Typical Methodology

(details as provided in technical specifications)

1. Surface adjacent to crack and area of application shall be cleaned of dust, dirt, grease oil, efflorescence and other foreign material by brushing/water jetting or sand blasting.

2. Provide entry ports along crack at 300 mm C/C or thickness of member whichever is drilled hole 13 mm dia and 200 mm deep. depth shall not be more than 60% of depth of member.

3. Seal the cracks with surface seal material between entry ports.

4. Inject epoxy adhesive from lowest entry port inject till adhesive appear at the next entry port.

5. Repeat the process of injecting epoxy from next entry port until the crack are completely filled.

6. If port to port travel of epoxy is noticed or the volume of the injected material exceed 2 liter at a particular entry port work shall be stopped and the engineer shall be consulted.

7. Sealing of crack by injection of epoxy shall be carried out as per month specification 2803.
TYPICAL CROSS SECTION

TYPICAL CROSS SECTION TYPE – 1

TYPICAL CROSS SECTION TYPE – 2

TYPICAL CROSS SECTION TYPE – 3

TYPICAL CROSS SECTION TYPE – 4

TYPICAL CROSS SECTION TYPE – 5

TYPICAL CROSS SECTION
TYPICAL GAD FOR SINGLE PIPE CULVERT
TYPICAL GAD FOR DOUBLE PIPE CULVERT

DETAILS OF ‘Y’

DETAILS OF ‘X’

NOTES:
1. THIS DRAWING HAS TO BE READ IN CONJUNCTION WITH
   RPPWC/06/10/01/10/163
2. THIS DRAWING IS VALID ONLY FOR FIRST CLASS ESCHING
   CAN BE USED FOR MAX. HEUGHT OF fillNG 4m.
3. PIPES SHOULD CONFORM TO T5-150.
4. LONGITUDINAL SLOPE OF PIPE SHOULD BE MINIMUM OF 1:1000
5. ALL DIMENSIONS IN MILLIETERS EXCEPT WHERE OTHERWISE
   MENTIONED.
6. FORMATION LEVEL FOLLOW ASP. PER THE HIGHWAY ALIGNMENT.
7. THE INVERT LEVEL OF NEW PIPE CULVERT SHALL NOT BE
   HIGHER THAN THE EXISTING INVERT LEVEL
8. IF CONSTRUCTION OF NEW WALL FALLS OUT SIDE ROW,
   SEE SLOPE MUST BE ADJUSTED ACCORDINGLY TO
   ACCOMMODATE THE STRUCTURE INSIDE ROW.
9. THE PIPE SHALL BE JOINED AS PER MORTH SPECIFICATION
   CLOSER-2000.
(A) GENERAL

I. The design is according to the following codes:
   a. IRC 9 – 1998
   b. IRC 8 – 2010
   c. IRC 18 – 2000
   d. IRC 21 – 2000
   e. IRC 22 – 2000
   f. IRC 78 – 1999
   g. IRC 83/84 (RRT I) – 1985
   h. IRC 83/84 (RRT II) – 1987
   i. IRC 33 – 1989

j. Specifications for Roads & Bridges (4th revision) by MORTH.

II. All dimensions are in mm (unless otherwise specified) & chainages are in metre. Only written dimensions shall be followed. No dimensions shall be scaled.

III. The following loads have been considered in the design:
   a. One lane of IRC class 70% or two lanes of IRC class A, on carriage way, whichever governs.
   b. Footpath load of 15KN/m
   c. Wearing course load of 2KN/m

IV. The designs are applicable for "moderate" and "severe" conditions of exposure. In case of "severe" conditions suitable anti-corrosion treatment as approved by the Engineer may be provided to reinforcement bars and exposed concrete surface.

(B) MATERIALS SPECIFICATIONS

Concrete

I. Concrete shall be design mix and have a minimum 28 days characteristic strength as given below on 150mm cubes.

II. Structural Element

PRESTRESSED CONCRETE GIRDER

<table>
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<tr>
<th>Material</th>
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<td>Prestressed girders</td>
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<tr>
<td>Reinforcing steel</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed concrete</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed slab</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed cap</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed abutment</td>
<td>35 MPa</td>
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<tr>
<td>Prestressed wall</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed slab</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed cap</td>
<td>35 MPa</td>
</tr>
<tr>
<td>Prestressed barrier</td>
<td>10 MPa</td>
</tr>
</tbody>
</table>

III. Prestressed concrete conforming to IS 2569 or High Strength Ordinary Portland Cement conforming to IS 8112 shall be used in the design for reinforcement.

IV. To improve workability of concrete and cement grunt, admixtures conforming to IS 6625 and IS 415/33 could be included subject to satisfactory proven use. Admixtures generating hydrogen, nitrogen, chlorides etc. should not be used.

V. Cement content in RCC members shall not be less than 500 kg/m³ or more than 540 kg/m³.

VI. Maximum water cement ratio shall be restricted to 0.40.

VII. The normal maximum size of aggregate to be used in RCC and PSC work shall be 20mm.

VIII. Minimum cover to reinforcement shall be 70mm at surfaces in direct contact with soil and/or, water, and 50mm at the remaining, unless otherwise noted.

IX. 12mm thick plaster in cement mortar 1:3 to be applied on the top surface of the deck slab before filling.

Sheathing

I. Sheathing shall be of "Droobach" type 75mm ID manufactured from minimum 0.4mm thick metal strip. It shall be tested as per IRC 18:1985, Appendix 1.

II. The joints of all sheathing shall be water tight and conform to provisions contained in appendix 2 of IRC 33:1985.

Water

I. Water to be used in concrete, grouting and curing shall conform to clause 5.10 of IRC 33:1988.

Reinforcement

I. All reinforcing steel shall be of High Yield Strength TMT-PC Bars (Grade designation Fe 415/Fe 500) conforming to IS: 1868 Mild Steel bars Grade designation S 240 shall conform to IS: 432 part-1.
(D) PRESTRESSING

I. The jacking force in each cable is 1543 kN to be imparted at both ends simultaneously by using multiple-strand jack.

II. The following basic properties of Prestress tendons have been considered in the design:
   a. Area of 1 strand = 98.7 mm²
   b. Yawable coefficient k = 0.0045
   c. Friction coefficient µ = 0.25
   d. Modulus of Elasticity of strand = 195×10⁵ MPa
   e. Anchorage slip = 6mm

III. Minimum strength of concrete at the time of tensioning of tendons shall not be less than 35 MPa.

IV. Grouting shall be carried out as per Appendix 2 of IRC:18-2000. After the prestressing operations are completed and strands have been cut by acceptable tools, reusable metal cap with a central hole shall be fixed by four bolts to the guide plate of anchor to prevent leakage during grouting under pressure. Suitable rubber gasket shall be provided at the interface of metal cap and guide. External threaded pipe of O.D=19mm shall be used as nipple for grouting and shall protrude from metal cap. All standard accessories and their details such as vent pipes, fixation details of vent pipe with sheathing, location of vent pipe and methodology of grouting shall be submitted by contractor in consultation with specialist agency for approval of the Engineer.

V. For future prestressing in case of bridge distress, single 12.7 mm dia, 7–ply class 2 strands as per IS:60068–1983 shall be used. The jacking force per strand shall be 1236.6 kN. Mono strand jacks shall be used for tensioning of strands utilizing approved prestressing system only. The external placed strands shall be protected by polyethylene sheathing and grouted.

