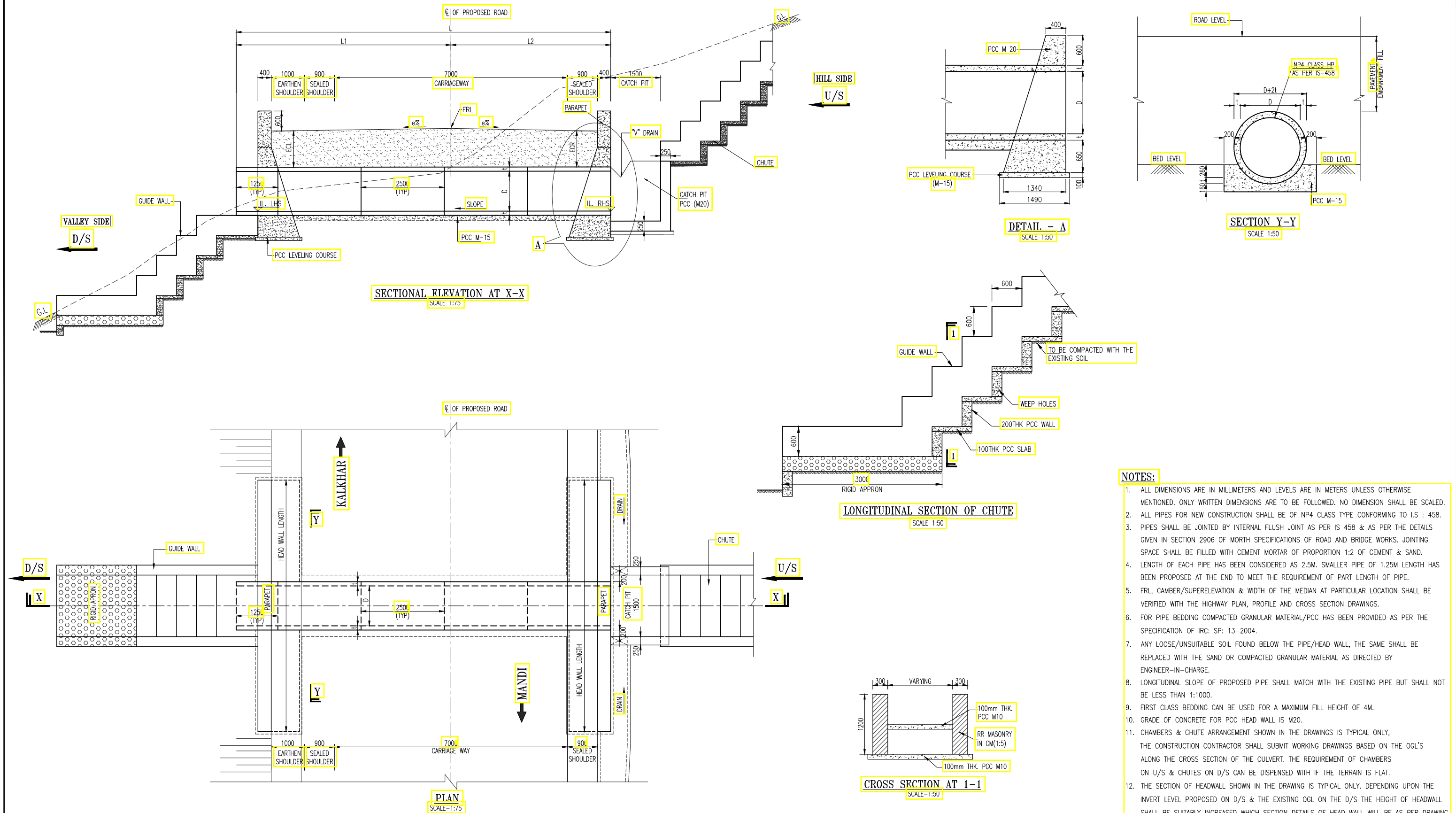




## TENDER PURPOSE ONLY

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| <div>NOTES:</div> <div>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div> |      |             |          |       |         |          | <div>CLIENT:</div> <div></div> <div>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |  |  |  |  |  |  | <div>CONSULTANT:</div> <div></div> <div>SATRA SERVICES AND SOLUTIONS PVT.LTD.</div> <div>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.</div> <div>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,</div> <div>E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  |  |  |  |  |  | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> <div><div>SCALE:</div><div>AS SHOWN</div><div>DATE</div></div> |  |  |  |  |  |  | <div>JOB No. : 01041055</div> <div><div>DESIGNED</div><div>GANESH</div><div></div></div> <div><div>DRAWN</div><div>SATYA</div><div></div></div> <div><div>CHECKED</div><div>PRANAI</div><div></div></div> <div><div>APPROVED</div><div>PRANAI</div><div></div></div> |  |  |  |  |  |  | <div>TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH CUSHION FOR TCS-3(A,B,D,E)</div> <div>DRAWING NO : HP/STR/PC/TYP/102</div> <div><div>ROAD NAME :</div><div>Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div></div> |  |  |  |  |  |  | <div>REV. 0</div> <div>SIZE : A3</div> <div>SHEET 01 OF 02</div> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| REV.                                                                                     | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |                                                                                                                                                                                                              |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |                                                                                                                                                            |  |  |  |  |  |  |                  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| S.No | Existing<br>Chainge | Design<br>Chainge | Design<br>FRL @ PCL | Camber<br>e%<br>(LHS) | Camber<br>e%<br>(RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Size of Pipe   |                    |                    | Cushion(m)<br>(LHS) 'ECL' | Cushion(m)<br>(RHS) 'ECR' | Lengths of Pipe (m)     |      |      | Length<br>of Head<br>Wall | Type of TCS | Type of Proposal |
|------|---------------------|-------------------|---------------------|-----------------------|-----------------------|-------------------|---------------|---------------|----------------|--------------------|--------------------|---------------------------|---------------------------|-------------------------|------|------|---------------------------|-------------|------------------|
|      |                     |                   |                     |                       |                       |                   |               |               | No of<br>Pipes | Dia of<br>Pipe 'D' | Thk of<br>Pipe 't' |                           |                           | Lengths of<br>Pipe(m) L | L1   | L2   |                           |             |                  |
| 1    | 6+020               | 5+881             | 904.849             | -2.50 %               | 1.29 %                | L-R               | 902.400       | 902.099       | 1              | 1                  | 0.115              | 1.229                     | 1.687                     | 11.25                   | 6.64 | 4.05 | 6.50                      | TCS-3A      | Reconstruction   |
| 2    | 6+960               | 6+813             | 880.648             | -2.50 %               | -2.50 %               | L-R               | 878.200       | 877.903       | 1              | 1                  | 0.115              | 1.232                     | 1.528                     | 11.25                   | 6.51 | 4.05 | 6.50                      | TCS-3A      | Reconstruction   |
| 3    | New                 | 10+045            | 925.647             | -2.50 %               | -2.50 %               | R-L               | 923.358       | 923.628       | 1              | 1                  | 0.115              | 1.051                     | 0.722                     | 11.25                   | 6.15 | 4.60 | 6.50                      | TCS-3A      | New Construction |
| 4    | New                 | 10+245            | 926.526             | -2.50 %               | -2.50 %               | R-L               | 923.921       | 924.239       | 1              | 1                  | 0.115              | 1.373                     | 1.069                     | 10.00                   | 5.65 | 4.10 | 6.50                      | TCS-3E      | New Construction |
| 5    | New                 | 10+313            | 926.739             | 2.22 %                | -3.68 %               | R-L               | 924.194       | 924.524       | 1              | 1                  | 0.115              | 1.526                     | 0.925                     | 10.00                   | 4.34 | 4.76 | 6.50                      | TCS-3E      | New Construction |
| 6    | 10+800              | 10+405            | 926.269             | -7.00 %               | 7.00 %                | R-L               | 923.573       | 923.900       | 1              | 1                  | 0.115              | 1.234                     | 1.537                     | 13.75                   | 9.22 | 4.05 | 6.50                      | TCS-3D      | Reconstruction   |
| 7    | New                 | 10+635            | 926.791             | -2.50 %               | -2.50 %               | R-L               | 924.273       | 924.571       | 1              | 1                  | 0.115              | 1.301                     | 1.003                     | 11.25                   | 6.65 | 4.08 | 6.50                      | TCS-3D      | New Construction |
| 8    | 11+270              | 10+879            | 924.076             | -7.00 %               | 7.00 %                | R-L               | 921.503       | 921.800       | 1              | 1                  | 0.115              | 1.174                     | 1.445                     | 11.25                   | 6.85 | 4.05 | 6.50                      | TCS-3B      | Reconstruction   |
| 9    | New                 | 10+966            | 923.692             | -7.00 %               | 7.00 %                | R-L               | 920.883       | 921.180       | 1              | 1                  | 0.115              | 1.410                     | 1.681                     | 11.25                   | 6.85 | 4.05 | 6.50                      | TCS-3B      | New Construction |
| 10   | 11+753              | 11+330            | 938.526             | -2.50 %               | -2.50 %               | R-L               | 936.657       | 936.954       | 1              | 1                  | 0.115              | 0.652                     | 0.356                     | 10.00                   | 5.35 | 4.05 | 6.50                      | TCS-3B      | Reconstruction   |

TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

|     |      |             |          |       |         |          |
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|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE  
DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION  
PROJECT (HPSRTP)

SCALE: AS SHOWN

DATE

JOB No. : 01041055

|          |        |  |
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| DESIGNED | GANESH |  |
| DRAWN    | SATYA  |  |
| CHECKED  | PRANAI |  |
| APPROVED | PRANAI |  |

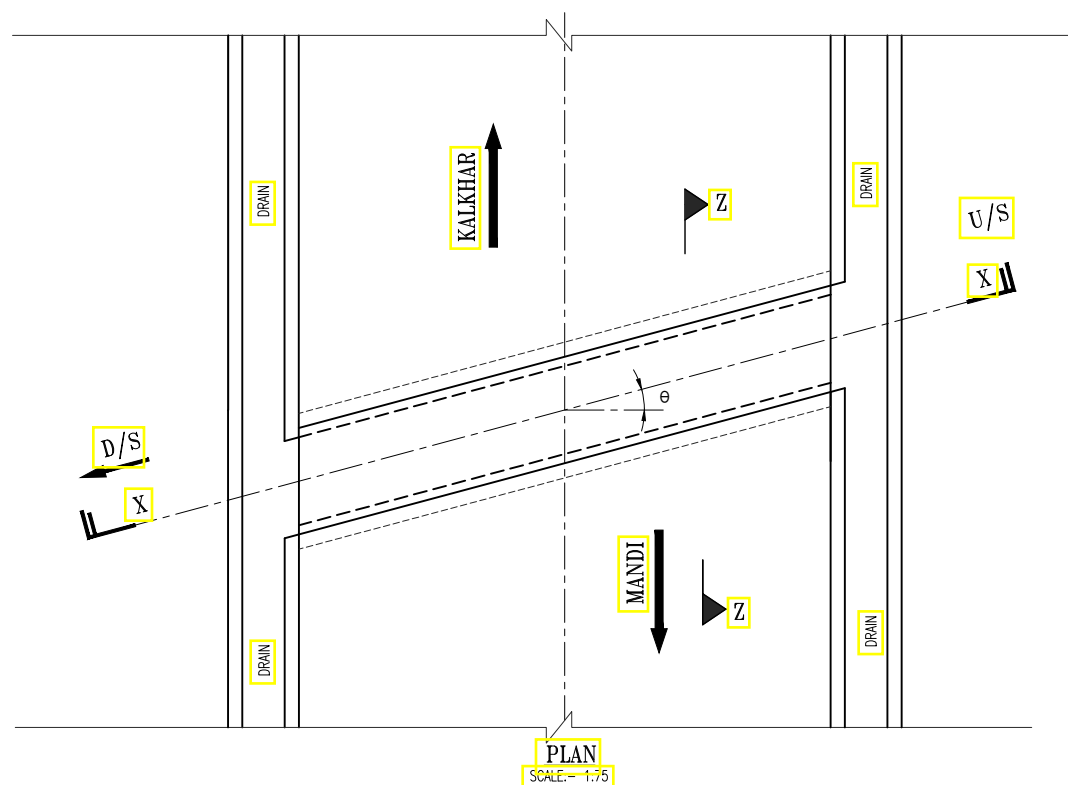
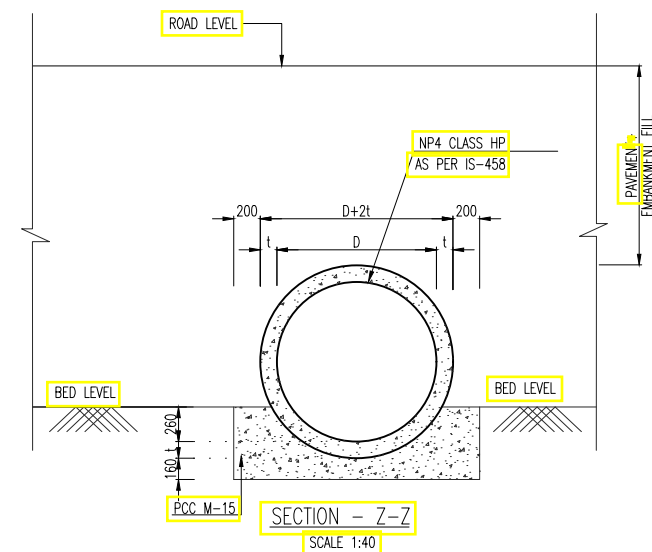
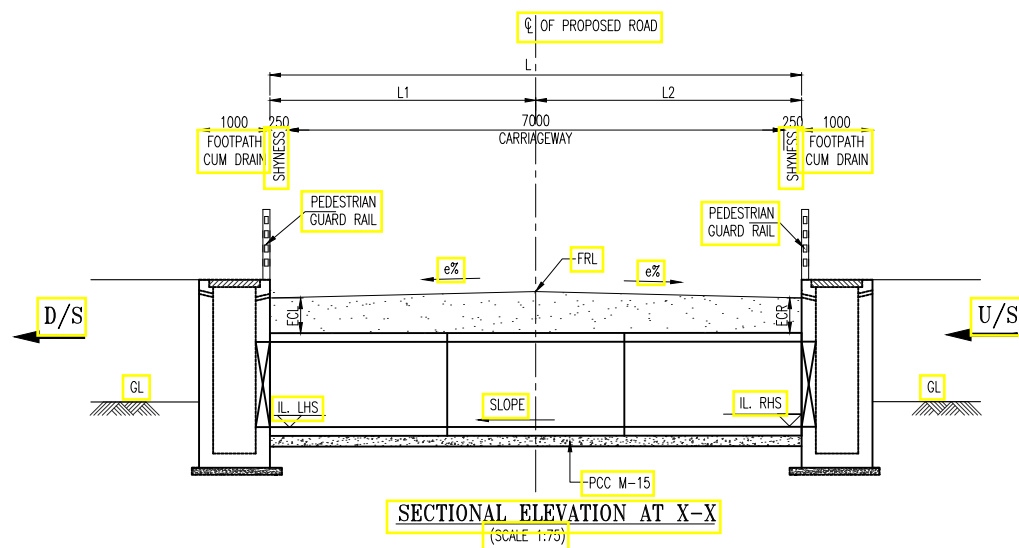
ROAD NAME :

Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in  
Mandi District From Km 0+000 To Km 11+000

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING  
FOR NEW/RECONSTRUCTION OF SINGLE ROW  
PIPE CULVERT WITH CUSHION FOR TCS-3(A,B,D,E)

DRAWING NO : HP/STR/PC/TYP/102

SHEET 02 OF 02



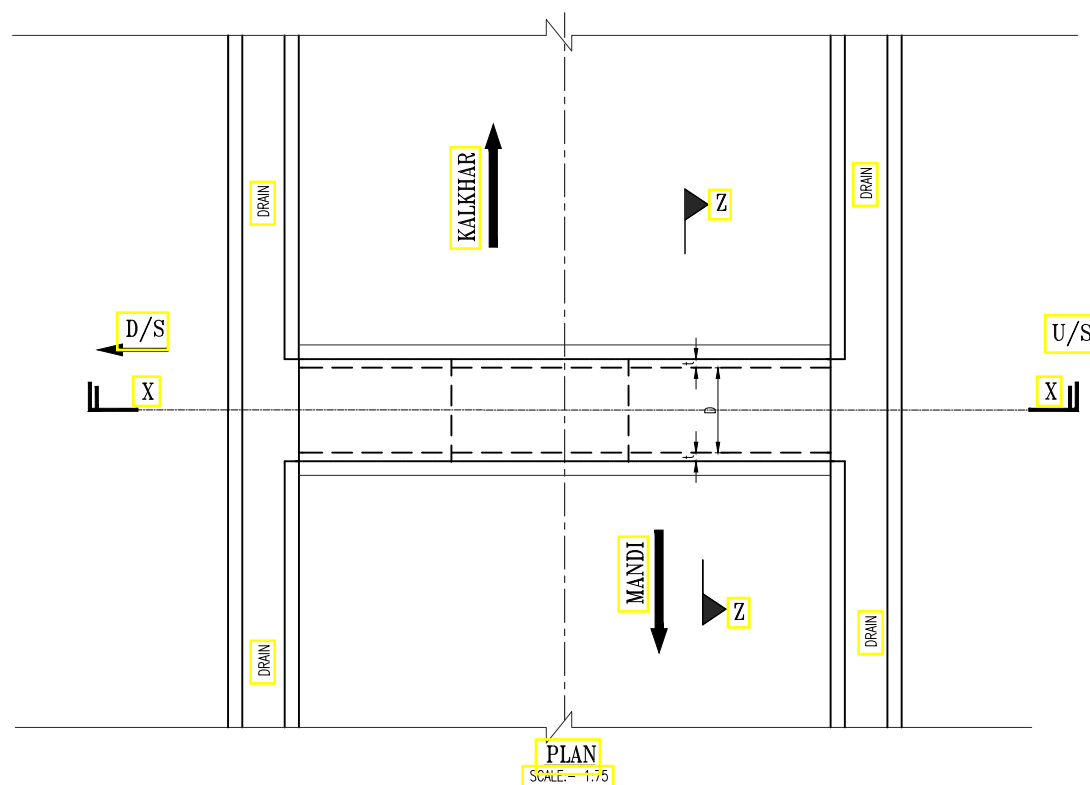
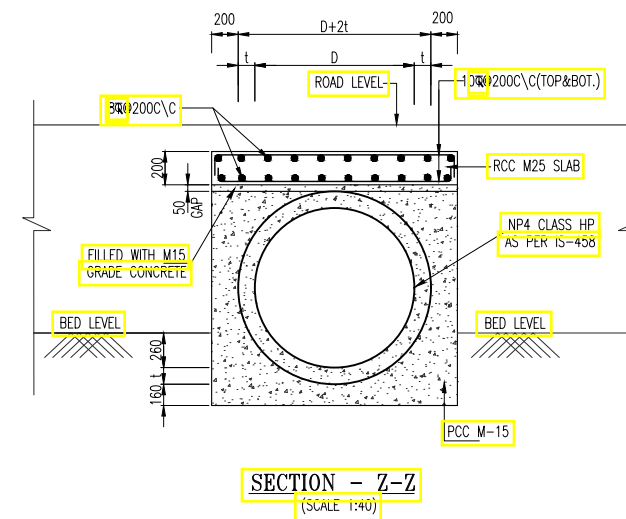
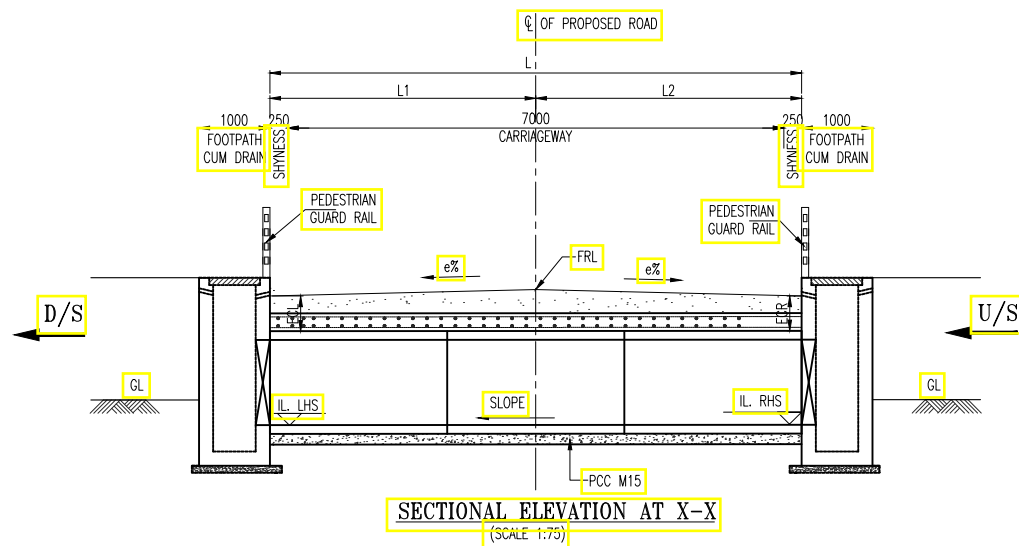
#### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
2. ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO I.S : 458.
3. PIPES SHALL BE JOINTED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
4. LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
5. FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
6. FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
7. ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
8. LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
9. FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
10. GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
11. EDGE GAP BETWEEN THE PIPE OF DRAIN WALL TO BE COVERED WITH PCC.
12. PIPE LENGTH PROVIDED BASED ON AVAILABILITY OF ROW.

| S.No | Existing Change | Design Change | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Size of Pipe |                 |                 | Cushion(m) (LHS) 'ECL' | Cushion(m) (RHS) 'ECR' | Lengths of Pipe (m)  |      |      | Type of TCS | Type of Proposal | Skew Angle | Direction |
|------|-----------------|---------------|------------------|-----------------|-----------------|----------------|------------|------------|--------------|-----------------|-----------------|------------------------|------------------------|----------------------|------|------|-------------|------------------|------------|-----------|
|      |                 |               |                  |                 |                 |                |            |            | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |                        |                        | Lengths of Pipe(m) L | L1   | L2   |             |                  |            |           |
| 1    | 8+440           | 8+070         | 874.484          | -7.00 %         | 7.00 %          | R-L            | 870.873    | 871.2      | 1            | 1               | 0.115           | 2.149                  | 2.452                  | 11.25                | 6.06 | 4.05 | TCS-2       | Reconstruction   | 12         | Right     |

#### TENDER PURPOSE ONLY

|                                                                                                                                   |  |  |  |  |  |  |  |                                                                                                                                                                                                              |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |                                                                                             |  |  |  |                                                                                                                                                                                                                          |  |  |  |                                                                                                                                                                                        |  |  |  |                                        |  |
|-----------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|---------------------------------------------------------------------------------------------|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|----------------------------------------|--|
| <div>NOTES:</div> <div>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div>                                          |  |  |  |  |  |  |  | <div>CLIENT:</div> <div></div> <div>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |  |  |  | <div>CONSULTANT:</div> <div></div> <div>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br/>E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  |  |  | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> |  |  |  | <div>JOB No. : 01041055</div> <div><div>DESIGNED</div><div>GANESH</div></div> <div><div>DRAWN</div><div>SATYA</div></div> <div><div>CHECKED</div><div>PRANAI</div></div> <div><div>APPROVED</div><div>PRANAI</div></div> |  |  |  | <div>TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT RIGHT SKEW WITH CUSHION (FOR TCS-2)</div> <div>DRAWING NO : HP/STR/PC/TYP/103</div> |  |  |  | <div>REV. 0</div> <div>SIZE : A3</div> |  |
| <div>REV</div> <div>DATE</div> <div>DESCRIPTION</div> <div>DESIGNED</div> <div>DRAWN</div> <div>CHECKED</div> <div>APPROVED</div> |  |  |  |  |  |  |  |                                                                                                                                                                                                              |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  | <div>SCALE:</div> <div>AS SHOWN</div>                                                       |  |  |  | <div>DATE</div>                                                                                                                                                                                                          |  |  |  | <div>ROAD NAME :</div> <div>Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div>                                           |  |  |  | <div>SHEET 01 OF 01</div>              |  |



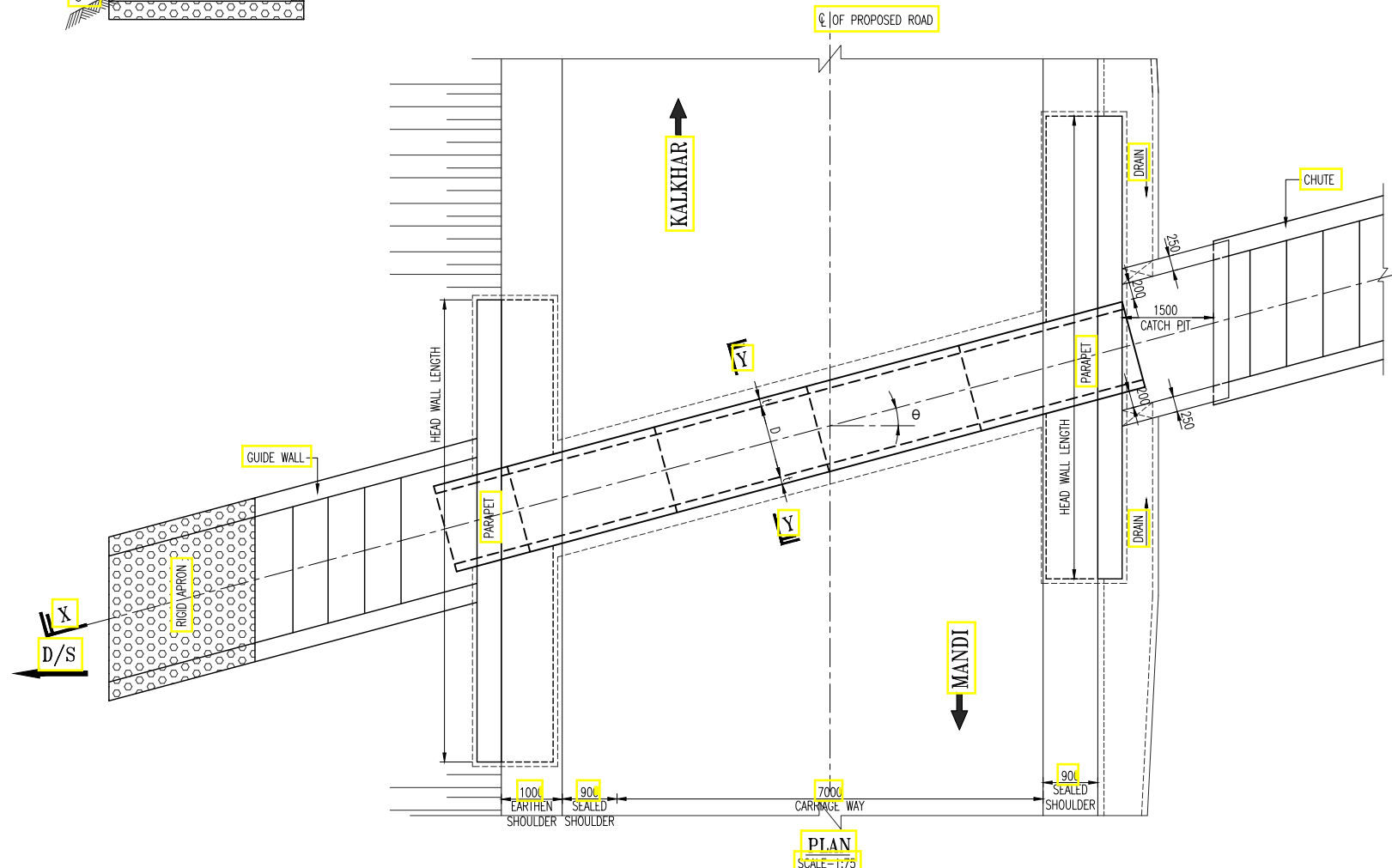
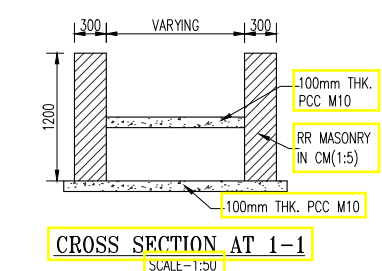
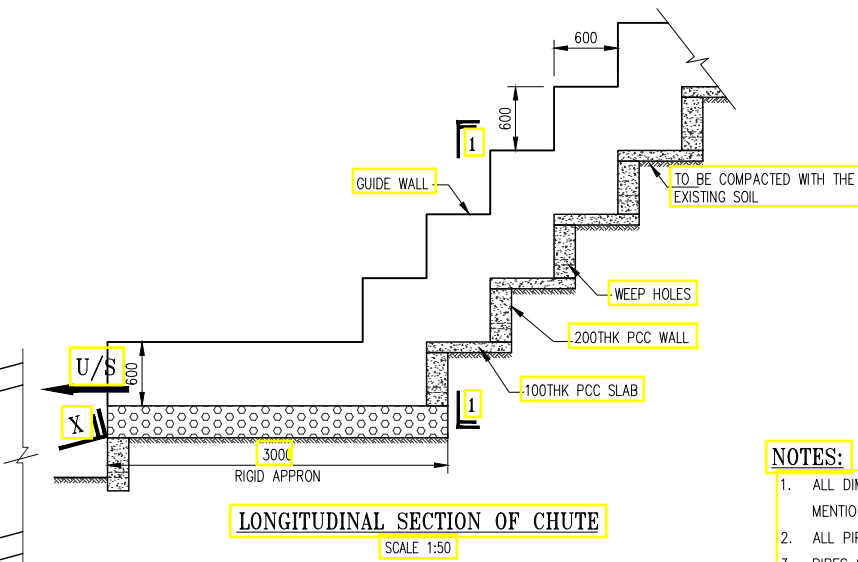
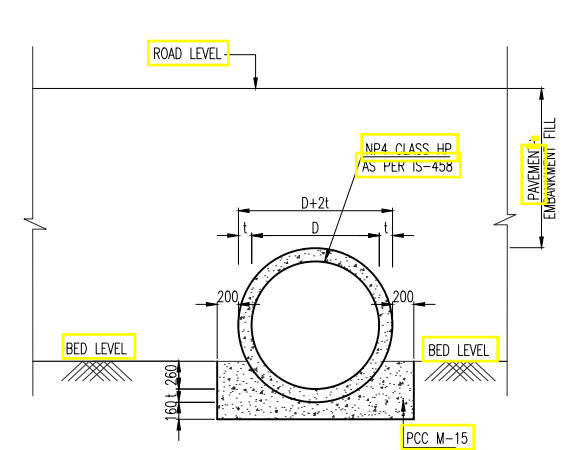
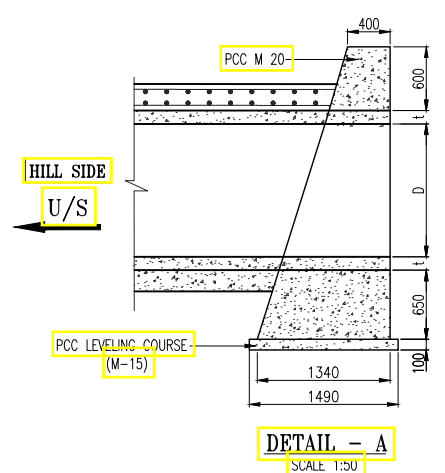
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11. EDGE GAP BETWEEN THE PIPE OF DRAIN WALL TO BE COVERED WITH PCC.
12. PIPE LENGTH PROVIDED BASED ON AVAILABILITY OF ROW.

| S.No | Existing | Design | Design  | Camber  | Camber  | Flow | IL LHS  | IL RHS  | Size of Pipe |                 |                 | Cushion(m) | Cushion(m) | Lengths of Pipe (m)  |      |      | Type of TCS | Type of Proposal |
|------|----------|--------|---------|---------|---------|------|---------|---------|--------------|-----------------|-----------------|------------|------------|----------------------|------|------|-------------|------------------|
|      |          |        |         |         |         |      |         |         | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |            |            | Lengths of Pipe(m) L | L1   | L2   |             |                  |
| 1    | New      | 5+201  | 935.939 | -2.50 % | -2.50 % | R-L  | 934.443 | 934.45  | 1            | 1               | 0.115           | 0.306      | 0.299      | 10.00                | 6.00 | 3.75 | TCS - 2     | New Construction |
| 2    | 6+550    | 6+406  | 891.415 | -2.50 % | -2.50 % | L-R  | 889.9   | 889.893 | 1            | 1               | 0.115           | 0.325      | 0.331      | 10.00                | 6.00 | 3.75 | TCS - 2     | Reconstruction   |

#### TENDER PURPOSE ONLY

|                                                                                          |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                              |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |                                                                                             |  |  |  |  |  |  |  |  |  |                                                                                                             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TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING (FOR TCS-2)</div> <div>DRAWING NO : HP/STR/PC/TYP/104</div> |  |  |  |  |  |  |  |  |  | <div>REV. 0</div> <div>SIZE : A3</div> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 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- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
  2. ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO I.S : 458.
  3. PIPES SHALL BE JOINTED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
  4. LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
  5. FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
  6. FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
  7. ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
  8. LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
  9. FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
  10. GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
  11. CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
  12. THE SECTION OF HEADWALL SHOWN IN THE DRAWING IS TYPICAL ONLY. DEPENDING UPON THE INVERT LEVEL PROPOSED ON D/S & THE EXISTING OGL ON THE D/S THE HEIGHT OF HEADWALL SHALL BE SUITABLY INCREASED WHICH SECTION DETAILS OF HEAD WALL WILL BE AS PER DRAWING HP/MAN-KAL/STR/PC/TYP/201.

| S.No | Existing<br>Chaiange | Design<br>Chaiange | Design<br>FRL @ PCL | Camber<br>e%<br>(LHS) | Camber<br>e%<br>(RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Size of Pipe   |                    |                    | Cushion(m)<br>(LHS) 'ECL' | Cushion(m)<br>(RHS) 'ECR' | Lengths of Pipe (m)     |      |      | Length<br>of Head<br>Wall | Type of TCS | Type of Proposal | Skew Angle | Direction |
|------|----------------------|--------------------|---------------------|-----------------------|-----------------------|-------------------|---------------|---------------|----------------|--------------------|--------------------|---------------------------|---------------------------|-------------------------|------|------|---------------------------|-------------|------------------|------------|-----------|
|      |                      |                    |                     |                       |                       |                   |               |               | No of<br>Pipes | Dia of<br>Pipe 'D' | Thk of<br>Pipe 't' |                           |                           | Lengths of<br>Pipe(m) L | L1   | L2   |                           |             |                  |            |           |
| 1    | 11+225               | 10+826             | 923.651             | -4.19 %               | 4.15 %                | R-L               | 921.603       | 921.900       | 1              | 1                  | 0.115              | 0.763                     | 0.804                     | 11.25                   | 6.33 | 4.13 | 6.50                      | TCS-3B      | Reconstruction   | 11         | Right     |

**NOTES:**  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

[illegible]

|                                                                                                                                                                                |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| CLIENT:                                                                                                                                                                        |  |
|  <p>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br/>DEVELOPMENT CORPORATION LIMITED.</p> |  |

**CONSULTANT:**

---



**SATRA SERVICES AND SOLUTIONS PVT.LTD.**

#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana – 500003, India.

Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: [info@satragroup.in](mailto:info@satragroup.in), Web: [www.satragroup.in](http://www.satragroup.in)

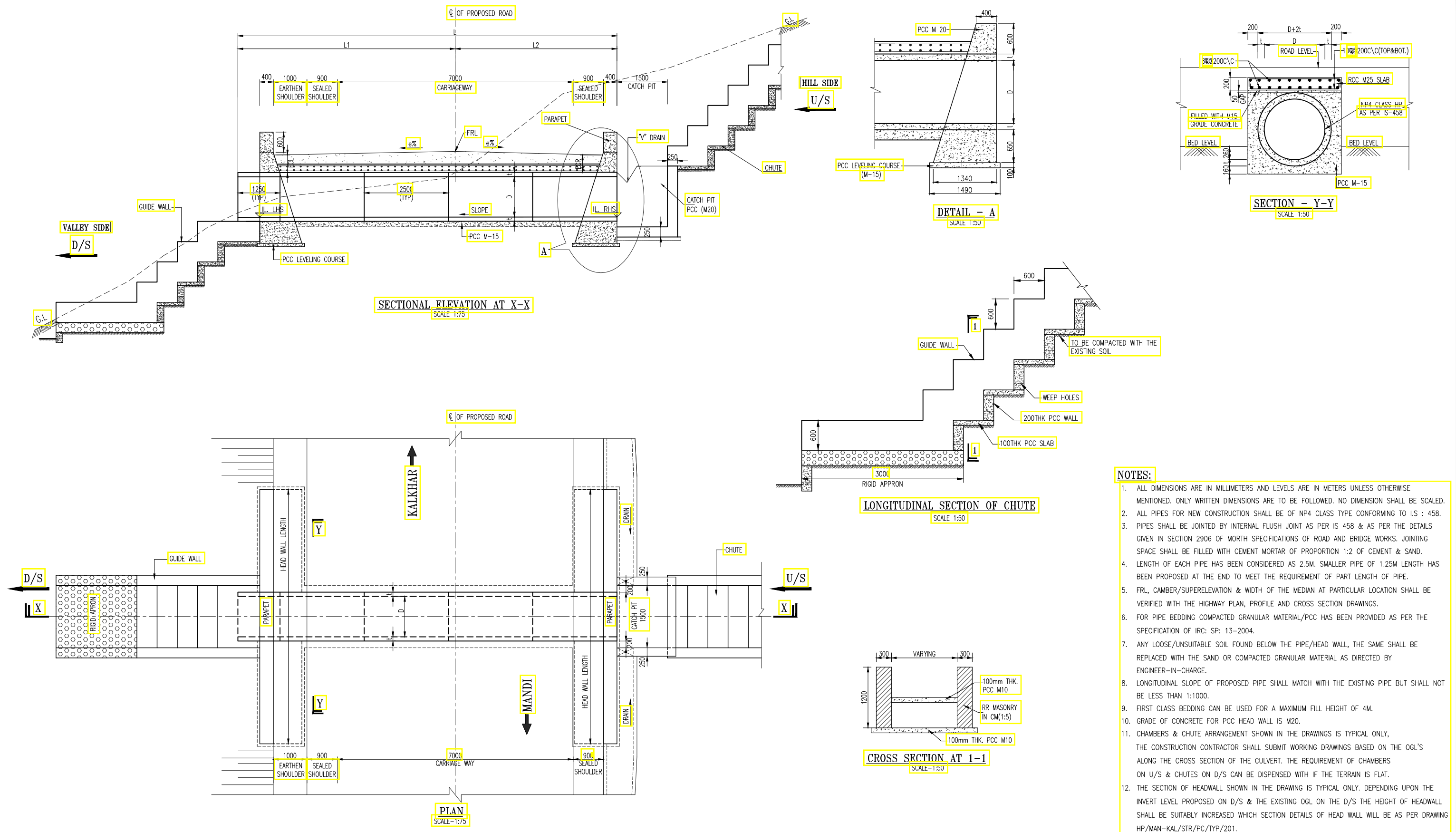
|                                                              |  |
|--------------------------------------------------------------|--|
| PROJECT:                                                     |  |
| HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP) |  |

|                    |        |  |
|--------------------|--------|--|
| JOB No. : 01041055 |        |  |
| DESIGNED           | GANESH |  |
| DRAWN              | SATYA  |  |
| CHECKED            | PRANAI |  |
| APPROVED           | PRANAI |  |

|                                                                                                                                                 |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING<br>FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE<br>CULVERT (RIGHT SKEW)WITH CUSHION FOR TCS-3(A,B,D,E) | REV. 0   |
|                                                                                                                                                 | SIZE : A |

DRAWING NO : HP/STR/PC/TYP/105

|             |                                                                                                              |                |
|-------------|--------------------------------------------------------------------------------------------------------------|----------------|
| ROAD NAME : | Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 | SHEET 01 OF 01 |
|-------------|--------------------------------------------------------------------------------------------------------------|----------------|



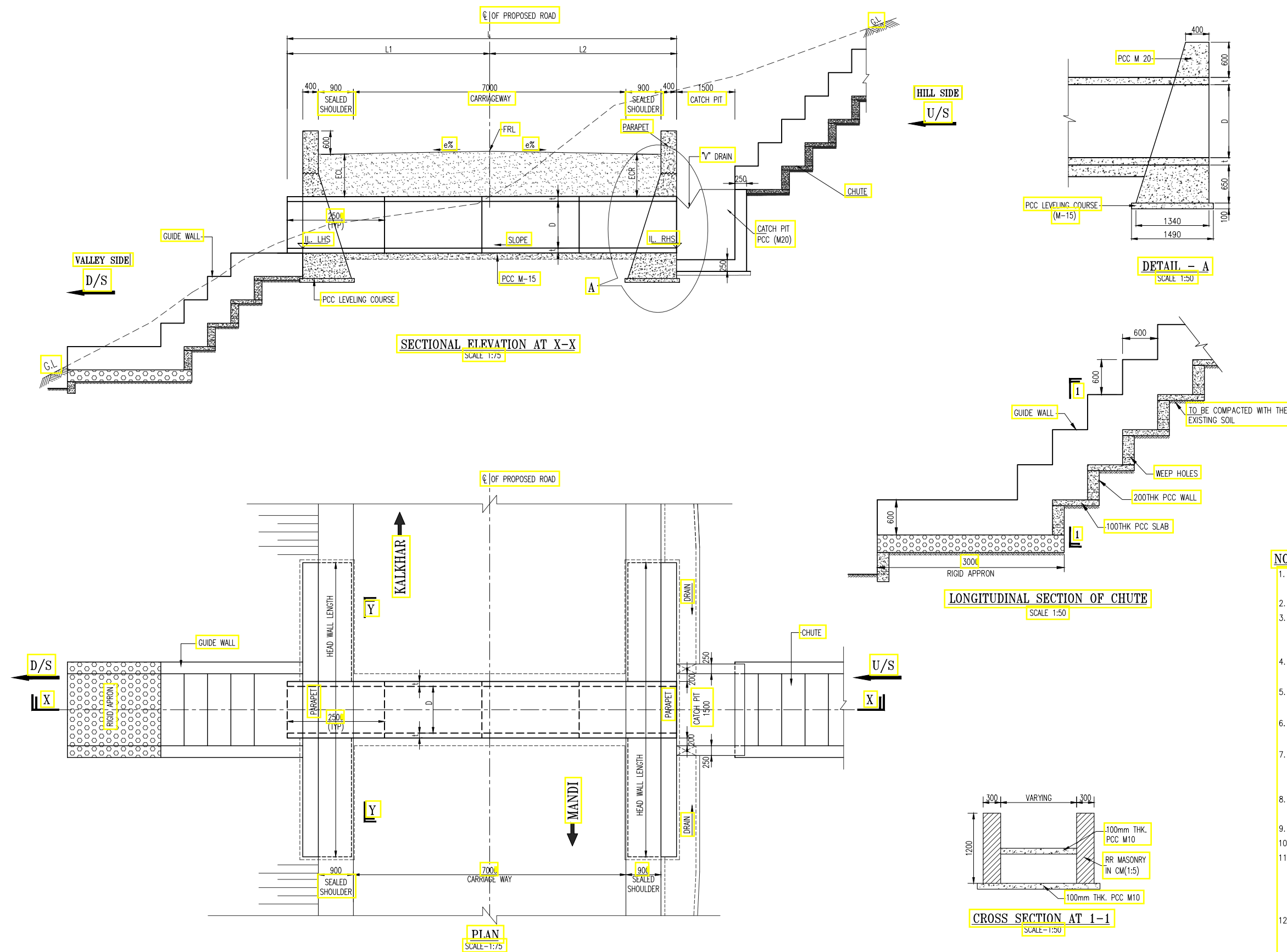
## TENDER PURPOSE ONLY

|                                                                                                                                   |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                              |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |  |                                                                                                                                                            |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |                                        |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|----------------------------------------|--|--|--|--|--|--|--|--|--|
| <div>NOTES:</div> <div>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div>                                          |  |  |  |  |  |  |  |  |  | <div>CLIENT:</div> <div></div> <div>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |  |  |  |  |  |  |  |  |  | <div>CONSULTANT:</div> <div></div> <div>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  |  |  |  |  |  |  |  |  | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> <div><div>SCALE:</div><div>AS SHOWN</div><div>DATE</div></div> |  |  |  |  |  |  |  |  |  | <div>JOB No. : 01041055</div> <div><div>DESIGNED</div><div>GANESH</div><div>DRAWN</div><div>SATYA</div><div>CHECKED</div><div>PRANAI</div><div>APPROVED</div><div>PRANAI</div></div> |  |  |  |  |  |  |  |  |  | <div>TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING FOR TCS-3(A,D)</div> <div>DRAWING NO : HP/STR/PC/TYP/106</div> |  |  |  |  |  |  |  |  |  | <div>REV. 0</div> <div>SIZE : A3</div> |  |  |  |  |  |  |  |  |  |
| <div>REV</div> <div>DATE</div> <div>DESCRIPTION</div> <div>DESIGNED</div> <div>DRAWN</div> <div>CHECKED</div> <div>APPROVED</div> |  |  |  |  |  |  |  |  |  | <div>ROAD NAME :</div> <div>Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div>                                                                 |  |  |  |  |  |  |  |  |  | <div>SHEET 01 OF 02</div>                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |                                                                                                                                                            |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |                                        |  |  |  |  |  |  |  |  |  |

| S.No | Existing<br>Chainge | Design<br>Chainge | Design<br>FRL @ PCL | Camber<br>e%<br>(LHS) | Camber<br>e%<br>(RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Size of Pipe   |                    |                    | Cushion(m)<br>(LHS) 'ECL' | Cushion(m)<br>(RHS) 'ECR' | Lengths of Pipe (m)     |      |      | Length<br>of Head<br>Wall | Type of TCS | Type of Proposal |
|------|---------------------|-------------------|---------------------|-----------------------|-----------------------|-------------------|---------------|---------------|----------------|--------------------|--------------------|---------------------------|---------------------------|-------------------------|------|------|---------------------------|-------------|------------------|
|      |                     |                   |                     |                       |                       |                   |               |               | No of<br>Pipes | Dia of<br>Pipe 'D' | Thk of<br>Pipe 't' |                           |                           | Lengths of<br>Pipe(m) L | L1   | L2   |                           |             |                  |
| 1    | 7+775               | 7+593             | 871.886             | -2.50 %               | -2.50 %               | R-L               | 870.116       | 870.413       | 1              | 1                  | 0.115              | 0.553                     | 0.256                     | 10.00                   | 5.16 | 4.05 | 6.50                      | TCS-3D      | Reconstruction   |
| 2    | 9+680               | 9+307             | 907.696             | -7.00 %               | 7.00 %                | R-L               | 905.783       | 906.100       | 1              | 1                  | 0.115              | 0.472                     | 0.765                     | 12.50                   | 7.39 | 4.05 | 6.50                      | TCS-3A      | Reconstruction   |

TENDER PURPOSE ONLY

|                                                                                   |        |             |          |       |         |          |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                             |  |                                                                                                                                                                                                                         |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |
|-----------------------------------------------------------------------------------|--------|-------------|----------|-------|---------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------|--------|-------|-------|---------|--------|----------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------|
| <div>NOTES:<br/>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div> |        |             |          |       |         |          | <div>CLIENT:</div> <div><br/>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |  | <div>CONSULTANT:</div> <div><br/>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> |  | <div>JOB No. : 01041055</div> <div><table><tr><td>DESIGNED</td><td>GANESH</td></tr><tr><td>DRAWN</td><td>SATYA</td></tr><tr><td>CHECKED</td><td>PRANAI</td></tr><tr><td>APPROVED</td><td>PRANAI</td></tr></table></div> |  | DESIGNED | GANESH | DRAWN | SATYA | CHECKED | PRANAI | APPROVED | PRANAI | <div>TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING FOR TCS-3(A,D)</div> <div>DRAWING NO : HP/STR/PC/TYP/106</div> |  | <div>ROAD NAME : Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div> |  | <div>REV. 0</div> <div>SIZE : A3</div> <div>SHEET 02 OF 02</div> |
| DESIGNED                                                                          | GANESH |             |          |       |         |          |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                             |  |                                                                                                                                                                                                                         |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |
| DRAWN                                                                             | SATYA  |             |          |       |         |          |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                             |  |                                                                                                                                                                                                                         |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |
| CHECKED                                                                           | PRANAI |             |          |       |         |          |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                             |  |                                                                                                                                                                                                                         |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |
| APPROVED                                                                          | PRANAI |             |          |       |         |          |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                             |  |                                                                                                                                                                                                                         |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |
| REV                                                                               | DATE   | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                                                           |  | SCALE: AS SHOWN                                                                             |  | DATE                                                                                                                                                                                                                    |  |          |        |       |       |         |        |          |        |                                                                                                                                                                                 |  |                                                                                                                                   |  |                                                                  |



## NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
- ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO IS : 458.
- PIPES SHALL BE JOINED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
- LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
- FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
- FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
- ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
- LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
- FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
- GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
- CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
- THE SECTION OF HEADWALL SHOWN IN THE DRAWING IS TYPICAL ONLY. DEPENDING UPON THE INVERT LEVEL PROPOSED ON D/S & THE EXISTING OGL ON THE D/S THE HEIGHT OF HEADWALL SHALL BE SUITABLY INCREASED WHICH SECTION DETAILS OF HEAD WALL WILL BE AS PER DRAWING HP/MAN-KAL/STR/PC/TYP/201.

## TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

SCALE:

AS SHOWN

DATE

JOB No. : 01041055

|          |        |
|----------|--------|
| DESIGNED | GANESH |
| DRAWN    | SATYA  |
| CHECKED  | PRANAI |
| APPROVED | PRANAI |

ROAD NAME :

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH CUSHION FOR TCS-3(C,F)

DRAWING NO : HP/STR/PC/TYP/107

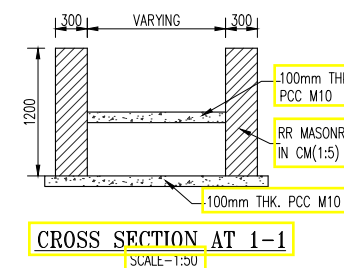
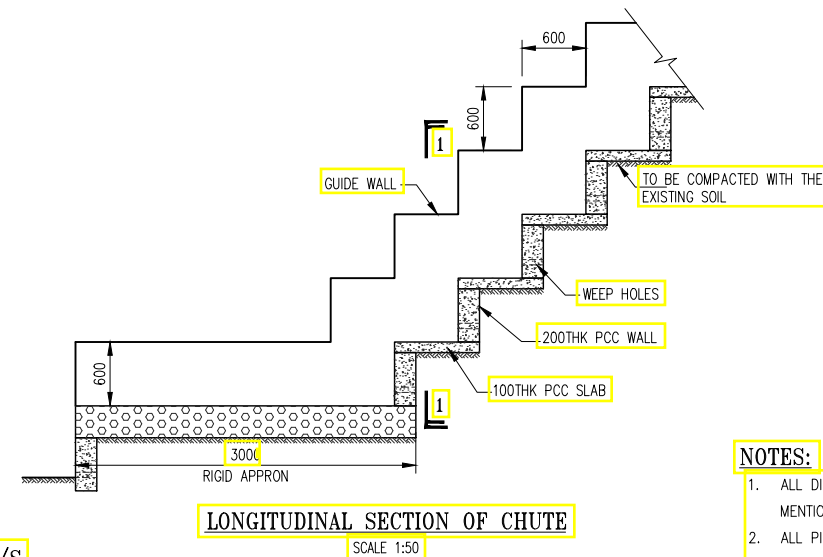
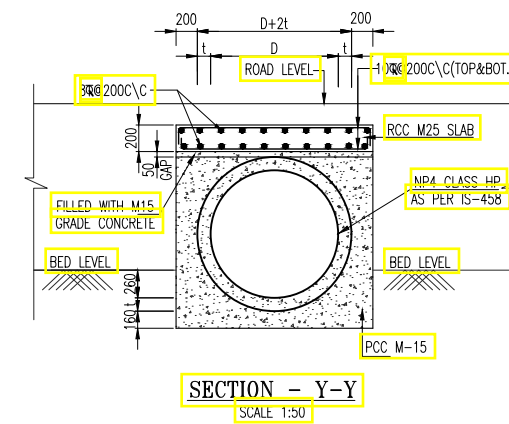
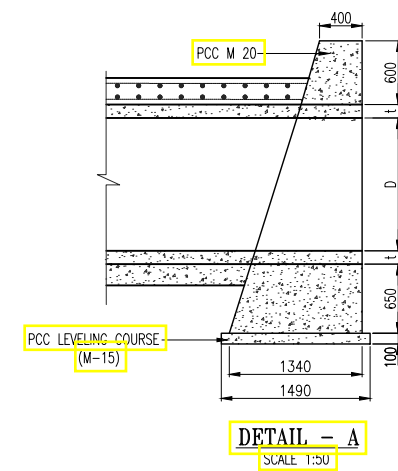
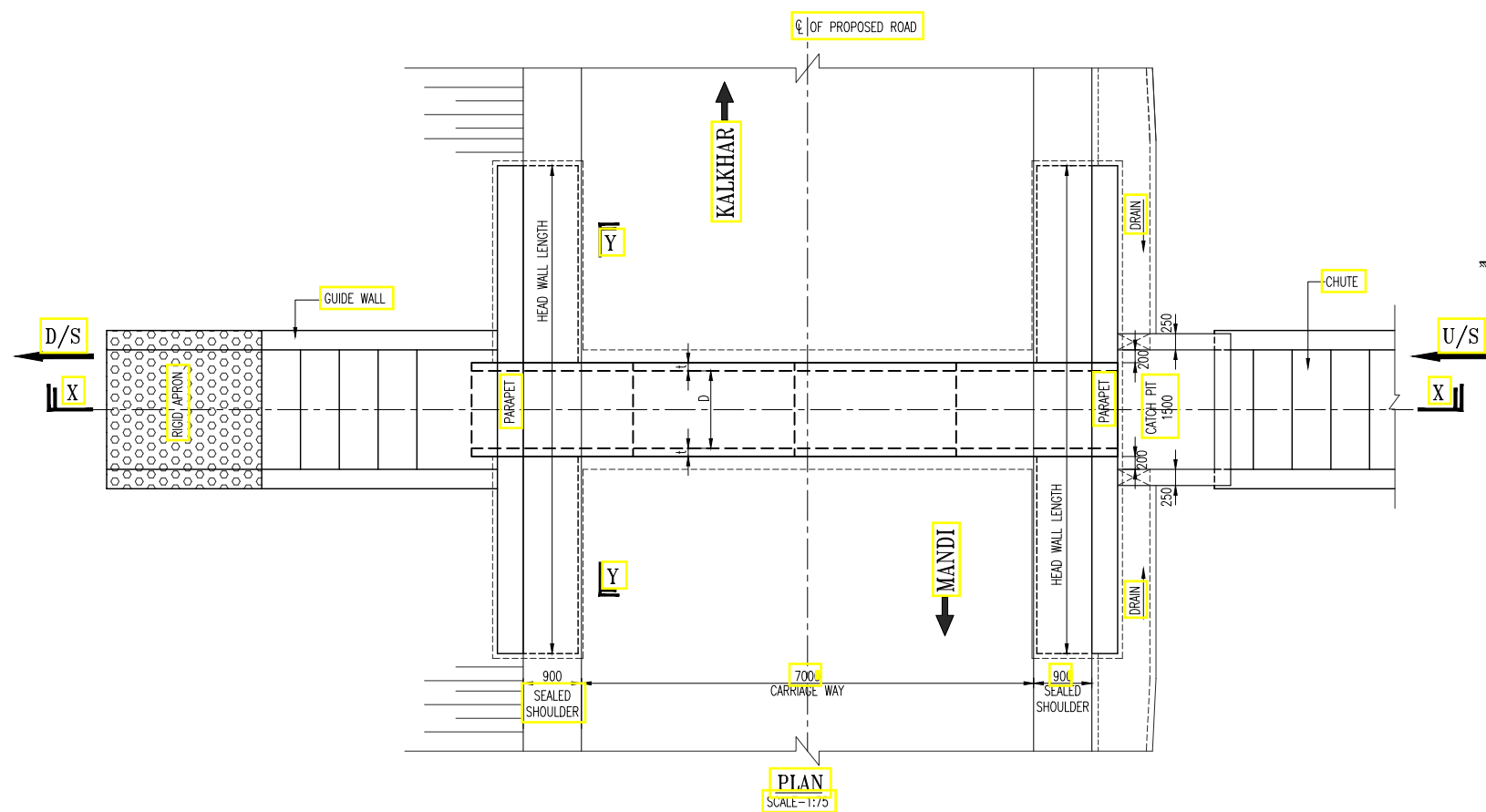
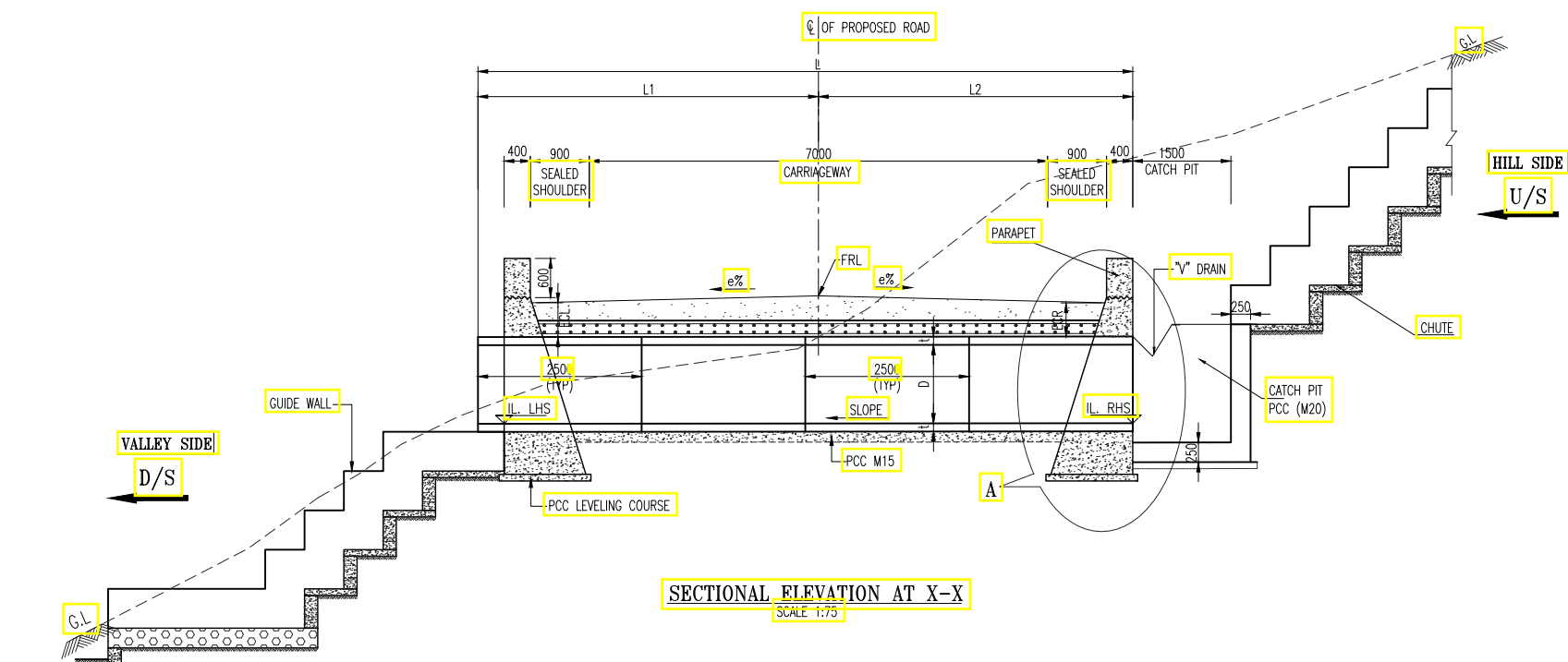
Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

REV. 0

SIZE : A3

SHEET 01 OF 02





#### NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
- ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO IS : 458.
- PIPES SHALL BE JOINTED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
- LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
- FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
- FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
- ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
- LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
- FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
- GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
- CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
- THE SECTION OF HEADWALL SHOWN IN THE DRAWING IS TYPICAL ONLY. DEPENDING UPON THE INVERT LEVEL PROPOSED ON D/S & THE EXISTING OGL ON THE D/S THE HEIGHT OF HEADWALL SHALL BE SUITABLY INCREASED WHICH SECTION DETAILS OF HEAD WALL WILL BE AS PER DRAWING HP/MAN-KAL/STR/PC/TYP/201.

| S.No | Existing Chainge | Design Chainge | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Size of Pipe |                 |                 | Cushion(m) (LHS) 'ECL' | Cushion(m) (RHS) 'ECR' | Lengths of Pipe (m)  |      |      | Length of Head Wall | Type of TCS | Type of Proposal                   |
|------|------------------|----------------|------------------|-----------------|-----------------|----------------|------------|------------|--------------|-----------------|-----------------|------------------------|------------------------|----------------------|------|------|---------------------|-------------|------------------------------------|
|      |                  |                |                  |                 |                 |                |            |            | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |                        |                        | Lengths of Pipe(m) L | L1   | L2   |                     |             |                                    |
| 1    | 6+300            | 6+162          | 896.340          | -2.62 %         | 0.87 %          | L-R            | 894.830    | 894.520    | 1            | 1               | 0.115           | 0.279                  | 0.741                  | 11.25                | 6.01 | 4.05 | 6.50                | TCS-3C      | Reconstruction (Half Pipe Encased) |

#### TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
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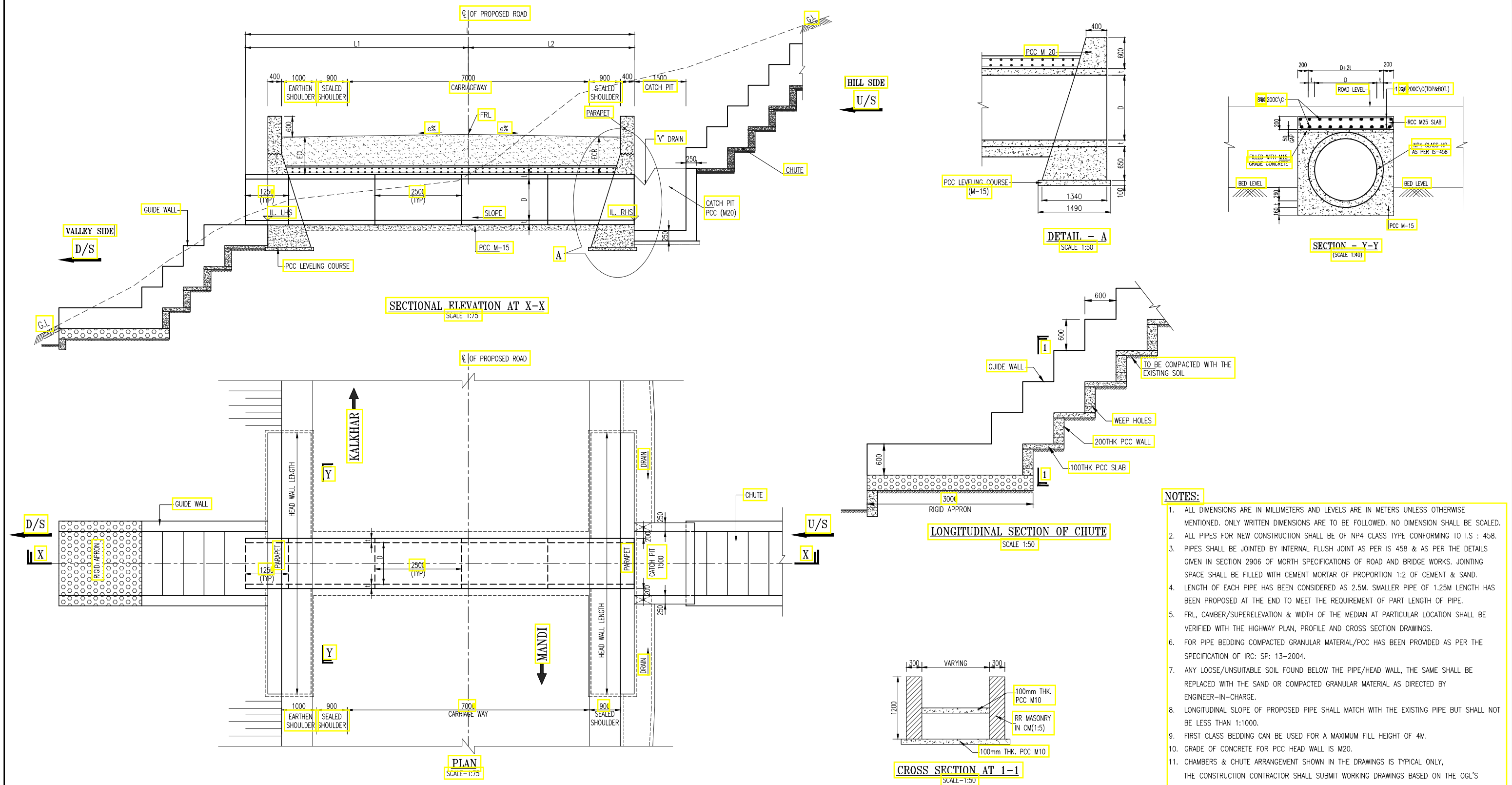
|                                                                                     |
|-------------------------------------------------------------------------------------|
| CLIENT:                                                                             |
|  |
| HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.     |

|                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CONSULTANT:                                                                                                                                                                                                                                                 |
|                                                                                                                                                                        |
| SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in |

|                                                              |
|--------------------------------------------------------------|
| PROJECT:                                                     |
| HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP) |
| SCALE: AS SHOWN                                              |
| DATE:                                                        |

|                    |
|--------------------|
| JOB No. : 01041055 |
| DESIGNED: GANESH   |
| DRAWN: SATYA       |
| CHECKED: PRANAI    |
| APPROVED: PRANAI   |
| ROAD NAME :        |

|                                                                                                                            |                |
|----------------------------------------------------------------------------------------------------------------------------|----------------|
| TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING (FOR TCS-3(C)) | REV. 0         |
| DRAWING NO : HP/STR/PC/TYP/108                                                                                             | SIZE : A3      |
| Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000                  | SHEET 01 OF 01 |



| S.No | Existing Change | Design Change | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Size of Pipe |                 |                 | Cushion(m) (LHS) 'ECL' | Cushion(m) (RHS) 'ECR' | Lengths of Pipe (m)  |      |      | Length of Head Wall | Type of TCS | Type of Proposal                   |
|------|-----------------|---------------|------------------|-----------------|-----------------|----------------|------------|------------|--------------|-----------------|-----------------|------------------------|------------------------|----------------------|------|------|---------------------|-------------|------------------------------------|
|      |                 |               |                  |                 |                 |                |            |            | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |                        |                        | Lengths of Pipe(m) L | L1   | L2   |                     |             |                                    |
| 1    | 2+310           | 2+298         | 880.541          | 2.58 %          | -3.53 %         | R-L            | 878.855    | 878.865    | 1            | 1               | 0.115           | 0.695                  | 0.392                  | 11.25                | 6.19 | 4.80 | 6.50                | TCS-5A      | Reconstruction (Half Pipe Encased) |

