

**PUBLIC WORKS DEPARTMENT
GOVERNMENT OF HIMACHAL PRADESH**

AND

**HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE
DEVELOPMENT CORPORATION (HPRIDC),**

NAME OF THE CONTRACT:

PACKAGE -VI

**UPGRADATION OF MANDI - REWALSAR - KALKHAR ROAD IN MANDI DISTRICT
FROM Km:11/000 TO Km:27/854**

BIDDING DOCUMENT

(NATIONAL OPEN COMPETITIVE PROCUREMENT)

VOLUME -4

PART- 2 : WORKS REQUIREMENT

SECTION -VII : DRAWINGS

DESIGN 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

CLIENT:



HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE
DEVELOPMENT CORPORATION LIMITED.

GENERAL DRAWINGS


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

Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE: NOT TO SCALE

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| DESIGNED | MADHU.K |
| DRAWN | DANIEL |
| CHECKED | CS/AH |
| APPROVED | PRADEEP KAPLA |

TITLE : DRAWING INDEX



DRAWING NO : HP/MAN-KAL/D1-001

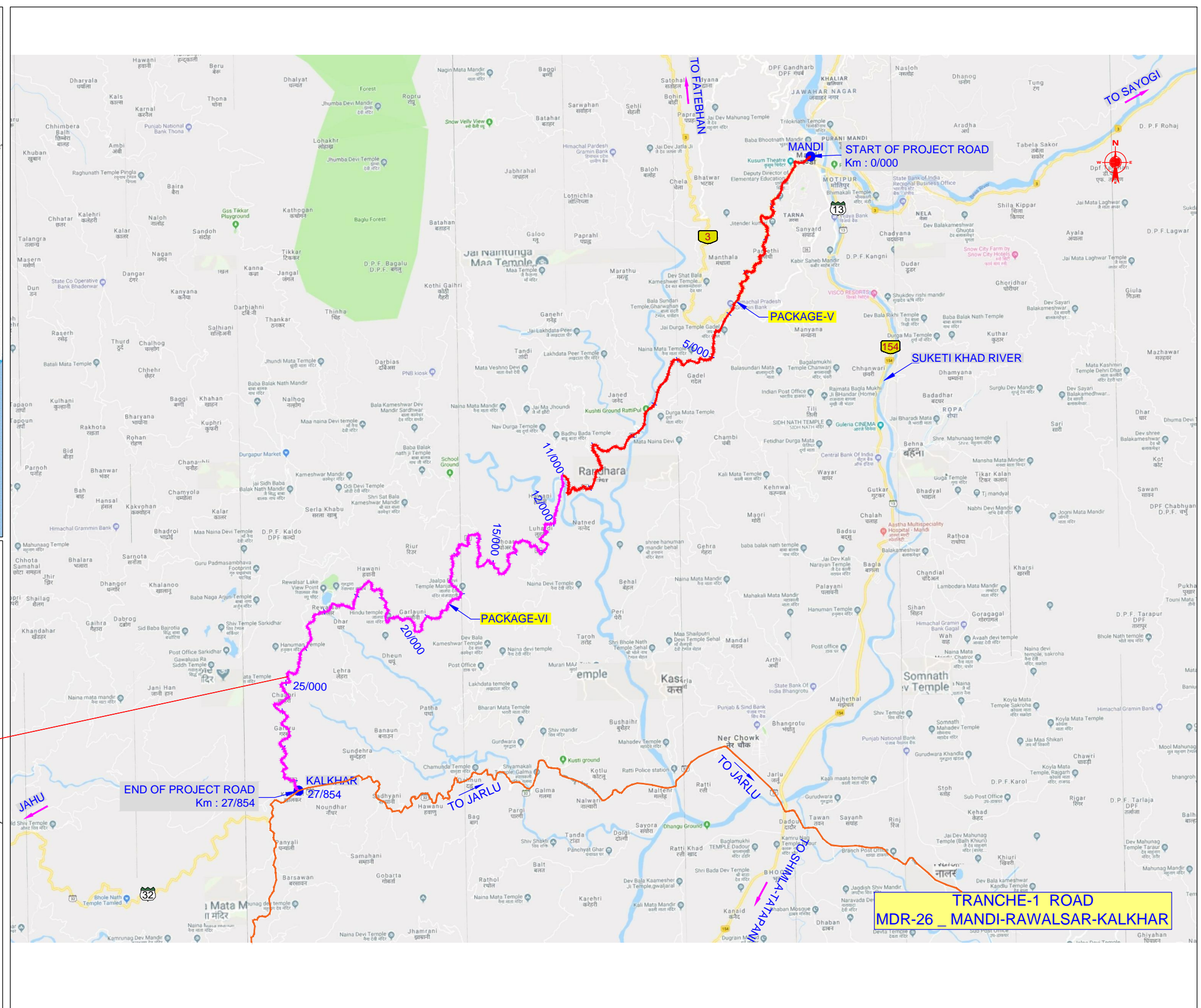
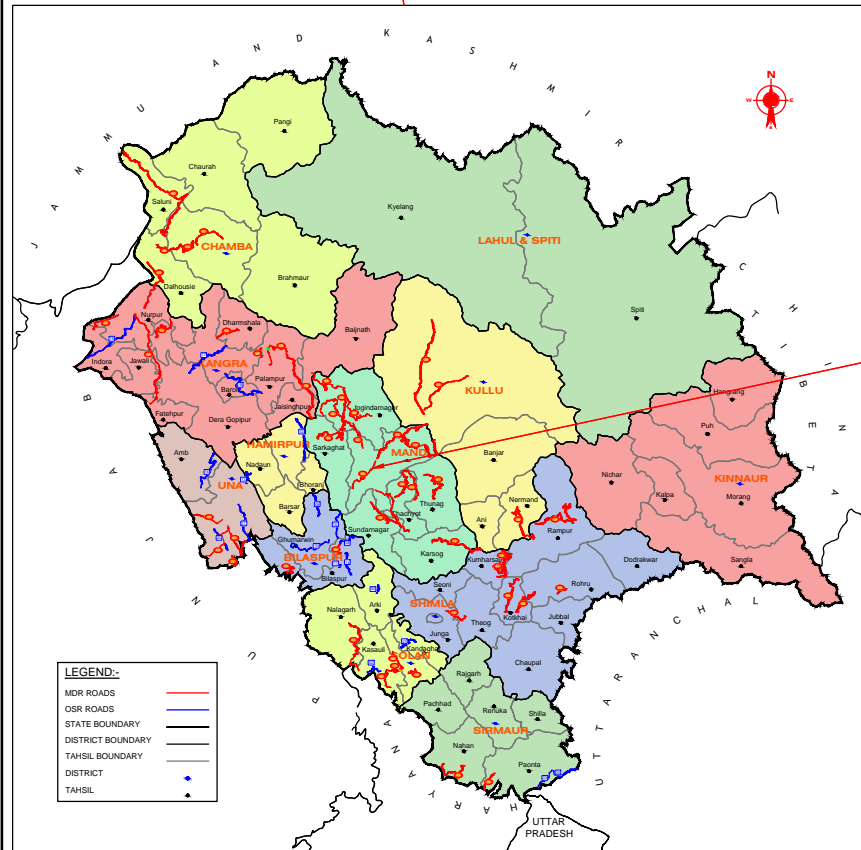
ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 01 OF 02

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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) | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : DRAWING INDEX DRAWING NO : HP/MAN-KAL/D1-002 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | SHEET 02 OF 02 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | NOT TO SCALE | | |



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| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
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PROJECT:
Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE: NOT TO SCALE

DESIGNED: MADHU.K
DRAWN: DANIEL
CHECKED: CS/AH
APPROVED: PRADEEP KAPLA

TITLE : PROJECT LOCATION MAP

DRAWING NO : HP/MAN-KAL/LM-001

ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 01 OF 01

LEGEND

| SL NO. | DESCRIPTION | |
|--------|------------------|--|
| 1 | TEMPLE | |
| 2 | CHURCH | |
| 3 | MOSQUE | |
| 4 | GATES | |
| 5 | ROW STONE | |
| 6 | WELL | |
| 7 | DGPS POINTS | |
| 8 | TREES | |
| 9 | PIPE CULVERT | |
| 10 | SLAB CULVERT | |
| 11 | UTILITY-HT | |
| 12 | LAMP POLE | |
| 13 | UTILITY-EP | |
| 14 | UTILITY-ESB | |
| 15 | ELE BOX | |
| 16 | OFC PILLAR | |
| 17 | HOARDING | |
| 18 | SIGNAL POST | |
| 19 | KILOMETRE STONE | |
| 20 | HECTOMETRE STONE | |
| 21 | HAND PUMP | |
| 22 | MAN HOLE | |
| 23 | BORE WELL | |
| 24 | BOLLARD | |
| 25 | UTILITY-TOWER | |
| 26 | FLAG POST | |
| 27 | SIGN BOARD | |
| 28 | NAME BOARD | |
| 29 | DUSTBIN | |
| 30 | ROAD SIGN | |
| 31 | CANTILIVER | |

| SL NO. | DESCRIPTION | |
|--------|-----------------------------|-------|
| 32 | SPOT LEVEL | |
| 33 | UTILITY-TP | |
| 34 | BUILDING PUCCA | |
| 35 | BUILDINGS KACHHA | |
| 36 | BUILDING UNDER CONSTRUCTION | |
| 37 | BUILDING-HUT | |
| 38 | BUILDING-SHED | |
| 39 | BRIDGE | |
| 40 | CARRIAGEWAY EDGE | |
| 41 | BT ROAD | |
| 42 | CART TRACK | |
| 43 | COMPOUND WALL | |
| 44 | POND | |
| 45 | RE WALL | |
| 46 | FENCING | |
| 47 | CENTERLINE | |
| 48 | EP LINE | |
| 49 | HT LINE | |
| 50 | RAILWAY TRACK | |
| 51 | TP LINE | |
| 52 | EROW LINE | |
| 53 | WATER PIPE LINE | |
| 54 | DRAIN | |
| 55 | EXISTING CHAINAGE | 0/000 |
| 56 | DIVIDER | |
| 57 | DIVIDER ISLAND | |
| 58 | NALA | |
| 59 | CANAL | |
| 60 | DRIVEWAY | |
| 61 | CULTIVATION AREA | |
| 62 | RIVER | |

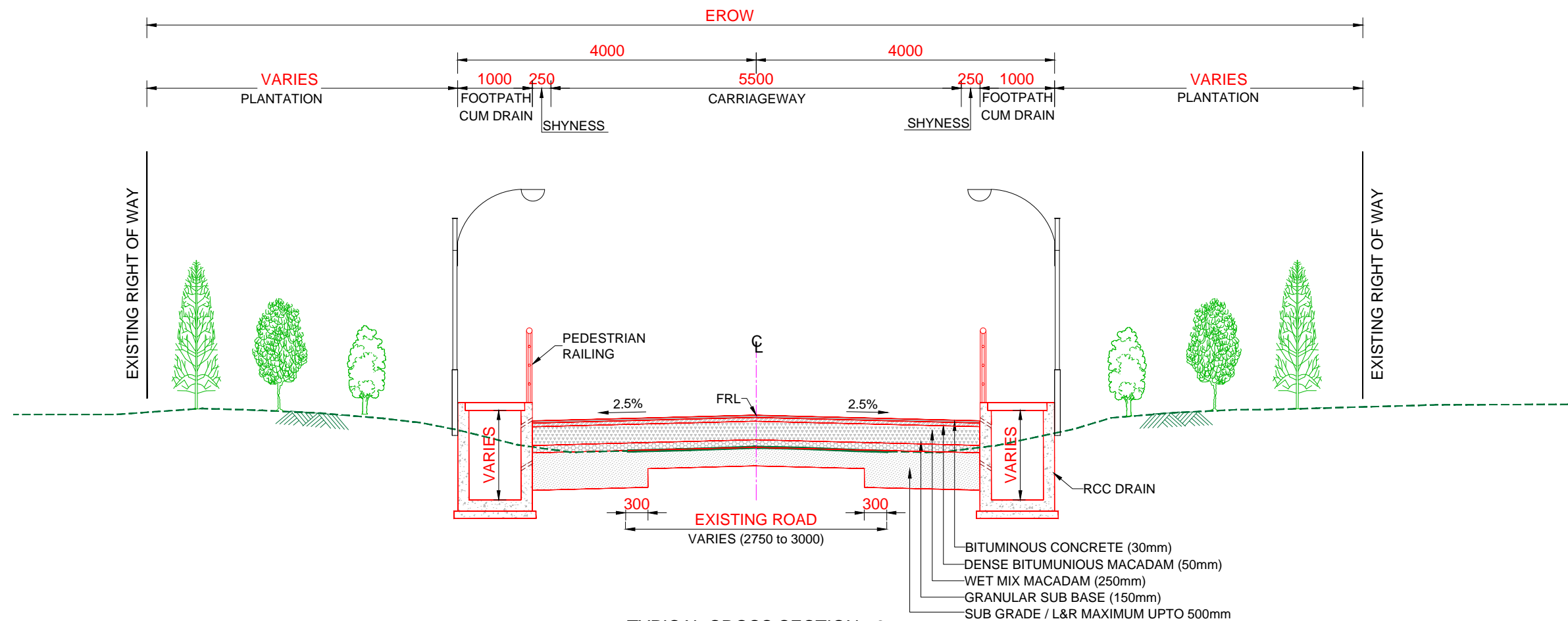
| SL NO. | DESCRIPTION | |
|--------|----------------|--|
| 63 | WATER TANK | |
| 64 | RAILING | |
| 65 | KERB | |
| 66 | CLIFF AREA | |
| 67 | RETAINING WALL | |

| PROPOSED FEATURES | | |
|-------------------|--------------------|-------|
| SL NO. | DESCRIPTION | |
| 1 | CHAINAGE | 0+000 |
| 2 | CENTRE LINE | |
| 3 | CARRIAGEWAY EDGE | |
| 4 | SHOULDER EDGE | |
| 5 | FOOTPATH CUM DRAIN | |
| 6 | CORRIDOR OF IMPACT | |
| 7 | CRASH BARRIER | |
| 8 | VISION BERM | |
| 9 | TOE WALL | |
| 10 | BREAST WALL | |
| 11 | BREAST WALL EDGE | |

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TYPICAL CROSS SECTIONS



TYPICAL CROSS SECTION - 2
INTERMEDIATE LANE CARRIAGEWAY IN BUILT-UP SECTIONS


- NOTES:-**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. ADJUSTMENT OF DRAINS / EARTHWORKS / SHOULDERS REQUIRED IN A FEW LOCATIONS TO FIT THE PROPOSED CROSS SECTION WITH IN THE AVAILABLE ROW.
 3. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS LESS THAN THE OGL THE ENTIRE EXISTING PAVEMENT SHALL BE REMOVED AND LOOSENING AND COMPACTION OF THE EXISTING SUBGRADE TO FULL DEPTH SHALL BE DONE IF THE SOIL SATISFIES THE REQUIREMENT OF EFFECTIVE CBR OF 9%. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENEED AND COMPACTED.
 4. DUE ALLOWANCE OF EXISTING WBM/WMM/GSB QUANTITIES SHALL BE ACCOUNTED FOR.
 5. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS MORE THAN THE OGL UP TO 420MM THE BITUMINOUS SURFACE SHALL BE SCARIFIED AND BE FILLED WITH SUBGRADE MATERIALS AND EXISTING LAYERS OF WBM/WMM/GSM SHALL NOT BE REMOVED. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENEED AND COMPACTED.
 6. THE LOCATION OF ELECTRIC POLE SHOWN IS TENTATIVE AND TO BE FINALIZED BY THE CONTRACTOR IN CONSULTATION WITH CSC/HPRIDC & CONCERNED AUTHORITY AS PER SITE CONDITION.
 7. FOR THE DETAILS LAINED DRAIN CUM UTILITY DUCT & DETAILS OF LAINED DRAIN REFER DRAWING NO:HP/MAN-KAL/MISC-020.
 8. FOR THE DETAILS OF PEDESTRIAN GUARDRAIL REFER DRAWING NO:HP/MAN-KAL/MISC-003
 9. FOR OPTIMUM UTILIZATION OF AVAILABLE ROW IN BUILT UP AREAS, LIKE FUTURE DEVELOPMENTS, THE POSITION OF FOOTPATH CUM DRAIN AND OTHER ELEMENTS SHALL BE ADJUSTED IN CONSULTATION WITH CSC AND HPRIDC.
 10. THE SPECIES AND WIDTH SHOWN FOR THE PLANTATION ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC.
 11. AT A FEW LOCATIONS BREAST WALLS WOULD BE REQUIRED, REFER TO DRAWING NO: HP/MAN-KAL/MISC-017 AND HP/MAN-KAL/MISC-023A.

TCS SCHEDULE

| S.No | Design Ch (Km) | | Length (m) |
|------|----------------|-------|------------|
| | From | To | |
| 1 | 11900 | 12100 | 200 |
| 2 | 16000 | 16250 | 250 |
| 3 | 21700 | 23250 | 1550 |

TENDER PURPOSE ONLY

| 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)

DESIGNED: MADHU.K
 DRAWN: DANIEL
 CHECKED: CS/AH
 APPROVED: PRADEEP KAPLA

SCALE: NOT TO SCALE

TITLE : TYPICAL CROSS SECTIONS

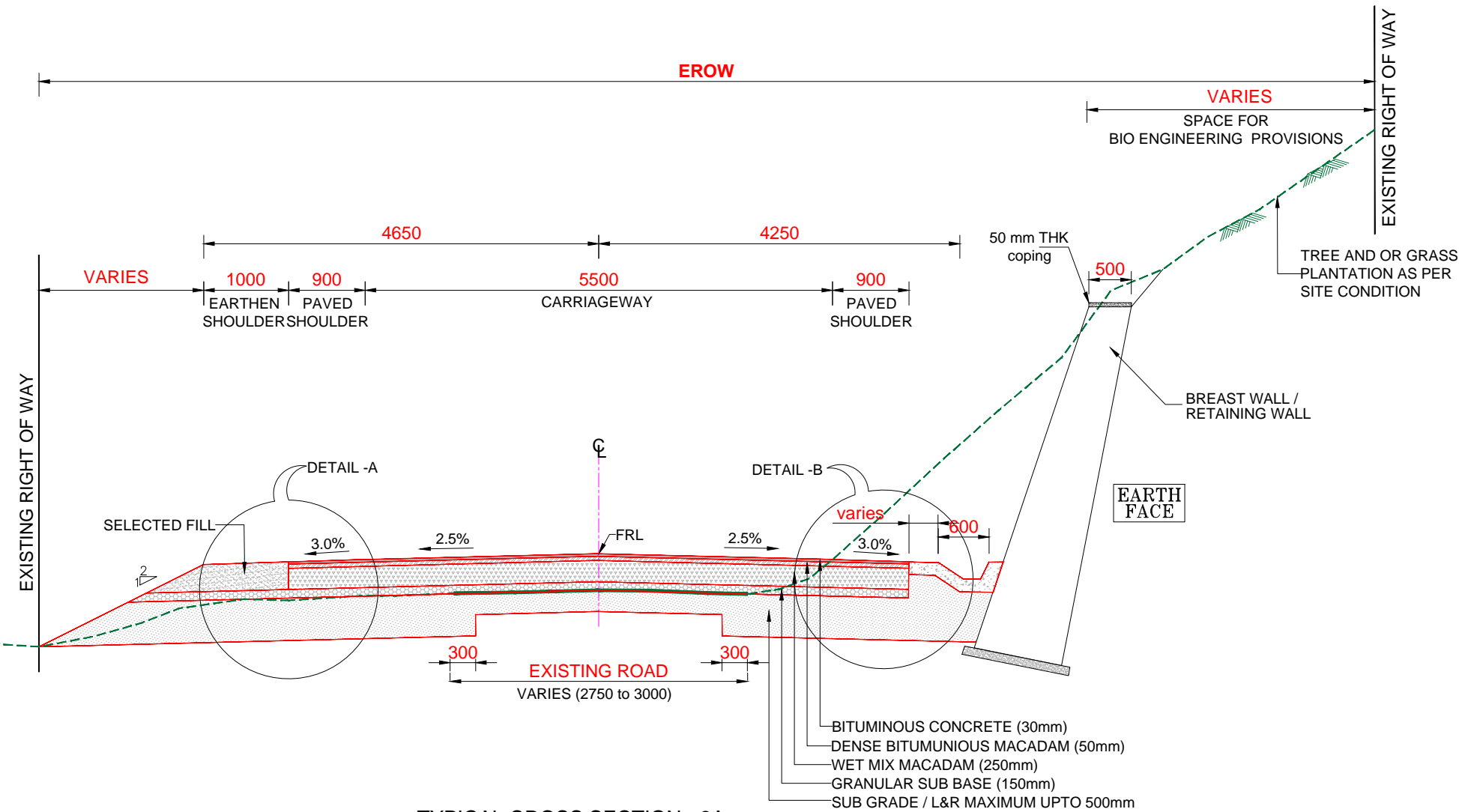
DRAWING NO : HP/MAN-KAL/TCS-002

ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 01 OF 04

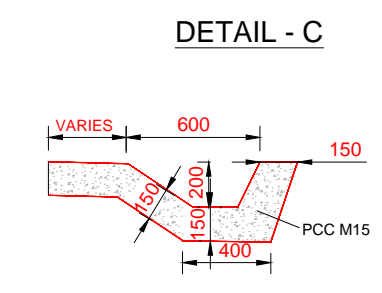
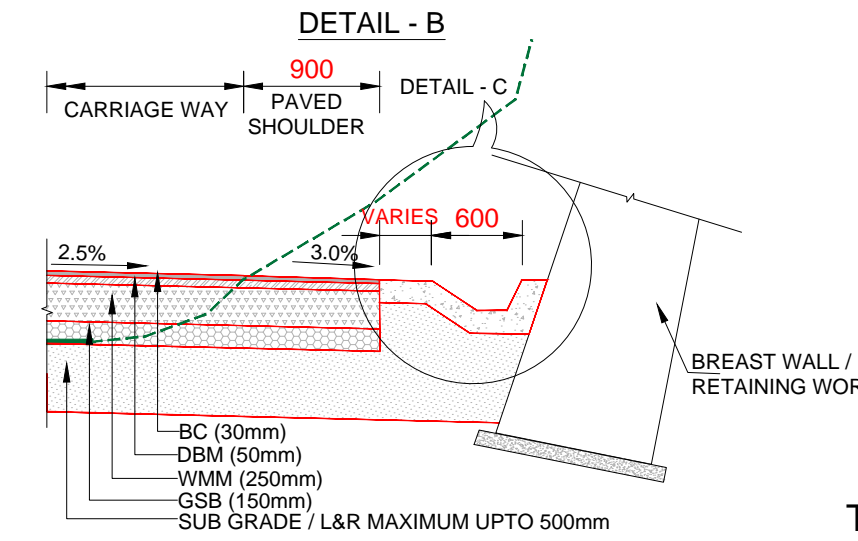
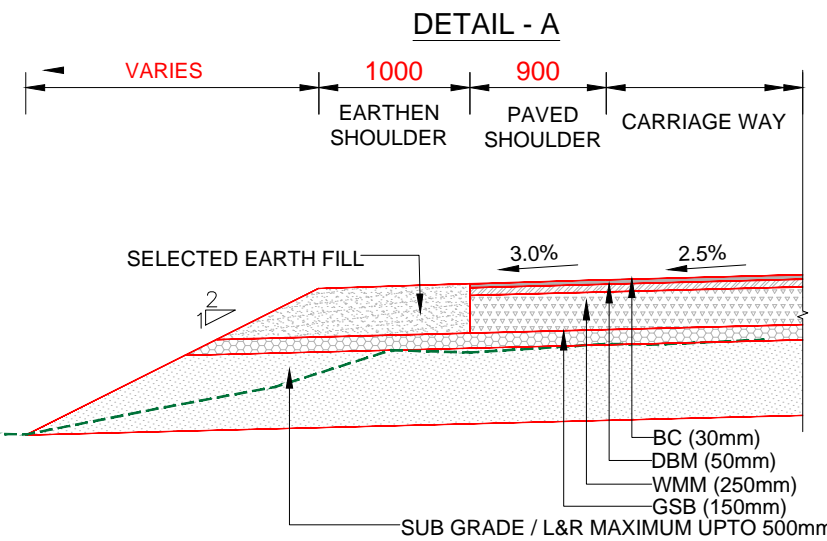
TCS SCHEDULE

| S.No | Design Ch (Km) | | Length (m) | S.No | Design Ch (Km) | | Length (m) |
|------|----------------|-------|------------|------|----------------|-------|------------|
| | From | To | | | From | To | |
| 1 | 11020 | 11240 | 220 | 28 | 19400 | 19530 | 130 |
| 2 | 11690 | 11790 | 100 | 29 | 19590 | 19710 | 120 |
| 3 | 12100 | 12210 | 110 | 30 | 19860 | 19970 | 110 |
| 4 | 12350 | 12380 | 30 | 31 | 20200 | 20250 | 50 |
| 5 | 12410 | 12910 | 500 | 32 | 20300 | 20370 | 70 |
| 6 | 12950 | 13040 | 90 | 33 | 20400 | 20460 | 60 |
| 7 | 13140 | 13180 | 40 | 34 | 20510 | 20630 | 120 |
| 8 | 13230 | 13380 | 150 | 35 | 20750 | 20930 | 180 |
| 9 | 13440 | 13530 | 90 | 36 | 20960 | 21030 | 70 |
| 10 | 13560 | 13650 | 90 | 37 | 21270 | 21280 | 10 |
| 11 | 14170 | 14220 | 50 | 38 | 21330 | 21370 | 40 |
| 12 | 14390 | 14470 | 80 | 39 | 21470 | 21510 | 40 |
| 13 | 14600 | 14660 | 60 | 40 | 21570 | 21600 | 30 |
| 14 | 15030 | 15340 | 310 | 41 | 21690 | 21700 | 10 |
| 15 | 15450 | 15490 | 40 | 42 | 23280 | 23290 | 10 |
| 16 | 15590 | 15690 | 100 | 43 | 23820 | 23840 | 20 |
| 17 | 15740 | 15840 | 100 | 44 | 23870 | 24050 | 180 |
| 18 | 15900 | 15930 | 30 | 45 | 25060 | 25110 | 50 |
| 19 | 17090 | 17110 | 20 | 46 | 25260 | 25270 | 10 |
| 20 | 17670 | 17760 | 90 | 47 | 25340 | 25400 | 60 |
| 21 | 17800 | 17810 | 10 | 48 | 25480 | 25560 | 80 |
| 22 | 18140 | 18210 | 70 | 49 | 26020 | 26050 | 30 |
| 23 | 18580 | 18630 | 50 | 50 | 26150 | 26160 | 10 |
| 24 | 18680 | 18750 | 70 | 51 | 27020 | 27070 | 50 |
| 25 | 18800 | 18810 | 10 | 52 | 27350 | 27410 | 60 |
| 26 | 18880 | 18960 | 80 | 53 | 27460 | 27470 | 10 |
| 27 | 19150 | 19360 | 210 | 54 | 27540 | 27650 | 110 |



TYPICAL CROSS SECTION - 3A
INTERMEDIATE LANE CARRIAGEWAY IN RURAL HILL CUTTING SECTIONS

- NOTES:-**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS LESS THAN THE OGL THE ENTIRE EXISTING PAVEMENT SHALL BE REMOVED AND LOOSENING AND COMPACTION OF THE EXISTING SUBGRADE TO FULL DEPTH SHALL BE DONE IF THE SOIL SATISFIES THE REQUIREMENT OF AFFECTIVE CBR OF 9%. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 3. DUE ALLOWANCE OF EXISTING WBM/WMM/GSB QUANTITIES SHALL BE ACCOUNTED FOR.
 4. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS MORE THAN THE OGL UP TO 420MM THE BITUMINOUS SURFACE SHALL BE SCARIFIED AND BE FILLED WITH SUBGRADE MATERIALS AND EXISTING LAYERS OF WBM/WMM/GSM SHALL NOT BE REMOVED. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 5. REFER DRAWING NOS : HP/MAN-KAL/MISC-017A, 017B, 017C AND 023A FOR SCHEDULES AND DETAILS OF BREAST WALL / RETAINING WALL TOWARDS THE HILL SIDE. THE SCHEDULES GIVEN ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BY THE CONTRACTOR BASED ON THE TYPE OF STRATA ENCOUNTERED AND CUT SLOPES ACHIEVED.
 6. AT NATURAL WATER STREAM LOCATIONS, THE RIGID PAVEMENT SHALL BE CONSTRUCTED. FOR SCHEDULE REFER DRAWING NO: HP/MAN-KAL/MISC-030.



TENDER PURPOSE ONLY

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

CONSULTANT:
SATRA
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: MADHU.K
DRAWN: DANIEL
CHECKED: CS/AH
APPROVED: PRADEEP KAPLA

TITLE: TYPICAL CROSS SECTIONS

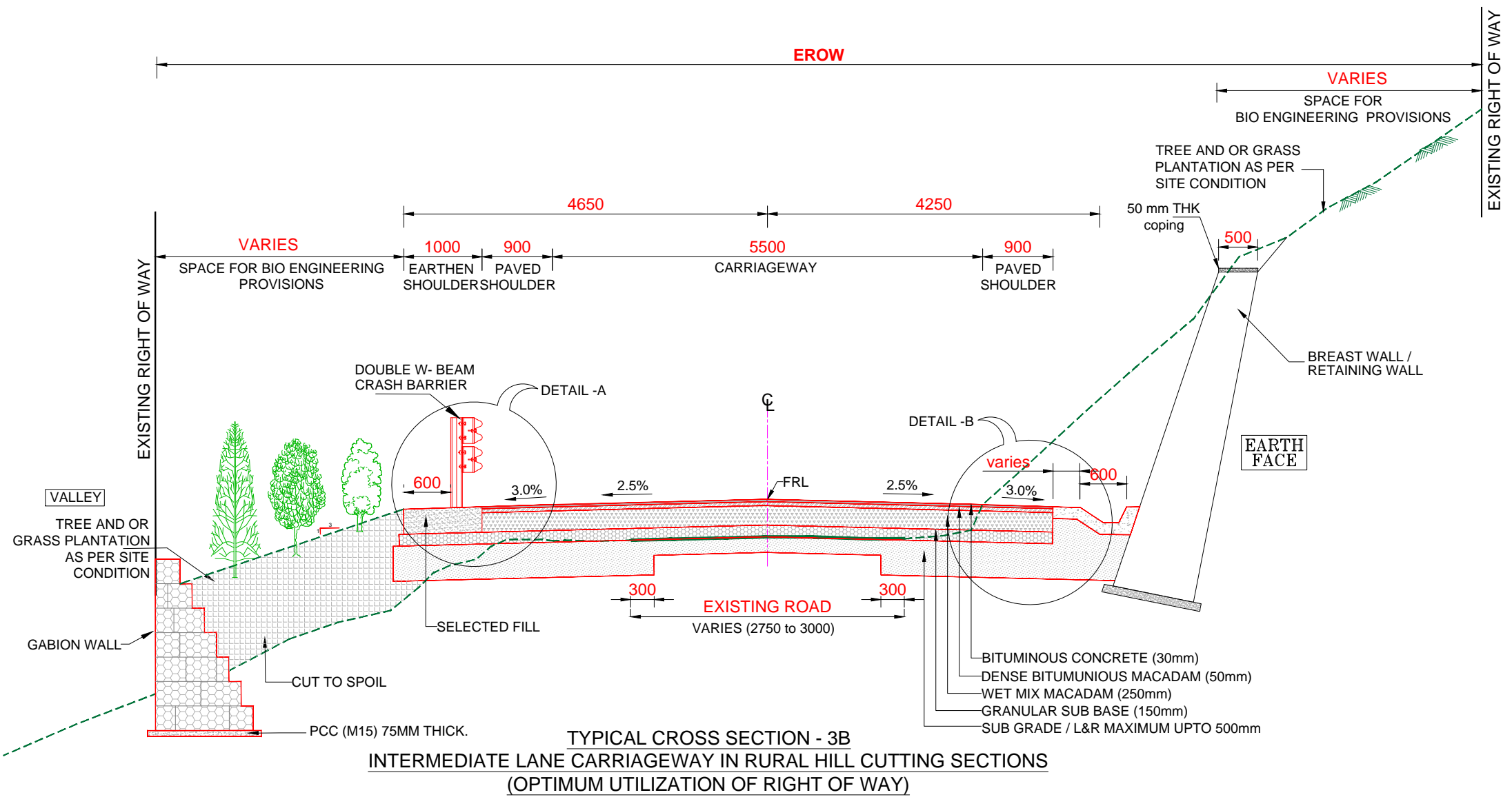
DRAWING NO : HP/MAN-KAL/TCS-003A

ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

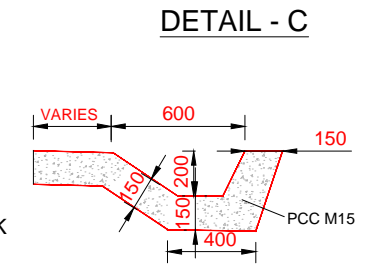
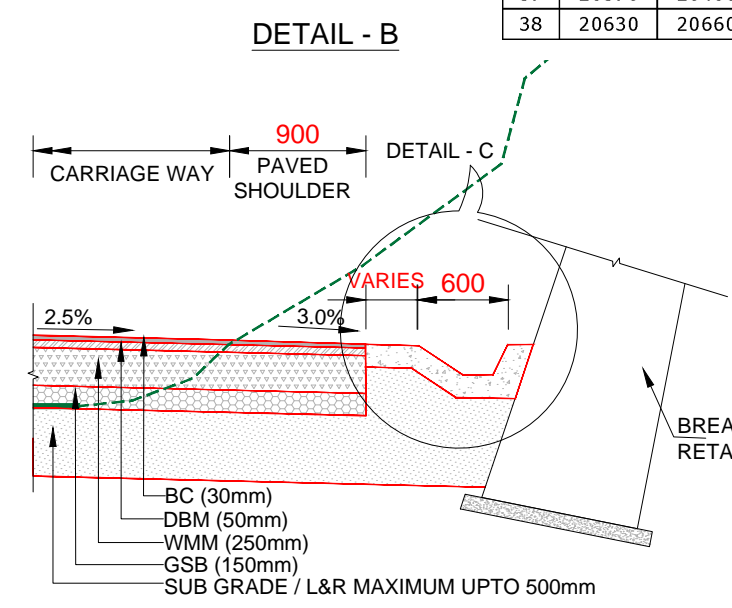
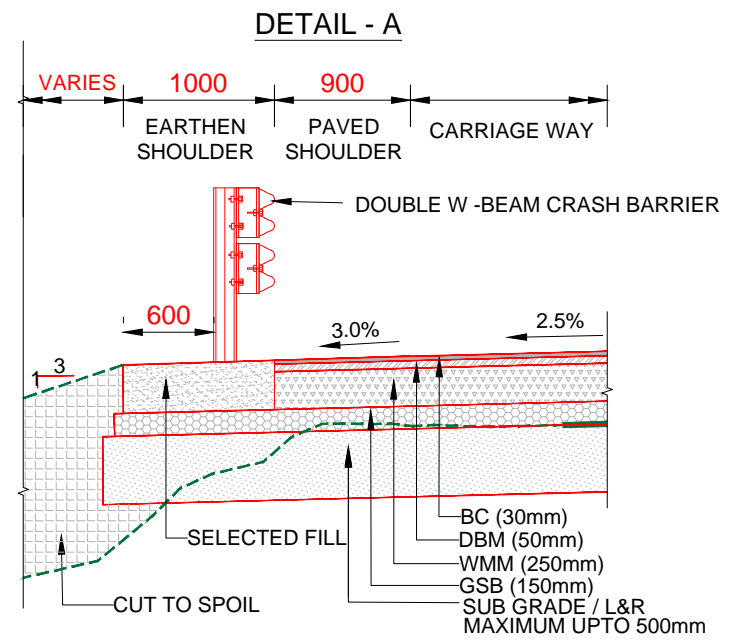
SHEET 02 OF 04