VI. Anchorages to be sealed with epoxy coating and filled with preplaced non-shrink mortar. End face of girder, at the location of anchorages, shall be coated with two coats of epoxy.

VII. Wherever necessary, reinforcement bars may be bent or shifted locally to avoid clashing with prestress tendons and anchorages, holes and recesses.

VIII. All anchorages plates are to be set at right angles to the tendon.

IX. Ducts for prestressing steel shall be securely fastened in place to prevent movement. Until concrete is placed and hardened, ducts shall be supported at intervals not exceeding 500mm or as shown on the drawings.

X. Welding is not permitted within 500mm of any tendon or tendon duct.

XI. Prestressing steel shall be accurately located and maintained in position as per drawing, with a minimum tolerance of ± 6mm. The sheathing being supported and fixed at interval not exceeding 0.75m by fixing shear chains on spacer bars to secondary reinforcement in such a manner that the profiles of the cables is in no way disturbed by heavy vibration and / or by the pressure of wet concrete.

XII. During concrete and up till final setting of concrete it shall be ensured that the cables move freely in the sheath by moving the sheath forward and backward.

(E) WORKMANSHIP/DATAILING

I. Minimum clear cover to reinforcement shall be 70mm at surfaces in direct contact with soil and/or water, and 50mm at the remainder, unless otherwise in the drawing.

II. For ensuring proper cover of concrete to reinforcement bars, the mortar blocks of same grade as of parent concrete shall be provided & should be able to withstand the crushing during construction.

III. Welding of reinforcement bars shall not be permitted.

IV. Bending of reinforcement bars to be as per IS:2502–1963.

V. Minimum lap length to be kept as 6Dd where ‘Dd’ is the diameter of bar. Lap shall be staggered in such a way that more than 50 bars are tipped at one location.

VI. Supporting chairs of 12mm dia shall be provided at suitable intervals as per IS:2502.

VII. Sharp edges of concrete shall be chamfered (25mmx25mm).

(F) SPECIAL NOTE FOR PRESTRESSING

If the calculated elongation is reached before the calculated gauge pressure is attained, continue tensioning till the calculated gauge pressure is attained. Over tensioning does not exceed 1.05 times the calculated elongation. If this elongation is achieved before the calculated gauge pressure is attained, stop stressing and inform the Engineer.

If the calculated elongation has not been reached, continue tensioning by intervals of 5kg/sqmm till the calculated elongation is attained. Provided the gauge pressure does not exceed 1.05 times the calculated gauge pressure.

If the elongation at 1.05 times the calculated gauge pressure is less than 0.95 times the calculated elongation, the final measurements must be taken, in succession, to define the cause of this lack of elongation.

Recalibrate the pressure gauge
Check the functioning of the jack, pump and lade
De-tension the cable. Slide it in its duct to check that it is not blocked by mortar which has entered through the holes in the sheath. Re-tension the cable. If free.

If the required elongation is not obtained, further finishing operations such as cutting or seeding should not be undertaken without the approval of the Engineer.
NOTES FOR REPAIR AND REHABILITATION

1. Objects of repair to RCC structural elements:
   - Repair carefully and without damage to adjacent structures to be
     left in place. All sub-standard materials,
   - Expose and protect corroded reinforcement,
   - Replace sub-standard materials by new specified materials.
2. Method statement of all works shall be given by the contractor
   during the design and detailing of the Rehabilitation works for each
   activity of the repair & rehabilitation works for each affected structure.
3. Representatives of manufacturers of proprietary materials and equipment
   to be available at site for training contractor's personnel and
   certifying work as per their specifications.
4. Use of special proprietary materials is authorized. This is based on
   "warrant" products. Approved equivalent can be used.
5. Use of special proprietary mechanical equipment for drilling, branching,
   cutting etc. is discouraged. The equipment for this purpose shall be
   of specified proprietary type/visit manufacturer for obtaining details
   and specifications. To be referred to: "warrant" products. Approved
   equivalent can be used as per the manufacturer's specifications.
6. Pre-repair tests:
   To understand the general extent/depth of defects. Contractor's
   repair expert may conduct some pre-repair tests (at the discretion
   of engineer) on samples of slab and/or other parts of structure
   conforming to IS:383-1986 below:
   a. Chloride test: Testing pieces of concrete (from given depth) for chloride
   content.
   b. Coring: For analyzing in laboratory for various properties including
   concrete strength.
   c. Proficiency test before taking up certain type of repair activities
   and making holes in reinforced concrete elements. It may be
   essential to pre-determine the location of existing reinforcement
   bars in the concrete section. This shall be done by employing
   instrument producer-'s available from AAM LTD.(for approved
   equivalent). This is important to ascertain the location and
   sizing of the existing reinforcement, other methods like drilling,
   cutting etc. for locating existing reinforcement bars would not
   be permitted.
   d. Ultrasonic test: For determining extent of corrosion
   over dressed length of repair from exposed end test panels
   simulating actual field condition as per IS:3007 of 1981.
7. DOG is approximate and subject to change. Inspection report shall be
   carried out jointly & approved by
   the engineer.
8. Access for inspection & carrying out all repair work to be arranged by
   contractor, working plan/erequire is to be provided by contractor shall
   be developed and shall be submitted to the consultant, which
   shall be approved by the consultant. The consultant shall
   ensure that the inspection is carried out in a systematic manner.
9. In case of wall / column cap require replacement / demolition at a place
   to ensure that the repair is durable and repairs traffic movement on bridge
   during rehabilitation.
10. In case, all expansion joints are blocked or damaged to the same,
    shall be removed carefully. This shall be considered incorrect to the
    work performed of new expansion joint and no separate payment shall
    be made for removal of existing joint, etc.
11. The service lines, if any shall be carefully checked as directed by the
    designer before commencing work and shall be re-located to original
    location and shall be signed by the designer as per approved
    drawings. All new service lines and no separate payment shall be
    made on this account.
12. Structural, concrete shall conform to "warrant" conditions of exposure as
    per IS:3041, 1981. Particular attention is drawn to clause
    14.3.1 of IS:3041, 1981 minimum slump requirements for
    concrete. All desired slump test on site before placing to ensure
    adequate workability of the concrete.
13. Arrangement of passage of traffic along a part of existing carriage
    way may be considered during
    construction shall remain the responsibility of the contractor. Additional steel
    trestles and provision of steel ramps required to facilitate passage of traffic.
    No separate payment shall be made on this account. Work undertaken be
    seened by contractor shall be done on the premises and subject to approval
    of the engineer. In such events shall be essential. The activity shall be
    constrained to ensure that the traffic loss is minimal and the traffic
    disturbance is as minimal as possible. The contract shall be
    considered ready for the implementation of the traffic management
    plan.
14. Flats jack used when lifting of superstructure or portion thereof
    shall be manufactured as per approved drawings. Steel jack used shall
    be of approved make & have the facility like hydraulic coupling, mechanical
    locking etc. These shall remain be calibrated "warrant"ly as directed by
    the engineer. Steel trestle used for lifting superstructure shall be designed
    in accordance with IS:383-1986. Jacks used shall be used only for lifting purposes
    and should be "warrant"ly locked. The loads shall be transferred as practically as
    possible to the lifting steel. /"warrant"ly markings and needs for
    safety.
15. For lifting new concrete to old concrete, all existing or new concrete
    shall be removed as per specifications & equipment without causing
    existing reinforcement of other elements from the shall. Loose material
    amounting to more than 10% of its weight to be removed. Concrete
    shall be removed of its entire weight by mechanical means. For
    concrete surface, concrete primer shall be applied on prepared concrete
    surface. Reinforcement primer or exposed reinforcement as per
    instructions to facilitate proper bonding between new & old concrete.
16. Formwork shall be left tight that major wage for each application.
17. Before taking up certain type of repair activities to existing reinforced concrete elements, it may be essential to pre-determine the location of existing reinforcement bars in the concrete. This shall be done by employing non-destructive techniques with the instrument as per "warrant" products. Approved equivalent. The instrument shall be suitable for determining the location and utility of the existing reinforcement, other methods like X-ray, thermal, ultrasonic etc. for locating existing reinforcement bars would not be permitted.
20. All reinforcing bar shall be cored and shall comply with IS:631-1972.
21. All reinforcing works or protection works like location adjustment and
    size shall be as directed by the engineer.
22. Not more than one bars shall be used at a time.
23. Lap length for bars shall be 0.7 times of bars (L0).
24. In case of bending of flat type superstructure for thickness and
    reinforcement (leaf) not as per standard drawing. If the most specified
    shear thickness is less than the existing shear thickness, the
    existing shear thickness be reduced in concrete grade B-25 and
    reinforcement (leaf) as per. Dept.
25. In repair bridges where steel framing or only guard structure is provided in
    existing bridges in part or in full length. RCC details shall be provided instead of
    steel guard railing as shown in IS:819, drawings of repair.
26. In bridges setting on open foundation and intended to be
    rehabilitated / widened shall be removed from top of the
    footings after repair / widening top of the foundation shall be
    back filled with mix of 40:20 PCC. To wash the original bed mixed
    level as directed by the engineer.
GENERAL STANDARD NOTES