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
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|     |      |             |          |       |         |          |

CLIENT:  
  
HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:  
  
SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:  
HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

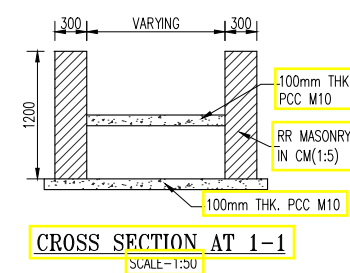
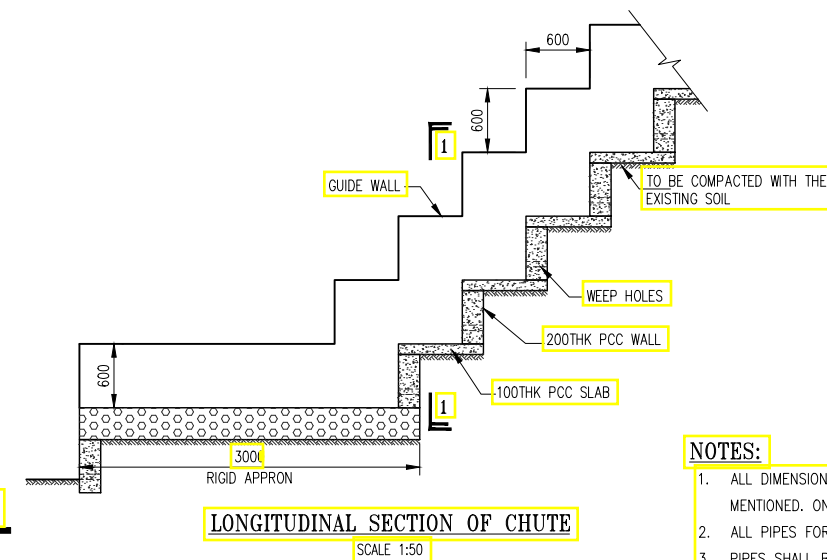
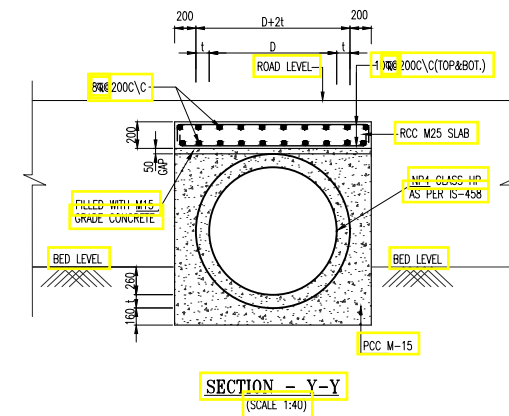
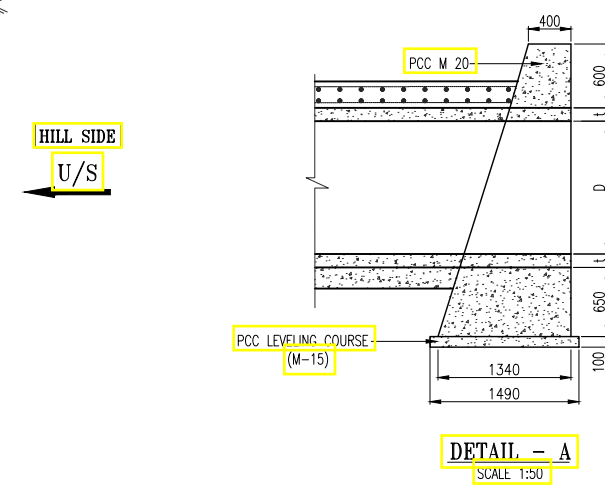
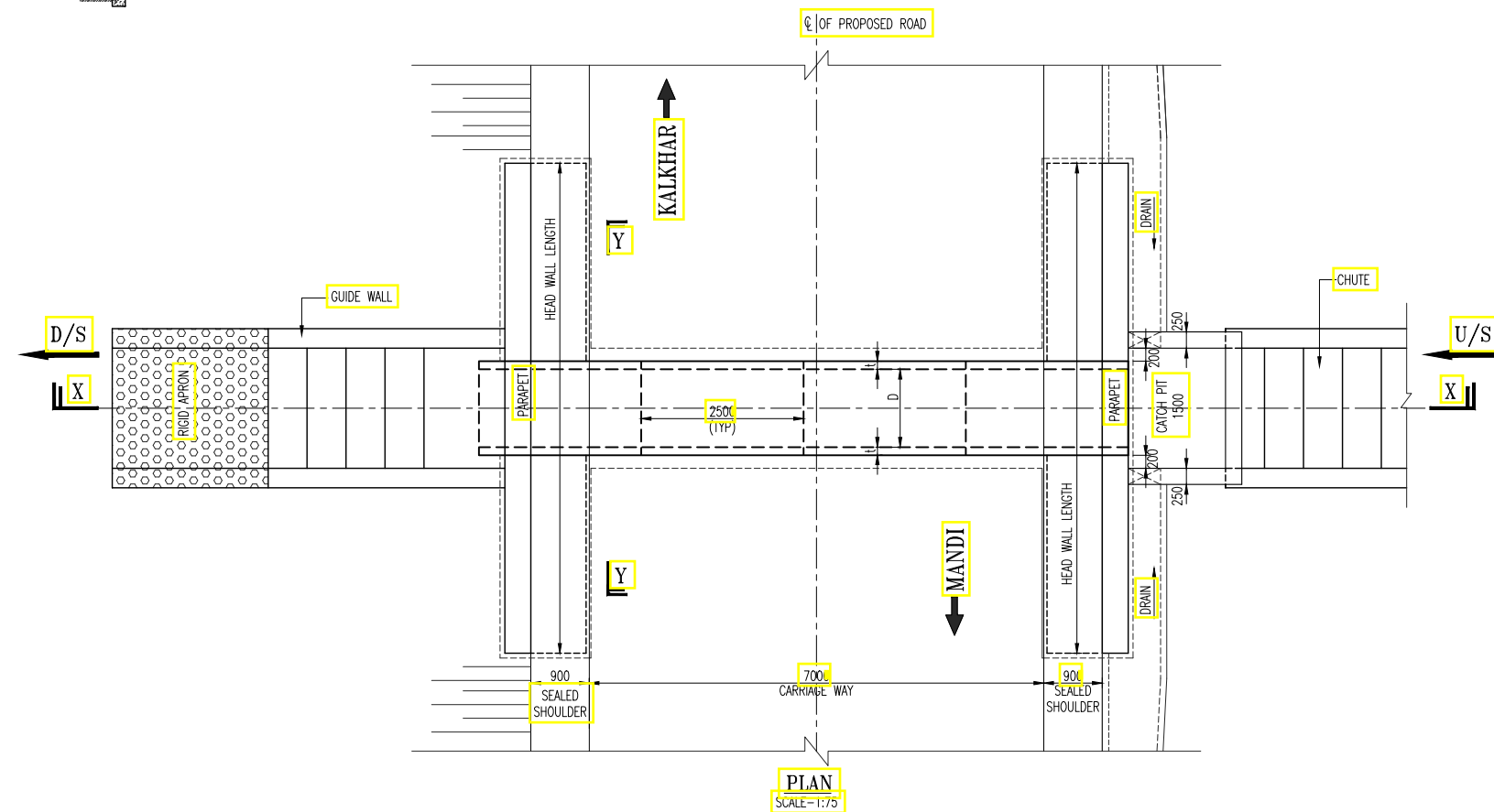
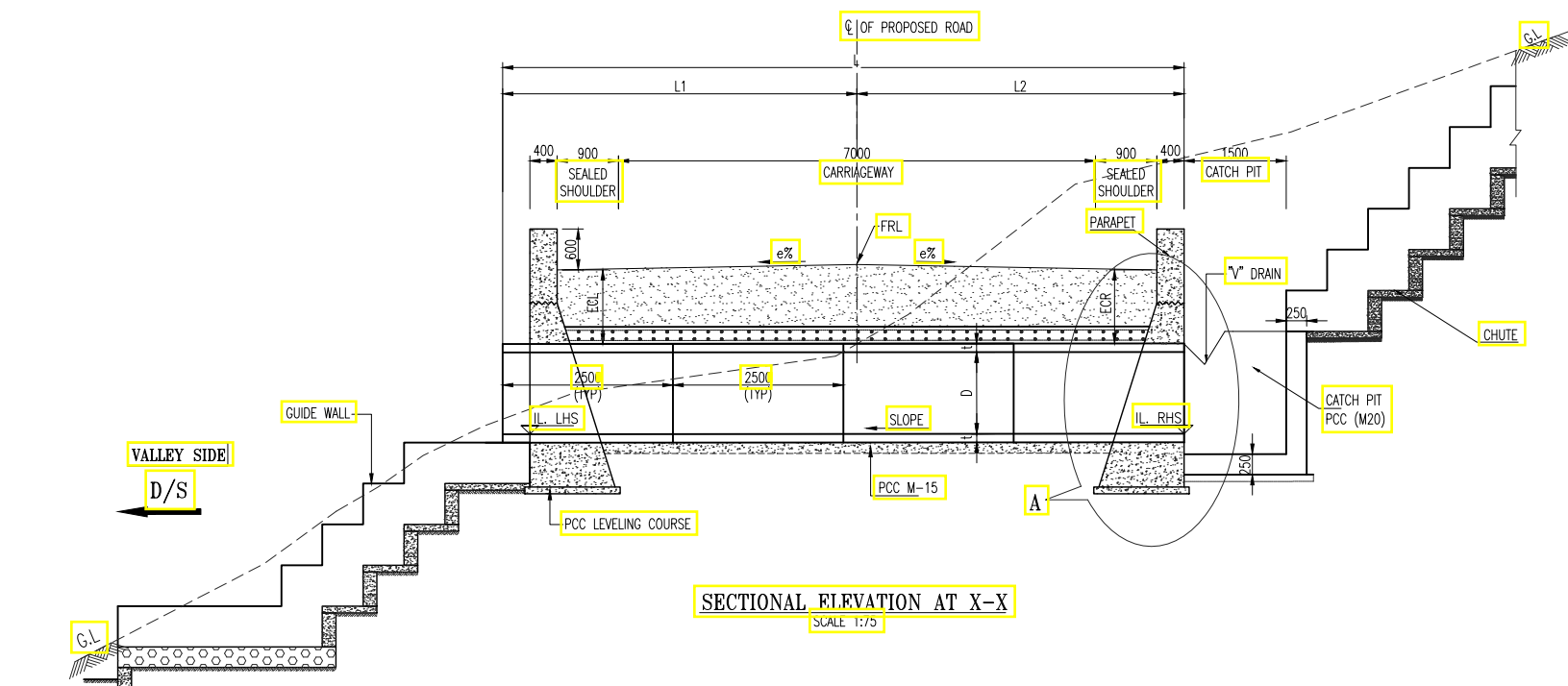
SCALE: AS SHOWN  
DATE:  

JOB No. : 01041055  
DESIGNED: GANESH  
DRAWN: SATYA  
CHECKED: PRANAI  
APPROVED: PRANAI

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING TCS-5(A)  
DRAWING NO : HP/STR/PC/TYP/109

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

SHEET 01 OF 01



#### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
2. ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO IS : 458.
3. PIPES SHALL BE JOINED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
4. LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
5. FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
6. FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
7. ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
8. LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
9. FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
10. GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
11. CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
12. THE SECTION OF HEADWALL SHOWN IN THE DRAWING IS TYPICAL ONLY. DEPENDING UPON THE INVERT LEVEL PROPOSED ON D/S & THE EXISTING OGL ON THE D/S THE HEIGHT OF HEADWALL SHALL BE SUITABLY INCREASED WHICH SECTION DETAILS OF HEAD WALL WILL BE AS PER DRAWING HP/MAN-KAL/STR/PC/TYP/201.

| S.No | Existing Change | Design Change | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Size of Pipe |                 |                 | Cushion(m) (LHS) 'ECL' | Cushion(m) (RHS) 'ECR' | Lengths of Pipe (m)  |      |      | Length of Head Wall | Type of TCS | Type of Proposal                   |
|------|-----------------|---------------|------------------|-----------------|-----------------|----------------|------------|------------|--------------|-----------------|-----------------|------------------------|------------------------|----------------------|------|------|---------------------|-------------|------------------------------------|
|      |                 |               |                  |                 |                 |                |            |            | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |                        |                        | Lengths of Pipe(m) L | L1   | L2   |                     |             |                                    |
| 1    | 3+370           | 3+351         | 937.691          | -7.00 %         | 7.00 %          | R-L            | 935.953    | 936.300    | 1            | 1               | 0.115           | 0.286                  | 0.612                  | 12.50                | 6.60 | 4.80 | 6.50                | TCS-SF      | Reconstruction (Half Pipe Encased) |

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

SCALE: AS SHOWN

DATE

JOB No. : 01041055

|          |        |
|----------|--------|
| DESIGNED | GANESH |
| DRAWN    | SATYA  |
| CHECKED  | PRANAI |
| APPROVED | PRANAI |

ROAD NAME :

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT WITH ENCASING TCS-5(F)

DRAWING NO : HP/STR/PC/TYP/110

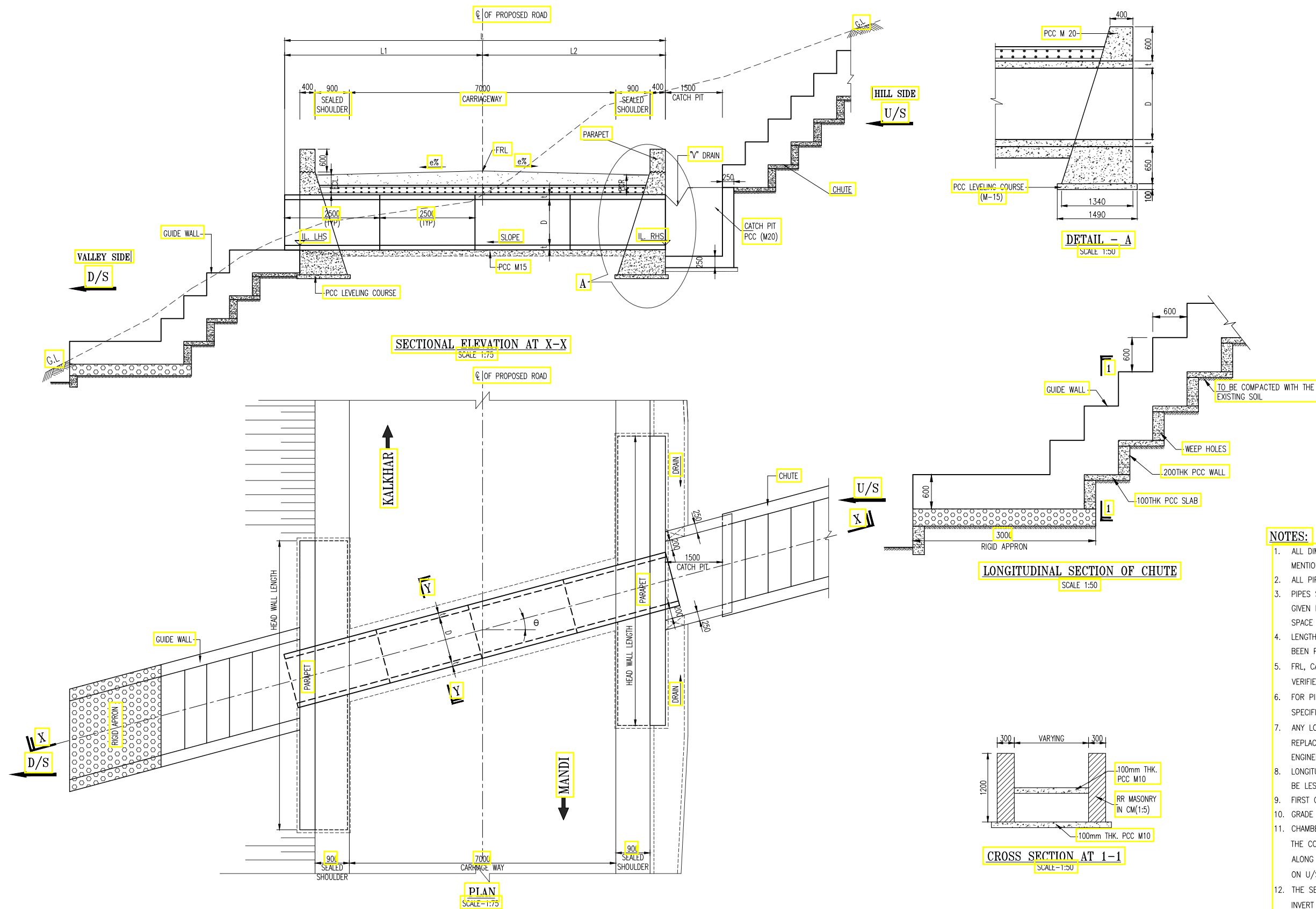
Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

REV. 0

SIZE : A3

SHEET 01 OF 01

TENDER PURPOSE ONLY



## NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.
- ALL PIPES FOR NEW CONSTRUCTION SHALL BE OF NP4 CLASS TYPE CONFORMING TO IS : 458.
- PIPES SHALL BE JOINTED BY INTERNAL FLUSH JOINT AS PER IS 458 & AS PER THE DETAILS GIVEN IN SECTION 2906 OF MORTH SPECIFICATIONS OF ROAD AND BRIDGE WORKS. JOINTING SPACE SHALL BE FILLED WITH CEMENT MORTAR OF PROPORTION 1:2 OF CEMENT & SAND.
- LENGTH OF EACH PIPE HAS BEEN CONSIDERED AS 2.5M. SMALLER PIPE OF 1.25M LENGTH HAS BEEN PROPOSED AT THE END TO MEET THE REQUIREMENT OF PART LENGTH OF PIPE.
- FRL, CAMBER/SUPERELEVATION & WIDTH OF THE MEDIAN AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY PLAN, PROFILE AND CROSS SECTION DRAWINGS.
- FOR PIPE BEDDING COMPACTED GRANULAR MATERIAL/PCC HAS BEEN PROVIDED AS PER THE SPECIFICATION OF IRC: SP: 13-2004.
- ANY LOOSE/UNSUITABLE SOIL FOUND BELOW THE PIPE/HEAD WALL, THE SAME SHALL BE REPLACED WITH THE SAND OR COMPACTED GRANULAR MATERIAL AS DIRECTED BY ENGINEER-IN-CHARGE.
- LONGITUDINAL SLOPE OF PROPOSED PIPE SHALL MATCH WITH THE EXISTING PIPE BUT SHALL NOT BE LESS THAN 1:1000.
- FIRST CLASS BEDDING CAN BE USED FOR A MAXIMUM FILL HEIGHT OF 4M.
- GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.
- CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
- THE SECTION OF HEADWALL SHOWN IN THE DRAWING IS TYPICAL ONLY. DEPENDING UPON THE INVERT LEVEL PROPOSED ON D/S & THE EXISTING OGL ON THE D/S THE HEIGHT OF HEADWALL SHALL BE SUITABLY INCREASED WHICH SECTION DETAILS OF HEAD WALL WILL BE AS PER DRAWING HP/MAN-KAL/STR/PC/TYP/201.

## TENDER PURPOSE ONLY

| S.No | Existing Change | Design Change | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Size of Pipe |                 |                 | Cushion(m) (LHS) 'ECL' | Cushion(m) (RHS) 'ECR' | Lengths of Pipe (m)  |      |      | Length of Head Wall | Type of TCS | Type of Proposal                   | Skew Angle | Direction |
|------|-----------------|---------------|------------------|-----------------|-----------------|----------------|------------|------------|--------------|-----------------|-----------------|------------------------|------------------------|----------------------|------|------|---------------------|-------------|------------------------------------|------------|-----------|
|      |                 |               |                  |                 |                 |                |            |            | No of Pipes  | Dia of Pipe 'D' | Thk of Pipe 't' |                        |                        | Lengths of Pipe(m) L | L1   | L2   |                     |             |                                    |            |           |
| 1    | 11+100          | 10+706        | 926.014          | -2.50 %         | -2.50 %         | R-L            | 924.087    | 924.400    | 1            | 1               | 0.115           | 0.699                  | 0.398                  | 11.25                | 6.18 | 4.18 | 6.50                | TCS-3C      | Reconstruction (Half Pipe Encased) | 14         | Right     |

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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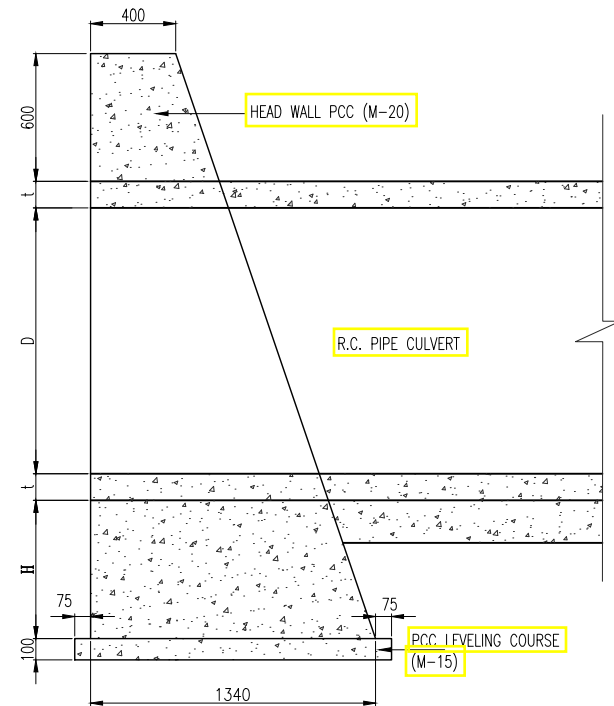
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|-------------------------------------------------------------------------------------|
| CLIENT:                                                                             |
|  |
| HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.     |

|                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CONSULTANT:                                                                                                                                                                                                                                                    |
|                                                                                                                                                                           |
| SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in |

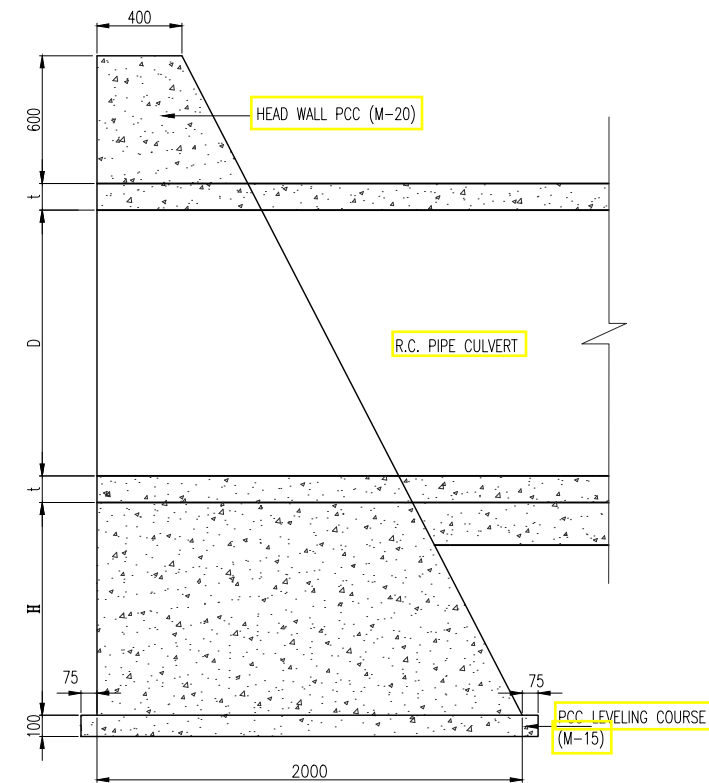
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| PROJECT:                                                     |
| HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP) |
| SCALE: AS SHOWN                                              |
| DATE                                                         |

|                    |
|--------------------|
| JOB No. : 01041055 |
| DESIGNED: GANESH   |
| DRAWN: SATYA       |
| CHECKED: PRANAI    |
| APPROVED: PRANAI   |
| ROAD NAME :        |

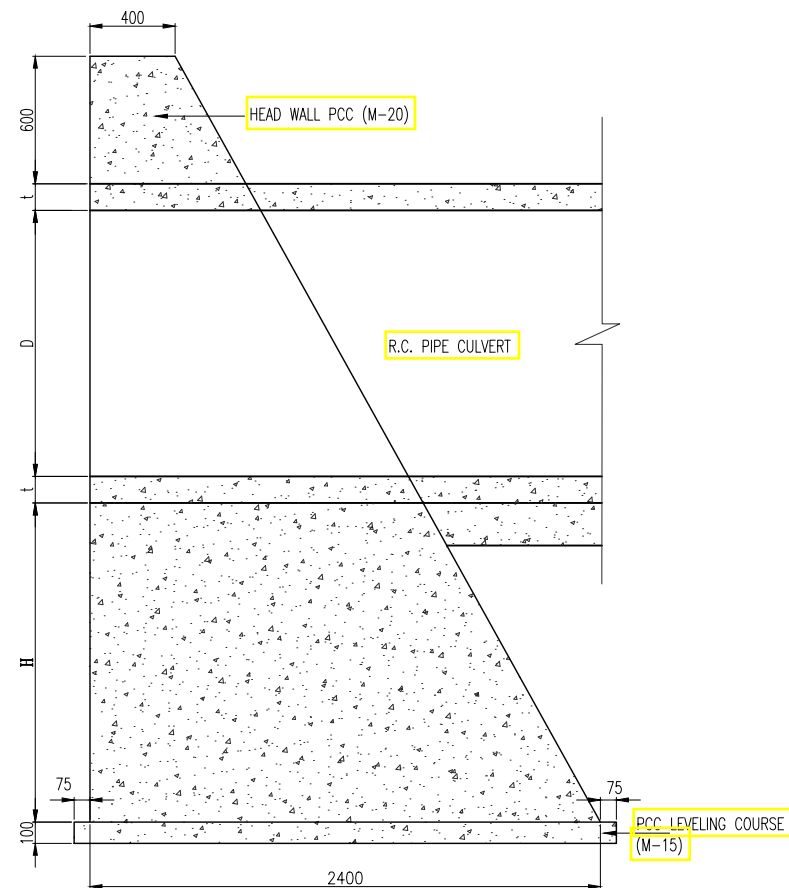
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| TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE ROW PIPE CULVERT (RIGHT SKEW) WITH ENCASING FOR TCS-(3C) | REV. 0         |
| DRAWING NO : HP/STR/PC/TYP/111                                                                                                        | SIZE : A3      |
| Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000                             | SHEET 01 OF 01 |



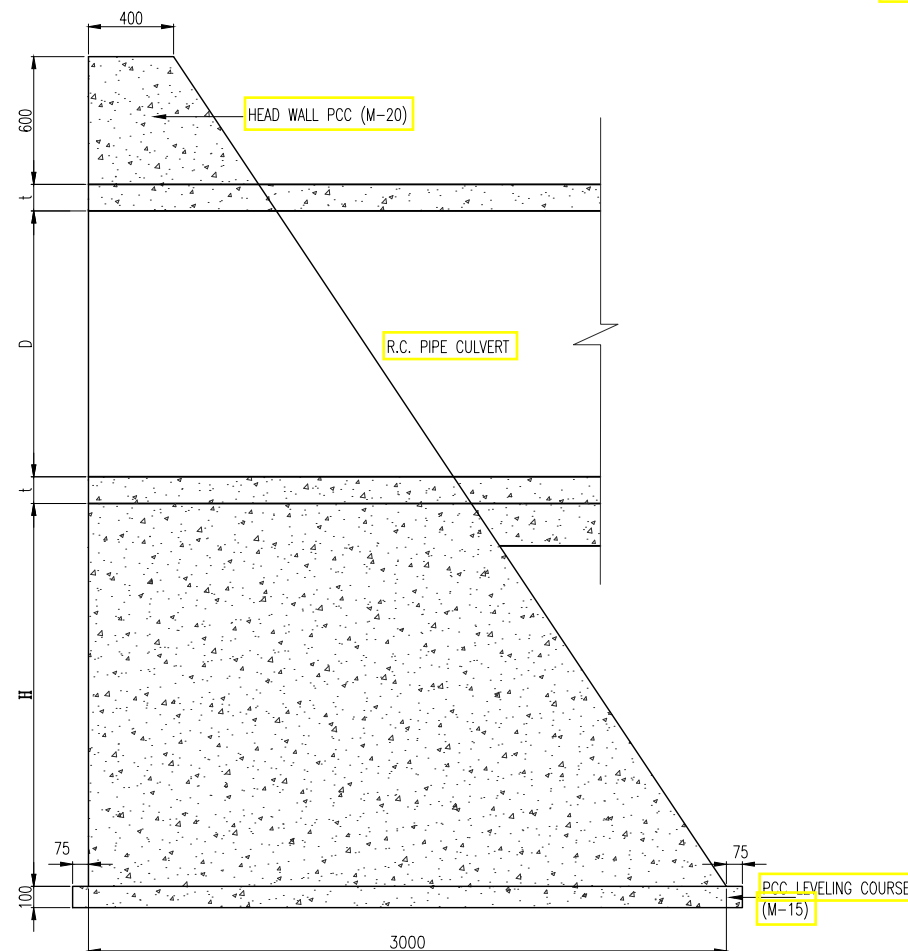
**HEAD WALL SECTION**  
(H= 650)



**HEAD WALL SECTION**  
(650> H≤1300)



**HEAD WALL SECTION**  
(1300> H≤1950)



**HEAD WALL SECTION**  
(1950> H≤2600)

**REFERENCE DRAWINGS:**

1. TYPICAL GENERAL ARRANGEMENT DRAWING OF PIPE CULVERT - HP/MAN-KAL/STR/PC/TYP/101-107.

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DIMENSION SHALL BE SCALED.  
2. GRADE OF CONCRETE FOR PCC HEAD WALL IS M20.

