

- NOTES :**
1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE MENTIONED.
  2. GRADE OF CONCRETE :-  
 BOX STRUCTURE - M30  
 RETURN WALL - M30  
 APPROACH SLAB - M30  
 RAILING - M30  
 CURTAIN WALL - M15  
 LEVELING COURSE(P.C.C) - M15  
 CRASH BARRIER - M40 & KERB-M30
  3. GRADE OF STEEL Fe-500 AS PER IS-1786.
  4. LIFE LOADE ANALYSIS HAS BEEN DONE FOR 3 LANE IN CONNECTION WITH THE RECOMMENDATION OF IRC-6-2010 & WORST EFFECT HAS BEEN CONSIDERED FOR DESIGN.
  5. PROPERTIES OF BACKFILL SOIL  $\gamma=1.8t/m^3$ ,  $\phi=30^\circ$
  6. FILTER MATERIAL BEHIND ABUTMENT AND RETURN WALL SHALL CONFORM TO CLAUSE 2504.2.2 OF MORTH SPECIFICATIONS TO A THICKNESS OF NOT LESS THAN 600mm. WITH SMALLER SIZE TOWARDS THE SOIL AND BIGGER SIZE TOWARDS THE WALL TO THE FULL HEIGHT.
  7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
  8. THE SOIL BELOW FOUNDATION LEVEL SHOULD BE WELL COMPACTED TO ACHIEVE MINIMUM BEARING CAPACITY OF 10t/SQM.



CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

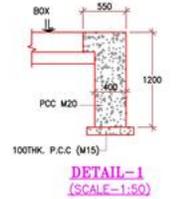
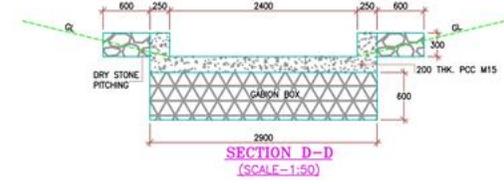
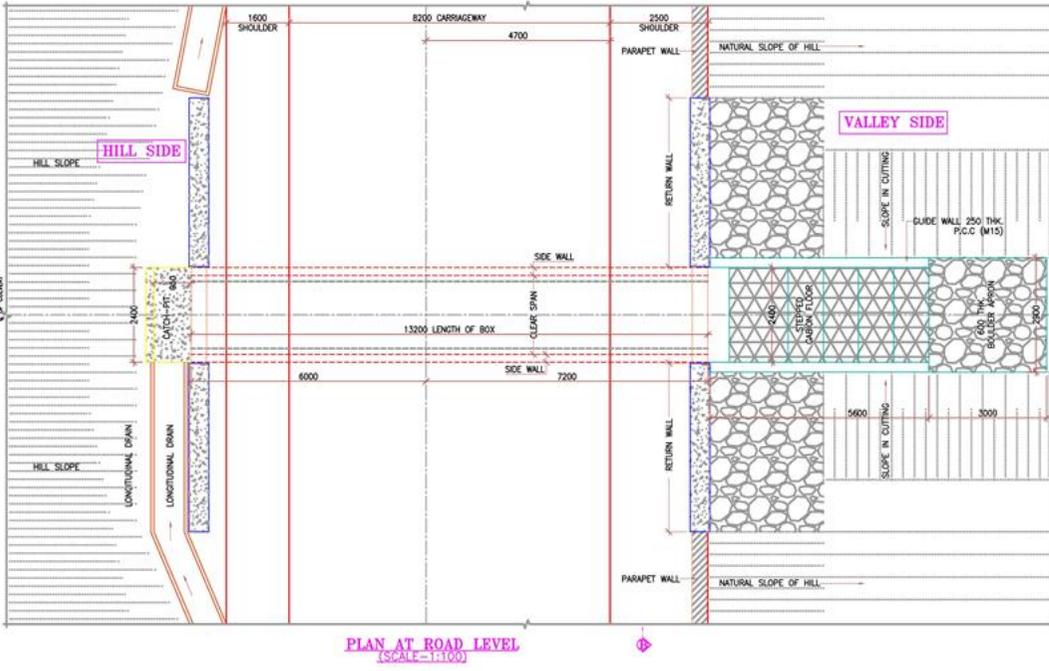
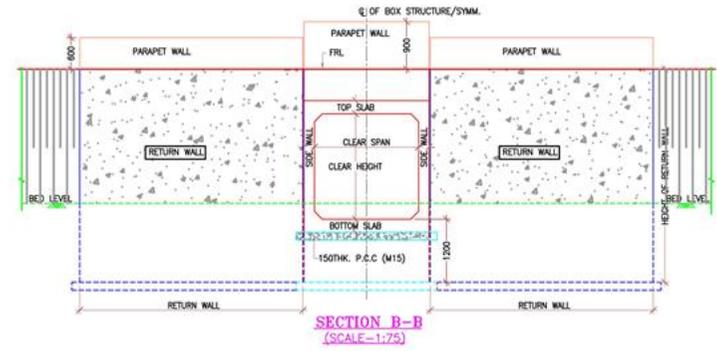
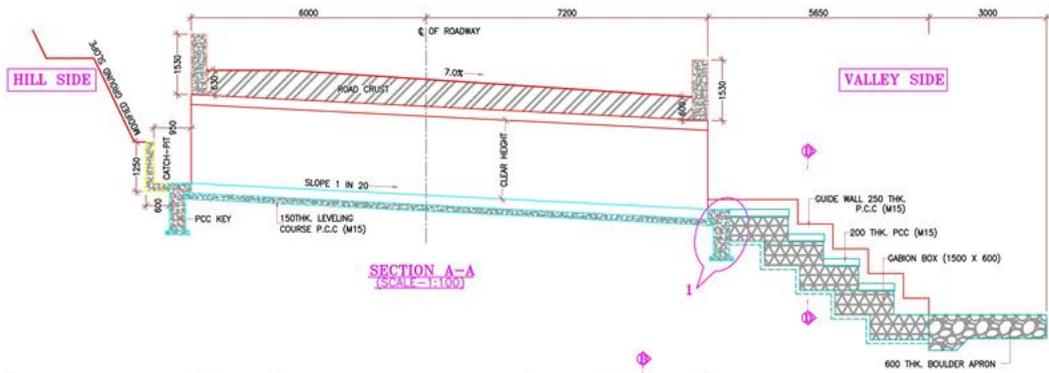
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
 403, 4th Floor, Park Centra,  
 Sector-30, Opp. 32nd Milestone, NH-8  
 Gurgaon-122002, Haryana  
 CIN- U74140HR2004PTC046918  
 Ph: 0124-4598200  
 Fax: 0124-4019051  
 E-mail: info@voyants.in, www.voyants.in

|      |            |             |               |          |               |  |
|------|------------|-------------|---------------|----------|---------------|--|
| RO   | 20/05/2016 |             | DRAWN BY :    | PD       | TITLE :       | TYPICAL DRAWING OF BOX CULVERT TYPE-01 |
| REV. | DATE       | DESCRIPTION | DESIGNED BY : | SG       | DRG. NO. :    |  |
|      |            |             | APPROVED BY : | KG       | REVISION : R0 |  |
|      |            |             | SCALE :       | AS SHOWN | SEPT 2016     |  |



- NOTES :**
1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE MENTIONED.
  2. GRADE OF CONCRETE :-  
BOX STRUCTURE - M30  
RETURN WALL - M30  
APPROACH SLAB - M30  
RAILING - M30  
CURTAIN WALL - M15  
LEVELING COURSE(P.C.C) - M15  
CRASH BARRIER- M40 & KERB-M30
  3. GRADE OF STEEL Fe-500 AS PER IS-1786.
  4. LIFE LOAD ANALYSIS HAS BEEN DONE FOR 3 LANE IN CONNECTION WITH THE RECOMMENDATION OF IRC: 6-2010 & WORST EFFECT HAS BEEN CONSIDERED FOR DESIGN.
  5. PROPERTIES OF BACKFILL SOIL  $\gamma=1.8t/m^3$ ,  $\phi=30^\circ$
  6. FILTER MATERIAL BEHIND ABUTMENT AND RETURN WALL SHALL CONFORM TO CLAUSE 2504.2.2 OF MORTH SPECIFICATIONS TO A THICKNESS OF NOT LESS THAN 600mm. WITH SMALLER SIZE TOWARDS THE SOIL AND BIGGER SIZE TOWARDS THE WALL TO THE FULL HEIGHT.
  7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
  8. THE SOIL BELOW FOUNDATION LEVEL SHOULD BE WELL COMPACTED TO ACHIEVE MINIMUM BEARING CAPACITY OF 10t/50M.