STANDARD NOTES FOR STRUCTURAL STEEL

— ALL BOLTS SPECIFIED IN DRS. ARE HIGH STRENGTH FRICITION
  GRIP TYPE (HSFG) OF PROPERTY CLASS 8.8 CONFORMING TO IS: 3757-1985.
— EACH NUT AND BOLT SHALL BE ASSEMBLED WITH AT LEAST ONE WASHER.
— ALL THE HSFG BOLTS SHALL CONFORM TO SP 5 (4)1969, IS 4000 – 1967
— ALL HOLES IN MEMBERS SHOULD PREFERRED BE DRILLED BURRS SHOULD
  BE REMOVED AND THE NOMINAL HOLE DIAMETER SHALL BE 13mm.
— ALL OIL, DIRT, LOOSE RUST, BURRS PAINT APPLIED FINISHES, ANY FOREIGN
  MATERIAL AND ANY OTHER DEFECT ON THE CONTACT SURFACES SHOULD BE REMOVED BY
  SAND BLASTING. A CLEAN AS ROLLED SURFACE WITH TIGHT MILL SCALE IS ACCEPTABLE.
— PACKING SHALL BE PROVIDED WHEREVER NECESSARY TO ENSURE THAT THE LOAD IS
  TRANSMITTED EFFECTIVELY. ALL PACKINGS SHALL BE OF STEEL WITH A SURFACE
  CONDITION SIMILAR TO THAT OF ADJACENT MEMBERS.
— PAINTING OF THE STRUCTURE SHOULD BE CARRIED OUT AT AN EARLY STAGE AFTER
  TIGHTENING AND INSPECTION OF THE JOINTS TO PREVENT RUSTING. PAINTING SHALL BE CARRIED OUT AS PER
  MOST STANDARDS AND AS DIRECTED BY ENGINEER.
— METHODS OF TIGHTENING OF ALL HSFG BOLTS SHALL BE ONE OF THE FOLLOWING.
  (i) CALIBRATED WRENCH TIGHTENING.
  (ii) TURN OF NUT OR PART TURN TIGHTENING.
  (iii) TIGHTENING BY USE OF DIRECT TENSION INDICATOR.
— "REUSE OF ANY HSFG BOLT AND NUT" SHOULD NOT BE DONE ONCE IT IS FULLY TIGHTENED.
— IT IS ADVISED TO MARK ALL TIGHTENED CONNECTIONS SO THAT THERE IS NO CONFUSION
  BETWEEN TIGHTENED BOLT AND YET TO BE TIGHTENED BOLTS.
LEGEND:

D = DIAMETER OF PIPE.

s = SPACING OF PIPES = 1/2 x D

NOTE:
THE SIMILAR HEADWALL DETAILS ARE APPLICABLE TO SINGLE AND MULTIPLE PIPE CULVERTS.
### SAVARKUNDLA - DHASA ROAD SH - 236 & SH - 021

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3. Concrete shall be of grade M30.

1. All dimensions are in millimeters unless noted otherwise.

2. Dimensions are not to be scaled. Only written dimensions are to be considered.

- Remove all loose concrete and corroded reinforcement.
- Drill & fill with epoxy.
- Concrete jacketing shall not be less than 150mm in any case.

Jacketing Notes:

Prior to pouring the concrete of the C.C. Masonry Pier and Abutment Jackets and all the Caps:

1. Remove free exposed reinforcement of cap.
   * Remove loose materials by sand blasting for exposed concrete surface and reinforcement as per specification.
2. Replace if cap reinforcement corroded badly or missing after certifying with engineer.
   * Install appropriate dowels embedded with epoxy mortar to lap with the new bars where required as directed by engineer and as per additional specification.
   * The size and spacing of dowels shall match the original design.
3. Apply concrete primer as per specification to prepare concrete surface.
   * Apply nitozinc primer of fosroc (or approved equivalent).
4. Provide watertight form work all around the pier/abutment and cap.
5. Pour M30 concrete in pier/abutment and cap and compact it as per specification.

Notes:

1. All dimensions are in millimeters unless noted otherwise.
2. Dimensions are not to be scaled. Only written dimensions shall be followed.
3. Concrete shall be of grade M30.
4. Similar jacketing methodolgy to be adopted for abutment, where only the exposed face of member would be jacketed.
TYPICAL CROSS SECTION OF PROTECTIVE WALL

WEEP HOLES

450MM

HARD SHOULDER

CARRIAGEWAY

1:12

FOUND. C C M15

0.5h

300MM

300MM

H

H/5

H/4

300MM

C C M20

TYPICAL CROSS SECTION OF PROTECTIVE WALL
TYPICAL SECTION OF RETAINING WALL, PROTECTIVE WALL & CURTAIN WALL

TYPICAL SECTION OF R.WALL FOR NAVALI BRIDGE
SH-236, CH-10+475

SH-236, CH-10+475

TYPICAL SECTION OF R.WALL FOR GAGADIO CH-27+490 &
KHARI BRIDGE CH-32+117 SH-236

P.C.C. M-15
SAND
M-20

TYPICAL SECTION
OF PROTECTIVE WALL AT
FOLLOWING CHAINAGE SH-236

TYPICAL SECTION
OF PROTECTIVE WALL IN SPILL SECTION
BETWEEN CH-13+100 TO 14+500, SH-236

TYPICAL SECTION
OF APROAN CURTAIN WALL CH-28+690,
43+018 SH-236 & CH-12+300 SH-021

TYPICAL SECTION
OF R.WALL

P.C.C. M-15

M-20

SH-236

CHAINAGE
40+800 TO 41+000
41+000 TO 41+300
41+300 TO 41+700
43+750 TO 43+800
44+420 TO 45+350
45+250 TO 45+550
45+550 TO 46+350
46+350 TO 46+500
46+500 TO 46+775

