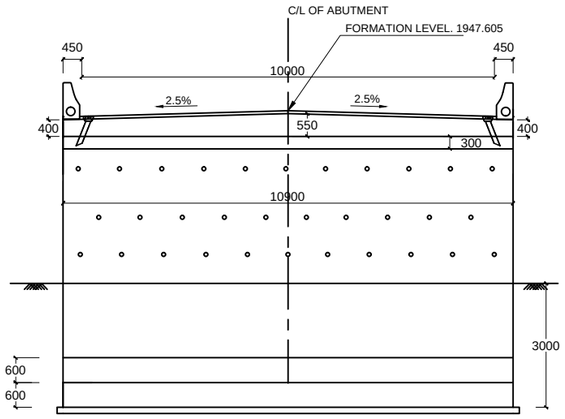
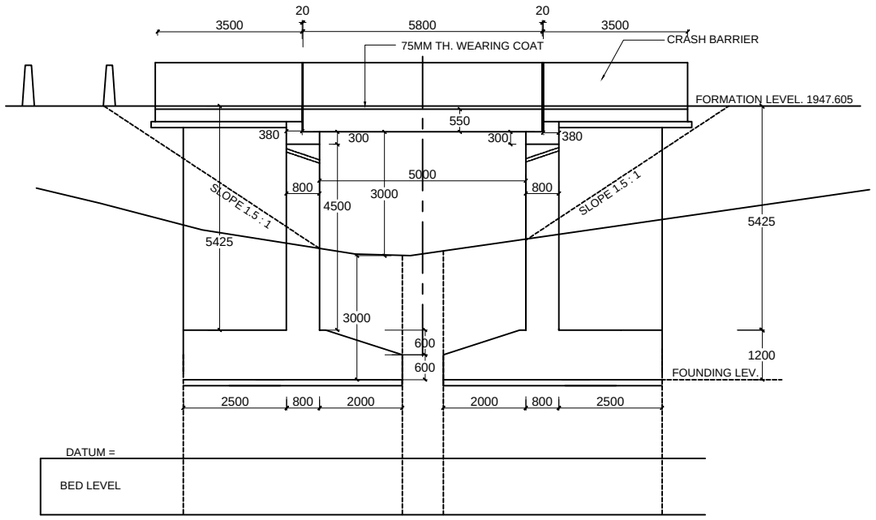
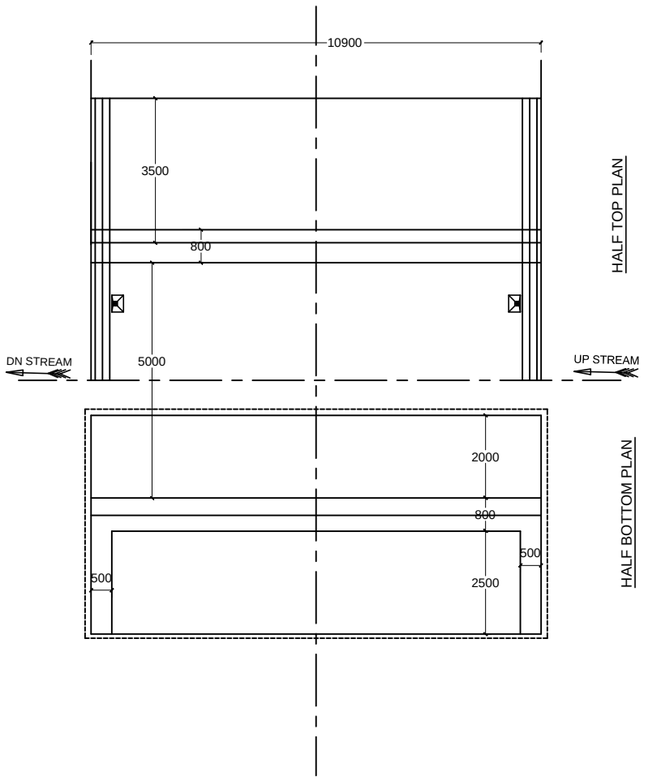


CROSS SECTION
(AT ABUTMENT)

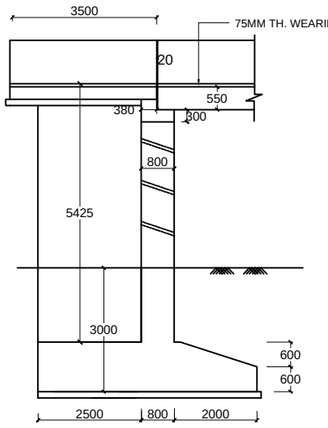


LONGITUDINAL SECTION



HALF TOP PLAN

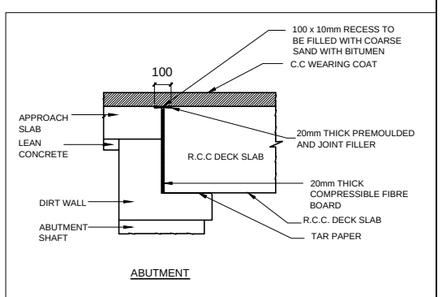
HALF BOTTOM PLAN



DETAIL OF ABUTMENT

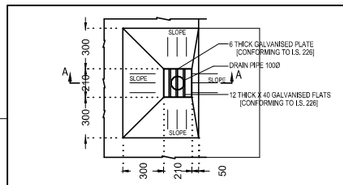
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

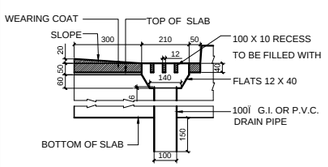


ABUTMENT

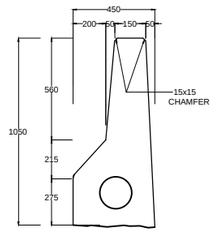
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT i OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET, THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP. TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVTMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

GENERAL ARRANGEMENT DRAWING
1 X 5.0 M SPAN FOR CATTLE CROSSING

(NEW CONSTRUCTION)

CONSULTANT :-

S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

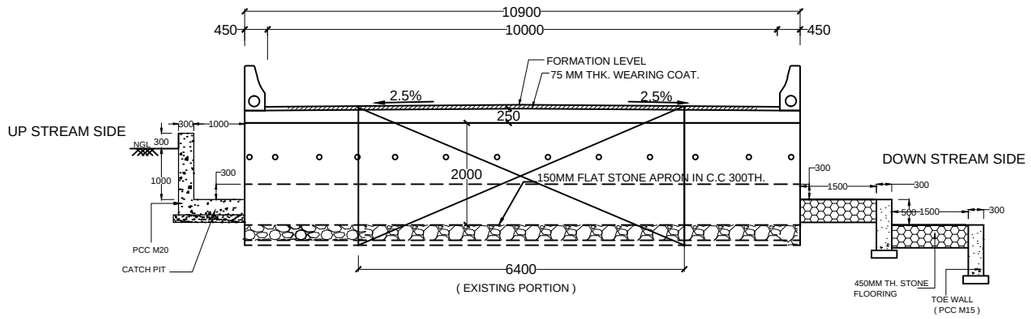
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE
DEC. - 2017