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

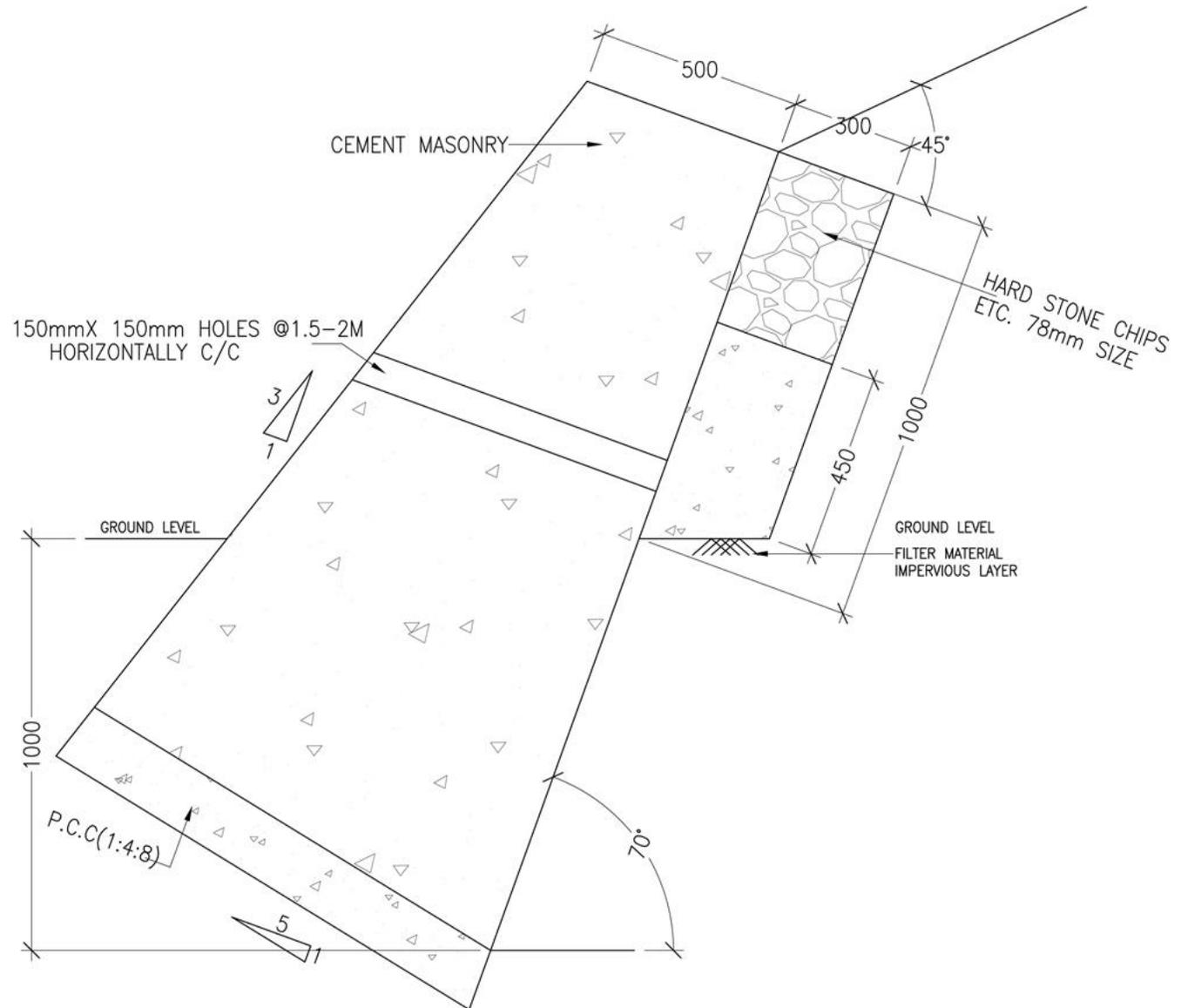
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|      |            |             |               |          |               |  |
|------|------------|-------------|---------------|----------|---------------|--|
| REV. | DATE       | DESCRIPTION | DRAWN BY :    | PD       | TITLE :       | TYPICAL DRAWING OF BOX CULVERT TYPE-02 |
|      |            |             | DESIGNED BY : | SG       | DRG. NO. :    |  |
|      |            |             | APPROVED BY : | KG       | REVISION : R0 |  |
| R0   | 20/05/2016 |             | SCALE :       | AS SHOWN | SEPT 2016     |  |



**BREAST WALL 1.0M HEIGHT**  
(SCALE-1:25)

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :  
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

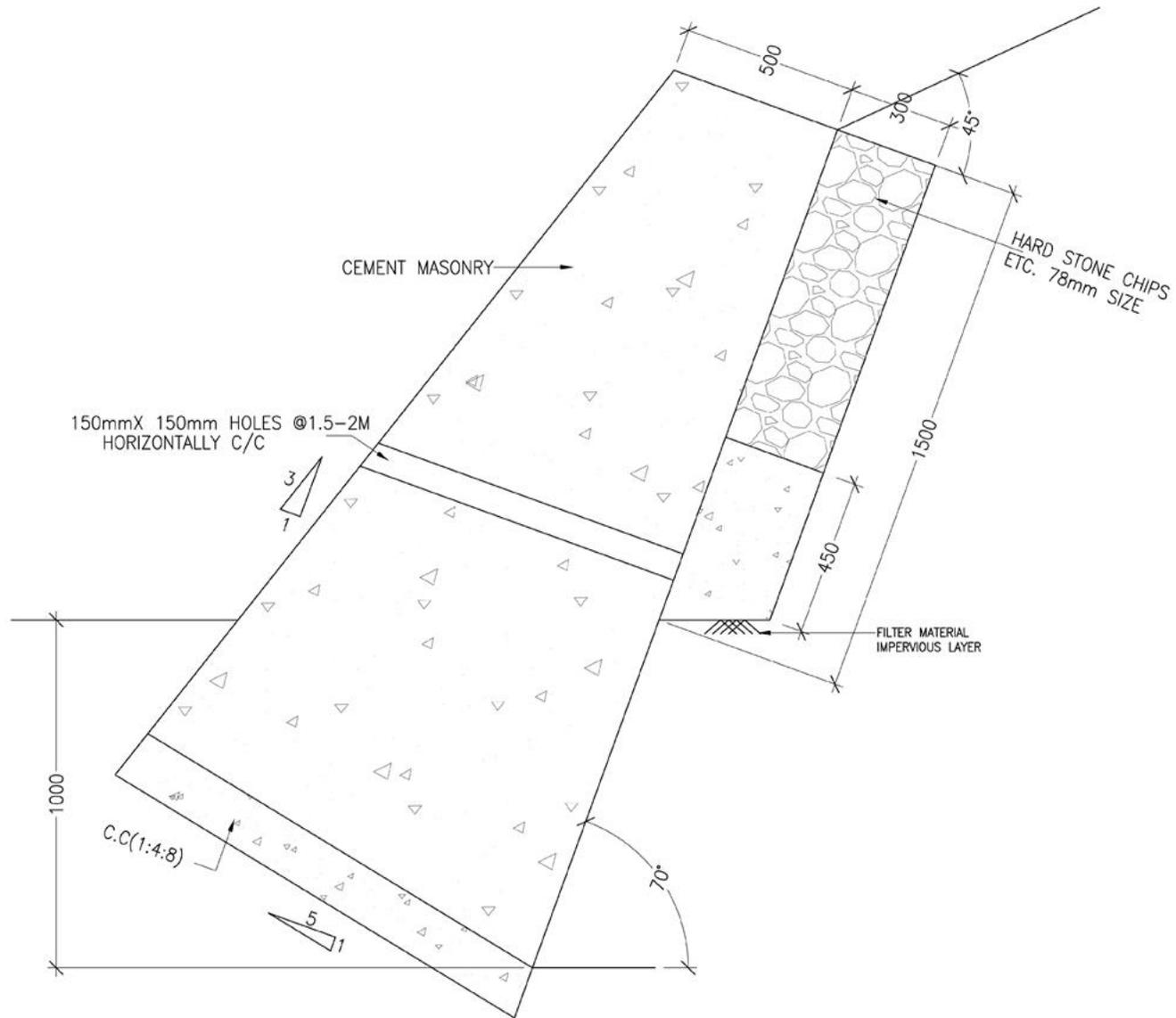
DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|      |            |             |         |          |               |                |
|------|------------|-------------|---------|----------|---------------|----------------|
| REV. | DATE       | DESCRIPTION | SCALE : | AS SHOWN | REVISION : R0 | SEPTEMBER 2016 |
| R0   | 14/09/2016 |             |         |          |               |                |

|               |    |            |
|---------------|----|------------|
| DRAWN BY :    | PD |            |
| DESIGNED BY : | SG |            |
| APPROVED BY : | KG | DRG. NO. : |



**BREAST WALL 1.5M HEIGHT**  
(SCALE-1:25)

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

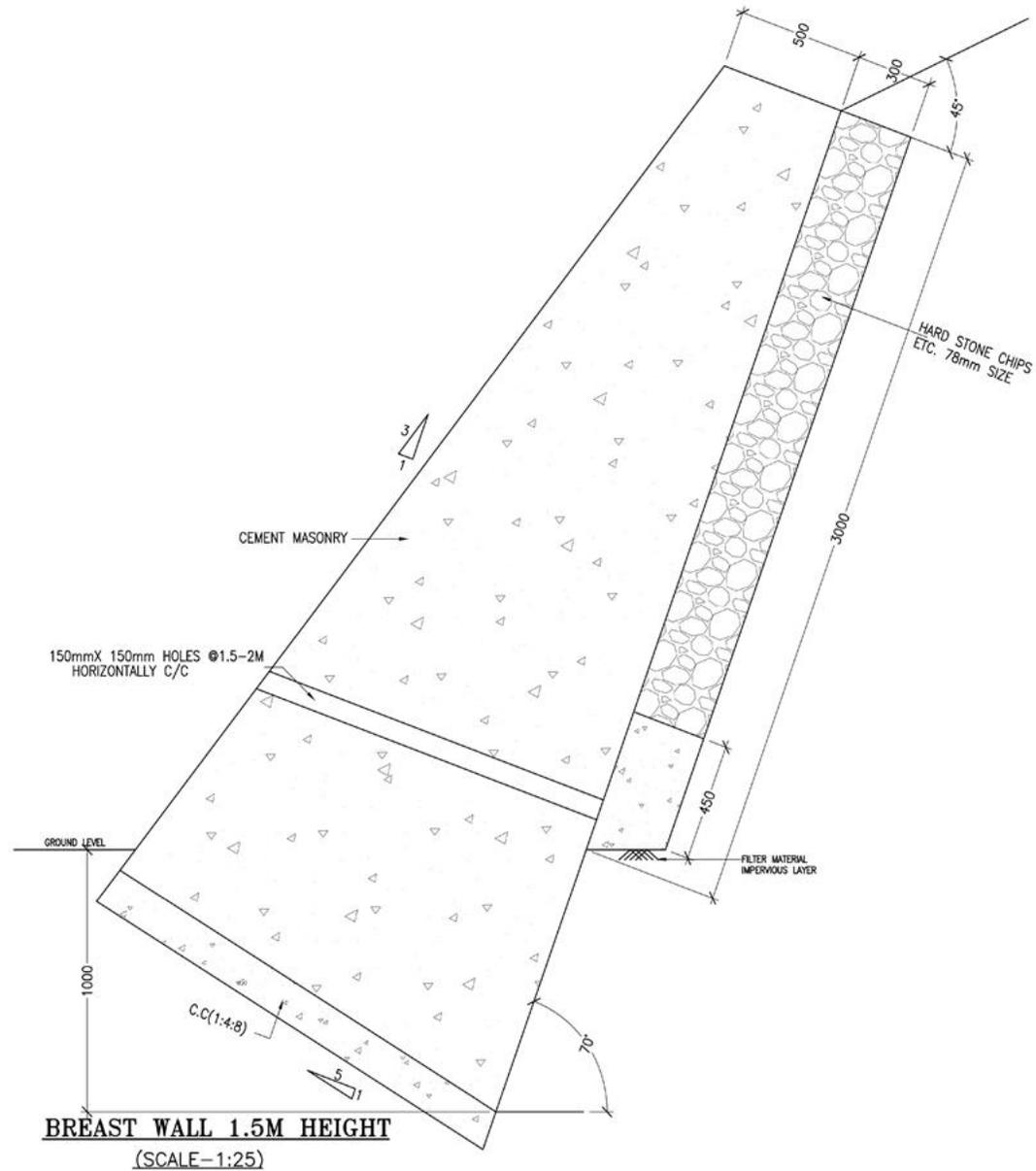
DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