**TENDER PURPOSE ONLY**

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



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Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

SCALE: AS SHOWN

DATE

JOB No. : 01041055

|          |        |
|----------|--------|
| DESIGNED | GANESH |
| DRAWN    | SATYA  |
| CHECKED  | PRANAI |
| APPROVED | PRANAI |

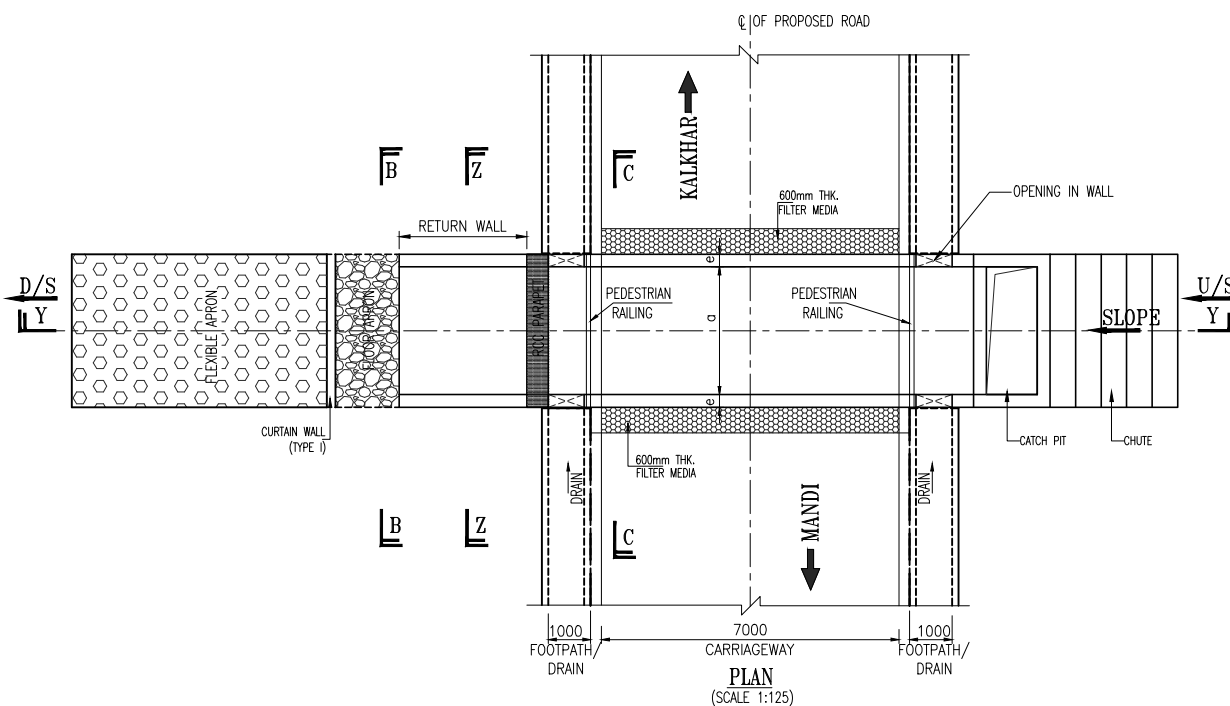
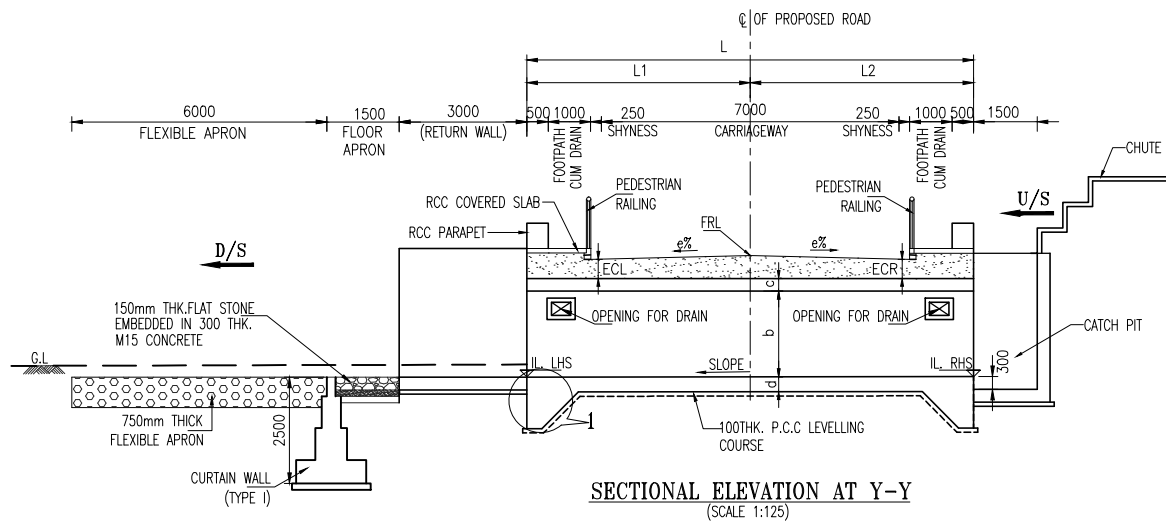
TITLE : DIMENSION DETAILS OF HEAD WALL FOR PIPE CULVERTS ON DOWN STREAM SIDE

DRAWING NO : HP/STR/PC/TYP/201

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

SHEET 01 OF 01

BOX CULVERTS



#### U-SHAPE RETAINING WALL

| S.No | Existing Change | Design Change | Design FRL @ PCL | Flow direction | Height Of U Shape Return Wall | Length Of U Shape Return Wall | Dimensions of U Shape Return Wall |          |               |
|------|-----------------|---------------|------------------|----------------|-------------------------------|-------------------------------|-----------------------------------|----------|---------------|
|      |                 |               |                  |                | D/S (b)                       |                               | Clear Span (a)                    | Wall (c) | Base Slab (d) |
| 1    | 4+850           | 4+827         | 950.344          | R-L            | 3.75                          | 3.00                          | 2.0                               | 0.35     | 0.40          |
| 2    | 6+745           | 6+597         | 886.997          | L-R            | 5.21                          | 3.00                          | 2.0                               | 0.45     | 0.50          |

#### BOX CULVERT

| S.No | Existing Change | Design Change | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Proposed Structure Details |             |                    |                      | Cushion (m) (LHS) (ECL) | Cushion (m) (RHS) (ECR) | Lengths of Box (m)   |      |      | Dimensions of Box (m) |               | Return Wall Length (LHS) (RTL) | Return Wall Length (RHS) (RTL) | SBC T/m2 | Skew Angle (°) | TCS Type | Improvement Proposal |
|------|-----------------|---------------|------------------|-----------------|-----------------|----------------|------------|------------|----------------------------|-------------|--------------------|----------------------|-------------------------|-------------------------|----------------------|------|------|-----------------------|---------------|--------------------------------|--------------------------------|----------|----------------|----------|----------------------|
|      |                 |               |                  |                 |                 |                |            |            | Type of Structure          | No of Spans | Clear Span (m) (a) | Clear Height (m) (b) |                         |                         | Lengths of Box (m) L | L1   | L2   | Wall Ex (e)           | Base Slab (d) |                                |                                |          |                |          |                      |
| 1    | 4+850           | 4+827         | 950.344          | -5.0            | 5.0             | R-L            | 946.589    | 946.600    | Box                        | 1           | 4.3                | 3.0                  | 0.100                   | 0.569                   | 11.85                | 7.00 | 4.85 | 0.40                  | 0.45          | -                              | -                              | 17       | 22 (Right)     | TCS2     | Reconstruction       |
| 2    | 6+745           | 6+597         | 886.997          | 4.4             | -4.4            | L-R            | 881.800    | 881.790    | Box                        | 1           | 2.0                | 2.5                  | 2.547                   | 2.157                   | 10.50                | 6.00 | 4.50 | 0.35                  | 0.40          | -                              | -                              | 15       | 0°             | TCS2     | Reconstruction       |

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CLIENT:



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Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in

CONSULTANT:

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

SCALE:

AS SHOWN

DATE

JOB No. : 01041055

DESIGNED GANESH

DRAWN SATYA

CHECKED PRANAI

APPROVED PRANAI

ROAD NAME :

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE CELL BOX CULVERT FOR TCS-2

REV. 0

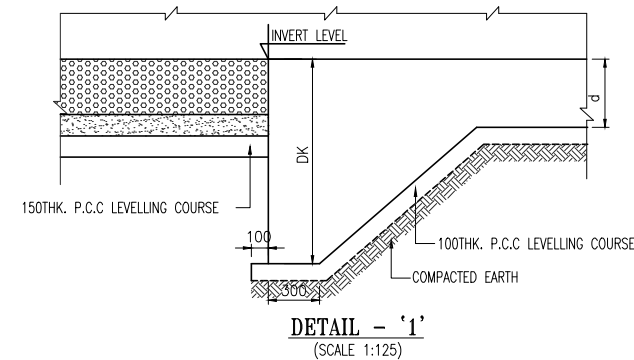
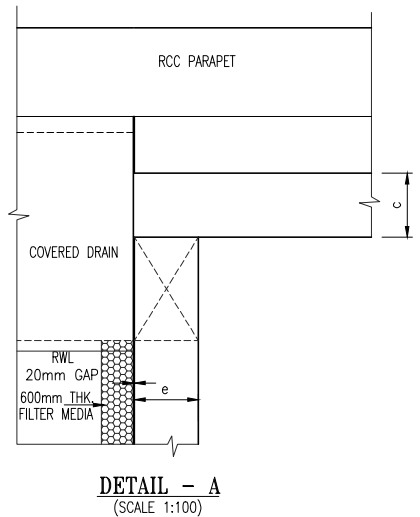
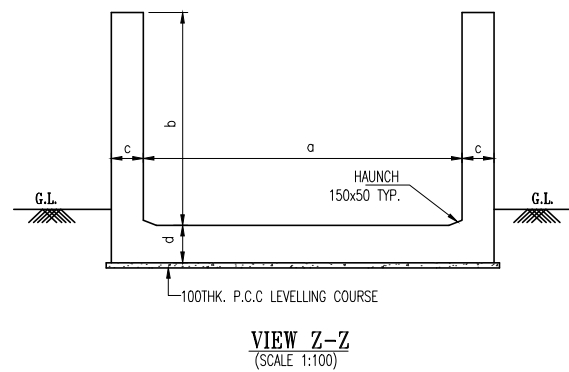
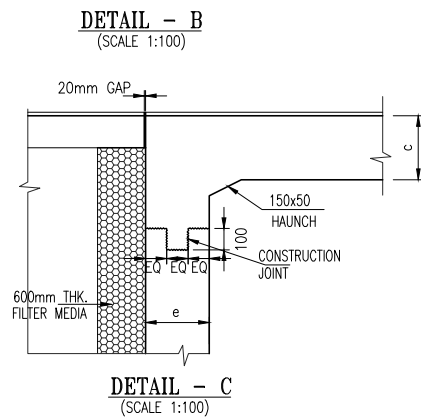
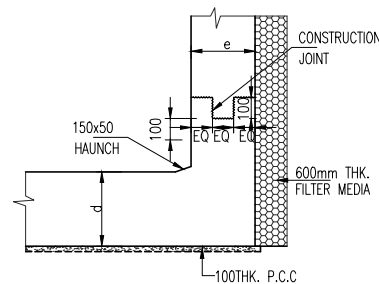
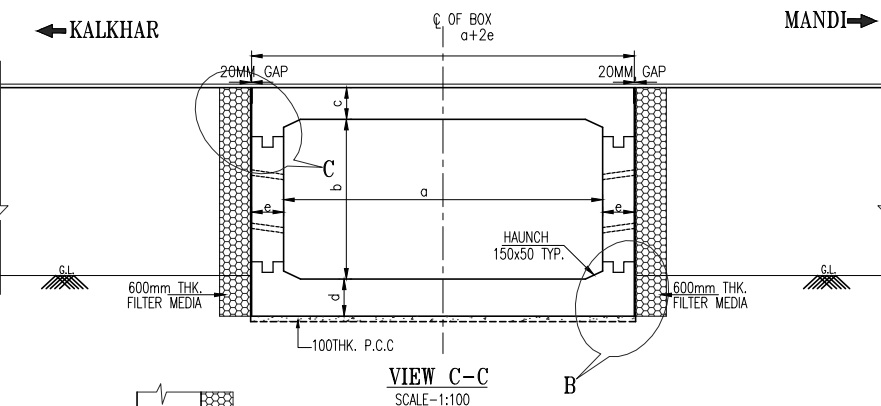
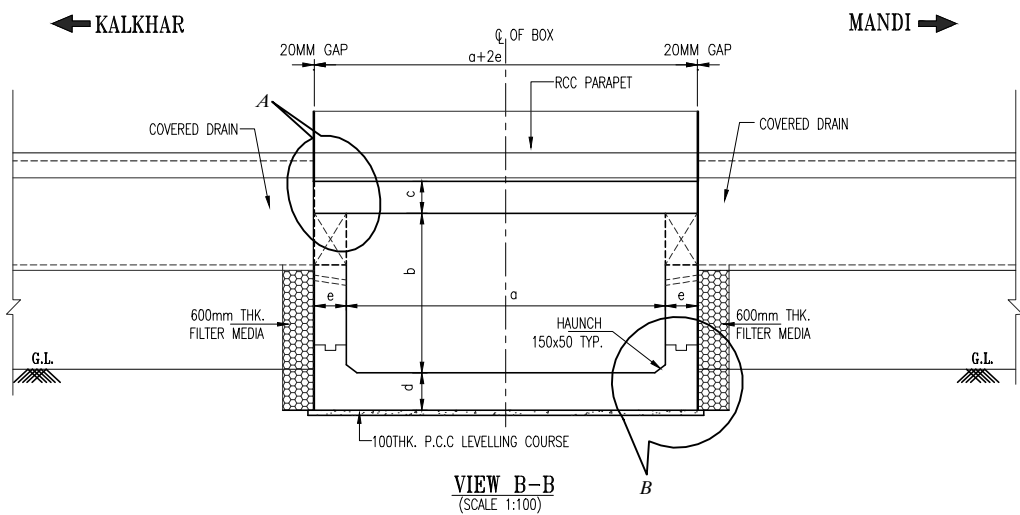
SIZE : A3

DRAWING NO : HP/STR/BC/TYP/101

Package-V:

Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

SHEET 01 OF 01



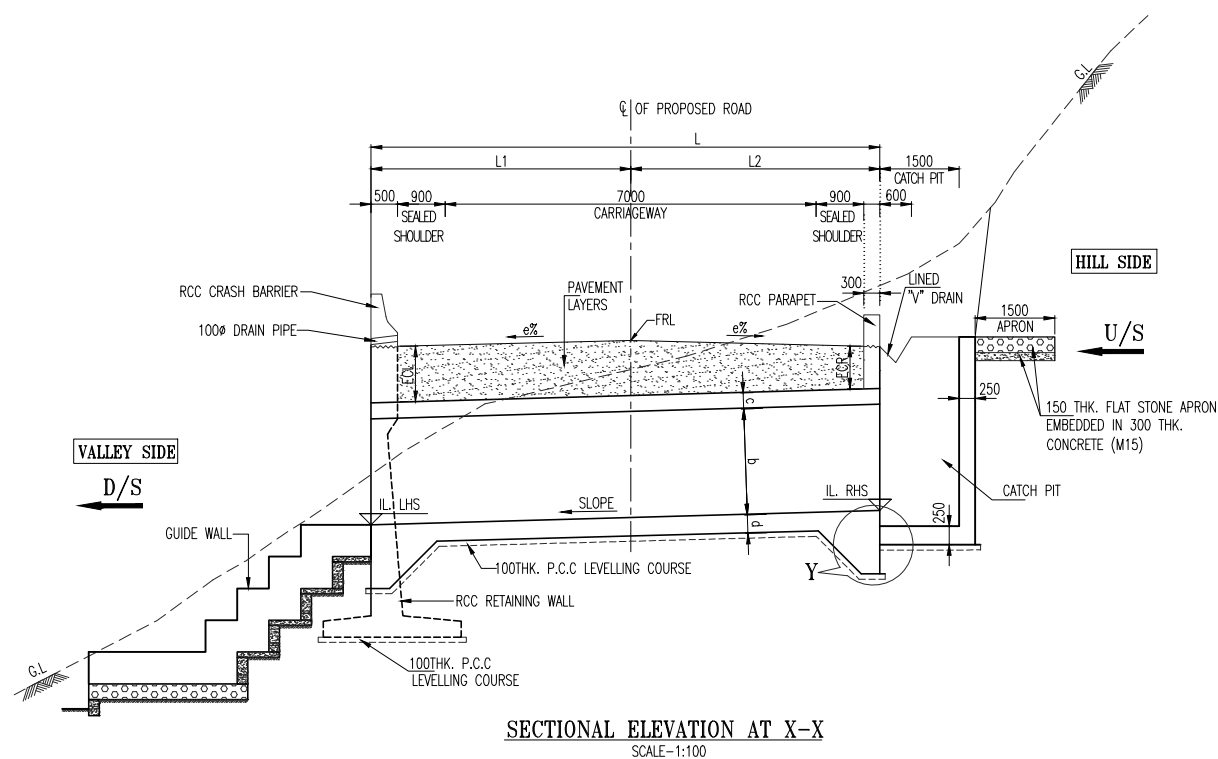
#### REFERENCE DRAWINGS:

1. REINFORCEMENT DETAILS OF BOX CULVERT - HP/MAN-KAL/STR/BC/TYP/201
2. MISCELLANEOUS DETAILS - HP/MAN-KAL/STR/MISC/601-606
3. RETAINING WALL DETAILS - HP/MAN-KAL/STR/MISC/608

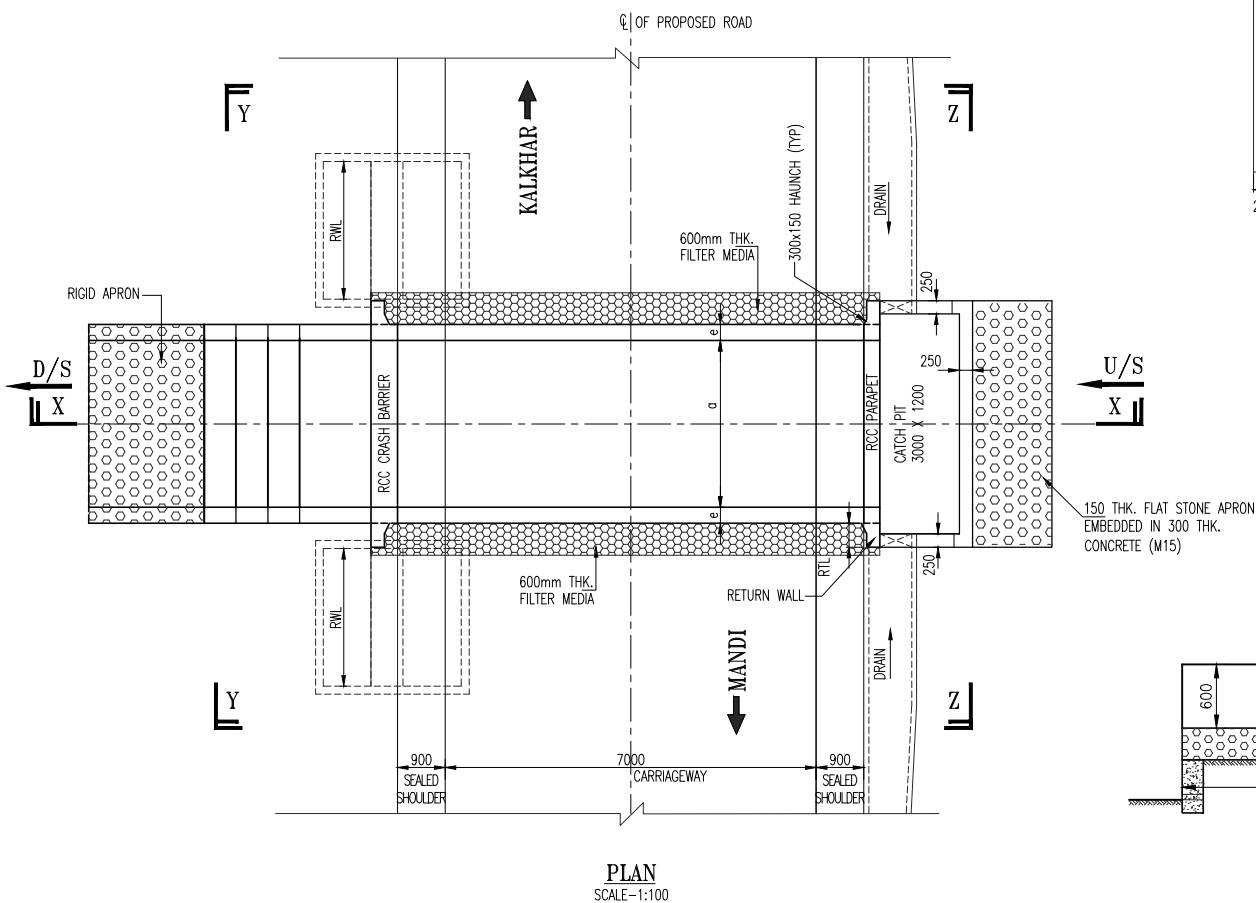
#### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE.
2. GRADE OF CONCRETE SHALL BE AS FOLLOWS.  
RC BOX - M30 RETAINING WALL - M30  
CURTAIN WALL, TOE WALL & LEVELING COURSE P.C.C - M15
3. CLEAR COVER FOR ANY REINFORCEMENT SHALL BE  
TOP SLAB - 40mm BOTTOM SLAB - 75mm  
SIDE WALL EARTH FACE - 75mm  
SIDE WALL OTHER FACE - 40mm
4. GRANULAR BACK FILL MATERIAL CONFORMING TO IRC:78-2014 SHALL BE USED.
5. DIMENSIONS & LEVELS MAY VARY AS PER SITE CONDITIONS.
6. GRADE OF STEEL - Fe-500D SHALL CONFORM TO IS1786.
7. ONLY WRITTEN DIMENSIONS ARE SHALL BE FOLLOWED, NO DIMENSION SHALL BE SCALED.
8. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY & STRUCTURAL DRAWINGS.
9. THE DIMENSIONS AND DETAILS ARE SUBJECTED TO MODIFICATION/ CORRECTION/ OMISSION DURING EXECUTION.
10. CHAMBERS & CHUTE ARRANGEMENT SHOWN IN THE DRAWINGS IS TYPICAL ONLY, THE CONSTRUCTION CONTRACTOR SHALL SUBMIT WORKING DRAWINGS BASED ON THE OGL'S ALONG THE CROSS SECTION OF THE CULVERT. THE REQUIREMENT OF CHAMBERS ON U/S & CHUTES ON D/S CAN BE DISPENSED WITH IF THE TERRAIN IS FLAT.
11. 'DK' IS DEPTH OF KEY AT BASE SLAB.  
FOR BASE SLAB THICKNESS VALUE OF "DK"  
UPTO 900MM. 1200MM.  
GREATER THAN 900MM D+300MM.  
D = BASE SLAB THICKNESS

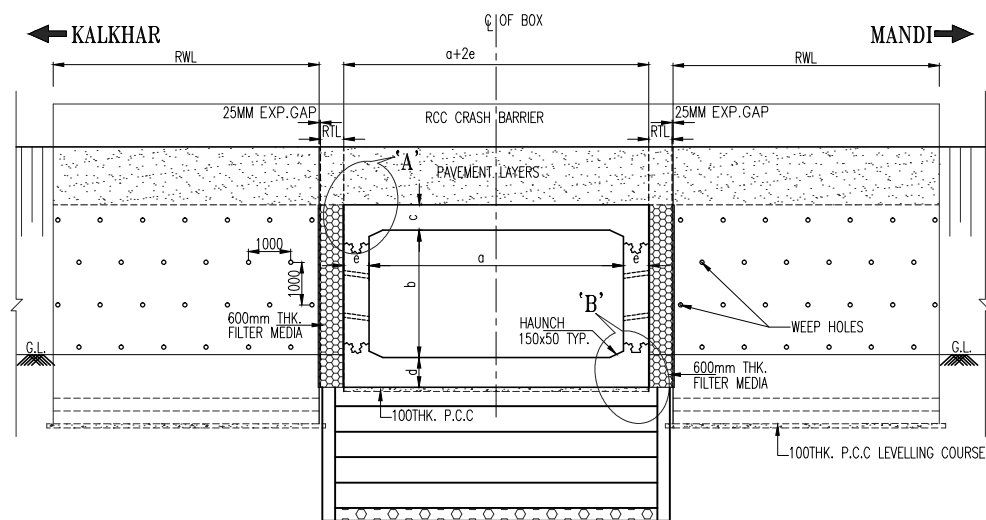
TENDER PURPOSE ONLY



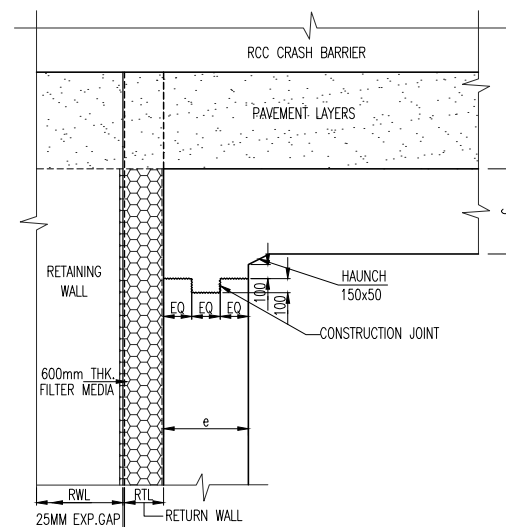
SECTIONAL ELEVATION AT X-X  
SCALE-1:100



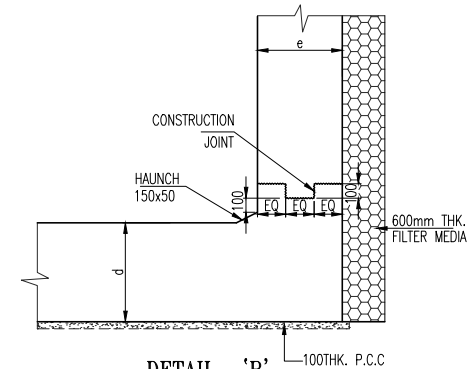
PLAN  
SCALE-1:100



VIEW Y-Y  
SCALE-1:125



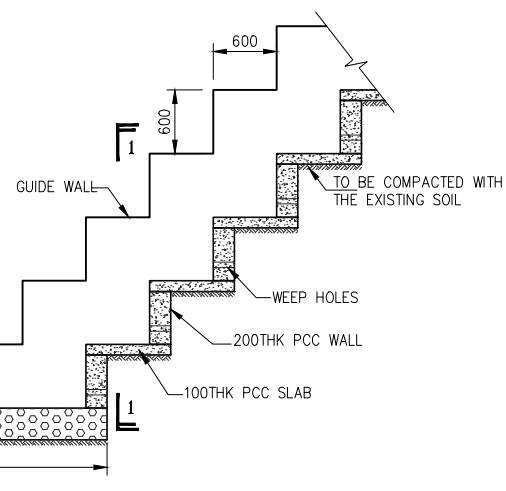
DETAIL - 'A'  
SCALE-1:75



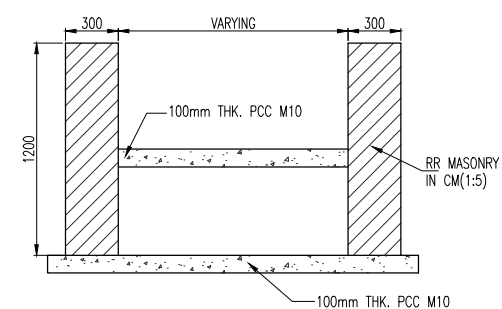
DETAIL - 'B'  
SCALE-1:75

#### LEGEND:

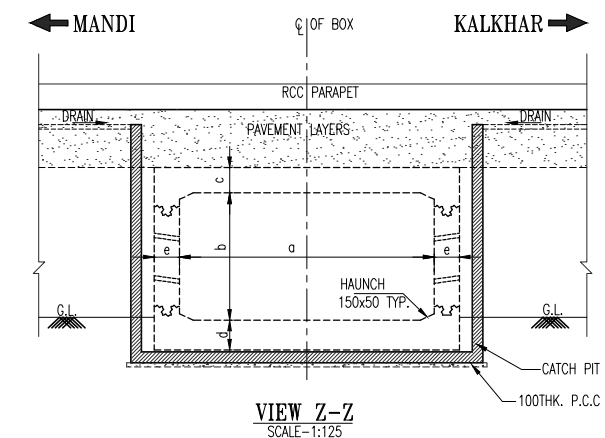
FRL : FINISHED ROAD LEVEL  
GL : GROUND LEVEL  
IL : INVERT LEVEL  
U/S : UP STREAM SIDE  
D/S : DOWN STREAM SIDE  
THK : THICKNESS  
RWL : RETAINING WALL  
RTL : RETURN WALL  
ECL : EARTH CUSHION LEFT  
ECR : EARTH CUSHION RIGHT



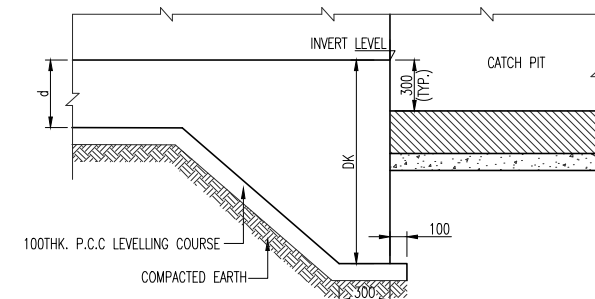
LONGITUDINAL SECTION OF CHUTE  
SCALE 1:50



CROSS SECTION AT 1-1  
SCALE-1:30



VIEW Z-Z  
SCALE-1:125



DETAIL - 'Y'  
SCALE-1:125

#### REFERENCE DRAWINGS:

1. REINFORCEMENT DETAILS OF BOX CULVERT - HP/MAN-KAL/STR/BC/TYP/201
2. MISCELLANEOUS DETAILS - HP/MAN-KAL/STR/MISC/601-606
3. RETAINING WALL DETAILS - HP/MAN-KAL/STR/MISC/608

#### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE.
2. GRADE OF CONCRETE SHALL BE AS FOLLOWS.  
RC BOX - M30 RETAINING WALL - M30  
CURTAIN WALL, TOE WALL & LEVELING COURSE P.C.C - M15
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11. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS  
UPTO 900MM.  
GREATER THAN 900MM  
D = BASE SLAB THICKNESS

VALUE OF "DK"  
1200MM.  
D+300MM.

#### TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE  
DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 TO 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION  
PROJECT (HPSRTP)

SCALE:

AS SHOWN

DATE

JOB No. : 01041055

|          |        |
|----------|--------|
| DESIGNED | GANESH |
| DRAWN    | SATYA  |
| CHECKED  | PRANAI |
| APPROVED | PRANAI |

ROAD NAME :

TITLE : **TYPICAL GENERAL ARRANGEMENT DRAWING  
FOR NEW/RECONSTRUCTION OF  
SINGLE CELL BOX CULVERT FOR TCS-3(F)**

REV. 0

SIZE : A3

DRAWING NO : HP/STR/BC/TYP/102

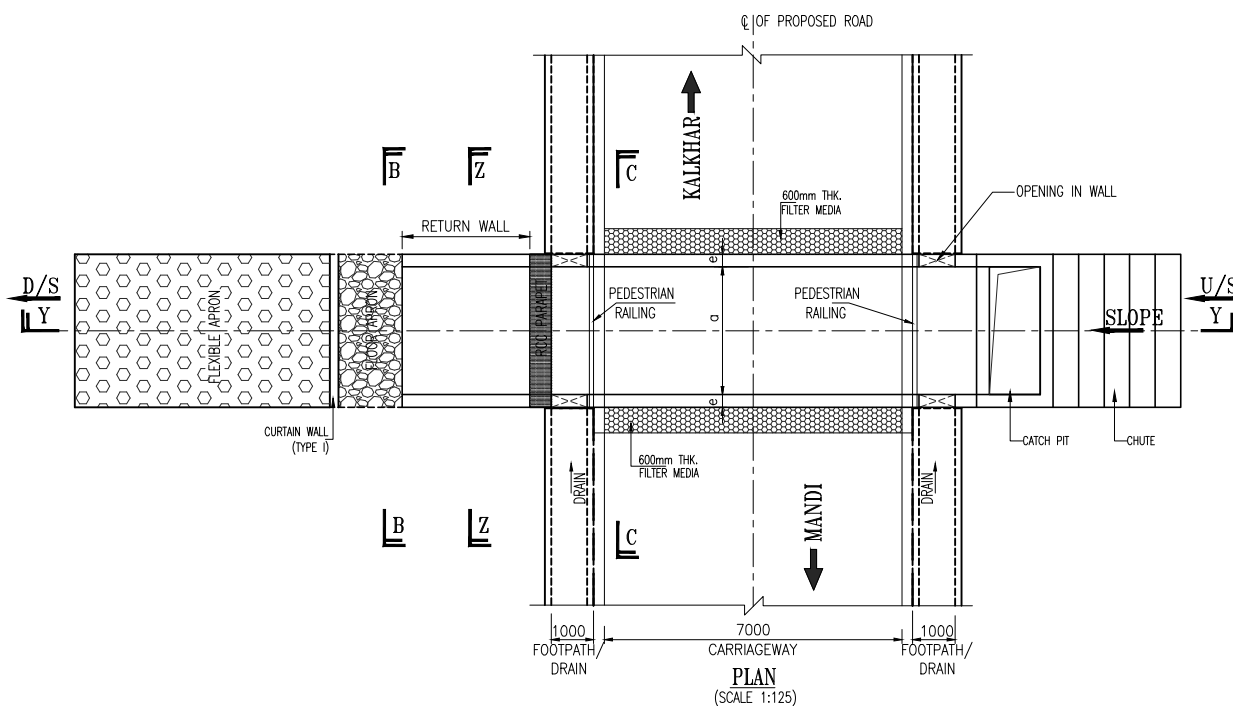
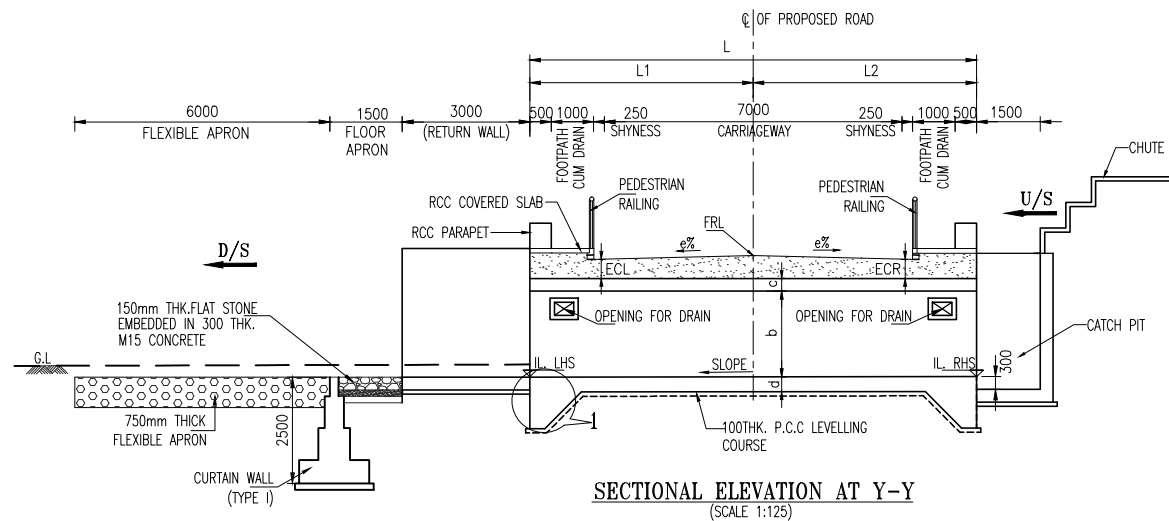
Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in  
Mandi District From Km 0+000 To Km 11+000