TCS SCHEDULE

| S.No | Design Ch (Km) | | Length (m) | S.No | Design Ch (Km) | | Length (m) |
|------|----------------|-------|------------|------|----------------|-------|------------|
| | From | To | | | From | To | |
| 1 | 11000 | 11020 | 20 | 39 | 20930 | 20960 | 30 |
| 2 | 11240 | 11310 | 70 | 40 | 21030 | 21110 | 80 |
| 3 | 11790 | 11900 | 110 | 41 | 21240 | 21270 | 30 |
| 4 | 12320 | 12350 | 30 | 42 | 21280 | 21330 | 50 |
| 5 | 12380 | 12410 | 30 | 43 | 21370 | 21470 | 100 |
| 6 | 13040 | 13140 | 100 | 44 | 21510 | 21570 | 60 |
| 7 | 13180 | 13230 | 50 | 45 | 21600 | 21690 | 90 |
| 8 | 13380 | 13440 | 60 | 46 | 23290 | 23340 | 50 |
| 9 | 13530 | 13560 | 30 | 47 | 23750 | 23800 | 50 |
| 10 | 13840 | 13880 | 40 | 48 | 23840 | 23870 | 30 |
| 11 | 14070 | 14100 | 30 | 49 | 24150 | 24200 | 50 |
| 12 | 14130 | 14170 | 40 | 50 | 24250 | 24280 | 30 |
| 13 | 14220 | 14390 | 170 | 51 | 24370 | 24400 | 30 |
| 14 | 14470 | 14600 | 130 | 52 | 24420 | 24520 | 100 |
| 15 | 14660 | 14700 | 40 | 53 | 24610 | 24740 | 130 |
| 16 | 14760 | 14790 | 30 | 54 | 24850 | 24980 | 130 |
| 17 | 15340 | 15450 | 110 | 55 | 25010 | 25060 | 50 |
| 18 | 15510 | 15540 | 30 | 56 | 25110 | 25180 | 70 |
| 19 | 15550 | 15590 | 40 | 57 | 25270 | 25340 | 70 |
| 20 | 15840 | 15900 | 60 | 58 | 25400 | 25480 | 80 |
| 21 | 16280 | 16350 | 70 | 59 | 25560 | 25680 | 120 |
| 22 | 16360 | 16420 | 60 | 60 | 25700 | 25790 | 90 |
| 23 | 16730 | 16840 | 110 | 61 | 25850 | 25960 | 110 |
| 24 | 16890 | 16920 | 30 | 62 | 26050 | 26150 | 100 |
| 25 | 17470 | 17670 | 200 | 63 | 26300 | 26350 | 50 |
| 26 | 17760 | 17800 | 40 | 64 | 26370 | 26420 | 50 |
| 27 | 18020 | 18140 | 120 | 65 | 26440 | 26470 | 30 |
| 28 | 18300 | 18420 | 120 | 66 | 26600 | 26660 | 60 |
| 29 | 18440 | 18580 | 140 | 67 | 26690 | 26740 | 50 |
| 30 | 18630 | 18680 | 50 | 68 | 26870 | 26910 | 40 |
| 31 | 18820 | 18880 | 60 | 69 | 26920 | 26990 | 70 |
| 32 | 18960 | 19130 | 170 | 70 | 27070 | 27140 | 70 |
| 33 | 19360 | 19400 | 40 | 71 | 27170 | 27240 | 70 |
| 34 | 19530 | 19590 | 60 | 72 | 27250 | 27350 | 100 |
| 35 | 20020 | 20060 | 40 | 73 | 27470 | 27540 | 70 |
| 36 | 20250 | 20300 | 50 | 74 | 27650 | 27680 | 30 |
| 37 | 20370 | 20400 | 30 | 75 | 27710 | 27780 | 70 |
| 38 | 20630 | 20660 | 30 | 76 | 27810 | 27860 | 50 |

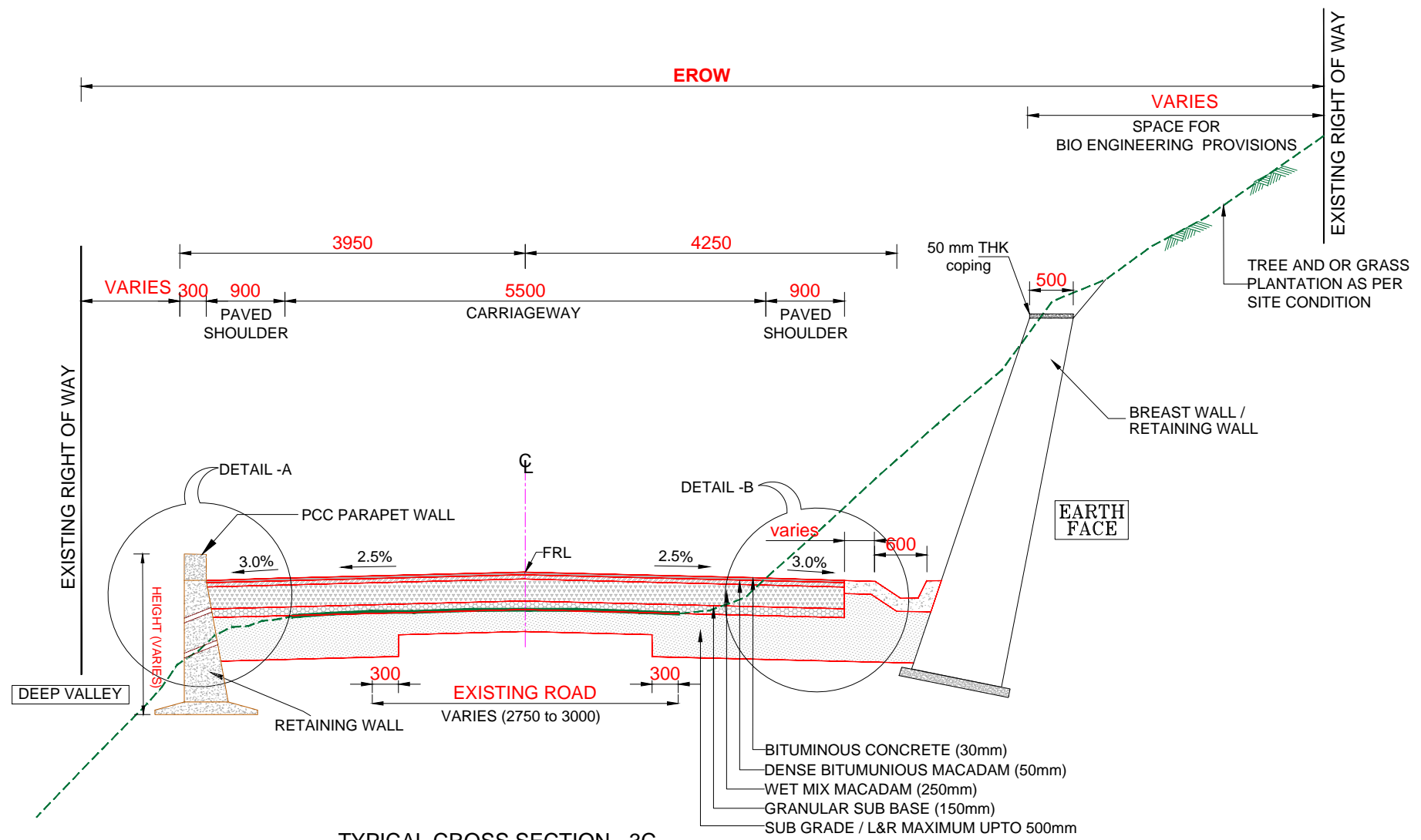


- NOTES:-**
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 - IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS LESS THAN THE OGL THE ENTIRE EXISTING PAVEMENT SHALL BE REMOVED AND LOOSENING AND COMPACTION OF THE EXISTING SUBGRADE TO FULL DEPTH SHALL BE DONE IF THE SOIL SATISFIES THE REQUIREMENT OF AFFECTIVE CBR OF 9%. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 - DUE ALLOWANCE OF EXISTING WBM/WMM/GSB QUANTITIES SHALL BE ACCOUNTED FOR.
 - IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS MORE THAN THE OGL UP TO 420MM THE BITUMINOUS SURFACE SHALL BE SCARIFIED AND BE FILLED WITH SUBGRADE MATERIALS AND EXISTING LAYERS OF WBM/WMM/GSM SHALL NOT BE REMOVED. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 - REFER DRAWING NOS : HP/MAN-KAL/MISC-017A, 017B, 017C AND 023A FOR SCHEDULES AND DETAILS OF BREAST WALL / RETAINING WALL TOWARDS THE HILL SIDE. THE SCHEDULES GIVEN ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BY THE CONTRACTOR BASED ON THE TYPE OF STRATA ENCOUNTERED AND CUT SLOPES ACHIEVED.
 - AT NATURAL WATER STREAM LOCATIONS, THE RIGID PAVEMENT SHALL BE CONSTRUCTED. FOR SCHEDULE REFER DRAWING NO: HP/MAN-KAL/MISC-030.
 - FOR W-BEAM CRASH BARRIER DETAILS REFER DRAWING NO: HP/MAN-KAL/MISC-004.
 - FOR RETAINING GABION STRUCTURES REFER DRAWING NO: HP/MAN-KAL/MISC-016.
 - THE SPECIES AND WIDTH SHOWN FOR THE BIOENGINEERING PROVISIONS ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BASED ON THE TYPE OF STRATA ENCOUNTERED AND CUT SLOPES ACHIEVED. REFER TO ESMP DRAWINGS FOR DETAILS OF VARIOUS BIOENGINEERING SOLUTIONS.



TENDER PURPOSE ONLY

| <table border="1"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>DESCRIPTION</th> <th>DESIGNED</th> <th>DRAWN</th> <th>CHECKED</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> | REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | | | | | | | | | | | | | | | | | | | | | | <p>CLIENT:</p> <p>HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</p> | <p>CONSULTANT:</p> <p>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</p> | <p>PROJECT:</p> <p>Himachal Pradesh State Roads Transformation Project (HPSRTP)</p> | <p>DESIGNED: MADHU.K</p> <p>DRAWN: DANIEL</p> <p>CHECKED: CS/AH</p> <p>APPROVED: PRADEEP KAPLA</p> | <p>TITLE :</p> <p>TYPICAL CROSS SECTIONS</p> <p>DRAWING NO : HP/MAN-KAL/TCS-003B</p> <p>ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854</p> | <p>SCALE: NOT TO SCALE</p> | <p>SHEET 03 OF 05</p> |
|--|-----|------|-------------|----------|-------|---------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|----------------------------|-----------------------|
| | REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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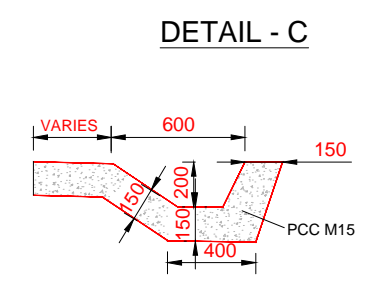
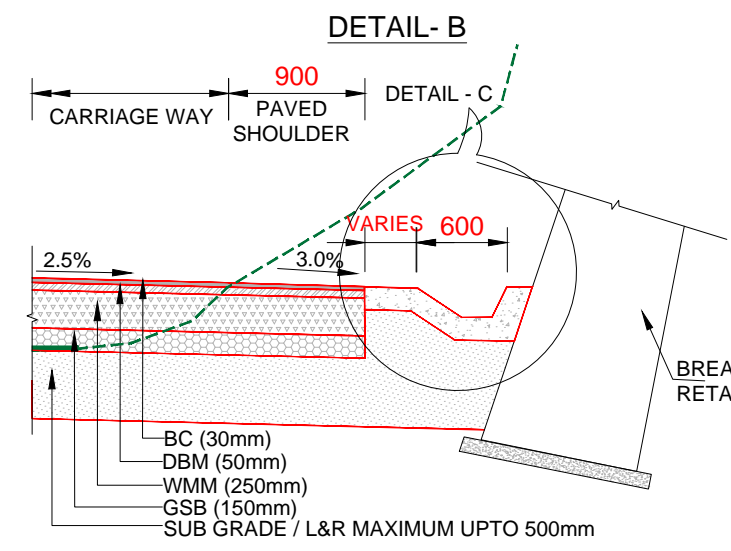
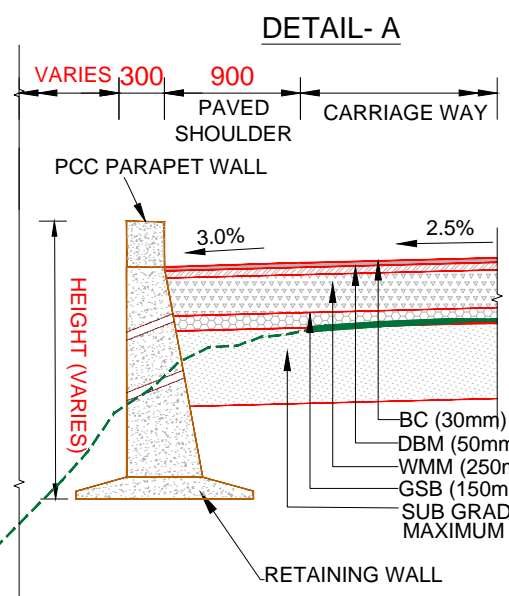


TCS SCHEDULE

| S.No | Design Ch (Km) | | Length (m) | S.No | Design Ch (Km) | | Length (m) |
|------|----------------|-------|------------|------|----------------|-------|------------|
| | From | To | | | From | To | |
| 1 | 11310 | 11690 | 380 | 24 | 21110 | 21240 | 130 |
| 2 | 12210 | 12250 | 40 | 25 | 23340 | 23500 | 160 |
| 3 | 14010 | 14060 | 50 | 26 | 23510 | 23750 | 240 |
| 4 | 14100 | 14130 | 30 | 27 | 23800 | 23820 | 20 |
| 5 | 14735 | 14760 | 25 | 28 | 24050 | 24150 | 100 |
| 6 | 15690 | 15740 | 50 | 29 | 24200 | 24250 | 50 |
| 7 | 15930 | 16000 | 70 | 30 | 24280 | 24300 | 20 |
| 8 | 16270 | 16280 | 10 | 31 | 24400 | 24420 | 20 |
| 9 | 16350 | 16360 | 10 | 32 | 24520 | 24610 | 90 |
| 10 | 16420 | 16450 | 30 | 33 | 24740 | 24850 | 110 |
| 11 | 16510 | 16550 | 40 | 34 | 26005 | 26020 | 15 |
| 12 | 16560 | 16620 | 60 | 35 | 26170 | 26210 | 40 |
| 13 | 16640 | 16730 | 90 | 36 | 26240 | 26280 | 40 |
| 14 | 16840 | 16890 | 50 | 37 | 26420 | 26440 | 20 |
| 15 | 16920 | 17055 | 135 | 38 | 26560 | 26600 | 40 |
| 16 | 18210 | 18235 | 25 | 39 | 26740 | 26870 | 130 |
| 17 | 18420 | 18440 | 20 | 40 | 26910 | 26920 | 10 |
| 18 | 18790 | 18800 | 10 | 41 | 26990 | 27020 | 30 |
| 19 | 18810 | 18820 | 10 | 42 | 27240 | 27250 | 10 |
| 20 | 19130 | 19150 | 20 | 43 | 27410 | 27460 | 50 |
| 21 | 20060 | 20200 | 140 | 44 | 27680 | 27710 | 30 |
| 22 | 20460 | 20510 | 50 | 45 | 27780 | 27810 | 30 |
| 23 | 20660 | 20750 | 90 | | | | |

TYPICAL CROSS SECTION - 3C
INTERMEDIATE LANE CARRIAGEWAY IN RURAL HILL CUTTING SECTIONS
(DEEP VALLEY LOCATION)

- NOTES:-
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS LESS THAN THE OGL THE ENTIRE EXISTING PAVEMENT SHALL BE REMOVED AND LOOSENING AND COMPACTION OF THE EXISTING SUBGRADE TO FULL DEPTH SHALL BE DONE IF THE SOIL SATISFIES THE REQUIREMENT OF AFFECTIVE CBR OF 9%. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 3. DUE ALLOWANCE OF EXISTING WBM/WMM/GSB QUANTITIES SHALL BE ACCOUNTED FOR.
 4. IF THE LEVEL OF THE GSB BOTTOM OF THE NEW PAVEMENT IS MORE THAN THE OGL UP TO 420MM THE BITUMINOUS SURFACE SHALL BE SCARIFIED AND BE FILLED WITH SUBGRADE MATERIALS AND EXISTING LAYERS OF WBM/WMM/GSM SHALL NOT BE REMOVED. FOR THE WIDENING PORTION THE TOP LAYER OF EMBANKMENT SHALL BE LOOSENED AND COMPACTED.
 5. REFER DRAWING NOS : HP/MAN-KAL/MISC-017A, 017B, 017C AND 023A FOR SCHEDULES AND DETAILS OF BREAST WALL / RETAINING WALL TOWARDS THE HILL SIDE. THE SCHEDULES GIVEN ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BY THE CONTRACTOR BASED ON THE TYPE OF STRATA ENCOUNTERED AND CUT SLOPES ACHIEVED.
 6. AT NATURAL WATER STREAM LOCATIONS, THE RIGID PAVEMENT SHALL BE CONSTRUCTED. FOR SCHEDULE REFER DRAWING NO: HP/MAN-KAL/MISC-030.
 7. FOR SCHEDULES AND DETAILS OF RETAINING WALLS TOWARDS THE VALLEY SIDE, REFER TO DRAWING NO: HP/MAN-KAL/MISC-015. THE SCHEDULES GIVEN ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BY THE CONTRACTOR BASED ON THE AVAILABLE RIGHT OF WAY AND FILL SLOPES.
 9. THE SPECIES AND WIDTH SHOWN FOR THE BIOENGINEERING PROVISIONS ARE INDICATIVE AND SHALL BE FINALIZED IN CONSULTATION WITH CSC BASED ON THE TYPE OF STRATA ENCOUNTERED AND CUT SLOPES ACHIEVED. REFER TO ESMF DRAWINGS FOR DETAILS OF VARIOUS BIOENGINEERING SOLUTIONS.



TENDER PURPOSE ONLY


| | | | | | | | | | |
|---|--|---|--|---|--|---|--|--|--|
| 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) | | DESIGNED: MADHU.K DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | | TITLE : TYPICAL CROSS SECTIONS | |
| REV. DATE DESCRIPTION DESIGNED DRAWN CHECKED APPROVED | | | | SCALE: NOT TO SCALE | | DRAWING NO : HP/MAN-KAL/TCS-003C | | ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | |

GEOMETRY AND SECONDARY
CONTROL/ REFERENCE POINTS

| DGPS Control Points | | | | | | | | | | |
|---------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-------------|----------|
| Sl. No. | Point ID | Latitude | | | Longitude | | | Easting | Northing | RL |
| | | Degrees ° | Minutes ' | Seconds " | Degrees ° | Minutes ' | Seconds " | | | |
| 1 | GPS1 | 31 | 42 | 23.2784 | 76 | 55 | 41.5429 | 682722.769 | 3509518.102 | - |
| 2 | GPS1A | 31 | 42 | 22.8182 | 76 | 55 | 41.5825 | 682724.062 | 3509503.948 | - |
| 3 | GPS2 | 31 | 41 | 34.4162 | 76 | 55 | 20.5124 | 682195.628 | 3508003.547 | - |
| 4 | GPS2A | 31 | 41 | 34.1478 | 76 | 55 | 20.9200 | 682206.507 | 3507995.470 | - |
| 5 | GPS3 | 31 | 40 | 27.4517 | 76 | 54 | 31.6689 | 680945.612 | 3505918.690 | - |
| 6 | GPS3A | 31 | 40 | 27.5712 | 76 | 54 | 32.3907 | 680964.558 | 3505922.701 | - |
| 7 | GPS4 | 31 | 39 | 32.6443 | 76 | 53 | 32.6752 | 679421.204 | 3504203.747 | - |
| 8 | GPS4A | 31 | 39 | 32.8028 | 76 | 53 | 32.2695 | 679410.433 | 3504208.444 | - |
| 9 | GPS5 | 31 | 38 | 51.5902 | 76 | 52 | 45.7249 | 678206.274 | 3502918.063 | - |
| 10 | GPS5A | 31 | 38 | 51.9292 | 76 | 52 | 45.4414 | 678198.626 | 3502928.375 | 968.127 |
| 11 | GPS6 | 31 | 38 | 28.8220 | 76 | 52 | 16.6494 | 677452.333 | 3502203.729 | 1093.402 |
| 12 | GPS6A | 31 | 38 | 28.6703 | 76 | 52 | 15.7689 | 677429.215 | 3502198.661 | 1092.598 |
| 13 | GPS7 | 31 | 38 | 1.7664 | 76 | 51 | 35.7444 | 676388.862 | 3501352.106 | - |
| 14 | GPS7A | 31 | 38 | 1.3808 | 76 | 51 | 34.9961 | 676369.348 | 3501339.895 | - |
| 15 | GPS8 | 31 | 38 | 12.8828 | 76 | 50 | 29.3632 | 674634.106 | 3501664.748 | - |
| 16 | GPS8A | 31 | 38 | 12.0916 | 76 | 50 | 28.7519 | 674618.410 | 3501640.110 | - |
| 17 | GPS9 | 31 | 37 | 18.0987 | 76 | 49 | 31.6691 | 673142.262 | 3499952.116 | 1332.541 |
| 18 | GPS9A | 31 | 37 | 18.0195 | 76 | 49 | 31.0931 | 673127.126 | 3499949.424 | 1332.326 |
| 19 | GPS10 | 31 | 36 | 5.5927 | 76 | 49 | 35.8002 | 673288.445 | 3497721.131 | - |
| 20 | GPS10A | 31 | 36 | 5.4587 | 76 | 49 | 36.6189 | 673310.090 | 3497717.368 | 1296.505 |

TENDER PURPOSE ONLY

| 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: NOT TO SCALE

| | |
|----------|---------------|
| DESIGNED | MADHU.K |
| DRAWN | DANIEL |
| CHECKED | CS/AH |
| APPROVED | PRADEEP KAPLA |

TITLE : **DGPS CONTROL POINTS & TRAVERSE STATIONS**

DRAWING NO : **HP/MAN-KAL/CP-001**

ROAD NAME : **Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854**

SHEET 01 OF 02

| List of Traversing Point | | | | |
|--------------------------|---------|------------|-------------|---------|
| Sl. No. | Station | Easting | Northing | RL |
| 1 | GPS1 | 682722.769 | 3509518.102 | - |
| 2 | L7 | 682762.271 | 3509631.940 | 771.977 |
| 3 | L8 | 682768.413 | 3509590.941 | 773.556 |
| 4 | L9 | 682762.909 | 3509554.562 | 775.887 |
| 5 | L10 | 682732.897 | 3509517.698 | 778.773 |
| 6 | L11 | 682712.747 | 3509478.077 | 782.282 |
| 7 | L12 | 682680.835 | 3509423.369 | 788.284 |
| 8 | L13 | 682648.076 | 3509362.580 | 793.111 |
| 9 | L14 | 682613.092 | 3509312.071 | 795.523 |
| 10 | L15 | 682559.114 | 3509271.470 | 798.649 |
| 11 | L16 | 682523.101 | 3509207.728 | 799.137 |
| 12 | L18 | 682501.427 | 3509088.552 | 802.519 |
| 13 | L19 | 682470.912 | 3509022.495 | 804.035 |
| 14 | L20 | 682404.036 | 3508955.528 | 806.614 |
| 15 | L21 | 682343.837 | 3508899.789 | 810.800 |
| 16 | Q12 | 682334.804 | 3508895.973 | - |
| 17 | L22 | 682336.094 | 3508819.463 | 818.574 |
| 18 | Q11 | 682306.885 | 3508743.386 | - |
| 19 | L23 | 682336.028 | 3508740.849 | 824.652 |
| 20 | L24 | 682365.555 | 3508668.190 | 830.321 |
| 21 | L25 | 682298.623 | 3508593.808 | 836.190 |
| 22 | L26 | 682201.439 | 3508589.774 | 843.550 |
| 23 | L27 | 682118.744 | 3508618.800 | 848.732 |
| 24 | L28 | 682126.175 | 3508523.784 | 855.554 |
| 25 | L29 | 682196.894 | 3508450.228 | 861.551 |
| 26 | L31 | 682249.421 | 3508292.270 | 875.737 |
| 27 | L32 | 682224.876 | 3508228.701 | 883.225 |
| 28 | L33 | 682201.328 | 3508135.335 | 890.949 |
| 29 | GPS2 | 682195.628 | 3508003.547 | - |
| 30 | GPS2A | 682206.507 | 3507995.470 | - |
| 31 | L35 | 682196.620 | 3507998.099 | 904.085 |
| 32 | L36 | 682192.048 | 3507912.856 | 910.800 |
| 33 | L38 | 682116.599 | 3507748.172 | 914.309 |
| 34 | L39 | 682045.476 | 3507712.376 | 919.099 |
| 35 | L40 | 681982.217 | 3507662.912 | 923.175 |
| 36 | Q10 | 682039.762 | 3507695.354 | - |
| 37 | L41 | 681997.963 | 3507588.790 | 928.983 |
| 38 | Q9 | 681937.638 | 3507555.479 | - |
| 39 | L43 | 681844.647 | 3507576.712 | 937.655 |
| 40 | Q8 | 681826.764 | 3507558.640 | - |
| 41 | L45 | 681863.239 | 3507435.197 | 944.872 |
| 42 | L46 | 681785.938 | 3507375.814 | 948.535 |
| 43 | L47 | 681766.992 | 3507290.413 | 954.413 |
| 44 | L48 | 681751.514 | 3507200.060 | 958.311 |
| 45 | L49 | 681722.044 | 3507137.129 | 962.590 |
| 46 | L50 | 681686.223 | 3507037.522 | 969.520 |
| 47 | L51 | 681642.956 | 3506986.665 | 973.003 |
| 48 | L52 | 681602.053 | 3506906.261 | 977.181 |
| 49 | L53 | 681526.713 | 3506777.551 | 971.486 |
| 50 | L54 | 681457.146 | 3506680.100 | 964.601 |
| 51 | L55 | 681407.553 | 3506584.953 | 959.674 |
| 52 | L56 | 681339.478 | 3506440.125 | 955.404 |
| 53 | L57 | 681290.899 | 3506438.304 | 951.652 |
| 54 | L58 | 681247.125 | 3506391.298 | 947.412 |
| 55 | L59 | 681219.417 | 3506291.287 | 941.312 |
| 56 | L60 | 681222.283 | 3506197.849 | 938.263 |
| 57 | L61 | 681224.615 | 3506045.180 | 935.610 |
| 58 | L62 | 681192.397 | 3505958.999 | 933.310 |
| 59 | L63 | 681168.972 | 3505895.016 | 927.759 |
| 60 | L64 | 681059.279 | 3505878.572 | 920.014 |

| List of Traversing Point | | | | |
|--------------------------|---------|------------|-------------|---------|
| Sl. No. | Station | Easting | Northing | RL |
| 61 | L65 | 680956.307 | 3505912.904 | 913.351 |
| 62 | L66 | 680922.243 | 3505786.800 | 904.347 |
| 63 | L67 | 680883.872 | 3505823.920 | 904.860 |
| 64 | L68 | 680804.827 | 3505863.521 | 904.261 |
| 65 | L69 | 680711.122 | 3505844.054 | 903.066 |
| 66 | L70 | 680639.046 | 3505780.096 | 898.337 |
| 67 | L71 | 680594.263 | 3505854.008 | 896.384 |
| 68 | L72 | 680514.083 | 3505887.538 | 895.601 |
| 69 | L73 | 680435.631 | 3505842.374 | 892.550 |
| 70 | L74 | 680389.338 | 3505740.598 | 891.687 |
| 71 | L75 | 680365.666 | 3505641.061 | 888.682 |
| 72 | L76 | 680319.825 | 3505506.450 | 883.656 |
| 73 | L78 | 680231.551 | 3505414.630 | 880.096 |
| 74 | L79 | 680172.811 | 3505311.263 | 879.149 |
| 75 | L80 | 680149.547 | 3505256.001 | 880.793 |
| 76 | L82 | 680120.556 | 3505115.681 | 873.929 |
| 77 | L83 | 680036.128 | 3504979.288 | 873.585 |
| 78 | L84 | 679939.127 | 3504953.337 | 872.589 |
| 79 | L85 | 679913.562 | 3504799.374 | 871.800 |
| 80 | L86 | 679908.221 | 3504701.610 | 870.524 |
| 81 | L87 | 679876.676 | 3504606.352 | 869.289 |
| 82 | L88 | 679794.610 | 3504594.905 | 868.640 |
| 83 | L89 | 679717.046 | 3504607.374 | 865.585 |
| 84 | L90 | 679779.081 | 3504523.131 | 867.902 |
| 85 | L91 | 679711.180 | 3504466.445 | 870.361 |
| 86 | L92 | 679622.962 | 3504428.432 | 873.443 |
| 87 | L93 | 679571.847 | 3504340.164 | 878.106 |
| 88 | L94 | 679535.911 | 3504234.835 | 882.045 |
| 89 | L95 | 679451.918 | 3504199.158 | 883.504 |
| 90 | GPS4 | 679421.204 | 3504203.747 | - |
| 91 | GPS4A | 679410.433 | 3504208.444 | - |
| 92 | L95 | 679452.029 | 3504199.064 | 883.504 |
| 93 | L96 | 679359.101 | 3504238.262 | - |
| 94 | L97 | 679267.268 | 3504198.988 | 884.098 |
| 95 | L98 | 679189.497 | 3504150.439 | 886.415 |
| 96 | L99 | 679095.364 | 3504160.897 | 888.018 |
| 97 | L100 | 679014.543 | 3504219.836 | 889.927 |
| 98 | L101 | 678936.402 | 3504274.265 | 892.171 |
| 99 | L102 | 678924.678 | 3504182.561 | 897.091 |
| 100 | L103 | 678977.793 | 3504095.893 | 901.803 |
| 101 | L104 | 679026.820 | 3504008.675 | 906.802 |
| 102 | L105 | 679049.707 | 3503911.304 | 912.441 |
| 103 | L106 | 679098.247 | 3503824.717 | 917.035 |
| 104 | S7 | 679035.714 | 3503782.744 | - |
| 105 | S6 | 679008.488 | 3503777.966 | - |
| 106 | L107 | 679002.048 | 3503773.642 | 919.392 |
| 107 | L108 | 678982.092 | 3503685.379 | 921.396 |
| 108 | L109 | 678951.977 | 3503581.914 | 923.576 |
| 109 | L110 | 678908.211 | 3503472.229 | 925.269 |
| 110 | L111 | 678813.551 | 3503426.143 | 925.375 |
| 111 | L112 | 678746.841 | 3503485.859 | 926.159 |
| 112 | L113 | 678670.875 | 3503426.471 | 925.959 |
| 113 | L114 | 678577.757 | 3503415.801 | 926.594 |
| 114 | L115 | 678521.500 | 3503416.856 | 926.599 |
| 115 | L116 | 678461.528 | 3503338.353 | 927.008 |
| 116 | L117 | 678456.182 | 3503415.408 | 926.426 |
| 117 | L118 | 678462.007 | 3503514.478 | 924.272 |
| 118 | L120 | 678373.373 | 3503682.222 | 922.743 |
| 119 | L121 | 678313.804 | 3503639.164 | 926.186 |
| 120 | L122 | 678360.228 | 3503560.075 | 933.391 |

| List of Traversing Point | | | | |
|--------------------------|---------|------------|-------------|----------|
| Sl. No. | Station | Easting | Northing | RL |
| 121 | S5 | 678326.476 | 3503685.027 | - |
| 122 | L123 | 678308.474 | 3503348.861 | 940.487 |
| 123 | L124 | 678291.288 | 3503239.197 | 947.503 |
| 124 | L125 | 678267.950 | 3503140.863 | 953.858 |
| 125 | L126 | 678233.684 | 3503059.241 | 958.700 |
| 126 | S4 | 678237.839 | 3503037.114 | - |
| 127 | L127 | 678221.643 | 3502974.943 | 964.290 |
| 128 | GPS5 | 678206.274 | 3502918.063 | - |
| 129 | GPS5A | 678198.626 | 3502928.375 | 968.127 |
| 130 | L128 | 678195.646 | 3502896.339 | 969.884 |
| 131 | L129 | 678198.780 | 3502780.485 | 977.057 |
| 132 | L130 | 678114.591 | 3502758.357 | 981.425 |
| 133 | L132 | 678015.470 | 3502677.581 | 992.858 |
| 134 | L133 | 678066.662 | 3502631.657 | 1000.468 |
| 135 | L134 | 677995.996 | 3502553.486 | 1006.247 |
| 136 | L135 | 677925.031 | 3502484.243 | 1012.168 |
| 137 | L136 | 678008.218 | 3502415.520 | 1020.477 |
| 138 | L137 | 678050.840 | 3502329.980 | 1028.256 |
| 139 | S3 | 678039.220 | 3502279.827 | - |
| 140 | L138 | 677984.807 | 3502256.129 | 1033.753 |
| 141 | L139 | 677910.474 | 3502198.400 | 1040.553 |
| 142 | L140 | 677864.741 | 3502297.908 | 1046.935 |
| 143 | L141 | 677847.542 | 3502338.480 | 1049.053 |
| 144 | L142 | 677810.313 | 3502348.304 | 1051.423 |
| 145 | L143 | 677749.162 | 3502334.349 | 1054.937 |
| 146 | L144 | 677722.149 | 3502384.659 | 1059.121 |
| 147 | L145 | 677648.638 | 3502427.005 | 1064.802 |
| 148 | L146 | 677561.460 | 3502436.411 | 1072.416 |
| 149 | L147 | 677477.736 | 3502422.198 | 1079.269 |
| 150 | L148 | 677427.871 | 3502358.668 | 1085.480 |
| 151 | L149 | 677465.168 | 3502281.202 | 1089.570 |
| 152 | GPS6 | 677452.333 | 3502203.729 | 1093.402 |
| 153 | GPS6A | 677429.215 | 3502198.661 | 1092.598 |
| 154 | L150 | 677423.827 | 3502207.439 | - |
| 155 | L151 | 677351.105 | 3502197.739 | 1097.352 |
| 156 | L152 | 677323.617 | 3502139.728 | 1101.839 |
| 157 | L153 | 677319.410 | 3502044.146 | 1106.729 |
| 158 | S2 | 677358.708 | 3501991.431 | - |
| 159 | L154 | 677332.633 | 3501962.348 | 1110.249 |
| 160 | L155 | 677283.398 | 3501878.539 | 1114.488 |
| 161 | L156 | 677220.798 | 3501808.682 | 1119.123 |
| 162 | L157 | 677130.892 | 3501827.037 | 1123.734 |
| 163 | L158 | 677116.196 | 3501921.940 | 1128.399 |
| 164 | L159 | 677037.718 | 3501971.638 | 1134.109 |
| 165 | L160 | 676983.543 | 3501995.510 | 1140.479 |
| 166 | L161 | 676939.849 | 3502077.652 | 1144.149 |
| 167 | L162 | 676870.878 | 3502006.180 | 1149.931 |
| 168 | L163 | 676787.201 | 3501952.305 | 1153.128 |
| 169 | L164 | 676722.564 | 3501992.052 | 1157.733 |
| 170 | L165 | 676731.538 | 3502093.014 | 1163.364 |
| 171 | L166 | 676788.346 | 3502167.644 | 1168.203 |
| 172 | L167 | 676748.536 | 3502254.284 | 1172.070 |
| 173 | L168 | 676741.371 | 3502344.083 | 1175.764 |
| 174 | L169 | 676747.558 | 3502437.874 | 1179.862 |
| 175 | L170 | 676758.552 | 3502506.055 | 1183.641 |
| 176 | L171 | 676728.526 | 3502584.943 | 1187.770 |
| 177 | L172 | 676637.827 | 3502559.085 | 1191.867 |
| 178 | L173 | 676552.403 | 3502527.215 | - |
| 179 | L174 | 676553.382 | 3502432.062 | 1198.758 |
| 180 | L175 | 676537.449 | 3502339.094 | 1202.828 |



| List of Traversing Point | | | | |
|--------------------------|---------|------------|-------------|----------|
| Sl. No. | Station | Easting | Northing | RL |
| 181 | L176 | 676444.383 | 3502367.342 | 1207.436 |
| 182 | L177 | 676373.221 | 3502351.043 | 1210.775 |
| 183 | L178 | 676339.903 | 3502292.784 | 1215.051 |
| 184 | L179 | 676376.772 | 3502207.571 | 1222.046 |
| 185 | S1 | 676310.381 | 3502168.501 | - |
| 186 | L180 | 676296.075 | 3502160.290 | 1226.816 |
| 187 | L181 | 676240.829 | 3502109.876 | 1229.549 |
| 188 | L182 | 676263.736 | 3502016.230 | 1234.699 |
| 189 | L183 | 676247.988 | 3501924.896 | 1240.086 |
| 190 | L184 | 676252.101 | 3501833.546 | 1243.984 |
| 191 | L185 | 676237. | | |