| REV. | DATE       | DESCRIPTION |
|------|------------|-------------|
| R0   | 14/09/2016 |             |

|               |          |                |
|---------------|----------|----------------|
| DRAWN BY :    | PD       |                |
| DESIGNED BY : | SG       |                |
| APPROVED BY : | KG       | DRG. NO. :     |
| SCALE :       | AS SHOWN | REVISION : R0  |
|               |          | SEPTEMBER 2016 |



CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

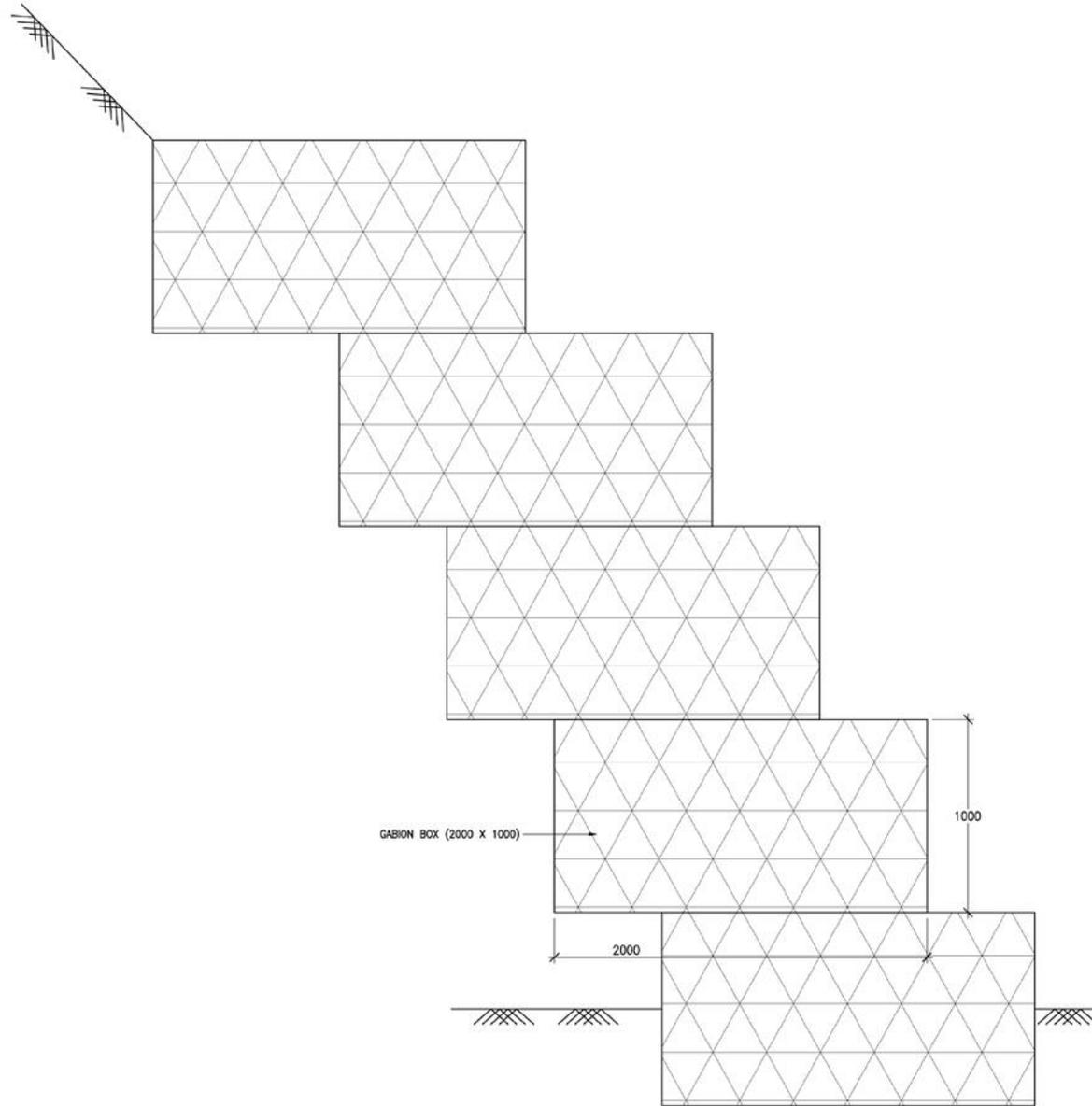
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|               |            |             |         |          |               |                |
|---------------|------------|-------------|---------|----------|---------------|----------------|
| REV           | DATE       | DESCRIPTION | SCALE : | AS SHOWN | REVISION : R0 | SEPTEMBER 2016 |
| R0            | 14/09/2016 |             |         |          |               |                |
| DRAWN BY :    |            |             | PD      |          |               |                |
| DESIGNED BY : |            |             | SG      |          |               |                |
| APPROVED BY : |            |             | KG      |          |               |                |
| DRG. NO. :    |            |             |         |          |               |                |



**GABION BOX**  
(SCALE-1:30)

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

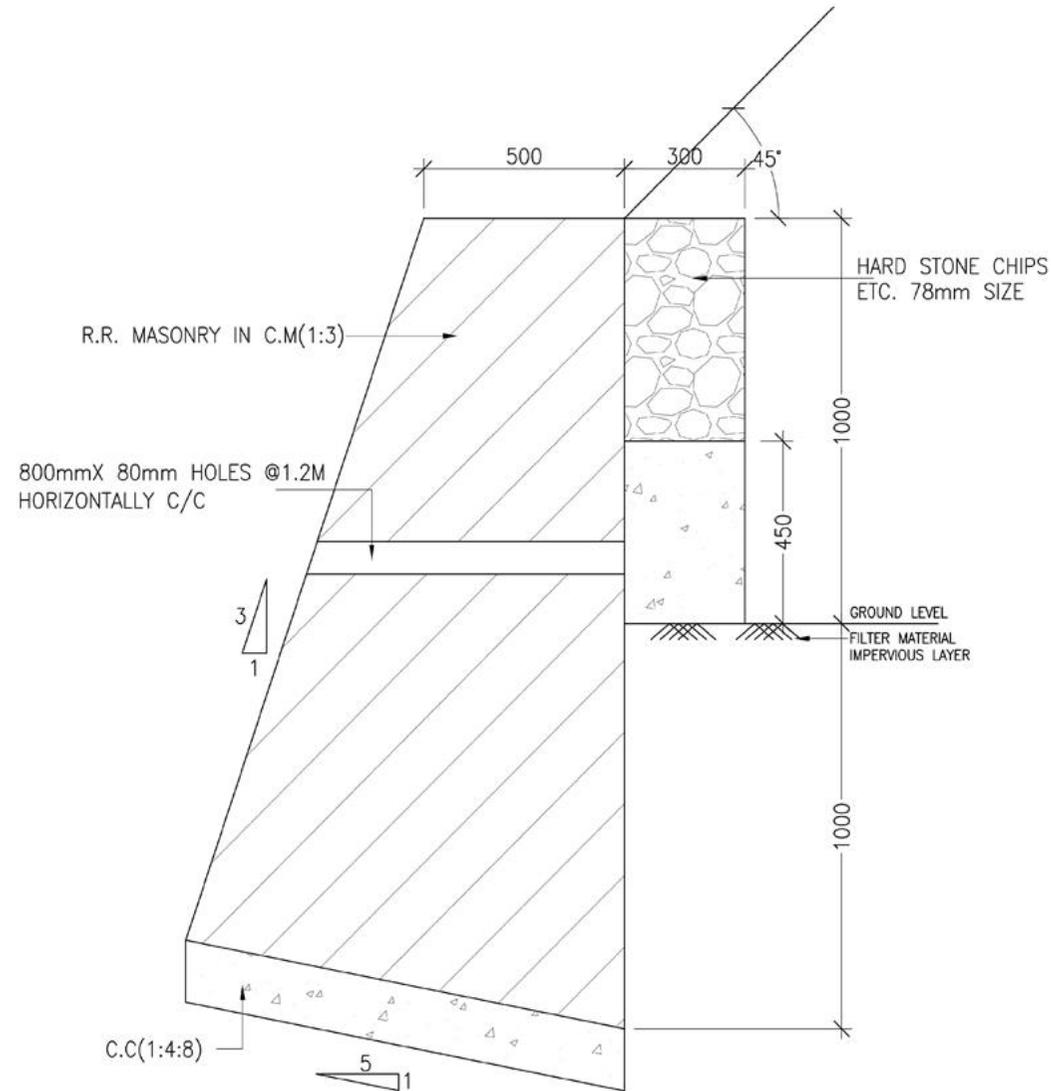
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|     |            |             |               |          |                |
|-----|------------|-------------|---------------|----------|----------------|
| REV | DATE       | DESCRIPTION | DRAWN BY :    | PD       |                |
|     |            |             | DESIGNED BY : | SG       |                |
| R0  | 14/09/2016 |             | APPROVED BY : | KG       | DRG. NO. :     |
|     |            |             | SCALE :       | AS SHOWN | REVISION : R0  |
|     |            |             |               |          | SEPTEMBER 2016 |



