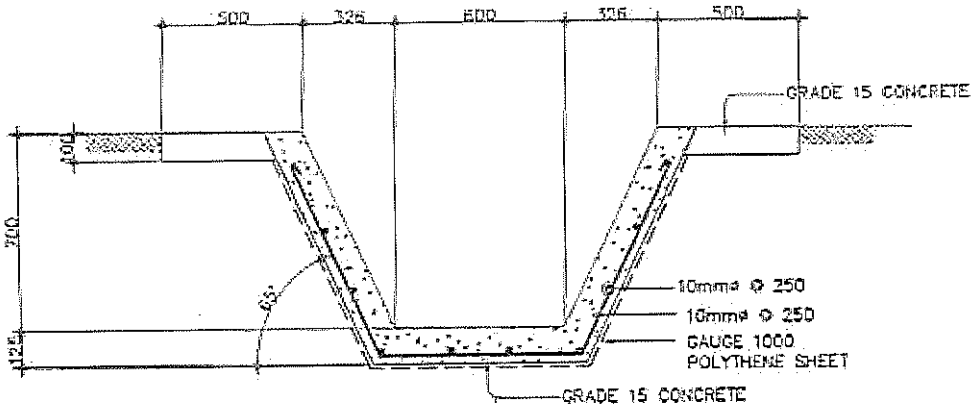
GEC

Annexure 04:

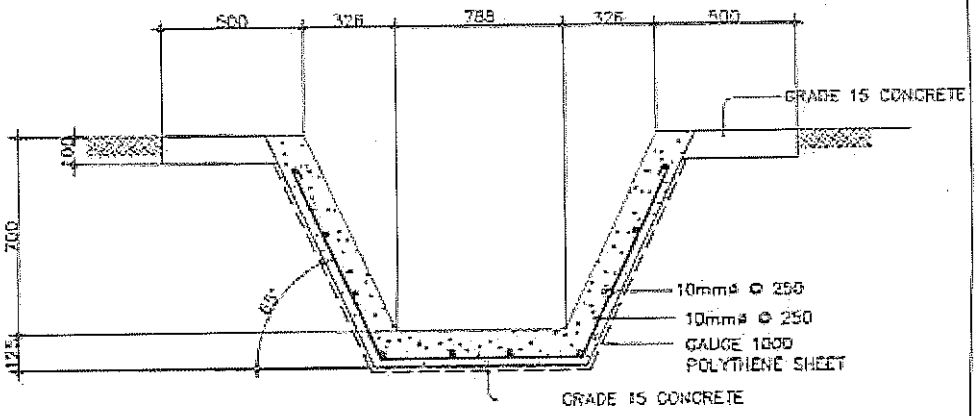
As Built Drawings

AS BUILT DRAWING OF PROPOSED SURFACE DRAINAGE DITCH CLOSE TO LOWER SMALL DAM

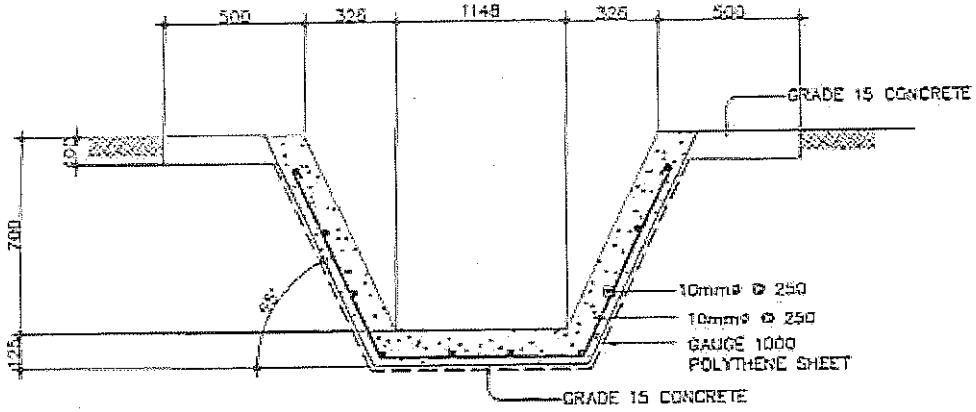
NUWARA ELIYA



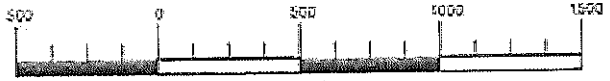
TYPE-A SURFACE DRAINAGE DITCH



TYPE-A(b) SURFACE DRAINAGE DITCH (X-Y)



TYPE-A(c) SURFACE DRAINAGE DITCH (Y-Z)

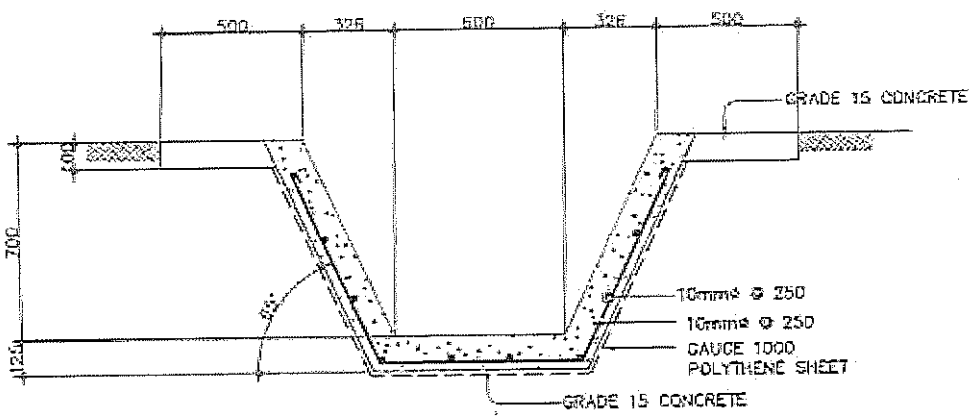


SCALE

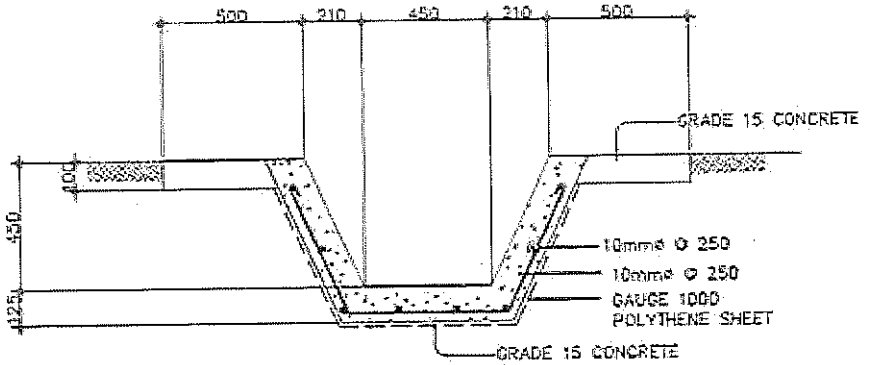
Employer : Japan International Cooperation Agency (JICA) ***Engineer :*** National Building Research Organization (NBRO)	***Contractor :*** Geo Engineering Consultants Pvt Ltd DATE : 09.03.2017	**Project:** The Pilot project for Landslide and Rock fall mitigation works Lot-02, Nuwara Eliya **As Built Drawing for Surface Drainage Ditch**

[redacted]S BUILT DRAWING - SURFACE DRAINAGE DITCHES

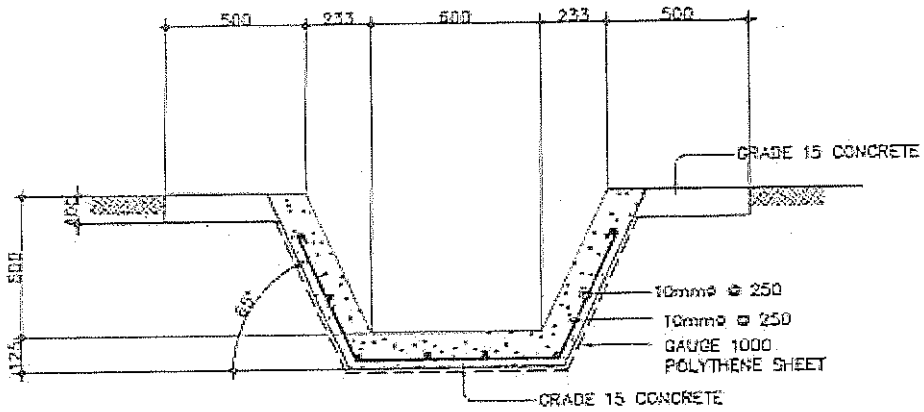
NUWARA ELIYA



TYPE-A SURFACE DRAINAGE DITCH



TYPE-C SURFACE DRAINAGE DITCH



TYPE-B SURFACE DRAINAGE DITCH

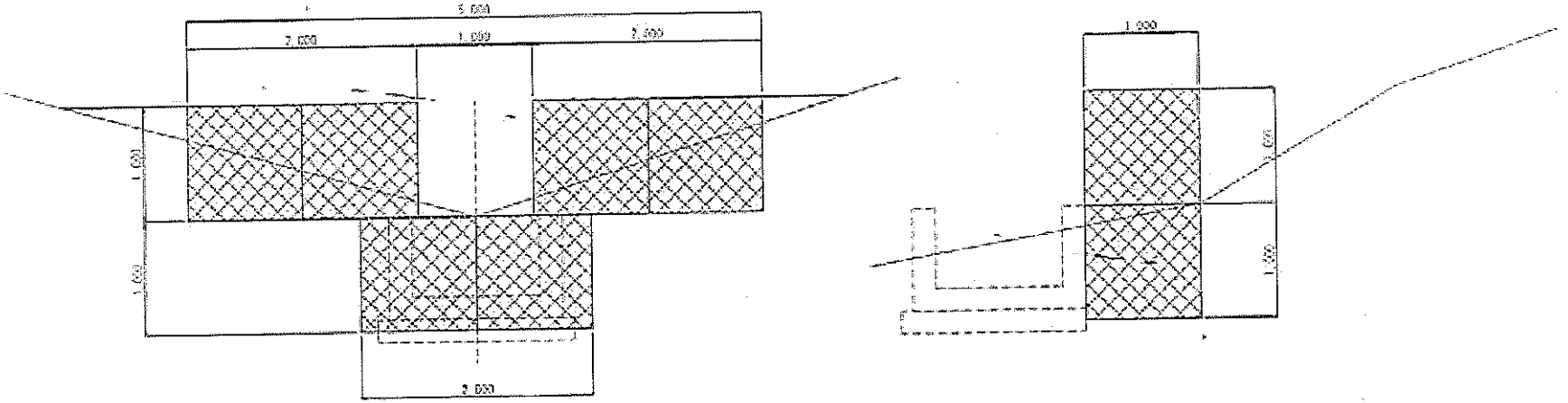
SCALE

Employer : Japan International Cooperation Agency ***Engineer :*** National Building Research Organization	***Contractor :*** (Site Engineer) Geo Engineering Consultants Pvt Ltd DATE : 09.03.2017	**Project:** The Pilot project for Landslide and Rock fall mitigation works Lot-02, Nuwara Eliya **As Built Drawing for Surface Drainage Ditch**

AS BUILT DRAWING OF THE SMALL DAM

(Lot 02 : Nuwara Eliya)