HORIZONTAL CURVE DETAILS

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|----|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 1 | 11+091 | 678335.812 | 3503610.446 | 30 | Left | 11+086 | 11+096 | 10 | 0 | 18 | 0.0 | 0.0 | 0.39 | 0.319 | 18 | 16 | 9 | 25 | -2.5 |
| 2 | 11+164 | 678364.123 | 3503542.475 | 60 | Right | 11+155 | 11+173 | 18 | 15 | 17 | 0.2 | 0.1 | 2.48 | 0.547 | 16 | 59 | 49 | 35 | 7.0 |
| 3 | 11+218 | 678355.769 | 3503487.943 | 90 | Right | 11+209 | 11+227 | 18 | 10 | 11 | 0.1 | 0.1 | 1.15 | 0.311 | 11 | 25 | 49 | 45 | 7.0 |
| 4 | 11+301 | 678318.87 | 3503413.952 | 100 | Left | 11+294 | 11+308 | 14 | 10 | 8 | 0.0 | 0.1 | 0.75 | 0.238 | 7 | 53 | 52 | 50 | 6.8 |
| 5 | 11+419 | 678292.622 | 3503299.148 | 150 | Left | 11+414 | 11+423 | 10 | 10 | 4 | 0.0 | 0.0 | 0.35 | 0.130 | 3 | 38 | 52 | 50 | 6.6 |
| 6 | 11+517 | 678283.346 | 3503201.207 | 120 | Right | 11+511 | 11+523 | 11 | 15 | 5 | 0.1 | 0.1 | 0.80 | 0.219 | 5 | 23 | 17 | 50 | 6.8 |
| 7 | 11+576 | 678265.048 | 3503144.76 | 200 | Right | 11+565 | 11+588 | 23 | 0 | 7 | 0.0 | 0.0 | 0.33 | 0.115 | 6 | 35 | 51 | 45 | -2.5 |
| 8 | 11+664 | 678228.639 | 3503065.081 | 50 | Left | 11+655 | 11+672 | 18 | 10 | 20 | 0.1 | 0.1 | 2.04 | 0.551 | 20 | 6 | 47 | 35 | 7.0 |
| 9 | 11+705 | 678233.806 | 3503023.084 | 90 | Right | 11+688 | 11+722 | 34 | 0 | 22 | 0.0 | 0.0 | 1.63 | 0.377 | 21 | 37 | 33 | 45 | -2.5 |
| 10 | 11+746 | 678223.492 | 3502983.518 | 60 | Right | 11+732 | 11+759 | 27 | 0 | 26 | 0.0 | 0.0 | 1.55 | 0.450 | 25 | 45 | 24 | 35 | -2.5 |
| 11 | 11+778 | 678202.376 | 3502958.68 | 50 | Left | 11+761 | 11+793 | 32 | 0 | 37 | 0.0 | 0.0 | 2.69 | 0.642 | 36 | 46 | 49 | 35 | -2.5 |
| 12 | 11+810 | 678200.302 | 3502925.596 | 100 | Right | 11+798 | 11+822 | 25 | 0 | 14 | 0.0 | 0.0 | 0.77 | 0.247 | 14 | 10 | 6 | 40 | -2.5 |
| 13 | 11+869 | 678182.012 | 3502868.482 | 50 | Left | 11+854 | 11+883 | 29 | 10 | 33 | 0.1 | 0.1 | 4.14 | 0.779 | 33 | 10 | 46 | 35 | 7.0 |
| 14 | 11+933 | 678211.742 | 3502809.836 | 40 | Right | 11+913 | 11+951 | 38 | 0 | 54 | 0.0 | 0.0 | 4.92 | 0.945 | 54 | 7 | 42 | 30 | -2.5 |
| 15 | 11+972 | 678192.675 | 3502772.81 | 25 | Right | 11+956 | 11+984 | 28 | 0 | 65 | 0.0 | 0.0 | 4.60 | 1.129 | 64 | 42 | 47 | 25 | -2.5 |
| 16 | 12+019 | 678142.426 | 3502774.529 | 50 | Left | 12+011 | 12+026 | 15 | 10 | 17 | 0.1 | 0.1 | 1.65 | 0.494 | 16 | 49 | 31 | 35 | 6.8 |
| 17 | 12+063 | 678102.616 | 3502754.832 | 60 | Right | 12+047 | 12+078 | 31 | 0 | 29 | 0.0 | 0.0 | 2.00 | 0.509 | 29 | 11 | 15 | 35 | -2.5 |
| 18 | 12+109 | 678055.168 | 3502757.204 | 40 | Right | 12+103 | 12+115 | 12 | 10 | 17 | 0.1 | 0.1 | 1.67 | 0.551 | 17 | 13 | 6 | 30 | 6.8 |
| 19 | 12+155 | 678006.989 | 3502790.199 | 15 | Left | 12+140 | 12+164 | 24 | 10 | 91 | 0.3 | 0.3 | 20.46 | 2.251 | 90 | 44 | 60 | 20 | 7.0 |
| 20 | 12+240 | 678015.161 | 3502687.33 | 30 | Right | 12+236 | 12+244 | 8 | 10 | 15 | 0.1 | 0.2 | 1.57 | 0.603 | 15 | 28 | 13 | 25 | 7.0 |
| 21 | 12+290 | 677986.824 | 3502638.3 | 14 | Left | 12+278 | 12+298 | 20 | 8 | 82 | 0.2 | 0.3 | 12.41 | 2.007 | 82 | 16 | 11 | 20 | 5.0 |
| 22 | 12+388 | 678138.494 | 3502624.987 | 18 | Right | 12+348 | 12+389 | 41 | 8 | 131 | 0.2 | 0.2 | 72.08 | 2.736 | 131 | 17 | 12 | 20 | 4.5 |
| 23 | 12+426 | 678023.542 | 3502587.121 | 50 | Left | 12+417 | 12+434 | 16 | 10 | 19 | 0.1 | 0.1 | 1.89 | 0.530 | 18 | 53 | 13 | 35 | 7.0 |
| 24 | 12+502 | 677972.984 | 3502529.818 | 200 | Right | 12+488 | 12+516 | 28 | 0 | 8 | 0.0 | 0.0 | 0.49 | 0.140 | 8 | 1 | 46 | 30 | -2.5 |
| 25 | 12+579 | 677911.518 | 3502477.23 | 25 | Left | 12+563 | 12+592 | 29 | 10 | 65 | 0.2 | 0.2 | 10.09 | 1.542 | 65 | 25 | 51 | 25 | 7.0 |
| 26 | 12+639 | 677953.623 | 3502425.045 | 40 | Left | 12+630 | 12+647 | 17 | 10 | 24 | 0.1 | 0.1 | 2.42 | 0.664 | 23 | 44 | 38 | 30 | 7.0 |
| 27 | 12+758 | 678075.467 | 3502396.839 | 30 | Right | 12+732 | 12+775 | 42 | 10 | 81 | 0.1 | 0.2 | 17.01 | 1.750 | 81 | 9 | 27 | 25 | 7.0 |
| 28 | 12+805 | 678051.008 | 3502340.018 | 300 | Left | 12+790 | 12+821 | 31 | 0 | 6 | 0.0 | 0.0 | 0.41 | 0.105 | 6 | 0 | 50 | 25 | -2.5 |
| 29 | 12+876 | 678029.891 | 3502272.121 | 30 | Right | 12+857 | 12+892 | 35 | 0 | 67 | 0.0 | 0.0 | 5.96 | 1.168 | 66 | 54 | 41 | 25 | -2.5 |
| 30 | 12+916 | 677984.684 | 3502267.519 | 30 | Left | 12+902 | 12+928 | 26 | 8 | 49 | 0.1 | 0.1 | 5.56 | 1.124 | 49 | 7 | 30 | 25 | 7.0 |
| 31 | 12+979 | 677962.362 | 3502205.462 | 50 | Right | 12+955 | 13+000 | 45 | 0 | 51 | 0.0 | 0.0 | 5.43 | 0.893 | 51 | 9 | 6 | 35 | -2.5 |
| 32 | 13+030 | 677911.438 | 3502187.863 | 20 | Right | 13+005 | 13+041 | 36 | 0 | 103 | 0.0 | 0.0 | 12.19 | 1.801 | 103 | 11 | 20 | 20 | -2.5 |
| 33 | 13+073 | 677905.493 | 3502245.624 | 40 | Left | 13+061 | 13+085 | 24 | 0 | 35 | 0.0 | 0.0 | 1.93 | 0.609 | 34 | 53 | 25 | 30 | -2.5 |
| 34 | 13+111 | 677880.631 | 3502274.461 | 90 | Right | 13+097 | 13+124 | 27 | 0 | 17 | 0.0 | 0.0 | 1.05 | 0.303 | 17 | 23 | 6 | 45 | -2.5 |
| 35 | 13+209 | 677839.849 | 3502368.79 | 30 | Left | 13+184 | 13+226 | 42 | 8 | 80 | 0.1 | 0.1 | 14.62 | 1.662 | 79 | 55 | 10 | 25 | 7.0 |
| 36 | 13+252 | 677791.581 | 3502342.496 | 40 | Right | 13+240 | 13+264 | 24 | 0 | 35 | 0.0 | 0.0 | 1.94 | 0.610 | 34 | 58 | 38 | 30 | -2.5 |
| 37 | 13+280 | 677763.2 | 3502345.678 | 40 | Left | 13+267 | 13+292 | 25 | 0 | 36 | 0.0 | 0.0 | 2.06 | 0.629 | 36 | 1 | 2 | 30 | -2.5 |
| 38 | 13+324 | 677724.003 | 3502323.393 | 18 | Right | 13+292 | 13+330 | 38 | 0 | 121 | 0.0 | 0.0 | 18.46 | 2.109 | 120 | 49 | 46 | 20 | -2.5 |
| 39 | 13+403 | 677726.299 | 3502432.116 | 25 | Left | 13+381 | 13+417 | 36 | 8 | 83 | 0.1 | 0.2 | 14.81 | 1.776 | 83 | 26 | 42 | 25 | 7.0 |
| 40 | 13+455 | 677662.497 | 3502420.211 | 30 | Right | 13+441 | 13+467 | 26 | 0 | 49 | 0.0 | 0.0 | 2.98 | 0.857 | 49 | 7 | 26 | 25 | -2.5 |
| 41 | 13+491 | 677632.925 | 3502443.78 | 40 | Left | 13+481 | 13+501 | 19 | 0 | 28 | 0.0 | 0.0 | 1.19 | 0.482 | 27 | 35 | 55 | 30 | -2.5 |
| 42 | 13+558 | 677565.571 | 3502456.818 | 20 | Left | 13+547 | 13+566 | 19 | 8 | 54 | 0.1 | 0.2 | 5.62 | 1.334 | 53 | 30 | 11 | 20 | 7.0 |
| 43 | 13+592 | 677550.039 | 3502422.79 | 30 | Right | 13+579 | 13+603 | 24 | 0 | 45 | 0.0 | 0.0 | 2.48 | 0.786 | 45 | 2 | 52 | 25 | -2.5 |
| 44 | 13+645 | 677497.324 | 3502403.167 | 20 | Right | 13+637 | 13+653 | 16 | 8 | 45 | 0.1 | 0.2 | 4.22 | 1.179 | 44 | 38 | 37 | 20 | 7.0 |
| 45 | 13+699 | 677454.569 | 3502449.248 | 16 | Left | 13+682 | 13+708 | 25 | 8 | 91 | 0.2 | 0.3 | 16.18 | 2.089 | 91 | 1 | 5 | 20 | 5.0 |



TENDER PURPOSE ONLY

| | | | | | | | | | | | | | | | |
|-----|------|-------------|----------|-------|--|----------|--|--|---|--|--|--|--|--|----------------|
| | | | | | 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) | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : HORIZONTAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/HCD-001 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | | SHEET 01 OF 07 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: NOT TO SCALE | | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|----|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 46 | 13+774 | 677427.491 | 3502363.252 | 200 | Left | 13+758 | 13+791 | 33 | 0 | 9 | 0.0 | 0.0 | 0.68 | 0.164 | 9 | 24 | 23 | 20 | -2.5 |
| 47 | 13+843 | 677417.475 | 3502292.628 | 20 | Left | 13+831 | 13+853 | 21 | 8 | 61 | 0.1 | 0.2 | 7.05 | 1.463 | 60 | 54 | 7 | 20 | 7.0 |
| 48 | 13+902 | 677484.122 | 3502275.699 | 30 | Right | 13+873 | 13+919 | 46 | 8 | 88 | 0.1 | 0.1 | 18.42 | 1.800 | 87 | 52 | 13 | 25 | 7.0 |
| 49 | 13+969 | 677443.672 | 3502197.666 | 15 | Right | 13+958 | 13+977 | 19 | 8 | 74 | 0.2 | 0.3 | 9.77 | 1.822 | 73 | 50 | 9 | 20 | 7.0 |
| 50 | 14+007 | 677409.48 | 3502228.231 | 15 | Left | 13+997 | 14+015 | 18 | 0 | 67 | 0.0 | 0.0 | 3.00 | 1.172 | 67 | 8 | 19 | 20 | -2.5 |
| 51 | 14+070 | 677350.392 | 3502200.244 | 80 | Right | 14+059 | 14+081 | 22 | 0 | 16 | 0.0 | 0.0 | 0.76 | 0.274 | 15 | 43 | 19 | 45 | -2.5 |
| 52 | 14+128 | 677286.375 | 3502189.39 | 22 | Left | 14+105 | 14+141 | 36 | 8 | 93 | 0.1 | 0.2 | 18.71 | 1.993 | 93 | 20 | 58 | 20 | 7.0 |
| 53 | 14+176 | 677323.122 | 3502134.512 | 40 | Right | 14+163 | 14+189 | 26 | 8 | 37 | 0.1 | 0.1 | 3.88 | 0.839 | 36 | 37 | 11 | 30 | 7.0 |
| 54 | 14+250 | 677304.308 | 3502060.552 | 40 | Left | 14+238 | 14+262 | 24 | 8 | 34 | 0.1 | 0.1 | 3.41 | 0.790 | 33 | 47 | 19 | 30 | 7.0 |
| 55 | 14+294 | 677327.604 | 3502021.743 | 150 | Left | 14+279 | 14+310 | 30 | 0 | 12 | 0.0 | 0.0 | 0.77 | 0.202 | 11 | 34 | 56 | 25 | -2.5 |
| 56 | 14+333 | 677353.977 | 3501993.021 | 20 | Right | 14+315 | 14+345 | 29 | 0 | 84 | 0.0 | 0.0 | 6.86 | 1.461 | 83 | 43 | 51 | 20 | -2.5 |
| 57 | 14+367 | 677327.643 | 3501962.911 | 50 | Left | 14+358 | 14+375 | 18 | 0 | 20 | 0.0 | 0.0 | 0.80 | 0.354 | 20 | 18 | 17 | 35 | -2.5 |
| 58 | 14+390 | 677319.144 | 3501940.618 | 50 | Right | 14+382 | 14+399 | 17 | 0 | 19 | 0.0 | 0.0 | 0.70 | 0.332 | 19 | 0 | 46 | 35 | -2.5 |
| 59 | 14+418 | 677301.327 | 3501919.295 | 40 | Left | 14+408 | 14+428 | 19 | 0 | 28 | 0.0 | 0.0 | 1.21 | 0.486 | 27 | 51 | 32 | 30 | -2.5 |
| 60 | 14+443 | 677296.07 | 3501894.611 | 30 | Right | 14+432 | 14+453 | 21 | 0 | 41 | 0.0 | 0.0 | 2.02 | 0.714 | 40 | 53 | 32 | 25 | -2.5 |
| 61 | 14+493 | 677255.148 | 3501863.678 | 40 | Left | 14+483 | 14+502 | 18 | 8 | 26 | 0.1 | 0.1 | 2.35 | 0.660 | 26 | 20 | 30 | 30 | 7.0 |
| 62 | 14+532 | 677244.459 | 3501824.101 | 30 | Right | 14+523 | 14+541 | 18 | 8 | 35 | 0.1 | 0.1 | 3.24 | 0.877 | 34 | 59 | 22 | 25 | 7.0 |
| 63 | 14+568 | 677210.762 | 3501808.66 | 30 | Right | 14+552 | 14+582 | 29 | 0 | 56 | 0.0 | 0.0 | 3.92 | 0.971 | 55 | 38 | 35 | 25 | -2.5 |
| 64 | 14+600 | 677180.659 | 3501826.765 | 30 | Left | 14+591 | 14+609 | 18 | 8 | 34 | 0.1 | 0.1 | 3.17 | 0.868 | 34 | 27 | 36 | 25 | 7.0 |
| 65 | 14+650 | 677132.486 | 3501810.447 | 20 | Right | 14+624 | 14+661 | 36 | 0 | 104 | 0.0 | 0.0 | 12.58 | 1.820 | 104 | 16 | 13 | 20 | -2.5 |
| 66 | 14+745 | 677123.739 | 3501923.008 | 20 | Left | 14+734 | 14+755 | 21 | 8 | 60 | 0.1 | 0.2 | 6.90 | 1.450 | 60 | 11 | 5 | 20 | 7.0 |
| 67 | 14+820 | 677044.729 | 3501926.393 | 20 | Right | 14+802 | 14+831 | 29 | 0 | 84 | 0.0 | 0.0 | 6.99 | 1.472 | 84 | 20 | 56 | 20 | -2.5 |
| 68 | 14+927 | 677037.591 | 3502054.155 | 20 | Left | 14+898 | 14+937 | 39 | 8 | 111 | 0.1 | 0.2 | 31.41 | 2.337 | 110 | 58 | 33 | 20 | 7.0 |
| 69 | 14+983 | 676976.581 | 3501988.52 | 14 | Right | 14+955 | 14+986 | 31 | 0 | 127 | 0.0 | 0.0 | 17.32 | 2.215 | 126 | 54 | 9 | 20 | -2.5 |
| 70 | 15+057 | 676954.997 | 3502108.61 | 20 | Left | 15+049 | 15+064 | 15 | 30 | 43 | 1.9 | 0.8 | 31.22 | 2.259 | 43 | 28 | 48 | 20 | 7.0 |
| 71 | 15+200 | 676846.773 | 3501981.389 | 50 | Right | 15+188 | 15+213 | 25 | 0 | 29 | 0.0 | 0.0 | 1.62 | 0.502 | 28 | 47 | 14 | 35 | -2.5 |
| 72 | 15+316 | 676734.231 | 3501938.58 | 20 | Right | 15+300 | 15+327 | 27 | 8 | 78 | 0.1 | 0.2 | 11.75 | 1.768 | 78 | 22 | 38 | 20 | 7.0 |
| 73 | 15+393 | 676719.971 | 3502023.517 | 90 | Right | 15+366 | 15+418 | 52 | 0 | 33 | 0.0 | 0.0 | 3.84 | 0.574 | 32 | 54 | 1 | 45 | -2.5 |
| 74 | 15+441 | 676739.687 | 3502069.143 | 50 | Left | 15+425 | 15+456 | 31 | 0 | 36 | 0.0 | 0.0 | 2.52 | 0.622 | 35 | 37 | 50 | 35 | -2.5 |
| 75 | 15+499 | 676726.563 | 3502129.538 | 45 | Right | 15+469 | 15+522 | 53 | 10 | 67 | 0.1 | 0.1 | 13.89 | 1.397 | 67 | 19 | 53 | 30 | 7.0 |
| 76 | 15+570 | 676809.232 | 3502163.268 | 20 | Left | 15+550 | 15+581 | 31 | 10 | 88 | 0.2 | 0.3 | 18.41 | 2.033 | 87 | 51 | 32 | 20 | 7.0 |
| 77 | 15+611 | 676765.958 | 3502201.281 | 60 | Right | 15+593 | 15+628 | 36 | 0 | 34 | 0.0 | 0.0 | 2.73 | 0.592 | 33 | 55 | 21 | 35 | -2.5 |
| 78 | 15+692 | 676745.089 | 3502280.377 | 35 | Right | 15+678 | 15+704 | 26 | 0 | 43 | 0.0 | 0.0 | 2.63 | 0.752 | 43 | 6 | 2 | 25 | -2.5 |
| 79 | 15+723 | 676760.693 | 3502309.333 | 30 | Left | 15+708 | 15+737 | 29 | 0 | 55 | 0.0 | 0.0 | 3.86 | 0.965 | 55 | 16 | 12 | 25 | -2.5 |
| 80 | 15+764 | 676741.155 | 3502347.76 | 70 | Right | 15+757 | 15+770 | 13 | 10 | 11 | 0.1 | 0.1 | 1.02 | 0.328 | 10 | 37 | 49 | 40 | 7.0 |
| 81 | 15+842 | 676730.122 | 3502424.948 | 30 | Right | 15+820 | 15+857 | 37 | 0 | 71 | 0.0 | 0.0 | 6.80 | 1.235 | 70 | 46 | 45 | 25 | -2.5 |
| 82 | 15+875 | 676764.221 | 3502442.59 | 20 | Left | 15+859 | 15+885 | 27 | 0 | 77 | 0.0 | 0.0 | 5.61 | 1.349 | 77 | 18 | 44 | 20 | -2.5 |
| 83 | 15+912 | 676753.532 | 3502483.429 | 70 | Right | 15+889 | 15+933 | 43 | 0 | 35 | 0.0 | 0.0 | 3.47 | 0.617 | 35 | 22 | 45 | 40 | -2.5 |
| 84 | 15+963 | 676772.413 | 3502533.367 | 30 | Left | 15+954 | 15+971 | 18 | 10 | 34 | 0.1 | 0.2 | 3.72 | 0.930 | 34 | 9 | 46 | 25 | 7.0 |
| 85 | 16+035 | 676730.006 | 3502599.806 | 20 | Left | 16+020 | 16+046 | 26 | 10 | 74 | 0.2 | 0.3 | 12.39 | 1.794 | 74 | 8 | 23 | 20 | 7.0 |
| 86 | 16+087 | 676686.832 | 3502556.12 | 35 | Right | 16+070 | 16+102 | 32 | 0 | 53 | 0.0 | 0.0 | 4.06 | 0.920 | 52 | 43 | 24 | 25 | -2.5 |
| 87 | 16+136 | 676635.527 | 3502562.771 | 100 | Left | 16+129 | 16+143 | 14 | 20 | 8 | 0.2 | 0.1 | 1.60 | 0.336 | 7 | 47 | 41 | 30 | 7.0 |
| 88 | 16+223 | 676548.13 | 3502544.404 | 20 | Left | 16+213 | 16+231 | 18 | 10 | 53 | 0.2 | 0.3 | 6.67 | 1.422 | 52 | 49 | 50 | 20 | 7.0 |
| 89 | 16+267 | 676550.949 | 3502496.182 | 30 | Right | 16+261 | 16+273 | 13 | 0 | 24 | 0.0 | 0.0 | 0.68 | 0.421 | 24 | 7 | 50 | 25 | -2.5 |
| 90 | 16+312 | 676534.585 | 3502453.067 | 30 | Left | 16+301 | 16+321 | 20 | 10 | 38 | 0.1 | 0.2 | 4.36 | 1.001 | 38 | 16 | 48 | 25 | 7.0 |



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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) | | | | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | | TITLE: HORIZONTAL CURVES DETAILS DRAWING NO: HP/MAN-KAL/HCD-002 ROAD NAME: Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | | | | SHEET 02 OF 07 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: NOT TO SCALE | | | | | | | | | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|----|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 91 | 16+364 | 676567.555 | 3502408.664 | 35 | Right | 16+350 | 16+377 | 26 | 10 | 43 | 0.1 | 0.1 | 5.49 | 1.042 | 43 | 18 | 46 | 25 | 7.0 |
| 92 | 16+443 | 676533.758 | 3502329.385 | 18 | Right | 16+432 | 16+453 | 21 | 10 | 66 | 0.2 | 0.3 | 9.74 | 1.707 | 65 | 59 | 54 | 20 | 5.0 |
| 93 | 16+494 | 676484.853 | 3502358.675 | 80 | Left | 16+481 | 16+506 | 26 | 0 | 19 | 0.0 | 0.0 | 1.06 | 0.324 | 18 | 33 | 58 | 45 | -2.5 |
| 94 | 16+527 | 676452.358 | 3502365.791 | 80 | Right | 16+518 | 16+535 | 17 | 0 | 12 | 0.0 | 0.0 | 0.46 | 0.214 | 12 | 15 | 19 | 45 | -2.5 |
| 95 | 16+552 | 676429.516 | 3502376.252 | 80 | Left | 16+538 | 16+566 | 28 | 0 | 20 | 0.0 | 0.0 | 1.24 | 0.350 | 20 | 3 | 53 | 45 | -2.5 |
| 96 | 16+620 | 676347.866 | 3502382.739 | 20 | Left | 16+596 | 16+631 | 35 | 10 | 100 | 0.2 | 0.3 | 26.59 | 2.244 | 99 | 56 | 24 | 20 | 7.0 |
| 97 | 16+686 | 676405.08 | 3502298.062 | 20 | Right | 16+664 | 16+697 | 33 | 10 | 95 | 0.2 | 0.3 | 22.57 | 2.152 | 94 | 39 | 35 | 20 | 7.0 |
| 98 | 16+745 | 676313.615 | 3502296.883 | 15 | Left | 16+730 | 16+754 | 23 | 10 | 89 | 0.3 | 0.3 | 19.35 | 2.219 | 88 | 58 | 13 | 20 | 7.0 |
| 99 | 16+858 | 676402.532 | 3502182.687 | 24 | Right | 16+826 | 16+870 | 44 | 10 | 106 | 0.2 | 0.2 | 33.28 | 2.270 | 106 | 12 | 25 | 20 | 7.0 |
| 100 | 16+900 | 676326.124 | 3502185.588 | 35 | Left | 16+887 | 16+912 | 25 | 0 | 41 | 0.0 | 0.0 | 2.33 | 0.711 | 40 | 44 | 15 | 25 | -2.5 |
| 101 | 16+934 | 676298.84 | 3502163.837 | 40 | Right | 16+919 | 16+947 | 28 | 0 | 40 | 0.0 | 0.0 | 2.58 | 0.700 | 40 | 5 | 3 | 30 | -2.5 |
| 102 | 16+989 | 676238.708 | 3502165.433 | 25 | Left | 16+974 | 17+002 | 28 | 10 | 63 | 0.2 | 0.2 | 9.50 | 1.506 | 63 | 23 | 36 | 25 | 7.0 |
| 103 | 17+033 | 676234.192 | 3502115.9 | 60 | Left | 17+017 | 17+048 | 31 | 0 | 29 | 0.0 | 0.0 | 2.00 | 0.509 | 29 | 10 | 46 | 35 | -2.5 |
| 104 | 17+116 | 676268.398 | 3502038.962 | 40 | Right | 17+107 | 17+125 | 18 | 10 | 26 | 0.1 | 0.1 | 2.72 | 0.704 | 25 | 59 | 18 | 30 | 7.0 |
| 105 | 17+155 | 676257.239 | 3502000.906 | 40 | Left | 17+140 | 17+168 | 28 | 0 | 41 | 0.0 | 0.0 | 2.68 | 0.712 | 40 | 47 | 22 | 30 | -2.5 |
| 106 | 17+191 | 676273.293 | 3501965.593 | 30 | Right | 17+179 | 17+202 | 22 | 8 | 43 | 0.1 | 0.1 | 4.42 | 1.014 | 42 | 48 | 34 | 25 | 7.0 |
| 107 | 17+274 | 676225.708 | 3501894.084 | 40 | Left | 17+258 | 17+288 | 30 | 10 | 43 | 0.1 | 0.1 | 5.77 | 1.006 | 43 | 20 | 35 | 30 | 7.0 |
| 108 | 17+351 | 676258.975 | 3501819.455 | 45 | Right | 17+327 | 17+372 | 45 | 8 | 58 | 0.1 | 0.1 | 9.29 | 1.183 | 57 | 36 | 43 | 30 | 7.0 |
| 109 | 17+404 | 676218.346 | 3501777.047 | 27 | Left | 17+385 | 17+418 | 34 | 0 | 71 | 0.0 | 0.0 | 6.25 | 1.246 | 71 | 23 | 38 | 25 | -2.5 |
| 110 | 17+444 | 676239.095 | 3501737.395 | 30 | Right | 17+423 | 17+459 | 37 | 0 | 70 | 0.0 | 0.0 | 6.62 | 1.222 | 69 | 59 | 30 | 25 | -2.5 |
| 111 | 17+523 | 676178.95 | 3501671.46 | 30 | Left | 17+497 | 17+539 | 42 | 10 | 80 | 0.1 | 0.2 | 16.39 | 1.727 | 79 | 51 | 7 | 25 | 7.0 |
| 112 | 17+588 | 676245.269 | 3501627.698 | 30 | Right | 17+577 | 17+597 | 20 | 8 | 39 | 0.1 | 0.1 | 3.75 | 0.941 | 38 | 36 | 50 | 25 | 7.0 |
| 113 | 17+634 | 676247.524 | 3501579.664 | 25 | Left | 17+613 | 17+648 | 35 | 0 | 80 | 0.0 | 0.0 | 7.54 | 1.390 | 79 | 37 | 12 | 25 | -2.5 |
| 114 | 17+678 | 676298.326 | 3501572.803 | 60 | Right | 17+666 | 17+690 | 24 | 10 | 23 | 0.1 | 0.1 | 2.55 | 0.565 | 22 | 49 | 26 | 35 | 7.0 |
| 115 | 17+732 | 676340.163 | 3501537.616 | 40 | Right | 17+722 | 17+742 | 20 | 0 | 29 | 0.0 | 0.0 | 1.31 | 0.505 | 28 | 56 | 28 | 30 | -2.5 |
| 116 | 17+770 | 676353.747 | 3501502.214 | 30 | Left | 17+759 | 17+780 | 21 | 0 | 40 | 0.0 | 0.0 | 1.91 | 0.696 | 39 | 53 | 40 | 25 | -2.5 |
| 117 | 17+797 | 676378.184 | 3501488.606 | 90 | Right | 17+787 | 17+807 | 20 | 0 | 13 | 0.0 | 0.0 | 0.56 | 0.222 | 12 | 43 | 36 | 45 | -2.5 |
| 118 | 17+828 | 676401.251 | 3501467.953 | 120 | Left | 17+811 | 17+844 | 33 | 0 | 16 | 0.0 | 0.0 | 1.13 | 0.273 | 15 | 38 | 11 | 35 | -2.5 |
| 119 | 17+878 | 676451.824 | 3501443.066 | 23 | Right | 17+855 | 17+891 | 36 | 8 | 90 | 0.1 | 0.2 | 17.11 | 1.913 | 89 | 40 | 4 | 20 | 7.0 |
| 120 | 17+943 | 676394.27 | 3501387.095 | 55 | Left | 17+927 | 17+958 | 31 | 0 | 33 | 0.0 | 0.0 | 2.30 | 0.568 | 32 | 34 | 19 | 35 | -2.5 |
| 121 | 17+986 | 676383.568 | 3501341.564 | 28 | Right | 17+969 | 18+000 | 31 | 8 | 64 | 0.1 | 0.1 | 8.65 | 1.394 | 63 | 30 | 27 | 25 | 7.0 |
| 122 | 18+032 | 676332.493 | 3501344.334 | 60 | Left | 18+021 | 18+042 | 21 | 0 | 20 | 0.0 | 0.0 | 0.93 | 0.350 | 20 | 3 | 10 | 35 | -2.5 |
| 123 | 18+061 | 676303.917 | 3501335.626 | 80 | Right | 18+049 | 18+073 | 24 | 0 | 17 | 0.0 | 0.0 | 0.87 | 0.294 | 16 | 50 | 17 | 45 | -2.5 |
| 124 | 18+116 | 676247.154 | 3501335.517 | 40 | Left | 18+092 | 18+135 | 44 | 8 | 63 | 0.1 | 0.1 | 10.22 | 1.294 | 62 | 41 | 10 | 30 | 7.0 |
| 125 | 18+159 | 676233.482 | 3501287.022 | 25 | Right | 18+146 | 18+171 | 25 | 0 | 57 | 0.0 | 0.0 | 3.48 | 0.999 | 57 | 13 | 0 | 25 | -2.5 |
| 126 | 18+185 | 676206.894 | 3501278.874 | 40 | Left | 18+177 | 18+192 | 15 | 0 | 22 | 0.0 | 0.0 | 0.73 | 0.379 | 21 | 43 | 37 | 30 | -2.5 |
| 127 | 18+238 | 676165.025 | 3501245.252 | 30 | Left | 18+228 | 18+247 | 18 | 8 | 35 | 0.1 | 0.1 | 3.23 | 0.877 | 34 | 58 | 13 | 25 | 7.0 |
| 128 | 18+286 | 676164.182 | 3501196.245 | 100 | Right | 18+271 | 18+300 | 29 | 0 | 17 | 0.0 | 0.0 | 1.07 | 0.291 | 16 | 39 | 49 | 30 | -2.5 |
| 129 | 18+315 | 676155.251 | 3501168.172 | 150 | Left | 18+303 | 18+327 | 24 | 0 | 9 | 0.0 | 0.0 | 0.48 | 0.159 | 9 | 8 | 6 | 35 | -2.5 |
| 130 | 18+360 | 676148.286 | 3501121.649 | 20 | Right | 18+348 | 18+369 | 21 | 8 | 60 | 0.1 | 0.2 | 6.88 | 1.449 | 60 | 5 | 14 | 20 | 7.0 |
| 131 | 18+451 | 676049.694 | 3501124.265 | 35 | Left | 18+426 | 18+470 | 44 | 8 | 71 | 0.1 | 0.1 | 12.37 | 1.474 | 71 | 21 | 7 | 25 | 7.0 |
| 132 | 18+498 | 676042.744 | 3501068.239 | 55 | Right | 18+484 | 18+512 | 28 | 0 | 29 | 0.0 | 0.0 | 1.80 | 0.505 | 28 | 55 | 14 | 35 | -2.5 |
| 133 | 18+539 | 676018.362 | 3501034.671 | 30 | Left | 18+531 | 18+546 | 15 | 8 | 29 | 0.1 | 0.1 | 2.50 | 0.775 | 29 | 7 | 17 | 25 | 6.9 |
| 134 | 18+577 | 676024.072 | 3500996.042 | 35 | Right | 18+562 | 18+590 | 29 | 0 | 47 | 0.0 | 0.0 | 3.22 | 0.826 | 47 | 20 | 40 | 25 | -2.5 |
| 135 | 18+612 | 676000.714 | 3500967.133 | 21 | Right | 18+599 | 18+623 | 23 | 0 | 63 | 0.0 | 0.0 | 3.66 | 1.104 | 63 | 15 | 10 | 20 | -2.5 |