NOTE

1:3
1:10

P.C.C. M-15
SAND

0.45
0.60
1.20
0.45
0.60
1.20

ALL DIMENSIONS ARE FOR GUIDE PURPOSES ONLY

TYPICAL SECTION OF RETAINING WALL, PROTECTIVE WALL & CURTAIN WALL

DEPUTY EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJ Kot

EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJ Kot

STATE ROAD PROJECT DIVISION
RAJ Kot

GOVERNMENT OF GUJARAT
ROADS AND BUILDINGS DEPARTMENT
SAWARKUNDLA – DAMHA ROAD SH 021 & 236
ROAD MAINTENANCE PROGRAMME

SCALE: 1:200
NOT TO SCALE

0.60
1.70
0.30
0.30
0.25
2.65
2.35
0.95
3.75
1:10
4.20

P.C.C. M-15
SAND
M-20

P.C.C. M-15
SAND

0.25
0.30
0.30
2.95
2.65
1.05
1.90

P.C.C. M-15
SAND

0.25
0.30
0.30
2.20
1.90
4.30
0.45
1:3

P.C.C. M-15
SAND

0.15
0.30
0.30
0.30
1.50
1.20
0.90
0.60
0.30
0.75
M-20

P.C.C. M-15
SAND

0.30
0.30
0.30
0.30
0.95
1.70

DETAILS OF RAISED PEDESTRIAN CROSSING
### Table: Bar Bending Schedule for Railings and Posts

<table>
<thead>
<tr>
<th>S.No</th>
<th>Matl.</th>
<th>Dia. (mm)</th>
<th>Lenth (m)</th>
<th>visitors</th>
<th>Bending DIam. (mm)</th>
<th>Bending Loc. (mm)</th>
<th>Moments (Nm)</th>
<th>Shear Force (kN)</th>
<th>Tension Force (kN)</th>
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<tr>
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**Additional Details:**

- Notes:
  1. For general notes refer ONS NO. PPME/6/3/1/101
  2. This drawing shall be read in conjunction to ONS NO. PPME/RMK/03/18 (Sheet 182 of 3)

---

### Table: Bar Bending Schedule for Approach Slab

<table>
<thead>
<tr>
<th>S.No</th>
<th>Matl.</th>
<th>Dia. (mm)</th>
<th>Lenth (m)</th>
<th>visitors</th>
<th>Bending DIam. (mm)</th>
<th>Bending Loc. (mm)</th>
<th>Moments (Nm)</th>
<th>Shear Force (kN)</th>
<th>Tension Force (kN)</th>
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</thead>
<tbody>
<tr>
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</table>

**Additional Details:**

- Notes:
  1. For general notes refer ONS NO. PPME/6/3/1/101
  2. This drawing shall be read in conjunction to ONS NO. PPME/RMK/03/18 (Sheet 182 of 3)

---

### Detail of R.C.C. Railing

- Government of Gujarat
- Roads and Buildings Department
- Saurashtra - Ohria Road SH 201 & 238
- Road Maintenance Programme

**Details:*

- Not to Scale
- State Road Project Division
- Rajkot
TYPICAL SECTION SHOWING SPALLED OUT CONCRETE IN RCC T-BEAM DECK SLAB

TYPICAL SECTION SHOWING SPALLED OUT CONCRETE IN RCC SOLID SLAB

TYPICAL SECTION SHOWING SPALLED OUT CONCRETE IN RCC PIER CAP

DETAIL OF C.C. CRACK REPAIR

Step 1
1. Demolish the damaged area
2. Remove plaster cover or coating, if any
3. Remove all loose concrete and expose rusted reinforcement
4. Identify extent of corrosion of reinforcement and remove concrete 300mm beyond rusted length and remove plaster 600mm beyond rusted length.
5. Cut edges of concrete base neat and square and in rectilinear pattern.
6. Hack back to sound concrete and roughen exposed concrete.
7. Clean spalled concrete with filtered compressed air.

Step 2
1. Cut and remove any severely corroded and detached reinforcement.
2. Clean remaining reinforcement with the help of specified anticorrosive treatment.
3. Provide and anchor new supplemental reinforcement and/or wire mesh as required.

Step 3
1. Primer slurry coat shall be applied with the help of stiff nylon bristle brush on spalled out surface.
2. Before the primer coat is fully cured, Polymer modified cementitious mortar shall be applied by means of trowels and floats.
3. The interval between the application of primer coat and PMC mortar shall be 15 to 30 minutes depending upon the ambient temperature.
4. A total thickness of PMC mortar shall be applied in multiple layers of thickness 25mm or manufacturer's recommendations by trowel.
5. Repaired surface shall be matched with original existing surface and curing be carried out by curing compound.
FIG-1 : DIVERSION OF TRAFFIC ON HALF OF THE ROAD WIDTH(SAY LEFT)
FIG-1: EXCAVATION AND EXTENSION OF SHOULDER

FIG-2: FILLING OF G.S.B MATERIAL ON SHOULDER
FIG-A: IDENTIFICATION

FIG-B: ABCD-MARKED AREA TO BE CUT/TRIMMED

FIG-C: EXCAVATING/CUTTING OF MARKED AREA

FIG-D: CUT/TRIM AND COMPACTED

FIG-E: BACKFILLING AND COMPACTING THE HOLE

FIG-3: DEEP POT HOLE/DEPRESSION REPAIR (AREA LESS THAN 1 SQ-M AND DEPTH > 75MM)
FIG-A : IDENTIFICATION

FIG-B : ABCD—MARKED AREA TO BE CUT/TRIMMED

FIG-C : EXCAVATING/CUTTING OF MARKED AREA

FIG-D : CUT/TRIM AND COMPACTED

FIG-E : FILLING WITH B.M. MATERIAL AND COMPACTED

FIG-4 : SHALLOW POT HOLE REPAIR LESS THAN 75MM IN DEPTH
FIG-5: PREPARATORY/REPAIR WORK FOR DEPRESSION LESS THAN 75MM
(Fig-6: Cross section of depression more than 75mm depth for full depth repair)

- L = Not less than 5.0 m
- W = Not less than 2.5 m (adequate width to suit the roller wheel)
- b = Greater than 1.0 m
- a = Greater than 1.0 m
- A/B/C/D = Area to be dismantled
- E = Distressed area > 1 sq-m

- I = Depression more than 75mm
- D = Dismantling of existing pavement
- E = Existing pavement + 300mm depth

- Slope suitable for movement of roller

- Section X-X

- Section Y-Y
(FIG- 7 : TREATMENT FOR FULL DEPTH REPAIR)
FIG - 8 SEALING OF WIDE CRACKS > 3MM

SPREADING OF SLURRY SEAL BY MANUAL MEANS AND COMPACTED WITH PNEUMATIC TYRED ROLLER

IDENTIFICATION OF CRACKS

MARKING OUT/CLEANING THE CRACKED AREA
IDENTIFICATION OF FINE CRACKS (ALIGATOR/TRANSVERSE/
LONGITUDINAL/SHRINKAGE)