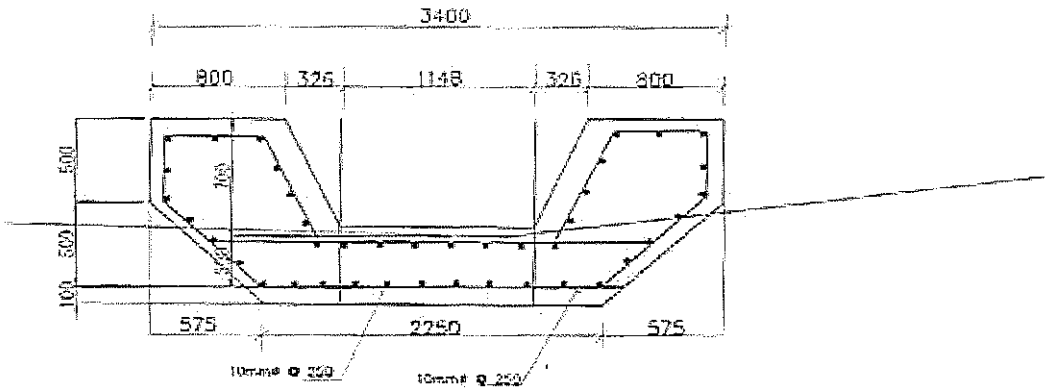
UPPER SLOPE

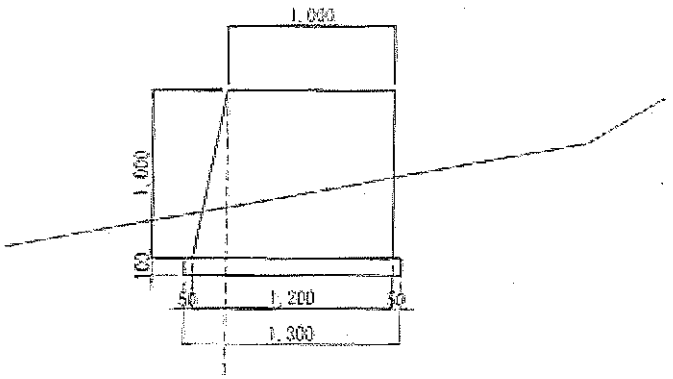


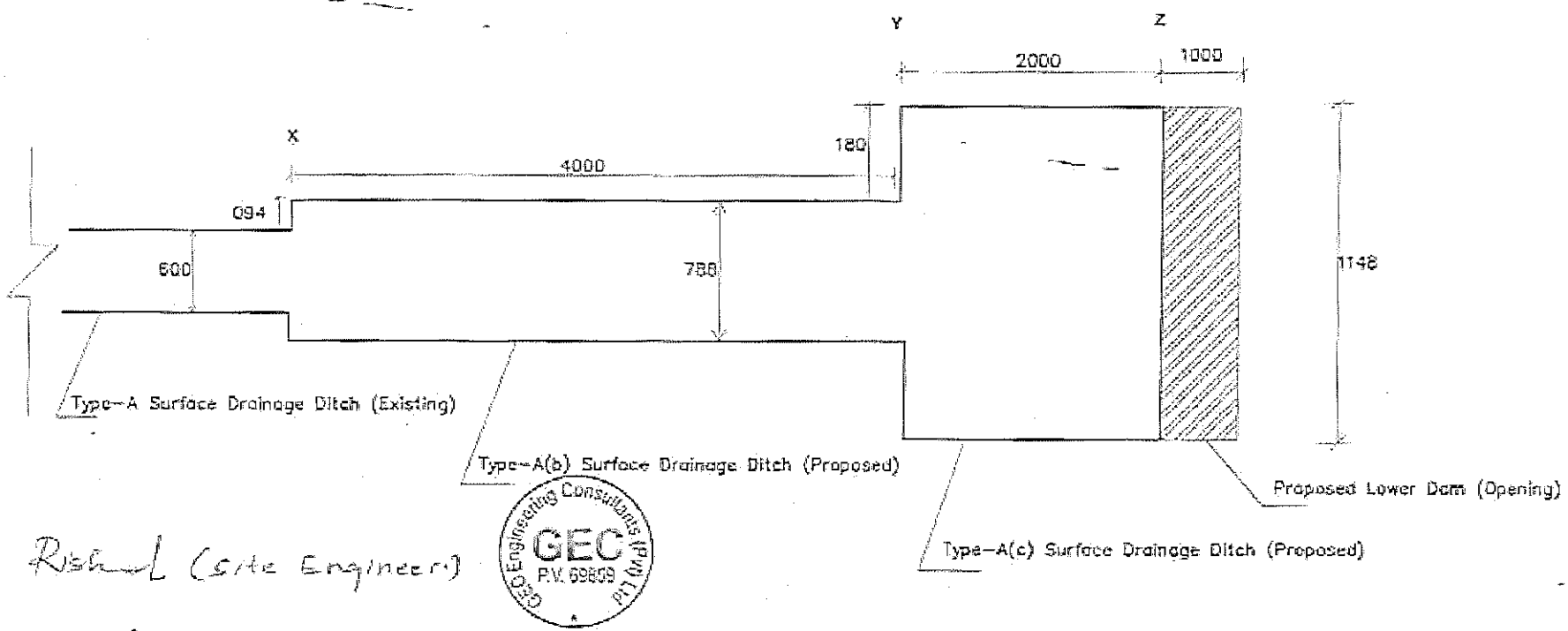
Geo Engineering Consultants (Pvt) Ltd
GEC
P.V. 69859

Contractor : (Resident Cattle Engineer) Geo Engineering Consultants Pvt Ltd	Employer : Japan International Cooperation Agency	Engineer : Sumith National Building Research Organization

LOWER SLOPE CONCRETE DAM







GEC Engineering Consultants (M'sia) Ltd
GEC
P.V. 69859

Contractor: Rishal (Site Engineer)

Engineer : Smith
National Building Research Organisation

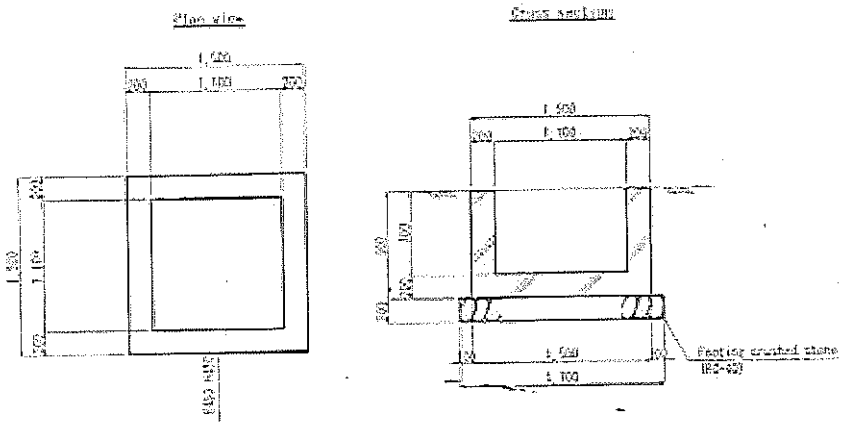
PLAN VIEW ALONG THE NEW DRAINAGE DITCH

AS BUILT DRAWING OF THE WATER COLLECTING PIT

(Nuwara Eliya)

Type. 1

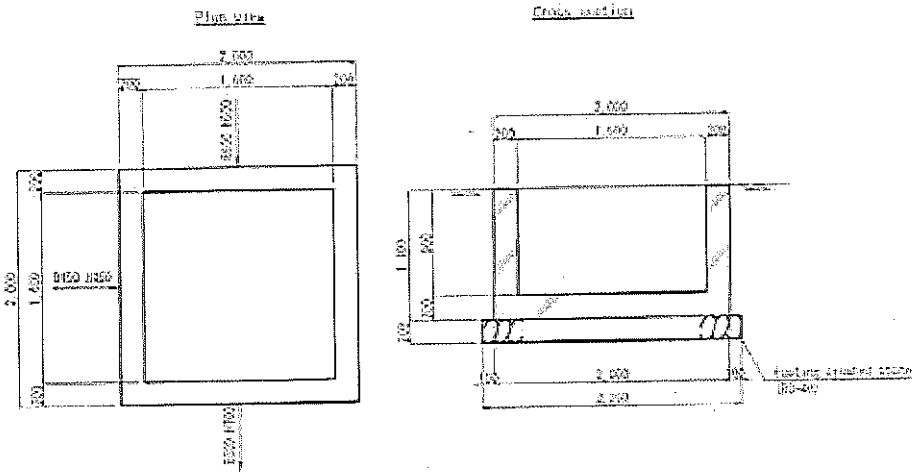
(1,100×1,100×700)



Type. 2

(1,600×1,600×900)

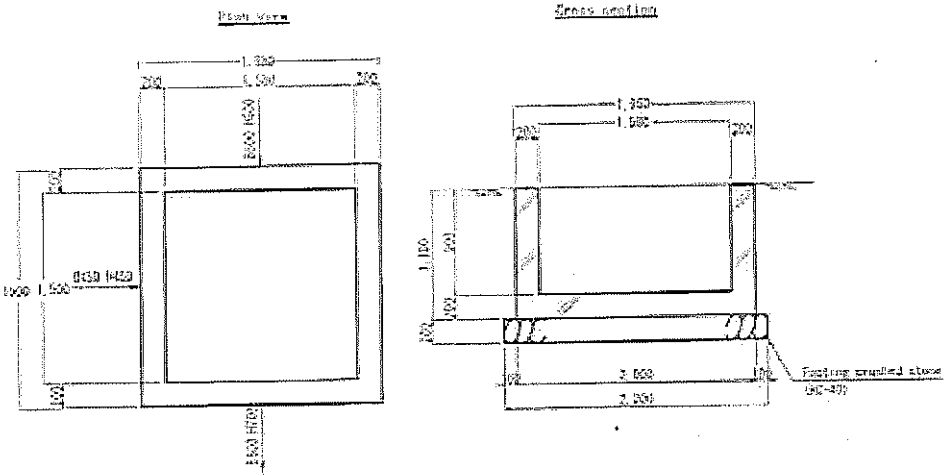
At □600 Type-B drain



Type. 2

(1,540×1,540×900)

At Centre point of A,B,C Drains



GEO Engineering Consultants (Pvt) Ltd GEC P.V. 69159

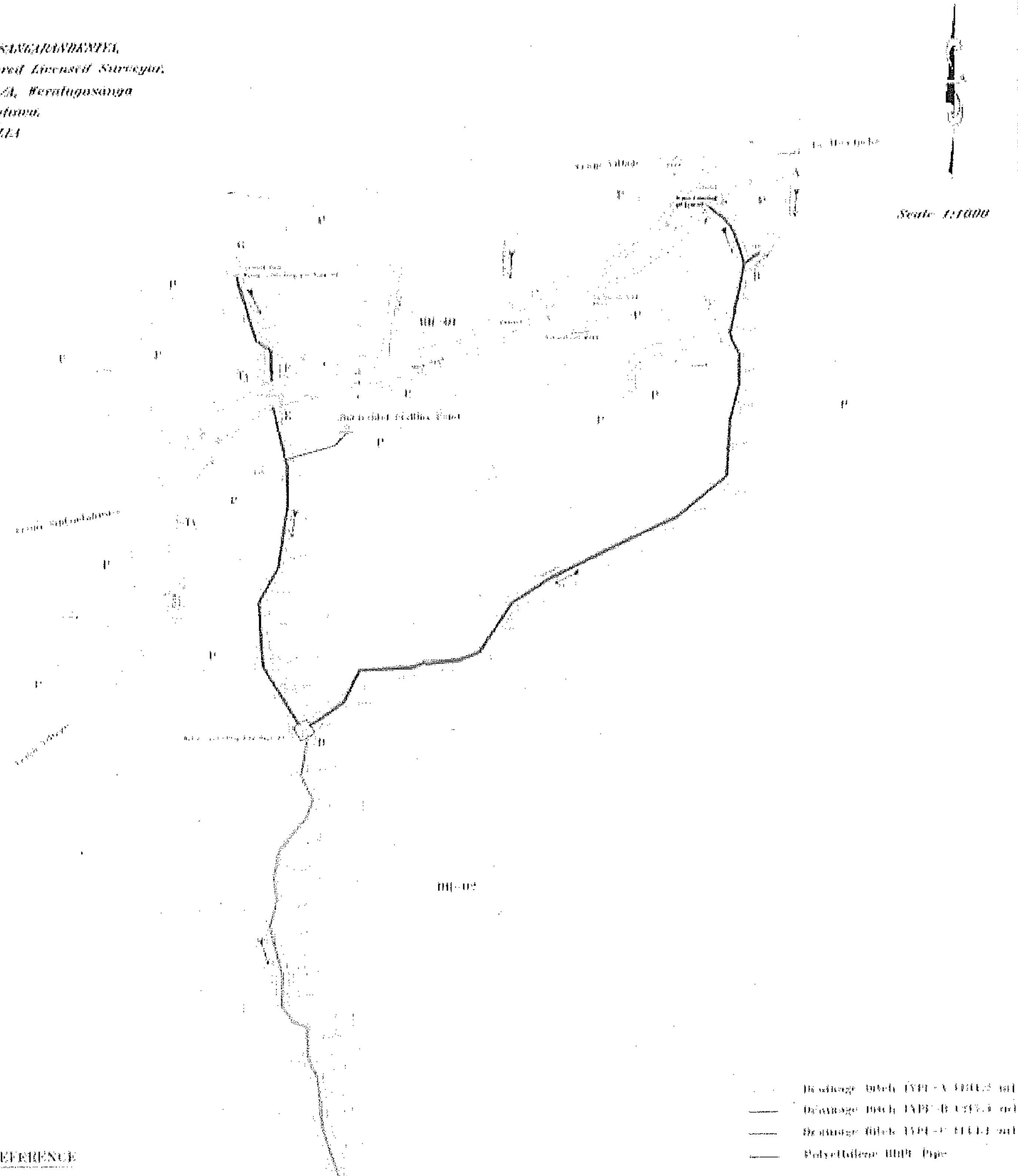
Contractor : Rishad (site Engineer) Geo Engineering Consultants Pvt Ltd	Employer : Japan International Cooperation Agency	Engineer : Sanath National Building Research Organization

THE PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS

UDAMADURA, NUWARAELIYA

Finalized Survey Plan of the Area

T.B.S. SANGARANDENIYA
Registered Licensed Surveyor,
No. 61/A, Weralugasanga
Galukotuwa,
KEGALLA



REFERENCE

RE -	Road Edge
LF -	Live Fence
P -	Permanent Building
Ty -	Temporary Building
B -	Bank
BH -	Bore Hall

Employer : Japan International Cooperation Agency	Contractor : Geo Engineering Consultants Pvt Ltd	Surveyed on : 2017.03.15
Engineer : National Building Research Organization		Certified By: T.B.S. SANGARANDENIYA Registered Licensed Surveyor Reg. No: 19790243

Annexure 05:

NBRO Certificate of Drilling completed & Summary of Drilling depths

21/10/2016

ආපදා කළමනාකරණ අමාත්‍යාංශය
அனர்த்த முகாமைத்துவ அமைச்சு
Ministry of Disaster Management

ජාතික ගොඩනැගිලි පර්යේෂණ සංවිධානය
தேசிய கட்டிட ஆராய்ச்சி நிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION

දුරකථන / தொலைபேசி / Telephone: 011-2588946, 011-2503431, 011-2500359
අධ්‍යක්ෂ ජනරාල් / பணிப்பாளர் நாயகம் / Director General: 011-2505149
ෆැක්ස් / தொலைநகல் / Fax: 011-2502611
වෙබ් අඩවිය / இணையத்தளம் / Website: www.nbro.gov.lk
විද්‍යුත් / மின்னஞ்சல் / E-mail: nbro@slinet.lk

99/1, ජාවත්ත පාර, කොළඹ 5.
99/1, ஜாவத்தை வீதி, கொழும்பு 5.
99/1, Jawatta Road, Colombo 5.