TENDER PURPOSE ONLY

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|------|-------------|----------|-------|--|----------|--------|--|--|--|--|--------------|--|--|---|--|--|--|--|--|--|--|--|--|--|--|----------------|
| | | | | | 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) | | | | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | | TITLE : HORIZONTAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/HCD-003 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | | | | SHEET 03 OF 07 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | | | | | NOT TO SCALE | | | | | | | | | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|------|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 136 | 18+639 | 675971.812 | 3500973.376 | 50 | Left | 18+629 | 18+649 | 21 | 0 | 24 | 0.0 | 0.0 | 1.12 | 0.419 | 24 | 0 | 49 | 35 | -2.5 |
| 137 | 18+665 | 675946.297 | 3500968.034 | 50 | Right | 18+653 | 18+676 | 23 | 0 | 26 | 0.0 | 0.0 | 1.32 | 0.455 | 26 | 3 | 6 | 35 | -2.5 |
| 138 | 18+702 | 675910.378 | 3500977.141 | 50 | Left | 18+687 | 18+716 | 29 | 0 | 33 | 0.0 | 0.0 | 2.14 | 0.575 | 32 | 56 | 9 | 35 | -2.5 |
| 139 | 18+764 | 675850.814 | 3500956.969 | 30 | Right | 18+742 | 18+779 | 37 | 0 | 71 | 0.0 | 0.0 | 6.81 | 1.236 | 70 | 50 | 33 | 25 | -2.5 |
| 140 | 18+792 | 675829.956 | 3500983.794 | 120 | Left | 18+782 | 18+802 | 21 | 0 | 10 | 0.0 | 0.0 | 0.45 | 0.172 | 9 | 52 | 57 | 25 | -2.5 |
| 141 | 18+848 | 675785.771 | 3501023.931 | 22 | Left | 18+834 | 18+859 | 25 | 10 | 65 | 0.2 | 0.2 | 9.63 | 1.586 | 64 | 50 | 13 | 20 | 7.0 |
| 142 | 18+896 | 675749.979 | 3500983.291 | 300 | Left | 18+877 | 18+914 | 37 | 0 | 7 | 0.0 | 0.0 | 0.58 | 0.125 | 7 | 8 | 18 | 35 | -2.5 |
| 143 | 19+042 | 675667.775 | 3500862.479 | 80 | Left | 19+028 | 19+054 | 26 | 10 | 19 | 0.1 | 0.1 | 2.11 | 0.449 | 18 | 34 | 34 | 45 | 7.0 |
| 144 | 19+098 | 675659.382 | 3500806.279 | 60 | Left | 19+082 | 19+113 | 30 | 0 | 29 | 0.0 | 0.0 | 1.97 | 0.505 | 28 | 57 | 38 | 35 | -2.5 |
| 145 | 19+155 | 675680.141 | 3500750.656 | 20 | Right | 19+144 | 19+164 | 19 | 8 | 55 | 0.1 | 0.2 | 5.87 | 1.358 | 54 | 54 | 46 | 20 | -2.5 |
| 146 | 19+231 | 675613.294 | 3500707.847 | 25 | Right | 19+217 | 19+242 | 25 | 0 | 58 | 0.0 | 0.0 | 3.58 | 1.012 | 57 | 58 | 57 | 25 | -2.5 |
| 147 | 19+267 | 675578.681 | 3500724.244 | 40 | Left | 19+253 | 19+279 | 26 | 0 | 38 | 0.0 | 0.0 | 2.30 | 0.662 | 37 | 56 | 32 | 30 | -2.5 |
| 148 | 19+313 | 675527.607 | 3500712.832 | 15 | Right | 19+300 | 19+321 | 21 | 8 | 80 | 0.2 | 0.3 | 11.80 | 1.937 | 80 | 26 | 57 | 20 | 7.0 |
| 149 | 19+414 | 675544.047 | 3500824.002 | 25 | Left | 19+407 | 19+422 | 15 | 8 | 34 | 0.1 | 0.2 | 3.02 | 0.920 | 34 | 22 | 2 | 25 | 7.0 |
| 150 | 19+447 | 675520.71 | 3500847.924 | 30 | Right | 19+437 | 19+455 | 18 | 0 | 34 | 0.0 | 0.0 | 1.40 | 0.600 | 34 | 21 | 38 | 25 | -2.5 |
| 151 | 19+492 | 675512.754 | 3500893.372 | 40 | Left | 19+479 | 19+504 | 25 | 8 | 36 | 0.1 | 0.1 | 3.77 | 0.829 | 36 | 0 | 52 | 30 | 7.0 |
| 152 | 19+526 | 675482.302 | 3500912.845 | 23 | Right | 19+517 | 19+534 | 17 | 0 | 42 | 0.0 | 0.0 | 1.66 | 0.738 | 42 | 15 | 42 | 20 | -2.5 |
| 153 | 19+566 | 675471.572 | 3500952.5 | 20 | Left | 19+559 | 19+572 | 14 | 8 | 39 | 0.1 | 0.2 | 3.49 | 1.084 | 39 | 9 | 51 | 20 | 7.0 |
| 154 | 19+628 | 675409.324 | 3500966.615 | 120 | Left | 19+617 | 19+639 | 21 | 0 | 10 | 0.0 | 0.0 | 0.48 | 0.179 | 10 | 14 | 47 | 25 | -2.5 |
| 155 | 19+673 | 675363.877 | 3500968.623 | 40 | Left | 19+660 | 19+686 | 25 | 0 | 36 | 0.0 | 0.0 | 2.08 | 0.632 | 36 | 11 | 32 | 30 | -2.5 |
| 156 | 19+714 | 675329.006 | 3500945.4 | 60 | Left | 19+706 | 19+723 | 17 | 0 | 17 | 0.0 | 0.0 | 0.63 | 0.289 | 16 | 31 | 51 | 35 | -2.5 |
| 157 | 19+771 | 675292.84 | 3500902.003 | 14 | Right | 19+736 | 19+769 | 33 | 0 | 136 | 0.0 | 0.0 | 23.44 | 2.375 | 136 | 4 | 53 | 20 | -2.5 |
| 158 | 19+793 | 675288.62 | 3500960.699 | 20 | Left | 19+775 | 19+805 | 30 | 0 | 85 | 0.0 | 0.0 | 7.16 | 1.486 | 85 | 8 | 15 | 20 | -2.5 |
| 159 | 19+832 | 675243.49 | 3500961.29 | 20 | Right | 19+818 | 19+842 | 24 | 0 | 70 | 0.0 | 0.0 | 4.40 | 1.220 | 69 | 53 | 6 | 20 | -2.5 |
| 160 | 19+891 | 675220.907 | 3501025.546 | 30 | Left | 19+860 | 19+908 | 47 | 8 | 90 | 0.1 | 0.1 | 19.84 | 1.845 | 90 | 26 | 57 | 25 | 7.0 |
| 161 | 19+964 | 675145.448 | 3500972.528 | 30 | Right | 19+948 | 19+978 | 30 | 0 | 57 | 0.0 | 0.0 | 4.09 | 0.990 | 56 | 42 | 51 | 25 | -2.5 |
| 162 | 20+003 | 675107.267 | 3500987.661 | 40 | Left | 19+985 | 20+018 | 34 | 0 | 48 | 0.0 | 0.0 | 3.86 | 0.845 | 48 | 26 | 31 | 30 | -2.5 |
| 163 | 20+072 | 675041.989 | 3500954.658 | 32 | Left | 20+058 | 20+085 | 27 | 8 | 47 | 0.1 | 0.1 | 5.38 | 1.078 | 47 | 28 | 5 | 25 | 7.0 |
| 164 | 20+215 | 675032.508 | 3500563.428 | 24.5 | Right | 20+112 | 20+178 | 66 | 8 | 153 | 0.1 | 0.2 | 329.36 | 3.002 | 153 | 18 | 55 | 20 | -2.5 |
| 165 | 20+207 | 674989.044 | 3500939.776 | 150 | Left | 20+199 | 20+216 | 17 | 0 | 6 | 0.0 | 0.0 | 0.23 | 0.111 | 6 | 20 | 42 | 25 | -2.5 |
| 166 | 20+271 | 674974.766 | 3501001.954 | 30 | Right | 20+262 | 20+280 | 18 | 0 | 35 | 0.0 | 0.0 | 1.48 | 0.616 | 35 | 18 | 3 | 25 | -2.5 |
| 167 | 20+332 | 674998.252 | 3501059.025 | 200 | Right | 20+318 | 20+346 | 28 | 10 | 8 | 0.0 | 0.0 | 0.91 | 0.188 | 7 | 55 | 29 | 25 | 7.0 |
| 168 | 20+413 | 675043.705 | 3501128.598 | 20 | Left | 20+400 | 20+423 | 22 | 8 | 64 | 0.1 | 0.2 | 7.79 | 1.521 | 64 | 15 | 14 | 20 | 7.0 |
| 169 | 20+502 | 674965.822 | 3501185.152 | 30 | Right | 20+483 | 20+516 | 33 | 8 | 62 | 0.1 | 0.1 | 8.66 | 1.357 | 62 | 29 | 21 | 25 | 7.0 |
| 170 | 20+591 | 675004.768 | 3501273.649 | 17 | Left | 20+584 | 20+598 | 14 | 8 | 46 | 0.2 | 0.2 | 4.35 | 1.275 | 46 | 3 | 54 | 20 | 4.8 |
| 171 | 20+641 | 674965.054 | 3501307.839 | 300 | Left | 20+628 | 20+655 | 27 | 0 | 5 | 0.0 | 0.0 | 0.30 | 0.089 | 5 | 6 | 33 | 30 | -2.5 |
| 172 | 20+712 | 674907.41 | 3501349.134 | 50 | Right | 20+689 | 20+732 | 43 | 0 | 49 | 0.0 | 0.0 | 5.03 | 0.862 | 49 | 21 | 38 | 35 | -2.5 |
| 173 | 20+798 | 674899.662 | 3501437.285 | 80 | Right | 20+786 | 20+809 | 24 | 0 | 17 | 0.0 | 0.0 | 0.87 | 0.294 | 16 | 51 | 10 | 45 | -2.5 |
| 174 | 20+854 | 674911.565 | 3501494.112 | 30 | Left | 20+841 | 20+866 | 24 | 10 | 46 | 0.1 | 0.2 | 5.76 | 1.137 | 46 | 1 | 10 | 25 | 7.0 |
| 175 | 20+904 | 674868.942 | 3501525.896 | 30 | Left | 20+893 | 20+915 | 22 | 0 | 42 | 0.0 | 0.0 | 2.14 | 0.735 | 42 | 5 | 42 | 25 | -2.5 |
| 176 | 20+955 | 674817.074 | 3501521.008 | 60 | Left | 20+941 | 20+969 | 28 | 0 | 27 | 0.0 | 0.0 | 1.66 | 0.466 | 26 | 40 | 56 | 35 | -2.5 |
| 177 | 21+013 | 674766.803 | 3501489.515 | 30 | Right | 21+001 | 21+024 | 23 | 10 | 45 | 0.1 | 0.2 | 5.50 | 1.114 | 44 | 42 | 16 | 25 | -2.5 |
| 178 | 21+072 | 674714.18 | 3501522.064 | 35 | Right | 21+053 | 21+088 | 35 | 0 | 57 | 0.0 | 0.0 | 4.74 | 0.986 | 56 | 31 | 8.52 | 25 | -2.5 |
| 179 | 21+128 | 674712.377 | 3501581.311 | 120 | Right | 21+111 | 21+146 | 35 | 0 | 17 | 0.0 | 0.0 | 1.30 | 0.293 | 16 | 46 | 56.9 | 25 | -2.5 |
| 180 | 21+178 | 674725.41 | 3501629.819 | 30 | Left | 21+159 | 21+193 | 35 | 0 | 66 | 0.0 | 0.0 | 5.83 | 1.157 | 66 | 18 | 27.2 | 25 | -2.5 |



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|--|------|-------------|----------|-------|--|----------|--------|--|--------------|--|--|--|--|--|---|--|---|--|--|--|--|-----------------------|
|  <p>CLIENT: HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</p> | | | | |  <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, Web: www.satragroup.in</p> | | | | | <p>PROJECT: Himachal Pradesh State Roads Transformation Project (HPSRTP)</p> | | | | | <p>DESIGNED: MADHUK</p> <p>DRAWN: DANIEL</p> <p>CHECKED: CS/AH</p> <p>APPROVED: PRADEEP KAPLA</p> | | <p>TITLE : HORIZONTAL CURVES DETAILS</p> <p>DRAWING NO : HP/MAN-KAL/HCD-004</p> <p>ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854</p> | | | | | <p>SHEET 04 OF 07</p> |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | | NOT TO SCALE | | | | | | | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|------|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 181 | 21+264 | 674650.884 | 3501689.592 | 25 | Left | 21+245 | 21+278 | 33 | 10 | 76 | 0.2 | 0.2 | 13.72 | 1.726 | 75 | 59 | 17 | 25 | 7.0 |
| 182 | 21+319 | 674618.316 | 3501632.783 | 60 | Right | 21+304 | 21+334 | 30 | 0 | 28 | 0.0 | 0.0 | 1.87 | 0.494 | 28 | 16 | 32.6 | 35 | -2.5 |
| 183 | 21+363 | 674580.66 | 3501609.345 | 80 | Left | 21+350 | 21+376 | 26 | 0 | 19 | 0.0 | 0.0 | 1.08 | 0.327 | 18 | 45 | 44.4 | 45 | -2.5 |
| 184 | 21+475 | 674509.667 | 3501522.728 | 30 | Right | 21+460 | 21+487 | 27 | 0 | 51 | 0.0 | 0.0 | 3.27 | 0.894 | 51 | 13 | 23.4 | 25 | -2.5 |
| 185 | 21+532 | 674445.709 | 3501523.355 | 25 | Left | 21+514 | 21+546 | 32 | 10 | 73 | 0.2 | 0.2 | 12.49 | 1.669 | 72 | 44 | 7.51 | 25 | 7.0 |
| 186 | 21+571 | 674450.017 | 3501474.999 | 100 | Right | 21+558 | 21+584 | 26 | 0 | 15 | 0.0 | 0.0 | 0.86 | 0.261 | 14 | 56 | 9.22 | 30 | -2.5 |
| 187 | 21+636 | 674439.011 | 3501411.567 | 60 | Right | 21+621 | 21+649 | 28 | 0 | 27 | 0.0 | 0.0 | 1.69 | 0.470 | 26 | 55 | 20.9 | 35 | -2.5 |
| 188 | 21+663 | 674422.14 | 3501388.988 | 60 | Left | 21+653 | 21+673 | 20 | 0 | 19 | 0.0 | 0.0 | 0.83 | 0.331 | 18 | 58 | 3.93 | 35 | -2.5 |
| 189 | 21+733 | 674400.829 | 3501322.608 | 60 | Right | 21+721 | 21+744 | 24 | 0 | 23 | 0.0 | 0.0 | 1.19 | 0.395 | 22 | 38 | 40.9 | 35 | -2.5 |
| 190 | 21+769 | 674376.51 | 3501294.077 | 30 | Left | 21+762 | 21+776 | 15 | 10 | 28 | 0.1 | 0.2 | 2.85 | 0.819 | 27 | 48 | 3.41 | 25 | 6.9 |
| 191 | 21+801 | 674380.216 | 3501261.324 | 80 | Right | 21+789 | 21+814 | 25 | 0 | 18 | 0.0 | 0.0 | 1.00 | 0.314 | 18 | 1 | 8.8 | 45 | -2.5 |
| 192 | 21+835 | 674373.425 | 3501228.129 | 100 | Left | 21+823 | 21+846 | 23 | 0 | 13 | 0.0 | 0.0 | 0.66 | 0.229 | 13 | 7 | 3.28 | 40 | -2.5 |
| 193 | 21+914 | 674375.717 | 3501143.664 | 18 | Right | 21+901 | 21+924 | 23 | 10 | 73 | 0.2 | 0.3 | 12.04 | 1.837 | 73 | 26 | 34.4 | 20 | -2.5 |
| 194 | 21+957 | 674325.229 | 3501155.989 | 35 | Right | 21+943 | 21+969 | 27 | 0 | 43 | 0.0 | 0.0 | 2.67 | 0.757 | 43 | 23 | 7.18 | 25 | -2.5 |
| 195 | 22+016 | 674292.523 | 3501206.555 | 17 | Left | 21+992 | 22+024 | 32 | 0 | 108 | 0.0 | 0.0 | 11.85 | 1.881 | 107 | 48 | 4.74 | 20 | -2.5 |
| 196 | 22+049 | 674262.303 | 3501169.637 | 13 | Right | 22+026 | 22+053 | 27 | 0 | 120 | 0.0 | 0.0 | 12.85 | 2.087 | 119 | 36 | 12.3 | 20 | -2.5 |
| 197 | 22+077 | 674244.552 | 3501215.657 | 15 | Left | 22+068 | 22+085 | 17 | 8 | 65 | 0.2 | 0.3 | 7.63 | 1.671 | 65 | 11 | 35.6 | 20 | 5.0 |
| 198 | 22+116 | 674205.184 | 3501195.733 | 14 | Right | 22+104 | 22+124 | 20 | 0 | 81 | 0.0 | 0.0 | 4.43 | 1.416 | 81 | 6 | 55.2 | 20 | -2.5 |
| 199 | 22+153 | 674181.266 | 3501228.983 | 40 | Left | 22+144 | 22+161 | 18 | 5 | 25 | 0.0 | 0.1 | 1.69 | 0.566 | 25 | 15 | 18.9 | 30 | 5.0 |
| 200 | 22+191 | 674145.709 | 3501243.244 | 20 | Left | 22+176 | 22+201 | 26 | 0 | 73 | 0.0 | 0.0 | 4.94 | 1.281 | 73 | 23 | 28.1 | 20 | -2.5 |
| 201 | 22+241 | 674111.599 | 3501200.305 | 38 | Right | 22+214 | 22+261 | 48 | 0 | 72 | 0.0 | 0.0 | 9.00 | 1.259 | 72 | 6 | 36.4 | 30 | -2.5 |
| 202 | 22+279 | 674069.587 | 3501216.073 | 30 | Left | 22+271 | 22+286 | 15 | 0 | 28 | 0.0 | 0.0 | 0.92 | 0.489 | 28 | 0 | 43.1 | 25 | -2.5 |
| 203 | 22+303 | 674044.792 | 3501212.836 | 20 | Right | 22+294 | 22+311 | 17 | 0 | 49 | 0.0 | 0.0 | 1.99 | 0.857 | 49 | 6 | 29.3 | 20 | -2.5 |
| 204 | 22+328 | 674025.767 | 3501229.767 | 80 | Left | 22+323 | 22+332 | 9 | 0 | 7 | 0.0 | 0.0 | 0.14 | 0.118 | 6 | 45 | 54.6 | 45 | -2.5 |
| 205 | 22+383 | 673980.534 | 3501261.327 | 14 | Left | 22+372 | 22+390 | 19 | 0 | 77 | 0.0 | 0.0 | 3.85 | 1.338 | 76 | 38 | 46.5 | 20 | -2.5 |
| 206 | 22+404 | 673961.869 | 3501244.672 | 40 | Left | 22+395 | 22+413 | 18 | 0 | 26 | 0.0 | 0.0 | 1.05 | 0.452 | 25 | 54 | 55.6 | 30 | -2.5 |
| 207 | 22+434 | 673950.57 | 3501217.18 | 140 | Right | 22+429 | 22+438 | 9 | 0 | 4 | 0.0 | 0.0 | 0.08 | 0.066 | 3 | 47 | 58.3 | 35 | -2.5 |
| 208 | 22+458 | 673939.82 | 3501195.277 | 50 | Left | 22+450 | 22+467 | 17 | 0 | 19 | 0.0 | 0.0 | 0.73 | 0.339 | 19 | 24 | 54.2 | 35 | -2.5 |
| 209 | 22+490 | 673936.015 | 3501163.015 | 40 | Right | 22+483 | 22+498 | 15 | 0 | 21 | 0.0 | 0.0 | 0.71 | 0.375 | 21 | 29 | 51.4 | 30 | -2.5 |
| 210 | 22+520 | 673921.637 | 3501136.227 | 50 | Right | 22+513 | 22+528 | 15 | 10 | 18 | 0.1 | 0.1 | 1.72 | 0.505 | 17 | 30 | 7.84 | 35 | 5.0 |
| 211 | 22+569 | 673880.309 | 3501109.578 | 50 | Right | 22+563 | 22+576 | 13 | 0 | 15 | 0.0 | 0.0 | 0.44 | 0.266 | 15 | 13 | 33 | 35 | -2.5 |
| 212 | 22+621 | 673830.637 | 3501093.832 | 100 | Right | 22+610 | 22+632 | 22 | 0 | 13 | 0.0 | 0.0 | 0.60 | 0.218 | 12 | 30 | 50.7 | 35 | -2.5 |
| 213 | 22+654 | 673797.61 | 3501090.9 | 60 | Left | 22+648 | 22+661 | 13 | 0 | 12 | 0.0 | 0.0 | 0.34 | 0.211 | 12 | 5 | 48.7 | 35 | -2.5 |
| 214 | 22+666 | 673786.907 | 3501087.592 | 80 | Right | 22+661 | 22+670 | 10 | 0 | 7 | 0.0 | 0.0 | 0.14 | 0.120 | 6 | 53 | 38.1 | 45 | -2.5 |
| 215 | 22+706 | 673746.974 | 3501080.351 | 45 | Left | 22+696 | 22+716 | 21 | 0 | 26 | 0.0 | 0.0 | 1.20 | 0.458 | 26 | 12 | 55.8 | 30 | -2.5 |
| 216 | 22+756 | 673706.278 | 3501050.246 | 60 | Right | 22+742 | 22+770 | 28 | 0 | 26 | 0.0 | 0.0 | 1.64 | 0.462 | 26 | 28 | 41.3 | 35 | -2.5 |
| 217 | 22+797 | 673665.434 | 3501043.033 | 800 | Left | 22+791 | 22+804 | 13 | 0 | 1 | 0.0 | 0.0 | 0.03 | 0.016 | 0 | 55 | 56.8 | 35 | -2.5 |
| 218 | 22+840 | 673623.658 | 3501034.952 | 60 | Left | 22+826 | 22+853 | 27 | 0 | 25 | 0.0 | 0.0 | 1.50 | 0.443 | 25 | 23 | 29 | 35 | -2.5 |
| 219 | 22+873 | 673596.63 | 3501015.07 | 14 | Left | 22+859 | 22+881 | 22 | 0 | 90 | 0.0 | 0.0 | 5.83 | 1.574 | 90 | 9 | 21.7 | 20 | -2.5 |
| 220 | 22+891 | 673611.147 | 3500995.448 | 80 | Right | 22+884 | 22+899 | 16 | 0 | 11 | 0.0 | 0.0 | 0.38 | 0.196 | 11 | 12 | 20 | 45 | -2.5 |
| 221 | 22+955 | 673639.599 | 3500935.228 | 32 | Right | 22+933 | 22+971 | 38 | 10 | 68 | 0.1 | 0.2 | 11.78 | 1.494 | 67 | 40 | 23.7 | 25 | 5.0 |
| 222 | 23+033 | 673564.567 | 3500892.412 | 45 | Right | 23+026 | 23+039 | 13 | 0 | 17 | 0.0 | 0.0 | 0.48 | 0.292 | 16 | 43 | 37.4 | 30 | -2.5 |
| 223 | 23+074 | 673524.448 | 3500883.161 | 30 | Left | 23+060 | 23+085 | 25 | 0 | 48 | 0.0 | 0.0 | 2.79 | 0.831 | 47 | 36 | 7.43 | 25 | -2.5 |
| 224 | 23+165 | 673477.284 | 3500799.507 | 35 | Left | 23+140 | 23+183 | 43 | 10 | 71 | 0.1 | 0.1 | 13.43 | 1.519 | 70 | 40 | 5.32 | 25 | 5.0 |
| 225 | 23+214 | 673527.098 | 3500767.923 | 25 | Right | 23+205 | 23+222 | 17 | 0 | 40 | 0.0 | 0.0 | 1.57 | 0.691 | 39 | 34 | 36.1 | 25 | -2.5 |