SHEET 01 OF 02

| S.No | Existing<br>Chainge | Design<br>Chainge | Design FRL<br>@ PCL | Camber<br>e%<br>(LHS) | Camber<br>e%<br>(RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Proposed Structure Details |                |                          |                            | Cushion<br>(m)<br>(LHS)<br>(ECL) | Cushion<br>(m)<br>(RHS)<br>(ECR) | Lengths of Box (m)         |      |      | Dimensions of Box (m) |                 |                     | Return<br>Wall<br>Length<br>(LHS)<br>(RTL) | Retaining<br>Wall<br>Length<br>(LHS)<br>(RWL) | Return<br>Wall<br>Length<br>(RHS)<br>(RTL) | Retaining<br>Wall<br>Length<br>(RHS)<br>(RWL) | Skew<br>Angle (°) | TCS Type | Improvement<br>Proposal |
|------|---------------------|-------------------|---------------------|-----------------------|-----------------------|-------------------|---------------|---------------|----------------------------|----------------|--------------------------|----------------------------|----------------------------------|----------------------------------|----------------------------|------|------|-----------------------|-----------------|---------------------|--------------------------------------------|-----------------------------------------------|--------------------------------------------|-----------------------------------------------|-------------------|----------|-------------------------|
|      |                     |                   |                     |                       |                       |                   |               |               | Type of<br>Structure       | No of<br>Spans | Clear<br>Span<br>(m) (a) | Clear<br>Height<br>(m) (b) |                                  |                                  | Lengths<br>of Box<br>(m) L | L1   | L2   | Top<br>Slab<br>(c)    | Wall Ex<br>( e) | Base<br>Slab<br>(d) |                                            |                                               |                                            |                                               |                   |          |                         |
| 1    | 9+340               | 9+003             | 893.057             | -5.7                  | 5.7                   | R-L               | 888.760       | 889.100       | Box                        | 1              | 2.05                     | 2.5                        | 1.208                            | 1.393                            | 11.00                      | 6.75 | 4.24 | 0.30                  | 0.30            | 0.35                | -                                          | 5.80                                          | 0.55                                       | -                                             | 12 (Right)        | TCS-3F   | Reconstruction          |
| 2    | 9+470               | 9+085             | 897.460             | -6.9                  | 6.9                   | R-L               | 893.570       | 893.900       | Box                        | 1              | 2.00                     | 2.5                        | 0.764                            | 1.044                            | 10.70                      | 6.55 | 4.15 | 0.30                  | 0.30            | 0.35                | -                                          | 5.10                                          | 0.55                                       | -                                             | 0°                | TCS-3F   | Reconstruction          |

TENDER PURPOSE ONLY

|                                                                       |      |             |  |  |          |          |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |          |        |                    |                                |                                                                                                                             |                                                                                                                  |  |  |        |
|-----------------------------------------------------------------------|------|-------------|--|--|----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|----------|----------|--------|--------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|--|--------|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |  |  |          |          | CLIENT:                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                            | CONSULTANT:                                                     |                    | PROJECT: |          |        | JOB No. : 01041055 |                                |                                                                                                                             | TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING<br>FOR NEW/RECONSTRUCTION OF<br>SINGLE CELL BOX CULVERT FOR TCS-3(F) |  |  | REV. 0 |
|                                                                       |      |             |  |  |          |          | <br>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br>DEVELOPMENT CORPORATION LIMITED. | <br>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,<br>Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in | HIMACHAL PRADESH STATE ROADS TRANSFORMATION<br>PROJECT (HPSRTP) | SCALE:<br>AS SHOWN | DATE     | DESIGNED | GANESH |                    | DRAWING NO : HP/STR/BC/TYP/102 | ROAD NAME :<br>Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 | SHEET 02 OF 02                                                                                                   |  |  |        |
|                                                                       |      |             |  |  |          | DRAWN    |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    | SATYA    |          |        |                    |                                |                                                                                                                             |                                                                                                                  |  |  |        |
|                                                                       |      |             |  |  |          | CHECKED  |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    | PRANAI   |          |        |                    |                                |                                                                                                                             |                                                                                                                  |  |  |        |
|                                                                       |      |             |  |  |          | APPROVED |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    | PRANAI   |          |        |                    |                                |                                                                                                                             |                                                                                                                  |  |  |        |
| REV                                                                   | DATE | DESCRIPTION |  |  | DESIGNED | DRAWN    | CHECKED                                                                                                                                                                   | APPROVED                                                                                                                                                                                                                                                                                                                                                   |                                                                 |                    |          |          |        |                    |                                |                                                                                                                             |                                                                                                                  |  |  |        |

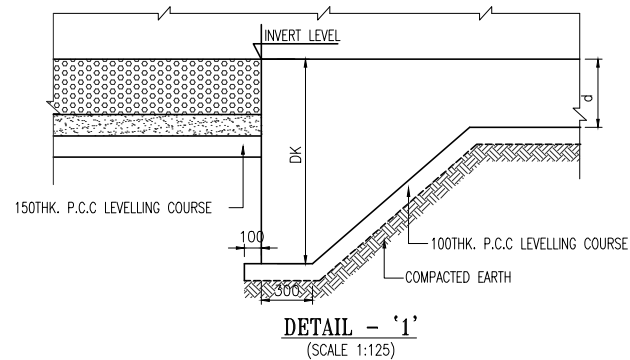
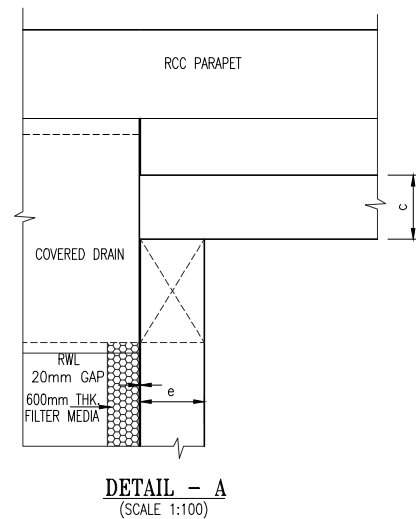
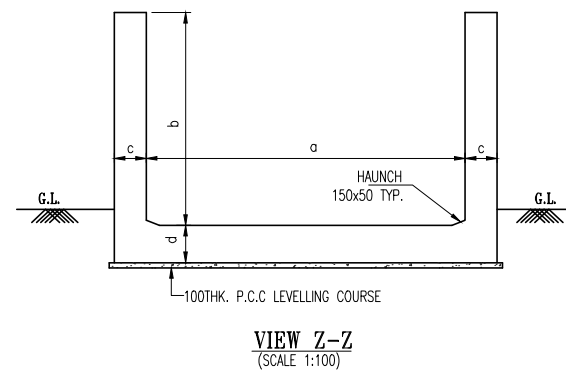
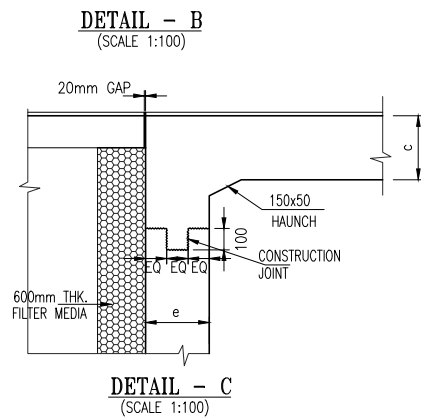
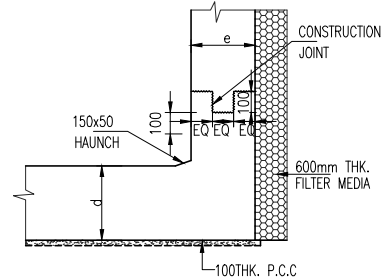
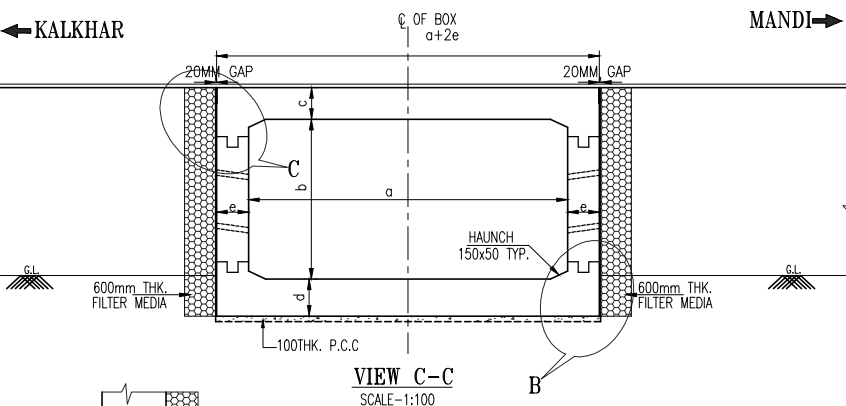
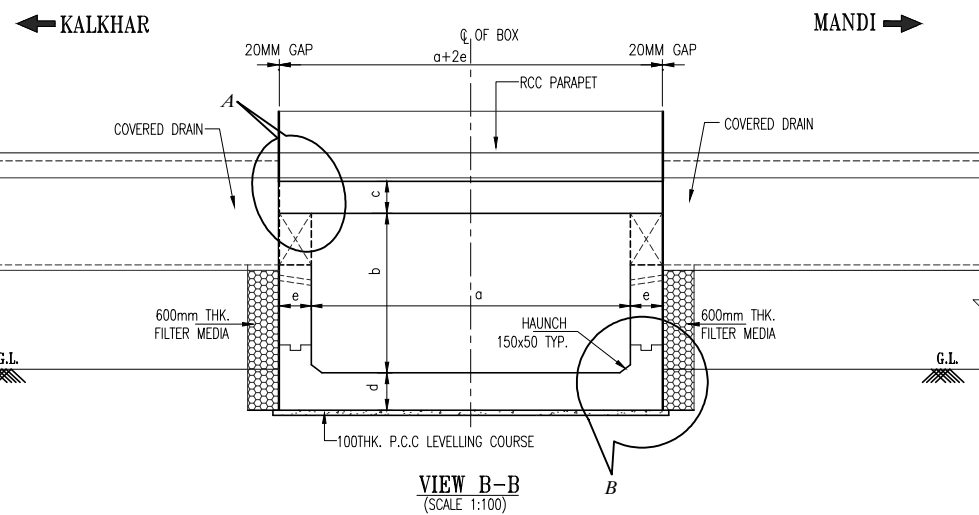


#### U-SHAPE RETAINING WALL

| S.No | Existing Chainge | Design Chainge | Design FRL @ PCL | Flow direction | Height Of U Shape Return Wall | Length Of U Shape Return Wall | Dimensions of U Shape Return Wall |          |               |
|------|------------------|----------------|------------------|----------------|-------------------------------|-------------------------------|-----------------------------------|----------|---------------|
|      |                  |                |                  |                | D/S (b)                       |                               | Clear Span (a)                    | Wall (c) | Base Slab (d) |
| 1    | New              | 2+850          | 912.721          | R-L            | 2.23                          | 3.00                          | 2.0                               | 0.25     | 0.30          |
| 2    | 3+090            | 3+088          | 923.238          | R-L            | 2.11                          | 3.00                          | 2.0                               | 0.25     | 0.30          |

#### BOX CULVERT

| S.No | Existing<br>Change | Design<br>Change | Design FRL<br>@ PCL | Camber<br>e% (LHS) | Camber<br>e% (RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Proposed Structure Details |                |                          |                            | Cushion<br>(m)<br>(LHS)<br>(ECL) | Cushion<br>(m)<br>(RHS)<br>(ECR) | Lengths of Box (m)         |      |      | Dimensions of Box (m) |                |                     | Return<br>Wall<br>Length<br>(LHS)<br>(RTL) | Return<br>Wall<br>Length<br>(RHS)<br>(RTL) | SBC<br>T/m2 | Skew Angle<br>(°) | TCS<br>Type | Improvement<br>Proposal |
|------|--------------------|------------------|---------------------|--------------------|--------------------|-------------------|---------------|---------------|----------------------------|----------------|--------------------------|----------------------------|----------------------------------|----------------------------------|----------------------------|------|------|-----------------------|----------------|---------------------|--------------------------------------------|--------------------------------------------|-------------|-------------------|-------------|-------------------------|
|      |                    |                  |                     |                    |                    |                   |               |               | Type of<br>Structure       | No of<br>Spans | Clear<br>Span<br>(m) (a) | Clear<br>Height<br>(m) (b) |                                  |                                  | Lengths<br>of Box<br>(m) L | L1   | L2   | Top Slab<br>(c)       | Wall Ex<br>(e) | Base<br>Slab<br>(d) |                                            |                                            |             |                   |             |                         |
| 1    | New                | 2+850            | 912.721             | -2.50              | -2.50              | R-L               | 910.489       | 910.500       | Box                        | 1              | 2                        | 1.5                        | 0.351                            | 0.340                            | 10.50                      | 5.25 | 5.25 | 0.25                  | 0.25           | 0.30                | -                                          | -                                          | 17          | 0°                | TCS4        | New Construction        |
| 2    | 3+090              | 3+088            | 923.238             | -5.00              | 5.00               | R-L               | 921.124       | 921.135       | Box                        | 1              | 2                        | 1.5                        | 0.102                            | 0.615                            | 12.30                      | 7.05 | 5.25 | 0.25                  | 0.25           | 0.30                | -                                          | -                                          | 15          | 0°                | TCS4        | Reconstruction          |



#### REFERENCE DRAWINGS:

- REINFORCEMENT DETAILS OF BOX CULVERT - HP/MAN-KAL/STR/BC/TYP/201
- MISCELLANEOUS DETAILS - HP/MAN-KAL/STR/MISC/601-606
- RETAINING WALL DETAILS - HP/MAN-KAL/STR/MISC/608

#### NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE.
- GRADE OF CONCRETE SHALL BE AS FOLLOWS.  
RC BOX - M30 RETAINING WALL - M30  
CURTAIN WALL, TOE WALL & LEVELING COURSE P.C.C - M15
- CLEAR COVER FOR ANY REINFORCEMENT SHALL BE  
TOP SLAB - 40mm BOTTOM SLAB - 75mm  
SIDE WALL EARTH FACE - 75mm  
SIDE WALL OTHER FACE - 40mm
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- 'DK' IS DEPTH OF KEY AT BASE SALB.  
FOR BASE SALB THICKNESS VALUE OF "DK"  
UPTO 900MM. 1200MM.  
GREATER THAN 900MM D+300MM.  
D = BASE SLAB THICKNESS

#### TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |

**CLIENT:**  
  
HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

**CONSULTANT:**  
  
SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in

**PROJECT:**  
HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)

SCALE: AS SHOWN

DATE

JOB No. : 01041055

DESIGNED: GANESH  
DRAWN: SATYA  
CHECKED: PRANAI  
APPROVED: PRANAI

TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING FOR NEW/RECONSTRUCTION OF SINGLE CELL BOX CULVERT FOR TCS-4

REV. 0

SIZE : A3

DRAWING NO : HP/STR/BC/TYP/103

ROAD NAME :

Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000

SHEET 01 OF 01



| S.No | Existing Chainge | Design Chainge | Design FRL @ PCL | Camber e% (LHS) | Camber e% (RHS) | Flow direction | IL LHS (m) | IL RHS (m) | Proposed Structure Details |             |                    |                      | Cushion (m) (LHS) (ECL) | Cushion (m) (RHS) (ECR) | Lengths of Box (m)   |      |      | Dimensions of Box (m) |             |               | Return Wall Length (LHS) (RTL) | Retaining Wall Length (LHS) (RWL) | Return Wall Length (RHS) (RTL) | Retaining Wall Length (RHS) (RWL) | Skew Angle (°) | TCS Type | Improvement Proposal |
|------|------------------|----------------|------------------|-----------------|-----------------|----------------|------------|------------|----------------------------|-------------|--------------------|----------------------|-------------------------|-------------------------|----------------------|------|------|-----------------------|-------------|---------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|----------------|----------|----------------------|
|      |                  |                |                  |                 |                 |                |            |            | Type of Structure          | No of Spans | Clear Span (m) (a) | Clear Height (m) (b) |                         |                         | Lengths of Box (m) L | L1   | L2   | Top Slab (c)          | Wall Ex (e) | Base Slab (d) |                                |                                   |                                |                                   |                |          |                      |
| 1    | 2+250            | 2+240          | 875.663          | -2.5            | -2.5            | R-L            | 873.589    | 873.600    | Box                        | 1           | 2                  | 1.5                  | 0.201                   | 0.191                   | 10.00                | 5.10 | 4.90 | 0.25                  | 0.25        | 0.30          | -                              | 2.70                              | 0.55                           | -                                 | 0°             | TCS 5C   | Reconstruction       |
| 2    | 4+000            | 3+983          | 965.180          | -3.5            | 3.0             | R-L            | 961.140    | 961.500    | Box                        | 1           | 2                  | 2.5                  | 1.117                   | 1.078                   | 10.80                | 5.90 | 4.90 | 0.25                  | 0.25        | 0.30          | -                              | 5.60                              | 0.55                           | -                                 | 0°             | TCS 5F   | Reconstruction       |

TENDER PURPOSE ONLY

|                                                                       |      |             |  |  |          |       |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |
|-----------------------------------------------------------------------|------|-------------|--|--|----------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|----------|--------------------|----------------|--------------------|--------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------|--------|--|----------------|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |  |  |          |       | CLIENT:                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                            | CONSULTANT:                                                     |                    | PROJECT: |                    |                | JOB No. : 01041055 |                    |                                | TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING<br>FOR NEW/RECONSTRUCTION OF<br>SINGLE CELL BOX CULVERT FOR TCS-3(C,F) |  |                                                                                                              | REV. 0 |  |                |
|                                                                       |      |             |  |  |          |       | <br>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br>DEVELOPMENT CORPORATION LIMITED. | <br>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,<br>Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in | HIMACHAL PRADESH STATE ROADS TRANSFORMATION<br>PROJECT (HPSRTP) | SCALE:<br>AS SHOWN | DATE     | DESIGNED<br>GANESH | DRAWN<br>SATYA | CHECKED<br>PRANAI  | APPROVED<br>PRANAI | DRAWING NO : HP/STR/BC/TYP/104 |                                                                                                                    |  | Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 |        |  | SHEET 02 OF 02 |
|                                                                       |      |             |  |  |          |       |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |
|                                                                       |      |             |  |  |          |       |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |
|                                                                       |      |             |  |  |          |       |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |
|                                                                       |      |             |  |  |          |       |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |
| REV                                                                   | DATE | DESCRIPTION |  |  | DESIGNED | DRAWN | CHECKED                                                                                                                                                                   | APPROVED                                                                                                                                                                                                                                                                                                                                                   |                                                                 |                    |          |                    |                |                    |                    |                                |                                                                                                                    |  |                                                                                                              |        |  |                |

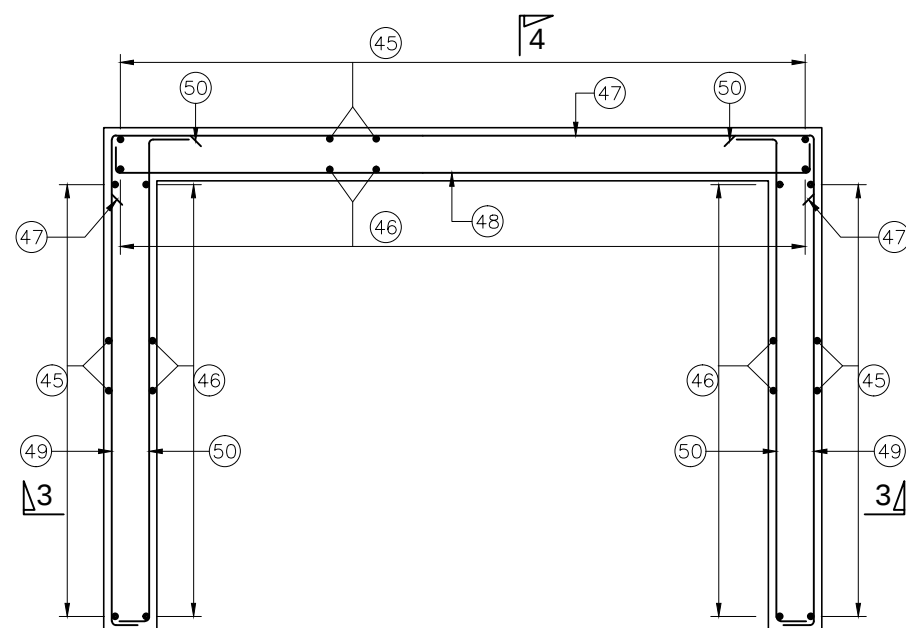


| S.No | Existing<br>Chainge | Design<br>Chainge | Design FRL<br>@ PCL | Camber<br>e%<br>(LHS) | Camber<br>e%<br>(RHS) | Flow<br>direction | IL LHS<br>(m) | IL RHS<br>(m) | Proposed Structure Details |                |                          |                            | Cushion(m)<br>(LHS) (ECL) | Cushion(m)<br>(RHS) (ECR) | Lengths of Box (m)         |      |      | Dimensions of Box (m) |                |                     | Return<br>Wall<br>Length<br>(LHS)<br>(RTL) | Retaining<br>Wall<br>Length<br>(LHS)<br>(RWL) | Return<br>Wall<br>Length<br>(RHS)<br>(RTL) | Retaining<br>Wall<br>Length<br>(RHS)<br>(RWL) | Skew<br>Angle (°) | TCS Type | Improvement<br>Proposal |
|------|---------------------|-------------------|---------------------|-----------------------|-----------------------|-------------------|---------------|---------------|----------------------------|----------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|------|------|-----------------------|----------------|---------------------|--------------------------------------------|-----------------------------------------------|--------------------------------------------|-----------------------------------------------|-------------------|----------|-------------------------|
|      |                     |                   |                     |                       |                       |                   |               |               | Type of<br>Structure       | No of<br>Spans | Clear<br>Span<br>(m) (a) | Clear<br>Height<br>(m) (b) |                           |                           | Lengths<br>of Box<br>(m) L | L1   | L2   | Top<br>Slab<br>(c)    | Wall Ex<br>(e) | Base<br>Slab<br>(d) |                                            |                                               |                                            |                                               |                   |          |                         |
| 1    | New                 | 2+526             | 897.888             | -3.8                  | 1.8                   | R-L               | 895.789       | 895.800       | Box                        | 1              | 2                        | 1.5                        | 0.162                     | 0.425                     | 13.80                      | 8.90 | 4.90 | 0.25                  | 0.25           | 0.30                | -                                          | 2.70                                          | 0.55                                       | -                                             | 0°                | TCS 5A   | New Construction        |
| 2    | 2+820               | 2+814             | 912.546             | -7.0                  | 7.0                   | R-L               | 910.389       | 910.400       | Box                        | 1              | 2                        | 1.5                        | 0.064                     | 0.739                     | 14.60                      | 9.70 | 4.90 | 0.25                  | 0.25           | 0.30                | -                                          | 2.50                                          | 0.55                                       | -                                             | 0°                | TCS 5D   | Reconstruction          |
| 3    | 3+720               | 3+705             | 951.386             | -7.0                  | 7.0                   | R-L               | 948.640       | 949.000       | Box                        | 1              | 2                        | 1.5                        | 0.653                     | 0.978                     | 14.60                      | 9.70 | 4.90 | 0.25                  | 0.25           | 0.30                | -                                          | 3.40                                          | 0.55                                       | -                                             | 0°                | TCS 5D   | Reconstruction          |

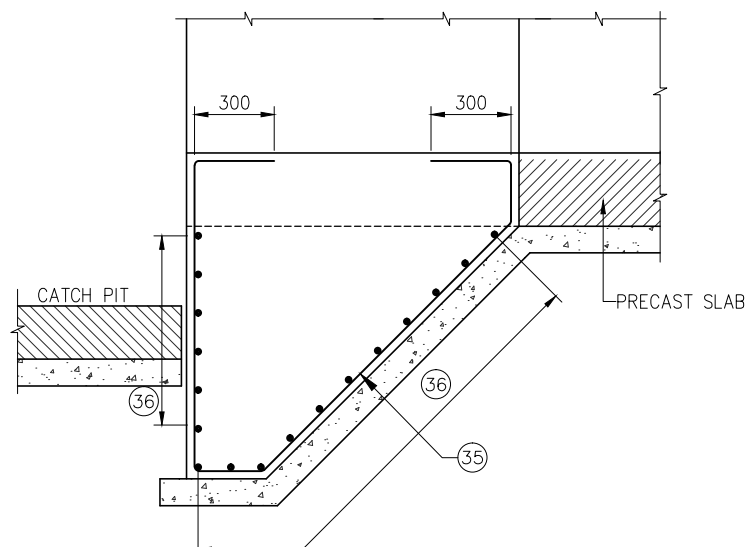
TENDER PURPOSE ONLY

|                                                                       |      |  |             |          |       |         |          |  |  |                                                                                     |  |                                                                                                                                                                                                                          |                    |                                                                 |                                                                                                                             |                    |  |                                                                                                                      |                                |        |
|-----------------------------------------------------------------------|------|--|-------------|----------|-------|---------|----------|--|--|-------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------|--|----------------------------------------------------------------------------------------------------------------------|--------------------------------|--------|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |  |             |          |       |         |          |  |  | CLIENT:                                                                             |  | CONSULTANT:                                                                                                                                                                                                              |                    | PROJECT:                                                        |                                                                                                                             | JOB No. : 01041055 |  | TITLE : TYPICAL GENERAL ARRANGEMENT DRAWING<br>FOR NEW/RECONSTRUCTION OF<br>SINGLE CELL BOX CULVERT FOR TCS-3(A,B,E) |                                | REV: 0 |
|                                                                       |      |  |             |          |       |         |          |  |  |  |  |                                                                                                                                     |                    | HIMACHAL PRADESH STATE ROADS TRANSFORMATION<br>PROJECT (HPSRTP) | DESIGNED                                                                                                                    | GANESH             |  |                                                                                                                      | SIZE : A3                      |        |
|                                                                       |      |  |             |          |       |         |          |  |  | HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br>DEVELOPMENT CORPORATION LIMITED.  |  | SATRA SERVICES AND SOLUTIONS PVT.LTD.                                                                                                                                                                                    |                    |                                                                 | DRAWN                                                                                                                       | SATYA              |  |                                                                                                                      |                                |        |
|                                                                       |      |  |             |          |       |         |          |  |  |                                                                                     |  | #1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,<br>Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in |                    |                                                                 | CHECKED                                                                                                                     | PRANAI             |  |                                                                                                                      |                                |        |
|                                                                       |      |  |             |          |       |         |          |  |  |                                                                                     |  |                                                                                                                                                                                                                          |                    |                                                                 | APPROVED                                                                                                                    | PRANAI             |  |                                                                                                                      | DRAWING NO : HP/STR/BC/TYP/105 |        |
|                                                                       |      |  |             |          |       |         |          |  |  |                                                                                     |  |                                                                                                                                                                                                                          |                    |                                                                 | ROAD NAME :<br>Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 |                    |  |                                                                                                                      | SHEET 02 OF 02                 |        |
| REV                                                                   | DATE |  | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |  |  |                                                                                     |  |                                                                                                                                                                                                                          | SCALE:<br>AS SHOWN |                                                                 | DATE                                                                                                                        |                    |  |                                                                                                                      |                                |        |

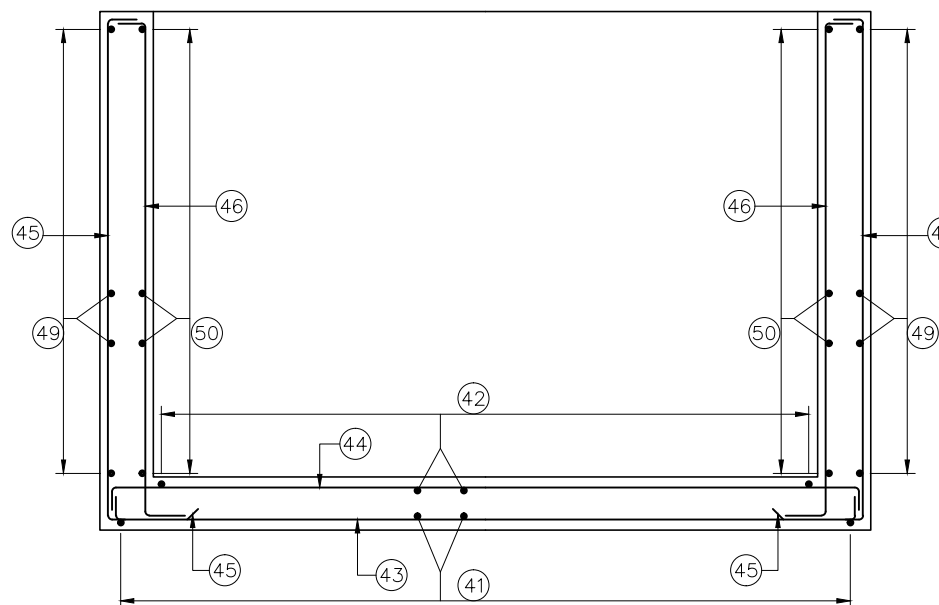




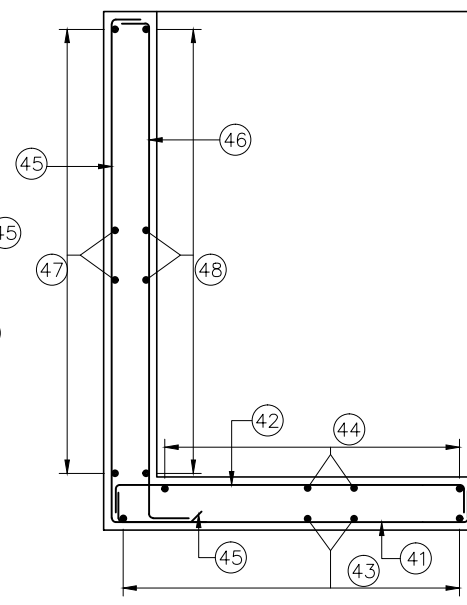
**SECTION DETAILS OF CATCH PIT**  
SCALE 1:20



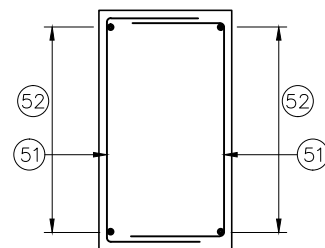
**DETAILS OF SHEAR KEY**  
SCALE 1:20



**SECTION 3-3**  
SCALE 1:20



**SECTION 4-4**  
SCALE 1:20



**PCC PARAPET**  
SCALE 1:20

**\*\* FOR REINFORCEMENT DETAILS REFER BAR BENDING SCHEDULE OF CATCH PIT**

### BAR BENDING SCHEDULE

| 1x2x1.5-UPTO 0.5m FILL (BOX-1) |           |               |
|--------------------------------|-----------|---------------|
| BAR NO                         | BAR SHAPE | REINFORCEMENT |
| 01                             | 150       | Ø12@200c/c    |
| 02                             | 125       | Ø12@200c/c    |
| 02A                            |           | Ø12@200c/c    |
| 03                             | 125       | Ø10@200c/c    |
| 04                             | 200       | Ø10@200c/c    |
| 05                             | 125       | Ø12@200c/c    |
| 06                             | 150       | Ø12@200c/c    |
| 07                             | 125       | Ø12@200c/c    |
| 07A                            |           | Ø12@200c/c    |
| 08                             | 125       | Ø10@200c/c    |
| 09                             | 125       | Ø10@200c/c    |
| 10                             | 500       | Ø12@200c/c    |
| 11                             | 125       | Ø10@200c/c    |
| 12                             | 125       | Ø10@200c/c    |
| 13                             | 125       | Ø10@200c/c    |
| 14                             | 125       | Ø10@200c/c    |
| 15                             | 125       | Ø10@200c/c    |
| 16                             | 125       | Ø10@200c/c    |
| 17                             |           | Ø10-2L@150c/c |
| 18                             |           | NOT USED      |
| 19                             |           | NOT USED      |

### BAR BENDING SCHEDULE

| 1x2x1.5-UPTO 0.5m FILL (BOX-2) |           |               |
|--------------------------------|-----------|---------------|
| BAR NO                         | BAR SHAPE | REINFORCEMENT |
| 21                             | 150       | Ø12@200c/c    |
| 22                             | 125       | Ø12@200c/c    |
| 22A                            |           | Ø12@200c/c    |
| 23                             | 125       | Ø10@200c/c    |
| 24                             | 200       | Ø10@200c/c    |
| 25                             | 125       | Ø12@200c/c    |
| 26                             | 600       | Ø12@200c/c    |
| 27                             | 125       | Ø12@200c/c    |
| 27A                            |           | Ø12@200c/c    |
| 28                             | 125       | Ø10@200c/c    |
| 29                             | 125       | Ø10@200c/c    |
| 30                             | 500       | Ø12@200c/c    |
| SHEAR KEY                      |           |               |
| 35                             | 300       | Ø10@250c/c    |
| 36                             | 125       | Ø8@200c/c     |

**TENDER PURPOSE ONLY**

|                                                                                                                              |  |  |  |  |  |  |                                                                                                                                                                                                              |  |                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                             |  |                                                                                                                                          |  |                                                                                                                         |  |                                        |  |
|------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------|--|
| <div>NOTES:</div> <div>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div>                                     |  |  |  |  |  |  | <div>CLIENT:</div> <div></div> <div>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |  | <div>CONSULTANT:</div> <div></div> <div>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br/>E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> |  | <div>JOB No. : 01041055</div> <div><div>DESIGNEDGANESH</div><div>DRAWNSATYA</div><div>CHECKEDPRANAI</div><div>APPROVEDPRANAI</div></div> |  | <div>TITLE : TYPICAL REINFORCEMENT DETAILS FOR SINGLE CELL BOX CULVERTS</div> <div>DRAWING NO : HP/STR/BC/TYP/201</div> |  | <div>REV. 0</div> <div>SIZE : A3</div> |  |
| <div>Package-V:</div> <div>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div> |  |  |  |  |  |  | <div>SHEET 02 OF 05</div>                                                                                                                                                                                    |  |                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                             |  |                                                                                                                                          |  |                                                                                                                         |  |                                        |  |