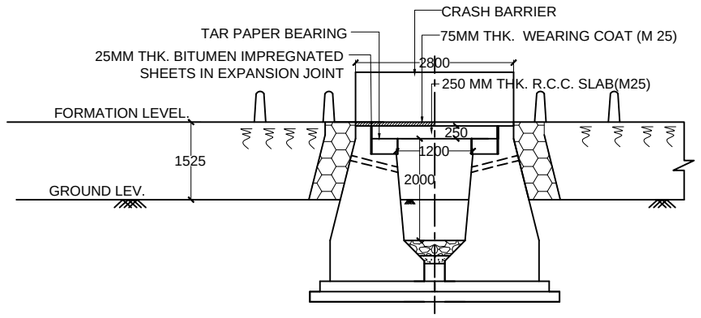
DRG. NO.
SMC/UKHRUL/SLAB -07

TYPICAL

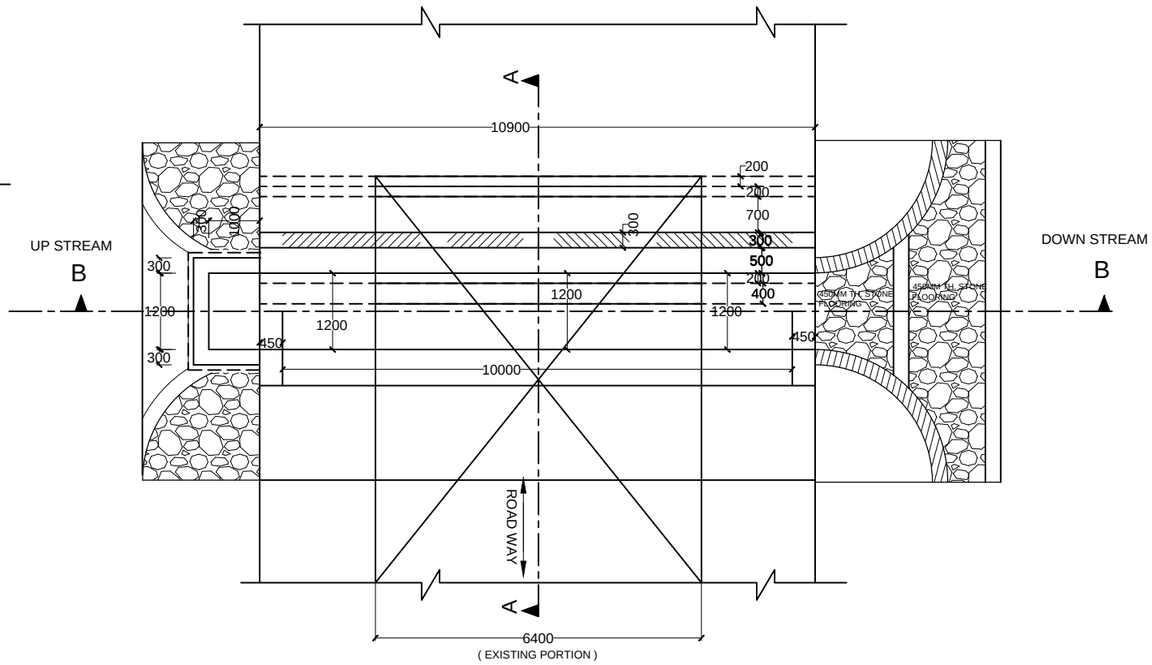
NOTE:- ALL DIMENSION ARE IN MM



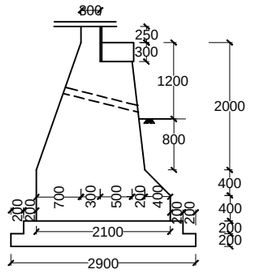
LONGITUDINAL SECTION AT B-B



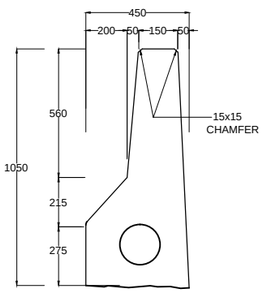
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

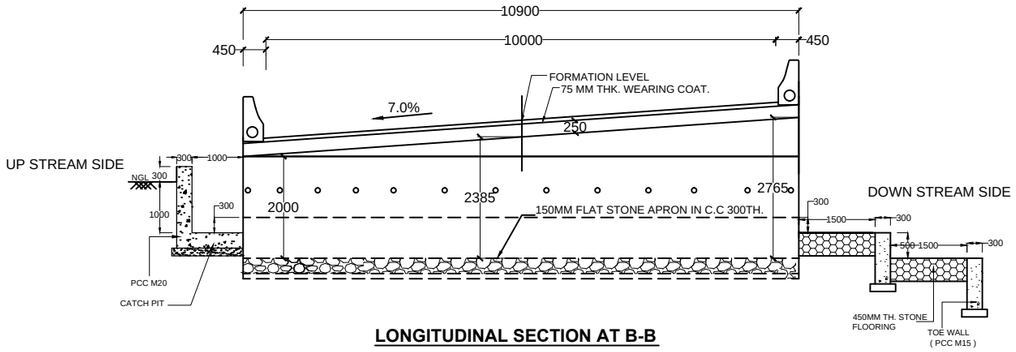
ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.2M SPAN ,1.2 HT). (SHOWING CATCH PIT & CASCADING) WIDENING BOTH SIDES	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com

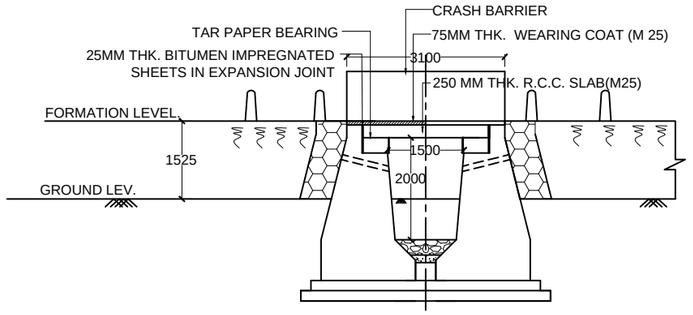
Scale:- 1:100	Drn. by	JYOTI	DATE: NOV. – 2017
	Chkd. by	SARMISTHA	
	Aprvd. by		DRG. NO. SMC/UKHRUL/SLAB –09

TYPICAL

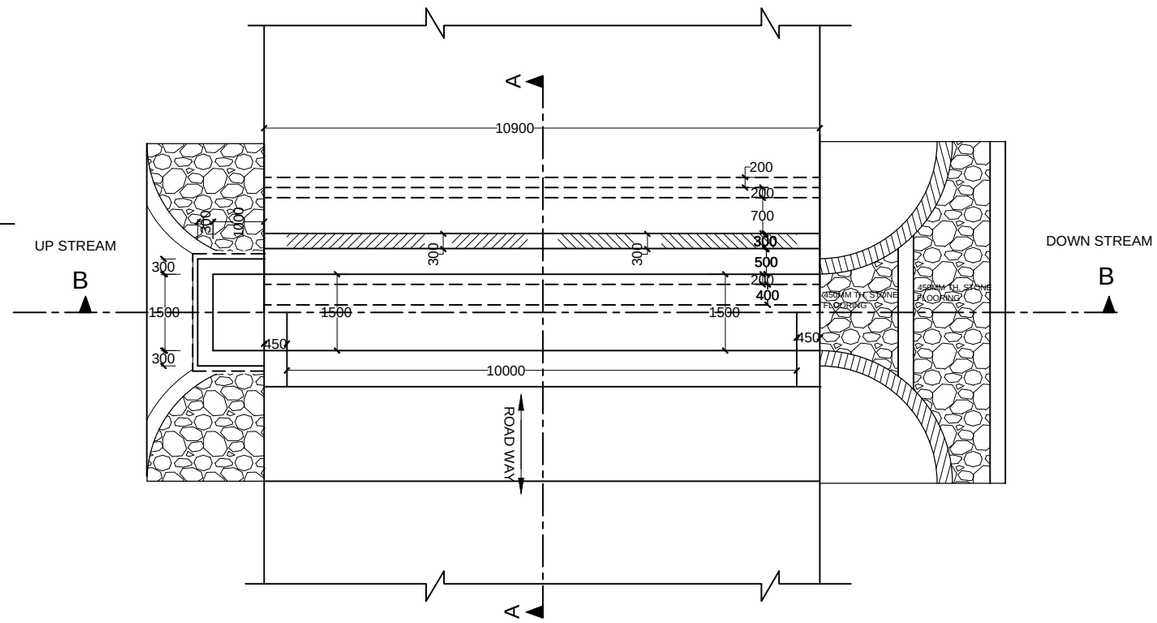
NOTE:- ALL DIMENSION ARE IN MM



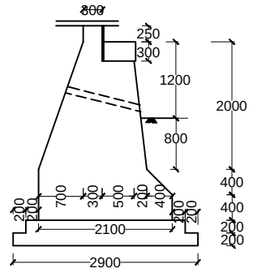
LONGITUDINAL SECTION AT B-B



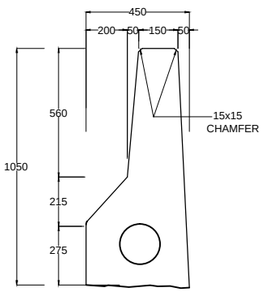
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

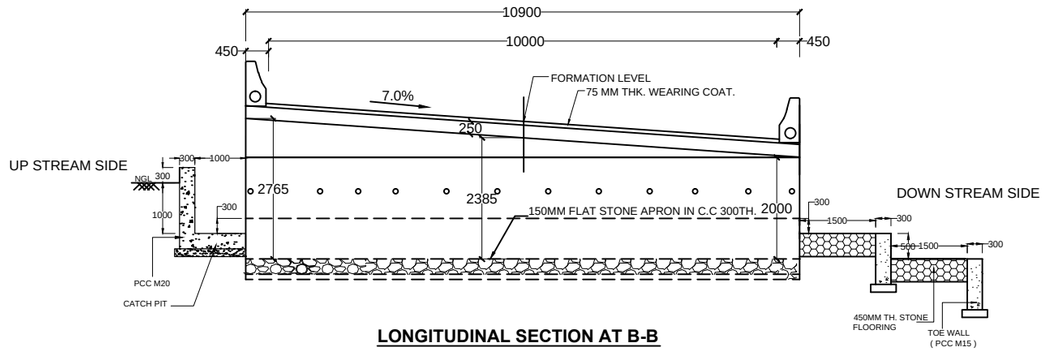
ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.5M SPAN ,1.2 HT). (SHOWING CATCH PIT & CASCADING) NEW CONSTRUCTION (FOR L.H.S CURVE ALIGNMENT)	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com