TENDER PURPOSE ONLY

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|------|-------------|--|--|--|-------|---------|----------|--------|--|--------------|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|----------------|
| | | | | | 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) | | | | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | | TITLE : HORIZONTAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/HCD-005 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | | | | SHEET 05 OF 07 |
| REV | DATE | DESCRIPTION | | | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | | NOT TO SCALE | | | | | | | | | | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|------|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 226 | 23+276 | 673546.744 | 3500707.628 | 35 | Right | 23+267 | 23+285 | 17 | 0 | 29 | 0.0 | 0.0 | 1.11 | 0.498 | 28 | 31 | 4.24 | 25 | -2.5 |
| 227 | 23+322 | 673538.336 | 3500662.13 | 90 | Left | 23+292 | 23+350 | 58 | 0 | 37 | 0.0 | 0.0 | 4.90 | 0.645 | 36 | 58 | 25.2 | 45 | -2.5 |
| 228 | 23+422 | 673584.837 | 3500568.878 | 60 | Right | 23+383 | 23+452 | 69 | 10 | 66 | 0.1 | 0.1 | 15.77 | 1.311 | 65 | 32 | 49.6 | 35 | 7.0 |
| 229 | 23+507 | 673512.523 | 3500505.109 | 120 | Left | 23+483 | 23+530 | 48 | 10 | 23 | 0.0 | 0.0 | 3.58 | 0.481 | 22 | 45 | 44.7 | 40 | 7.0 |
| 230 | 23+581 | 673485.499 | 3500434.911 | 70 | Right | 23+570 | 23+592 | 23 | 0 | 19 | 0.0 | 0.0 | 0.94 | 0.325 | 18 | 37 | 47.9 | 40 | -2.5 |
| 231 | 23+624 | 673458.139 | 3500401.94 | 50 | Right | 23+611 | 23+636 | 24 | 0 | 28 | 0.0 | 0.0 | 1.50 | 0.484 | 27 | 45 | 15.9 | 35 | -2.5 |
| 232 | 23+664 | 673420.447 | 3500386.281 | 30 | Left | 23+657 | 23+671 | 15 | 0 | 28 | 0.0 | 0.0 | 0.95 | 0.496 | 28 | 25 | 57.6 | 25 | -2.5 |
| 233 | 23+767 | 673355.311 | 3500305.867 | 70 | Left | 23+748 | 23+784 | 36 | 10 | 30 | 0.1 | 0.1 | 4.04 | 0.659 | 29 | 34 | 24 | 40 | 7.0 |
| 234 | 23+835 | 673353.792 | 3500236.245 | 100 | Left | 23+827 | 23+843 | 16 | 0 | 9 | 0.0 | 0.0 | 0.33 | 0.163 | 9 | 19 | 29.7 | 50 | -2.5 |
| 235 | 23+857 | 673356.806 | 3500215.007 | 80 | Right | 23+847 | 23+866 | 19 | 0 | 14 | 0.0 | 0.0 | 0.57 | 0.238 | 13 | 39 | 12.7 | 45 | -2.5 |
| 236 | 23+898 | 673352.734 | 3500173.315 | 80 | Right | 23+888 | 23+908 | 20 | 10 | 14 | 0.1 | 0.1 | 1.46 | 0.373 | 14 | 11 | 46.1 | 45 | 7.0 |
| 237 | 23+960 | 673324.099 | 3500116.959 | 80 | Left | 23+950 | 23+970 | 20 | 30 | 15 | 0.5 | 0.2 | 4.64 | 0.630 | 14 | 36 | 52.5 | 45 | 7.0 |
| 238 | 24+034 | 673335.949 | 3500043.508 | 40 | Right | 24+017 | 24+048 | 31 | 0 | 44 | 0.0 | 0.0 | 3.21 | 0.775 | 44 | 25 | 52.3 | 30 | -2.5 |
| 239 | 24+082 | 673306.777 | 3500002.257 | 80 | Left | 24+071 | 24+093 | 22 | 10 | 16 | 0.1 | 0.1 | 1.64 | 0.396 | 15 | 30 | 20.3 | 45 | 7.0 |
| 240 | 24+162 | 673288.967 | 3499922.57 | 25 | Right | 24+154 | 24+171 | 17 | 10 | 39 | 0.2 | 0.2 | 4.40 | 1.086 | 39 | 17 | 45 | 25 | 7.0 |
| 241 | 24+211 | 673239.89 | 3499909.248 | 35 | Right | 24+198 | 24+223 | 25 | 0 | 40 | 0.0 | 0.0 | 2.28 | 0.704 | 40 | 19 | 33.9 | 25 | -2.5 |
| 242 | 24+333 | 673123.757 | 3499963.746 | 15 | Left | 24+323 | 24+341 | 18 | 10 | 69 | 0.3 | 0.3 | 10.85 | 1.877 | 69 | 19 | 40.2 | 20 | 7.0 |
| 243 | 24+376 | 673116.995 | 3499913.167 | 100 | Right | 24+364 | 24+388 | 23 | 0 | 13 | 0.0 | 0.0 | 0.68 | 0.233 | 13 | 22 | 8.67 | 25 | -2.5 |
| 244 | 24+402 | 673107.503 | 3499888.416 | 30 | Left | 24+391 | 24+413 | 23 | 0 | 43 | 0.0 | 0.0 | 2.29 | 0.758 | 43 | 25 | 4.99 | 25 | -2.5 |
| 245 | 24+434 | 673120.098 | 3499857.909 | 100 | Right | 24+424 | 24+445 | 21 | 0 | 12 | 0.0 | 0.0 | 0.53 | 0.206 | 11 | 46 | 29.1 | 35 | -2.5 |
| 246 | 24+477 | 673127.939 | 3499816.251 | 50 | Left | 24+464 | 24+489 | 25 | 0 | 29 | 0.0 | 0.0 | 1.60 | 0.499 | 28 | 34 | 21 | 35 | -2.5 |
| 247 | 24+552 | 673183.73 | 3499747.924 | 15 | Right | 24+537 | 24+561 | 24 | 10 | 92 | 0.3 | 0.3 | 21.04 | 2.266 | 91 | 37 | 38.8 | 20 | 7.0 |
| 248 | 24+623 | 673094 | 3499748.852 | 80 | Left | 24+614 | 24+632 | 18 | 0 | 13 | 0.0 | 0.0 | 0.50 | 0.222 | 12 | 43 | 29.7 | 45 | -2.5 |
| 249 | 24+704 | 673014.929 | 3499731.853 | 80 | Left | 24+692 | 24+715 | 23 | 0 | 17 | 0.0 | 0.0 | 0.84 | 0.289 | 16 | 33 | 46 | 45 | -2.5 |
| 250 | 24+762 | 672964.007 | 3499703.979 | 15 | Left | 24+733 | 24+766 | 33 | 0 | 125 | 0.0 | 0.0 | 17.33 | 2.177 | 124 | 42 | 22.3 | 20 | -2.5 |
| 251 | 24+780 | 673002.318 | 3499684.796 | 17 | Right | 24+774 | 24+785 | 12 | 0 | 39 | 0.0 | 0.0 | 1.02 | 0.678 | 38 | 49 | 29.1 | 20 | -2.5 |
| 252 | 24+797 | 673009.764 | 3499668.515 | 30 | Left | 24+794 | 24+801 | 7 | 0 | 14 | 0.0 | 0.0 | 0.22 | 0.243 | 13 | 55 | 58.8 | 25 | -2.5 |
| 253 | 24+810 | 673017.689 | 3499658.556 | 20 | Left | 24+805 | 24+815 | 10 | 0 | 30 | 0.0 | 0.0 | 0.70 | 0.521 | 29 | 52 | 13.8 | 20 | -2.5 |
| 254 | 24+850 | 673055.13 | 3499643.717 | 17 | Right | 24+831 | 24+860 | 28 | 0 | 96 | 0.0 | 0.0 | 8.34 | 1.671 | 95 | 43 | 3.57 | 20 | -2.5 |
| 255 | 24+906 | 673025.22 | 3499585.858 | 30 | Left | 24+869 | 24+922 | 53 | 0 | 101 | 0.0 | 0.0 | 17.39 | 1.771 | 101 | 27 | 31.2 | 25 | -2.5 |
| 256 | 24+944 | 673081.683 | 3499569.797 | 30 | Right | 24+934 | 24+954 | 20 | 0 | 38 | 0.0 | 0.0 | 1.69 | 0.656 | 37 | 35 | 11.4 | 25 | -2.5 |
| 257 | 25+070 | 673160.918 | 3499462.854 | 15 | Right | 25+058 | 25+078 | 20 | 10 | 77 | 0.3 | 0.3 | 13.47 | 2.009 | 76 | 53 | 46.8 | 20 | 7.0 |
| 258 | 25+140 | 673079.905 | 3499446.458 | 28 | Left | 25+131 | 25+149 | 19 | 10 | 38 | 0.2 | 0.2 | 4.27 | 1.021 | 38 | 3 | 14.6 | 25 | 7.0 |
| 259 | 25+190 | 673062.059 | 3499397.537 | 20 | Right | 25+184 | 25+195 | 11 | 10 | 32 | 0.2 | 0.3 | 3.41 | 1.058 | 31 | 57 | 49.8 | 20 | 6.9 |
| 260 | 25+238 | 673012.74 | 3499389.42 | 18 | Left | 25+226 | 25+247 | 22 | 0 | 69 | 0.0 | 0.0 | 3.85 | 1.205 | 69 | 3 | 8.76 | 20 | -2.5 |
| 261 | 25+268 | 673006.165 | 3499357.395 | 14 | Right | 25+260 | 25+274 | 15 | 0 | 60 | 0.0 | 0.0 | 2.21 | 1.056 | 60 | 28 | 58.1 | 20 | -2.5 |
| 262 | 25+293 | 672980.371 | 3499349.056 | 100 | Left | 25+281 | 25+305 | 24 | 0 | 13 | 0.0 | 0.0 | 0.70 | 0.235 | 13 | 28 | 17 | 35 | -2.5 |
| 263 | 25+336 | 672944.151 | 3499326.958 | 26 | Right | 25+320 | 25+348 | 29 | 0 | 63 | 0.0 | 0.0 | 4.57 | 1.108 | 63 | 29 | 41.2 | 25 | -2.5 |
| 264 | 25+366 | 672915.722 | 3499344.796 | 50 | Left | 25+354 | 25+377 | 24 | 0 | 27 | 0.0 | 0.0 | 1.45 | 0.476 | 27 | 15 | 20.5 | 35 | -2.5 |
| 265 | 25+401 | 672879.89 | 3499347.838 | 40 | Left | 25+389 | 25+413 | 24 | 0 | 35 | 0.0 | 0.0 | 1.92 | 0.608 | 34 | 48 | 50.4 | 30 | -2.5 |
| 266 | 25+438 | 672847.16 | 3499328.969 | 15 | Left | 25+421 | 25+447 | 26 | 0 | 100 | 0.0 | 0.0 | 8.24 | 1.738 | 99 | 35 | 28.4 | 20 | -2.5 |
| 267 | 25+521 | 672906.057 | 3499257.658 | 32 | Left | 25+513 | 25+529 | 16 | 0 | 28 | 0.0 | 0.0 | 0.97 | 0.487 | 27 | 53 | 0.27 | 25 | -2.5 |
| 268 | 25+552 | 672934.302 | 3499245.922 | 25 | Right | 25+545 | 25+558 | 12 | 0 | 28 | 0.0 | 0.0 | 0.79 | 0.496 | 28 | 26 | 7.03 | 25 | -2.5 |
| 269 | 25+575 | 672948.871 | 3499227.932 | 25 | Left | 25+571 | 25+578 | 7 | 0 | 16 | 0.0 | 0.0 | 0.23 | 0.272 | 15 | 34 | 5.58 | 25 | -2.5 |
| 270 | 25+633 | 672996.78 | 3499193.848 | 32 | Left | 25+625 | 25+640 | 16 | 10 | 28 | 0.1 | 0.2 | 2.88 | 0.799 | 27 | 53 | 23.4 | 25 | 7.0 |



TENDER PURPOSE ONLY

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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) | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : HORIZONTAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/HCD-006 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | SHEET 06 OF 07 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: NOT TO SCALE | | | | | | | |

PACKAGE-VI - HORIZONTAL CURVE DETAILS

| HIP No. | HIP Chainage (KM) | Easting | Northing | Radius (m) | Hand of Curve | Curve Start Chainage (Km) | Curve End Chainage (Km) | Length of Circular Curve (mts) | Transition Length (m) | Deviation and Central Angle of Circular Arc (Dc) | Shift (S) | Tangent Distance (Ts) | Apex Distance (Es) | Total Deviation Angle (Delta) | Included Angle | | | Design Speed (KMPH) | Super Elevation (%) |
|---------|-------------------|------------|-------------|------------|---------------|---------------------------|-------------------------|--------------------------------|-----------------------|--|-----------|-----------------------|--------------------|-------------------------------|----------------|----|------|---------------------|---------------------|
| | | | | | | | | | | | | | | | ° | ' | " | | |
| 271 | 25+685 | 673048.819 | 3499203.366 | 18 | Right | 25+665 | 25+695 | 30 | 0 | 94 | 0.0 | 0.0 | 8.51 | 1.649 | 94 | 29 | 0.68 | 20 | -2.5 |
| 272 | 25+708 | 673052.179 | 3499170.749 | 30 | Left | 25+698 | 25+718 | 20 | 0 | 38 | 0.0 | 0.0 | 1.70 | 0.658 | 37 | 40 | 49 | 25 | -2.5 |
| 273 | 25+772 | 673096.838 | 3499123.79 | 200 | Left | 25+753 | 25+792 | 39 | 0 | 11 | 0.0 | 0.0 | 0.96 | 0.195 | 11 | 11 | 18.4 | 25 | -2.5 |
| 274 | 25+821 | 673136.39 | 3499095.838 | 15 | Right | 25+796 | 25+827 | 31 | 0 | 118 | 0.0 | 0.0 | 13.97 | 2.053 | 117 | 38 | 10.3 | 20 | -2.5 |
| 275 | 25+856 | 673088.033 | 3499071.077 | 35 | Left | 25+846 | 25+866 | 20 | 0 | 32 | 0.0 | 0.0 | 1.43 | 0.562 | 32 | 12 | 56.9 | 25 | -2.5 |
| 276 | 25+901 | 673064.794 | 3499031.892 | 80 | Right | 25+888 | 25+914 | 27 | 0 | 19 | 0.0 | 0.0 | 1.13 | 0.334 | 19 | 6 | 59.4 | 45 | -2.5 |
| 277 | 26+005 | 672978.409 | 3498958.858 | 35 | Left | 25+966 | 26+025 | 59 | 10 | 97 | 0.1 | 0.1 | 28.64 | 1.972 | 96 | 38 | 30.9 | 25 | 7.0 |
| 278 | 26+117 | 673103.713 | 3498895.632 | 80 | Right | 26+104 | 26+130 | 27 | 0 | 19 | 0.0 | 0.0 | 1.13 | 0.334 | 19 | 8 | 30.4 | 45 | -2.5 |
| 279 | 26+152 | 673128.331 | 3498870.214 | 50 | Right | 26+142 | 26+162 | 20 | 0 | 23 | 0.0 | 0.0 | 1.04 | 0.404 | 23 | 7 | 49.5 | 35 | -2.5 |
| 280 | 26+214 | 673150.608 | 3498812.038 | 60 | Right | 26+210 | 26+219 | 9 | 10 | 9 | 0.1 | 0.1 | 0.87 | 0.324 | 9 | 0 | 19.9 | 35 | 6.7 |
| 281 | 26+303 | 673154.35 | 3498722.678 | 45 | Right | 26+286 | 26+318 | 32 | 10 | 40 | 0.1 | 0.1 | 5.39 | 0.926 | 40 | 18 | 19.2 | 30 | 7.0 |
| 282 | 26+356 | 673111.34 | 3498687.398 | 50 | Right | 26+342 | 26+369 | 27 | 0 | 31 | 0.0 | 0.0 | 1.91 | 0.544 | 31 | 10 | 4.89 | 35 | -2.5 |
| 283 | 26+388 | 673079.395 | 3498682.799 | 45 | Left | 26+380 | 26+395 | 14 | 0 | 18 | 0.0 | 0.0 | 0.58 | 0.321 | 18 | 21 | 59.7 | 30 | -2.5 |
| 284 | 26+456 | 673018.381 | 3498652.3 | 70 | Left | 26+449 | 26+462 | 13 | 10 | 11 | 0.1 | 0.1 | 1.01 | 0.328 | 10 | 35 | 15.6 | 40 | 7.0 |
| 285 | 26+517 | 672974.897 | 3498608.309 | 45 | Left | 26+503 | 26+530 | 27 | 0 | 34 | 0.0 | 0.0 | 2.09 | 0.598 | 34 | 17 | 6.94 | 30 | -2.5 |
| 286 | 26+564 | 672965.621 | 3498557.684 | 25 | Left | 26+548 | 26+577 | 29 | 10 | 67 | 0.2 | 0.2 | 10.44 | 1.562 | 66 | 34 | 33.4 | 25 | 7.0 |
| 287 | 26+606 | 673014.185 | 3498548.342 | 20 | Right | 26+595 | 26+616 | 21 | 0 | 60 | 0.0 | 0.0 | 3.05 | 1.040 | 59 | 36 | 22 | 20 | -2.5 |
| 288 | 26+631 | 673023.111 | 3498523.145 | 40 | Left | 26+618 | 26+643 | 25 | 0 | 35 | 0.0 | 0.0 | 2.00 | 0.619 | 35 | 28 | 6.69 | 30 | -2.5 |
| 289 | 26+669 | 673054.795 | 3498500.938 | 40 | Right | 26+650 | 26+685 | 35 | 0 | 50 | 0.0 | 0.0 | 4.12 | 0.871 | 49 | 53 | 43.5 | 30 | -2.5 |
| 290 | 26+708 | 673058.451 | 3498459.802 | 80 | Left | 26+697 | 26+719 | 22 | 0 | 16 | 0.0 | 0.0 | 0.74 | 0.271 | 15 | 30 | 46.2 | 45 | -2.5 |
| 291 | 26+736 | 673068.484 | 3498433.097 | 45 | Left | 26+726 | 26+746 | 20 | 0 | 25 | 0.0 | 0.0 | 1.08 | 0.434 | 24 | 51 | 27.6 | 30 | -2.5 |
| 292 | 26+776 | 673098.104 | 3498403.937 | 30 | Right | 26+763 | 26+788 | 25 | 10 | 48 | 0.1 | 0.2 | 6.11 | 1.167 | 47 | 44 | 31 | 25 | 7.0 |
| 293 | 26+847 | 673070.854 | 3498334.372 | 40 | Right | 26+838 | 26+856 | 18 | 10 | 26 | 0.1 | 0.1 | 2.68 | 0.699 | 25 | 41 | 59.1 | 30 | 7.0 |
| 294 | 26+933 | 672992.868 | 3498291.88 | 18 | Left | 26+926 | 26+940 | 14 | 10 | 45 | 0.2 | 0.3 | 5.19 | 1.332 | 44 | 30 | 9.46 | 20 | 5.0 |
| 295 | 26+995 | 673009.38 | 3498229.905 | 50 | Left | 26+977 | 27+011 | 34 | 0 | 39 | 0.0 | 0.0 | 2.97 | 0.673 | 38 | 33 | 5.67 | 35 | -2.5 |
| 296 | 27+039 | 673046.109 | 3498202.697 | 100 | Right | 27+026 | 27+052 | 25 | 0 | 15 | 0.0 | 0.0 | 0.81 | 0.254 | 14 | 33 | 54.8 | 30 | -2.5 |
| 297 | 27+159 | 673121.366 | 3498109.446 | 14 | Right | 27+130 | 27+161 | 31 | 0 | 128 | 0.0 | 0.0 | 17.93 | 2.234 | 127 | 59 | 14.2 | 20 | -2.5 |
| 298 | 27+179 | 673075.099 | 3498108.705 | 50 | Left | 27+170 | 27+187 | 17 | 0 | 19 | 0.0 | 0.0 | 0.71 | 0.335 | 19 | 12 | 39.8 | 35 | -2.5 |
| 299 | 27+233 | 673020.249 | 3498088.602 | 14 | Left | 27+226 | 27+240 | 13 | 10 | 55 | 0.3 | 0.4 | 7.36 | 1.675 | 55 | 2 | 36 | 20 | 4.9 |
| 300 | 27+348 | 673074.291 | 3497978.277 | 22 | Right | 27+334 | 27+359 | 25 | 10 | 65 | 0.2 | 0.2 | 9.58 | 1.583 | 64 | 40 | 22.5 | 20 | 7.0 |
| 301 | 27+400 | 673021.253 | 3497953.114 | 14 | Left | 27+371 | 27+402 | 32 | 0 | 129 | 0.0 | 0.0 | 18.71 | 2.257 | 129 | 19 | 8.42 | 20 | -2.5 |
| 302 | 27+436 | 673078.763 | 3497925.929 | 30 | Left | 27+426 | 27+446 | 19 | 0 | 37 | 0.0 | 0.0 | 1.65 | 0.649 | 37 | 11 | 40.5 | 25 | -2.5 |
| 303 | 27+466 | 673108.261 | 3497932.142 | 35 | Right | 27+458 | 27+473 | 15 | 0 | 25 | 0.0 | 0.0 | 0.83 | 0.431 | 24 | 41 | 56.1 | 25 | -2.5 |
| 304 | 27+511 | 673153.08 | 3497921.956 | 50 | Right | 27+493 | 27+527 | 34 | 10 | 39 | 0.1 | 0.1 | 5.30 | 0.876 | 38 | 42 | 49.5 | 35 | 7.0 |
| 305 | 27+562 | 673178.893 | 3497871.343 | 16 | Left | 27+554 | 27+569 | 15 | 10 | 55 | 0.3 | 0.3 | 7.23 | 1.590 | 55 | 19 | 7.93 | 20 | 4.9 |
| 306 | 27+638 | 673257.997 | 3497913.672 | 14 | Right | 27+626 | 27+646 | 20 | 10 | 82 | 0.3 | 0.4 | 16.17 | 2.154 | 82 | 29 | 34.7 | 20 | 5.0 |
| 307 | 27+695 | 673251.514 | 3497843.344 | 30 | Left | 27+690 | 27+699 | 8 | 10 | 16 | 0.1 | 0.2 | 1.62 | 0.614 | 16 | 3 | 23 | 25 | 6.4 |
| 308 | 27+730 | 673269.271 | 3497812.449 | 30 | Right | 27+718 | 27+741 | 23 | 0 | 44 | 0.0 | 0.0 | 2.39 | 0.772 | 44 | 15 | 12.8 | 25 | -2.5 |
| 309 | 27+759 | 673261.831 | 3497783.401 | 40 | Left | 27+748 | 27+769 | 20 | 0 | 29 | 0.0 | 0.0 | 1.35 | 0.512 | 29 | 21 | 5.65 | 30 | -2.5 |
| 310 | 27+803 | 673273.527 | 3497739.707 | 70 | Left | 27+784 | 27+821 | 37 | 10 | 31 | 0.1 | 0.1 | 4.27 | 0.677 | 30 | 34 | 55.3 | 40 | 7.0 |

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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) | | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : HORIZONTAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/HCD-007 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | | | SHEET 07 OF 07 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: NOT TO SCALE | | | | | | | | |

VERTICAL CURVE DETAILS



Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 1 | 11+123 | 923.63 | 11+098.459 | 11+148.459 | 0 | 7.476 | 50 | 6.688 | Sag |
| 2 | 11+260 | 933.86 | 11+235.224 | 11+285.224 | 7.476 | 6.695 | 50 | 63.96 | Hog |
| 3 | 11+403 | 943.39 | 11+392.681 | 11+412.681 | 6.695 | 6.102 | 20 | 33.775 | Hog |
| 4 | 11+897 | 973.58 | 11+879.800 | 11+914.800 | 6.102 | 3.66 | 35 | 14.329 | Hog |
| 5 | 11+942 | 975.21 | 11+932.001 | 11+952.001 | 3.66 | 5.054 | 20 | 14.341 | Sag |
| 6 | 12+000 | 978.16 | 11+990.326 | 12+010.326 | 5.054 | 6.584 | 20 | 13.078 | Sag |
| 7 | 12+054 | 981.68 | 12+043.776 | 12+063.776 | 6.584 | 5.321 | 20 | 15.836 | Hog |
| 8 | 12+146 | 986.61 | 12+136.376 | 12+156.376 | 5.321 | 7.075 | 20 | 11.403 | Sag |
| 9 | 12+210 | 991.10 | 12+184.856 | 12+234.856 | 7.075 | 5.988 | 50 | 46.009 | Hog |
| 10 | 12+297 | 996.34 | 12+282.415 | 12+312.415 | 5.988 | 7.048 | 30 | 28.292 | Sag |
| 11 | 12+359 | 1000.67 | 12+346.323 | 12+371.323 | 7.048 | 5.626 | 25 | 17.571 | Hog |
| 12 | 12+636 | 1016.28 | 12+626.316 | 12+646.316 | 5.626 | 7.417 | 20 | 11.163 | Sag |
| 13 | 12+732 | 1023.38 | 12+722.041 | 12+742.041 | 7.417 | 3.74 | 20 | 5.439 | Hog |
| 14 | 12+757 | 1024.30 | 12+746.705 | 12+766.705 | 3.74 | 6.407 | 20 | 7.5 | Sag |
| 15 | 12+840 | 1029.63 | 12+829.828 | 12+849.828 | 6.407 | 4.534 | 20 | 10.681 | Hog |
| 16 | 12+869 | 1030.96 | 12+859.339 | 12+879.339 | 4.534 | 6.069 | 20 | 13.027 | Sag |
| 17 | 12+942 | 1035.38 | 12+932.152 | 12+952.152 | 6.069 | 4.858 | 20 | 16.516 | Hog |
| 18 | 12+999 | 1038.14 | 12+983.822 | 13+013.822 | 4.858 | 6.926 | 30 | 14.507 | Sag |
| 19 | 13+059 | 1042.29 | 13+048.770 | 13+068.770 | 6.926 | 4.346 | 20 | 7.751 | Hog |
| 20 | 13+080 | 1043.22 | 13+070.117 | 13+090.117 | 4.346 | 6.614 | 20 | 8.818 | Sag |
| 21 | 13+135 | 1046.83 | 13+122.225 | 13+147.225 | 6.614 | 4.801 | 25 | 13.786 | Hog |
| 22 | 13+219 | 1050.89 | 13+209.419 | 13+229.419 | 4.801 | 6.736 | 20 | 10.334 | Sag |
| 23 | 13+259 | 1053.58 | 13+249.325 | 13+269.325 | 6.736 | 3.643 | 20 | 6.465 | Hog |
| 24 | 13+290 | 1054.70 | 13+280.016 | 13+300.016 | 3.643 | 6.656 | 20 | 6.637 | Sag |
| 25 | 13+364 | 1059.64 | 13+354.219 | 13+374.219 | 6.656 | 3.209 | 20 | 5.802 | Hog |
| 26 | 13+424 | 1061.55 | 13+413.587 | 13+433.587 | 3.209 | 7.14 | 20 | 5.088 | Sag |
| 27 | 13+748 | 1084.71 | 13+735.586 | 13+760.586 | 7.14 | 3.495 | 25 | 6.859 | Hog |
| 28 | 13+980 | 1092.82 | 13+969.966 | 13+989.966 | 3.495 | 4.71 | 20 | 16.461 | Sag |
| 29 | 14+180 | 1102.26 | 14+170.484 | 14+190.484 | 4.71 | 2.28 | 20 | 8.232 | Hog |
| 30 | 14+206 | 1102.85 | 14+196.115 | 14+216.115 | 2.28 | 6.396 | 20 | 4.859 | Sag |
| 31 | 14+278 | 1107.47 | 14+268.316 | 14+288.316 | 6.396 | 5.043 | 20 | 14.782 | Hog |
| 32 | 14+335 | 1110.31 | 14+324.690 | 14+344.690 | 5.043 | 1.403 | 20 | 5.494 | Hog |
| 33 | 14+371 | 1110.82 | 14+361.396 | 14+381.396 | 1.403 | 4.071 | 20 | 7.496 | Sag |
| 34 | 14+510 | 1116.48 | 14+497.751 | 14+522.751 | 4.071 | 6.326 | 25 | 11.088 | Sag |
| 35 | 14+580 | 1120.87 | 14+569.728 | 14+589.728 | 6.326 | 3.667 | 20 | 7.523 | Hog |
| 36 | 14+632 | 1122.78 | 14+621.836 | 14+641.836 | 3.667 | 5.327 | 20 | 12.051 | Sag |
| 37 | 14+714 | 1127.17 | 14+701.616 | 14+726.616 | 5.327 | 6.553 | 25 | 20.394 | Sag |
| 38 | 14+781 | 1131.58 | 14+771.447 | 14+791.447 | 6.553 | 3.448 | 20 | 6.442 | Hog |
| 39 | 14+851 | 1133.96 | 14+838.039 | 14+863.039 | 3.448 | 5.397 | 25 | 12.828 | Sag |
| 40 | 15+013 | 1142.71 | 15+002.618 | 15+022.618 | 5.397 | 3.22 | 20 | 9.186 | Hog |

Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 41 | 15+067 | 1144.44 | 15+056.532 | 15+076.532 | 3.22 | 5.599 | 20 | 8.407 | Sag |
| 42 | 15+168 | 1150.10 | 15+157.590 | 15+177.590 | 5.599 | 2.245 | 20 | 5.963 | Hog |
| 43 | 15+232 | 1151.55 | 15+222.274 | 15+242.274 | 2.245 | 5.221 | 20 | 6.719 | Sag |
| 44 | 15+267 | 1153.39 | 15+257.381 | 15+277.381 | 5.221 | 3.049 | 20 | 9.207 | Hog |
| 45 | 15+299 | 1154.36 | 15+289.349 | 15+309.349 | 3.049 | 7.012 | 20 | 5.046 | Sag |
| 46 | 15+331 | 1156.57 | 15+320.847 | 15+340.847 | 7.012 | 4.495 | 20 | 7.945 | Hog |
| 47 | 15+381 | 1158.81 | 15+370.625 | 15+390.625 | 4.495 | 5.356 | 20 | 23.236 | Sag |
| 48 | 15+558 | 1168.30 | 15+547.908 | 15+567.908 | 5.356 | 1.883 | 20 | 5.759 | Hog |
| 49 | 15+585 | 1168.82 | 15+575.262 | 15+595.262 | 1.883 | 6.434 | 20 | 4.394 | Sag |
| 50 | 15+618 | 1170.92 | 15+607.967 | 15+627.967 | 6.434 | 2.597 | 20 | 5.213 | Hog |
| 51 | 15+682 | 1172.59 | 15+672.253 | 15+692.253 | 2.597 | 4.39 | 20 | 11.159 | Sag |
| 52 | 15+755 | 1175.78 | 15+742.447 | 15+767.447 | 4.39 | 2.181 | 25 | 11.321 | Hog |
| 53 | 15+788 | 1176.51 | 15+778.461 | 15+798.461 | 2.181 | 4.822 | 20 | 7.574 | Sag |
| 54 | 15+893 | 1181.55 | 15+882.911 | 15+902.911 | 4.822 | 5.363 | 20 | 36.989 | Sag |
| 55 | 16+009 | 1187.76 | 15+996.220 | 16+021.220 | 5.363 | 1.22 | 25 | 6.035 | Hog |
| 56 | 16+051 | 1188.28 | 16+041.285 | 16+061.285 | 1.22 | 5.406 | 20 | 4.778 | Sag |
| 57 | 16+080 | 1189.83 | 16+070.004 | 16+090.004 | 5.406 | 3.372 | 20 | 9.833 | Hog |
| 58 | 16+105 | 1190.69 | 16+095.324 | 16+115.324 | 3.372 | 5.231 | 20 | 10.757 | Sag |
| 59 | 16+171 | 1194.14 | 16+158.801 | 16+183.801 | 5.231 | 0.072 | 25 | 4.846 | Hog |
| 60 | 16+229 | 1194.18 | 16+216.942 | 16+241.942 | 0.072 | 4.058 | 25 | 6.272 | Sag |
| 61 | 16+272 | 1195.89 | 16+259.126 | 16+284.126 | 4.058 | 2.821 | 25 | 20.199 | Hog |
| 62 | 16+300 | 1196.70 | 16+290.307 | 16+310.307 | 2.821 | 6.325 | 19.999809 | 5.707 | Sag |
| 63 | 16+334 | 1198.82 | 16+323.871 | 16+343.871 | 6.325 | 3.564 | 20 | 7.242 | Hog |
| 64 | 16+398 | 1201.12 | 16+373.368 | 16+423.368 | 3.564 | 5.22 | 50 | 30.187 | Sag |
| 65 | 16+458 | 1204.24 | 16+448.035 | 16+468.035 | 5.22 | 2.517 | 20 | 7.398 | Hog |
| 66 | 16+500 | 1205.28 | 16+489.520 | 16+509.520 | 2.517 | 6.778 | 20 | 4.694 | Sag |
| 67 | 16+529 | 1207.26 | 16+518.763 | 16+538.763 | 6.778 | 4.117 | 20 | 7.516 | Hog |
| 68 | 16+574 | 1209.12 | 16+563.794 | 16+583.794 | 4.117 | 2.297 | 20 | 10.988 | Hog |
| 69 | 16+611 | 1209.97 | 16+600.977 | 16+620.977 | 2.297 | 4.254 | 20 | 10.217 | Sag |
| 70 | 16+682 | 1212.99 | 16+671.885 | 16+691.885 | 4.254 | 4.656 | 20 | 49.783 | Sag |
| 71 | 16+766 | 1216.92 | 16+756.479 | 16+776.479 | 4.656 | 6.928 | 20 | 8.803 | Sag |
| 72 | 16+852 | 1222.86 | 16+842.173 | 16+862.173 | 6.928 | 2.94 | 20 | 5.015 | Hog |
| 73 | 16+896 | 1224.15 | 16+886.093 | 16+906.093 | 2.94 | 6.714 | 20 | 5.299 | Sag |
| 74 | 16+935 | 1226.78 | 16+922.692 | 16+947.692 | 6.714 | 2.953 | 25 | 6.647 | Hog |
| 75 | 17+067 | 1230.69 | 17+054.993 | 17+079.993 | 2.953 | 6.807 | 25 | 6.488 | Sag |
| 76 | 17+123 | 1234.44 | 17+112.714 | 17+132.714 | 6.807 | 3.312 | 20 | 5.723 | Hog |
| 77 | 17+165 | 1235.84 | 17+152.282 | 17+177.282 | 3.312 | 6.897 | 25 | 6.973 | Sag |
| 78 | 17+216 | 1239.36 | 17+203.413 | 17+228.413 | 6.897 | 3.652 | 25 | 7.703 | Hog |
| 79 | 17+307 | 1242.70 | 17+297.404 | 17+317.404 | 3.652 | 5.814 | 20 | 9.249 | Sag |
| 80 | 17+349 | 1245.12 | 17+339.012 | 17+359.012 | 5.814 | 3.197 | 20 | 7.643 | Hog |

TENDER PURPOSE ONLY

| | | | | | | | | | | |
|-----|------|-------------|----------|-------|--|--|---|--|---|----------------|
| | | | | | 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) | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : VERTICAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/CD-001 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | SHEET 01 OF 03 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | NOT TO SCALE | | |



Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 81 | 17+383 | 1246.21 | 17+373.075 | 17+393.075 | 3.197 | 4.673 | 20 | 13.555 | Sag |
| 82 | 17+435 | 1248.65 | 17+425.292 | 17+445.292 | 4.673 | 2.119 | 20 | 7.833 | Hog |
| 83 | 17+515 | 1250.34 | 17+499.891 | 17+529.891 | 2.119 | 5.879 | 30 | 7.979 | Sag |
| 84 | 17+634 | 1257.34 | 17+623.965 | 17+643.965 | 5.879 | 2.022 | 20 | 5.186 | Hog |
| 85 | 17+677 | 1258.22 | 17+664.963 | 17+689.963 | 2.022 | 5.625 | 25 | 6.94 | Sag |
| 86 | 17+808 | 1265.56 | 17+797.998 | 17+817.998 | 5.625 | 6.858 | 20 | 16.213 | Sag |
| 87 | 17+904 | 1272.17 | 17+894.312 | 17+914.312 | 6.858 | 4.646 | 20 | 9.042 | Hog |
| 88 | 18+002 | 1276.70 | 17+979.338 | 18+024.338 | 4.646 | 6.111 | 45 | 30.713 | Sag |
| 89 | 18+144 | 1285.40 | 18+134.306 | 18+154.306 | 6.111 | 4.989 | 20 | 17.814 | Hog |
| 90 | 18+189 | 1287.62 | 18+158.798 | 18+218.798 | 4.989 | 6.438 | 60 | 41.394 | Sag |
| 91 | 18+324 | 1296.32 | 18+313.897 | 18+333.897 | 6.438 | 5.843 | 20 | 33.596 | Hog |
| 92 | 18+388 | 1300.06 | 18+375.414 | 18+400.414 | 5.843 | 3.692 | 25 | 11.626 | Hog |
| 93 | 18+435 | 1301.80 | 18+422.590 | 18+447.590 | 3.692 | 6.637 | 25 | 8.49 | Sag |
| 94 | 18+569 | 1310.72 | 18+559.480 | 18+579.480 | 6.637 | 4.927 | 20 | 11.698 | Hog |
| 95 | 18+624 | 1313.40 | 18+613.730 | 18+633.730 | 4.927 | 6.879 | 20 | 10.248 | Sag |
| 96 | 18+704 | 1318.90 | 18+693.748 | 18+713.748 | 6.879 | 4.848 | 20 | 9.848 | Hog |
| 97 | 18+753 | 1321.30 | 18+743.143 | 18+763.143 | 4.848 | 6.302 | 20 | 13.754 | Sag |
| 98 | 18+797 | 1324.05 | 18+784.305 | 18+809.305 | 6.302 | 0.826 | 25 | 4.566 | Hog |
| 99 | 18+836 | 1324.37 | 18+823.586 | 18+848.586 | 0.826 | 3.167 | 25 | 10.68 | Sag |
| 100 | 18+868 | 1325.38 | 18+855.249 | 18+880.249 | 3.167 | 0.783 | 25 | 10.486 | Hog |
| 101 | 18+958 | 1326.08 | 18+947.770 | 18+967.770 | 0.783 | 2.223 | 20 | 13.885 | Sag |
| 102 | 19+053 | 1328.19 | 19+037.826 | 19+067.826 | 2.223 | 0.782 | 29.99987 | 20.805 | Hog |
| 103 | 19+129 | 1328.79 | 19+104.264 | 19+154.264 | 0.782 | 1.694 | 50 | 54.772 | Sag |
| 104 | 19+192 | 1329.86 | 19+177.189 | 19+207.190 | 1.694 | 2.835 | 30.000384 | 26.297 | Sag |
| 105 | 19+236 | 1331.10 | 19+226.176 | 19+246.176 | 2.835 | 0.985 | 20 | 10.808 | Hog |
| 106 | 19+324 | 1331.96 | 19+313.555 | 19+333.555 | 0.985 | 1.956 | 20 | 20.589 | Sag |
| 107 | 19+412 | 1333.70 | 19+399.564 | 19+424.564 | 1.956 | 6.062 | 25 | 6.088 | Sag |
| 108 | 19+447 | 1335.84 | 19+434.993 | 19+459.993 | 6.062 | 1.96 | 25 | 6.095 | Hog |
| 109 | 19+509 | 1337.06 | 19+496.886 | 19+521.886 | 1.96 | 4.453 | 25 | 10.031 | Sag |
| 110 | 19+533 | 1338.12 | 19+523.318 | 19+543.318 | 4.453 | 3.126 | 20 | 15.075 | Hog |
| 111 | 19+585 | 1339.75 | 19+575.204 | 19+595.204 | 3.126 | 1.123 | 20 | 9.986 | Hog |
| 112 | 19+639 | 1340.35 | 19+619.149 | 19+659.149 | 1.123 | 5.422 | 40 | 9.304 | Sag |
| 113 | 19+680 | 1342.56 | 19+667.387 | 19+692.387 | 5.422 | 1.765 | 25 | 6.835 | Hog |
| 114 | 19+719 | 1343.25 | 19+709.106 | 19+729.106 | 1.765 | 6.766 | 20 | 3.999 | Sag |
| 115 | 19+879 | 1354.09 | 19+864.268 | 19+894.268 | 6.766 | 6.328 | 30 | 68.455 | Hog |
| 116 | 19+905 | 1355.73 | 19+895.120 | 19+915.120 | 6.328 | 5.931 | 20 | 50.299 | Hog |
| 117 | 19+936 | 1357.57 | 19+926.272 | 19+946.272 | 5.931 | 6.978 | 20 | 19.095 | Sag |
| 118 | 20+162 | 1373.32 | 20+146.895 | 20+176.895 | 6.978 | 2.226 | 30 | 6.313 | Hog |
| 119 | 20+208 | 1374.35 | 20+198.306 | 20+218.306 | 2.226 | 3.299 | 20 | 18.635 | Sag |
| 120 | 20+240 | 1375.41 | 20+230.376 | 20+250.376 | 3.299 | 4.985 | 20 | 11.862 | Sag |

Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 121 | 20+274 | 1377.10 | 20+264.317 | 20+284.317 | 4.985 | 0.564 | 20 | 4.524 | Hog |
| 122 | 20+336 | 1377.45 | 20+326.360 | 20+346.360 | 0.564 | 1.326 | 20 | 26.254 | Sag |
| 123 | 20+393 | 1378.20 | 20+375.508 | 20+410.520 | 1.326 | 0.136 | 35.011982 | 29.424 | Hog |
| 124 | 20+492 | 1378.34 | 20+472.134 | 20+512.134 | 0.136 | 1.472 | 40 | 29.946 | Sag |
| 125 | 20+527 | 1378.85 | 20+517.034 | 20+536.540 | 1.472 | 1.518 | 19.506553 | 417.404 | Sag |
| 126 | 20+583 | 1379.69 | 20+570.133 | 20+595.133 | 1.518 | -0.165 | 25 | 14.85 | Hog |
| 127 | 20+671 | 1379.55 | 20+658.015 | 20+683.015 | -0.165 | -3.374 | 25 | 7.792 | Hog |
| 128 | 20+751 | 1376.83 | 20+738.730 | 20+763.730 | -3.374 | -2.786 | 25 | 42.522 | Sag |
| 129 | 20+785 | 1375.88 | 20+775.357 | 20+795.357 | -2.786 | -5.564 | 20 | 7.198 | Hog |
| 130 | 20+818 | 1374.05 | 20+808.162 | 20+828.162 | -5.564 | -4.16 | 20 | 14.242 | Sag |
| 131 | 20+851 | 1372.68 | 20+841.193 | 20+861.193 | -4.16 | 0.269 | 20 | 4.516 | Sag |
| 132 | 20+938 | 1372.91 | 20+928.108 | 20+948.108 | 0.269 | -0.857 | 20 | 17.761 | Hog |
| 133 | 20+991 | 1372.46 | 20+980.572 | 21+000.572 | -0.857 | -3.3 | 20 | 8.185 | Hog |
| 134 | 21+019 | 1371.52 | 21+009.068 | 21+029.068 | -3.3 | -0.637 | 20 | 7.51 | Sag |
| 135 | 21+076 | 1371.16 | 21+061.020 | 21+091.020 | -0.637 | -3.684 | 30 | 9.847 | Hog |
| 136 | 21+147 | 1368.53 | 21+137.268 | 21+157.268 | -3.684 | -1.454 | 20 | 8.97 | Sag |
| 137 | 21+184 | 1368.00 | 21+174.016 | 21+194.016 | -1.454 | -0.199 | 20 | 15.937 | Sag |
| 138 | 21+220 | 1367.93 | 21+210.146 | 21+230.146 | -0.199 | -1.324 | 20 | 17.78 | Hog |
| 139 | 21+281 | 1367.12 | 21+265.713 | 21+295.713 | -1.324 | 1.199 | 30 | 11.891 | Sag |
| 140 | 21+322 | 1367.62 | 21+312.103 | 21+332.103 | 1.199 | -0.398 | 20 | 12.529 | Hog |
| 141 | 21+359 | 1367.47 | 21+349.401 | 21+369.401 | -0.398 | -3.118 | 20 | 7.353 | Hog |
| 142 | 21+418 | 1365.65 | 21+407.831 | 21+427.831 | -3.118 | -1.847 | 20 | 15.74 | Sag |
| 143 | 21+469 | 1364.70 | 21+459.252 | 21+479.252 | -1.847 | -2.905 | 20 | 18.9 | Hog |
| 144 | 21+505 | 1363.65 | 21+495.305 | 21+515.305 | -2.905 | -1.564 | 20 | 14.911 | Sag |
| 145 | 21+560 | 1362.80 | 21+544.617 | 21+574.617 | -1.564 | -3.571 | 30 | 14.945 | Hog |
| 146 | 21+597 | 1361.45 | 21+587.452 | 21+607.452 | -3.571 | -1.235 | 20 | 8.56 | Sag |
| 147 | 21+657 | 1360.71 | 21+642.201 | 21+672.201 | -1.235 | -0.234 | 30 | 29.96 | Sag |
| 148 | 21+730 | 1360.54 | 21+720.122 | 21+740.122 | -0.234 | -2.494 | 20 | 8.85 | Hog |
| 149 | 21+761 | 1359.77 | 21+751.318 | 21+771.318 | -2.494 | -0.496 | 20 | 10.014 | Sag |
| 150 | 21+813 | 1359.51 | 21+802.906 | 21+822.906 | -0.496 | -1.231 | 20 | 27.221 | Hog |
| 151 | 21+948 | 1357.84 | 21+925.989 | 21+970.989 | -1.231 | -7.361 | 45 | 7.342 | Hog |
| 152 | 22+137 | 1343.94 | 22+127.296 | 22+147.296 | -7.361 | -4.534 | 20 | 7.076 | Sag |
| 153 | 22+189 | 1341.61 | 22+178.672 | 22+198.672 | -4.534 | -1.493 | 20 | 6.576 | Sag |
| 154 | 22+235 | 1340.93 | 22+224.588 | 22+244.588 | -1.493 | -6.28 | 20.000166 | 4.178 | Hog |
| 155 | 22+272 | 1338.57 | 22+264.631 | 22+279.631 | -6.28 | -1.662 | 15 | 3.248 | Sag |
| 156 | 22+291 | 1338.26 | 22+283.286 | 22+298.286 | -1.662 | -4.895 | 15 | 4.64 | Hog |
| 157 | 22+320 | 1336.85 | 22+309.614 | 22+329.614 | -4.895 | -2.029 | 20 | 6.98 | Sag |
| 158 | 22+344 | 1336.36 | 22+333.665 | 22+353.665 | -2.029 | -6.898 | 20 | 4.107 | Hog |
| 159 | 22+383 | 1333.65 | 22+372.961 | 22+392.961 | -6.898 | 0.817 | 20 | 2.592 | Sag |
| 160 | 22+443 | 1334.14 | 22+433.079 | 22+453.079 | 0.817 | 3.787 | 20 | 6.735 | Sag |

TENDER PURPOSE ONLY

| | | | | | | | | | | | |
|-----|------|-------------|----------|-------|--|--|---|--|---|---------------------|----------------|
| | | | | | 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) | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : VERTICAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/CD-002 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | SCALE: NOT TO SCALE | SHEET 02 OF 03 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | | | | | |



Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 161 | 22+487 | 1335.80 | 22+474.281 | 22+499.281 | 3.787 | -1.788 | 25 | 4.485 | Hog |
| 162 | 22+679 | 1332.36 | 22+658.989 | 22+698.989 | -1.788 | -3.508 | 40 | 23.249 | Hog |
| 163 | 22+736 | 1330.36 | 22+703.444 | 22+768.444 | -3.508 | 6.398 | 65 | 6.561 | Sag |
| 164 | 22+828 | 1336.27 | 22+813.275 | 22+843.275 | 6.398 | 5.448 | 30 | 31.566 | Hog |
| 165 | 22+871 | 1338.58 | 22+855.696 | 22+885.696 | 5.448 | 2.438 | 30 | 9.969 | Hog |
| 166 | 22+941 | 1340.28 | 22+928.031 | 22+953.031 | 2.438 | 6.962 | 25 | 5.526 | Sag |
| 167 | 22+979 | 1342.95 | 22+963.857 | 22+993.857 | 6.962 | 2.541 | 30 | 6.786 | Hog |
| 168 | 23+039 | 1344.47 | 23+023.667 | 23+053.667 | 2.541 | 1.88 | 30 | 45.369 | Hog |
| 169 | 23+090 | 1345.43 | 23+079.589 | 23+099.589 | 1.88 | 6.977 | 20 | 3.924 | Sag |
| 170 | 23+144 | 1349.22 | 23+133.974 | 23+153.974 | 6.977 | 5.821 | 20 | 17.309 | Hog |
| 171 | 23+170 | 1350.73 | 23+159.791 | 23+179.791 | 5.821 | 6.909 | 20 | 18.394 | Sag |
| 172 | 23+291 | 1359.07 | 23+275.573 | 23+305.573 | 6.909 | 1.693 | 30 | 5.752 | Hog |
| 173 | 23+348 | 1360.05 | 23+338.048 | 23+358.048 | 1.693 | 5.278 | 20 | 5.579 | Sag |
| 174 | 23+416 | 1363.63 | 23+393.469 | 23+438.469 | 5.278 | -6.919 | 45 | 3.69 | Hog |
| 175 | 23+519 | 1356.52 | 23+506.180 | 23+531.180 | -6.919 | -3.413 | 25 | 7.131 | Sag |
| 176 | 23+676 | 1351.16 | 23+660.699 | 23+690.699 | -3.413 | -6.853 | 30 | 8.721 | Hog |
| 177 | 23+860 | 1338.57 | 23+819.517 | 23+899.517 | -6.853 | -1.809 | 80 | 15.861 | Sag |
| 178 | 23+974 | 1336.49 | 23+959.289 | 23+989.289 | -1.809 | -3.451 | 30 | 18.268 | Hog |
| 179 | 24+022 | 1334.84 | 24+007.087 | 24+037.087 | -3.451 | -1.972 | 30 | 20.274 | Sag |
| 180 | 24+126 | 1332.79 | 24+113.719 | 24+138.719 | -1.972 | 0.167 | 25 | 11.689 | Sag |
| 181 | 24+229 | 1332.96 | 24+214.070 | 24+244.070 | 0.167 | -1.851 | 30 | 14.868 | Hog |
| 182 | 24+279 | 1332.04 | 24+266.340 | 24+291.340 | -1.851 | 1.743 | 25 | 6.957 | Sag |
| 183 | 24+330 | 1332.92 | 24+314.504 | 24+344.504 | 1.743 | -4.093 | 30 | 5.14 | Hog |
| 184 | 24+373 | 1331.14 | 24+360.635 | 24+385.635 | -4.093 | -0.826 | 25 | 7.651 | Sag |
| 185 | 24+433 | 1330.64 | 24+423.384 | 24+443.384 | -0.826 | -5.093 | 20 | 4.687 | Hog |
| 186 | 24+530 | 1325.71 | 24+517.644 | 24+542.644 | -5.093 | -0.818 | 25 | 5.849 | Sag |
| 187 | 24+586 | 1325.26 | 24+573.332 | 24+598.332 | -0.818 | -1.162 | 25 | 72.721 | Hog |
| 188 | 24+661 | 1324.38 | 24+648.204 | 24+673.204 | -1.162 | -0.06 | 25 | 22.694 | Sag |
| 189 | 24+743 | 1324.34 | 24+730.757 | 24+755.757 | -0.06 | -3.909 | 25 | 6.496 | Hog |
| 190 | 24+796 | 1322.28 | 24+783.331 | 24+808.331 | -3.909 | -0.758 | 25 | 7.936 | Sag |
| 191 | 24+849 | 1321.88 | 24+836.600 | 24+861.600 | -0.758 | -0.764 | 25 | 4623.11 | Hog |
| 192 | 24+913 | 1321.39 | 24+900.227 | 24+925.227 | -0.764 | -0.067 | 25 | 35.876 | Sag |
| 193 | 25+008 | 1321.33 | 24+998.268 | 25+018.268 | -0.067 | -1.592 | 20 | 13.111 | Hog |
| 194 | 25+102 | 1319.84 | 25+089.275 | 25+114.275 | -1.592 | -2.722 | 25 | 22.127 | Hog |
| 195 | 25+170 | 1317.99 | 25+157.270 | 25+182.270 | -2.722 | -0.95 | 25 | 14.108 | Sag |
| 196 | 25+206 | 1317.65 | 25+193.155 | 25+218.155 | -0.95 | -2.27 | 25 | 18.938 | Hog |
| 197 | 25+272 | 1316.13 | 25+259.930 | 25+284.930 | -2.27 | 0.461 | 25 | 9.153 | Sag |
| 198 | 25+339 | 1316.44 | 25+326.525 | 25+351.525 | 0.461 | 2.464 | 25 | 12.484 | Sag |
| 199 | 25+373 | 1317.28 | 25+363.122 | 25+383.122 | 2.464 | 1.067 | 20 | 14.324 | Hog |
| 200 | 25+395 | 1317.51 | 25+385.235 | 25+405.235 | 1.067 | 4.244 | 20 | 6.295 | Sag |

Package-VI-VERTICAL CURVE DETAILS

| IP No. | IP Chainage (Km) | IP Level (m) | Curve Start Chainage (Km) | Curve End Chainage (Km) | In Gradient (%) | Out Gradient | Curve Length (m) | K Value | Curve Type |
|--------|------------------|--------------|---------------------------|-------------------------|-----------------|--------------|------------------|---------|------------|
| 201 | 25+432 | 1319.06 | 25+419.303 | 25+444.303 | 4.244 | -0.712 | 25 | 5.044 | Hog |
| 202 | 25+508 | 1318.52 | 25+492.918 | 25+522.918 | -0.712 | 0.005 | 30 | 41.827 | Sag |
| 203 | 25+624 | 1318.53 | 25+609.073 | 25+639.073 | 0.005 | -1.498 | 30 | 19.962 | Hog |
| 204 | 25+664 | 1317.93 | 25+649.006 | 25+679.006 | -1.498 | 1.852 | 30 | 8.957 | Sag |
| 205 | 25+692 | 1318.45 | 25+679.407 | 25+704.407 | 1.852 | -0.887 | 25 | 9.13 | Hog |
| 206 | 25+717 | 1318.22 | 25+707.157 | 25+727.157 | -0.887 | 2.173 | 20 | 6.536 | Sag |
| 207 | 25+771 | 1319.40 | 25+758.854 | 25+783.854 | 2.173 | -0.22 | 25 | 10.447 | Hog |
| 208 | 25+837 | 1319.26 | 25+824.196 | 25+849.196 | -0.22 | -1.311 | 25 | 22.903 | Hog |
| 209 | 25+928 | 1318.06 | 25+915.409 | 25+940.409 | -1.311 | 0.792 | 25 | 11.887 | Sag |
| 210 | 25+999 | 1318.63 | 25+976.761 | 26+021.761 | 0.792 | -0.921 | 45 | 26.271 | Hog |
| 211 | 26+136 | 1317.37 | 26+120.995 | 26+150.995 | -0.921 | -3.15 | 30 | 13.46 | Hog |
| 212 | 26+229 | 1314.45 | 26+216.218 | 26+241.218 | -3.15 | 0.303 | 25 | 7.241 | Sag |
| 213 | 26+294 | 1314.64 | 26+266.000 | 26+321.000 | 0.303 | -4.185 | 55 | 12.256 | Hog |
| 214 | 26+399 | 1310.24 | 26+381.086 | 26+416.086 | -4.185 | 5.337 | 35 | 3.676 | Sag |
| 215 | 26+455 | 1313.25 | 26+437.427 | 26+472.427 | 5.337 | -5.037 | 35 | 3.374 | Hog |
| 216 | 26+564 | 1307.77 | 26+551.155 | 26+576.155 | -5.037 | -3.866 | 25 | 21.354 | Sag |
| 217 | 26+613 | 1305.85 | 26+603.360 | 26+623.360 | -3.866 | -0.147 | 20 | 5.377 | Sag |
| 218 | 26+647 | 1305.80 | 26+632.396 | 26+662.396 | -0.147 | -6.733 | 30 | 4.555 | Hog |
| 219 | 26+683 | 1303.41 | 26+665.395 | 26+700.395 | -6.733 | -0.908 | 35 | 6.009 | Sag |
| 220 | 26+816 | 1302.20 | 26+791.222 | 26+841.222 | -0.908 | 1.577 | 50 | 20.122 | Sag |
| 221 | 26+905 | 1303.60 | 26+855.021 | 26+955.021 | 1.577 | -3.423 | 100 | 20.003 | Hog |
| 222 | 27+005 | 1300.18 | 26+984.888 | 27+024.888 | -3.423 | 1.516 | 40 | 8.099 | Sag |
| 223 | 27+074 | 1301.23 | 27+046.383 | 27+101.383 | 1.516 | -2.921 | 55 | 12.395 | Hog |
| 224 | 27+281 | 1295.18 | 27+263.429 | 27+298.429 | -2.921 | -1.117 | 35 | 19.399 | Sag |
| 225 | 27+334 | 1294.59 | 27+319.141 | 27+349.141 | -1.117 | -4.578 | 30 | 8.668 | Hog |
| 226 | 27+382 | 1292.39 | 27+367.201 | 27+397.201 | -4.578 | 2.599 | 30 | 4.18 | Sag |
| 227 | 27+425 | 1293.51 | 27+405.297 | 27+445.297 | 2.599 | 1.829 | 40 | 51.946 | Hog |
| 228 | 27+476 | 1294.44 | 27+466.063 | 27+486.063 | 1.829 | 0.278 | 20 | 12.893 | Hog |
| 229 | 27+565 | 1294.68 | 27+555.078 | 27+575.078 | 0.278 | -0.959 | 20 | 16.171 | Hog |
| 230 | 27+708 | 1293.32 | 27+687.578 | 27+727.578 | -0.959 | 0.098 | 40 | 37.845 | Sag |
| 231 | 27+793 | 1293.40 | 27+780.258 | 27+805.258 | 0.098 | 6.196 | 25 | 4.1 | Sag |

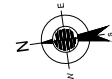
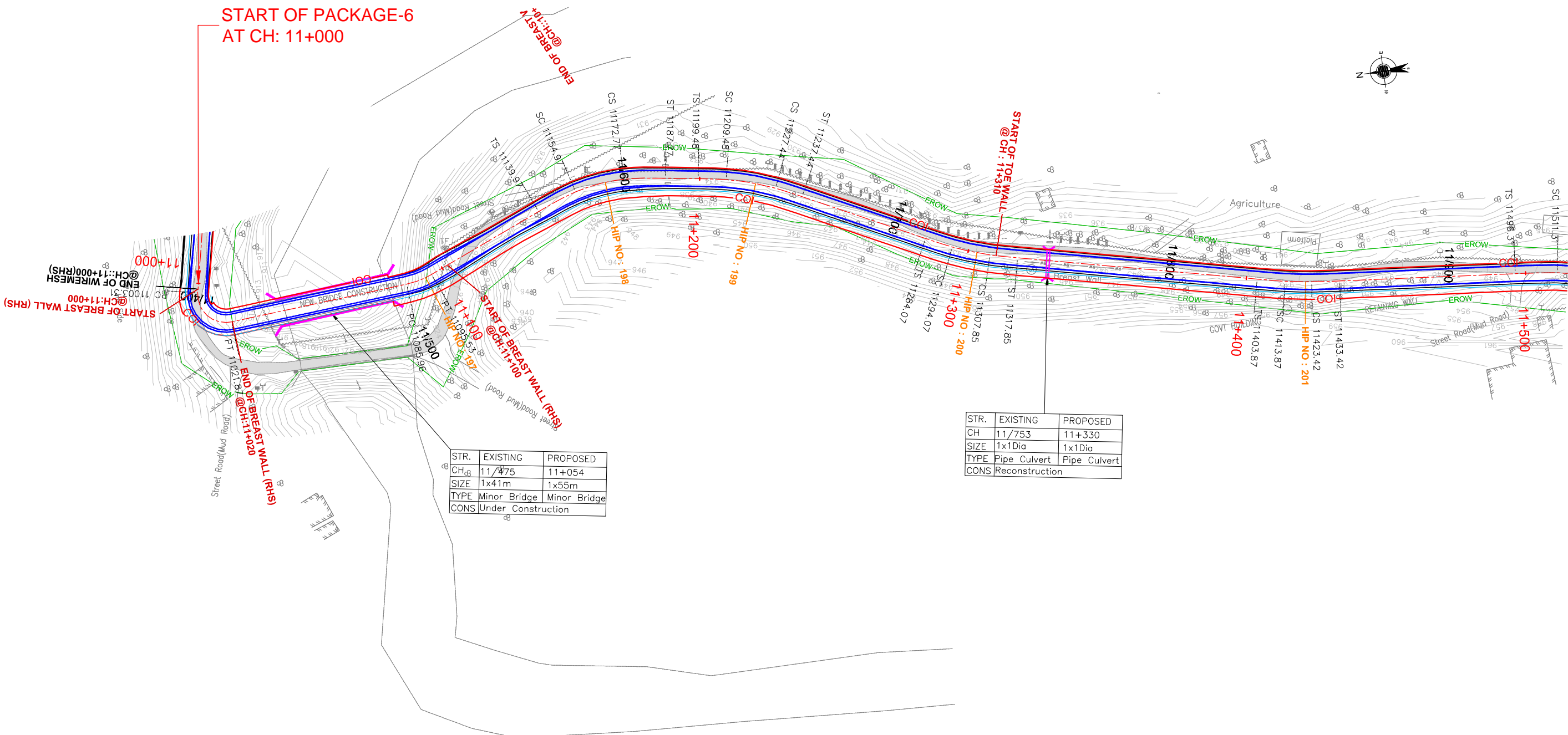
TENDER PURPOSE ONLY

| | | | | | | | | | | |
|-----|------|-------------|----------|-------|--|--|---|--|---|----------------|
| | | | | | 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) | DESIGNED: MADHUK DRAWN: DANIEL CHECKED: CS/AH APPROVED: PRADEEP KAPLA | TITLE : VERTICAL CURVES DETAILS DRAWING NO : HP/MAN-KAL/CD-003 ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854 | SHEET 03 OF 03 |
| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | SCALE: | NOT TO SCALE | | |

PLAN & PROFILES
(KM 11+000 TO 27+854)

← MANDI

KALKHAR →



END OF WIREMESH @CH:11+000(RHS)
START OF BREAST WALL (RHS) @CH:11+000

START OF PACKAGE-6 AT CH: 11+000

START OF TOEWALL @CH: 11+310


END OF BREAST WALL (RHS) @CH:11+020

| STR. | EXISTING | PROPOSED |
|------|--------------------|--------------|
| CH | 11/475 | 11+054 |
| SIZE | 1x41m | 1x55m |
| TYPE | Minor Bridge | Minor Bridge |
| CONS | Under Construction | |

| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 11/753 | 11+330 |
| SIZE | 1x1Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |

TENDER PURPOSE ONLY

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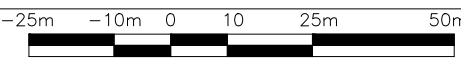
CLIENT:

 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:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

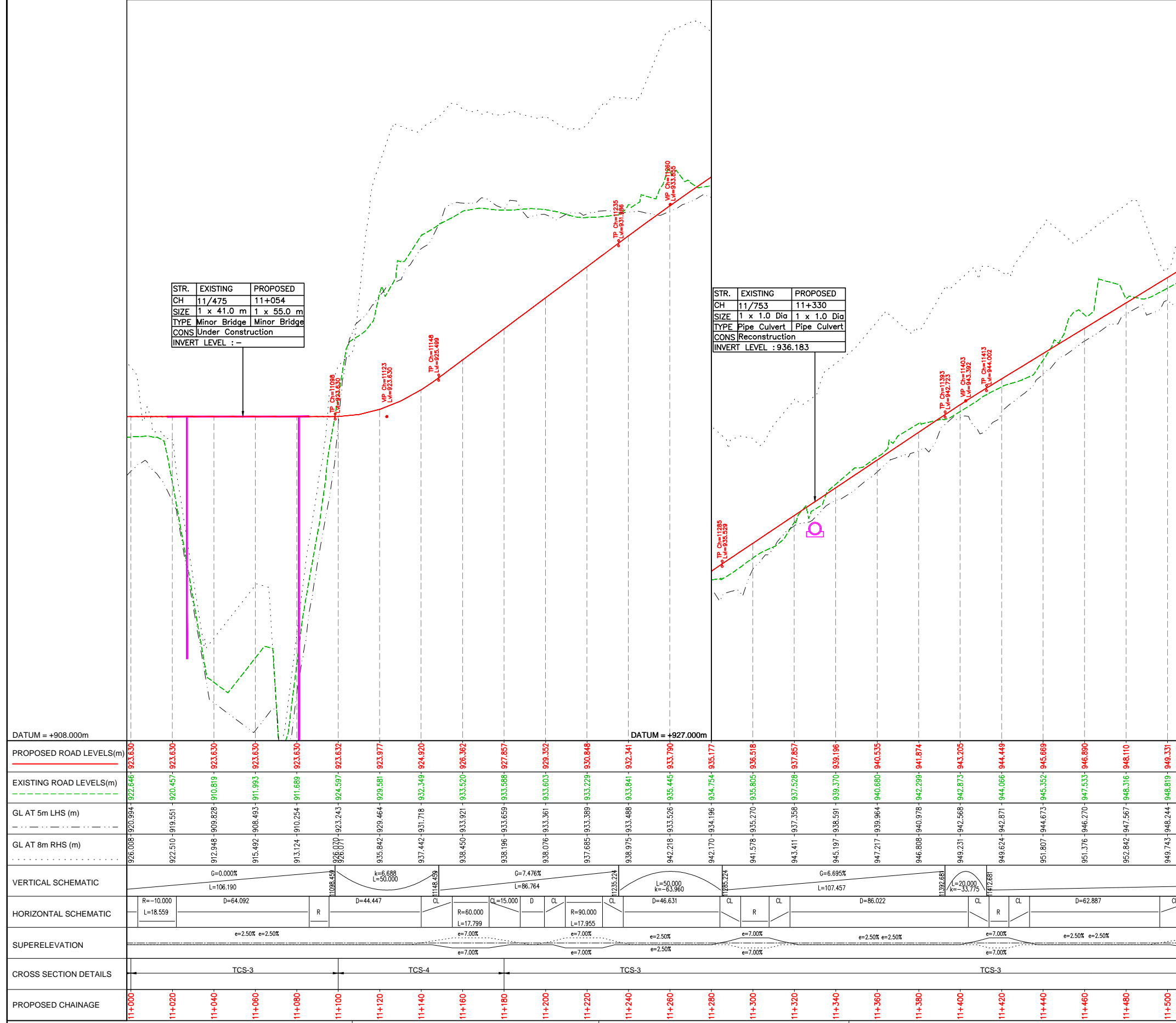
TITLE : PLAN & PROFILE FROM CH: 11+000 TO CH: 11+500

DRAWING NO : HP/MAN-KAL/P&P-01A

ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 01A OF 22

← MANDI → KALKHAR →



| STR. | EXISTING | PROPOSED |
|-----------------|--------------------|--------------|
| CH | 11/475 | 11+054 |
| SIZE | 1 x 41.0 m | 1 x 55.0 m |
| TYPE | Minor Bridge | Minor Bridge |
| CONS | Under Construction | |
| INVERT LEVEL :- | | |

| STR. | EXISTING | PROPOSED |
|------------------------|----------------|--------------|
| CH | 11/753 | 11+330 |
| SIZE | 1 x 1.0 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL : 936.183 | | |

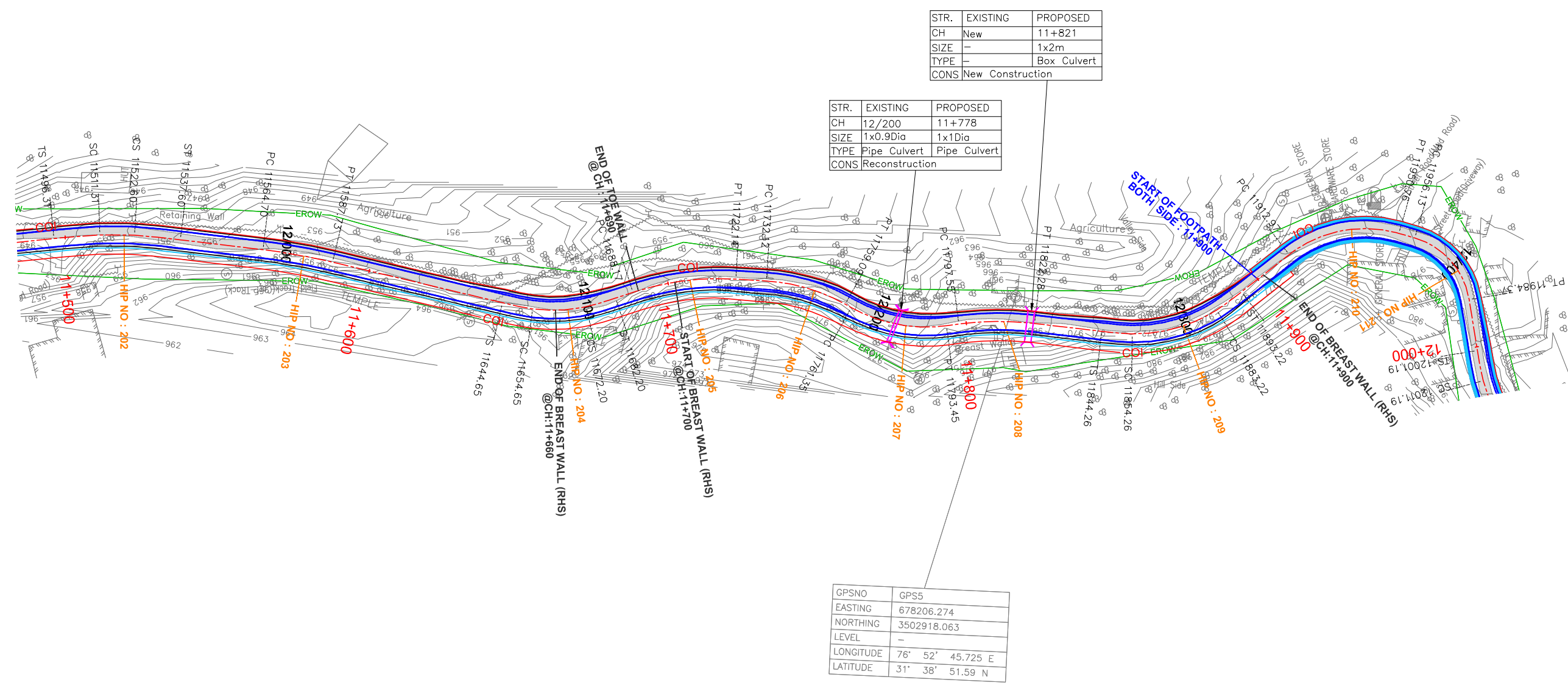
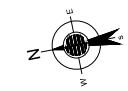
| | 11+000 | 11+020 | 11+040 | 11+060 | 11+080 | 11+100 | 11+120 | 11+140 | 11+160 | 11+180 | 11+200 | 11+220 | 11+240 | 11+260 | 11+280 | 11+300 | 11+320 | 11+340 | 11+360 | 11+380 | 11+400 | 11+420 | 11+440 | 11+460 | 11+480 | 11+500 | | |
|-------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|--|
| PROPOSED ROAD LEVELS(m) | 923.630 | 923.630 | 923.630 | 923.630 | 923.630 | 923.632 | 923.977 | 924.920 | 926.362 | 927.857 | 929.352 | 930.848 | 932.341 | 933.790 | 935.177 | 936.518 | 937.857 | 939.196 | 940.535 | 941.874 | 943.205 | 944.449 | 945.689 | 946.890 | 948.110 | 949.331 | | |
| EXISTING ROAD LEVELS(m) | 922.846 | 920.457 | 910.819 | 911.893 | 911.689 | 924.597 | 929.581 | 932.349 | 933.520 | 933.588 | 933.603 | 933.229 | 933.841 | 935.445 | 934.754 | 935.805 | 937.528 | 939.370 | 940.680 | 942.299 | 942.873 | 944.066 | 945.552 | 947.533 | 948.316 | 948.819 | | |
| GL AT 5m LHS (m) | 920.994 | 919.551 | 909.828 | 908.493 | 910.254 | 923.243 | 929.464 | 931.718 | 933.921 | 933.659 | 933.361 | 933.389 | 933.488 | 935.526 | 934.196 | 935.270 | 937.358 | 939.591 | 940.964 | 942.978 | 942.568 | 944.671 | 945.673 | 947.270 | 948.567 | 949.244 | | |
| GL AT 8m RHS (m) | 926.008 | 922.510 | 912.946 | 915.492 | 913.124 | 926.077 | 935.842 | 937.442 | 938.450 | 938.196 | 938.076 | 937.685 | 938.975 | 942.218 | 942.170 | 941.578 | 943.411 | 945.197 | 947.217 | 946.808 | 949.231 | 949.624 | 951.807 | 951.376 | 952.842 | 949.743 | | |
| VERTICAL SCHEMATIC | <p>Vertical alignment diagram showing grades (e.g., -0.000%, 6.688%, 7.476%, 6.695%), lengths (L), and k-values (k=50.000, k=33.775).</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HORIZONTAL SCHEMATIC | <p>Horizontal alignment diagram showing curves with radii (R), lengths (L), and deflection angles (D).</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUPERELEVATION | <p>Superelevation diagram showing cross-slopes (e) for different sections.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CROSS SECTION DETAILS | <p>Diagram showing cross-sections TCS-3 and TCS-4.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PROPOSED CHAINAGE | <p>Chainage markers from 11+000 to 11+500 in 20m increments.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TENDER PURPOSE ONLY

| <table border="1"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>DESCRIPTION</th> <th>DESIGNED</th> <th>DRAWN</th> <th>CHECKED</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> | REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | | | | | | | | | | | | | | | | | | | | | | <p>CLIENT: HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.</p> | <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, Web: www.satragroup.in</p> | <p>PROJECT: Himachal Pradesh State Roads Transformation Project (HPSRTP)</p> | <p>DESIGNED: MADHUBABU DRAWN: DANIEL CHECKED: CHANDRA/ASHIK APPROVED: PRADEEP KAPLA</p> | <p>TITLE : PLAN & PROFILE FROM CH: 11+000 TO CH: 11+500</p> <p>DRAWING NO : HP/MAN-KAL/P&P-01B</p> <p>ROAD NAME : Package-VI: Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854</p> | <p>SHEET 01B OF 22</p> |
|--|-----|------|-------------|----------|-------|---------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|---|--|--|------------------------|
| | REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>SCALE: HOR 1:1500 VER 1:200</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>W:\92.168.1.240\projects\501041055-HPSRTP\04 Designs\01 Highways\02 Drawings\Working\05_DPR 2019 12 27\PKG-5 MDR-26\17.06.2021\02_1-PnP\MDR-26 PnP 2020 12 29 P6.dwg</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |


← MANDI

KALKHAR →



TENDER PURPOSE ONLY

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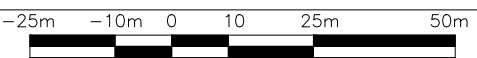
CLIENT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



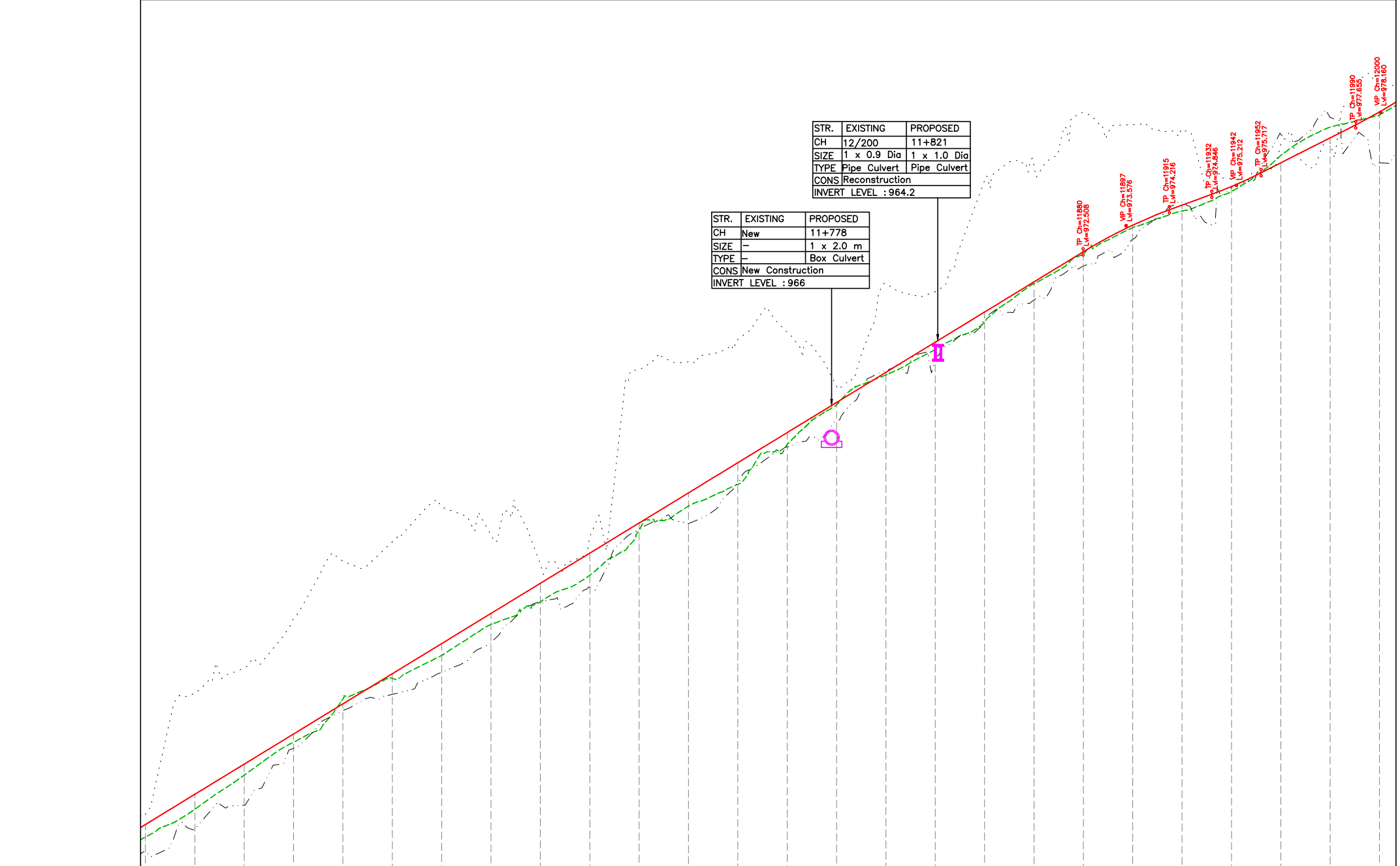
DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 11+500 TO CH: 12+000

DRAWING NO : HP/MAN-KAL/P&P-02A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 02A OF 22



| STR. | EXISTING | PROPOSED |
|--------------|----------------|--------------|
| CH | 12/200 | 11+821 |
| SIZE | 1 x 0.9 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL | : 964.2 | |


| STR. | EXISTING | PROPOSED |
|--------------|------------------|-------------|
| CH | New | 11+778 |
| SIZE | - | 1 x 2.0 m |
| TYPE | - | Box Culvert |
| CONS | New Construction | |
| INVERT LEVEL | : 966 | |

| PROPOSED ROAD LEVELS(m) | EXISTING ROAD LEVELS(m) | GL AT 5m LHS (m) | GL AT 8m RHS (m) |
|-------------------------|-------------------------|------------------|------------------|
| 949.331 | 948.819 | 948.244 | 949.743 |
| 950.551 | 949.945 | 949.155 | 954.639 |
| 951.772 | 951.329 | 950.101 | 955.659 |
| 952.992 | 952.661 | 952.411 | 957.678 |
| 954.213 | 954.408 | 953.934 | 959.986 |
| 955.433 | 955.242 | 955.598 | 960.772 |
| 956.654 | 956.775 | 956.484 | 962.202 |
| 957.874 | 957.426 | 956.697 | 961.052 |
| 959.095 | 958.334 | 958.340 | 959.877 |
| 960.315 | 959.417 | 958.928 | 960.979 |
| 961.536 | 961.227 | 961.295 | 967.733 |
| 962.756 | 962.219 | 962.520 | 968.064 |
| 963.977 | 963.103 | 963.173 | 968.962 |
| 965.197 | 964.727 | 964.616 | 969.263 |
| 966.418 | 966.323 | 966.688 | 967.084 |
| 967.638 | 967.550 | 967.702 | 971.225 |
| 968.859 | 968.558 | 968.299 | 970.903 |
| 970.079 | 969.692 | 969.854 | 975.402 |
| 971.300 | 971.225 | 970.563 | 975.984 |
| 972.520 | 972.428 | 971.945 | 978.167 |
| 973.598 | 973.493 | 973.020 | 977.672 |
| 974.407 | 974.170 | 974.497 | 977.456 |
| 975.161 | 974.968 | 975.107 | 975.476 |
| 976.122 | 976.428 | 977.263 | 976.877 |
| 977.133 | 977.570 | 977.956 | 976.915 |
| 978.179 | 978.064 | 978.120 | 979.193 |

| VERTICAL SCHEMATIC | HORIZONTAL SCHEMATIC | SUPERELEVATION | CROSS SECTION DETAILS | PROPOSED CHAINAGE |
|-----------------------|---|--|----------------------------|--|
| G=6.102% L=467.119 | CL, R, D=27.108, R=200.000, L=23.030, D=56.918, R=50.000, L=17.552, R=90.000, L=33.970, D=60.000, L=26.972, R=50.000, L=32.097, D=21.985, R=100.000, L=24.728, D=19.755, R=40.000, L=37.789, D=25.000, L=28.236 | e=7.00%, e=2.50%, e=2.50%, e=7.00%, e=2.50%, e=2.50%, e=7.00%, e=2.50% | TCS-3, TCS-4, TCS-3, TCS-2 | 11+500, 11+520, 11+540, 11+560, 11+580, 11+600, 11+620, 11+640, 11+660, 11+680, 11+700, 11+720, 11+740, 11+760, 11+780, 11+800, 11+820, 11+840, 11+860, 11+880, 11+900, 11+920, 11+940, 11+960, 11+980, 12+000 |

TENDER PURPOSE ONLY

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

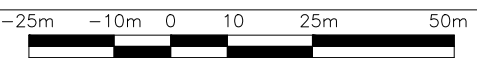
CLIENT:

 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:
 HOR 1:1500
 VER 1:200



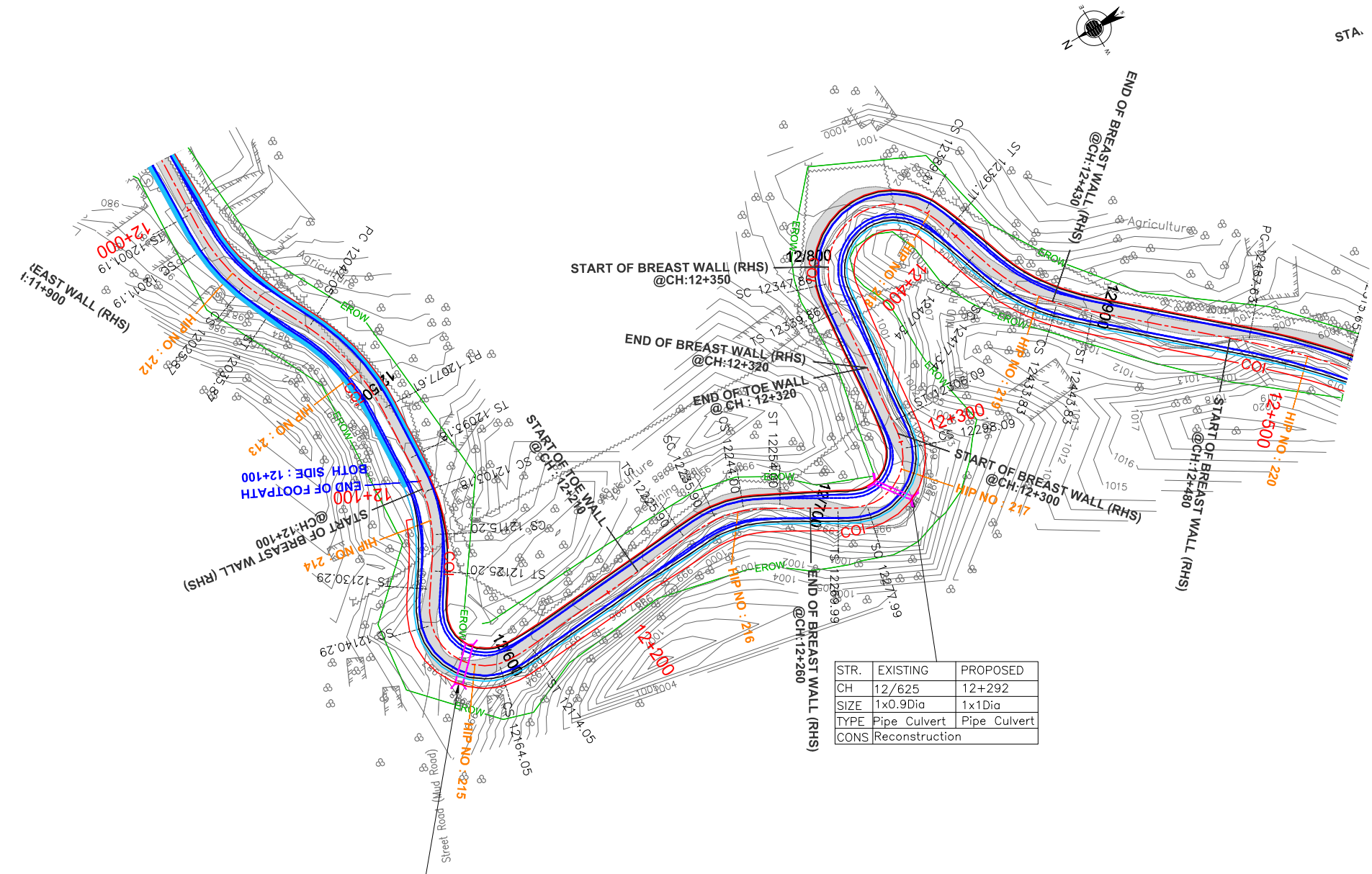
DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 11+500 TO CH: 12+000

DRAWING NO : HP/MAN-KAL/P&P-02B

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854


SHEET 02B OF 22



| STR. | EXISTING | PROPOSED |
|------|----------------|-------------|
| CH | 12/587 | 12+153 |
| SIZE | 1x1.2m | 1x2m |
| TYPE | Slab Culvert | Box Culvert |
| CONS | Reconstruction | |

| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 12/625 | 12+292 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |

TENDER PURPOSE ONLY

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

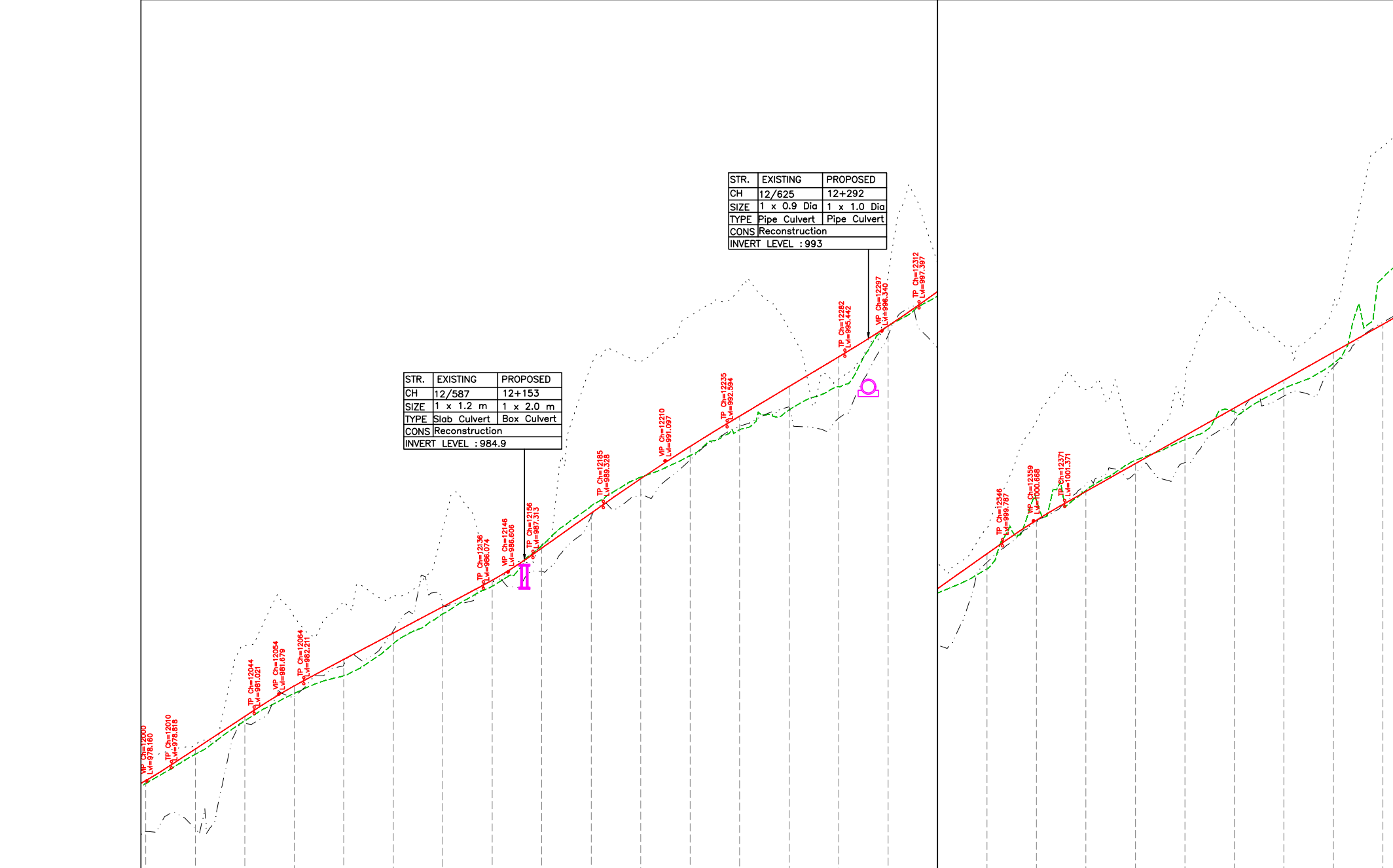
PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 12+000 TO CH: 12+500
 DRAWING NO : HP/MAN-KAL/P&P-03A
 ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

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






| STR. | EXISTING | PROPOSED |
|--------------|----------------|--------------|
| CH | 12/625 | 12+292 |
| SIZE | 1 x 0.9 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL | : 993 | |

| STR. | EXISTING | PROPOSED |
|--------------|----------------|-------------|
| CH | 12/587 | 12+153 |
| SIZE | 1 x 1.2 m | 1 x 2.0 m |
| TYPE | Slab Culvert | Box Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL | : 984.9 | |

| | 12+000 | 12+020 | 12+040 | 12+060 | 12+080 | 12+100 | 12+120 | 12+140 | 12+160 | 12+180 | 12+200 | 12+220 | 12+240 | 12+260 | 12+280 | 12+300 | 12+320 | 12+340 | 12+360 | 12+380 | 12+400 | 12+420 | 12+440 | 12+460 | 12+480 | 12+500 | | |
|-------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
| DATUM = +974.000m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PROPOSED ROAD LEVELS(m) | 978.064 | 979.455 | 980.772 | 982.006 | 983.074 | 984.138 | 985.203 | 986.273 | 987.570 | 988.985 | 990.375 | 991.680 | 992.902 | 994.100 | 995.297 | 996.549 | 997.932 | 999.342 | 1000.698 | 1001.860 | 1002.965 | 1004.110 | 1005.235 | 1006.360 | 1007.485 | 1008.610 | | |
| EXISTING ROAD LEVELS(m) | 976.120 | 976.237 | 979.245 | 980.591 | 981.707 | 982.413 | 983.710 | 984.915 | 986.031 | 987.672 | 989.270 | 991.311 | 992.361 | 993.154 | 994.096 | 996.557 | 997.753 | 998.729 | 1000.481 | 1001.889 | 1003.116 | 1003.943 | 1005.087 | 1006.031 | 1007.025 | 1008.069 | | |
| GL AT 5m LHS (m) | 979.193 | 979.640 | 983.643 | 984.777 | 985.414 | 985.675 | 986.231 | 986.641 | 987.711 | 988.849 | 989.723 | 991.140 | 992.493 | 993.244 | 994.393 | 996.173 | 995.649 | 998.995 | 1000.664 | 1002.608 | 1003.024 | 1003.843 | 1004.704 | 1005.707 | 1006.884 | 1008.106 | | |
| GL AT 8m RHS (m) | 979.193 | 979.640 | 983.643 | 984.777 | 985.414 | 985.675 | 986.231 | 986.641 | 987.711 | 988.849 | 989.723 | 991.140 | 992.493 | 993.244 | 994.393 | 996.173 | 995.649 | 998.995 | 1000.664 | 1002.608 | 1003.024 | 1003.843 | 1004.704 | 1005.707 | 1006.884 | 1008.106 | | |
| VERTICAL SCHEMATIC | [Vertical curve diagrams showing grades (G), lengths (L), and vertical points (VP)] | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HORIZONTAL SCHEMATIC | [Horizontal curve diagrams showing radii (R), lengths (L), and chainages] | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUPERELEVATION | [Superelevation diagrams showing cross-slopes (e)] | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CROSS SECTION DETAILS | TCS-2 | | | | | | | | | | | | | | TCS-3 | | | | | | | | | | | | | |
| PROPOSED CHAINAGE | 12+000 | 12+020 | 12+040 | 12+060 | 12+080 | 12+100 | 12+120 | 12+140 | 12+160 | 12+180 | 12+200 | 12+220 | 12+240 | 12+260 | 12+280 | 12+300 | 12+320 | 12+340 | 12+360 | 12+380 | 12+400 | 12+420 | 12+440 | 12+460 | 12+480 | 12+500 | | |

TENDER PURPOSE ONLY

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

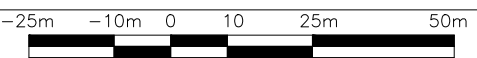
CLIENT:

 HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

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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:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 12+000 TO CH: 12+500

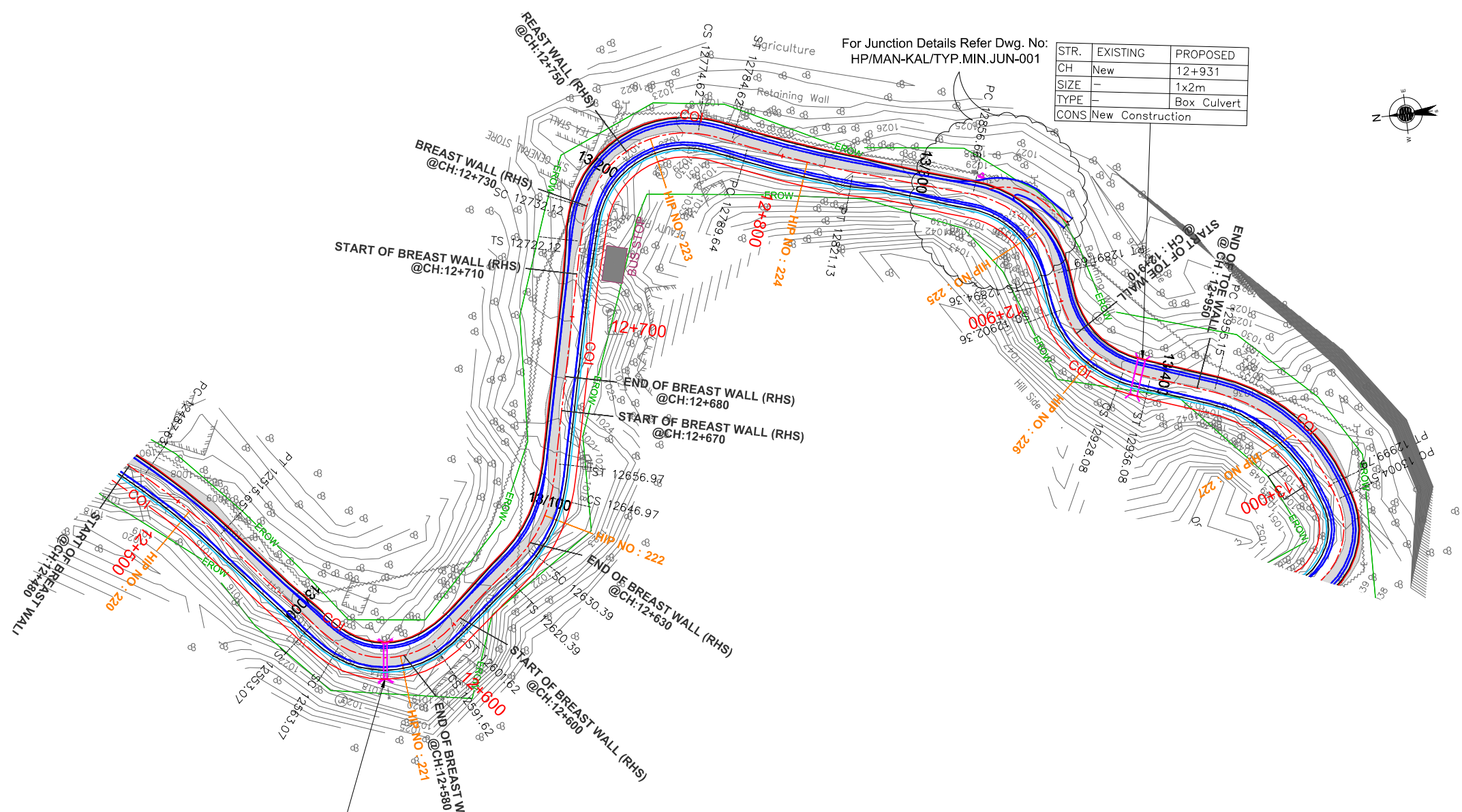
DRAWING NO : HP/MAN-KAL/P&P-03B

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 03B OF 22

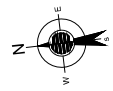
← MANDI

KALKHAR →



For Junction Details Refer Dwg. No:
HP/MAN-KAL/TYP.MIN.JUN-001

| STR. | EXISTING | PROPOSED |
|------|----------|--------------|
| CH | New | 12+931 |
| SIZE | - | 1x2m |
| TYPE | - | Box Culvert |
| CONS | New | Construction |



| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 13/030 | 12+578 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |

TENDER PURPOSE ONLY

| 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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#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:
HOR 1:1500
VER 1:200

| | |
|----------|---------------|
| DESIGNED | MADHUBABU |
| DRAWN | DANIEL |
| CHECKED | CHANDRA/ASHIK |
| APPROVED | PRADEEP KAPLA |

TITLE : PLAN & PROFILE
FROM CH: 12+500 TO CH: 13+000

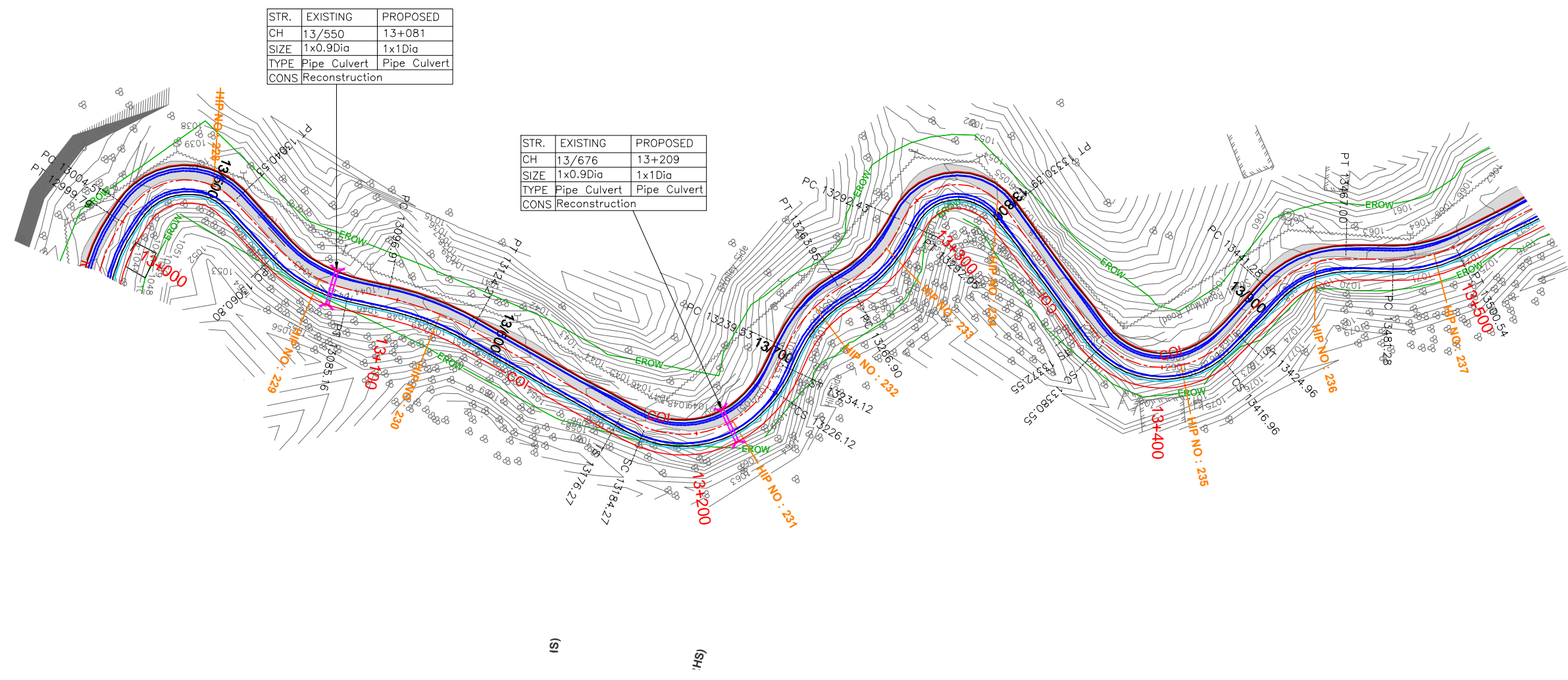
DRAWING NO : HP/MAN-KAL/P&P-04A

ROAD NAME : Package-VI:
Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 04A OF 22

← MANDI

KALKHAR →




| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 13/550 | 13+081 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |

| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 13/676 | 13+209 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |

TENDER PURPOSE ONLY

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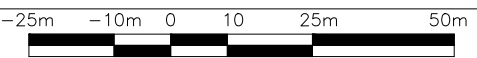
CLIENT:

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CONSULTANT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



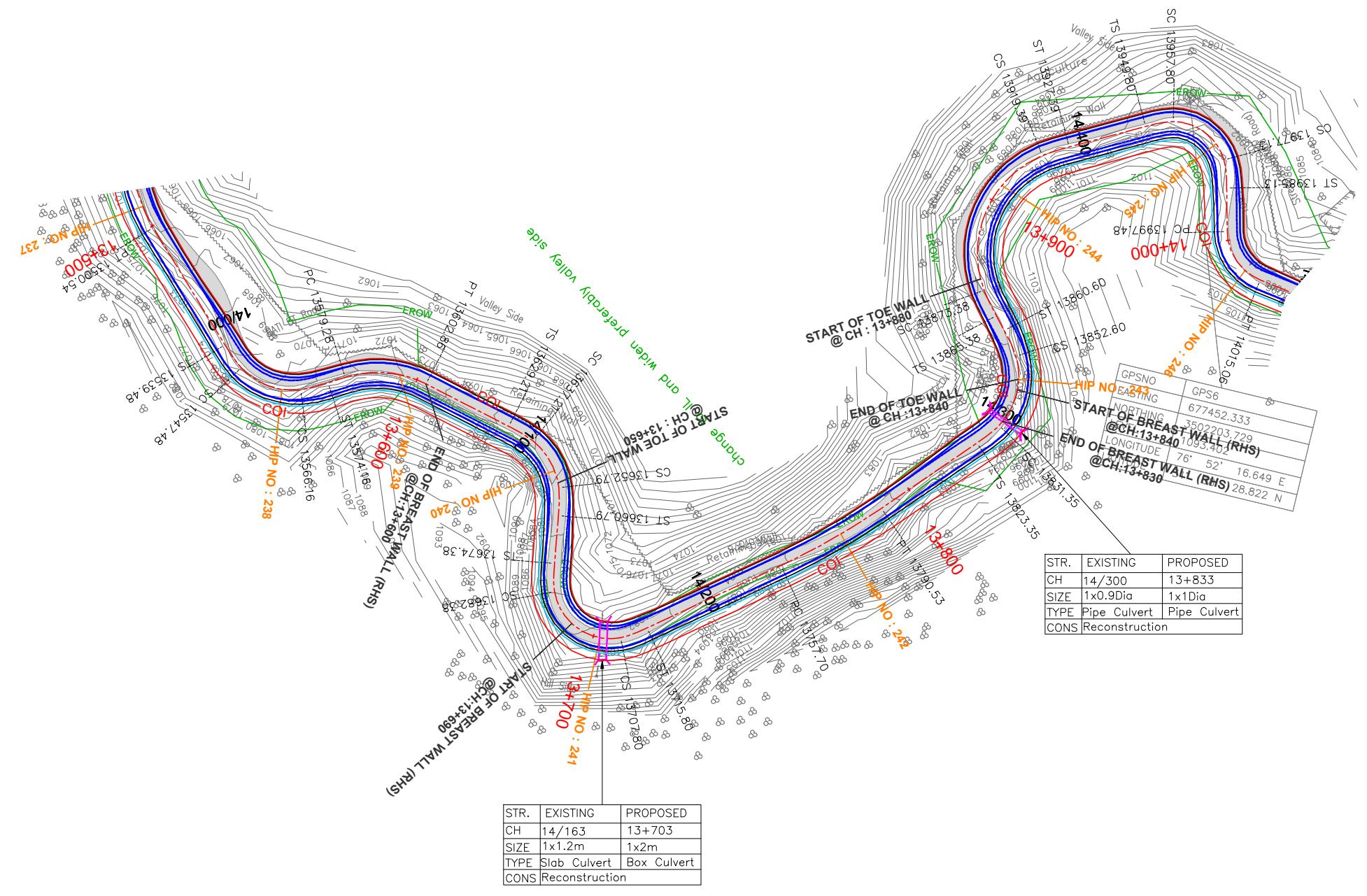
DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 13+000 TO CH: 13+500

DRAWING NO : HP/MAN-KAL/P&P-05A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854


SHEET 05A OF 22



| | |
|----------------------------|------------------|
| GPSNO | GPS6 |
| EASTING | 677452.333 |
| NORTHING | 3502203.729 |
| START OF BREAST WALL (RHS) | @CH:13+840 |
| LONGITUDE | 76° 52' 16.649 E |
| END OF BREAST WALL (RHS) | @CH:13+830 |
| LONGITUDE | 76° 52' 28.822 N |

TENDER PURPOSE ONLY

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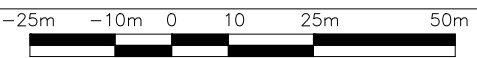
CLIENT:

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CONSULTANT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 13+500 TO CH: 14+000