MARKING OUT THE AREA AND SWEPT/CLEANING

APPLYING FOE SEAL AT THE RATE OF 0.5 TO 1.0 LIT/SQ-M.
USING PRESSURE TANK SPRAYING BAR AND FLEXIBLE HOSE

FIG - 9 SEALING OF FINE/NARROW CRACKS < 3MM
FIG-XA : CENTRE LINE MARKING FOR TWO LANE ROAD ON STRAIGHT ALIGNMENT

FIG-10 : CENTRE LINE MARKING FOR TWO LANE ROAD ON HORIZONTAL CURVE
(FIG-VIII : PROFILE CORRECTIVE COURSE)

PROFILE CORRECTIVE COURSE WITH BM MATERIAL (t1)

G.S.B MATERIAL GRADE 1 TABLE 400-2
150 THICK (COMPACTED)

EXISTING PAVEMENT

BITUMINOUS CONCRETE/SURFACE DRESSING

LAYERS:
- Layer I: 30 mm Bituminous Concrete
- Layer II: DBM Overlay 50 to 100 mm thick

TOTAL THICKNESS = (75/80/40) + PCC

DETAIL - A

NOTE: THE INDIVIDUAL THICKNESS OF LAYERS I & II SHALL BE AS DIRECTED BY THE ENGINEER

(CARRIAGE WAY)

VARYING (0.5 - 7.0m)

1500

1.0

1.5

G.L.

(FIG-12 : PROPOSED BITUMINOUS WORK/TREATMENTS)

T1 = 50 TO 95MM THICK G.S.B MATERIAL GRADE II
MOST TABLE 400-2 WITH P.I 3 - 8 COMPACTED

T2 = 150MM THICK G.S.B MATERIAL GRADE I
MOST TABLE 400-2 WITH P.I 3 - 8 COMPACTED
TYPICAL DETAIL OF TREE GUARD

GERU MARKING ON TREE

TREE GUARD
SECTION - A A

SIDE VIEW

PLAN
STOP LINE

YIELD LINE

PEDESTRIAN CROSSING MARKING

GENERAL LAYOUT

SOLID LANE MARKING

STANDARD LANE MARKING

WARNING LANE MARKING

DOUBLE LANE ARRANGEMENT

LANE MARKINGS

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

FIG-16 LANE MARKINGS
STOP LINE
RETRO - REFLECTIVE ROAD STUDS (RED)

YIELD LINE
RETRO - REFLECTIVE ROAD STUDS (RED)

PEDESTRIAN CROSSING MARKING
RETRO - REFLECTIVE ROAD STUDS (RED)

GENERAL LAYOUT

STOP MARKING
RETRO - REFLECTIVE ROAD STUDS (YELLOW)

YIELD MARKING
RETRO - REFLECTIVE ROAD STUDS (YELLOW)

PEDESTRIAN CROSSING MARKING
RETRO - REFLECTIVE ROAD STUDS (RED)

GENERAL LAYOUT

NIGHT TIME SAFETY
(POSITION OF ROAD STUDS)

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

DEPUTY EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

STATE ROAD PROJECT DIVISION
RAJKOT

GOVERNMENT OF GUJARAT
ROADS AND BUILDINGS DEPARTMENT
SAVARIRUNDAL - CHASA ROAD SH 201 & 235
ROAD MAINTENANCE PROGRAMME

SCALE: NOT TO SCALE
NOTE:
1. SIGN PANELS TO BE MADE OF ALUMINIUM COMPOSITE MATERIAL (E NO. RE-SALE VALUE)
2. REFLECTIVE SHEETING – 3M OR APPROVED EQUAL
3. THE CHEVRON ALIGNMENT SIGN MAY BE USED TO PROVIDE ADDITIONAL EMERGENCY AND GUIDANCE FOR A CHANGE IN HORIZONTAL ALIGNMENT A CHEVRON ALIGNMENT SIGN MAY BE USED AS AN ALTERNATE OF SUPPLEMENTAL TO STANDARD DELINERATIONS ON CURVES.
4. IF USED CHEVRON ALIGNMENT SIGNS SHALL BE INSTALLED ON THE OUTSIDE OF A TURN OR CURVE, IN LINE WITH AND AT APPROXIMATELY A RIGHT ANGLE TO APPROACHING TRAFFIC.

ADDITIONAL CURVE DELINEATION
PLACEMENT OF CHEVRON SIGNS
( FOR CURVES OF RADIUS LESS THAN 300M )

MEDIAN ENDS

MEDIAN DELINEATION

TRAFFIC CONTROL AND SAFETY DEVICES

FIG-18

DEPUTY EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

SOME:
NOT TO SCALE

STATE ROAD PROJECT DIVISION
RAJKOT

GOVERNMENT OF GUJARAT
ROADS AND BUILDINGS DEPARTMENT
SAVARNINAGAL - DHAHA ROAD SH-021 & 238
ROAD MAINTENANCE PROGRAMME

TOTAL

NOT TO SCALE
ROADWAY DELINEATOR SPACING ON CURVES

SECTION

DELINTEATOR WITH CIRCULAR REFLECTOR

PLAN

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE SPECIFIED.
2. INSTALL ALL DELINTEATORS AT EDGE OF THE ROADWAY PERPENDICULAR TO THE ONGOING TRAFFIC.
3. SEE TABLE FOR VALUE OF 'S' i.e. SPACING OF DELINTEATORS ON THE CURVE.
4. ON TANGENT SECTION OF ROADWAY DELINTEATORS TO BE PLACED UNFORMLY AT INTERVALS OF 50M. AT PROBLEM LOCATIONS SUCH AS CAUSEWAYS DELINTEATOR SPACING TO BE REDUCED TO 10M.

FIG-19 DELINTEATOR LAYOUT
### Rumble Strips

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Location</th>
<th>Km Chainage</th>
<th>Nos</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SH - 236</td>
<td>1+010</td>
<td>2</td>
<td>Nr Settlement</td>
</tr>
<tr>
<td>2</td>
<td>SH - 236</td>
<td>5+750</td>
<td>2</td>
<td>Curveture</td>
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<tr>
<td>3</td>
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<td>10+600</td>
<td>2</td>
<td>Village (Bhuva)</td>
</tr>
<tr>
<td>4</td>
<td>SH - 236</td>
<td>27+000</td>
<td>2</td>
<td>Curveture</td>
</tr>
<tr>
<td>5</td>
<td>SH - 236</td>
<td>28+000</td>
<td>2</td>
<td>Curveture</td>
</tr>
<tr>
<td>6</td>
<td>SH - 236</td>
<td>30+400</td>
<td>2</td>
<td>Village (Sanalia)</td>
</tr>
<tr>
<td>7</td>
<td>SH - 236</td>
<td>12+300</td>
<td>2</td>
<td>Curveture</td>
</tr>
<tr>
<td>8</td>
<td>SH - 236</td>
<td>10+600</td>
<td>2</td>
<td>Village (Bhuva)</td>
</tr>
<tr>
<td>9</td>
<td>SH - 236</td>
<td>26+850</td>
<td>2</td>
<td>Village (Sanalia)</td>
</tr>
<tr>
<td>10</td>
<td>SH - 236</td>
<td>27+800</td>
<td>2</td>
<td>Curveture</td>
</tr>
<tr>
<td>11</td>
<td>SH - 236</td>
<td>28+500</td>
<td>2</td>
<td>Village (Khara)</td>
</tr>
<tr>
<td>12</td>
<td>SH - 236</td>
<td>32+650</td>
<td>2</td>
<td>Village (Khara)</td>
</tr>
<tr>
<td>13</td>
<td>SH - 236</td>
<td>29+400</td>
<td>2</td>
<td>Village (Gundran)</td>
</tr>
<tr>
<td>14</td>
<td>SH - 236</td>
<td>30+300</td>
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<td>Village (Eklera)</td>
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<td>43+450</td>
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<td>Village (Ingorala)</td>
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<td>47+300</td>
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<td>Village (Hawtad)</td>
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<td>Curveture</td>
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<td>SH - 021</td>
<td>9+700</td>
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<td>Village (Dahithara)</td>
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Note: Also at all side roads rumble is proposed (Total 10 side roads)