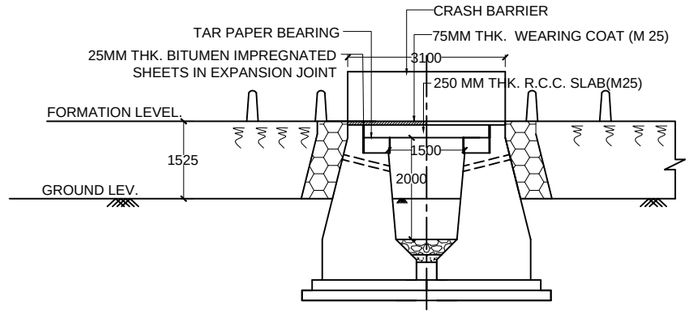
Scale:- 1:100	Drn. by	JYOTI	DATE: NOV. – 2017
	Chkd. by	SARMISTHA	
	Aprvd. by		DRG. NO. SMC/UKHRUL/SLAB –27

TYPICAL

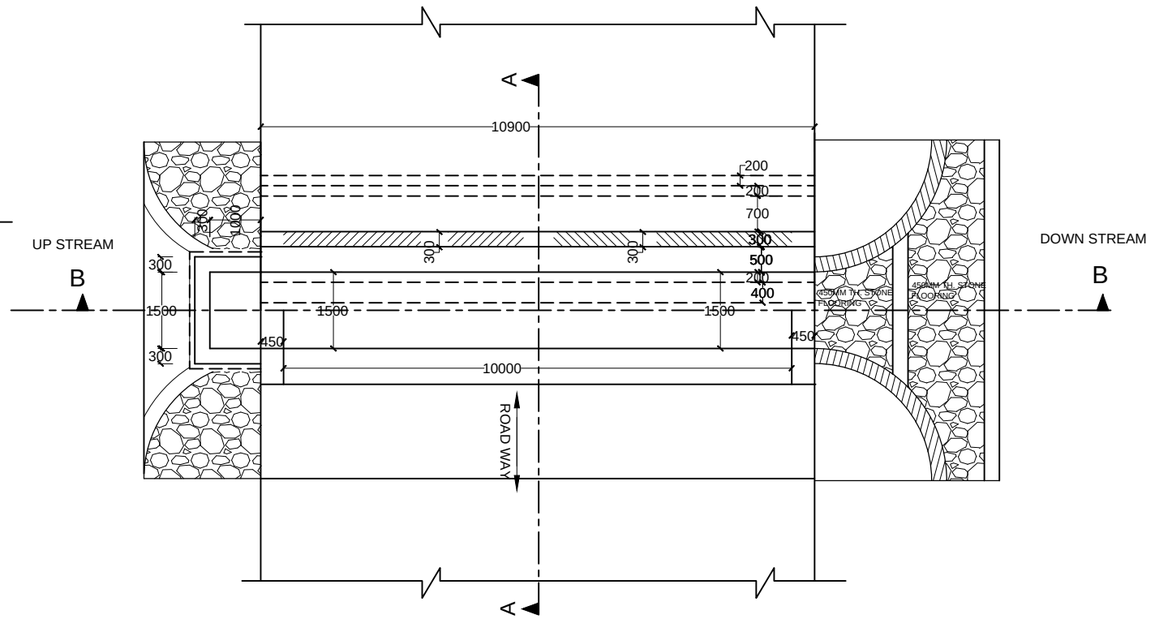
NOTE:- ALL DIMENSION ARE IN MM



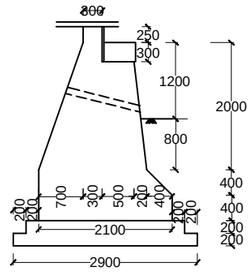
LONGITUDINAL SECTION AT B-B



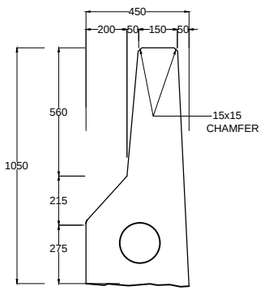
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.5M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING) NEW CONSTRUCTION (FOR R.H.S CURVE ALIGNMENT)

CONSULTANT :-

S.M. CONSULTANTS
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Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

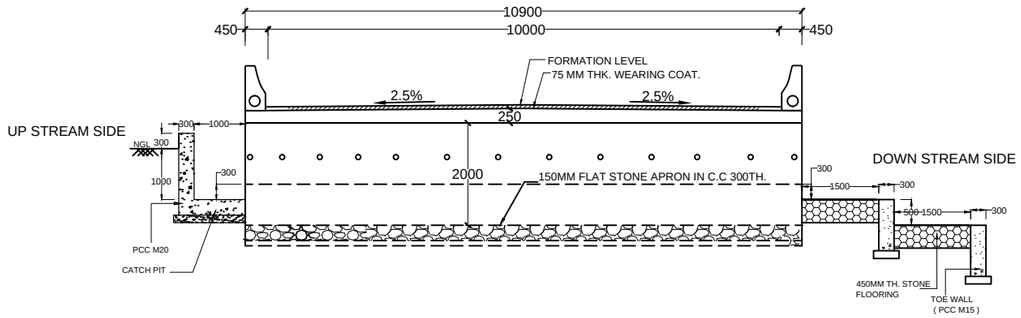
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. - 2017

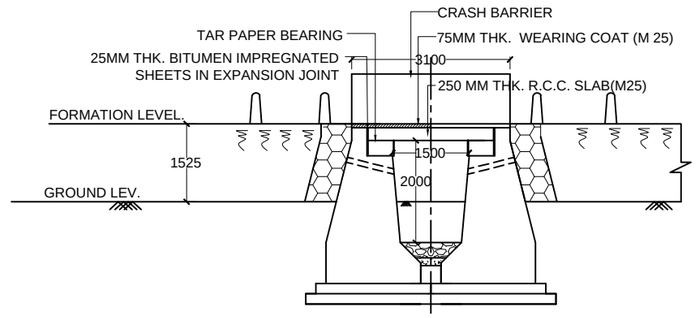
DRG. NO.: SMC/UKHRUL/SLAB -30

TYPICAL

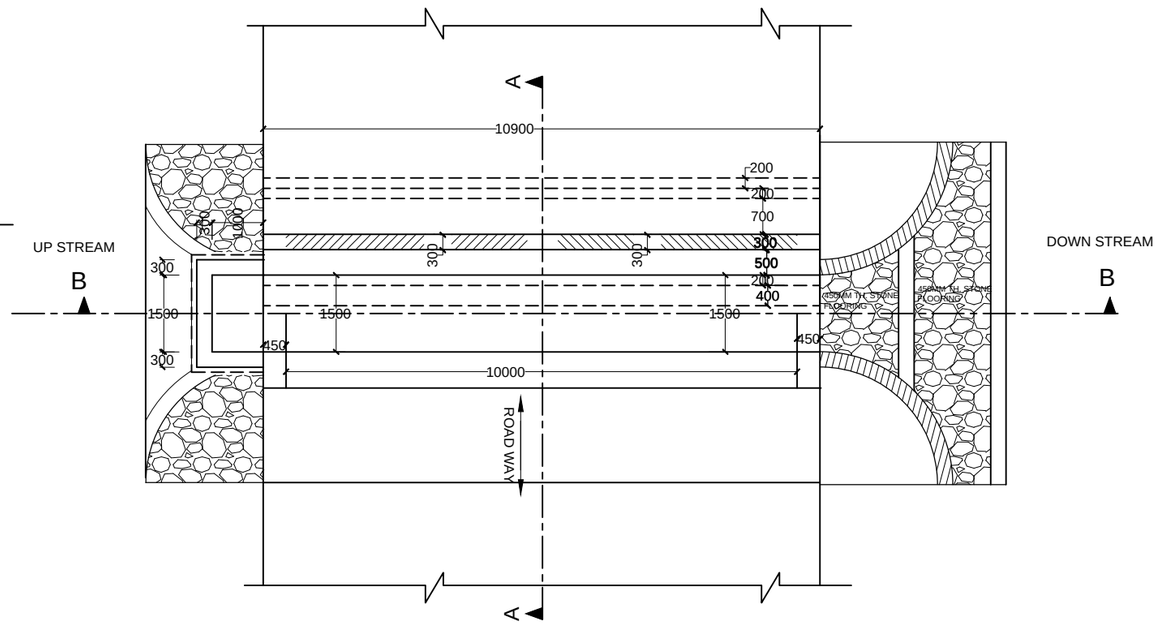
NOTE:- ALL DIMENSION ARE IN MM



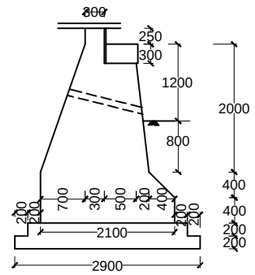
LONGITUDINAL SECTION AT B-B



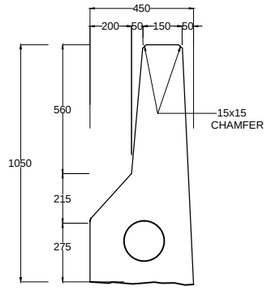
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.5M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