**BREAST WALL 1.0M HEIGHT**  
(SCALE-1:25)

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

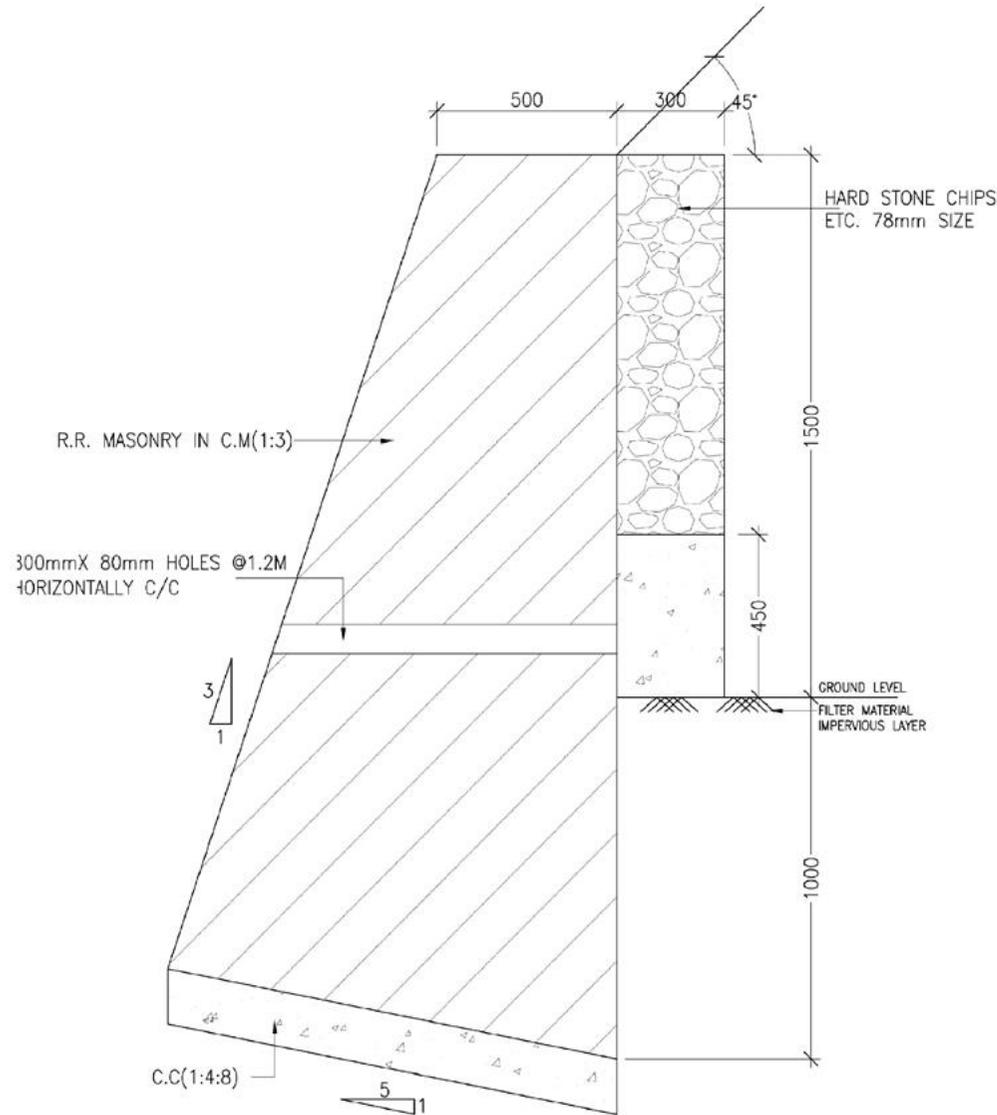
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|               |            |             |         |          |               |                |
|---------------|------------|-------------|---------|----------|---------------|----------------|
| REV.          | DATE       | DESCRIPTION | SCALE : | AS SHOWN | REVISION : R0 | SEPTEMBER 2016 |
| R0            | 14/09/2016 |             |         |          |               |                |
| DRAWN BY :    |            |             | PD      |          |               |                |
| DESIGNED BY : |            |             | SG      |          |               |                |
| APPROVED BY : |            |             | KG      |          | DRG. NO. :    |                |



**BREAST WALL 1.5M HEIGHT**  
(SCALE-1:25)

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

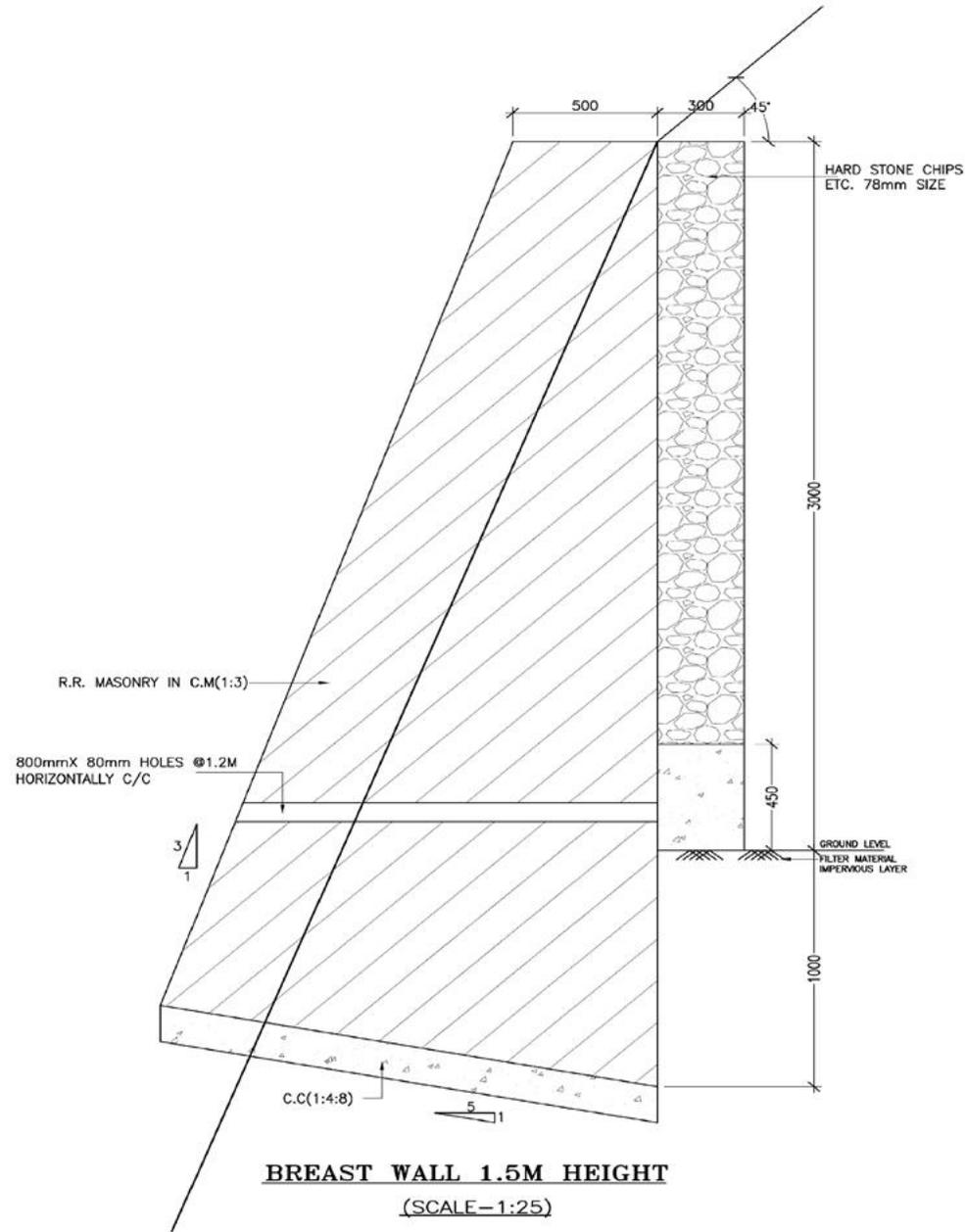
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|               |            |             |         |          |               |                |
|---------------|------------|-------------|---------|----------|---------------|----------------|
| REV.          | DATE       | DESCRIPTION | SCALE : | AS SHOWN | REVISION : R0 | SEPTEMBER 2016 |
| R0            | 14/09/2016 |             |         |          |               |                |
| DRAWN BY :    |            |             | PD      |          |               |                |
| DESIGNED BY : |            |             | SG      |          |               |                |
| APPROVED BY : |            |             | KG      |          | DRG. NO. :    |                |



CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

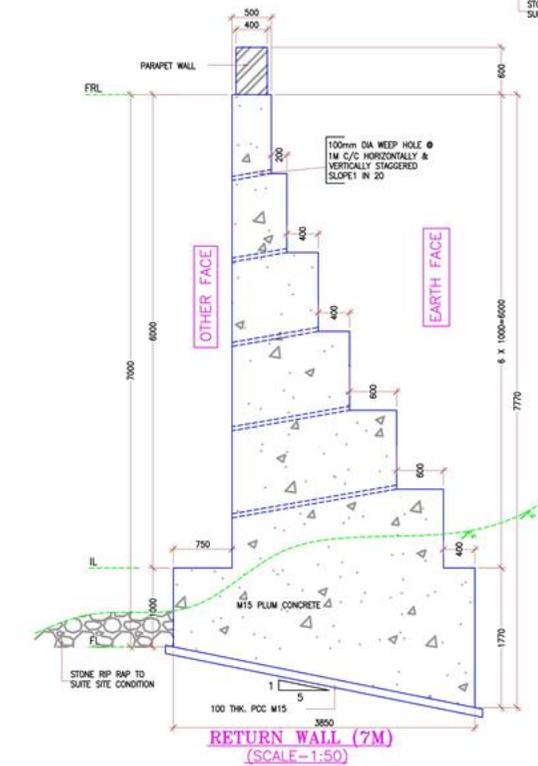
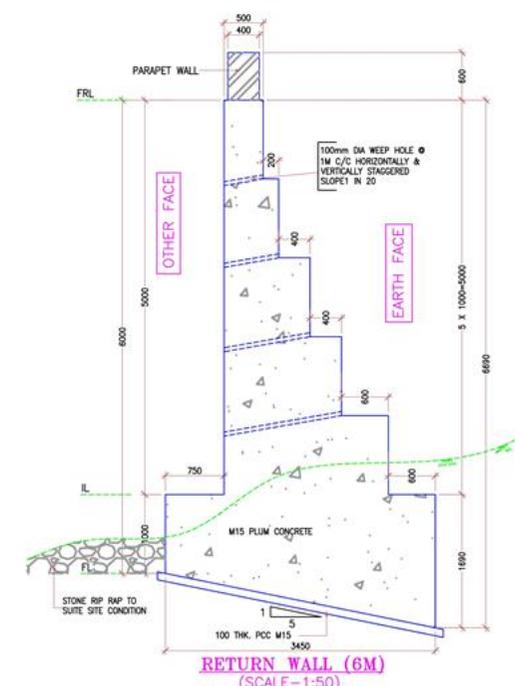
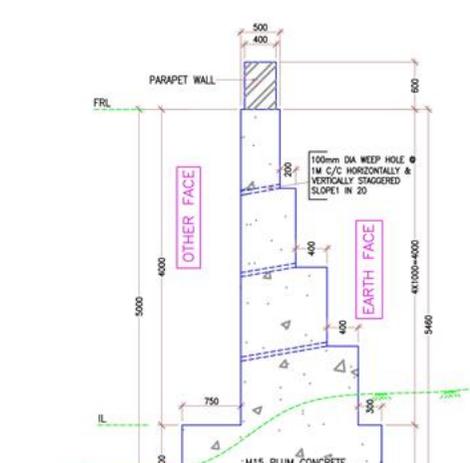
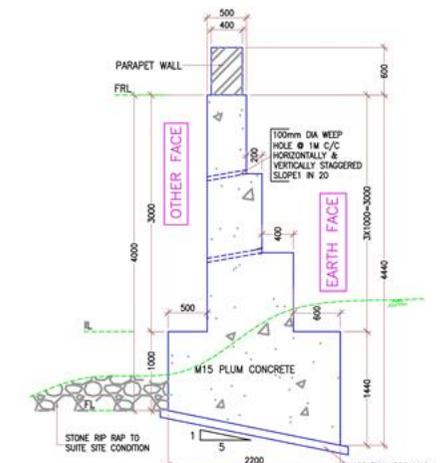
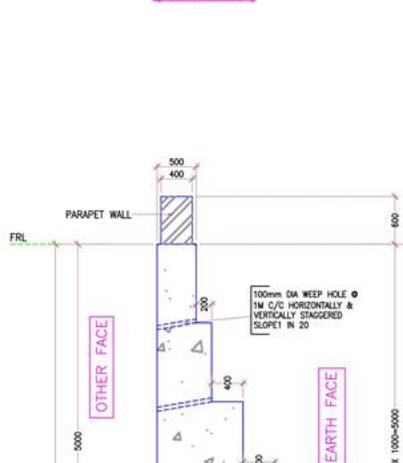
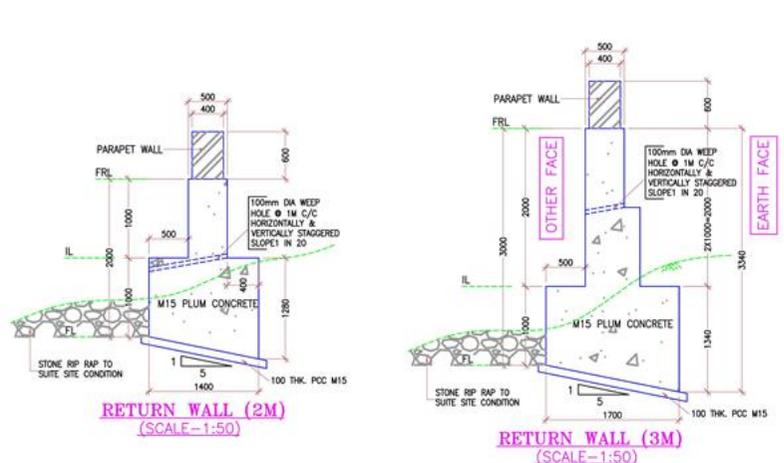
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|      |            |             |            |          |               |    |               |    |                |
|------|------------|-------------|------------|----------|---------------|----|---------------|----|----------------|
| REV. | DATE       | DESCRIPTION | DRAWN BY : | PD       | DESIGNED BY : | SG | APPROVED BY : | KG | DRG. NO. :     |
| R0   | 14/09/2016 |             |            |          |               |    |               |    |                |
|      |            |             | SCALE :    | AS SHOWN | REVISION :    | R0 |               |    | SEPTEMBER 2016 |



**NOTES :**

1. ALL DIMENSIONS ARE IN MM, UNLESS OTHERWISE MENTIONED.
2. DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. 100 DIA WEEP HOLES WITH SLOPE 1:1:20 SHALL BE PROVIDED AT SPACING OF 1000 C/C BOTH HORIZONTALLY & VERTICALLY (STAGGERED) IN FULL HEIGHT OF THE RETAINING WALL WITH BOTTOM MOST ROW 150MM ABOVE G.L.
4. BACK FILLING AND FILTER MEDIA BEHIND THE RETAINING WALL SHALL BE PROVIDED WITH SELECTED EARTH CONFORMING TO APPENDIX 6 OF IRC:78-2000 HAVING PROPERTIES  $e=20$ ,  $c=0$ ,  $\gamma=20$ /m<sup>3</sup>.
5. ALL FACE OF WALL SHALL BE PROVIDED WITH A MINIMUM STEEL OF 250mm<sup>2</sup> IN EACH DIRECTION, SPACING OF THESE BARS SHALL NOT EXCEED 300mm.
6. THESE DRAWING ARE APPLICABLE FOR M15 PCC OR M15 GRADE CONCRETE WITH PLUM, REFER SPECIFICATIONS FOR PLUM CONCRETE GIVEN IN THIS DRAWING.

**PLUM CONCRETE SPECIFICATIONS:**  
 THE SIZE OF STONE PLUMS MAY BE FROM 150-300MM, THE MAXIMUM DIMENSION OF THESE STONES OR PLUMS SHALL NOT EXCEED 1/3 RD THE LEAST DIMENSION OF THE MEMBERS.

**MATERIAL:**  
 ALL PLUMS SHALL BE HARD, DURABLE, CLEAN AND FREE FROM SOFT MATERIALS OR LOOSEPIECES OR DELETERIOUS SUBSTANCE IN THEM & SHALL NOT HAVE SHARP.

**CONSTRUCTION OPERATIONS:**  
 DURING CONCRETING THE FIRST LAYER OF CONCRETE OF THE SPECIFIED MIX SHALL BE LAID TO A THICKNESS OF THE MAXIMUM SIZE OF THE PLUMS TO BE USED, THE PLUMS SHALL THEN BE LAID WHILE THE TOP PORTION OF THIS CONCRETE IS STILL GREEN BUT SUFFICIENTLY STIFF TO PREVENT COMPLETE SUBMERGENCE OF THE PLUM UNDER THEIR OWN WEIGHT, THESE PLUMS SHALL BE ABOUT HALF EMBEDDED IN THE CONCRETE & THE REMAINING PART EXPOSED SO AS TO FORM A KEY WITH THE NEXT LAYER OF THE CONCRETE. NO PLUM SHALL BE USED FOR CONCRETE LAID UNDER WATER.

WHILE PLACING THE PLUMS, CARE SHALL BE TAKEN TO SEE THAT THE CLEAR DISTANCE BETWEEN ANY TWO PLUMS IS NOT LESS THAN EITHER THE WIDTH OR THICKNESS OF EITHER OF THE PLUMS. THE DISTANCE FROM THE PLUMS TO THE OUTER SURFACE FROM ANY STEEL REINFORCEMENT SHALL BE EQUAL TO GREATEST WIDTH OF PLUMS. IF PLUMS OF STRATIFIED STONE ARE USED, THEY SHALL BE LAID ON THEIR NATURAL BED, STONES WITH CONCAVE FACES SHALL BE LAID WITH THE CONCAVE UPWARD, THE THICKNESS OF THE NEXT AND SUCCESSIVE LAYERS OF CONCRETE SHALL BE AT LEAST TWICE THAT OF THE LARGEST PLUM.