### Raised Pedestrian Crossing

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<th>Sr. No</th>
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<th>Km Chainage</th>
<th>Nos</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>SH - 236</td>
<td>10+600</td>
<td>2</td>
<td>Village (Bhuva)</td>
</tr>
<tr>
<td>2</td>
<td>SH - 236</td>
<td>26+850</td>
<td>2</td>
<td>Village (Gundran)</td>
</tr>
<tr>
<td>3</td>
<td>SH - 236</td>
<td>32+650</td>
<td>2</td>
<td>Village (Sanalia)</td>
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<tr>
<td>4</td>
<td>SH - 236</td>
<td>27+800</td>
<td>2</td>
<td>Village (Navagam)</td>
</tr>
<tr>
<td>5</td>
<td>SH - 236</td>
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<td>6</td>
<td>SH - 236</td>
<td>30+400</td>
<td>2</td>
<td>Village (Sanalia)</td>
</tr>
<tr>
<td>7</td>
<td>SH - 236</td>
<td>28+000</td>
<td>2</td>
<td>Village (Village)</td>
</tr>
<tr>
<td>8</td>
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<td>SH - 236</td>
<td>10+600</td>
<td>2</td>
<td>Village (Bhuva)</td>
</tr>
<tr>
<td>10</td>
<td>SH - 236</td>
<td>26+850</td>
<td>2</td>
<td>Village (Gundran)</td>
</tr>
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### Crash Barrier

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<th>Remarks</th>
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<td>27+200 to 27+275</td>
<td>75</td>
<td>LHS</td>
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<tr>
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<td>27+275 to 27+375</td>
<td>100</td>
<td>RHS &amp; LHS</td>
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<tr>
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<td>SH - 236</td>
<td>32+117</td>
<td>55</td>
<td>RHS &amp; LHS</td>
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</table>

Note: Also at all side roads rumble is proposed (Total 10 side roads)
TYPICAL RECONSTRUCTION OF SLAB DRAIN (6.00 Mt. SPAN)

REF:
FOR REINFORCEMENT & OTHER DETAILS REFER STANDARD PLAN FOR HIGHWAY BRIDGES W/ R CC SLAB TYPE SUPER STRUCTURE VOL-II, ISSUED BY MINISTRY OF SURFACE TRANSPORT (ROAD WING) NEW DELHI.
TYPICAL RECONSTRUCTION OF SLAB DRAIN (6.00 Mt. SPAN)

REF.: FOR REINFORCEMENT & OTHER DETAILS REFER STANDARD PLAN FOR HIGHWAY BRIDGES W/ CC SLAB TYPE SUPER STRUCTURE VOL.-II, ISSUED BY MINISTRY OF SURFACE TRANSPORT (ROAD WING) NEW DELHI.
TYPICAL WIDENING OF SLAB DRAIN (6.00 ML. SPAN)

EXISTING SLAB TO BE DISMANTLED & JOIN WITH NEW

REFERENCE:
FOR REINFORCEMENT & OTHER DETAILS REFER STANDARD PLAN FOR HIGHWAY BRIDGES WITH RC SLAB TYPE SUPER STRUCTURE VOL. II, ISSUED BY MINISTRY OF SURFACE TRANSPORT (ROAD WING), NEW DELHI.
TYPICAL DRG. OF WIDENING OF SLAB CULVERTS (C/C SPAN 3.80mt & HEIGHT FROM G.L. UP TO 2.00mt)

REFERENCE :-
1. FOR RAINFORCEMENT & OTHER DETAILS REFFER STANDERD PLAN FOR HIGHWAY BRIDGES WITH R.C.C. SLAB TYPE SUPER STRUCTURE VOL. - II, ISSUED BY MINISTRY OF SURFACE TRANSPORT (ROAD WING) NEW DELHI.
2. FOR SECTION OF ABUTMENT & RETURN STANDARD SECTION AS PER S.V. NATU'S CIRCULAR (STATE SOR) SHALL FOLLOW.

TYPICAL SECTIONAL ELEVATION

TYPICAL SECTION OF ABUTMENT

TYPICAL SECTION OF PIER

TYPICAL SECTION OF SQUARE RETURN

TYPICAL PLAN

SECTION X-X
PROPOSED FRL. UP TO 0.5m ABOVE EXISTING ROAD LEVEL
Traffic Management requirements and construction methodology

The Contractor shall submit, for the Engineer's approval, Traffic Management Plans and associated methods and details at least 3 working days prior to commencement of the works. The Traffic Management Plans and method statements shall include the following minimum information and details:

- Proposed location and sequence of sub-sections for construction.
- Proposed staging of “half-width” by “half-width” road construction and traffic safety and control.
- Details of transitions to maintain safe traffic flow between various road construction stages.
- Details of temporary diversions in accordance with Specification Clause 112.3.
- Typical details of arrangements for construction under traffic including details of traffic movements after the cessation of work each day.

Special consideration shall be given in the Traffic Management Plans to the safety of pedestrians and workers, both by day and by night. Temporary diversions will be constructed only with the approval of the Engineer.

In general the contractor must plan his works in consideration of the following basic principles:

1. Partial pavement construction over long lengths shall not be permitted. The contractor shall concentrate his activities over sections such that he can complete continuous fronts of up to a maximum of say 10km before starting the adjacent front. (10km is taken as a reasonable guide.) The contractor may open more than one continuous 10km front provided that he has the necessary resources to do so. The resources working on a 10km front may not be shifted to next front until no longer required on previous front. It is acknowledged that as one front moves towards completion plant will become available to work on a successive front. This implies some inevitable overlap between one front and its successor, which is acceptable.

2. In all cases, temporary diversions, excavation adjacent to the existing road shall not be permitted on both sides simultaneously. Earthworks must be completed to the level of the existing road before excavation work on the opposite side will be permitted.

3. The construction operations taking place on a particular front must be managed efficiently such that delays between successive pavement layers are minimised.

4. Before the start of the monsoon season (June) the contractor shall ensure that the pavement over all the fronts is complete, full width, at least to DBM level, but preferably with AC wearing course. The contractor shall not start any sections of pavement that he cannot complete before the start of the monsoon season.

5. In the absence of permanent facilities, temporary drainage and erosion control measures, as required by the Specifications, are to be implemented prior to the onset of the monsoon.

6. Each project road has its own unique conditions and therefore the above traffic management concept should be modified to suit, but respecting the basic principle of completion of a section.

7. Works on CD structures requiring diversions should be sequenced in with the overall traffic management plan, but can be treated independently of the established 10km working fronts where separate resources are available.