NEW CONSTRUCTION

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

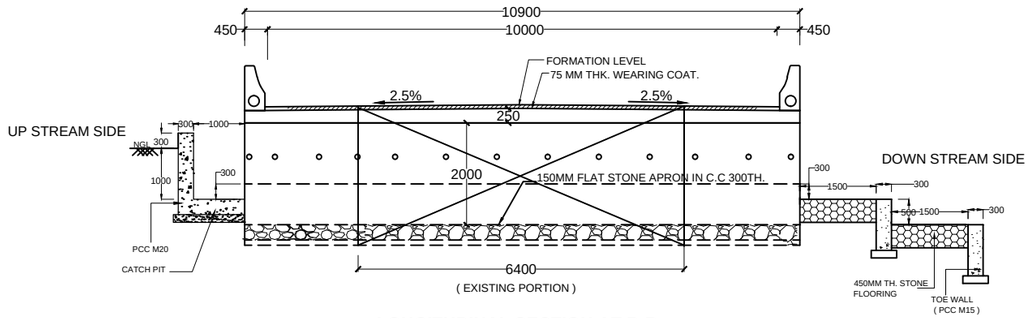
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. – 2017

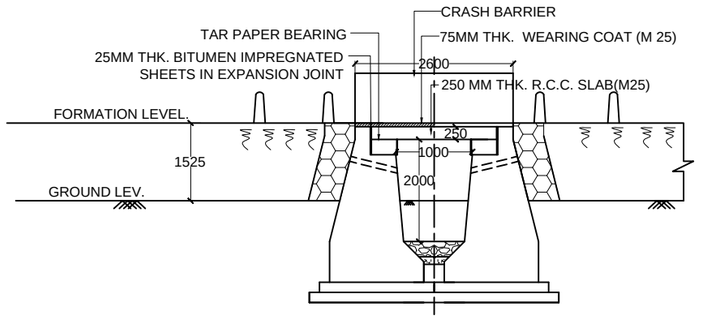
DRG. NO.: SMC/UKHRUL/SLAB –24

NOTE:- ALL DIMENSION ARE IN MM

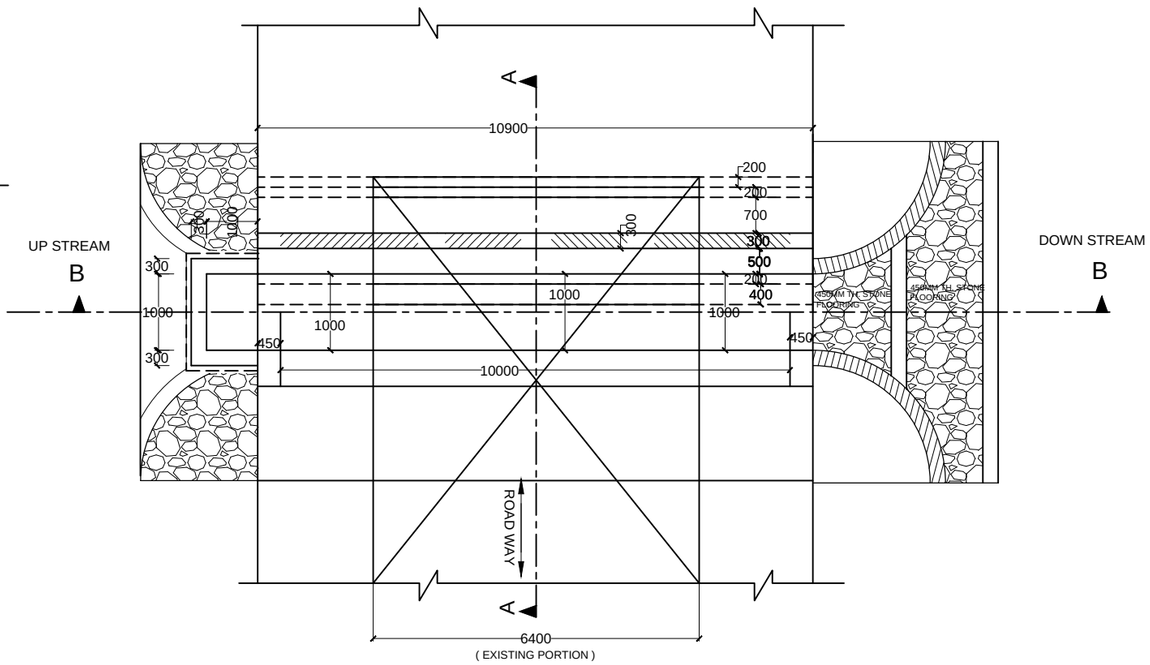
TYPICAL



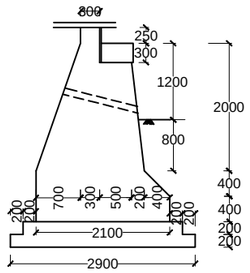
LONGITUDINAL SECTION AT B-B



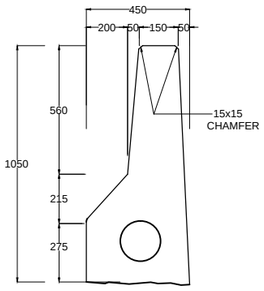
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.0M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

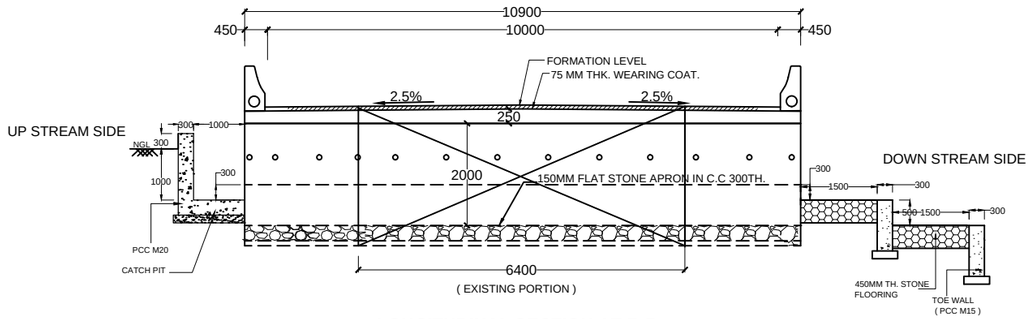
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. – 2017