මගේ අංකය / எமது இல. / Our Ref.:

ඔබේ අංකය / உமது இல. / Your Ref.:

දිනය / திகதி / Date: 18th October 2016

Managing Director,
Geo Engineering Consultants Pvt Ltd,
No.929/18, Kahandawala road,
Thalangama north,
Malabe.

Dear Sir,

THE PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS UNDER THE TECHNICAL COOPERATION FOR LANDSLIDE MITIGATION PROJECT, LOT 02-NUWARA ELIYA

SUBJECT: CONFIRMATION OF COMPLETION WORK OF THE HORIZONTAL DRILLING

This refers to the joint site inspection done by us with JICA and you on 14th October 2016 regarding the above subject.
As per the observations, Horizontal Drainage Drilling work has been completed successfully and all the 10 number of holes have reached to the required design length of 50.0m.
The work has been carried out according to the given specification and fulfilled the design requirements.
The measured drilling lengths are as follows.

Hole No.	Designed Length (m)	Final measured length after cleaning & drilling (m)
H-01	50	51.50
H-02	50	50.50
H-03	50	50.55
H-04	50	51.05
H-05	50	50.20
H-06	50	50.00
H-07	50	50.80
H-08	50	50.10
H-09	50	50.90
H-10	50	51.76

The payment related to this work would be done by JICA.

Yours faithfully,

18/10/2016

Mr. R. M. S. Bandara
Director- LRRMD
NBRO.

Copy : Mr. Hashimoto, Representative, JICA Sri Lanka Office

Contract Title : Landslide Mitigation project / Lot 02-Udamadura, Nuwara Eliya

Contractor : Geo Engineering Consultants Pvt Ltd

Horizontal Drilling Data sheet

Hole No	Soil (m)		Bedrock (m)	Total Depth Drilled	Total depth after washing	Chek the Engineer
	Soil (m)	Boulders (m)				
H-01	19.70	30.30	0.00	50.00	51.50	
H-02	39.00	11.00	0.00	50.00	50.50	
H-03	40.70	9.30	0.00	50.00	50.55	
H-04	41.50	8.50	0.00	50.00	51.05	
H-05	40.10	9.90	0.00	50.00	50.20	
H-06	40.25	9.75	0.00	50.00	50.00	
H-07	44.30	5.70	0.00	50.00	50.80	
H-08	41.00	9.00	0.00	50.00	50.10	
H-09	41.50	8.50	0.00	50.00	50.90	
H-10	40.40	9.60	0.00	50.00	51.76	

Prepared by: Rishad

Annexure 06:

Measurement sheets for concrete ditch, water collecting pit, gabion works, additional works

Contract Title : Landslide Mitigation project / Lot 02-Udamadura, Nuwara Eliya
Contractor : Geo Engineering Consultants Pvt Ltd

Measurement Data Sheet for work done up to 15th March 2017

Expence Item	Construction Work	Nos.	Length (m)	Breadth (m)	Depth (m)	Total	Chek the Engineer
GABION WORK	Supplying assembling and placing of PVC coated Gabion wall boxes of size 1.0 x 1.0 x 1.0 m	10	1m	1m	1m	10m3	
SURFACE DRAINAGE DITCH	Excavation of Drainage Ditch Type A	1	55m	2.2m	0.9m	108.9 m3	
	Excavation of Drainage Ditch Type B	1	83m	2m	0.6m	99.6 m3	
	Excavation of Drainage Ditch Type C	1	59m	1.5m	0.6m	53.4 m3	
	Supply and fabricate, installing removing of formwork(ply wood)	654	2.4 m	0.8 m		1255m2	
	Supply and laying Grade 15 concrete prepared at site using mixer and vibrator Type A	1	114m			66.2 m3	
	Supply and laying Grade 15 concrete prepared at site using mixer and vibrator Type B	1	217m			92.65 m3	
	Supply and laying Grade 15 concrete prepared at site using mixer and vibrator Type C	1	114m			14.25m3	
	Expansion joints with water stops					35 m	
	Tor steel reinforcement (Kg)					5300 Kg	

Expence Item	Construction Work	Nos.	Length (m)	Breadth (m)	Depth (m)	Total	Chek the Engineer
WATER COLLECTING PIT	Excavation for structures in soil , backfilling with existing soil, and disposal of excess materials away from the site	3	2m	2m	0.85m	10 m3	
	Supply and lying of 200mm thick Crushed stone base Type 2	2	2m	2m	0.2m	1.6m3	
	Supply and lying of 200mm thick Crushed stone base Type 1	1	1.5m	1.5m	.2m	.45 m3	
	Construction of 225mm thick Brick masonry work in Catch pits Type 2	2	7.2m		1.1m	15.84 m2	
	Construction of 225mm thick Brick masonry work in Catch pits Type 1	1	1.3m		.9m	1.17 m2	
SMALL DAM	Construction of RCC dam including Excavation for structures in soil, backfilling with existing soil, and disposal of excess materials away from the site	1				10m3	
	Supplying, assembling and placing of PVC coated Gabion wall boxes of size 1.0x1.0x1.0 m	6	1m	1m	1m	6m3	

Expence Item	Construction Work	Nos.	Length (m)	Breadth (m)	Depth (m)	Total	Chek the Engineer
ADITIONAL WORK ITEMS	Rock Demolishing and removing					16 m3	
	Construction of 450x450x450mm size concrete water collecting pit at the bottom of Gabion wall and open man hole	2				2m3	
	Supplying and placing of 160mm dia. Polyethilene connecting pipe	4	5m	1 1		20m	

Annexure 07:

NBRO & JICA approval letters for rock/ boulder demolishing

Japan International Cooperation Agency
10th & 13th Floors, DHPL Building,
No. 42, Navam Mawatha, Colombo - 2, SRI LANKA.
TEL : (+94)011-2300470 / 2303700
FAX : (+94)011-2305473 / 2305692
E-mail : sl_oso_rep@jica.go.jp
Homepage: http://www.jica.go.jp/srilanka/english/index.html
Facebook: https://www.facebook.com/jicasrilanka

JICA (SL) 11-02002

November 3, 2016

Mr. Dilum Wanigasekara
Manager – Project
GEO Engineering Consultants (Pvt) Ltd

Dear Sir,

RE: SUBMISSION OF THE PROPOSAL AND COST VARIATION FOR THE ROCK DEMOLITION, CONSTRUCTION OF DRAINAGE & SMALL DAM FOR THE PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION WORKS UNDER THE TECHNICAL COOPERATION FOR LANDSLIDE MITIGATION PROJECT (LOT 2)

This refers to your letter dated October 21, 2016 regarding your proposal.

We approve your proposal and cost variation for the work of rock demolition, construction of drainage and small dam.

Additional cost that will accrue from the cost variation specified in your proposal should be financed by the contingencies allocated under the contract and therefore the contact is not amended as the contract amount is not changed.

Thank you.

Yours sincerely,

Kiyoshi Amada
Chief Representative
JICA Sri Lanka office

C.C.: Mr. Ryuichi Hara, Team Leader, Technical Cooperation for Landslide Mitigation Project
Mr. R.M.S.Bandara, Director, Landslide Research and Risk Management, NBRO
Mr. Samantha Bogahapitiya, NBRO Nuwara Eliya District Office
Mr. Malaka Hettiarachchi, NBRO Nuwara Eliya District Office
Mr. Nishantha Hikkaduwa, Managing Director, GEO Engineering Consultants (Pvt) Ltd
NBRO Site Engineer

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காணி முகாமைத்துவ அமைச்சு
Ministry of Disaster Management

தேசிய கட்டிட ஆராய்ச்சி நிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION

தொலைபேசி 011-2588946, 011-2500431
Telephone 011-2500354

பணிப்பாளர் நாயகம் 011-2505149
Director General

தொலைநகல் 011-2502011
Fax

இணையத்தளம் www.nbro.gov.lk
Website

மின்னஞ்சல் nbro@slnet.lk
E-mail

99/1, ஜாவத்தை வீதி, கொழும்பு 5.
99/1, Jawatta Road, Colombo 5.

எமது உசாவல் / Our Ref.

தமது உசாவல் / Your Ref.

திகதி / Date 10th Oct, 2016

Mr.Nishantha Hikkaduwa,

Managing Director,

Geo Engineering Consultants (Pvt) Ltd

The Technical Cooperation for Landslide Mitigation Project (TCLMP)

Sub: Approval of the Cost Variation for Rock Demolition, Construction of Drainage Ditch & Small Dam – Udamadura – N' Eliya

Reference is made to your letter dated Aug 23, 2016 for the above mentioned project.

We have scrutinized the letter including following documents you submitted.

- Rock demolition
- Construction of drainage ditch
- Small dam

We kindly, hereby approve the documents and method statements for the above mentioned project. Hence, please submit the same documents to JICA Sri Lanka office for their approval.

After the approval by JICA, please commence the construction work immediately and your cooperation in this regard shall be appreciated.

20/10/16

for RMS Bandara

Director

Landslide Research and Risk Management Division

R.M.S. BANDARA
Deputy Director
Landslide Research and Risk Management
National Building Research Organisation
No. 99/1, Jawatta Road,
Colombo 05.

CC:

Mr. Hiroki Hashimoto, Representative, JICA Sri Lanka Office

Mr. Ryuichi Hara, Team Leader, Technical Cooperation for Landslide Mitigation Project,

Earth System Science Co., Ltd.

Mr. Samantha Bogahapitiya, NBRO Nuwara Eliya District Officer

Mr.Malaka Hettiarachchi, NBRO Nuwara Eliya District Office

Mr. NBRO Site Engineer

Annexure 08:

NBRO & JICA approvals for water collecting pit & Polyethilene pipes

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அனர்த்த முகாமைத்துவ அமைச்சு
Ministry of Disaster Management

ජාතික ගොඩනැගිලි පර්යේෂණ සංවිධානය
தேசிய கட்டிட ஆராய்ச்சி நிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION

දුරකථන / தொலைபேசி / Telephone } 011-2558046, 011-2505431, 011-2500356
අධ්‍යක්ෂ ජනරාල් / பணிப்பாளர் நாயகம் / Director General } 011-2505149
ෆැක්ස් / தொலைநகல் / Fax } 011-2502611
වෙබ් අඩවිය / இணையத்தளம் / Website } www.nbro.gov.lk
ඊමේල් / மின்னஞ்சல் / E-mail } nbro@slnet.lk

99/1, ජාවත්ත පාර, කොළඹ 5.
99/1, ஜாவத்தை வீதி, கொழும்பு 5.
99/1, Jawatta Road, Colombo 5.

Our Ref / எமது இல. / Your Ref / உமது இல. / Date / திகதி

Mr. Nishantha Hikkaduwa,

Managing Director,

Geo Engineering Consultant (Pvt) Ltd.

Dear Mr. Nishantha,

THE PILOT PROJECT FOR LANDSLIDE AND ROCK FALL MITIGATION; WORK-LOT 02: NUWARA ELIYA

Proposal for the Polyethylene Connecting Pipe

In reference to your letter, dated 30th January, 2017, we reviewed the proposal and design given for the polyethylene connecting pipe network at the gabion wall.

We agreed with the revised proposal and design and hence the revised proposal and design are approved.

We expect you to make the best effort to complete this work with good quality by the due date.

Yours sincerely,

R.M.S. BANDARA
Director
Landslide Research and Risk Management Division
National Building Research Organization
No. 99/1, Jawaththa Road.

Mr. R.M.S. Bandara
Director Landslide Research and Risk Assessment Division
NBRO

CC:

Mr. Hiroki Hashimoto, Representative, JICA Sri Lanka Office

Mr. Ryuichi Hara, Team Leader, Technical Cooperation for Landslide Mitigation Project, Earth System Science Co., Ltd.

Mr. Samantha Bogahapitiya, NBRO Nuwara Eliya District Officer

Mr. Malaka Hettiarachchi, NBRO Nuwara Eliya District Office

Amendment of Contract

THIS AMENDMENT OF CONTRACT is made and entered into on 15th of February, 2017 by and between Japan International Cooperation Agency (JICA) Sri Lanka Office (hereinafter referred as "Employer") and GEO Engineering Consultants (Pvt) Ltd with its principal place of business at No.929/18, Kahadawala Rd, Thalangama North, Malabe, Sri Lanka (hereinafter referred as "the Contractor"), as amendment of the original contract made on 2nd of February, 2016 and the amendment of the contract made on 15th of November 2016 by and between the Employer and the Contractor (hereinafter referred as "Original Contract").