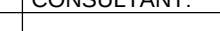
| BAR BENDING SCHEDULE              |           |                   |
|-----------------------------------|-----------|-------------------|
| 1x2x1.5–0.5m TO 1.2m FILL (BOX–1) |           |                   |
| BAR NO                            | BAR SHAPE | REINFORCEMENT     |
| ①                                 | 150       | ϕ12@200c/c        |
| ②                                 | 125       | ϕ12@200c/c        |
| ②A                                |           | ϕ12@200c/c        |
| ③                                 | 125       | ϕ10@150 c/c       |
| ④                                 | 200       | ϕ10@200c/c        |
| ⑤                                 | 125       | ϕ12@200c/c        |
| ⑥                                 | 150       | ϕ12@200c/c        |
| ⑦                                 | 125       | ϕ12@200c/c        |
| ⑦A                                |           | ϕ12@200c/c        |
| ⑧                                 | 125       | ϕ10@150 c/c       |
| ⑨                                 | 125       | ϕ10@150 c/c       |
| ⑩                                 | 500       | ϕ12@200c/c        |
| ⑪                                 | 125       | ϕ10@150 c/c       |
| ⑫                                 | 125       | ϕ10@150 c/c       |
| ⑬                                 | 125       | ϕ10@250c/c        |
| ⑭                                 | 125       | ϕ 8 @150 c/c      |
| ⑮                                 | 125       | ϕ10@250c/c        |
| ⑯                                 | 125       | ϕ 8 @200c/c       |
| ⑰                                 |           | ϕ8 –2L@100c/c     |
| ⑱                                 |           | NOT USED          |
| ⑲                                 |           | ϕ10 LINKS @250c/c |

| BAR BENDING SCHEDULE              |           |               |
|-----------------------------------|-----------|---------------|
| 1x2x1.5–0.5M TO 1.2M FILL (BOX–2) |           |               |
| BAR NO                            | BAR SHAPE | REINFORCEMENT |
| ②①                                | 150       | ϕ12@200c/c    |
| ②②                                | 125       | ϕ12@200c/c    |
| ②②A                               |           | ϕ12@200c/c    |
| ②③                                | 125       | ϕ10@150 c/c   |
| ②④                                | 200       | ϕ10@200c/c    |
| ②⑤                                | 125       | ϕ12@200c/c    |
| ②⑥                                | 600       | ϕ12@200c/c    |
| ②⑦                                | 125       | ϕ12@200c/c    |
| ②⑦A                               |           | ϕ12@200c/c    |
| ②⑧                                | 125       | ϕ10@150 c/c   |
| ②⑨                                | 125       | ϕ10@150 c/c   |
| ③⑩                                | 500       | ϕ12@200c/c    |
| SHEAR KEY                         |           |               |
| ③⑤                                | 300 300   | ϕ10@250c/c    |
| ③⑥                                | 125       | ϕ 8 @200c/c   |

| BAR BENDING SCHEDULE         |           |                      |
|------------------------------|-----------|----------------------|
| 1x2x2–UPTO 0.5m FILL (BOX–1) |           |                      |
| BAR NO                       | BAR SHAPE | REINFORCEMENT        |
| ①                            | 150       | ϕ12@200c/c           |
| ②                            | 125       | ϕ12@200c/c           |
| ②A                           |           | ϕ12@200c/c           |
| ③                            | 125       | ϕ10@200c/c           |
| ④                            | 200       | ϕ10@200c/c           |
| ⑤                            | 125       | ϕ12@200c/c           |
| ⑥                            | 150       | ϕ12@200c/c           |
| ⑦                            | 125       | ϕ12@200c/c           |
| ⑦A                           |           | ϕ12@200c/c           |
| ⑧                            | 125       | ϕ10@200c/c           |
| ⑨                            | 125       | ϕ10@200c/c           |
| ⑩                            | 500       | ϕ12@200c/c           |
| ⑪                            | 125       | ϕ10@200c/c           |
| ⑫                            | 125       | ϕ10@200c/c           |
| ⑬                            | 125       | ϕ10@200c/c           |
| ⑭                            | 125       | ϕ10@200c/c           |
| ⑮                            | 125       | ϕ10@200c/c           |
| ⑯                            | 125       | ϕ10@200c/c           |
| ⑰                            |           | ϕ10–2L@200c/c IN L–L |
| ⑱                            |           | NOT USED             |
| ⑲                            |           | NOT USED             |

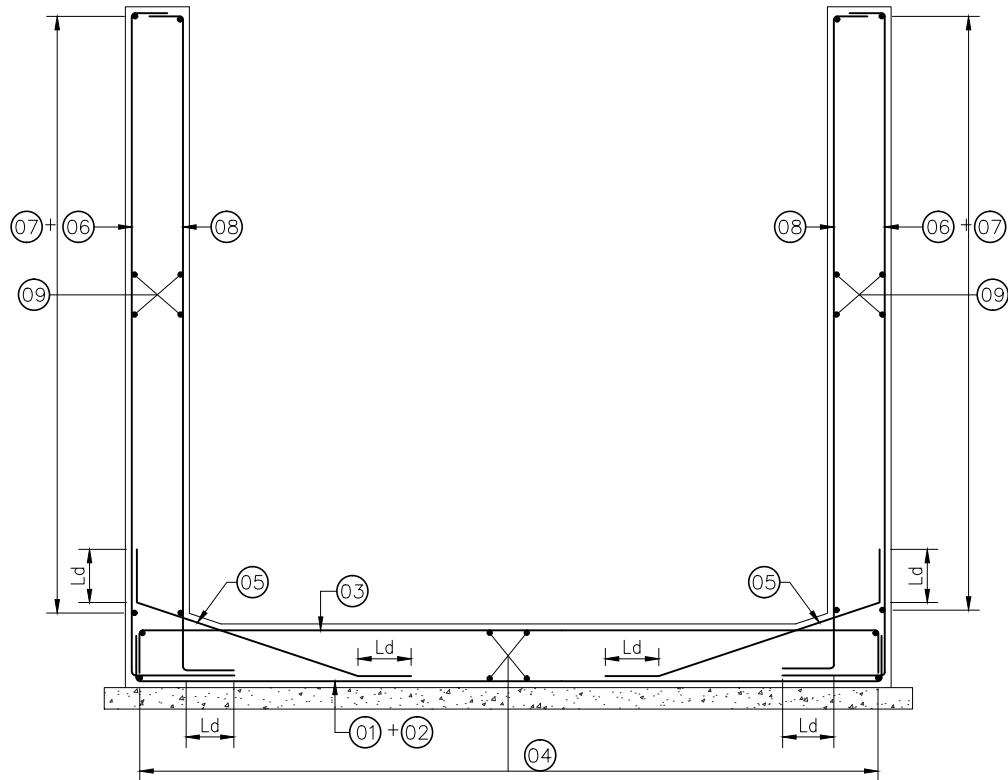
| BAR BENDING SCHEDULE         |           |               |
|------------------------------|-----------|---------------|
| 1x2x2–UPTO 0.5m FILL (BOX–2) |           |               |
| BAR NO                       | BAR SHAPE | REINFORCEMENT |
| ②①                           | 150       | ϕ12@200c/c    |
| ②②                           | 125       | ϕ12@200c/c    |
| ②②A                          |           | ϕ12@200c/c    |
| ②③                           | 125       | ϕ10@200c/c    |
| ②④                           | 200       | ϕ10@200c/c    |
| ②⑤                           | 125       | ϕ12@200c/c    |
| ②⑥                           | 600       | ϕ12@200c/c    |
| ②⑦                           | 125       | ϕ12@200c/c    |
| ②⑦A                          |           | ϕ12@200c/c    |
| ②⑧                           | 125       | ϕ10@200c/c    |
| ②⑨                           | 125       | ϕ10@200c/c    |
| ③⑩                           | 500       | ϕ12@200c/c    |
| SHEAR KEY                    |           |               |
| ③⑤                           | 300 300   | ϕ10@250c/c    |
| ③⑥                           | 125       | ϕ 8 @200c/c   |

TENDER PURPOSE ONLY

|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                    |                                                                                       |                                                                                                                                                                                                                          |                                                                 |                    |      |                    |         |          |                                                                          |                                                                                                              |                |
|-----------------------------------------------------------------------|------|-------------|--|--|--|----------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|------|--------------------|---------|----------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |  |  |  |          | CLIENT:                                                                             |                                                                                    | CONSULTANT:                                                                           |                                                                                                                                                                                                                          | PROJECT:                                                        |                    |      | JOB No. : 01041055 |         |          | TITLE :<br>TYPICAL REINFORCEMENT DETAILS FOR<br>SINGLE CELL BOX CULVERTS |                                                                                                              | REV. 0         |
|                                                                       |      |             |  |  |  |          |  | HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br>DEVELOPMENT CORPORATION LIMITED. |  | #1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,<br>Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in | HIMACHAL PRADESH STATE ROADS TRANSFORMATION<br>PROJECT (HPSRTP) | SCALE:<br>AS SHOWN | DATE | DESIGNED           | GANESH  |          | DRAWING NO : HP/STR/BC/TYP/201                                           | Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 | SHEET 03 OF 05 |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                    |                                                                                       |                                                                                                                                                                                                                          |                                                                 |                    |      | DRAWN              | SATYA   |          |                                                                          |                                                                                                              |                |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                    |                                                                                       |                                                                                                                                                                                                                          |                                                                 |                    |      | CHECKED            | PRANAI  |          |                                                                          |                                                                                                              |                |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                    |                                                                                       |                                                                                                                                                                                                                          |                                                                 |                    |      | APPROVED           | PRANAI  |          |                                                                          |                                                                                                              |                |
| REV                                                                   | DATE | DESCRIPTION |  |  |  | DESIGNED |                                                                                     |                                                                                    |                                                                                       |                                                                                                                                                                                                                          |                                                                 |                    |      | DRAWN              | CHECKED | APPROVED |                                                                          |                                                                                                              |                |







RCC U-SHAPE RETAINING WALL  
REINFORCEMENT DETAIL

SCALE 1: 25

BAR BENDING SCHEDULE

| BAR NO            | BAR SHAPE | REINFORCEMENT |
|-------------------|-----------|---------------|
| U SHAPE WING WALL |           |               |
| 01                |           | 12@200c/c     |
| 02                |           | 10@200c/c     |
| 03                |           | 10@200c/c     |
| 04                |           | 10@200c/c     |
| 05                |           | 10@200c/c     |
| 06                |           | 10@200c/c     |
| 07                |           | 10@200c/c     |
| 08                |           | 10@200c/c     |
| 09                |           | 10@200c/c     |

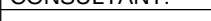
NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS IN METERS UNLESS OTHERWISE MENTIONED.
- ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. DRAWINGS SHALL NOT BE SCALED.
- THE GRADE OF CONCRETE FOR  
RCC U SHAPE WING WALL & RETAINING WALL : M25
- CLEAR COVER TO REINFORCEMENT FOR  
SIDE WALL EARTH FACE : 75mm  
SIDE WALL OTHER FACE : 40mm.  
BOTTOM SLAB : 75mm  
RCC U SHAPE RETAINING WALL : 75mm
- LAPS SHALL BE STAGGERED MINIMUM LAP LENGTH AND ANCHORAGE LENGTH SHALL BE AS PER IRC:112-2011
- REINFORCEMENT BAR SHALL BE HYSD BARS (DENOTED BY  $\Phi$ ) OF GRADE Fe-500D AND CONFORMING TO IS -1786 :2000.
- LAP LENGTH & DEVELOPMENT LENGTH SHALL BE

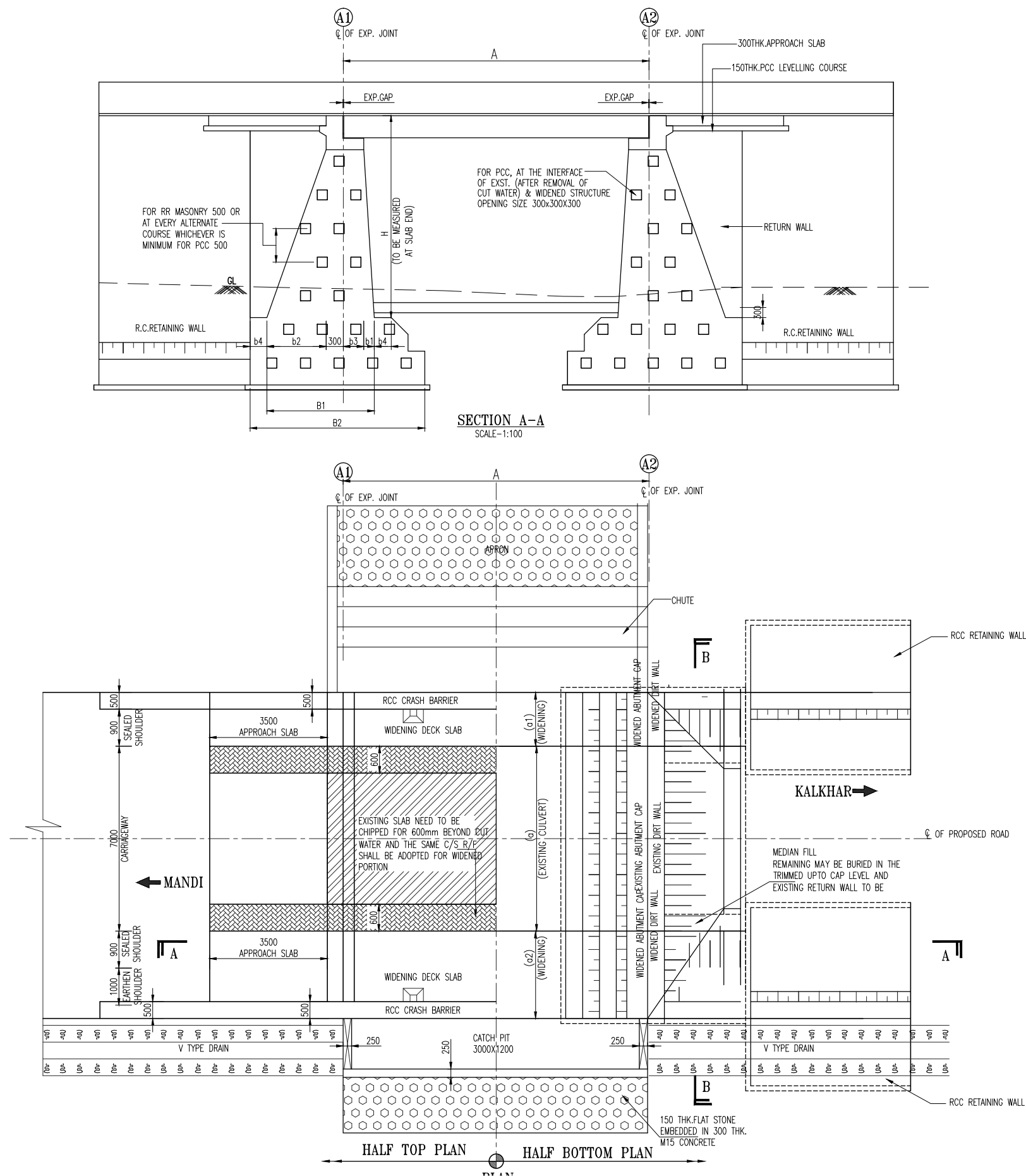
FOR HYSD BARS Fe 500 & Fe 500D  $\Phi \leq 32$ mm

|                              |           |             |           |           |           |           |             |
|------------------------------|-----------|-------------|-----------|-----------|-----------|-----------|-------------|
| CONCRETE GRADE Mpa           | M20       | M25         | M30       | M35       | M40       | M45       | M50         |
| DEVELOPMENT LENGTH           | 54 $\Phi$ | 47 $\Phi$   | 40 $\Phi$ | 36 $\Phi$ | 34 $\Phi$ | 32 $\Phi$ | 29 $\Phi$   |
| LAP LENGTH > 50% LAPPED BARS | 81 $\Phi$ | 70.5 $\Phi$ | 60 $\Phi$ | 54 $\Phi$ | 51 $\Phi$ | 48 $\Phi$ | 43.5 $\Phi$ |

TENDER PURPOSE ONLY

|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                       |                                                                                 |                                                                                                                                                                                                                                                                |                                                              |                    |      |                    |        |          |                                                                                                     |                                                                                                           |                |        |  |
|-----------------------------------------------------------------------|------|-------------|--|--|--|----------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------|------|--------------------|--------|----------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------|--------|--|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |  |  |  |          | CLIENT:                                                                             |                                                                                       | CONSULTANT:                                                                     |                                                                                                                                                                                                                                                                | PROJECT:                                                     |                    |      | JOB No. : 01041055 |        |          | TITLE : REINFORCEMENT DETAILS OF U-SHAPE RETAINING WALL FOR TYPICAL SINGLE CELL BOX CULVERT (TCS-2) |                                                                                                           | REV. 0         |        |  |
|                                                                       |      |             |  |  |  |          |  |  | HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED. | SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in | HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP) | SCALE:<br>AS SHOWN | DATE | DESIGNED           | GANESH |          | DRAWING NO : HP/STR/BC/TYP/202                                                                      | Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000 | SHEET 01 OF 01 |        |  |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                       |                                                                                 |                                                                                                                                                                                                                                                                |                                                              |                    |      |                    |        | DRAWN    |                                                                                                     |                                                                                                           |                | SATYA  |  |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                       |                                                                                 |                                                                                                                                                                                                                                                                |                                                              |                    |      |                    |        | CHECKED  |                                                                                                     |                                                                                                           |                | PRANAI |  |
|                                                                       |      |             |  |  |  |          |                                                                                     |                                                                                       |                                                                                 |                                                                                                                                                                                                                                                                |                                                              |                    |      |                    |        | APPROVED |                                                                                                     |                                                                                                           |                | PRANAI |  |
| REV                                                                   | DATE | DESCRIPTION |  |  |  | DESIGNED | DRAWN                                                                               | CHECKED                                                                               |                                                                                 |                                                                                                                                                                                                                                                                |                                                              |                    |      | APPROVED           |        |          |                                                                                                     |                                                                                                           |                |        |  |

SLAB CULVERTS

**LEGEND:**

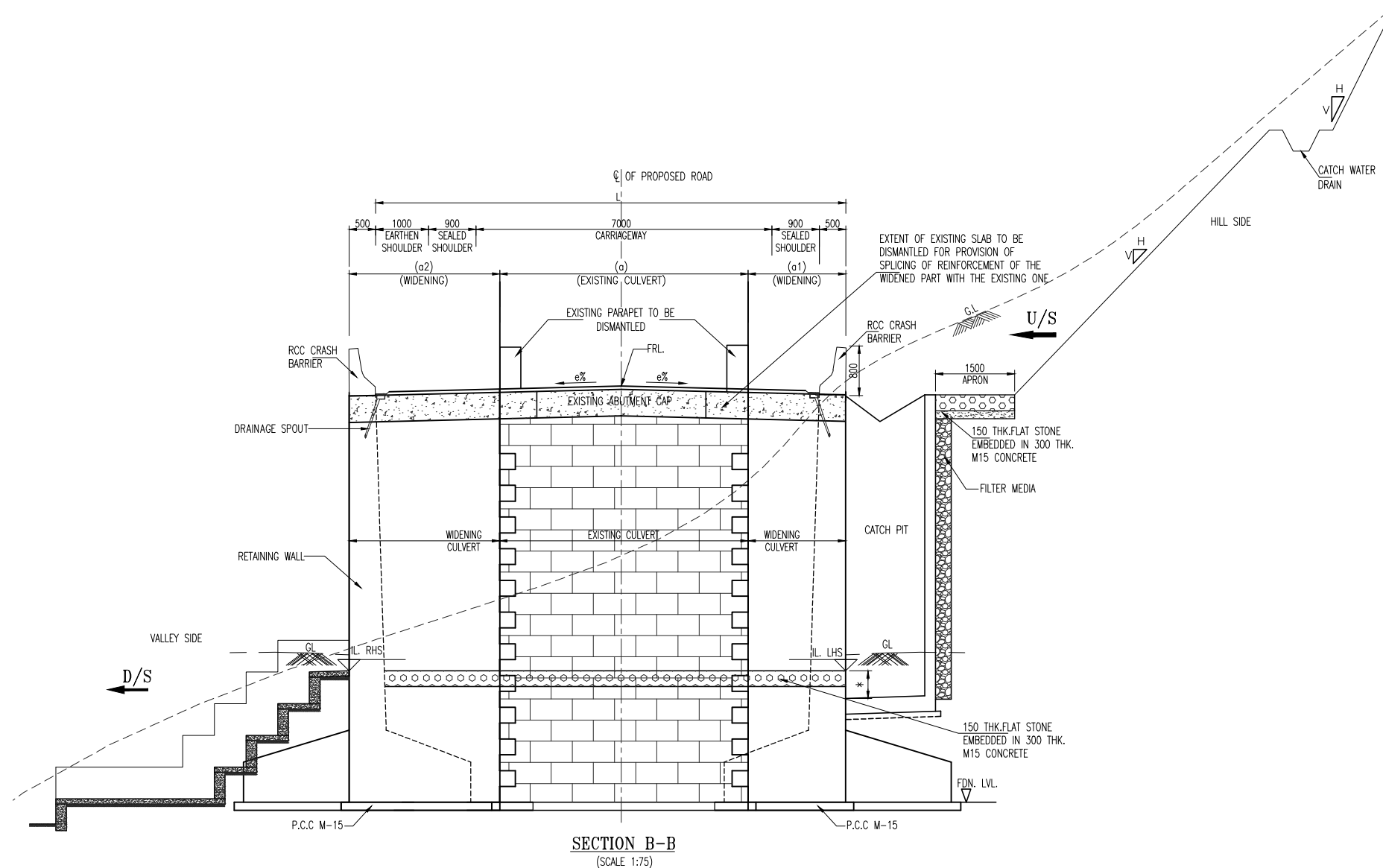
FRL : FINISHED ROAD LEVEL  
GL : GROUND LEVEL  
THK : THICKNESS  
FDN : FOUNDING LEVEL

**NOTES:**

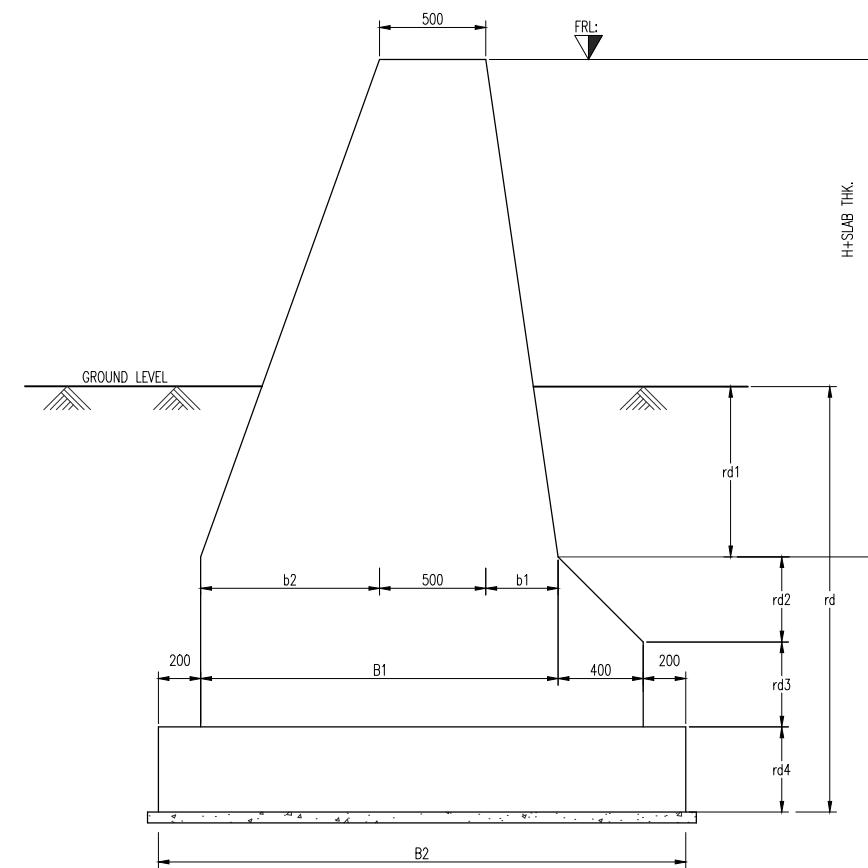
- ALL WIDENING OF FOUNDATION, SUBSTRUCTURE AND SUPER STRUCTURE WAS DONE BY KIND AND MONOLITHICALLY. PROPOSED APPROACH SLAB SHALL BE ANCHORED WITH THE EXISTING ONE AS PER SITE CONDITION.
- R.R.MASONRY/PCC WING WALL DISMANTLED AND REPLACED BY RCC RETAINING WALL. FOR DIMENSION AND REINFORCEMENT VIDE RELEVANT DRAWING. PCC STRAIGHT RETURN DISMANTLED UPTO CAP LEVEL AND REMAINING MAY BE BURIED AS PER SITE CONDITION.
- KEY STONES FROM RR MASONRY ABUTMENT WALL AND PIER REMOVED TO PROVIDE SHEAR KEY AS SHOWN IN THE SECTIONAL ELEVATION FROM PREPARED INTERFACE OF FOUNDATION AND SUBSTRUCTURE. FOR PCC ABUTMENT AND PIERS RECESSES WERE SCOOPED OUT FROM PREPARED SURFACE OF EXISTING STEMS AND FOUNDATIONS AS SHEAR KEYS FOR MECHANICAL BONDING BETWEEN EXISTING AND PROPOSED STRUCTURE AS SHOWN IN THE SECTIONAL ELEVATION AND CROSS-SECTIONS.
- APPROVED EPOXY BONDING AGENT E.G. CONGRESIVE 1414 OR OTHER APPLIED AT THE INTERFACE PRIOR TO PLACEMENT OF CONCRETE IN THE WIDENED PART IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION IN CASE OF CONCRETE TO CONCRETE WIDENING.
- THE SHAPE OF BURIED COMPONENTS OF ABUTMENT AND PIER FOUNDATIONS SHOWN IN THIS DRAWING ARE ASSUMED. THE DIMENSIONS OF DIFFERENT COMPONENTS IN THE WIDENED PART SHALL BE ADOPTED THE SAME AS THAT OF THE EXISTING STRUCTURE, AFTER THEY ARE EXPOSED BY EXCAVATION.
- WIDENING OF ABUTMENT MAY BE DONE BY PCC/RCC AS THE CASE MAY BE IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS. THE GRADES OF CONCRETE SHALL BE AS UNDER :
  - SUPERSTRUCTURE – M 25 GRADE OF CONCRETE.
  - SUBSTRUCTURE FOR ABUTMENT AND WINGWALL – M 20 GRADE OF CONCRETE.
  - LEVELLING COURSE – M15 GRADE OF CONCRETE.
- FLOOR PROTECTION IF NEEDED WAS PROVIDED AS PER SITE CONDITIONS AND / OR AS DIRECTED BY THE ENGINEER-IN-CHARGE.
- THE WIDENED BRIDGE IS CAPABLE OF SAFE WITHSTANDING 1 LANE OF IRC CLASS 70 R + 1 LANE OF CLASS A OR 3 LANES OF CLASS A LOADING, WHICHEVER IS SEVERER,
- APPROACH SLAB WAS CONSTRUCTED FOR THE WIDENED PART OF THE STRUCTURE.
- ALL UNTENSIONED REINFORCEMENT GRADE DESIGNATION S-500 HAVING YIELD STRENGTH OF 500 Mpa, CONFORMING TO IS:1786 STANDARD.
- CLEAR COVER TO REINFORCEMENT IS 40 MM.
- THE BACK FILL BEHIND THE ABUTMENT OF SLAB CULVERT WAS FILLED WITH GRANULAR MATERIAL AS PER CLAUSE 401.4.2.
- WEEP HOLES 100 DIA, SPACED AT 1000 c/c BOTH HORIZONTALLY AND VERTICALLY WAS PROVIDED IN A STAGGERED MANNER IN ABUTMENT WALL, RETURN WALLS & MEDIAN WALLS FROM FLOOR LEVEL UPTO THE ENTIRE HEIGHT OF ABUTMENTS AND RETAINING WALLS.
- 600 THK. FILTER MEDIA WAS PROVIDED BEHIND THE ENTIRE LENGTH OF ABUTMENT AND WING WALLS WITH LOWER SIZE AGGREGATES TOWARDS THE FILL IN ACCORDANCE WITH APPLICABLE SPECIFICATION.
- THIS DRAWING READ IN CONJUNCTION WITH THE RELEVANT DRAWINGS.
- WIDENING SHALL BE DONE BY KIND AND SHALL BE MADE INTEGRAL WITH THE EXISTING FOUNDATION AND SUBSTRUCTURES BY ANCHORING DOWEL BARS AND SUPERSTRUCTURE SHALL BE MONOLITHIC WITH EXISTING SUPERSTRUCTURE.