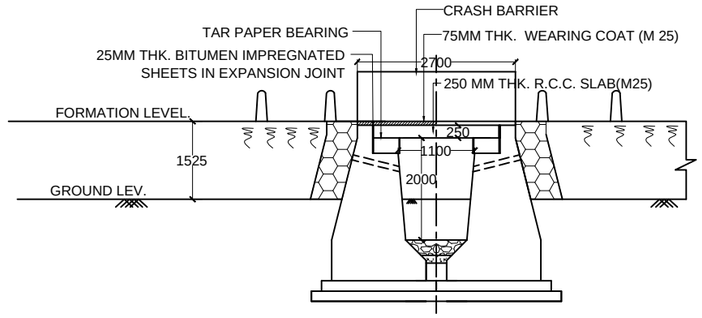
DRG. NO.: SMC/UKHRUL/SLAB –3

NOTE:- ALL DIMENSION ARE IN MM

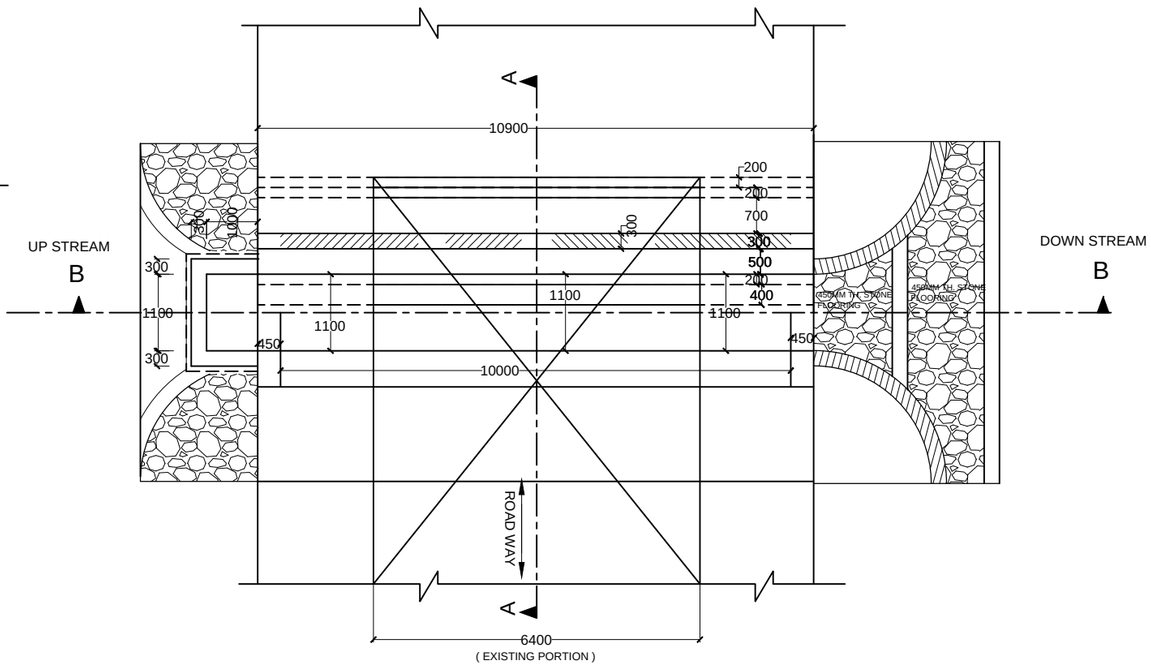
TYPICAL



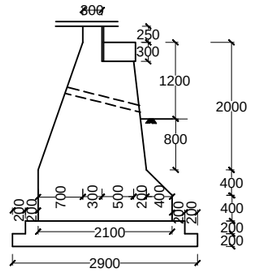
LONGITUDINAL SECTION AT B-B



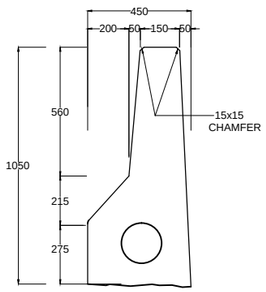
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.1M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

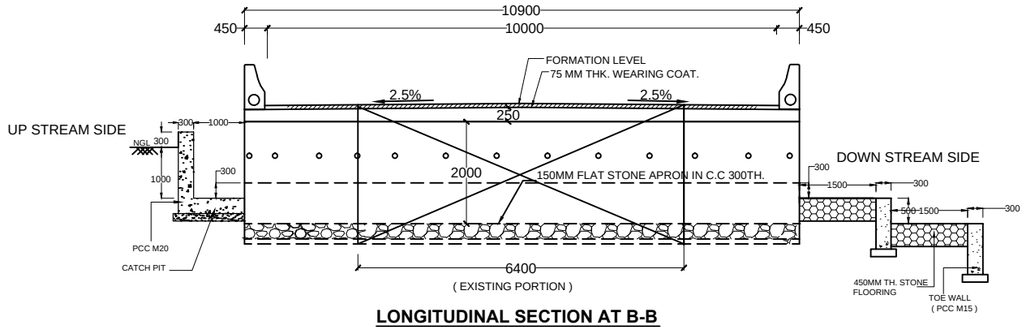
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. – 2017

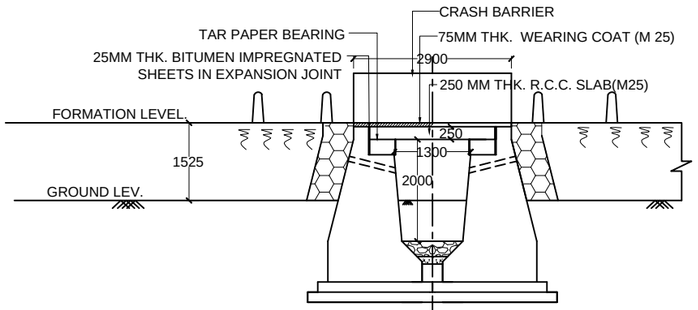
DRG. NO.: SMC/UKHRUL/SLAB –06

NOTE:- ALL DIMENSION ARE IN MM

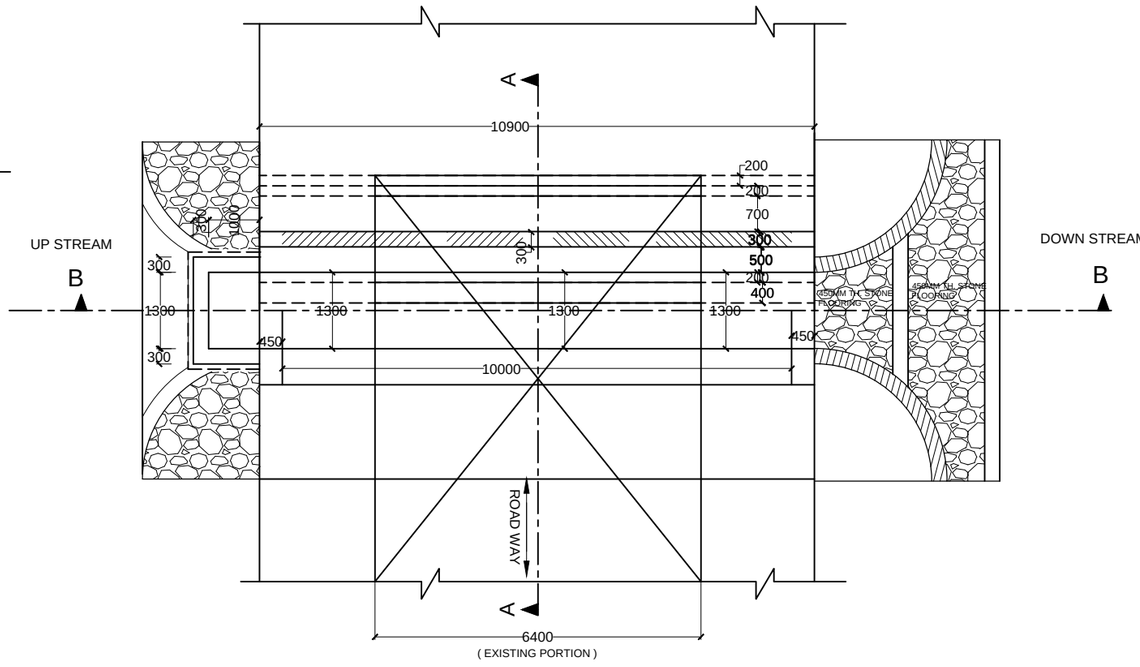
TYPICAL



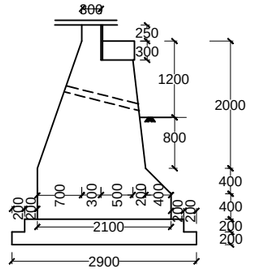
LONGITUDINAL SECTION AT B-B



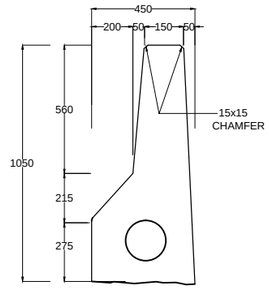
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.3M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

Web : http / www.smcindia.com ,e-mail : support@smcindia.com

Scale:- 1:100

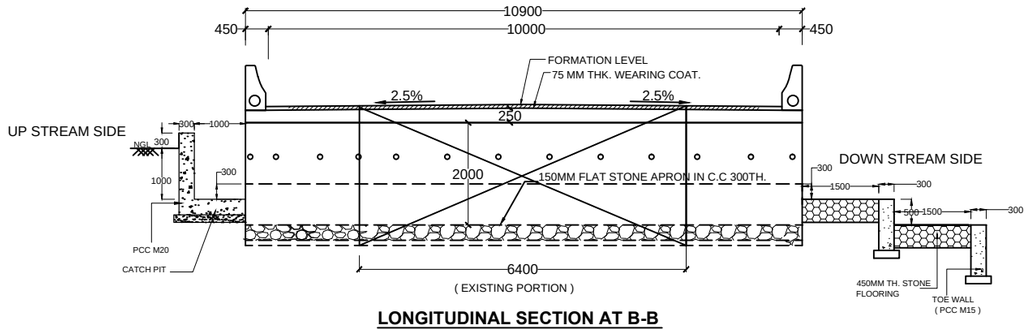
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. – 2017