8. When separate traffic diversions are required for CD works and other situations that demand them the minimum requirements of Spec Cl 112.3 of MORTH should be equalled or bettered. Such diversions should have smooth connections to the road with well-established and clear signage to give all required information to the road users. Such diversions should be maintained throughout their required duration including use of salvaged materials from the existing road where possible.

9. In general traffic management and safety measures implemented should be inspected regularly by the contractor and the Engineer (day and night) to rectify problems before giving cause for complaint.

10. The Engineer is highly concerned about the quality of traffic management and safety as an integral part of the project and will not compromise on these aspects at any stage.

Separate traffic diversions are per Spec Cl 112.3 of MORTH should in general be required for the following construction situations as determined by the Engineer:

- For CD reconstruction
- Widening projects considered necessary by the Engineer
- For new roadworks when the FRL is substantially above existing RL
- For new roadworks when the FRL is substantially below the existing RL such that a separate diversion is required in the judgment of the Engineer

The above criteria may be adjusted as decided by the Engineer if alternative methodology is possible and cost-effective as per actual site conditions. The above criteria may also be adjusted when the design centerline is significantly offset with respect to the existing.

In cases where separate traffic diversions are not essential or cost-effective the construction methodology should be in accordance with the following guidelines:

The contractor working on a 10km section, the pavement construction (except new alignments) should be limited to 500m sub-sections with a minimum of 1 to 3km between successive sub-sections to ease traffic management and safety issues. The earthworks in the widening portions are not limited in this respect. Excavation on both sides of the existing road over the same sub-section simultaneously shall not be permitted for reasons of safety to the traffic, particularly at night. Sub-sections longer than 500m may be authorized by the Engineer if two-way traffic flow can be comfortably managed and the Contractor should maintain dust control, proper road edge delineation, proper signage and traffic control. The number of sub-sections for construction shall suit the contractor's needs to his approved clause 14 Programme.

Where single file traffic is permitted (only applicable to final wearing course operations), the sub-sections shall be reduced to a minimum length whereby safe traffic regulation can be physically managed. Single file traffic may not be permitted at certain locations or times of the day when traffic volumes are such that excessive congestion shall occur.

Three typical traffic management scenarios for which separate traffic diversions are not required are illustrated on the attached drawings and described as follows:

**Case 1: Proposed FRL at Approximately the same level as the existing RL. (Refer to drawing TM 01)**

**Stage I**
- Traffic running normally on the existing road.
- Construct the extra level only with proper berthing into the existing embankment as appropriate.
- Temporary additional widening by approximately 1.0m to 1.25m as directed by the Engineer.
- Construct temporary overbridge to match the level of the adjacent existing pavement.
- Install proper edge delineation and temporary road signs to suit stage.

**Stage II**
- Divert traffic on new partial construction and half width of existing road.
- Earth running surface is kept watered periodically to control dust.
- Breakout half width of the existing road on the other side.
- Use salvaged materials elsewhere or dispose as appropriate.
- Prepare cut formation as per Spec Cl 301.6 of MORTH or as otherwise directed by the Engineer.
- Construct earthworks to the design levels including the use of salvaged materials from the existing road where possible.
- Construct GSB, WMM layers and DBM to the design levels.
- DBM complete to half width. Adjust temporary delineation and signs ready for next stage.

**Stage III**
- Divert traffic onto the new DBM and work on the other side.
- Scrape temporary earthworks and break out remaining portion of the existing road (soilage materials for reuse in earthworks of adjacent section.)
- Prepare cut formation as per Spec Cl 301.6 of MORTH.
- Such diversions should be maintained throughout their required duration including use of salvaged materials from the existing road where possible.
- Construct GSB and WMM layers to the design levels.
- Construct DBM complete half width (full width now complete)
- Construct AC wearing course from middle of the road.
- Adjust temporary delineation and signs ready for next stage.

**Stage IV**
- Regular traffic to single file flow properly controlled by signalmen when the AC wearing course is completed on the other side to complete the full width.
- Shoulders and side edges made good and finished during this stage.
- This stage with single file traffic flow should be limited to the shortest duration possible to minimize disruption to traffic flow.

(The Engineer may allow the full road width to be open for traffic after completion of DBM (Stage III) provided that wearing course operations follow without undue delay.)

Move to the next 500m and repeat the process. The bituminous paving works should be planned in conjunction with the staging of the road base works to give a continuity of operations in accordance with the contractor's production plans and production rates. The bituminous paving works must take place as soon as practicable.

During paving operations short stretches of alternating single file traffic may be permitted during off-peak times. Traffic control for single file traffic must meet the approval of the Engineer and be diligently controlled throughout its implementation.
Case 2: Proposed FRL up to 0.5 m above the existing RL (Refer to drawing TM-05)

Stage I
- Traffic running normally on the existing road.
- Construct the earthworks on one side only with proper benching into the existing embankment as appropriate. Finish to match level of the existing road.
- Install proper edge delineation and temporary road signs to suit next stage.

Stage II
- Diverter traffic on new partial construction and half width of existing road. Earth running surface to be kept watered periodically to control dust.
- Breakout half width of the existing road on the other side. Reuse salvaged materials elsewhere or dispose as appropriate.
- Prepare cut formation as per Spec CI 301.6 of MBRR, or as otherwise directed by the Engineer.
- Construct earthworks to the design levels including the use of salvaged materials from the existing road where possible.
- Construct GSB to the design levels.
- Adjust temporary delineation and signs ready for next stage.

Stage III
- Diverter traffic on the new GSB and work on the other side.
- Breakout remaining portion of the existing road (salvage materials for reuse in earthworks of adjacent section) and trim adjacent earthworks to the required level.
- Prepare cut formation as per Spec CI 301.6 of MBRR.
- Construct earthworks to the design levels including use of salvaged materials from the existing road where possible.
- Construct GSB and WWI layers to the design levels.
- Construct DBM complete half width. (or AC if approved by the Engineer)
- Adjust temporary delineation and signs ready for next stage.

Stage IV
- Diverter traffic on the new DBM and work on the other side.
- Prepare surface of GSB, repair any traffic damage.
- Construct WWI and DBM. (DBM now complete to full width)

Stage V
- Prepare traffic to single file flow properly controlled by signalmen while the AC wearing course is completed on each side to complete the full width.
- Shoulder and side slope made good and finished during this stage.
- This stage with single file traffic flow should be limited to the shortest duration possible to minimise disruption to traffic flow.

Case 3: Proposed FRL up to 1 m above the existing RL (Refer to drawing TM-05)

Stage I
- Traffic running normally on the existing road.
- Construct the earthworks on one side only with proper benching into the existing embankment as appropriate. Finish to match level of the existing road.
- Install proper edge delineation and temporary road signs to suit next stage.

Stage II
- Diverter traffic on new partial construction and half width of existing road. Earth running surface to be kept watered periodically to control dust.
- Breakout half width of the existing road on the other side. Reuse salvaged materials elsewhere or dispose as appropriate.
- Prepare cut formation as per Spec CI 301.6 or as otherwise directed by the Engineer.
- Construct earthworks to the design levels including the use of salvaged materials from the existing road where possible.
- Construct GSB to the design levels.
- Protect half-width construction edge with sandbags or other approved method.
- Adjust temporary delineation and signs ready for next stage.