**TENDER PURPOSE ONLY**

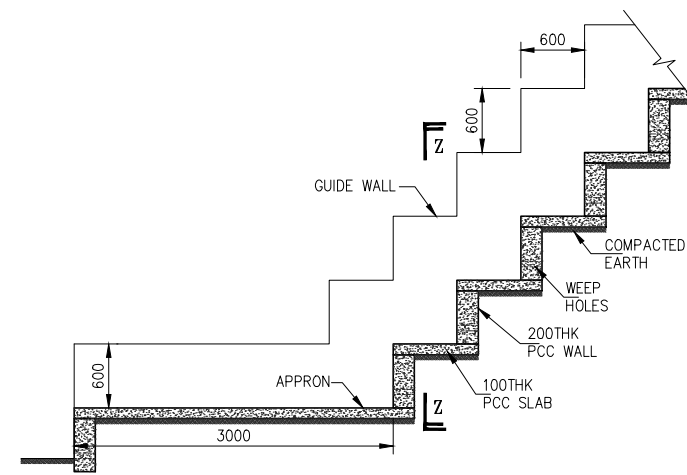
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| <div>NOTES:<br/>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div> 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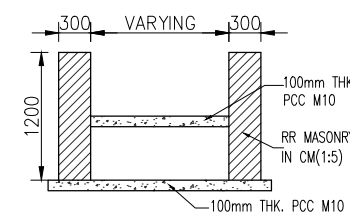
\* - DRINKING WATER FACILITY FOR STAY ANIMALS



RETURN WALL SECTION  
(SCALE 1:50)



LONGITUDINAL SECTION OF CHUTE  
SCALE 1:50



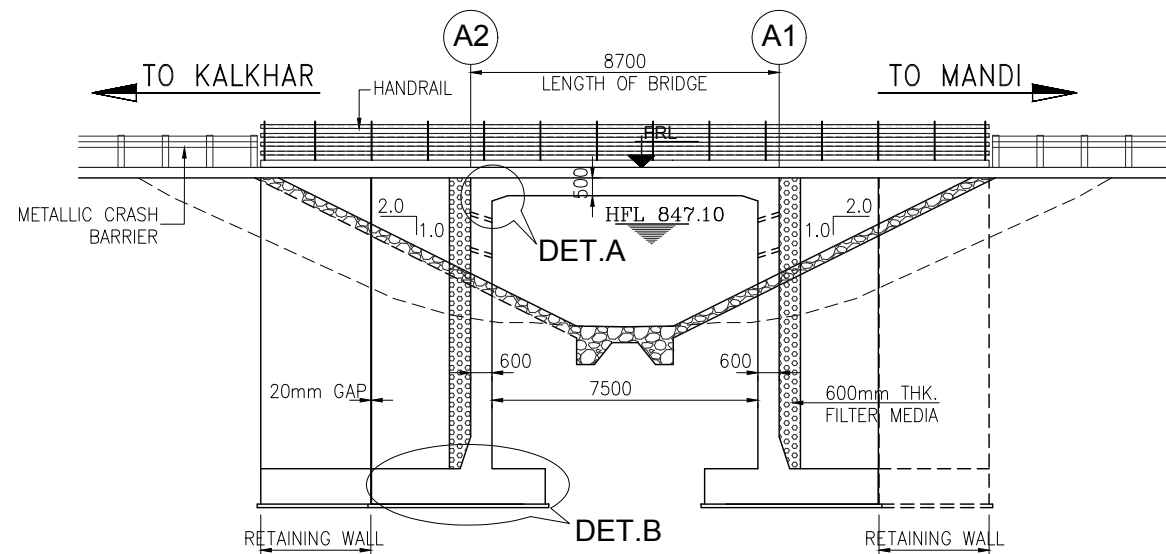
CROSS SECTION AT Z-Z  
SCALE 1:50

| Proposed Structure Details |                        |                      |                |                   |             |              |                  |                        | Lengths of Slab (m) |      |      |      |      | Abutment Section |      |     |     |     |    |     |     | Return wall Section |      |      |      |      |      | TCS Type | Type of Proposal |
|----------------------------|------------------------|----------------------|----------------|-------------------|-------------|--------------|------------------|------------------------|---------------------|------|------|------|------|------------------|------|-----|-----|-----|----|-----|-----|---------------------|------|------|------|------|------|----------|------------------|
| S. No.                     | Existing Chainage (Km) | Design Chainage (km) | Design FRL (m) | Type of Structure | No of Spans | Span (m) (A) | Clear Height (m) | Slab Thickness (t) (m) | L                   | L1   | L2   | a    | a1   | a2               | H    | B1  | B2  | b1  | b2 | b3  | b4  | H                   | B1   | B2   | b1   | b2   | RWL  |          |                  |
| 1                          | 3+390                  | 3+381                | 938.03         | Slab              | 1           | 2            | 2.2              | 0.25                   | 7.00                | 3.50 | 3.50 | 6.90 | 1.13 | 0.00             | 2.45 | 2.2 | 3.2 | 0.4 | 1  | 0.5 | 0.5 | 2.45                | 2.08 | 2.88 | 0.45 | 1.13 | 5.65 | TCS-5    | WIDENING         |

TENDER PURPOSE ONLY

|                                                                       |      |             |  |  |  |          |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |  |          |          |         |                    |                    |  |                                                                                            |                                |                                                                                                                             |        |           |  |
|-----------------------------------------------------------------------|------|-------------|--|--|--|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--|----------|----------|---------|--------------------|--------------------|--|--------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------|-----------|--|
| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |  |  |  |          | CLIENT:                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                            | CONSULTANT:                                                     |  | PROJECT: |          |         | JOB No. : 01041055 |                    |  | TITLE :<br>TYPICAL GENERAL ARRANGEMENT DRAWING<br>FOR WIDENING OF SLAB CULVERT (FOR TCS-5) |                                |                                                                                                                             | REV. 0 |           |  |
|                                                                       |      |             |  |  |  |          | <br>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE<br>DEVELOPMENT CORPORATION LIMITED. | <br>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,<br>Secunderabad, Telangana – 500003, India.<br>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br>E-mail: info@satragroup.in, Web: www.satragroup.in | HIMACHAL PRADESH STATE ROADS TRANSFORMATION<br>PROJECT (HPSRTP) |  |          | DESIGNED |         |                    | GANESH             |  |                                                                                            | DRAWING NO : HP/STR/SC/TYP/101 |                                                                                                                             |        | SIZE : A3 |  |
|                                                                       |      |             |  |  |  | DRAWN    |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |  |          | SATYA    |         |                    |                    |  |                                                                                            |                                |                                                                                                                             |        |           |  |
|                                                                       |      |             |  |  |  | CHECKED  |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |  |          | PRANAI   |         |                    |                    |  |                                                                                            |                                |                                                                                                                             |        |           |  |
|                                                                       |      |             |  |  |  | APPROVED |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |  |          | PRANAI   |         |                    |                    |  |                                                                                            |                                |                                                                                                                             |        |           |  |
| REV                                                                   | DATE | DESCRIPTION |  |  |  | DESIGNED |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                            |                                                                 |  |          | DRAWN    | CHECKED | APPROVED           | SCALE:<br>AS SHOWN |  | DATE                                                                                       |                                | ROAD NAME :<br>Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in<br>Mandi District From Km 0+000 To Km 11+000 |        |           |  |

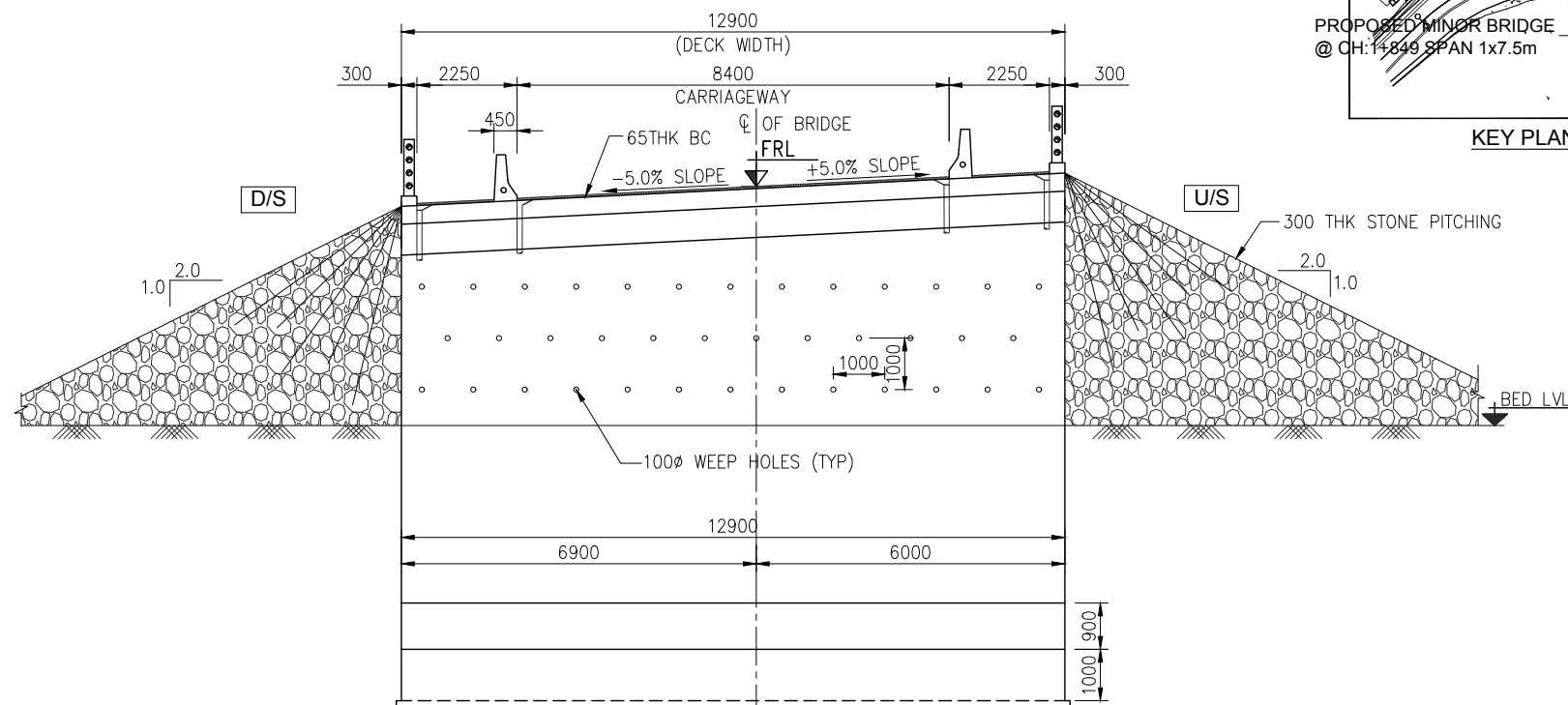
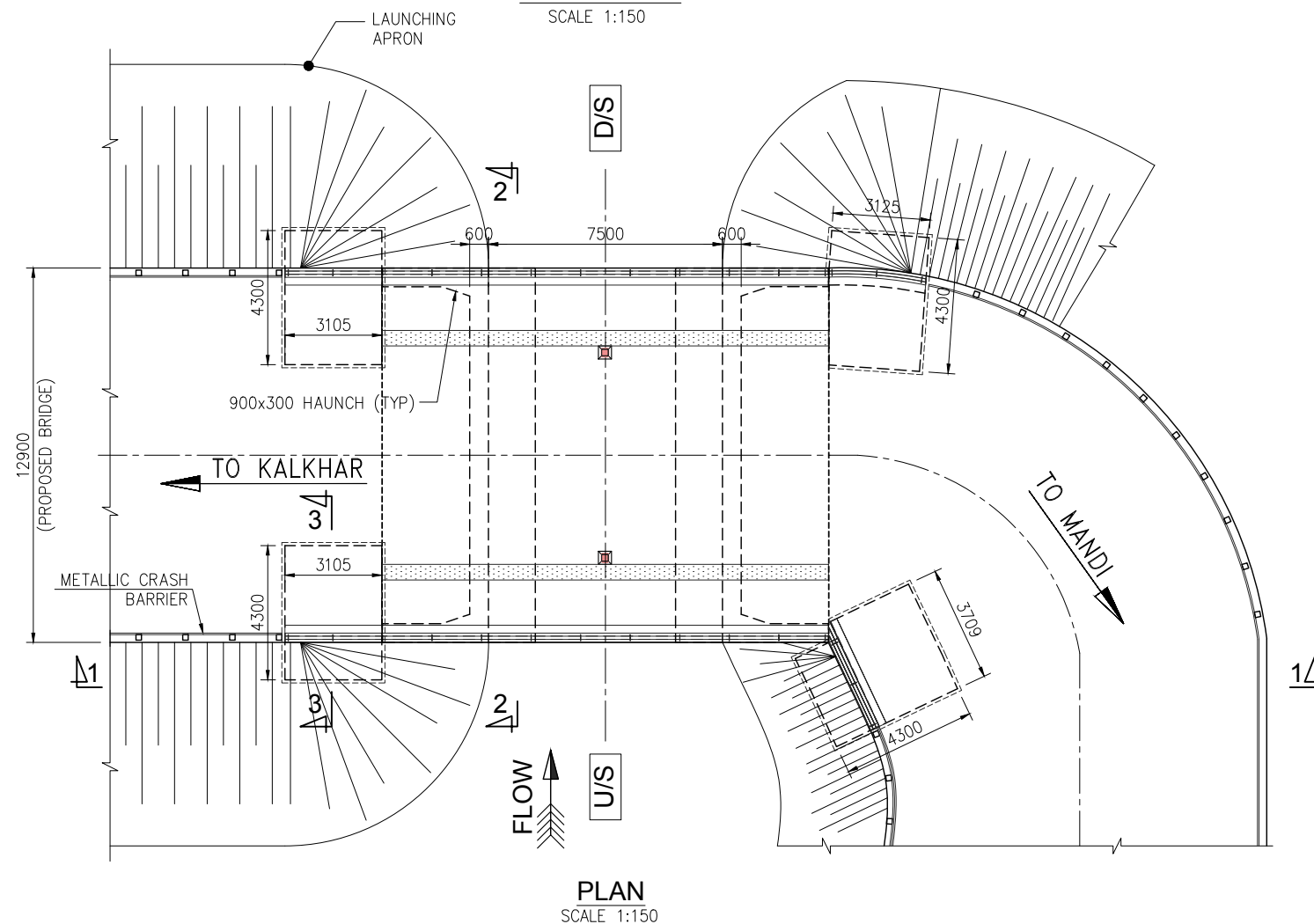
MINOR BRIDGE



| DESCRIPTION  | A2      | A1      |
|--------------|---------|---------|
| FRL          | 848.742 | 848.742 |
| BED LVL      | 844.41  | 844.41  |
| FOUNDING LVL | 839.282 | 839.282 |

SECTION 1-1

SCALE 1:150



SECTION 2-2

SCALE 1:100

PROPOSED MINOR BRIDGE  
@ CH:1+849 SPAN 1x7.5m

KEY PLAN

## NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE.
- GRADE OF CONCRETE SHALL BE AS FOLLOWS.  
PORTAL FRAME - M35  
FLYING WALL - M25  
RETAINING WALL - M25  
CURTAIN WALL, TOE WALL & LEVELING COURSE P.C.C - M15
- CLEAR COVER FOR ANY REINFORCEMENT SHALL BE  
TOP SLAB - 40mm  
SIDE WALL EARTH FACE - 75mm  
SIDE WALL OTHER FACE - 40mm
- REQUIRED SAFE BEARING CAPACITY FOR SOIL IS MINIMUM 40T/ SQM
- GRANULAR BACK FILL MATERIAL CONFORMING TO IRC:78-2014 SHALL BE USED.
- DIMENSIONS & LEVELS MAY VARY AS PER SITE CONDITIONS.
- REINFORCEMENT BAR SHALL BE THERMO MECHANICALLY TREATED HYSD BARS (DENOTED AS  $\Phi$ ) DESIGNED FE:500 AND CONFORMING TO IS: 1786
- ONLY WRITTEN DIMENSIONS ARE SHALL BE FOLLOWED, NO DIMENSION SHALL BE SCALED.
- REFER DRAWING NO. NHAI/BIR-BAR/--- FOR RETAINING WALL DETAILS
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY & STRUCTURAL DRAWINGS

## TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |
|     |      |             |          |       |         |          |

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE  
DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:



SATRA SERVICES AND SOLUTIONS PVT.LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:

HIMACHAL PRADESH STATE ROADS TRANSFORMATION  
PROJECT (HPSRTP)

SCALE:  
AS SHOWN

DATE

JOB No. : 01041055

|          |               |
|----------|---------------|
| DESIGNED | GANESH        |
| DRAWN    | SWAROOPA RANI |
| CHECKED  | PRANAI        |
| APPROVED | PRANAI        |

ROAD NAME :

TITLE : GENERAL ARRANGEMENT DETAILS OF  
MINOR BRIDGE AT CH:1+849  
(RECONSTRUCTION)

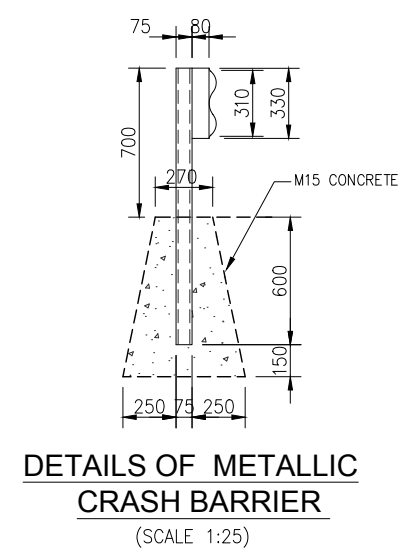
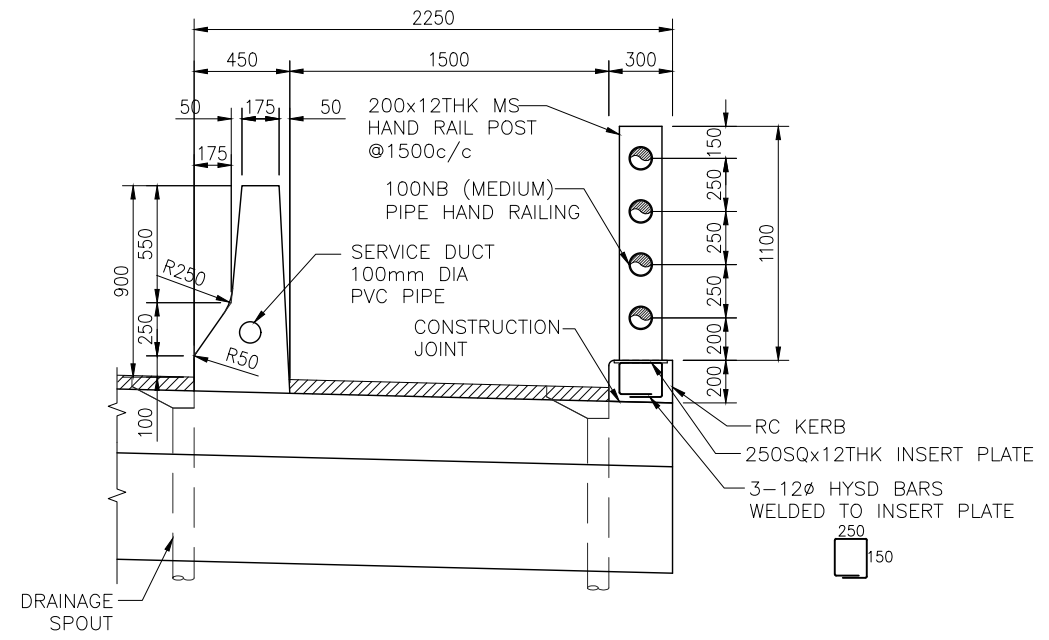
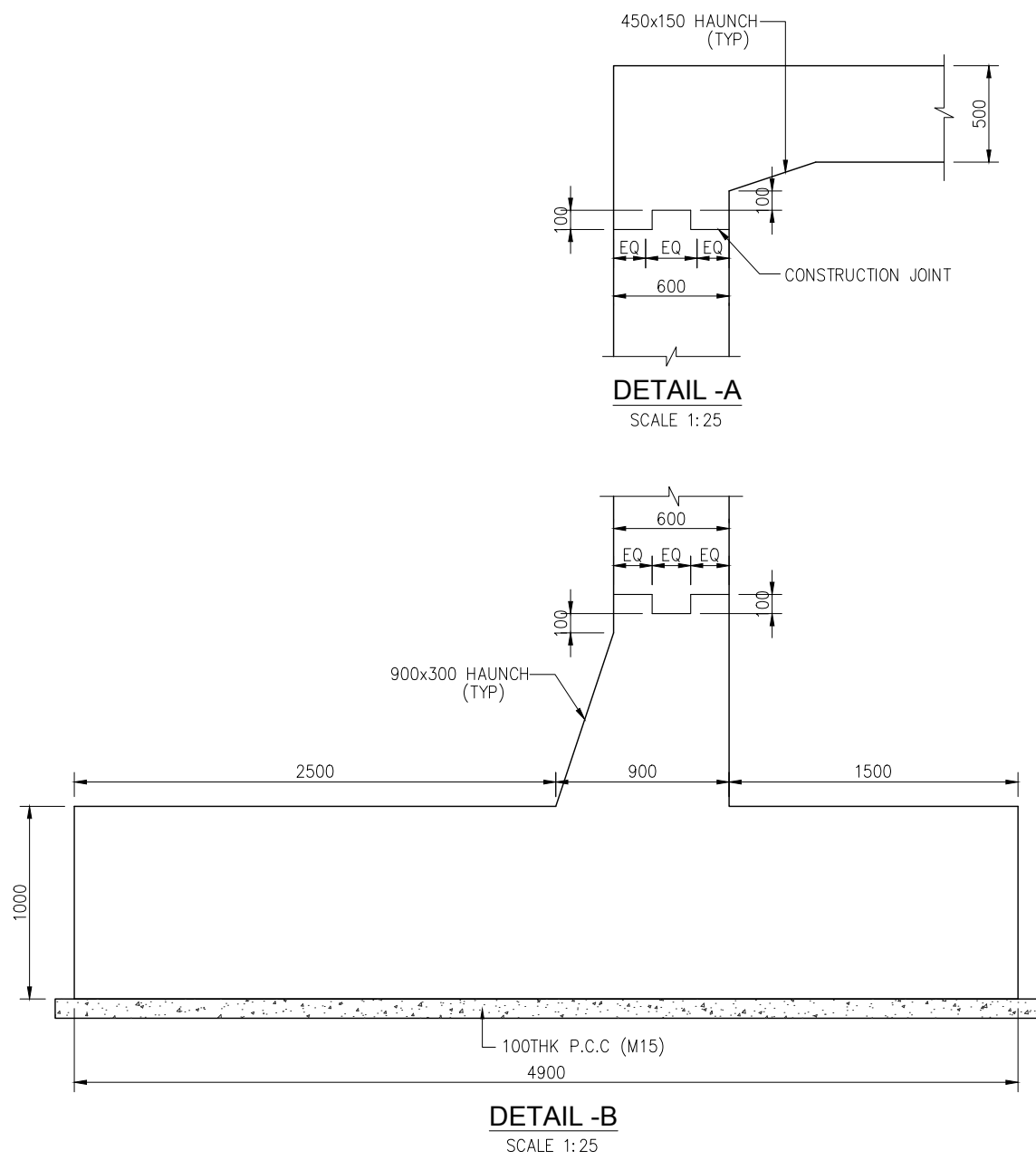
DRAWING NO : HP/MAN-KAL/STR/MNB/1+849/101

Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in  
Mandi District From Km 0+000 To Km 11+000

REV. 0

SIZE : A3

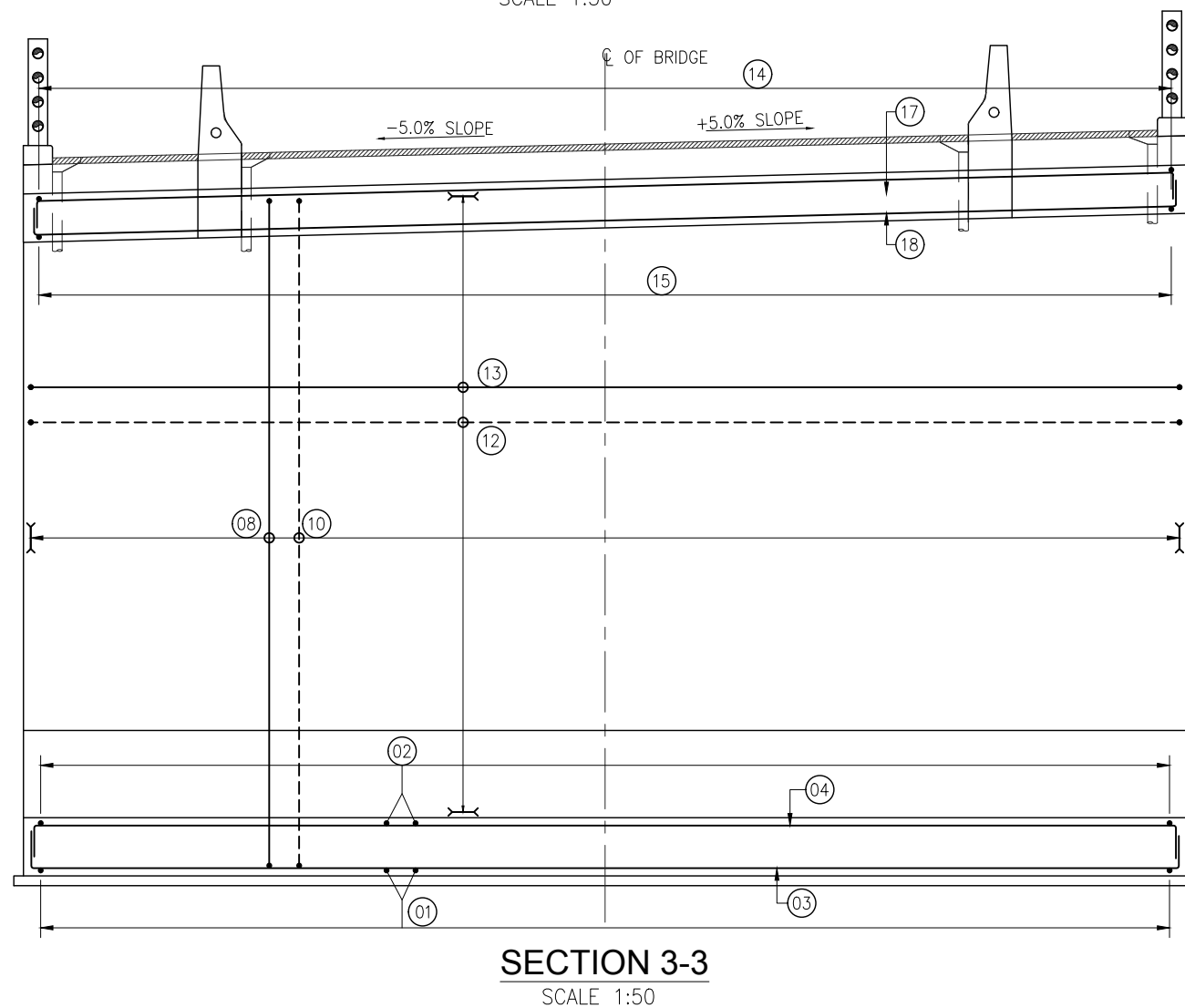
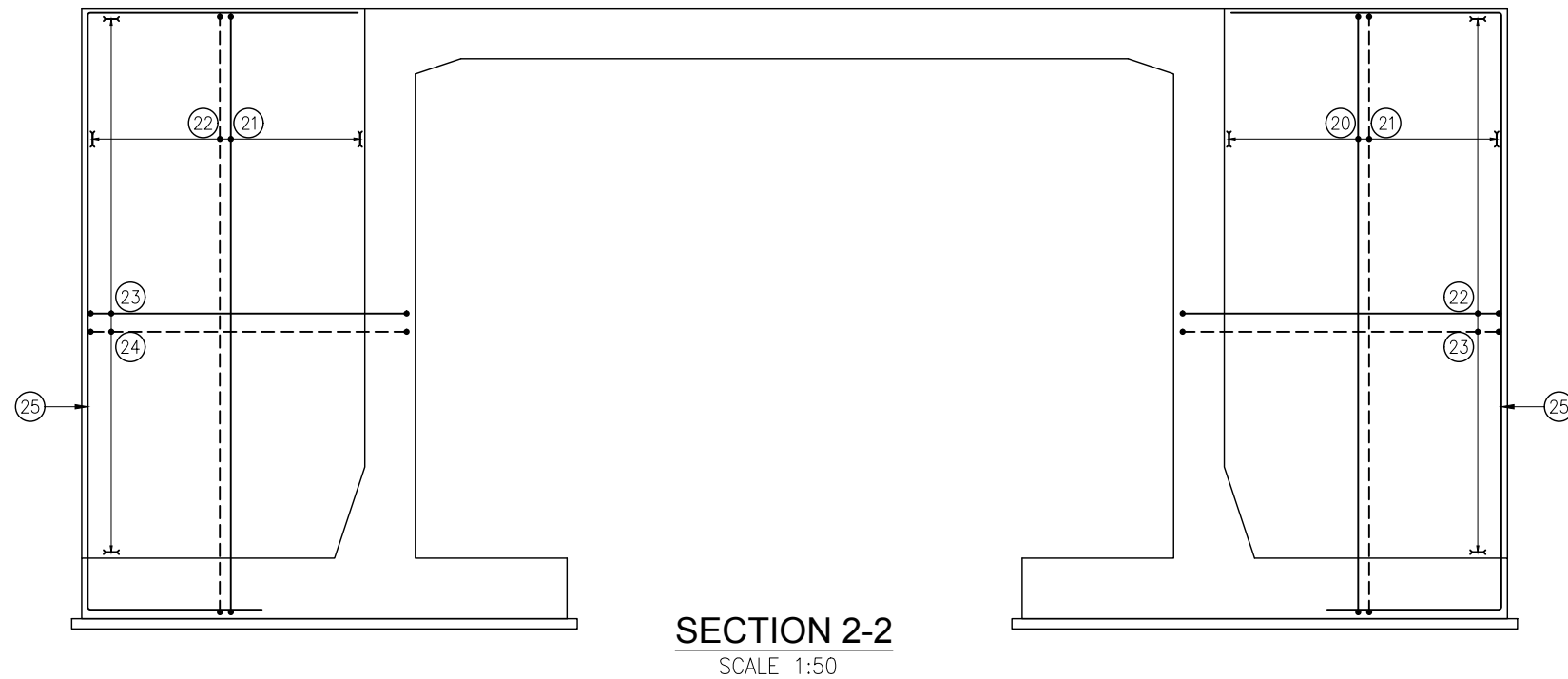
SHEET 01 OF 02



TENDER PURPOSE ONLY

|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                    |         |                                                                                                                                                                                                                                                                                                                                                                    |  |                                                                         |                                |  |                                                                                                                       |  |                                                                                             |  |                           |  |
|-----------------------------------------------------------------------------------|------|-------------|--|--|--|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------|--------------------------------|--|-----------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------|--|---------------------------|--|
| <div>NOTES:<br/>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div> |      |             |  |  |  |          | <div>CLIENT:</div>                                                                                                                                                                 |         | <div>CONSULTANT:</div>                                                                                                                                                                                                                                                                                                                                             |  | <div>PROJECT:</div>                                                     |                                |  | <div>JOB No. : 01041055</div>                                                                                         |  | <div>TITLE : GENERAL ARRANGEMENT DETAILS OF MINOR BRIDGE AT CH:1+849 (RECONSTRUCTION)</div> |  | <div>REV. 0</div>         |  |
|                                                                                   |      |             |  |  |  |          | <div><br/>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div> |         | <div><br/>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050, E-mail: info@satragroup.in, Web: www.satragroup.in</div> |  | <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> |                                |  | <div>MATCH<br/>BALABHIM</div>                                                                                         |  |                                                                                             |  |                           |  |
|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                    |         |                                                                                                                                                                                                                                                                                                                                                                    |  | <div>DRAWN</div>                                                        |                                |  | <div>SWAROOPA RAO S SHARMA</div>                                                                                      |  |                                                                                             |  |                           |  |
|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                    |         |                                                                                                                                                                                                                                                                                                                                                                    |  | <div>CHECKED</div>                                                      |                                |  | <div>PRANAI</div>                                                                                                     |  | <div>PRADEEP KAPLA</div>                                                                    |  |                           |  |
|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                    |         |                                                                                                                                                                                                                                                                                                                                                                    |  | <div>APPROVED</div>                                                     |                                |  | <div>PRANAI</div>                                                                                                     |  |                                                                                             |  |                           |  |
|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                    |         |                                                                                                                                                                                                                                                                                                                                                                    |  | <div>ROAD NAME :</div>                                                  |                                |  | <div>Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div> |  | <div>DRAWING NO : HP/MAN-KAL/STR/MNB/1+849/101</div>                                        |  |                           |  |
| REV                                                                               | DATE | DESCRIPTION |  |  |  | DESIGNED | DRAWN                                                                                                                                                                              | CHECKED | APPROVED                                                                                                                                                                                                                                                                                                                                                           |  |                                                                         | <div>SCALE:<br/>AS SHOWN</div> |  | <div>DATE</div>                                                                                                       |  |                                                                                             |  | <div>SHEET 02 OF 02</div> |  |



**LEGEND:**

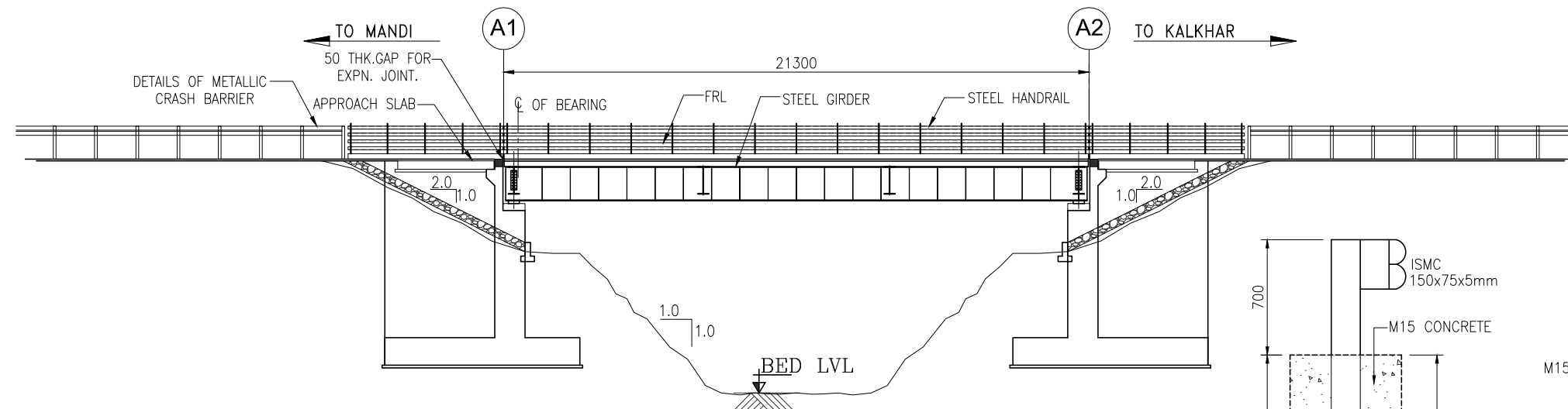
|                |       |
|----------------|-------|
| TOP BARS       | ----- |
| BOTTOM BARS    | ===== |
| NEAR FACE BARS | ===== |
| FOR FACE BARS  | ----- |

**BAR BENDING SCHEDULE**

| BAR NO | BAR SHAPE                                            | REINFORCEMENT |
|--------|------------------------------------------------------|---------------|
| ①      |                                                      | Φ20@150 c/c   |
| ②      |                                                      | Φ16@150 c/c   |
| ③      |                                                      | Φ10@150 c/c   |
| ④      |                                                      | Φ10@150 c/c   |
| ⑤      |                                                      | Φ12@125 c/c   |
| ⑥      |                                                      | Φ25@125 c/c   |
| ⑦      | NOT IN USE                                           |               |
| ⑧      |                                                      | Φ25@125 c/c   |
| ⑨      | NOT IN USE                                           |               |
| ⑩      |                                                      | Φ20@125 c/c   |
| ⑪      | NOT IN USE                                           |               |
| ⑫      |                                                      | Φ12@125 c/c   |
| ⑬      |                                                      | Φ12@125 c/c   |
| ⑭      |                                                      | Φ20@125 c/c   |
| ⑮      |                                                      | Φ20@125 c/c   |
| ⑯      | NOT IN USE                                           |               |
| ⑰      |                                                      | Φ12@125 c/c   |
| ⑱      |                                                      | Φ12@125 c/c   |
| ⑲      |                                                      | Φ20@125 c/c   |
| ⑳      |                                                      | Φ10@150 c/c   |
| ㉑      |                                                      | Φ10@200c/c    |
| ㉒      |                                                      | Φ16@200c/c    |
| ㉓      |                                                      | Φ16@100 c/c   |
| ㉔      |                                                      | Φ16@100 c/c   |
| ㉕      |                                                      | Φ12@200c/c    |
| ㉖      | 10 Φ -250c/c LONGITUDINAL<br>10 Φ -250c/c TRANSVERSE |               |