WHEREAS, this amendment is made in accordance with Article 23 and 24 of the Original Contract;

NOW, THEREFORE, the parties hereto hereby agree as follows:

1. Items 7.5, 7.5.1, 11.3 and Total Amount of "Bill of Quantity" (hereinafter referred as "BOQ") in the Contractor's Bid under the Original Contract shall be amended as attached.

2. Article 4 "Period of Execution of Work" in the Original Contract and Article 1 of the Amendment of the Contract shall be amended as follows;

   The words in the Article 4.2 "On or before 15th November 2016" which is amended to "On or before 15th February 2017" shall be deleted and "On or before 15th March 2017" shall be substituted in lieu thereof.

3. Article 5, "Remuneration" in the Original Contract shall be amended as follows;

   The words in the Article 5.1 "The Employer shall remunerate the Contractor with a total amount of Sri Lankan Rupees Twelve Million Nine Hundred Seventy Eight Thousand and Three Hundred Seventy Seven and Cents Fifty Only (Rs. 12,978,377.50) (excluding the VAT) as the Contract Price for the Work, in accordance with the payment schedule stated in Article 6.3 of this Contract."

4. All the other parts of the Original Contract shall remain unchanged.

IN WITNESS WHEREOF, the parties hereto have caused this Amendment of Contract to be signed in their respective names in duplicate, each party retaining one (1) copy thereof, as of the date first above written.

GEO Engineering Consultants (Pvt) Ltd GEC P.V. 69859

Amendment of Contract

THIS AMENDMENT OF CONTRACT is made and entered into on 15th of November, 2016 by and between Japan International Cooperation Agency (JICA) Sri Lanka Office (hereinafter referred as "Employer") and GEO Engineering Consultants (Pvt) Ltd with its principal place of business at No.929/18, Kahadawala Rd, Thalangama North, Malabe (hereinafter referred as "the Contractor"), as amendment of the original contract made on 2nd of February, 2016 by and between the Employer and the Contractor (hereinafter referred as "Original Contract").

WHEREAS, this amendment is made in accordance with Clause 23 and 24 of the Original Contract;

NOW, THEREFORE, the parties hereto hereby agree as follows:

1. Article 4. "Period of Execution of Work" in the Original Contract shall be amended as follows;

   The words in the Article 4.2 "On or before 15th November 2016" shall be deleted and "On or before 15th February 2017" shall be substituted in lieu thereof.

2. All the other parts of the Original Contract shall remain unchanged.

IN WITNESS WHEREOF, the parties hereto have caused this Amendment of Contract to be signed in their respective names in duplicate, each party retaining one (1) copy thereof, as of the date first above written.

The Employer:

Kiyoshi AMADA
Chief Representative
Japan International Cooperation Agency
JICA Sri Lanka Office

The Contractor:

Nishantha Hikkaduwa
Managing Director
GEO Engineering Consultants (Pvt) Ltd.

Attachment

Breakdown of "Bill of Quantity" with Amendment

Item	Description	Original BOQ				Amended BOQ				Difference
		Unit	Qty	Rate	Amount	Unit	Qty	Rate	Amount	
7	HORIZONTAL DRAINAGE DRILLING									
7.5	Supplying and placing of 90mm@ Polyethilene pipes tyre 1000. Amended item: Supplying and placing of 160 mm@ Polyethilene pipes tyre 1000	m	25.00	2,200.00	55,000.00	m^2	20.00	4,900.00	98,000.00	43,000.00
7.5.1	Construction of 450x450x450 mm size concrete Grade 20 water collecting pit at the bottom of Gabion wall and 300x300x300 mm Open Man hole	m^3	0.00	0.00	0.00	m^3	2.00	16,000.00	32,000.00	32,000.00
11	SMALL DAM									
11.3	Demolition and removal	m^3	5.00	850.00	4,250.00	m^3	0.00	0.00	0.00	-4,250.00
		Total before Amendment			59,250.00	Total after Amendment			130,000.00	70,750.00
						Amount to be added to the contract amount				70,750.00

No	Contract Amount	Original	Amendment
1	Lot 2: TOTAL OF BILL OF QUANTITIES	11,727,775.00	11,798,525.00
2	Contingencies-10% of Total BOQ	1,172,225.00	1,179,852.50
3	TOTAL CONTRACT PRICE (1+2)	12,900,000.00	12,978,377.50

Geo Engineering Consultants (Pvt) Ltd

Annexure 09:

BOQ Comparison table

BILL OF QUANTITIES for Nuwara Eliya Landslide Mitigation works

COMPARISON TABLE OF BOQ BEFORE AND AFTER THE AMENDMENTS

Contractor: Gen Engineering Consultant PVT LTD.

ITEM	DESCRIPTION	UNIT	QTY		RATE (Rs.Cts.)		AMOUNT (Rs. Cts.)	
			Before amendment	After Amendment	Before Amendment	After Amendment	Before Amendment	After Amendment
1	CONTRACTOR'S SITE ESTABLISHMENT							
1.1	Establishment, maintenance, and removal of contractor's site facilities such as office, stores, services, security, etc...	LS	1	1	25,000	25,000	25,000.00	25,000.00
1.2	Mobilisation and de-mobilization of plant, equipment, and machinery	LS	1	1	800,000	800,000	800,000.00	800,000.00
1.2.1	Mobilization and demobilization of New drilling machine	LS	1	1	-	250,000	-	250,000.00
TOTAL OF CONTRACTOR'S SITE ESTABLISHMENT		A					825,000.00	1,075,000.00
2	HEALTH, SAFETY AND ENVIRONMENT							
2.1	Health and safety measures during construction confirming to the latest industrial standards	LS	1	1	75,000	75,000	75,000.00	75,000.00
2.2	Environmental protection and precaution during construction (hording and dust screens shall be provided to control dust escaping to surrounding areas).	LS	1	1	35,000	35,000	35,000.00	35,000.00
TOTAL OF HEALTH, SAFETY AND ENVIRONMENT		B					110,000.00	110,000.00
3	INSURANCE, BONDS AND SECURITIES							
3.1	Insurance of works, contractor's equipment, third party, and workmen's compensation	LS	1	1	100,000	100,000	100,000.00	100,000.00
3.5	Performance security	LS	1	1	10,000	10,000	10,000.00	10,000.00
3.6	Advance payment security	LS	1	1	35,000	35,000	35,000.00	35,000.00
TOTAL OF INSURANCE, BONDS AND SECURITIES		C					145,000.00	145,000.00
4	PROJECT SIGN BOARDS							
4.1	Provide and maintain project signboards	item	1	1	50,000	50,000	50,000.00	50,000.00
TOTAL OF PROJECT SIGN BOARDS		D					50,000.00	50,000.00
5	SITE INVESTIGATION / TESTING							
5.1	Site investigation and Testing as directed by the Engineer (Not included in contractors quality control/assurance plans)	PS	1	1	75,000	75,000	75,000.00	75,000.00
TOTAL OF SITE INVESTIGATION / TESTING		E					75,000.00	75,000.00

6	QUALITY STANDARD AND PROGRESS							
6.1	Provision for monthly progress reports and photographs and etc	Month	9	10	40,000	40,000	360,000.00	400,000.00
6.2	Provide as built drawings, Quality assurance reports	LS	1	1	50,000	50,000	50,000.00	50,000.00
TOTAL OF QUALITY STANDARD AND PROGRESS			F				410,000.00	450,000.00
7	HORIZONTAL DRAINAGE DRILLING							
7.1	Temporary working platform for Horizontal Drilling work.	LS	1	1	200,000	200,000	200,000.00	200,000.00
7.1.1	Erection of solid concrete platform for new drilling machine	LS	1	1	-	250,000	-	250,000.00
7.2	Drilling for 100mm dia horizontal drains through any type of soil an intermittent rock and disposal of drilled material away from site as directed by Engineer.	m	450	450	10,200	11,500	4,590,000.00	5,175,000.00
7.3	Ditto- do- but through fresh bedrock.	m	50	50	10,200	11,500	510,000.00	575,000.00
7.4	90mm dia. long drains with perforated type 1000 PVC pipes and geotextile wrapping. Rate shall include for any other associated work as directed by the Engineer.	m	500	500	2,200	1,900	1,100,000.00	950,000.00
7.5	Supplying and placing of 90 mm dia. Polyethilene pipes Type 1000. Rate shall include for connecting the pipes to the PVC pipes and any other associated work as directed by the Engineer.	m	25	25	2,200	2,200	55,000.00	Cost for this item will be removed and included in the additional work items
TOTAL OF HORIZONTAL DRAINAGE DRILLING			G				6,455,000.00	7,150,000.00
8	GABION WORK							
8.1	Supplying assembling and placing of PVC coated Gabion wall boxes of size 1.0 x 1.0 x 1.0 m, filling dry rubble 6" x 9" at toe region of the surface drain outlet including provision of excavation & trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications, drawings and instructed by the Engineer.	m^3	10	10	11,000	11,000	110,000.00	110,000.00
TOTAL OF GABION WORK			H				110,000.00	110,000.00
9	SURFACE DRAINAGE DITCH							

9.1	Excavation for structures in soil , backfilling with existing soil, and disposal of excess materials away from the site within 5km distance as directed by the Engineer.[Rate shall include for planking and strutting if necessary] SCA 05-302	m^3	262	262	750	750	196,500.00	196,500.00
9.2	Supply and laying Grade 15 concrete prepared at site using mixer and vibrator, including placing in position, compacting and curing. SCA/5/1001	m^3	173	173	8,075	8,075	1,396,975.00	1,396,975.00
9.3	Tor steel reinforcement	Kg	5300	5300	100	100	530,000.00	530,000.00
9.4	Supply and fabricate, installing removing of formwork(ply wood) to sides of Drain SCA/5/1008	m^2	1253	1253	800	800	1,002,400.00	1,002,400.00
9.5	Expansion joints with water stops for drain @20m intervals	m	35	35	50	50	1,750.00	1,750.00
TOTAL OF SURFACE DRAINAGE DITCH			1				**3,127,625.00**	**3,127,625.00**
10 WATER COLLECTING PIT								
10.1	Excavation for structures in soil , backfilling with existing soil, and disposal of excess materials away from the site within 5km distance as directed by the Engineer.[Rate shall include for planking and strutting if necessary] SCA 05-302	m^3	10	10	750	750	7,500.00	7,500.00
10.2	Supply and lying of 200mm thick Crusheal stone base including compacting and preparation of the surface.	m^2	1.6	1.6	4000	4000	6,400.00	6,400.00
10.3	Construction of 225mm thick Brick masonry work in Catch pits using cement: sand motor 1:5.	m^2	17	17	2600	2600	44,200.00	44,200.00
10.4	25mm thick plastering work using cement sand 1:3 mix finished semi rough	m^2	12	12	650	650	7,800.00	7,800.00
TOTAL OF WATER COLLECTION PIT			1				**65,900.00**	**65,900.00**

11	**SMALL DAM**							
11.1	Supplying, assembling and placing of PVC coated Gabion wall boxes of size 1.0x1.0x1.0 m, filling dry rubble 6"x9" at toe region of the surface drain outlet including provision of excavation & trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications, drawings and instructed bi the Engineer. Gabion H=2.0 m Specification: SCA/5/1001 Pay:SCA/5/1001(2)	m^3.	10	6	25.000	25.000	250,000.00	150,000.00
11.2	Construction of RCC dam including Excavation for structures in soil, backfilling with existing soil, and disposal of excess materials away from the site within 5 km distance as directed by the Engineer, planking and strutting if necessary; Supply and laying Grade 15 concrete prepared at site using mixer and vibrator. Tor steel reinforcement. Supply and fabricate, installing removing of formwork (ply wood) two sides of drain expansion joints with water stops for drain @20 m intervals and cost of curing continuously. Replaced dam should maintain the water use function of former dam. Specification: SCA 05-302, SCA/5/1001, SCA/5/1002 SCA/5/1008, Parti. Spec. concrete H=1.0 m Pay:SCA 05-302(1), SCA/5/1001(2), SCA/5/1002(1), SCA/5/1008(1), Part.Preamble.	m^3.	10	10	10,000	10,000	100,000.00	100,000.00
11.3	Demolition and removal	m^3	5		850		4,250.00	The work item is cancelled by the engineer.
	TOTAL OF SMALL DAM				**K**		**354,250.00**	**250,000.00**

ADDITIONAL WORK ITEMS								
1	Rock Demolishing and removing	m^3	-	16	-	11.523	-	184,368.00
2	Construction of 450x450x450mm size concrete water collecting pit at the bottom of Gabion wall and open man hole	m^3	-	2	-	16.000	-	32,000.00
3	Supplying and placing of 160mm dia. Polyethilene pipe	m	-	20	-	4.900	-	98,000.00
	TOTAL OF ADDITIONAL WORK ITEMS							314,368.00
1	TOTAL OF BILL OF QUANTITIES (TOTAL OF A-K)						**11,727,775.00**	**12,922,893.00**
2	Contingencies - 10% of Sub Total						1,172,225.00	
	TOTAL BID PRICE (1+2)						**12,900,000.00**	
	TOTAL BID PRICE (Amount in words): *Rupees Twelve Million Nine Hundred Thousand Only.*							