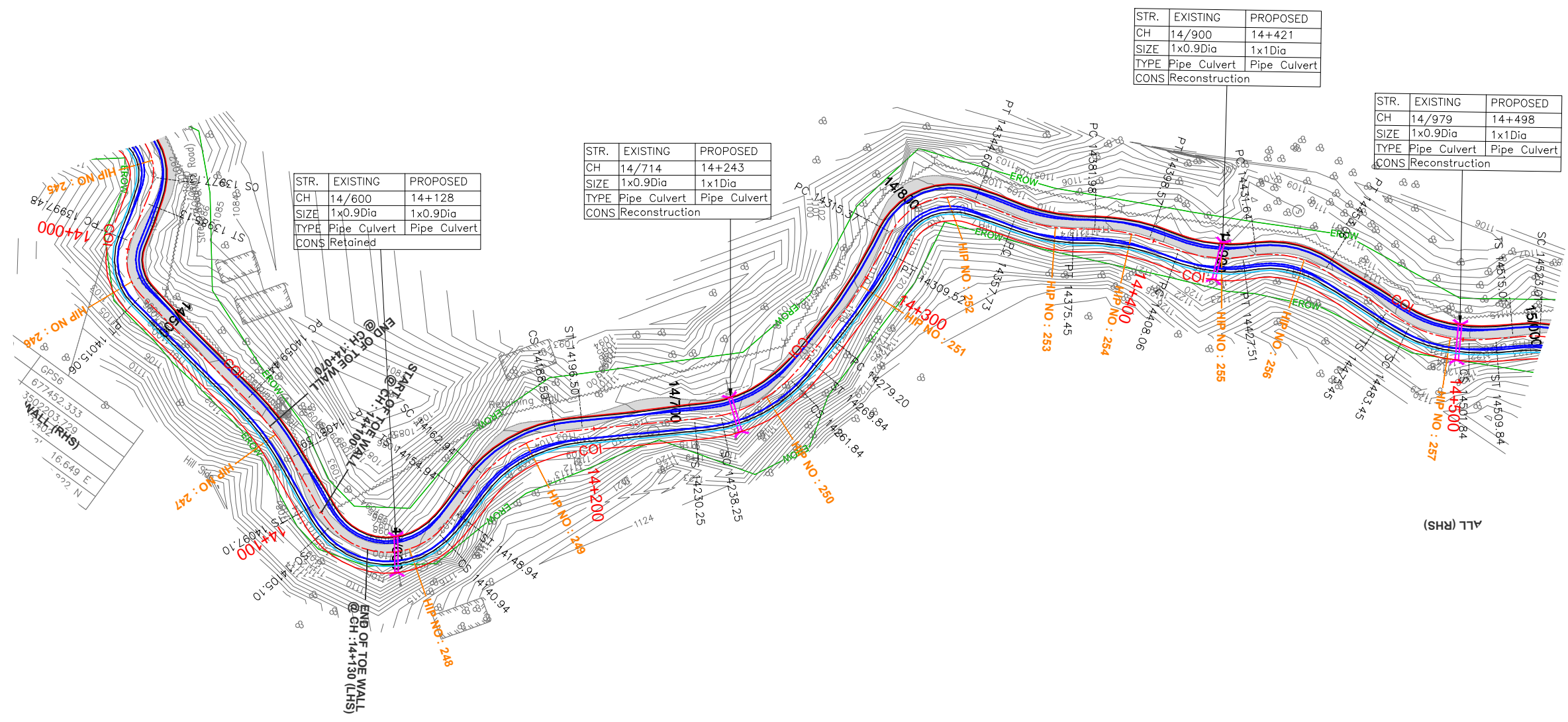
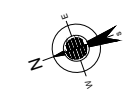
DRAWING NO : HP/MAN-KAL/P&P-06A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 06A OF 22

← MANDI


KALKHAR →



ALL (RHS)

TENDER PURPOSE ONLY

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | CHECKED | APPROVED |
|-----|------|-------------|----------|-------|---------|----------|
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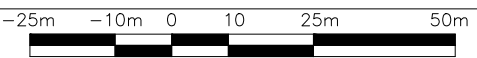
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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 14+000 TO CH: 14+500

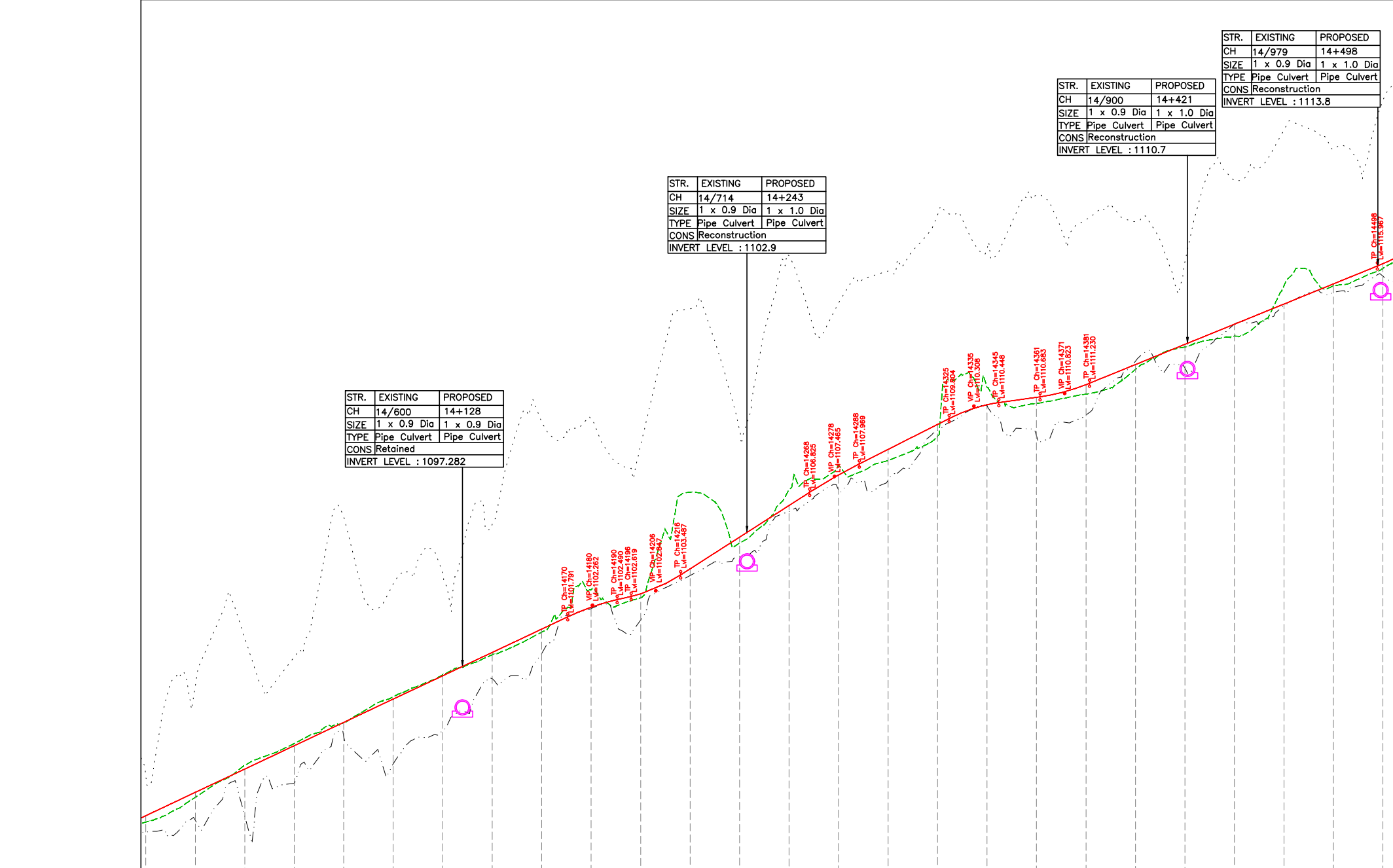
DRAWING NO : HP/MAN-KAL/P&P-07A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 07A OF 22

← MANDI

KALKHAR →



| STR. | EXISTING | PROPOSED |
|-------------------------|--------------|--------------|
| CH | 14/600 | 14+128 |
| SIZE | 1 x 0.9 Dia | 1 x 0.9 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Retained | |
| INVERT LEVEL : 1097.282 | | |

| STR. | EXISTING | PROPOSED |
|-----------------------|----------------|--------------|
| CH | 14/714 | 14+243 |
| SIZE | 1 x 0.9 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL : 1102.9 | | |

| STR. | EXISTING | PROPOSED |
|-----------------------|----------------|--------------|
| CH | 14/900 | 14+421 |
| SIZE | 1 x 0.9 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL : 1110.7 | | |

| STR. | EXISTING | PROPOSED |
|-----------------------|----------------|--------------|
| CH | 14/979 | 14+498 |
| SIZE | 1 x 0.9 Dia | 1 x 1.0 Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |
| INVERT LEVEL : 1113.8 | | |

| PROPOSED ROAD LEVELS(m) | EXISTING ROAD LEVELS(m) | GL AT 5m LHS (m) | GL AT 8m RHS (m) | VERTICAL SCHEMATIC | HORIZONTAL SCHEMATIC | SUPERELEVATION | CROSS SECTION DETAILS | PROPOSED CHAINAGE |
|-------------------------|-------------------------|------------------|------------------|--------------------|----------------------|----------------|-----------------------|-------------------|
| 1095.433 | 1093.509 | 1093.782 | 1093.782 | | | | | 14+000 |
| 1099.006 | 1093.572 | 1094.495 | 1094.704 | | | | | 14+020 |
| 1100.944 | 1093.739 | 1095.798 | 1095.646 | | | | | 14+040 |
| 1100.160 | 1095.064 | 1096.677 | 1096.588 | | | | | 14+060 |
| 1105.839 | 1096.955 | 1097.517 | 1097.530 | | | | | 14+080 |
| 1103.128 | 1095.851 | 1098.567 | 1098.472 | | | | | 14+100 |
| 1103.579 | 1097.228 | 1099.452 | 1099.414 | | | | | 14+120 |
| 1105.536 | 1099.299 | 1100.266 | 1100.356 | | | | | 14+140 |
| 1109.653 | 1100.309 | 1101.176 | 1101.298 | | | | | 14+160 |
| 1109.819 | 1102.130 | 1102.890 | 1102.185 | | | | | 14+180 |
| 1108.713 | 1101.674 | 1102.567 | 1102.723 | | | | | 14+200 |
| 1114.240 | 1103.461 | 1106.830 | 1103.735 | | | | | 14+220 |
| 1109.342 | 1104.246 | 1104.775 | 1105.014 | | | | | 14+240 |
| 1116.379 | 1106.051 | 1106.934 | 1106.293 | | | | | 14+260 |
| 1114.480 | 1106.916 | 1107.935 | 1107.527 | | | | | 14+280 |
| 1115.767 | 1107.317 | 1108.103 | 1108.559 | | | | | 14+300 |
| 1118.024 | 1109.316 | 1109.090 | 1109.567 | | | | | 14+320 |
| 1116.664 | 1110.314 | 1111.066 | 1110.362 | | | | | 14+340 |
| 1118.847 | 1109.122 | 1110.418 | 1110.663 | | | | | 14+360 |
| 1117.838 | 1109.947 | 1110.793 | 1111.175 | | | | | 14+380 |
| 1117.765 | 1112.123 | 1111.789 | 1111.987 | 14+400 | | | | |
| 1116.154 | 1111.850 | 1112.691 | 1112.802 | 14+420 | | | | |
| 1119.401 | 1113.622 | 1113.139 | 1113.616 | 14+440 | | | | |
| 1121.458 | 1114.370 | 1115.163 | 1114.430 | 14+460 | | | | |
| 1120.729 | 1114.897 | 1115.159 | 1115.244 | 14+480 | | | | |
| 1122.660 | 1115.562 | 1115.873 | 1116.061 | 14+500 | | | | |

TENDER PURPOSE ONLY

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

CLIENT:

 HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200

| | |
|----------|---------------|
| DESIGNED | MADHUBABU |
| DRAWN | DANIEL |
| CHECKED | CHANDRA/ASHIK |
| APPROVED | PRADEEP KAPLA |

TITLE : PLAN & PROFILE
 FROM CH: 14+000 TO CH: 14+500

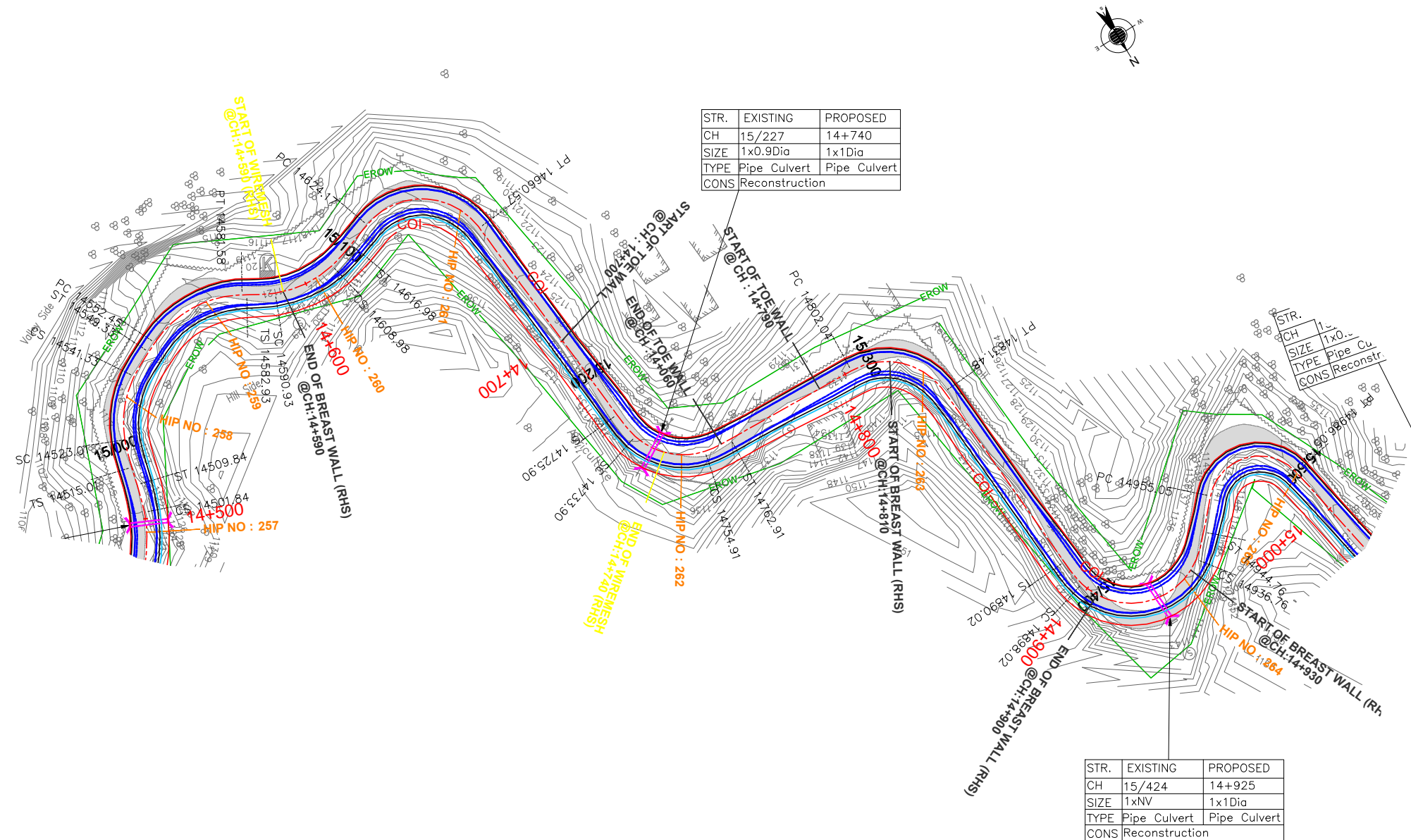
DRAWING NO : HP/MAN-KAL/P&P-07B

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

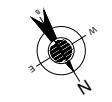
SHEET 07B OF 22

← MANDI

KALKHAR →




| STR. | EXISTING | PROPOSED |
|------|--------------|----------------|
| CH | 15/227 | 14+740 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | | Reconstruction |



| STR. | EXISTING | PROPOSED |
|------|--------------|----------------|
| CH | 15/424 | 14+925 |
| SIZE | 1xNV | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | | Reconstruction |

TENDER PURPOSE ONLY

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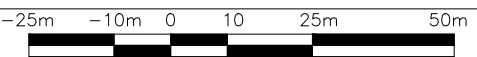
CLIENT:

 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:
 HOR 1:1500
 VER 1:200



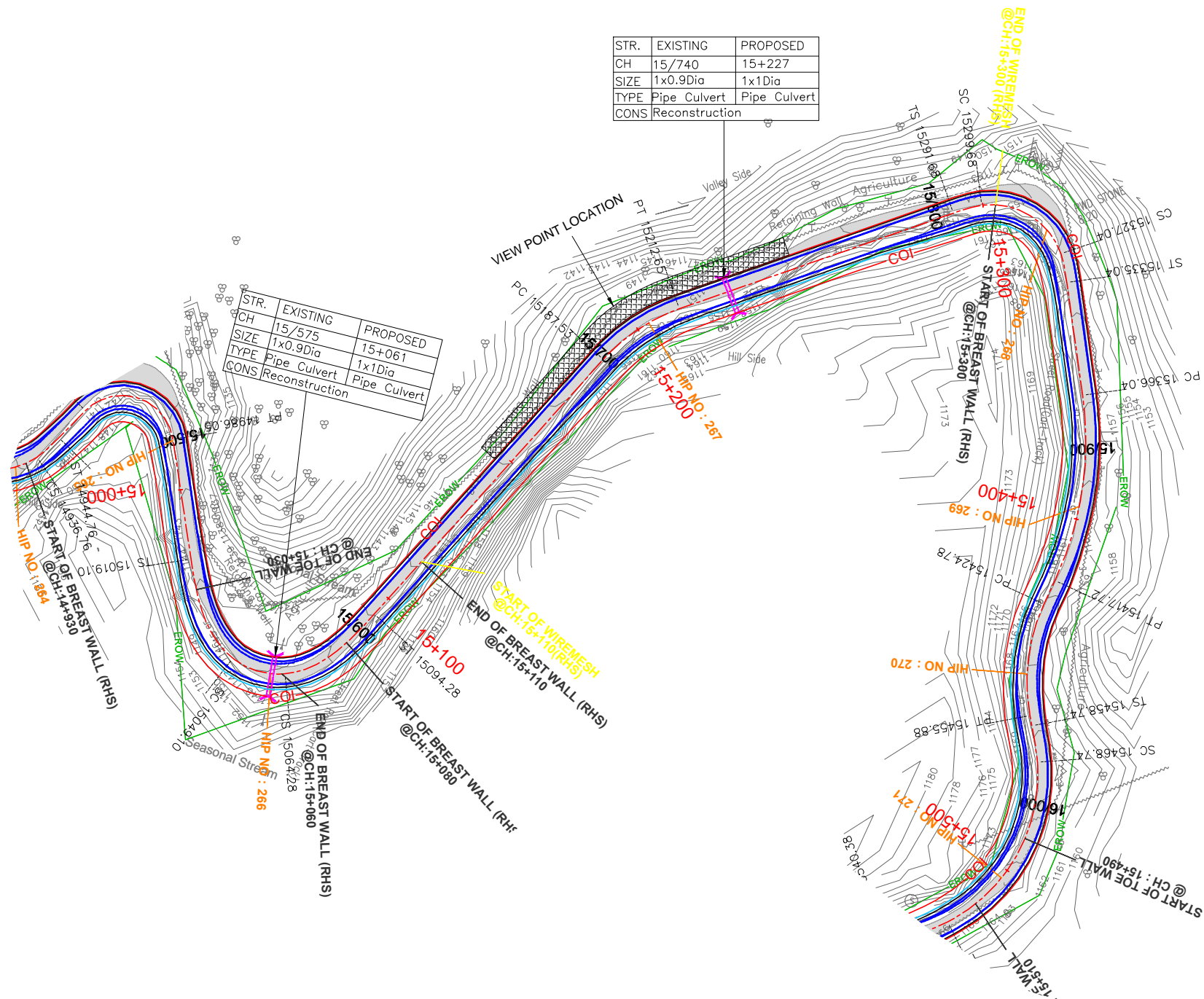
| | |
|----------|---------------|
| DESIGNED | MADHUBABU |
| DRAWN | DANIEL |
| CHECKED | CHANDRA/ASHIK |
| APPROVED | PRADEEP KAPLA |

TITLE : PLAN & PROFILE
 FROM CH: 14+500 TO CH: 15+000

DRAWING NO : HP/MAN-KAL/P&P-08A


ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 08A OF 22



TENDER PURPOSE ONLY

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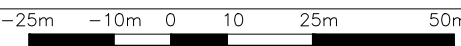
CLIENT:

 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.
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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 15+000 TO CH: 15+500

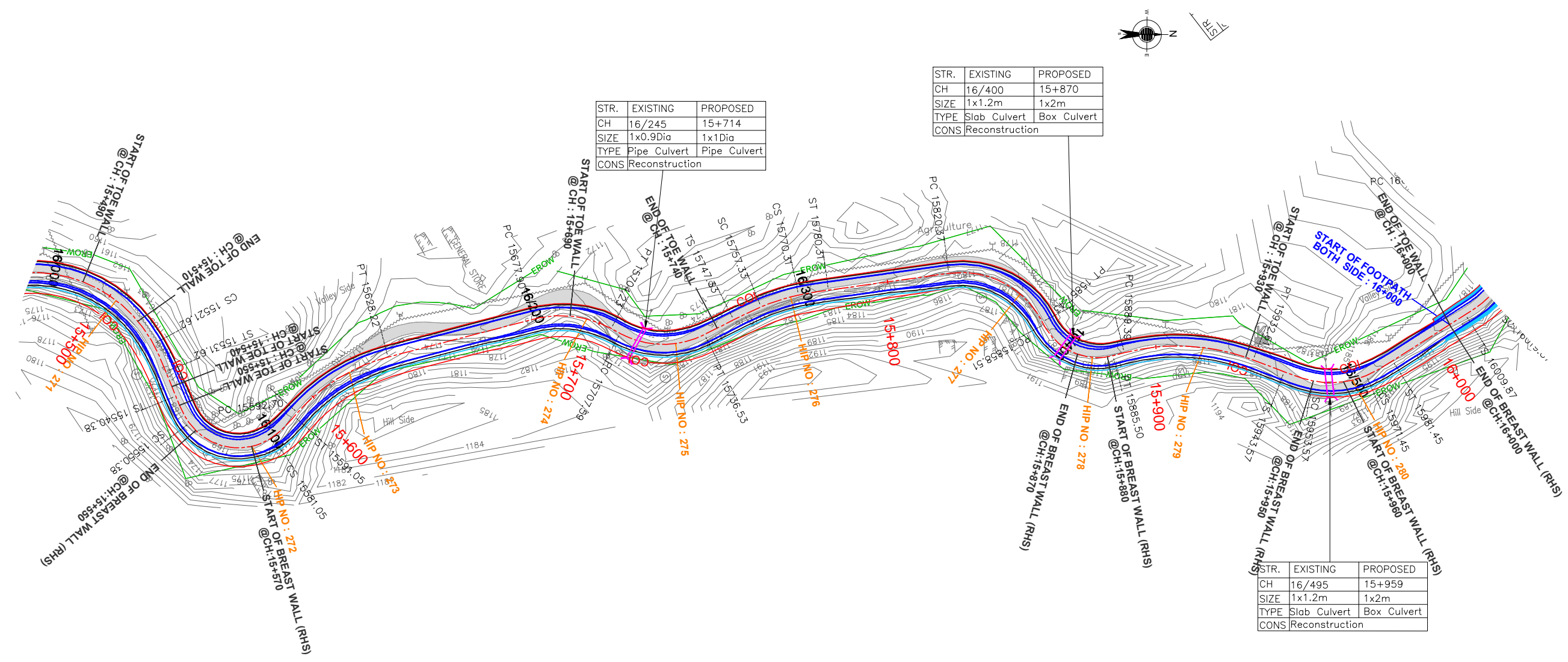
DRAWING NO : HP/MAN-KAL/P&P-09A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 09A OF 22

← MANDI

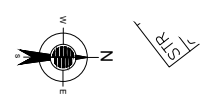
KALKHAR →



| STR. | EXISTING | PROPOSED |
|------|----------------|--------------|
| CH | 16/245 | 15+714 |
| SIZE | 1x0.9Dia | 1x1Dia |
| TYPE | Pipe Culvert | Pipe Culvert |
| CONS | Reconstruction | |


| STR. | EXISTING | PROPOSED |
|------|----------------|-------------|
| CH | 16/400 | 15+870 |
| SIZE | 1x1.2m | 1x2m |
| TYPE | Slab Culvert | Box Culvert |
| CONS | Reconstruction | |

| STR. | EXISTING | PROPOSED |
|------|----------------|-------------|
| CH | 16/495 | 15+959 |
| SIZE | 1x1.2m | 1x2m |
| TYPE | Slab Culvert | Box Culvert |
| CONS | Reconstruction | |



TENDER PURPOSE ONLY

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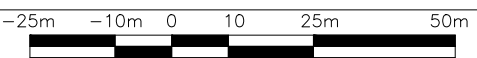
CLIENT:

 HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 15+500 TO CH: 16+000

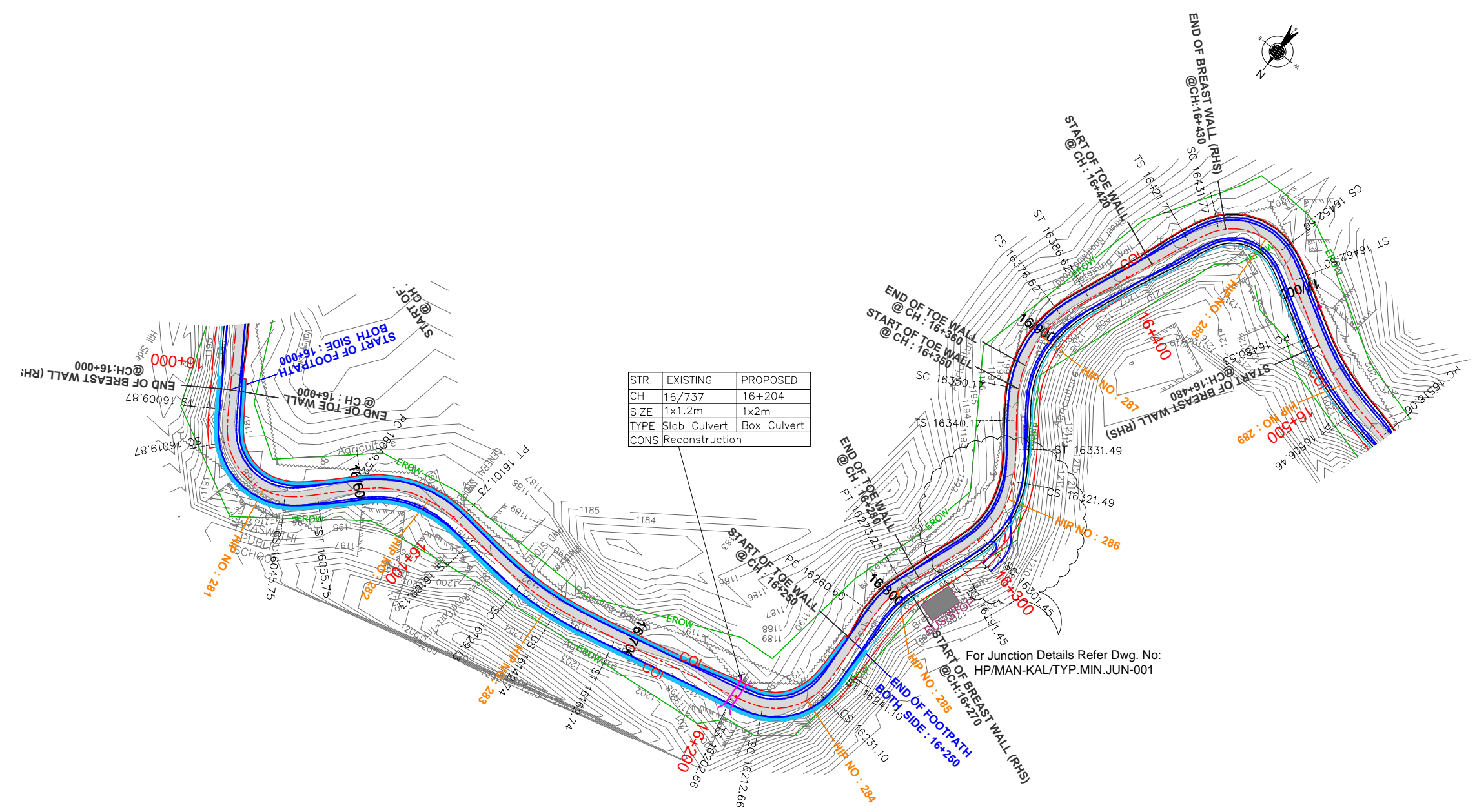
DRAWING NO : HP/MAN-KAL/P&P-10A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 10A OF 22

← MANDI

KALKHAR →




| STR. | EXISTING | PROPOSED |
|------|--------------|----------------|
| CH | 16/737 | 16+204 |
| SIZE | 1x1.2m | 1x2m |
| TYPE | Slab Culvert | Box Culvert |
| CONS | | Reconstruction |

For Junction Details Refer Dwg. No:
HP/MAN-KAL/TYP.MIN.JUN-001

TENDER PURPOSE ONLY

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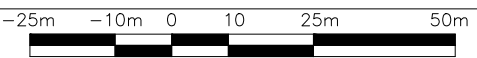
CLIENT:

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CONSULTANT:

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 #1-8-359 to 363, 4th Floor, Centre Point Building, SP Road, Begumpet, Secunderabad, Telangana - 500003, India.
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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



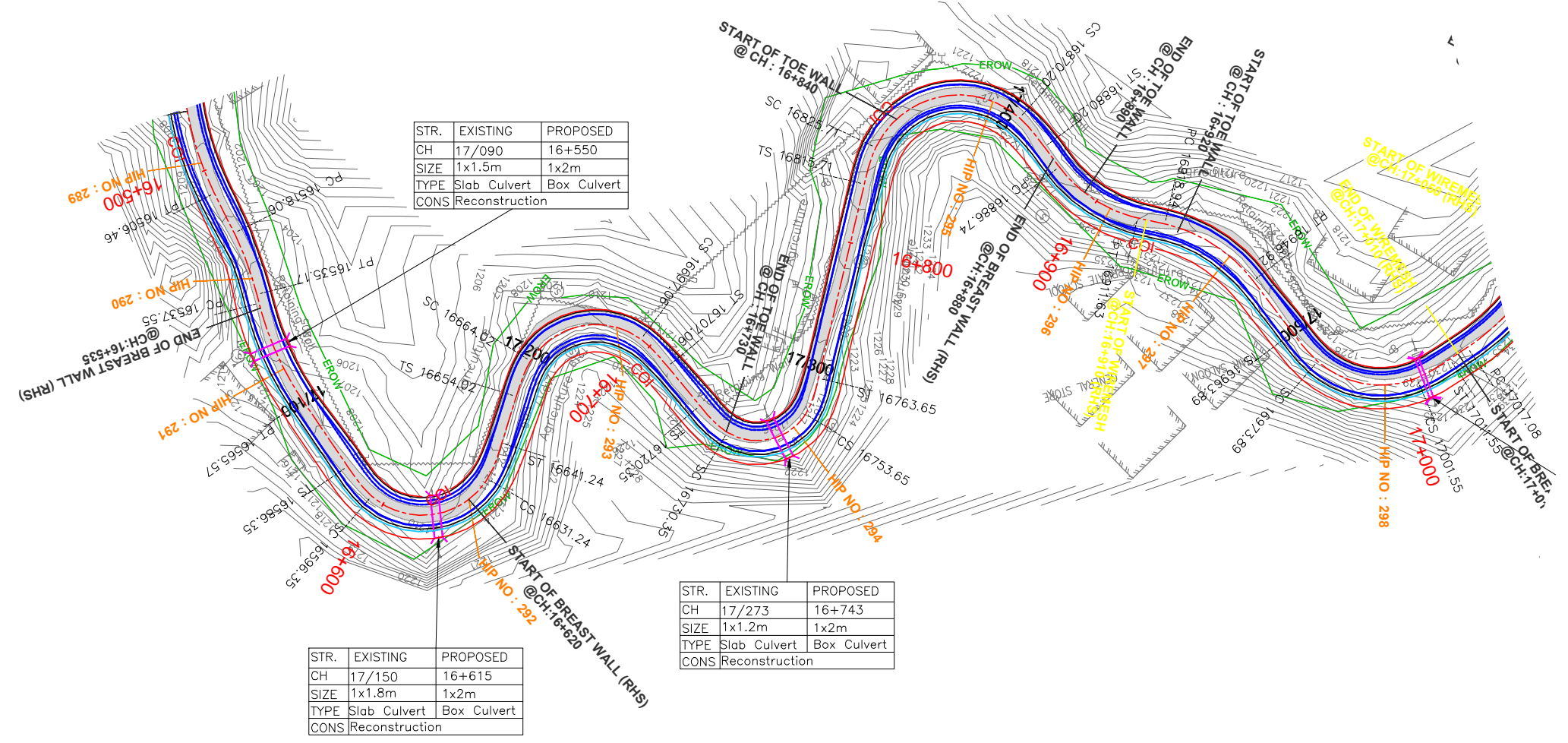
DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 16+000 TO CH: 16+500

DRAWING NO : HP/MAN-KAL/P&P-11A


ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 11A OF 22



TENDER PURPOSE ONLY

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

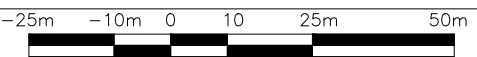
CLIENT:

 HIMACHAL PRADESH ROAD AND OTHER INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

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PROJECT:
 Himachal Pradesh State Roads Transformation Project (HPSRTP)

SCALE:
 HOR 1:1500
 VER 1:200



DESIGNED: MADHUBABU
 DRAWN: DANIEL
 CHECKED: CHANDRA/ASHIK
 APPROVED: PRADEEP KAPLA

TITLE : PLAN & PROFILE
 FROM CH: 16+500 TO CH: 17+000

DRAWING NO : HP/MAN-KAL/P&P-12A

ROAD NAME : Package-VI:
 Upgradation of Mandi - Rewalsar - Kalkhar Road in Mandi District From Km 11+000 To Km 27+854

SHEET 12A OF 22