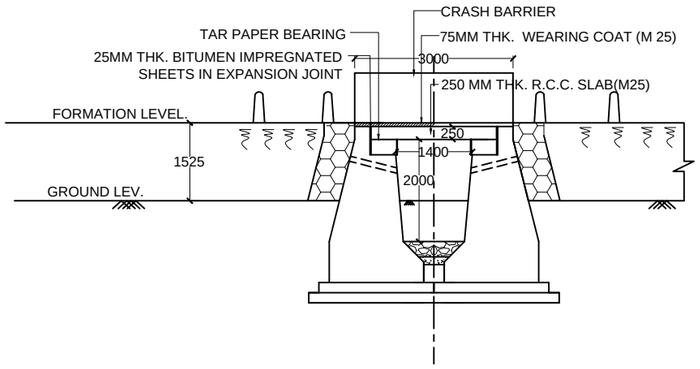
DRG. NO.: SMC/UKHRUL/SLAB –12

NOTE:- ALL DIMENSION ARE IN MM

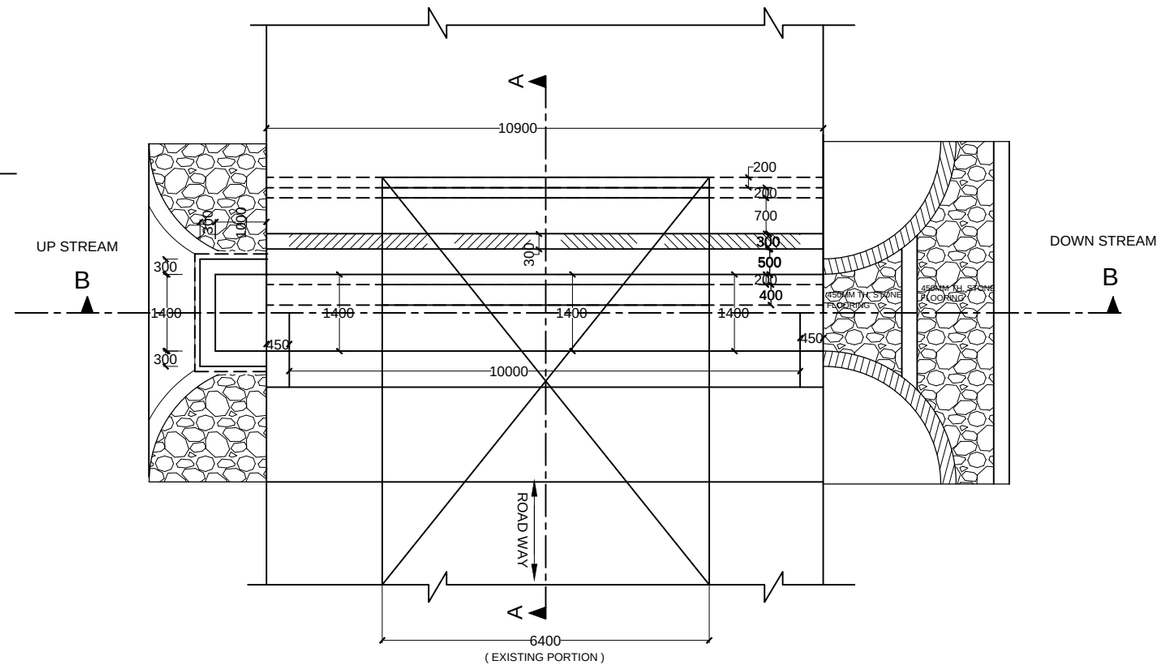
TYPICAL



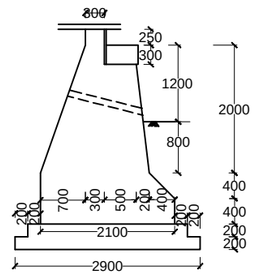
LONGITUDINAL SECTION AT B-B



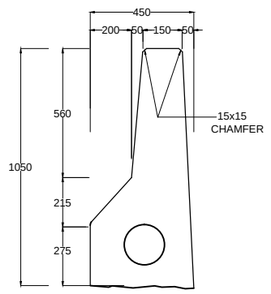
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.4M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

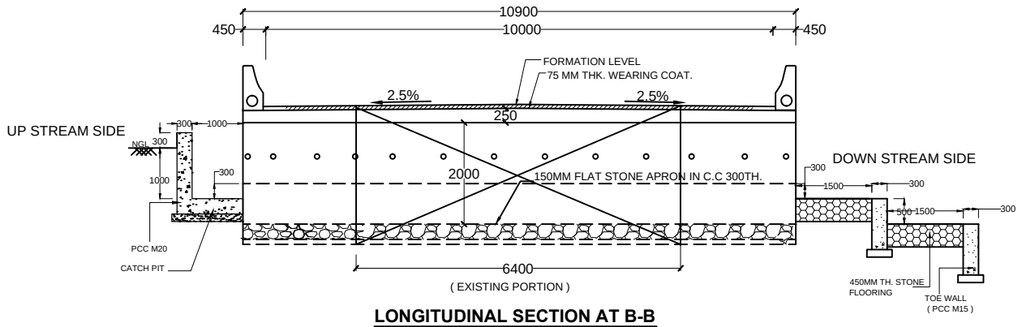
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. - 2017

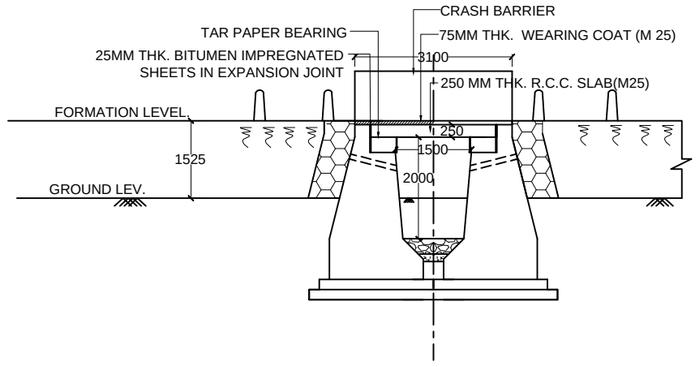
DRG. NO.: SMC/UKHRUL/SLAB -15

NOTE:- ALL DIMENSION ARE IN MM

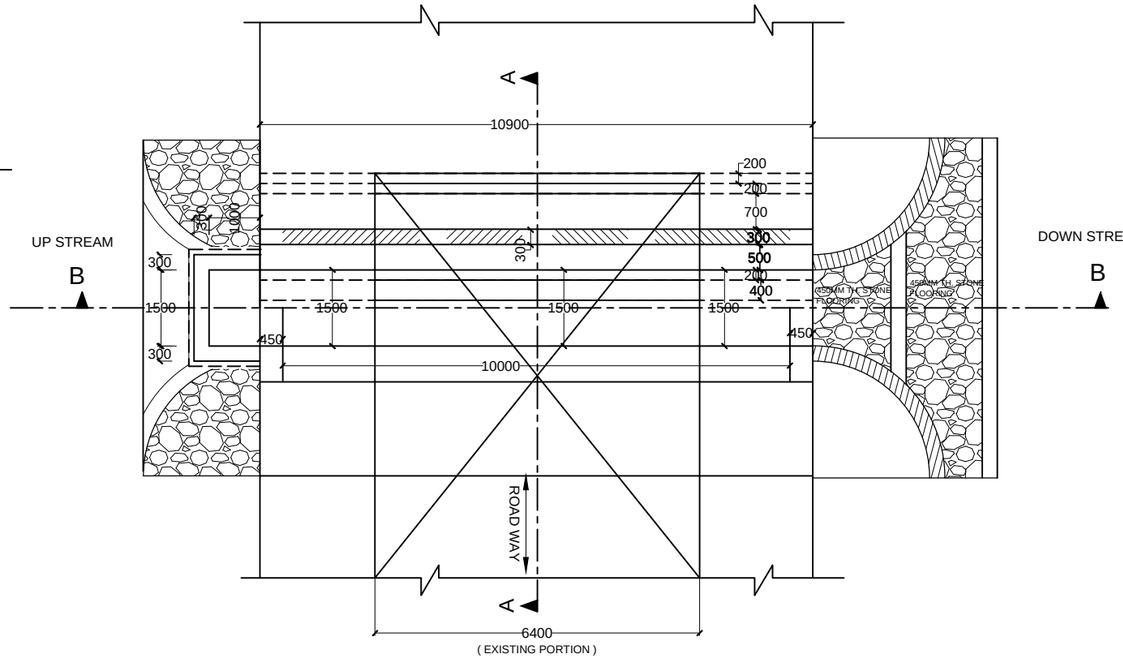
TYPICAL



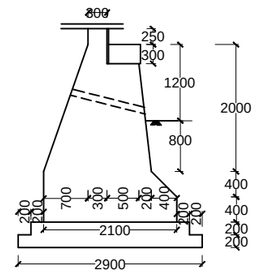
LONGITUDINAL SECTION AT B-B



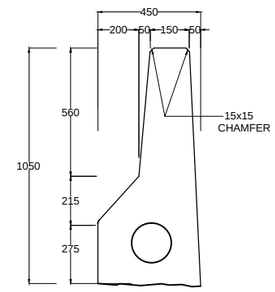
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(1.5M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

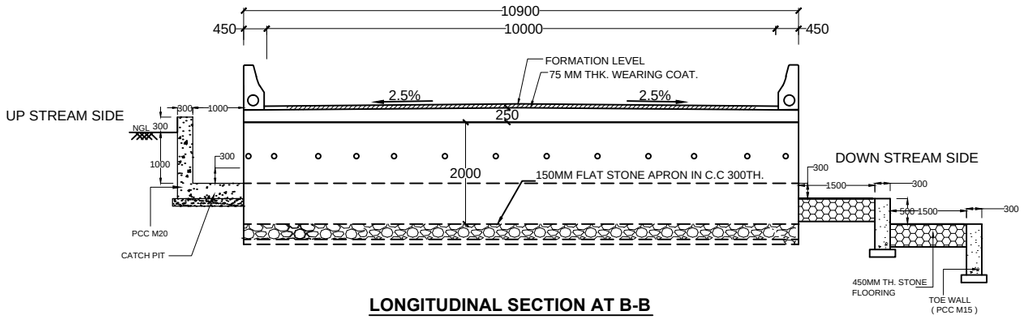
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