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Programme Name : The Technical Cooperation for Landslide Mitigation Project

Project Name: The Pillot Project for Landslide and Rock Fall Mitigation Works (Lot 3)

FINAL COMPLETION REPORT

Contractor : Sanguine Engineering (Pvt) Limited

Thursday, March 16, 2017

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Programme Name : The Technical Cooperation for Landslide Mitigation Project

Project Name: The Pillot Project for Landslide and Rock Fall Mitigation Works (Lot 3)

CONTENTS

FINAL COMPLETION REPORT

Thursday, March 16, 2017

PROJECT DETAIL

THE EMPLOYER	**-**	**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**
THE ENGINEER	**-**	**NATIONAL BUILDING RESEARCH ORGANAIZATION (NBRO)**
THE CONTRACTOR	**-**	**SANGUINE ENGINEERING (PVT) LTD**
CONTRACT VALUE	**-**	**Rs.32,168,235.00**
CONTRACT DURATION	**-**	**11 MONTHS**
SUMMARY OF WORKS	**-**	**1. ROCK EXCAVATION AND DRILLING**
		2. GABION WORK
		3. EMBANKMENT CONSTRUCTION
		4. CANNEL EXCAVATION
		5. RUBBLE PITCHING
		6.DRAINAGE DITCH WORK
WORK START DATE		**- 2016/02/18**
WORK COMPLETED DATE		**- 2017/03/16**

1.BILL OF QUANTITY

B2-Lot 3)

Lot 3: BILL OF QUANTITIES fot Matale Rock fall mitigation works

nternational Cooperation Agency (JICA) Sri Lanka Office,
3th Floors, DHPL Building,
Navam Mawatha,
o 02 Sri Lanka

Item	Description	Unit	Qty	Rate	Amount
1	**CONTRACTOR'S SITE ESTABLISHMENT**				
1.1	Establishment, maintenance, and removal of contractor's site facilities such as office, stores, services, security, etc...	LS	1	2,500,000/=	2,500,000·0
1.2	Mobilization and de-mobilization of plant, equipment, and machinery	LS	1	1,250,000/=	1,250,000·0
	TOTAL OF CONTRACTOR'S SITE ESTABLISHMENT			**A**	3,750,000·0
2	**HEALTH, SAFETY AND ENVIRONMENT**				
2.1	Health and safety measures during construction confirming to the latest industrial standards	LS	1	875,000/=	875,000·0
2.2	Environmental protection and precaution during construction (hording and dust screens shall be provided to control dust escaping to surrounding areas).	LS	1	625,000/=	625,000·00
	TOTAL OF HEALTH, SAFETY AND ENVIRONMENT			**B**	1,500,000·0
3	**INSURANCE, BONDS AND SECURITIES**				
3.1	Insurance of works, contractor's equipment, third party, and workmen's compensation	LS	1	187,500/=	187,500·00
3.2	Performance security	LS	1	125,000/=	125,000·00
3.3	Advance payment security	LS	1	250,000/=	250,000·00
	TOTAL OF INSURANCE, BONDS AND SECURITIES			**C**	562,500·00
4	**PROJECT SIGN BOARDS**				
4.1	Provide and maintain project signboards	item	1	125,000/=	125,000·00
	TOTAL OF PROJECT SIGN BOARDS			**D**	125,000·00
5	**SITE INVESTIGATION / TESTING**				
5.1	Site investigation and Testing as directed by the Engineer (Not included in contractors quality control/assurance plane)	PS	1	125,000/=	125,000·00
	TOTAL OF SITE INVESTIGATION / TESTING			**E**	125,000·00
6	**QUALITY STANDARD AND PROGRESS**				
6.1	Provision for monthly progress reports and photograps and etc	Month	11	18,750/=	206,250·00
6.2	Provide as built drawings, Quality assurance reports	LS	1	125,000/=	125,000·00
	TOTAL OF QUALITY STANDARD AND PROGRESS			**F**	331,250·00
7	**EARTH WORK**				
7.1	Excavation for canal (ditch) in soil soft rock, disposal of materials on site location and preservating for reuse as directed by the Engineer.	m^3	1,030	2500/=	2,575,000·0
7.2	Rock excavation for structures/reshaping the slope/berms using control blasting and disposal of excess materials away from the site within 5km distance as directed by the Engineer.	m^3	412	26875/=	11,072,500·0
7.3	Filling to Embankment using existing soil at downside of the slope including compaction (Ave effective height-2m approximate) as per the specifications, drawing and instructed	m^3	738	1500/=	1,107,000·00

Sanguine Engineering (Pvt) Ltd

	by the Engineer.				
7.4	Leveling of excavated Canal disposal of materials on site location and preservating for reuse as directed by the Engineer.	m³	91	1250/=	113,750.00
7.5	Supplying and placing of Rubble stone pitching top of the Earth embankment and bottom of the Canal as directed by the Engineer.	m²	679	2250/=	1,527,750.00
[redacted]	[redacted]	[redacted]	[redacted]	13750/=	1,375,000.00
	TOTAL OF EARTH WORK			**G**	17,771,000.00
8	**GABION WORK.**				
8.1	Supplying, assembling and placing of PVC coated Gabion wall boxes of size 1.0 x 1.0 x 1.0m, filling dry rubble 6" x 9" at toe region of the surface drain outlet including provision of excavation & trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications, drawings and instructed by the Engineer.	m³	201	16250/=	3,266,250.00
	TOTAL OF GABION WORK			**H**	3,266,250.00
9	**DRAINAGE WORK**				
9.1	Supplying and placing of 700mmØ Precast RCC hume Pipee. Rate to include for Excavation for drain, Connection of Pipes and Backfill as per the drawings, specifications and as instructed by the Engineer.	m	18	25000/=	450,000.00
	TOTAL OF DRAINAGE WORK			**I**	450,000.00
1. Lot 3: TOTAL OF BILL OF QUANTITIES (TOTAL OF A~I)					21,881,000.00
2. Contingencies-10% of Sub Total					2,788,100.00
TOTAL BID PRICE (1+2)					30,669,100.00
TOTAL BID PRICE (Amount in words): Thirty million six hundred sixty nine thousand and one hundred only.					
VAT 12% OF TOTAL BID PRICE (12.5%)					3,833,637.50
GRAND TOTAL INCLUDING VAT					34,502,737.50

(Signature) Sanguine Engineering (Pvt) Ltd.

(Name of Signer)

(Title of Signer)

Sanguine Engineering (Pvt) Ltd.

Director

14-8

2. AMENDMENT OF CONTRACT

SANGUI
Engineering (Pvt)
Civil Engineers & Construction Contractors

10th January 2017

Director
Landslide Research and Risk Management Division
National Building Research Organaization
No 99/01 Jawatte Road,
Colombo 05,
Sri Lanka

Dear Sir

PILOT PROJECT FOR LANDSLIDE AND ROCKFALL MITIGATION WORKS (LOT 03)

Request for the Amendment of Contract

This refers to the above project. We wish to submit our request for Amendment of Contract considering following details.

1.0 Design change of the Drainage Work (Item 9.1)

The original pre-cast hume-pipe laying design has been revised with an open ditch considering the site conditions. The proposed design is a labor intensive work since it should be constructed along steep elevation. Excavation, Material lowering and all other activities should be done manually. Please refer the attached Layout Drawing and Cross section (**Annex 01**).

2.0 Conclusion

2.1 Unexpected Work

During the construction work, we found some unexpected works such as additional excavation of rock layers, requirement for some extra gabion work, exceeding of soil excavation volume etc.

2.2 Changes to BOQ Quantities

The quantities of following BOQ items are changing due to above (2.1) mentioned reasons.

Item 3.3 – Advance Payment Security amount shall be deleted as contractor did not request for Advance Payment.

Item 7.1 – Excavation quantity has been increased due to site conditions.

Item 7.2 – Rock Excavation quantity has been increased due to unforeseen rock layers.

Item 8.1 – It has been proposed to increase no of Gabion boxes with new layout design.

Item 9.1 – The amount of Drainage work shall be revised with new design.

Lumbini Mawatha, Dalugama, Kelaniya.
Tel-071-0353503 / 071-0353507 Fax 011-291 3012

Please refer the attached Revised BOQ prepared for such changes (**Annex 02**).

2.3 Extension of Time for Construction Period

Change of Drainage Design

We request you to consider above mentioned Design Change for Drainage work and extend our time period by 06 weeks (Refer **Annex 03** for Activity Plan)to execute the newly proposed ditch work.

Bad Weather Condition

There were some rainy days as listed in the attachment affected the progress of the work more than 03 weeks from the commencement date of site works. Please refer the attachments (**Annex 04**).

Considering all the above mentioned issues and justifications provided, we kindly request you to amend the contract by approving the Revised BOQ and extending our Time Duration up to **16th March 2017** in order to complete the balance work.

Thanking for the cooperation provided by you and all the consultants. Your favorable attention would be highly appreciated.

We assure best services.

Yours' faithfully
SANGUINE ENGINEERING (PVT) LTD
Sanguine Engineering (Pvt) Ltd.

.....
Director

sila Wijesinghe
roject Manager(Director)

Amendment of Contract

THIS AMENDMENT OF CONTRACT is made and entered into on 13th of January, 2017 by and between Japan International Cooperation Agency (JICA) Sri Lanka Office (hereinafter referred as "Employer") and Sanguine Engineering (Pvt) Ltd with its principal place of business at 116, Waragoda Road, Kelaniya, Sri Lanka (hereinafter referred as "the Contractor"), as amendment of the original contract made on 28th of January, 2016 by and between the Employer and the Contractor (hereinafter referred as "Original Contract").

WHEREAS, this amendment is made in accordance with Clause 23 and 24 of the Original Contract;

NOW, THEREFORE, the parties hereto hereby agree as follows:

1. Items 3.3, 7.1, 7.2, 8.1, 9.1 and Total Amount of "Bill of Quantity" (hereinafter referred as "BOQ") in the Contractor's Bid under the Original Contract shall be amended as attached.

2. Rs. 1,400,187.50, the amount of difference in the item 7.2 of "BOQ" between the original and amended after amendment specified in the preceding article of this amendment of the contract shall be defrayed from the contingencies as additional cost upon the Contractor's progress report approved by the Employer.

3. Article 4. "Period of Execution of Work" in the Original Contract shall be amended as follows;

   The words in the Article 4.2 "On or before 15th January 2017" shall be deleted and "On or before 16th March 2017" shall be substituted in lieu thereof.

4. Article 5. "Remuneration" in the Original Contract shall be amended as follows;

   The words in the Article 5.1 "The Employer shall remunerate the Contractor with a total amount of Sri Lankan Rupees Thirty Two Million One Hundred Sixty Eight Thousand and Two Hundred Thirty Five Only (Rs. 32,168,235.00) (excluding the VAT) as the Contract Price for the Work, in accordance with the payment schedule stated in Article 6.3 of this Contract."