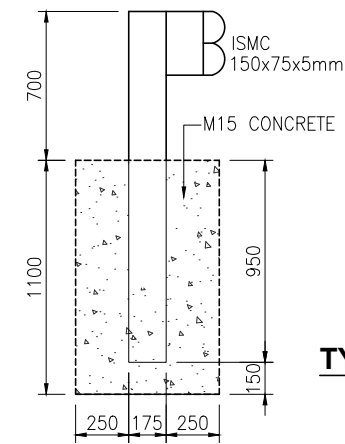
**TENDER PURPOSE ONLY**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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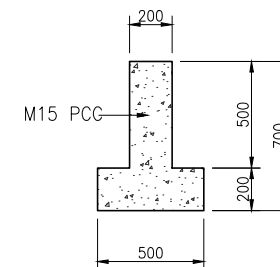


LONGITUDINAL ELEVATION OF BRIDGE

|                      |         |        |         |
|----------------------|---------|--------|---------|
| FORMATION LEVEL (m)  | 890.740 |        | 890.740 |
| BED LEVEL (m)        | 887.26  | 882.95 | 887.26  |
| SCOUR/ROCK LEVEL (m) | 883.26  |        | 883.26  |
| FOUNDING LEVEL (m)   | 883.558 |        | 883.558 |
| CHAINAGE (m)         | 9+0209  | 9+022  | 9+0231  |

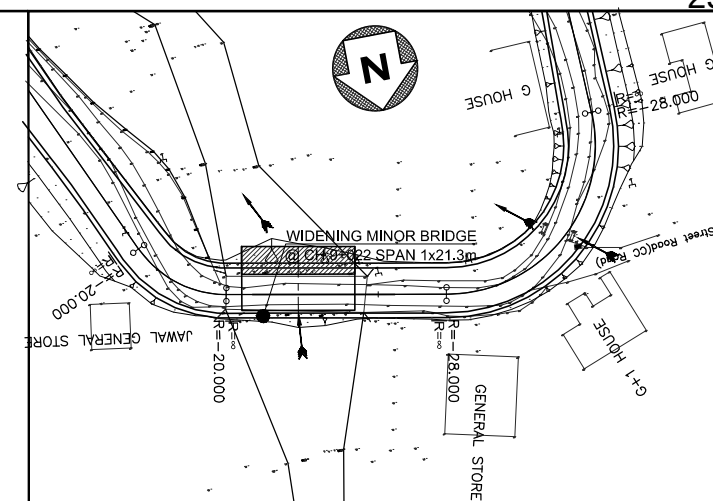


DETAILS OF METALLIC CRASH BARRIER

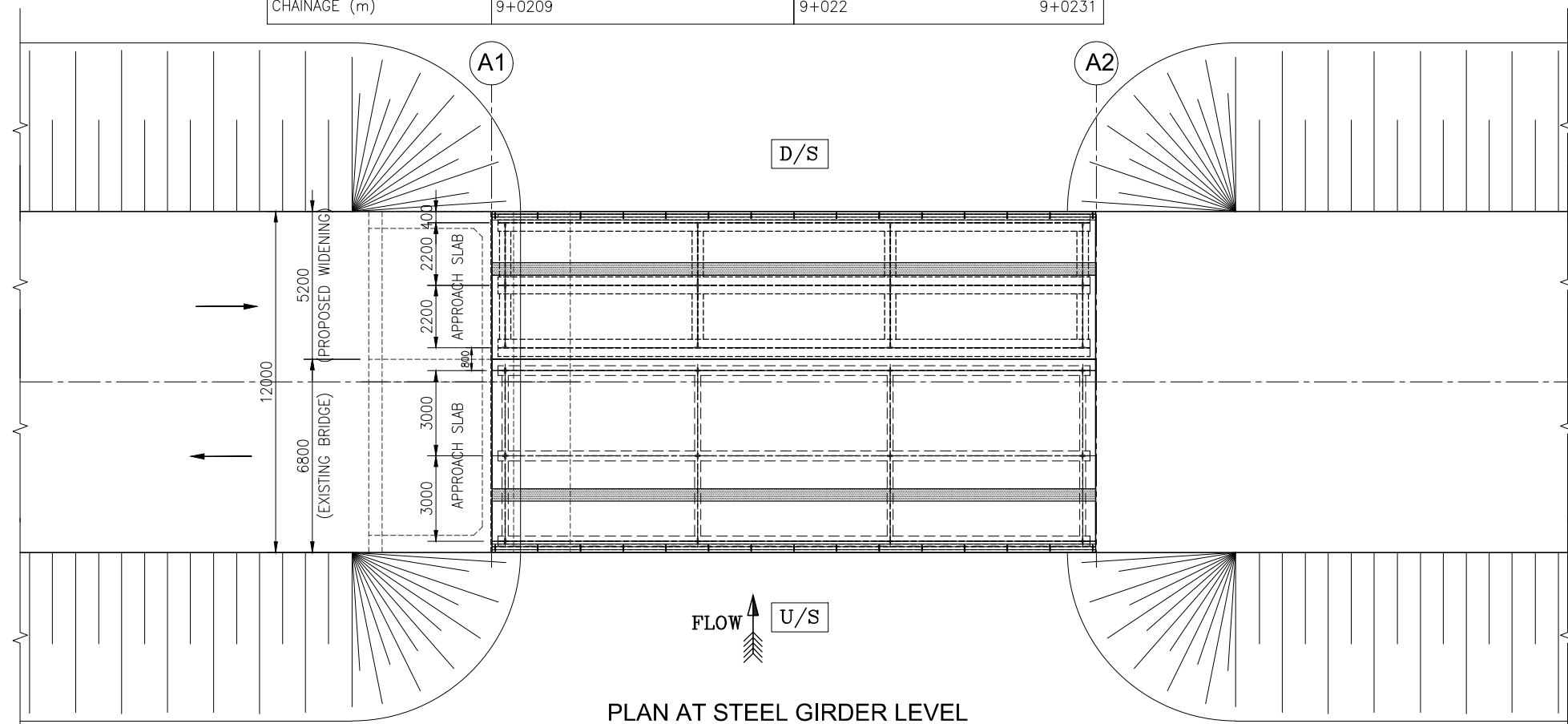


TYPICAL DETAILS OF TOE WALL

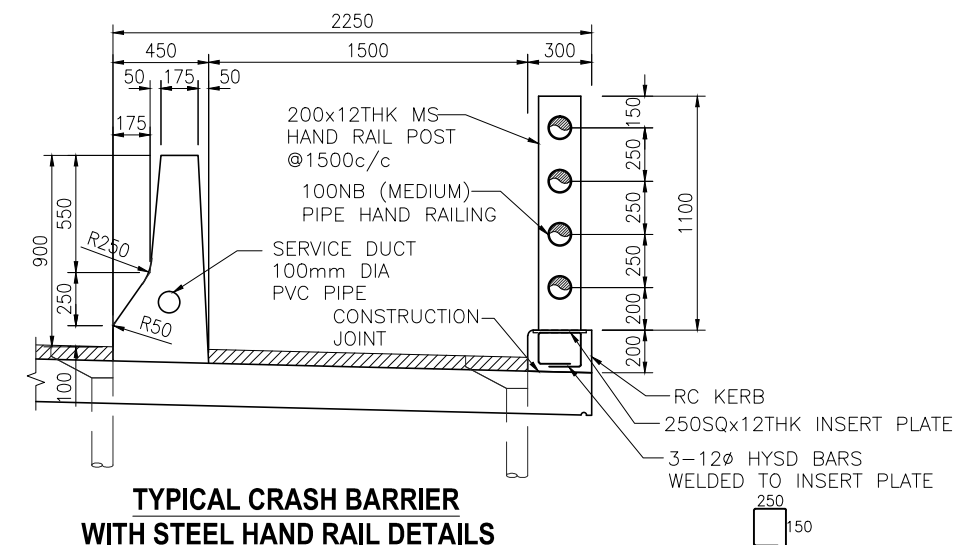
SCALE 1:25



KEY PLAN



PLAN AT STEEL GIRDER LEVEL



TYPICAL CRASH BARRIER WITH STEEL HAND RAIL DETAILS

## NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE.
- GRADE OF CONCRETE SHALL BE AS FOLLOWS.  
ABUTMENT, RETAINING WALL, DIRT WALL & FOUNDATION - M35  
P.C.C LEVELING COURSE - M15  
APPROACH SLAB - M30  
CRASH BARRIER - M40
- REQUIRED MINIMUM SBC IS 50T/SQM
- GRANULAR BACK FILL MATERIAL CONFORMING TO IRC:78-2014 SHALL BE USED
- ONLY WRITTEN DIMENSIONS ARE SHALL BE FOLLOWED, NO DIMENSION SHALL BE SCALED.

## TENDER PURPOSE ONLY

|                                                                                   |      |             |  |  |  |          |                                                                                                                                                                                                             |         |                                                                                                                                                                                                                                                                                                                                                                                                     |                            |                                                                                             |                 |                                                                                                                                                  |                                                                                                                                       |                                                                                                                                            |                           |                                        |  |
|-----------------------------------------------------------------------------------|------|-------------|--|--|--|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------|--|
| <div>NOTES:<br/>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</div> |      |             |  |  |  |          | <div>CLIENT:</div> <div><div>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</div></div> |         | <div>CONSULTANT:</div> <div><div>SATRA SERVICES AND SOLUTIONS PVT.LTD.<br/>#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana – 500003, India.<br/>Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,<br/>E-mail: info@satragroup.in, Web: www.satragroup.in</div></div> |                            | <div>PROJECT:</div> <div>HIMACHAL PRADESH STATE ROADS TRANSFORMATION PROJECT (HPSRTP)</div> |                 | <div>JOB No. : 01041055</div> <div><div>DESIGNEDGANESH</div><div>DRAWNSWAROOPA RANI</div><div>CHECKEDPRANAI</div><div>APPROVEDPRANAI</div></div> |                                                                                                                                       | <div>TITLE : GENERAL ARRANGEMENT DETAILS OF MINOR BRIDGE AT CH:8+948 (WIDENING)</div> <div>DRAWING NO : HP/MAN-KAL/STR/MNB/8+948/101</div> |                           | <div>REV. 0</div> <div>SIZE : A3</div> |  |
| REV                                                                               | DATE | DESCRIPTION |  |  |  | DESIGNED | DRAWN                                                                                                                                                                                                       | CHECKED | APPROVED                                                                                                                                                                                                                                                                                                                                                                                            | <div>SCALE: AS SHOWN</div> |                                                                                             | <div>DATE</div> |                                                                                                                                                  | <div>ROAD NAME :<br/>Package-V:<br/>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000</div> |                                                                                                                                            | <div>SHEET 01 OF 02</div> |                                        |  |

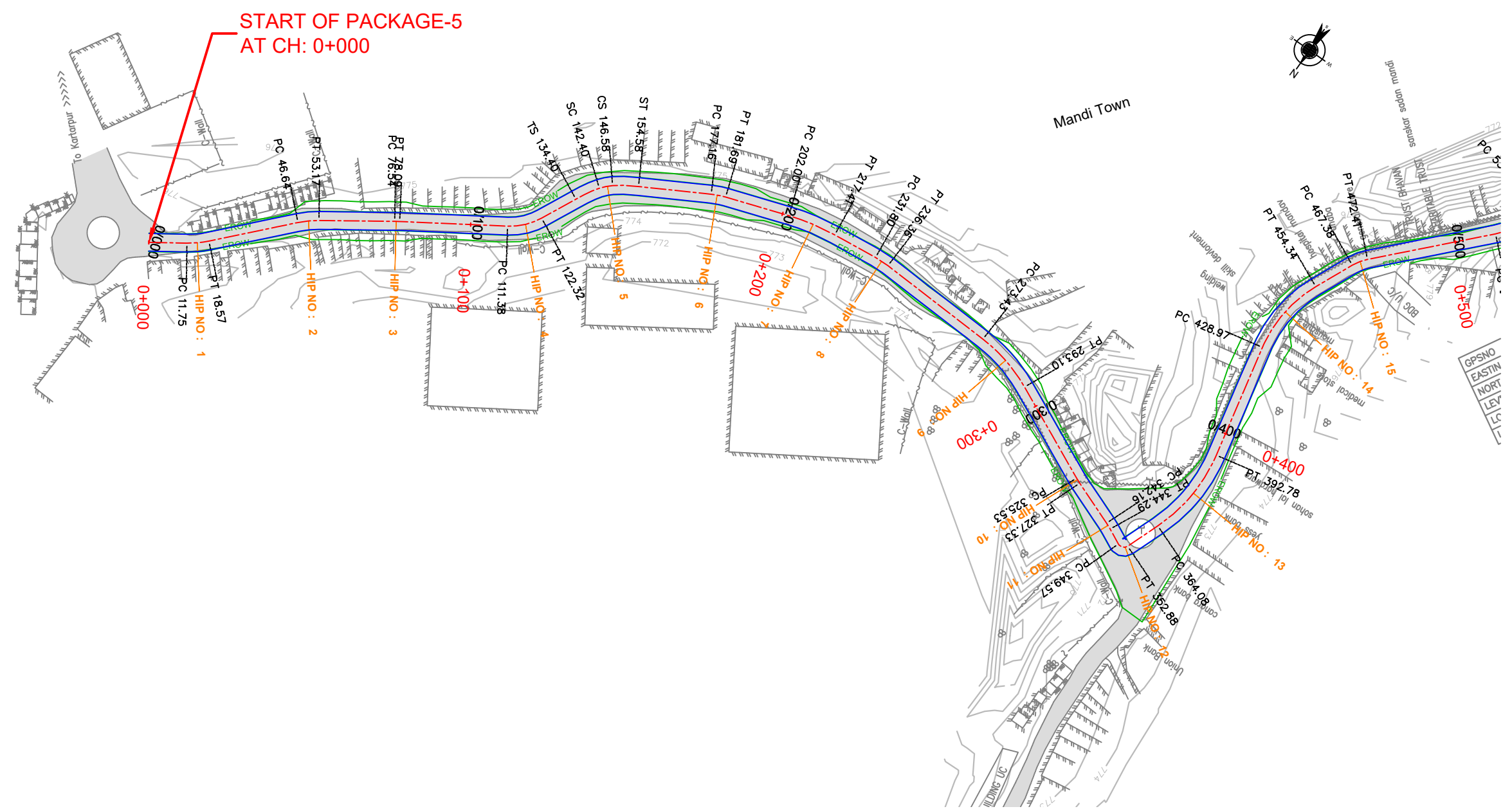


DRAINAGE DRAWINGS

PLAN & PROFILES  
(KM 0+000 TO 11+000)

MANDI

KALKHAR



TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

|     |      |             |          |       |         |          |
|-----|------|-------------|----------|-------|---------|----------|
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|     |      |             |          |       |         |          |
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HIMACHAL PRADESH ROAD  
AND OTHER INFRASTRUCTURE DEVELOPMENT  
CORPORATION LIMITED.

  
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#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana - 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:  
Himachal Pradesh State Roads Transformation  
Project (HPSRTP)

SCALE: NOT TO SCALE

|          |               |
|----------|---------------|
| DESIGNED | GANESH        |
| DRAWN    | SWAROOPA RANI |
| CHECKED  | PRANAI        |
| APPROVED | PRANAI        |

TITLE : DRAINAGE PLAN & PROFILE  
FROM CH: 0+000 TO CH: 0+500

DRAWING NO : HP/MAN-KAL/DRAINAGE P&P

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi  
District From Km 0+000 To Km 11+000

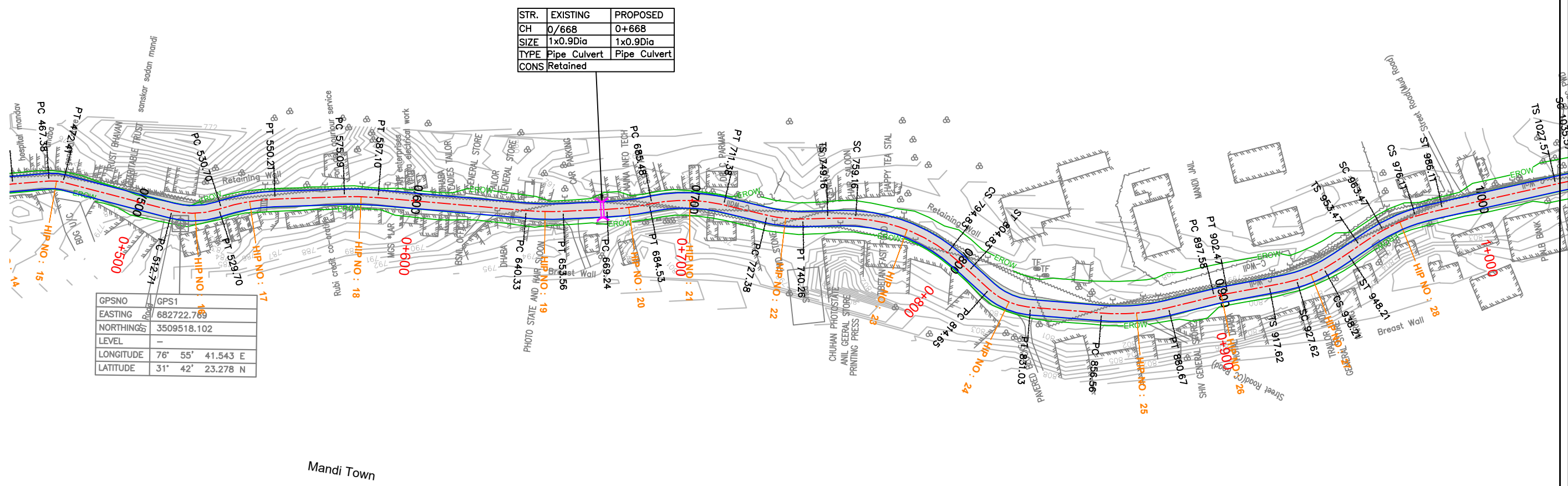
SHEET 1A OF 22B



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← MANDI

KALKHAR →



| STR. | EXISTING     | PROPOSED     |
|------|--------------|--------------|
| CH   | 0/668        | 0+668        |
| SIZE | 1x0.9Dia     | 1x0.9Dia     |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Retained     |              |

|           |                  |
|-----------|------------------|
| GPSNO     | GPS1             |
| EASTING   | 682722.789       |
| NORTHINGS | 3509518.102      |
| LEVEL     | -                |
| LONGITUDE | 76° 55' 41.543 E |
| LATITUDE  | 31° 42' 23.278 N |

TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

|     |      |             |          |       |         |          |
|-----|------|-------------|----------|-------|---------|----------|
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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HIMACHAL PRADESH ROAD  
AND OTHER INFRASTRUCTURE DEVELOPMENT  
CORPORATION LIMITED.



SATRA SERVICES AND SOLUTIONS PVT LTD.  
#1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet,  
Secunderabad, Telangana – 500003, India.  
Tel: +91 40 2784 0040, Fax: +91 40 2784 0050,  
E-mail: info@satragroup.in, Web: www.satragroup.in

PROJECT:  
  
Himachal Pradesh State Roads Transformation  
Project (HPSRTP)

SCALE:  
  
NOT TO SCALE

|          |               |
|----------|---------------|
| DESIGNED | GANESH        |
| DRAWN    | SWAROOPA RANI |
| CHECKED  | PRANVI        |
| APPROVED | PRANVI        |

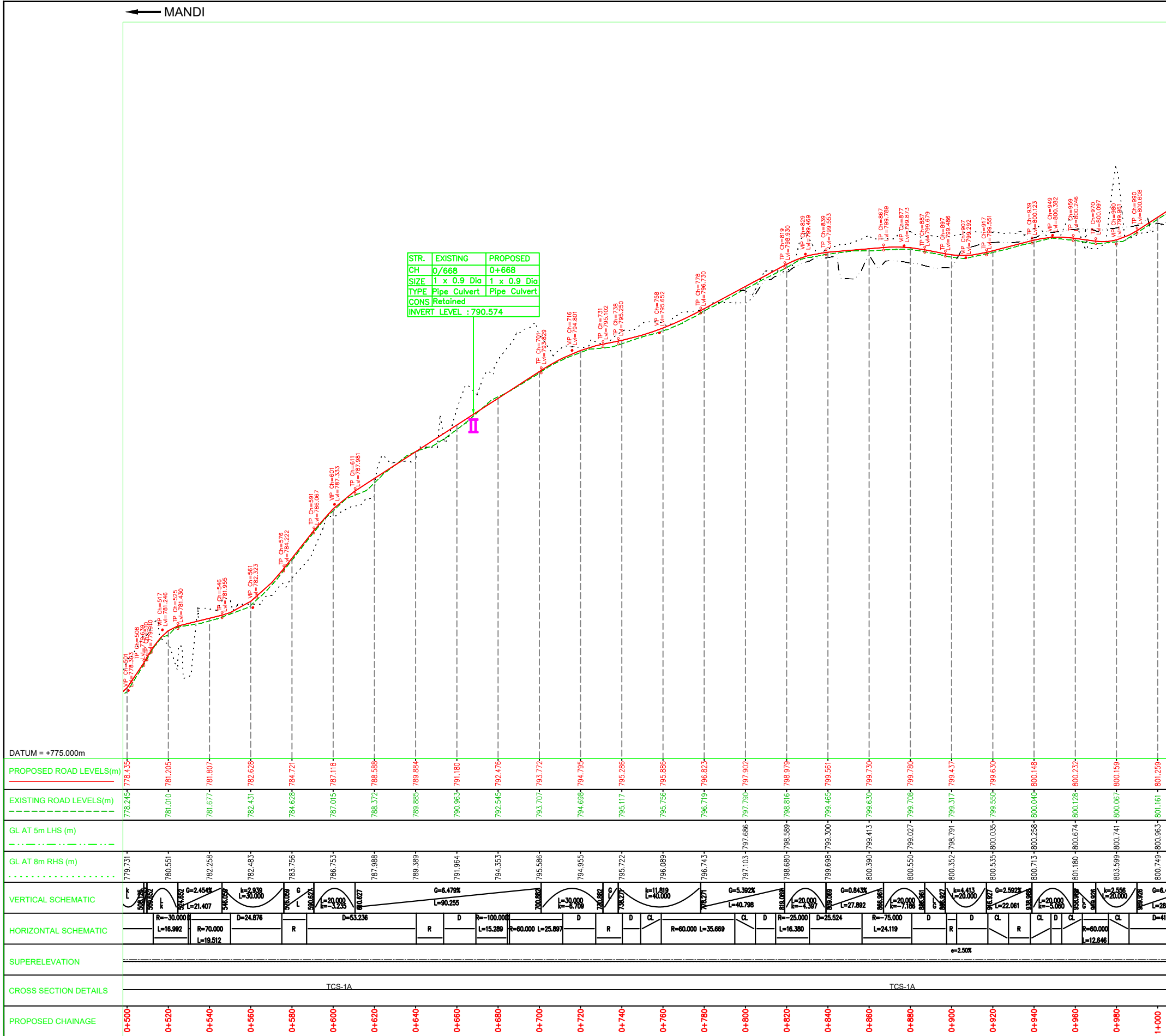
TITLE :  
  
DRAINAGE PLAN & PROFILE  
FROM CH: 0+500 TO CH: 1+000

DRAWING NO : HP/MAN-KAL/DRAINAGE P&P

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi  
District From Km 0+000 To Km 11+000

SHEET 2A OF 22B

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| NOTES:<br>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. |      |             |          |       |
| REV                                                                   | DATE | DESCRIPTION | DESIGNED | DRAWN |
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PROJECT:  
Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE: NOT TO SCALE

|          |               |                                                                                                                       |                 |
|----------|---------------|-----------------------------------------------------------------------------------------------------------------------|-----------------|
| DESIGNED | GANESH        | TITLE :<br>DRAINAGE PLAN & PROFILE<br>FROM CH: 0+500 TO CH: 1+000                                                     |                 |
| DRAWN    | SWAROOPA RANI |                                                                                                                       |                 |
| CHECKED  | PRANAI        | DRAWING NO : HP/MAN-KAL/DRAINAGE P&P                                                                                  |                 |
| APPROVED | PRANAI        | ROAD NAME : Package-V:<br>Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000 | SHEET 2B OF 22B |

TENDER PURPOSE ONLY

MANDI

KALKHAR



TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.



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PROJECT:  
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Project (HPSRTP)

SCALE: NOT TO SCALE

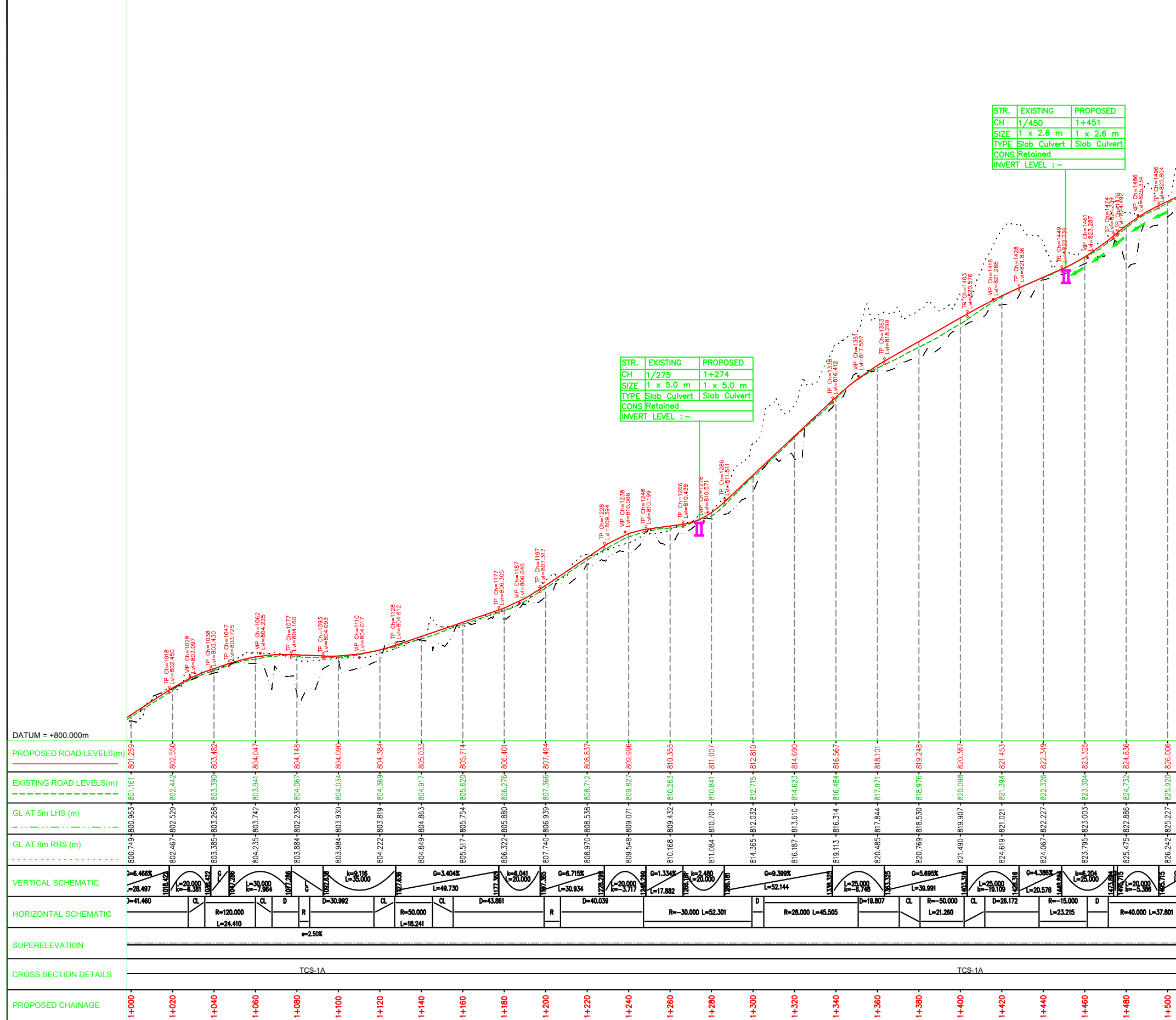
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| DESIGNED | GANESH        |
| DRAWN    | SWAROOPA RANI |
| CHECKED  | PRANVI        |
| APPROVED | PRANVI        |

TITLE :  
DRAINAGE PLAN & PROFILE  
FROM CH: 1+000 TO CH: 1+500

DRAWING NO : HP/MAN-KAL/DRAINAGE P&P

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi  
District From Km 0+000 To Km 11+000

SHEET 3A OF 22B



NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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SCALE:  
NOT TO SCALE

| DESIGNED | GANESH        |
|----------|---------------|
| DRAWN    | SWAROOPA RANI |
| CHECKED  | PRANVI        |
| APPROVED | PRANVI        |

TITLE :  
DRAINAGE PLAN & PROFILE  
FROM CH: 1+000 TO CH: 1+500

DRAWING NO : HP/MAN-KAL/DRAINAGE P&P

ROAD NAME : Package-V:  
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi  
District From Km 0+000 To Km 11+000

SHEET 3B OF 22B

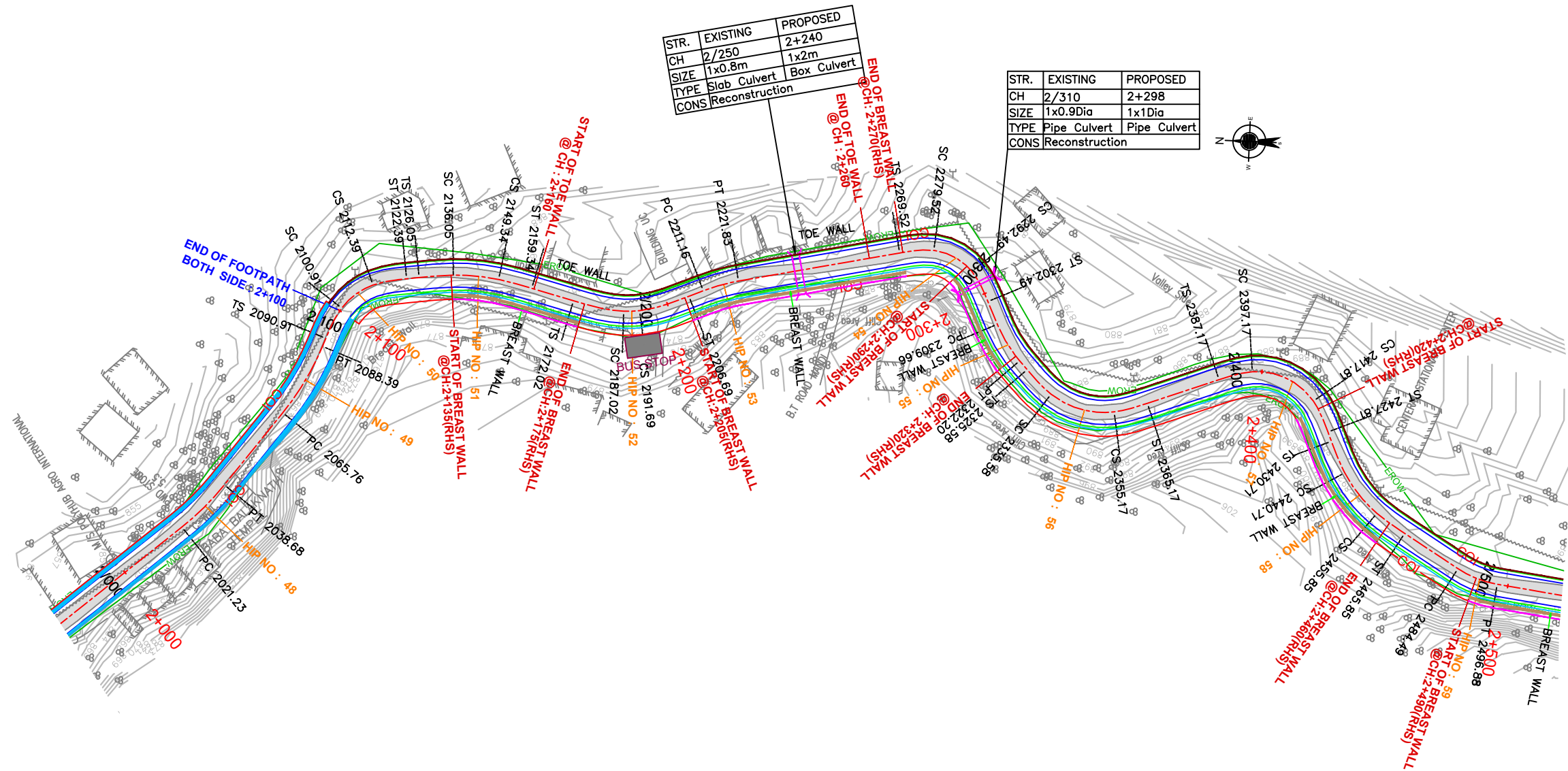
TENDER PURPOSE ONLY





← MANDI

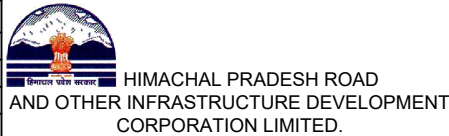
KALKHAR →



TENDER PURPOSE ONLY

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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|          |                                                              |
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| PROJECT: | Himachal Pradesh State Roads Transformation Project (HPSRTP) |
| SCALE:   | NOT TO SCALE                                                 |

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| DESIGNED | GANESH        | TITLE :      | DRAINAGE PLAN & PROFILE FROM CH: 2+000 TO CH: 2+500                                                    |
| DRAWN    | SWAROOPA RANI | DRAWING NO : | HP/MAN-KAL/DRAINAGE P&P                                                                                |
| CHECKED  | PRANVI        | ROAD NAME :  | Package-V: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 0+000 To Km 11+000 |
| APPROVED | PRANVI        |              |                                                                                                        |