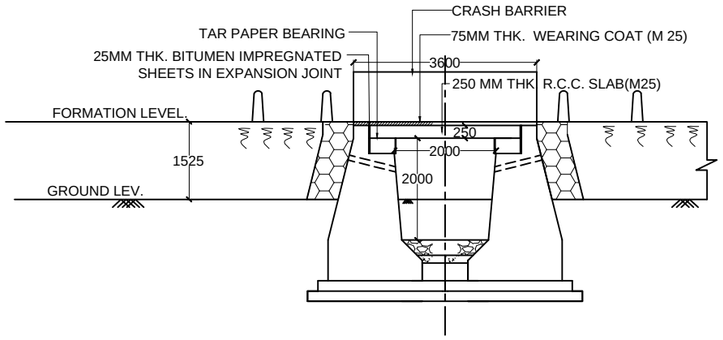
Drn. by	JYOTI	DATE: NOV. – 2017
Chkd. by	SARMISTHA	
Aprvd. by		DRG. NO.: SMC/UKHRUL/SLAB –18

TYPICAL

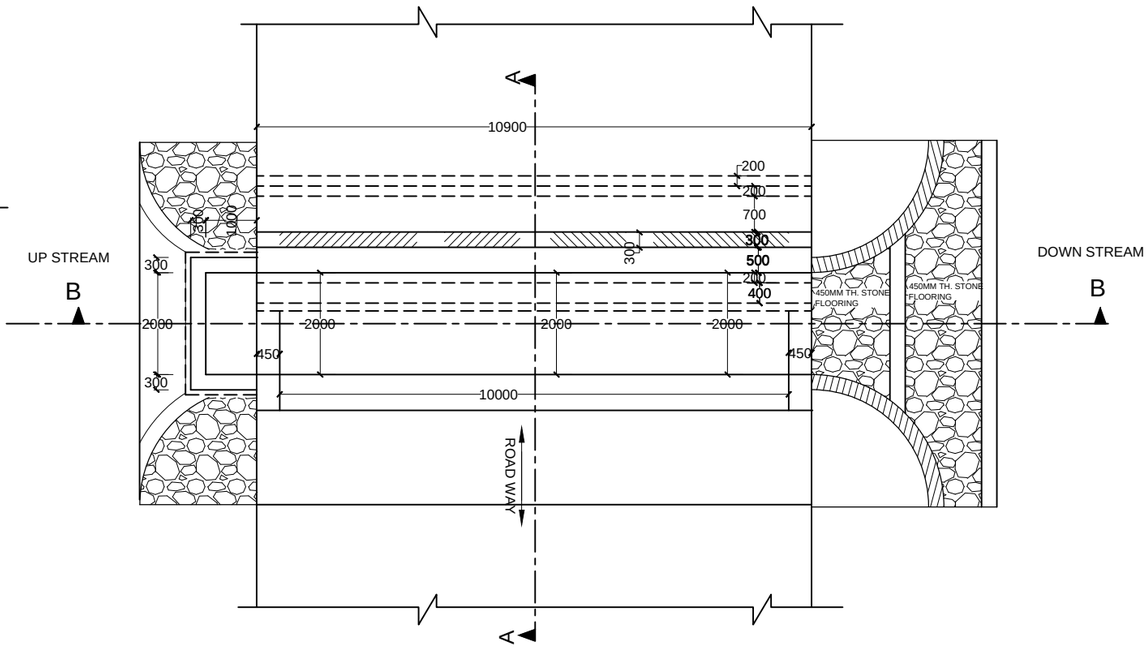
NOTE:- ALL DIMENSION ARE IN MM



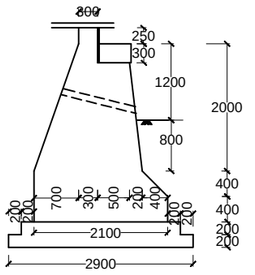
LONGITUDINAL SECTION AT B-B



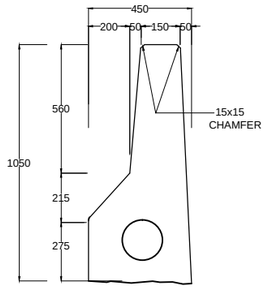
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(2.0M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

NEW CONSTRUCTION

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

Web : http / www.smcindia.com ,e-mail : support@smcindia.com

Scale:- 1:100

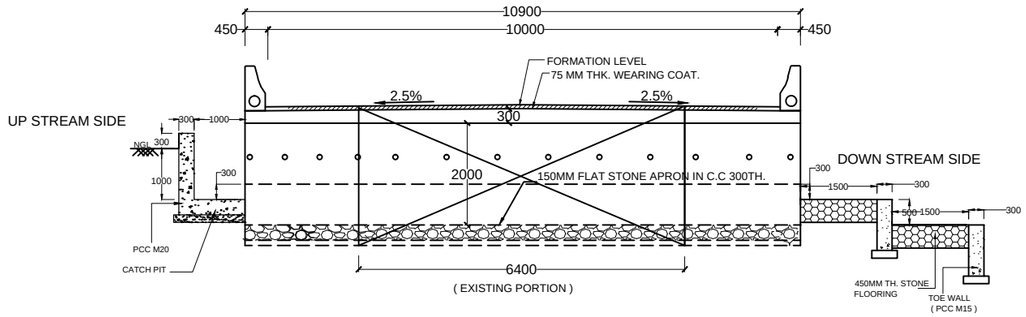
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. - 2017

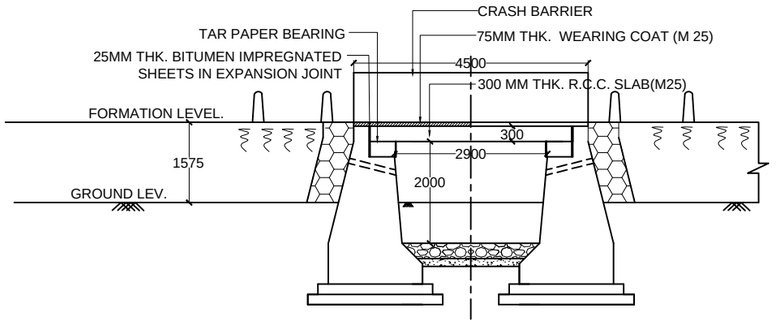
DRG. NO.: SMC/UKHRUL/SLAB -33

TYPICAL

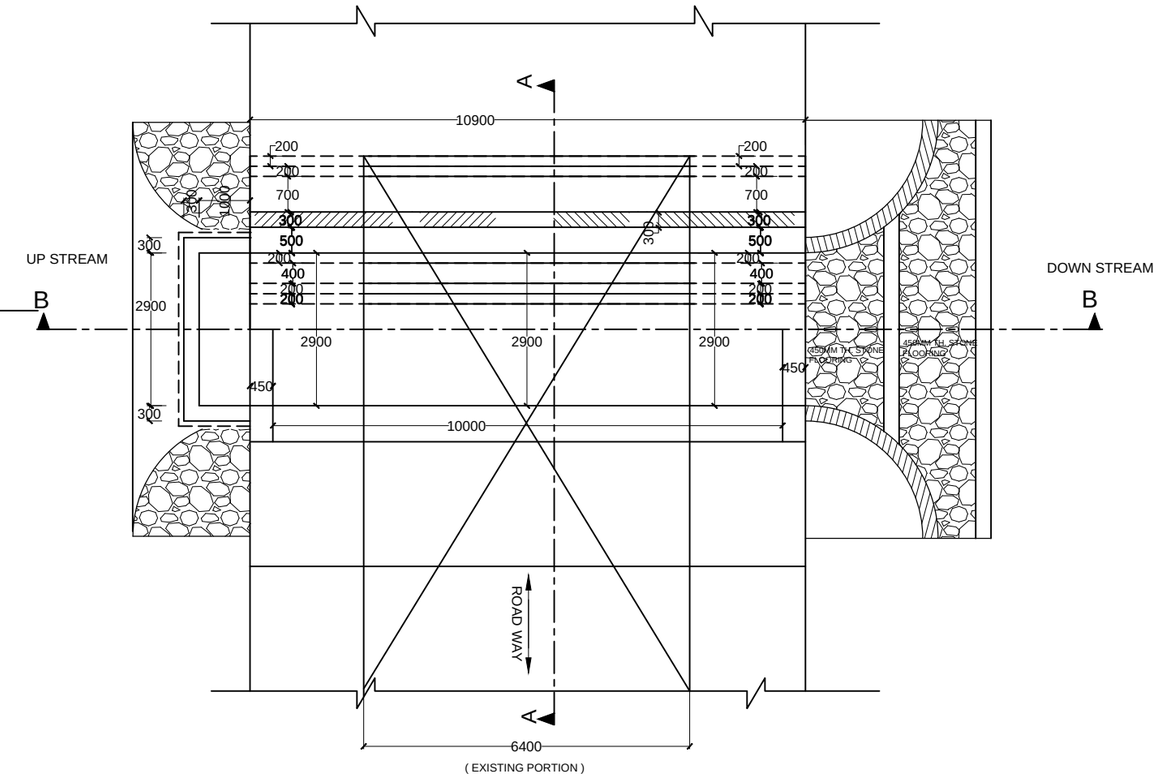
NOTE:- ALL DIMENSION ARE IN MM



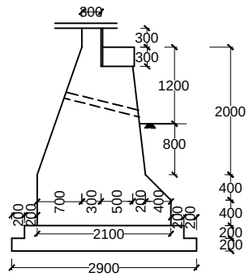
LONGITUDINAL SECTION AT B-B



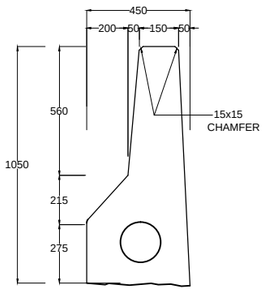
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