5. All the other parts of the Original Contract shall remain unchanged.

Breakdown of "Bill of Quantity" with Amendment

Item	Description	Original BOQ				Amended BOQ				Difference
		Unit	Qty	Rate	Amount	Unit	Qty	Rate	Amount	
3	**INSURANCE, BONDS AND SECURITIES**									
3.3	Advance payment security	LS	1	250,000.00	250,000.00	LS	1	0.00	0.00	**-250,000.00**
7	**EARTH WORK**									
7.1	Excavation for canal (ditch) in soil soft rock, disposal of materials on site location and persevering for reuse as directed by the Engineer.	m^3	1,030.00	2,500.00	2,575,000.00	m^3	1,232.70	2,500.00	3,081,750.00	**506,750.00**
7.2	Rock excavation for structures/reshaping the slope/berms using **control blasting** and disposal of excess materials away from the site within 5km distance as directed by the Engineer.	m^3	412.00	26,875.00	11,072,500.00	m^3	464.10	26,875.00	12,472,687.50	**1,400,187.50**
8	**GABION WORK.**									
8.1	Supplying, assembling and placing of PVC coated Gabion wall boxes of size 1.0 x 1.0 x 1.0m, filling dry rubble 6" x 9" at toe region of the surface drain outlet including provision of excavation & trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications, drawings and instructed by the	m^3	201.00	16,250.00	3,266,250.00	m^3	213.00	16,250.00	3,461,250.00	**195,000.00**
9	**DRAINAGE WORK**									
9.1	Supplying and placing of 700mm Ø Precast RCC hume Pipe. Rate to include for Excavation for drain, Connection of Pipes and Backfill as per the drawings, specifications and as instructed by the Engineer.	m	18.00	25,000.00	450,000.00	LS	1.00	1,361,100.00	1,361,100.00	**911,100.00**
		Total before Amendment			17,613,750.00	Total after Amendment			20,376,787.50	**2,763,037.50**
						Amount to be added to the contract amount				**1,362,850.00**
						Amount to be covered with contingency				**1,400,187.50**

No	Contract Amount	Original	Amendment
1	Lot 3: TOTAL OF BILL OF QUANTITIES	27,881,000.00	29,243,850.00
2	Contingencies-10% of Total BOQ	2,788,100.00	2,924,385.00
3	TOTAL CONTRACT PRICE (1+2)	30,669,100.00	32,168,235.00

3. VARIATIONS

Rate Analysis - Surface Drainage Ditch (Extra Works) - Item No: 9.1

Item	Description	Unit	Qty	Rate	Amount
01	- **Machinary - for rock drilling and sizeing - (70.0 m^3)**				
	Compressior with operator	Hrs	80.00	2,000.00	160,000.00
	Jack hammer	Hrs	80.00	750.00	60,000.00
	Excavater - 120	Hours	30.00	3,500.00	105,000.00
	Crack stone	Kg	800.00	120.00	96,000.00
	Total for material cost				**421,000.00**
02	**Labour for drilling and chemical work**				
	Skill labour	Day	20.00	2,000.00	40,000.00
	Unskill labour	Day	40.00	1,400.00	56,000.00
03	**Labour for site clearning work**				
	Unskill labour	Day	5.00	1,400.00	7,000.00
04	**Labour for excavation work - (mannual excavation)**				
	Unskill labour	Day	20.00	1,400.00	28,000.00
05	**Labour for levelling and trimming work**				
	Unskill labour	Day	20.00	1,400.00	28,000.00
06	**Labour for rubble sizeing work**				
	Unskill labour	Day	25.00	1,400.00	35,000.00
07	**Labour for rubble supplying and transporting (Mannual)**				
	Unskill labour	Day	30.00	1,400.00	42,000.00
08	**Labour for rubble pitching work**				
	Skill labour	Day	90.00	2,000.00	180,000.00
	Unskill labour	Day	150.00	1,400.00	210,000.00
	Total for labour cost				**626,000.00**
	Sub Total				1,047,000.00
	Allow Profit & Overheads 30%				314,100.00
	Total cost per extra drain work(Surface drainage ditch)				**1,361,100.00**

4. COMPLETED WORK PROGRESS

1. **B.O.Q Item No : 7.1**

Excavation for cannel in soil soft rock,disposal of materials on site location and preservating for reuse as directed by the engineer.

Work started date : 2016/12/01
Work finished date : 2016/12/25
Completed QTY : 1232.7 m^3

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


2. B.O.Q Item No : 7.2

Rock excavation for structures/reshaping the slope/berms using control blasting and disposal of excess materials away from the site within 5 km distance as directed by the engineer.

Work started date : 2016/08/01
Work finished date : 2016/12/18
Completed QTY : 464.1 m^3

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


3. B.O.Q Item No : 7.3

Filling to embankment using existing soil at downside of the slope including compaction.

Work started date : 2016/10/05
Work finished date : 2016/10/25
Completed QTY : 730.80 m^3

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


4. B.O.Q Item No : 7.5

Supply and placing of rubble stone pitching top of the earth embankment and bottom of the cannel as directed by the engineer.

Work started date	:	2016/12/24
Work finished date	:	2017/01/30
Completed QTY	:	676.7 m^2

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


5. B.O.Q Item No : 7.6

Temporary road constructions.

Work started date	:	2016/07/12
Work finished date	:	2016/07/15
Completed QTY	:	100.0 m

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


6. B.O.Q Item No : 8.1

Supply,assembling and placing of PVC coated gabion wall boxes of size 1.0x1.0x1.0 m, filling dry rubble 6”x9” at toe region of the surface drain outlet including provisions of excavation and trimming and preparation of ground surface to accommodate the proper placing of gabion boxes and as per the specifications,drawings and instructed by the engineer.

Work started date	:	2016/10/02
Work finished date	:	2016/10/26
Completed QTY	:	213.0 m^3

BEFORE CONSTRUCTION


AFTER CONSTRUCTION


7. B.O.Q Item No : 9.1

Drainage ditch work.

Work started date : 2017/02/02
Work finished date : 2017/03/02
Completed QTY : 100% Completed

AFTER CONSTRUCTION


BEFORE CONSTRUCTION


5. FINAL PROGRESS REPORT

Monthly Progress Report (From 1st of February to 28th February 2017)

Name of the Lot: 3

Period of Construction: 11 months

Company Name: Sanguine Engineering (Pvt) Ltd.

Date: 3/1/2017

Month/Year	Planned progress of the work %	Actual progress of the work %	Remarks
Feb-16	0%	0%	
Mar-16	0%	0%	
Apr-16	0%	0%	
May-16	0%	0%	
Jun-16	20%	18.03%	
Jul-16	20%	14.20%	
Aug-16	35%	30.96%	
Sep-16	45%	40.02%	
Oct-16	65%	61.30%	
Nov-16	70%	62.10%	
Dec-16	80%	73.30%	
Jan-17	95%	92.19%	
Feb-17	100%	98.45%	

The Contractor - Sanguine Engineering (Pvt) Ltd.

.....

Name: W. M. A. Weerasinghe

Title: Quantity Surveyor.

The Engineer (NBRO)

.....

Name:

Title:

The Employer (JICA)

.....

Name:

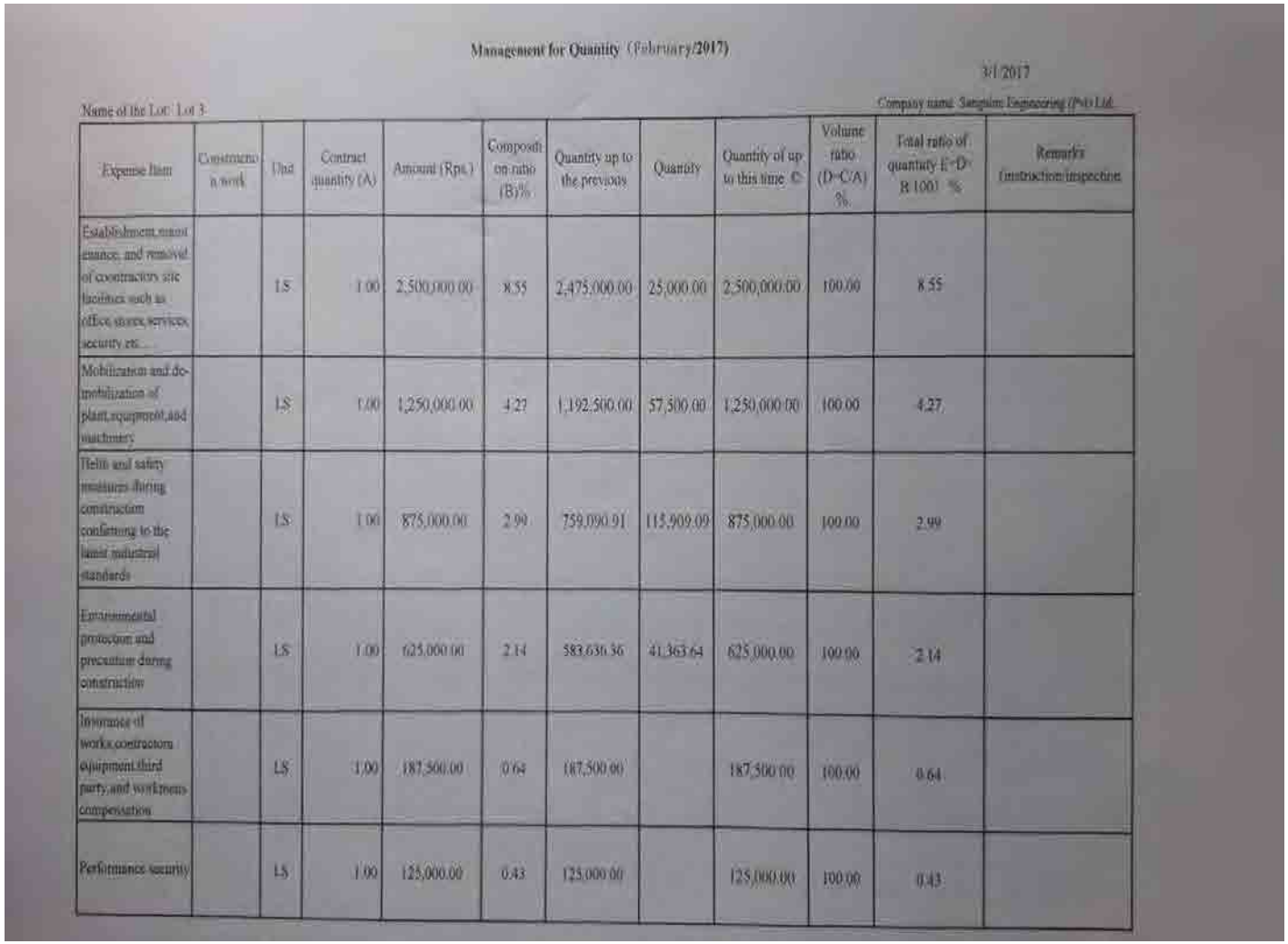
Title:

The Engineer(TCLMP)

.....

Name:

Title:



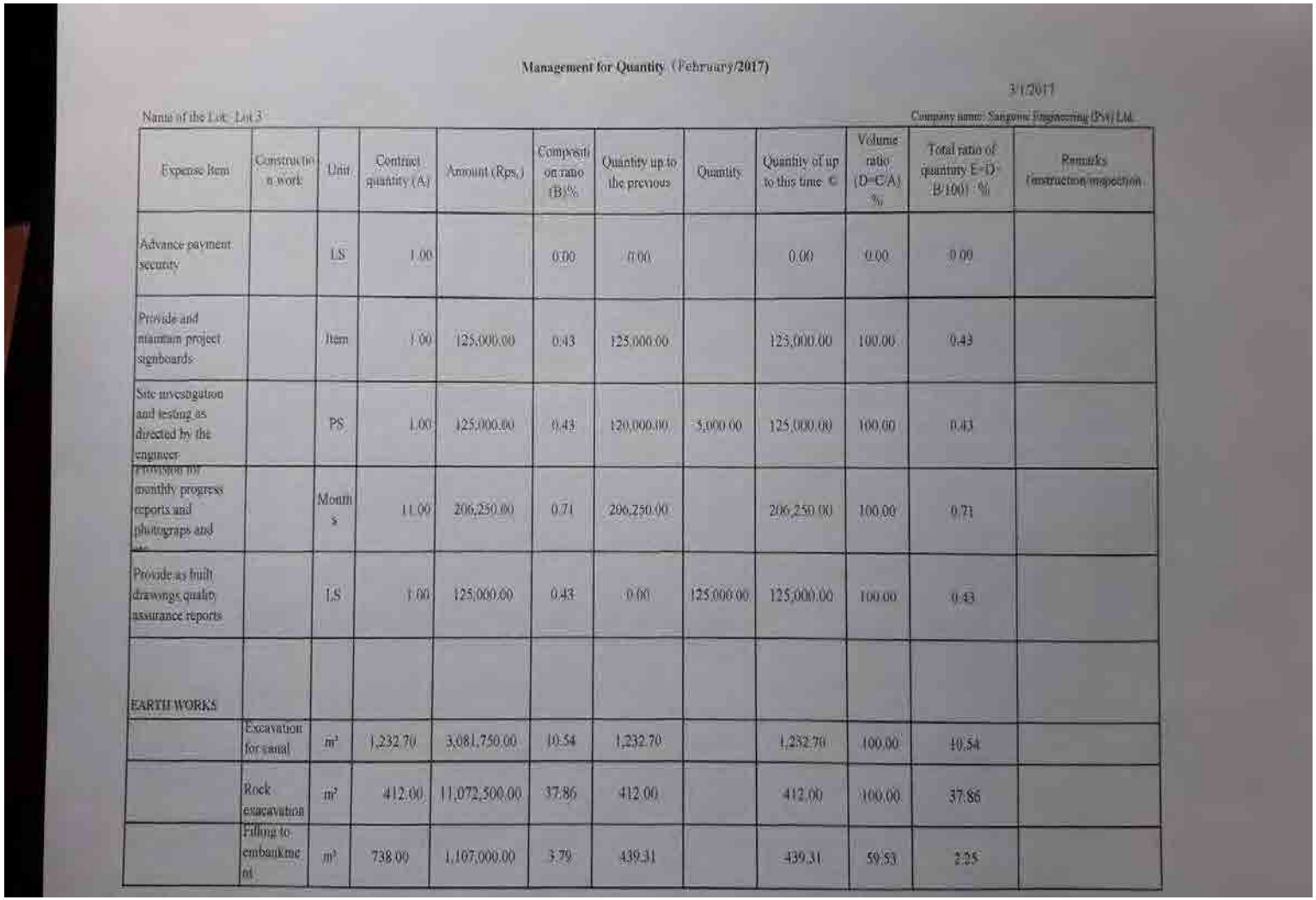
Management for Quantity (February/2017)

3/1/2017

Name of the Lot: Lot 3

Company name: Sangsim Engineering (Pvt) Ltd.