Stage III
- Diverter traffic onto the new GSB and work on the other side.
- Breakout remaining portion of the existing road (salvage materials for reuse in earthworks of adjacent section) and trim adjacent earthworks to the required level.
- Prepare cut formation as per Spec CI 301.6 of MBRR.
- Construct earthworks to the design levels including use of salvaged materials from the existing road where possible.
- Construct GSB and WWI layers to the design levels.
- Construct DBM complete half width. (or AC if approved by the Engineer)
- Adjust temporary delineation and signs ready for next stage.

Stage IV
- Diverter traffic on the new DBM and work on the other side.
- Construct WWI and DBM. (DBM now complete to full width)

Stage V
- Prepare traffic to single file flow properly controlled by signalmen while the AC wearing course is completed on each side to complete the full width.
- Shoulder and side slope made good and finished during this stage.
- This stage with single file traffic flow should be limited to the shortest duration possible to minimise disruption to traffic flow.

For all the above construction scenarios there shall be a need for a considerable input into planning and implementing the different stages in a practical and safe manner. There shall correspondingly be a need for clear and explicit signage correctly positioned to give adequate warning and guidance to road users. The contractor shall pay particular attention to the control of dust during the trafficking of earth or granular surfaces and proper delineation of the edges of the trafficked way. Watering to control dust should be carried out at least three times per day. If the Contractor fails to control dust from the trafficking of earth or granular surfaces the Engineer will instruct the Contractor to apply a temporary bituminous surface treatment at the Contractor's cost. The Contractor is responsible for maintaining and making good any surface under trafficking to the approval of the Engineer and at no additional cost to the Employer.

The contractor may propose alternative traffic management systems provided that the concept of sectional completion and combined working sub-section is respected.

Other Traffic Management Considerations during Construction

During any particular stage of traffic management, the Contractor shall make sure that adjoining properties and access roads are not cut off unless there are visible alternatives available. Where required, the Contractor shall construct and maintain temporary access respecting all necessary safety requirements. Such access shall be properly signed and adjusted to suit the traffic management stage with proper and safe accessibility for pedestrians.

The Contractor must ensure his personnel are assigned for the purposes of traffic control and safety. These personnel must understand the importance of their role and have a proper awareness of the concept of safe traffic management. Such personnel should themselves be road users to understand safe traffic control procedures.

Safety Requirements

The importance of proper safety measures cannot be over-emphasised. It is the sole responsibility of the Contractor to implement and maintain all necessary safety measures during the course of the work. The Contractor shall be thoroughly familiar with the requirements of the MOST Specifications and the latest IRC codes, particularly IRC:SP:05-2001 concerning safety in road construction zones. The Engineer shall strictly monitor the Contractor's performance in the execution of his duties with respect to safety and The Engineer shall exercise his authority under the Contract to have any deficiencies remedied.

REFERENCE DRAWINGS

TYPICAL CROSS SECTIONS FOR TRAFFIC MANAGEMENT
CASE-1 DWG.NO. TM-03
TYPICAL CROSS SECTIONS FOR TRAFFIC MANAGEMENT
CASE-2 DWG.NO. TM-04
TYPICAL CROSS SECTIONS FOR TRAFFIC MANAGEMENT
CASE-3 DWG.NO. TM-05
TYPICAL PLAN FOR TRAFFIC MANAGEMENT
DWG.NO. TM-06
SEQUENCING DURING CONSTRUCTION
DWG.NO. TM-07
TYPICAL ARRANGEMENT OF TRAFFIC DIVERSION DEVICES
DWG.NO. TM-08
TYPICAL ARRANGEMENT OF TRAFFIC DIVERSION AT NEW CULVERT
DWG.NO. TM-09
NOTES:
1. A QUALIFIED PERSONNEL AT LEAST AVERAGE INTELLIGENCE, BE MENTALLY ALERT AND GOOD IN PHYSICAL CONDITION BE SELECTED.
2. FLAGMEN SHOULD BE EQUIPPED WITH YELLOW REFLECTIVE STRIPE PADDED ARM AND LEGS, REFLECTIVE VESTS AND HATS WITH RED SLOW PADDLES AND LIGHTS ARE USED IN CONTROLLING TRAFFIC THROUGH WORK AREA.

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED
2. CONTRACTOR SHALL SUBMIT DIVERSION PLAN FOR SUPERVISORY APPROVAL PRIOR TO CONSTRUCTION
3. CONTRACTOR SHALL MAINTAIN DIVISION THROUGHOUT UNTIL THE CONSTRUCTION IS COMPLETE
4. CONTRACTOR IS RESPONSIBLE FOR THE SECURITY OF THE SIGNS AND REMOVAL
5. PROVIDE NECESSARY SAFETY SIGNS AND SIGNS WITH CAUTION MARKS OF HIGH QUALITY PVC TAPE TAPE TAPE TYPE TO ENSURE CONSTRUCTION AREA
6. TYPE OF RUMBLE STRIP WILL DEPEND ON ROAD SURFACE IF SURFACE IS BLACK TOP-BITUMINOUS, IF 0.56-0.600
7. USE TWO ROWS OF RUMBLE STRIP WHEN CONSTRUCTION ZONE IS DANGEROUS ON BOTH EDGES OF WORKABLE AREA

SIGN & DELINATIONS INVENTORY AT 2 LANE

- 1. SPEED LIMIT SIGN 2 NO.
- 2. MEN AT WORK SIGN & BOARD 2 NO.
- 3. Dimensions board & sign 2 NO.
- 4. Traffic cones 5.0m C/C
- 5. Keep right 3 NO.
- 6. Steel portable barricade 5.0m C/C
- 7. Single file traffic 2 NO.
- 8. Traffic control area 2 NO.

SUB-SECTION UNDER CONSTRUCTION

2 LANE
SIGN & DELINEATORS INVENTORY

- MEN AT WORK SIGN & BOARD: 2 NOS.
- MEN AT WORK SIGN & BOARD: 2 NOS.
- DIVERSION BOARD: 2 NOS.
- OVERTAKING PROHIBITED SIGN: 2 NOS.
- CURVE SIGN: 2 NOS.
- DIVERSION BOARD & SIGN: 2 NOS.
- ROAD CLOSED BOARD: 2 NOS.
- HAZARD MARKER: 4 NOS.
- TRAFFIC CONES: 5.0m C/C
- STEEL PORTABLE BARRICADE: 5.0m C/C

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. CONTRACTOR SHALL SUBMIT DIVERSION PLAN FOR ENGINEER'S APPROVAL PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL MAINTAIN DIVERSION THROUGHOUT THE CONSTRUCTION PERIOD.
4. CONTRACTOR IS RESPONSIBLE FOR THE SECURITY OF THE DIVERSION AND MARKINGS.
5. PROVIDE BARREN/FATIGUE SIGNS OF HIGH QUALITY PEELING TYPE TO EXCLUDE CONSTRUCTION AREA.
6. USE THE POINTS OF DIVERSION LIMITING WITHIN CONSTRUCTION ZONE DURING BREAKS OR BOTH

SIVA KUNDU – DHAASA ROAD SH 01 & 238 ROAD MAINTENANCE PROGRAMME

DEPUTY EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

EXECUTIVE ENGINEER
STATE ROAD PROJECT DIVISION
RAJKOT

STATE ROAD PROJECT DIVISION
RAJKOT

GOVERNMENT OF GUJARAT
ROADS AND BUILDINGS DEPARTMENT