**QUALITY OF PLUM:**  
 THE TOTAL VOLUME OF PLUMS SHALL NOT EXCEED 15% OF THE VOLUME OF THE FINISHED CONCRETE.

**MIX OF CONCRETE:**  
 PLUM CONCRETE 1:2:4 1. CEMENT, 2 SAND, 4 GRADED STONE AGGREGATE 40 MM NORMAL SIZE) WITH 15% PLUMS.

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

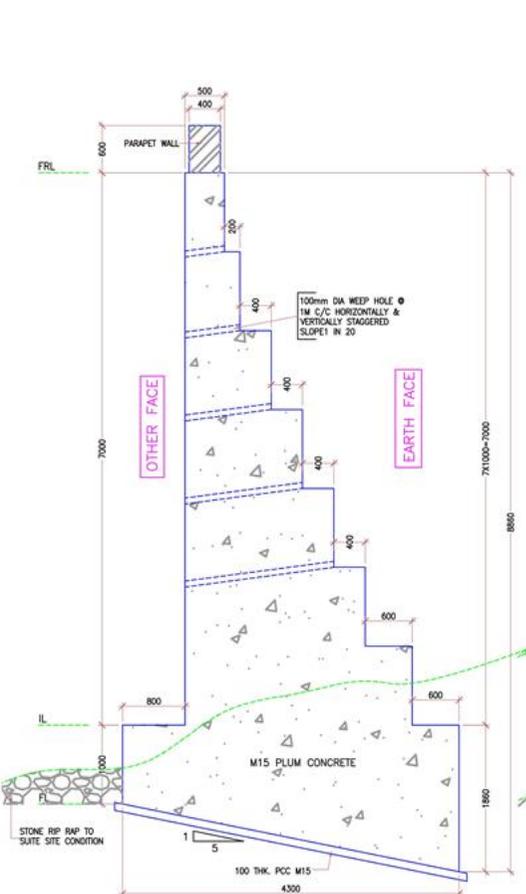
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:

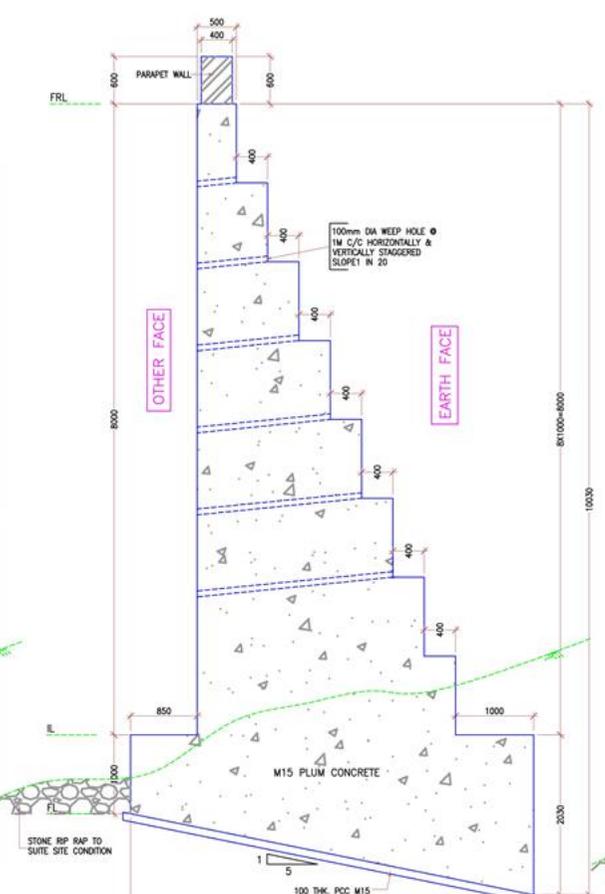


**Voyants Solutions Pvt Ltd.**  
 403, 4th Floor, Park Centra,  
 Sector-30, Opp. 32nd Milestone, NH-8  
 Gurgaon-122002, Haryana  
 CIN- U74140HR2004PTC046918  
 Ph: 0124-4598200  
 Fax: 0124-4019051  
 E-mail: info@voyants.in, www.voyants.in

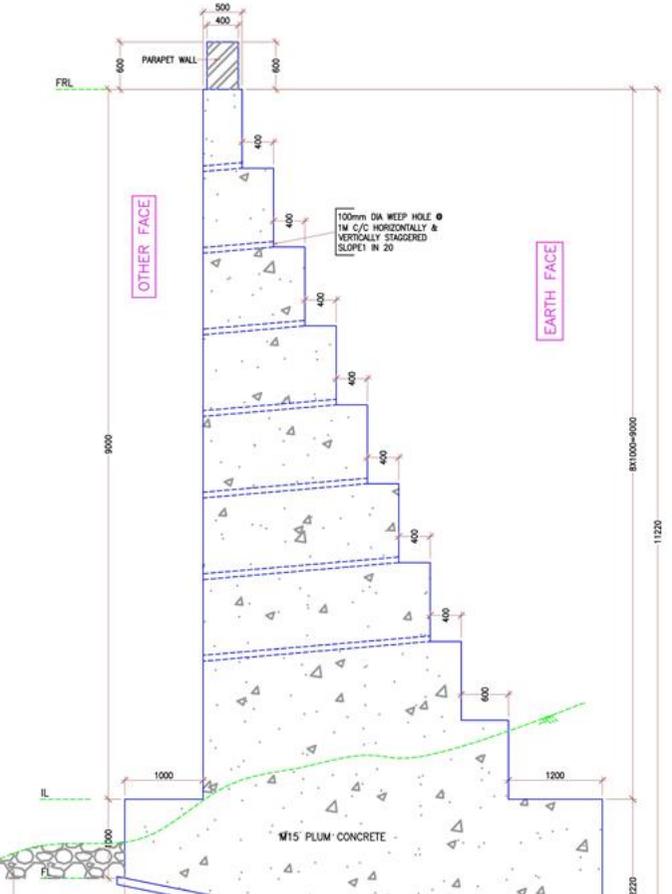
|      |            |             |               |          |               |                        |
|------|------------|-------------|---------------|----------|---------------|------------------------|
| RO   | 20/05/2016 | DESCRIPTION | DRAWN BY :    | PD       | TITLE :       | DETAILS OF RETURN WALL |
|      |            |             | DESIGNED BY : | SG       |               |                        |
|      |            |             | APPROVED BY : | KG       | DRG. NO. :    |                        |
| REV. | DATE       | DESCRIPTION | SCALE :       | AS SHOWN | REVISION : R0 | SEPT 2016              |



**RETURN WALL (8M)**  
(SCALE-1:50)



**RETURN WALL (9M)**  
(SCALE-1:50)



**RETURN WALL (10M)**  
(SCALE-1:50)

- NOTES :**
1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE MENTIONED.
  2. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
  3. 100 DIA WEEP HOLES WITH SLOPE 1 | 20 SHALL BE PROVIDED AT SPACING OF 1000 C/C BOTH HORIZONTALLY & VERTICALLY (STAGGERED) IN FULL HEIGHT OF THE RETAINING WALL WITH BOTTOM MOST ROW 150mm ABOVE G.L.
  4. BACK FILLING AND FILTER MEDIA BEHIND THE RETAINING WALL SHALL BE PROVIDED WITH SELECTED EARTH CONFORMING TO APPENDIX B OF IS:2728-2000 HAVING PROPERTIES #=30', C=0.7 =21m'
  5. ALL FACE OF WALL SHALL BE PROVIDED WITH A MINIMUM STEEL OF 250mm<sup>2</sup> IN EACH DIRECTION SPACING OF THESE BARS SHALL NOT EXCEED 300mm.
  6. THESE DRAWING ARE APPLICABLE FOR M15 PCC OR M15 GRADE CONCRETE WITH PLUM. REFER SPECIFICATIONS FOR PLUM CONCRETE GIVEN IN THIS DRAWING.
- PLUM CONCRETE SPECIFICATIONS:**  
THE SIZE OF STONE PLUMS MAY BE FORM 150-300MM. THE MAXIMUM DIMENSION OF THESE STONES OR PLUMS SHALL NOT EXCEED 1/3 TO THE LEAST DIMENSION OF THE MEMBERS.
- MATERIAL:**  
ALL PLUMS SHALL BE HARD, DURABLE, CLEAN AND FREE FROM SOFT MATERIALS OR LOOSEPIECES OR DELETERIOUS SUBSTANCE IN THEM & SHALL NOT HAVE SHARP.
- CONSTRUCTION OPERATIONS:**  
DURING CONCRETING THE FIRST LAYER OF CONCRETE OF THE SPECIFIED MIX SHALL BE LAID TO A THICKNESS OF THE MAXIMUM SIZE OF THE PLUMS TO BE USED. THE PLUMS SHALL THEN BE LAID WHILE THE TOP PORTION OF THIS CONCRETE IS STILL GREEN BUT SUFFICIENTLY STIFF TO PREVENT COMPLETE SUBMERGENCE OF THE PLUM UNDER THEIR OWN WEIGHT. THESE PLUMS SHALL BE ABOUT HALF EMBEDDED IN THE CONCRETE. IN THE REMAINING PART EXPOSED SO AS TO FORM A KEY WITH THE NEXT LAYER OF THE CONCRETE. NO PLUM SHALL BE USED FOR CONCRETE LAID UNDER WATER.
- WHILE PLACING THE PLUMS, CARE SHALL BE TAKEN TO SEE THAT THE CLEAR DISTANCE BETWEEN ANY TWO PLUMS IS NOT LESS THAN EITHER THE WIDTH OR THICKNESS OF EITHER OF THE PLUMS. THE DISTANCE FROM THE PLUMS TO THE OUTER SURFACE FROM ANY STEEL REINFORCEMENT SHALL BE EQUAL TO GREATEST WIDTH OF PLUMS. IF PLUMS OF STRATIFIED STONE ARE USED THEY SHALL BE LAID ON THEIR NATURAL BED. STONES WITH CONCAVE FACES SHALL BE LAID WITH THE CONCAVE UPWARD. THE THICKNESS OF THE NEXT AND SUCCESSIVE LAYERS OF CONCRETE SHALL BE AT LEAST TWICE THAT OF THE LARGEST PLUM.
- QUALITY OF PLUM:**  
THE TOTAL VOLUME OF PLUMS SHALL NOT EXCEED 15% OF THE VOLUME OF THE FINISHED CONCRETE.
- MIX OF CONCRETE:**  
PLUM CONCRETE 1:2:4, 1 CEMENT, 2 SAND, 4 GRADED STONE AGGREGATE 40 MM NORMAL SIZE) WITH 15% PLUMS.