Expense Item	Construction work	Unit	Contract quantity (A)	Amount (Rps.)	Composition ratio (B)%	Quantity up to the previous	Quantity	Quantity of up to this time C	Volume ratio (D=C/A) %	Total ratio of quantity E=D×B/100) %	Remark's (instruction/inspection)
Establishment maintenance, and removal of construction site facilities such as office, stores, services, security etc....		LS	1.00	2,500,000.00	8.55	2,475,000.00	25,000.00	2,500,000.00	100.00	8.55	
Mobilization and de-mobilization of plant,equipment,and machinery		LS	1.00	1,250,000.00	4.27	1,192,500.00	57,500.00	1,250,000.00	100.00	4.27	
Helth and safety measures during construction conforming to the latest industrial standards		LS	1.00	875,000.00	2.99	759,090.91	115,909.09	875,000.00	100.00	2.99	
Environmental protection and precautions during construction		LS	1.00	625,000.00	2.14	583,636.36	41,363.64	625,000.00	100.00	2.14	
Insurance of works,contractors equipment,third party,and workmens compensation		LS	1.00	187,500.00	0.64	187,500.00		187,500.00	100.00	0.64	
Performance security		LS	1.00	125,000.00	0.43	125,000.00		125,000.00	100.00	0.43	



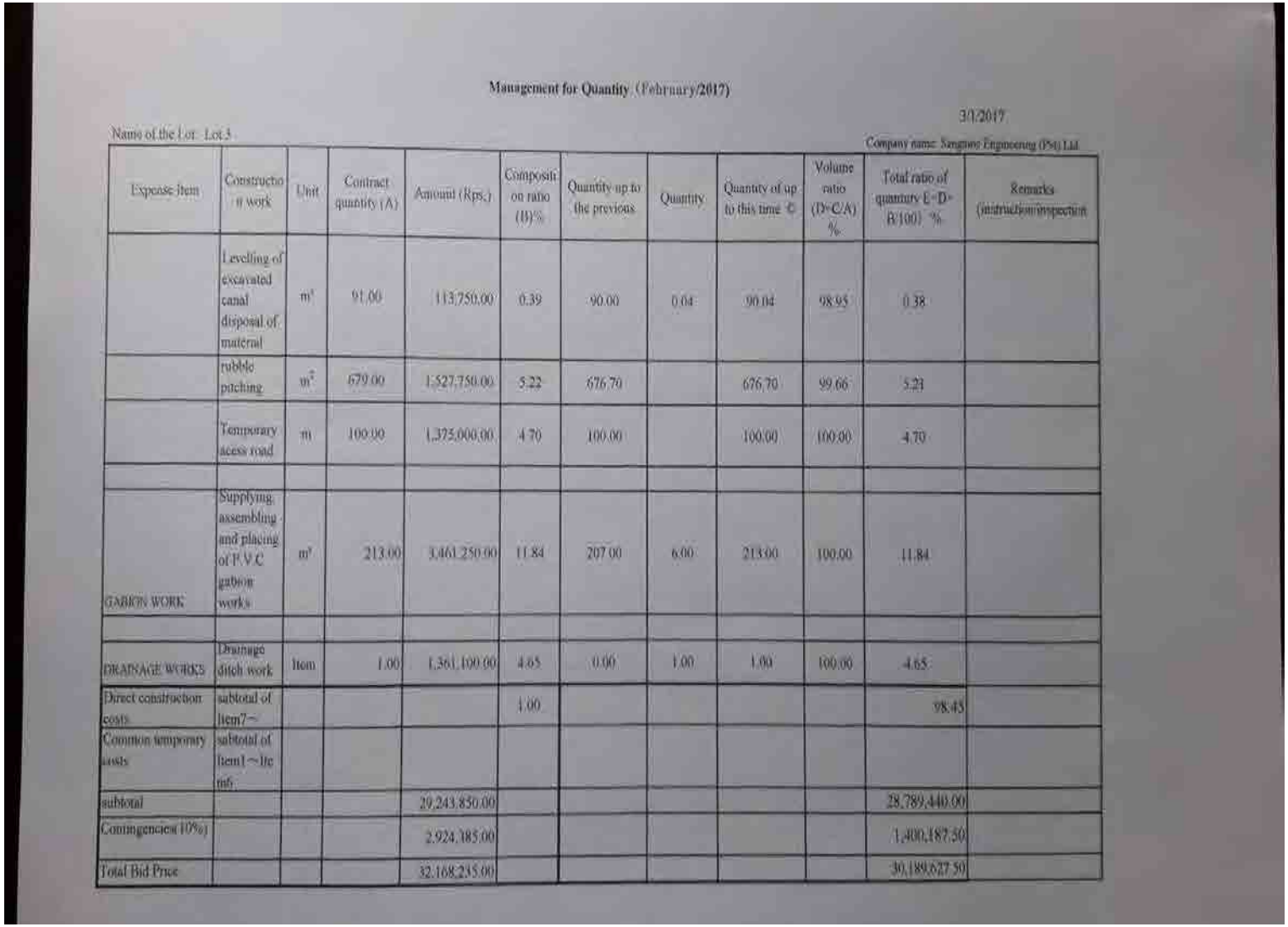
Management for Quantity (February/2017)

3/1/2017

Name of the Lot: Lot 3

Company name: Sangyou Engineering (Pvt) Ltd.

Expense Item	Construction work	Unit	Contract quantity (A)	Amount (Rps.)	Composition ratio (B)%	Quantity up to the previous	Quantity	Quantity of up to this time C	Volume ratio (D=C/A) %	Total ratio of quantity E=D*B/100 %	Remarks (instruction, inspection
Advance payment security		LS	1.00		0.00	0.00		0.00	0.00	0.00	
Provide and maintain project signboards		Item	1.00	125,000.00	0.43	125,000.00		125,000.00	100.00	0.43	
Site investigation and testing as directed by the engineer		PS	1.00	125,000.00	0.43	120,000.00	5,000.00	125,000.00	100.00	0.43	
Provision of monthly progress reports and photograps and etc		Month s	11.00	206,250.00	0.71	206,250.00		206,250.00	100.00	0.71	
Provide as built drawings quality assurance reports		LS	1.00	125,000.00	0.43	0.00	125,000.00	125,000.00	100.00	0.43	
EARTH WORKS											
	Excavation for canal	m³	1,232.70	3,081,750.00	10.54	1,232.70		1,232.70	100.00	10.54	
	Rock excavation	m³	412.00	11,072,500.00	37.86	412.00		412.00	100.00	37.86	
	Filling to embankment	m³	738.00	1,107,000.00	3.79	439.31		439.31	59.53	2.25	



Management for Quantity (February/2017)

3/1/2017

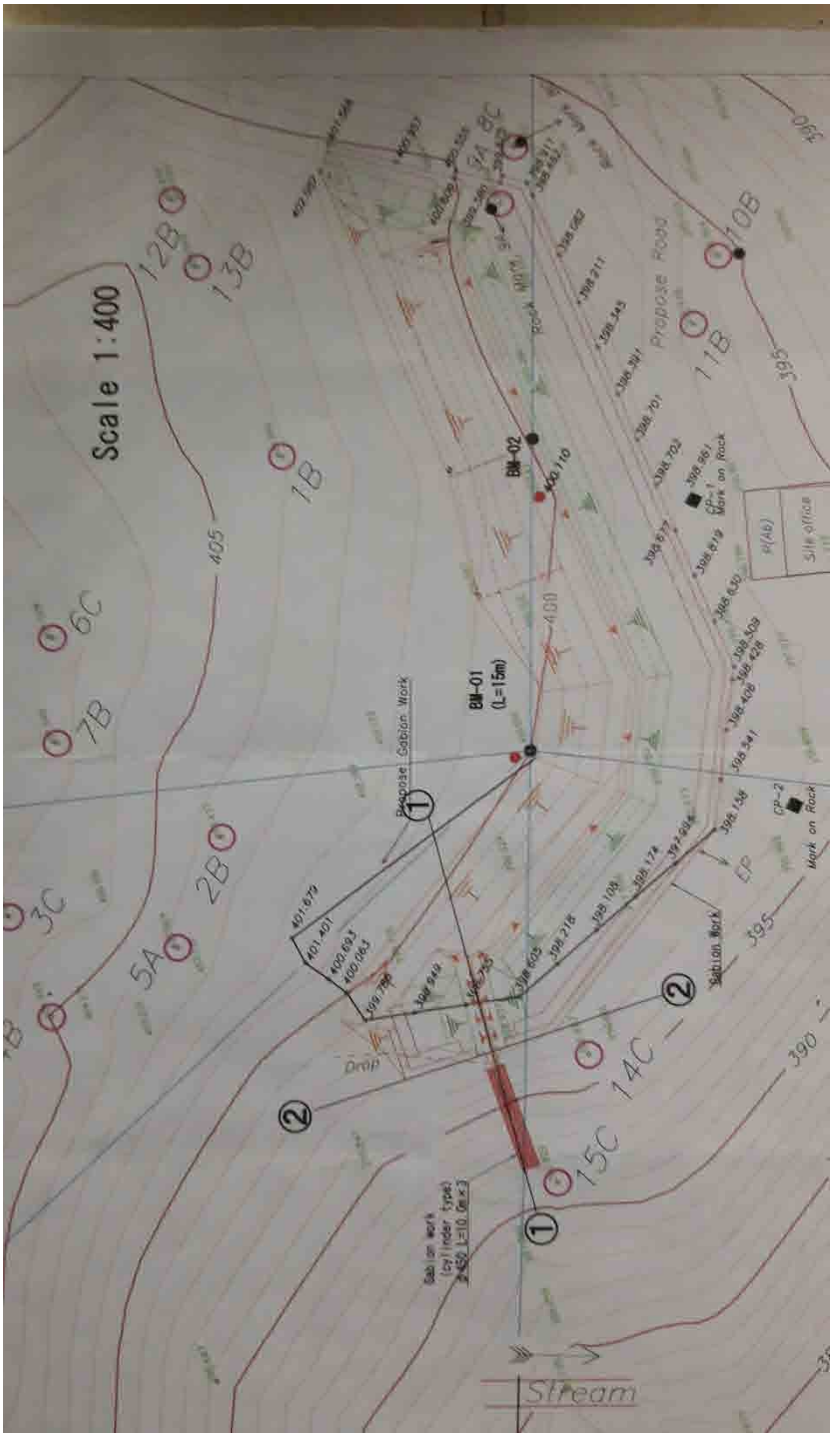
Name of the Lot Lot 5

Company name: Sangtuwo Engineering (Pvt) Ltd

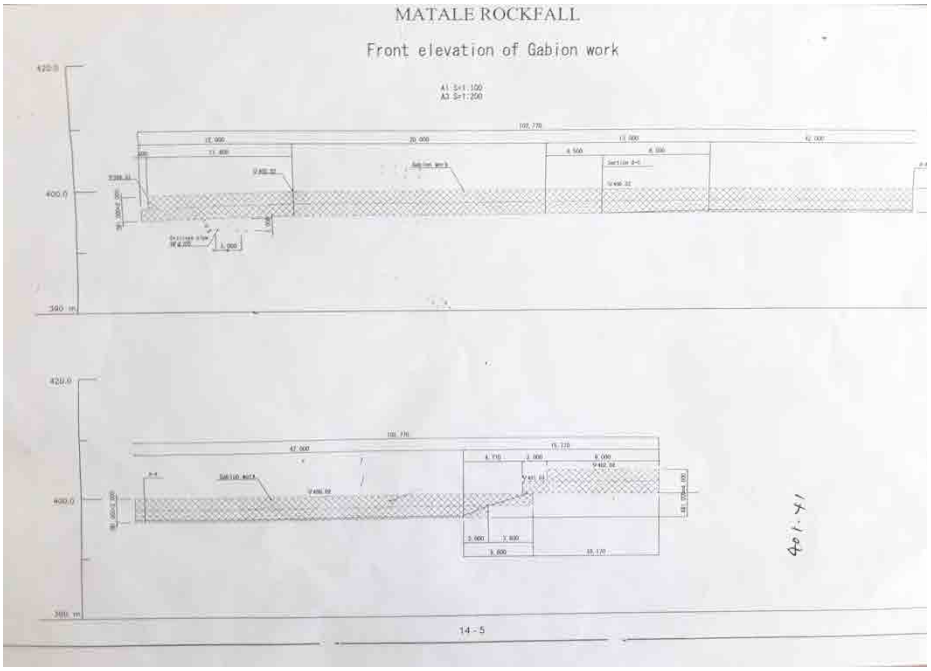
Expense item	Construction work	Unit	Contract quantity (A)	Amount (Rps.)	Composition ratio (B)%	Quantity up to the previous	Quantity	Quantity of up to this time C	Volume ratio (D=C/A) %	Total ratio of quantity E=D×B/100) %	Remarks (instruction/inspection
	Levelling of excavated canal disposal of material	m^3	91.00	113,750.00	0.39	90.00	0.04	90.04	98.95	0.38	
	rubble pitching	m^2	679.00	1,527,750.00	5.22	676.70		676.70	99.66	5.21	
	Temporary access road	m	100.00	1,375,000.00	4.70	100.00		100.00	100.00	4.70	
GABION WORK	Supplying, assembling and placing of P.V.C gabion works	m^3	213.00	3,461,250.00	11.84	207.00	6.00	213.00	100.00	11.84	
DRAINAGE WORKS	Drainage ditch work	Item	1.00	1,361,100.00	4.65	0.00	1.00	1.00	100.00	4.65	
Direct construction costs	subtotal of item7~				1.00					98.45	
Common temporary costs	subtotal of item1~ite m6										
subtotal				29,243,850.00						28,789,440.00	
Contingencies(10%)				2,924,385.00						1,400,187.50	
Total Bid Price				32,168,235.00						30,189,627.50	