CLIENT :



**NHIDCL**  
BUILDING INFRASTRUCTURE - BUILDING THE NATION

National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

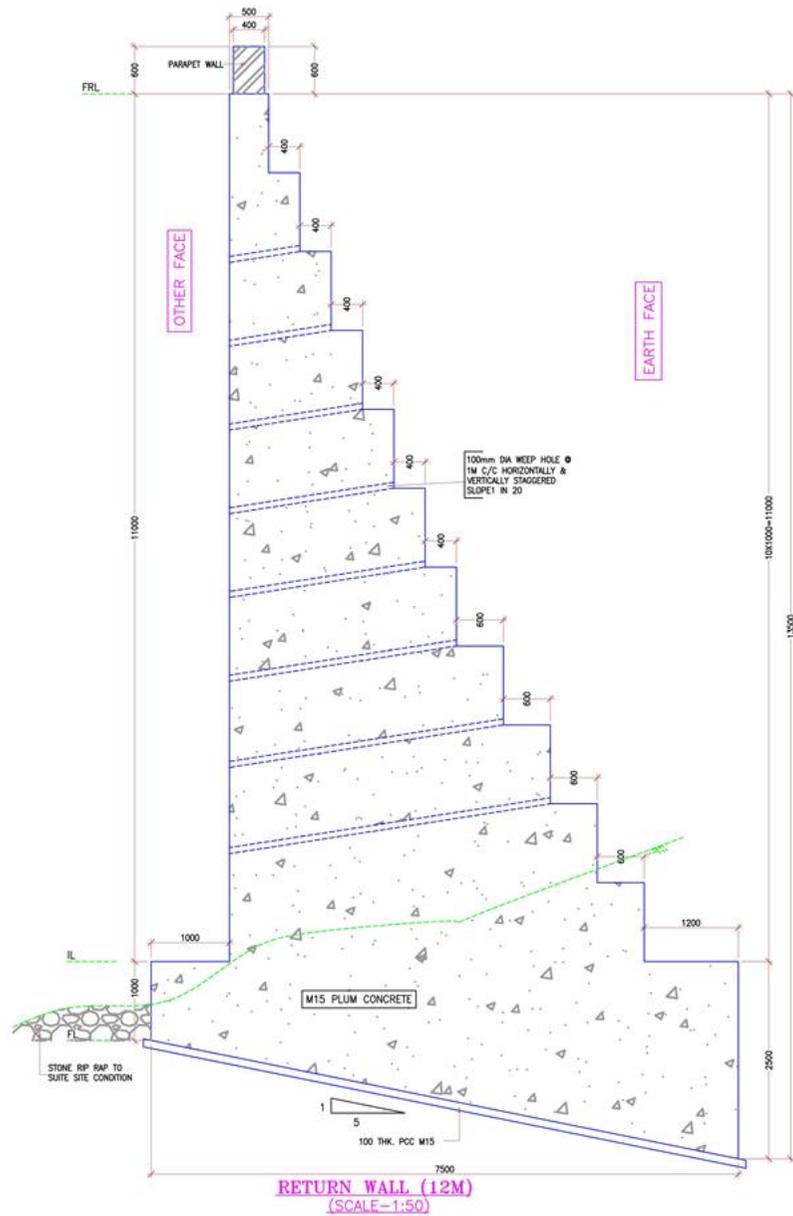
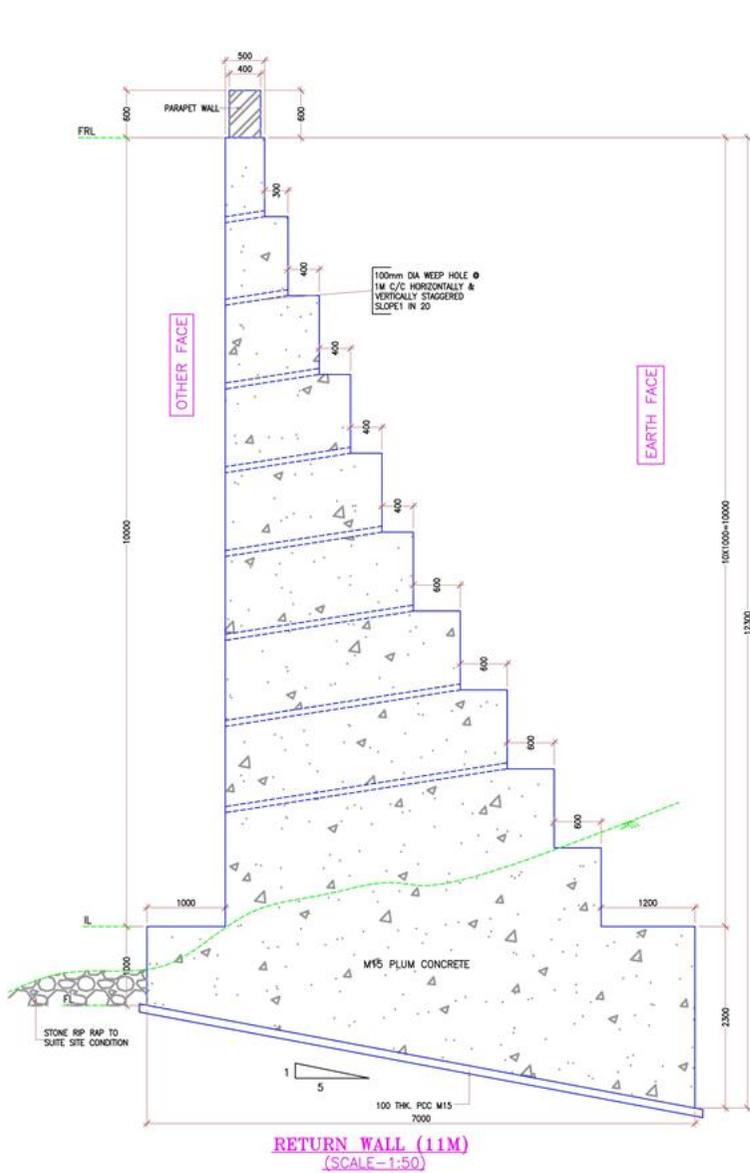
DESIGN CONSULTANT:



**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

|            |            |               |            |                        |    |
|------------|------------|---------------|------------|------------------------|----|
| RO         | 20/05/2016 |               |            |                        |    |
| REV.       | DATE       | DESCRIPTION   | SCALE :    | AS SHOWN               |    |
| DRAWN BY : | PD         | DESIGNED BY : | SG         | APPROVED BY :          | KG |
|            |            |               | TITLE :    | DETAILS OF RETURN WALL |    |
|            |            |               | DRG. NO. : |                        |    |
|            |            |               | REVISION : | R0                     |    |
|            |            |               | SEPT 2016  |                        |    |

|            |                        |
|------------|------------------------|
| TITLE :    | DETAILS OF RETURN WALL |
| DRG. NO. : |                        |
| REVISION : | R0                     |
| SEPT 2016  |                        |



- NOTES :**
1. ALL DIMENSIONS ARE IN MM, UNLESS OTHERWISE MENTIONED.
  2. DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
  3. 100 DIA WEEP HOLES WITH SLOPE 1:1:20 SHALL BE PROVIDED AT SPACING OF 1000 C/C BOTH HORIZONTALLY & VERTICALLY (STAGGERED), IN FULL HEIGHT OF THE RETAINING WALL WITH BOTTOM MOST ROW 150mm ABOVE G.L.
  4. BACK FILLING AND FILTER MEDIA BEHIND THE RETAINING WALL SHALL BE PROVIDED WITH SELECTED EARTH CONFORMING TO APPENDIX 6 OF IRC:78-2000 HAVING PROPERTIES  $\mu=35^\circ$ ,  $C=0$ ,  $\gamma=24/m^3$
  5. ALL FACE OF WALL SHALL BE PROVIDED WITH A MINIMUM STEEL OF 250mm<sup>2</sup> IN EACH DIRECTION SPACING OF THESE BARS SHALL NOT EXCEED 300mm.
  6. THESE DRAWING ARE APPLICABLE FOR M15 PCC OR M15 GRADE CONCRETE WITH PLUM. REFER SPECIFICATIONS FOR PLUM CONCRETE GIVEN IN THIS DRAWING.
- PLUM CONCRETE SPECIFICATIONS:**  
THE SIZE OF STONE PLUMS MAY BE FORM 150-300MM, THE MAXIMUM DIMENSION OF THESE STONES OR PLUMS SHALL NOT EXCEED  $\frac{1}{3}$  RD THE LEAST DIMENSION OF THE MEMBERS.
- MATERIAL:**  
ALL PLUMS SHALL BE HARD, DURABLE, CLEAN AND FREE FROM SOFT MATERIALS OR LOOSEPIECES OR DELETERIOUS SUBSTANCE IN THEM & SHALL NOT HAVE SHARP.
- CONSTRUCTION OPERATIONS:**  
DURING CONCRETING THE FIRST LAYER OF CONCRETE OF THE SPECIFIED MIX SHALL BE LAID TO A THICKNESS OF THE MAXIMUM SIZE OF THE PLUMS TO BE USED. THE PLUMS SHALL THEN BE LAID WHILE THE TOP PORTION OF THIS CONCRETE IS STILL GREEN BUT SUFFICIENTLY STIFF TO PREVENT COMPLETE SUBMERSION OF THE PLUM UNDER THEIR OWN WEIGHT. THESE PLUMS SHALL BE ABOUT HALF EMBEDDED IN THE CONCRETE & THE REMAINING PART EXPOSED 50 AS TO FORM A KEY WITH THE NEXT LAYER OF THE CONCRETE. NO PLUM SHALL BE USED FOR CONCRETE LAID UNDER WATER.
- WHILE PLACING THE PLUMS, CARE SHALL BE TAKEN TO SEE THAT THE CLEAR DISTANCE BETWEEN ANY TWO PLUMS IS NOT LESS THAN EITHER THE WIDTH OR THICKNESS OF EITHER OF THE PLUMS. THE DISTANCE FROM THE PLUMS TO THE OUTER SURFACE FROM ANY STEEL REINFORCEMENT SHALL BE EQUAL TO GREATEST WIDTH OF PLUMS. IF PLUMS OF STRATIFIED STONE ARE USED THEY SHALL BE LAID ON THEIR NATURAL BED. STONES WITH CONCAVE FACES SHALL BE LAID WITH THE CONCAVE UPWARD THE THICKNESS OF THE NEXT AND SUCCESSIVE LAYERS OF CONCRETE SHALL BE AT LEAST TWICE THAT OF THE LARGEST PLUM.
- QUALITY OF PLUM:**  
THE TOTAL VOLUME OF PLUMS SHALL NOT EXCEED 15% OF THE VOLUME OF THE FINISHED CONCRETE.
- MIX OF CONCRETE:**  
PLUM CONCRETE 1:2:(4+1) CEMENT, 2 SAND, 4 GRADED STONE AGGREGATE 40 MM NORMAL SIZE) WITH 15% PLUMS.

CLIENT :



National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

PROJECT :

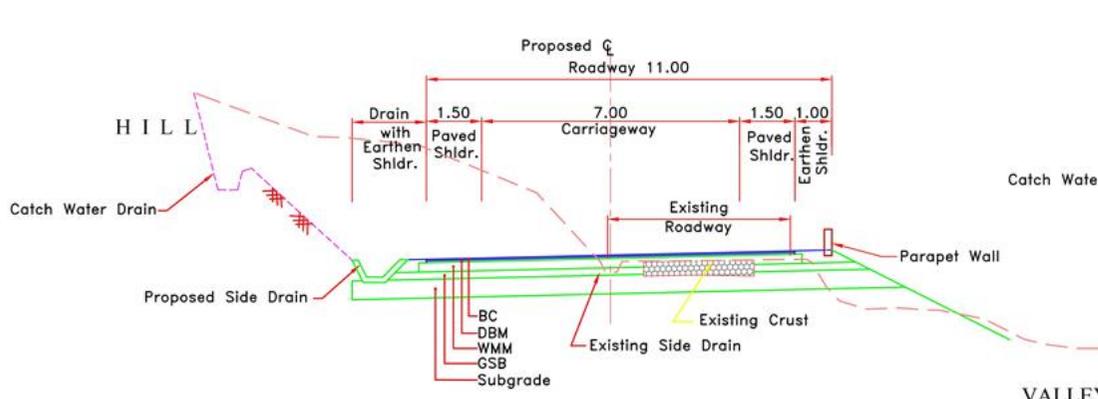
TWO LANING OF JORAM - KOLORIANG ROAD (NH-713) FROM KM. 20.00 TO KM. 50.00 IN THE STATE OF ARUNACHAL PRADESH ON EPC MODE

DESIGN CONSULTANT:

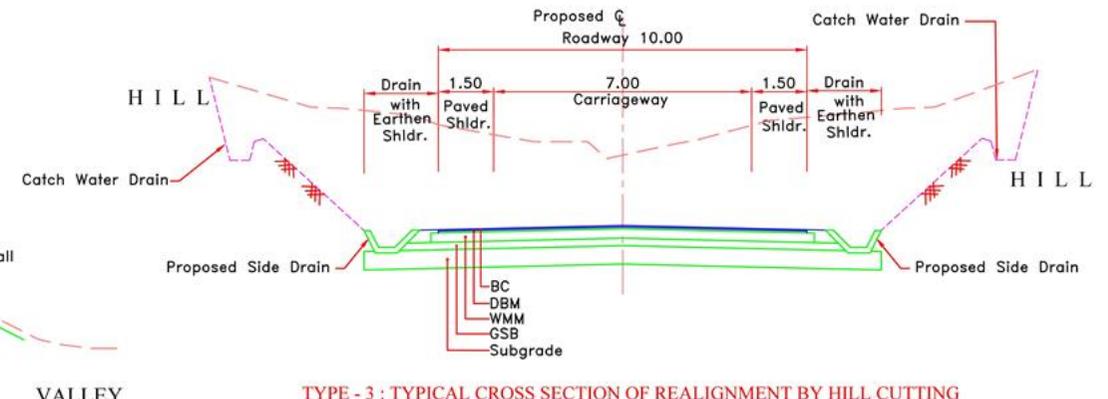


**Voyants Solutions Pvt Ltd.**  
403, 4th Floor, Park Centra,  
Sector-30, Opp. 32nd Milestone, NH-8  
Gurgaon-122002, Haryana  
CIN- U74140HR2004PTC046918  
Ph: 0124-4598200  
Fax: 0124-4019051  
E-mail: info@voyants.in, www.voyants.in

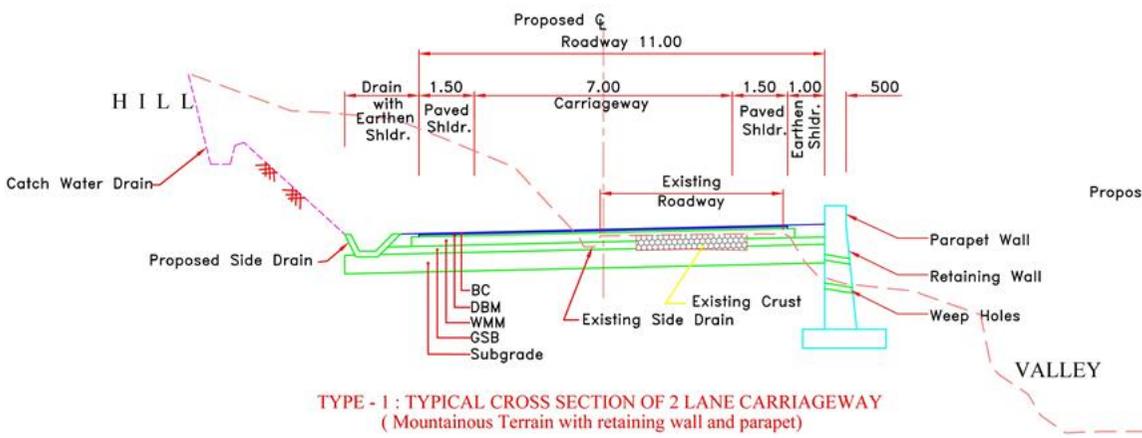
|      |            |             |               |          |               |                        |
|------|------------|-------------|---------------|----------|---------------|------------------------|
| RO   | 20/05/2016 |             | DRAWN BY :    | PD       | TITLE :       | DETAILS OF RETURN WALL |
|      |            |             | DESIGNED BY : | SG       |               |                        |
|      |            |             | APPROVED BY : | KG       | DRG. NO. :    |                        |
| REV. | DATE       | DESCRIPTION | SCALE :       | AS SHOWN | REVISION : R0 | SEPT 2016              |



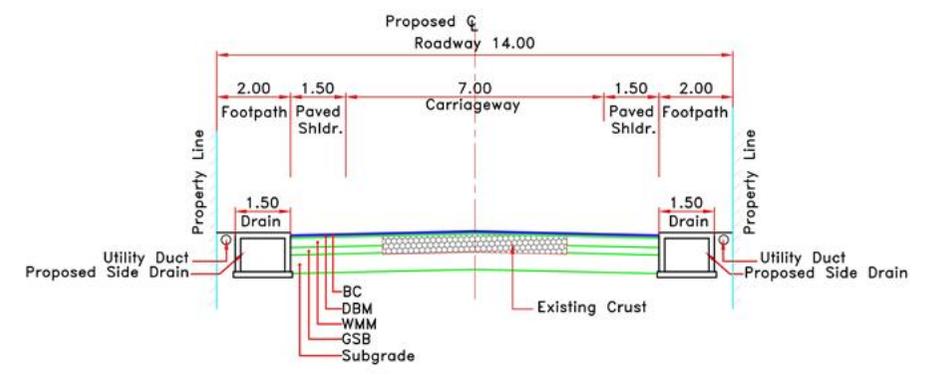
TYPE - 2 : TYPICAL CROSS SECTION OF 2 LANE CARRIAGEWAY  
( Mountainous Terrain without retaining wall)



TYPE - 3 : TYPICAL CROSS SECTION OF REALIGNMENT BY HILL CUTTING



TYPE - 1 : TYPICAL CROSS SECTION OF 2 LANE CARRIAGEWAY  
( Mountainous Terrain with retaining wall and parapet)



TYPE - 4 : TYPICAL CROSS SECTION OF PAVEMENT IN BUILT-UP AREA

Note:

- Breast Wall to be considered at the hill side cut section as required.