6. CONSTRUCTION DRAWINGS

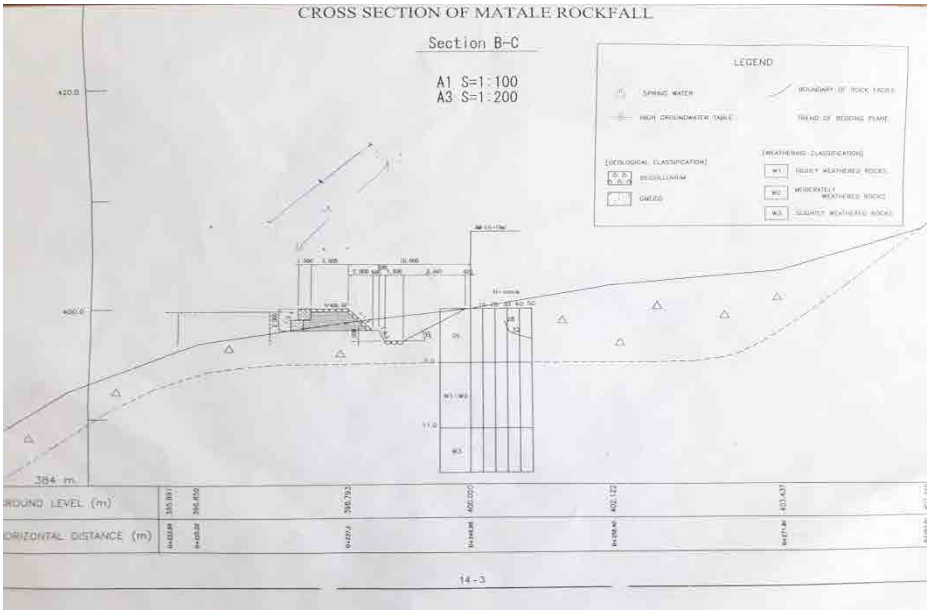
LAOUT DRAWING



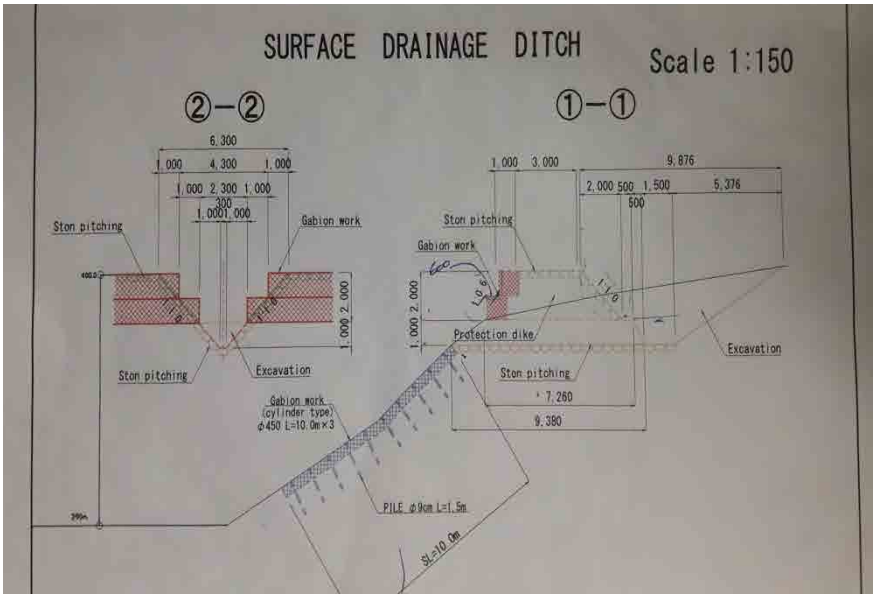
FRONT ELEVATION IN GABION WALL

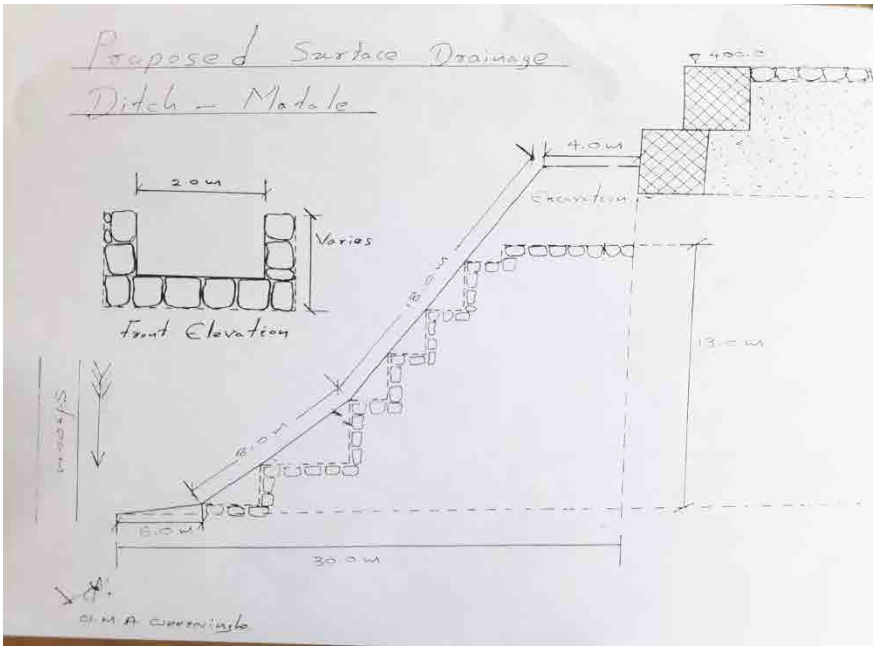


SECTIONAL ELEVATION IN GABION WALL

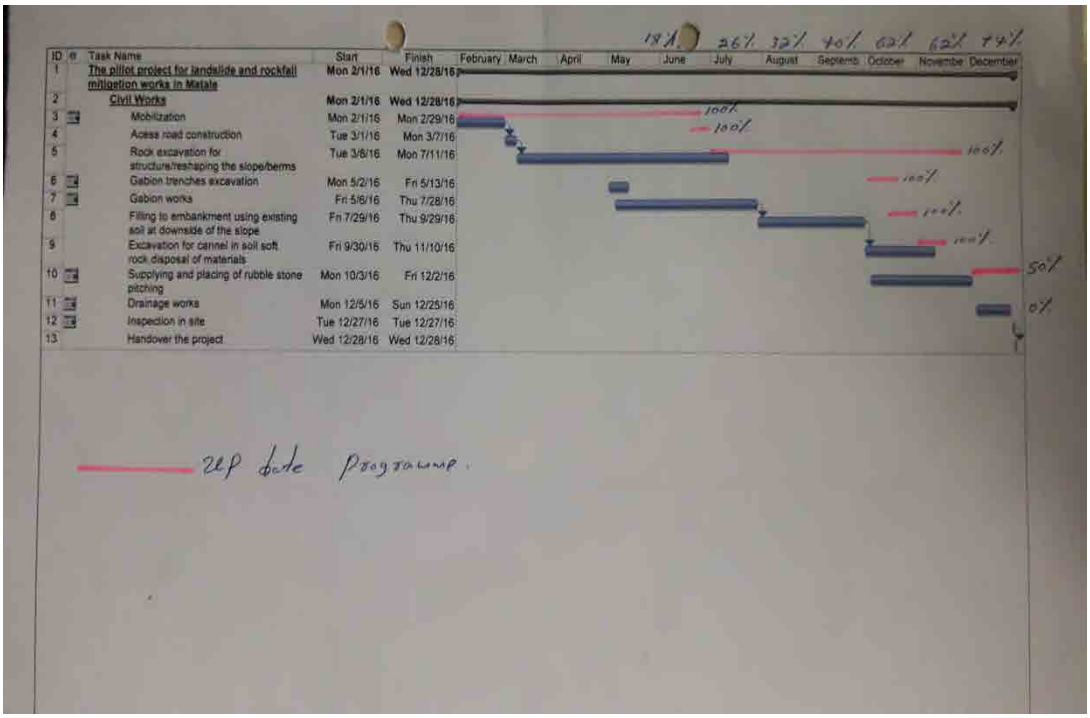


SURFACE DRAINAGE DITCH





7. CONSTRUCTION PROGRAMME


18% 26% 32% 40% 62% 62% 74%
ID Task Name Start Finish February March April May June July August Septemb October Novembe December
1 The pillot project for landslide and rockfall mitigation works in Matale Mon 2/1/16 Wed 12/28/16
2 Civil Works Mon 2/1/16 Wed 12/28/16
3 Mobilization Mon 2/1/16 Mon 2/29/16
4 Acess road construction Tue 3/1/16 Mon 3/7/16
5 Rock excavation for structure/reshaping the slope/berms Tue 3/8/16 Mon 7/11/16
6 Gabion trenches excavation Mon 5/2/16 Fri 5/13/16
7 Gabion works Fri 5/6/16 Thu 7/28/16
8 Filling to embankment using existing soil at downside of the slope Fri 7/29/16 Thu 9/29/16
9 Excavation for cannel in soil soft rock disposal of materials Fri 9/30/16 Thu 11/10/16
10 Supplying and placing of rubble stone pitching Mon 10/3/16 Fri 12/2/16
11 Drainage works Mon 12/5/16 Sun 12/25/16
12 Inspection in site Tue 12/27/16 Tue 12/27/16
13 Handover the project Wed 12/28/16 Wed 12/28/16
100%
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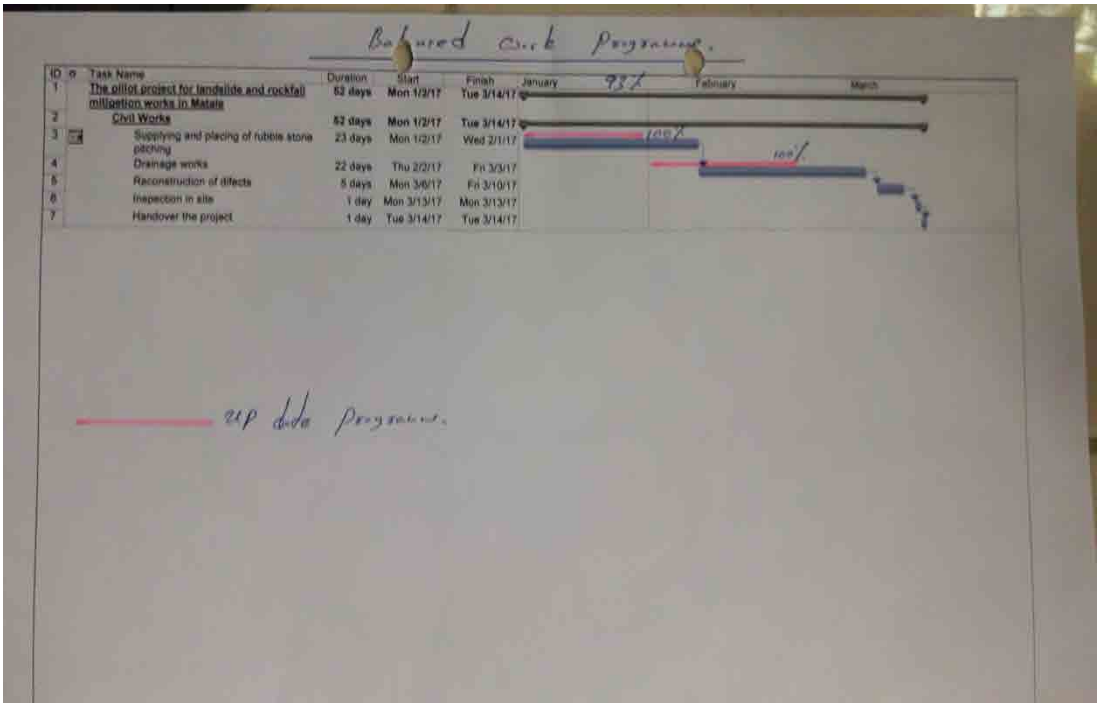
Up date Programme.


Revised Work Programme.
ID Task Name Duration Start Finish January February March
1 The pillot project for landslide and rockfall mitigation works in Matale 52 days Mon 1/2/17 Tue 3/14/17
2 Civil Works 52 days Mon 1/2/17 Tue 3/14/17
3 Supplying and placing of rubble stone pitching 23 days Mon 1/2/17 Wed 2/1/17
4 Drainage works 22 days Thu 2/2/17 Fri 3/3/17
5 Reconstruction of dfects 5 days Mon 3/6/17 Fri 3/10/17
6 Inspection in site 1 day Mon 3/13/17 Mon 3/13/17
7 Handover the project 1 day Tue 3/14/17 Tue 3/14/17
93%
100%
100%
Up date Programme.