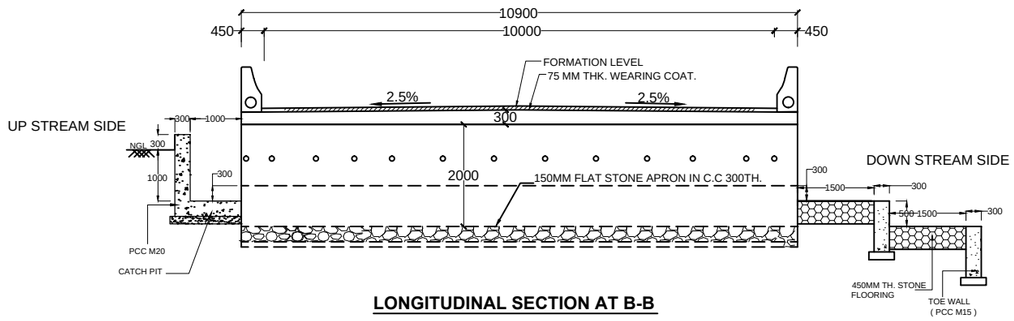
GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

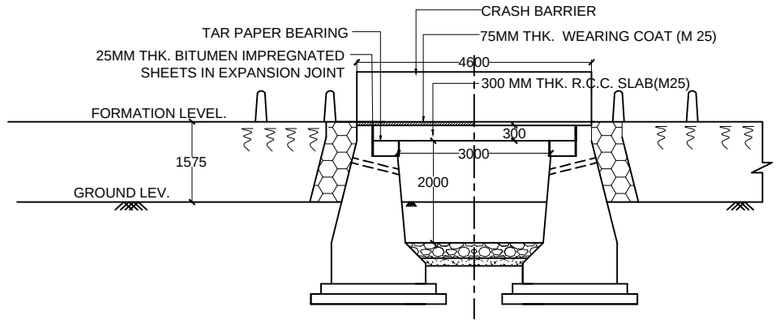
CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith Earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(2.9M SPAN ,1.2 HT). (SHOWING CATCH PIT & CASCADING) WIDENING BOTH SIDES	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com	Scale:- 1:100	Drn. by JYOTI; Chkd. by SARMISTHA; Aprvd. by; DATE NOV. - 2017; DRG. NO. SMC/UKHRUL/SLAB -1

TYPICAL

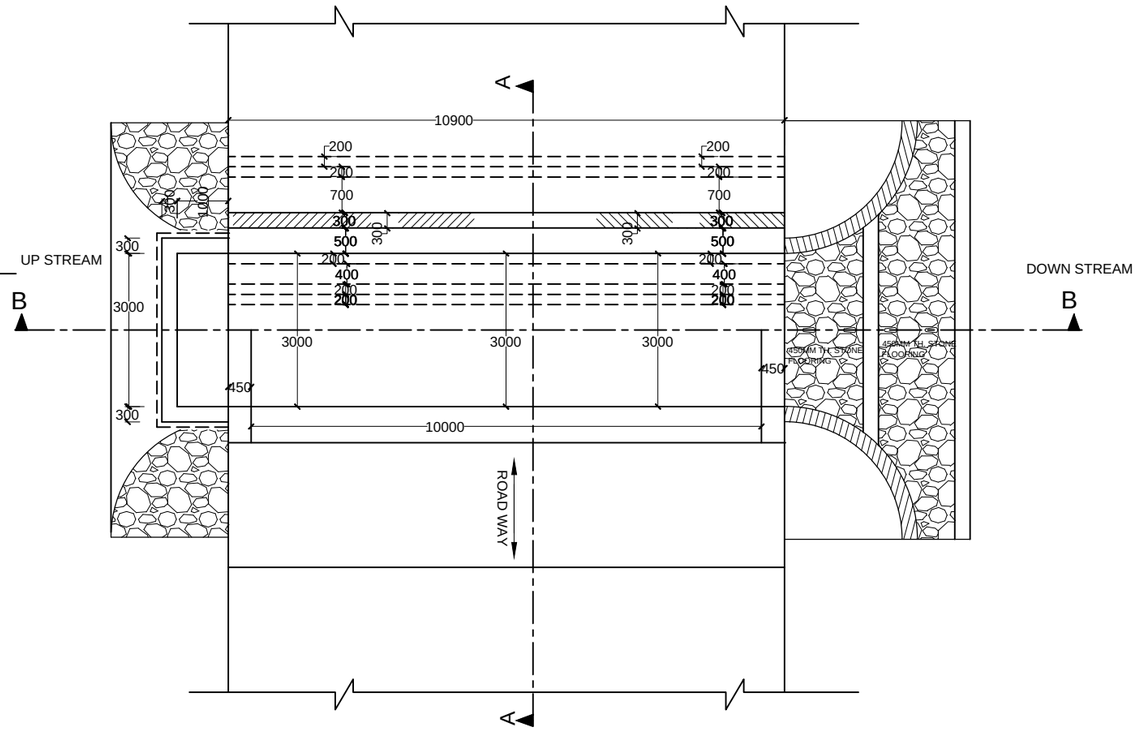
NOTE:- ALL DIMENSION ARE IN MM



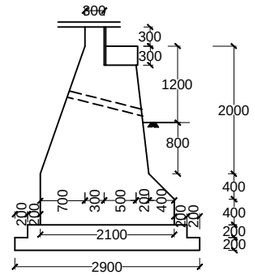
LONGITUDINAL SECTION AT B-B



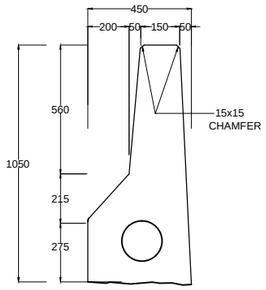
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

PLAN,ELEVATION & SECTION OF SLAB CULVERT(3.0M SPAN ,1.2 HT).

(SHOWING CATCH PIT & CASCADING)

NEW CONSTRUCTION

CONSULTANT :-

S.M. CONSULTANTS

An ISO 9001 Company

Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi

Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

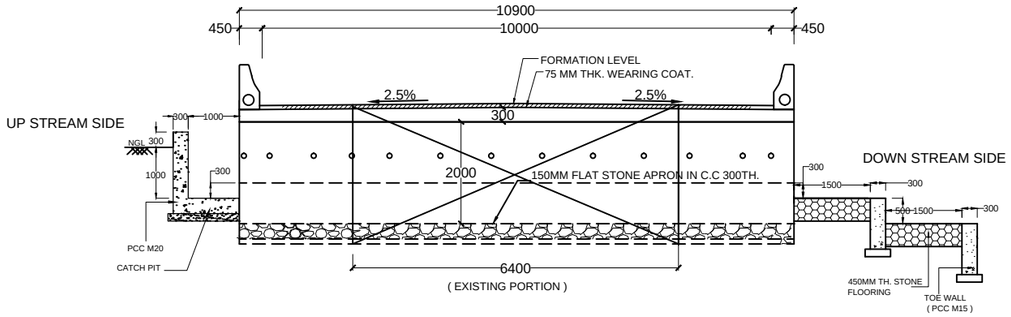
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. – 2017

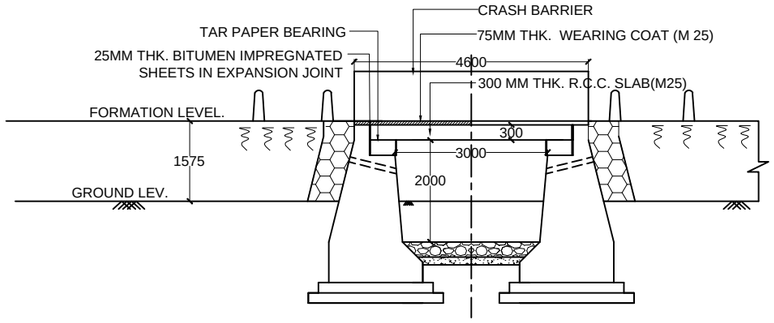
DRG. NO.: SMC/UKHRUL/SLAB –35

TYPICAL

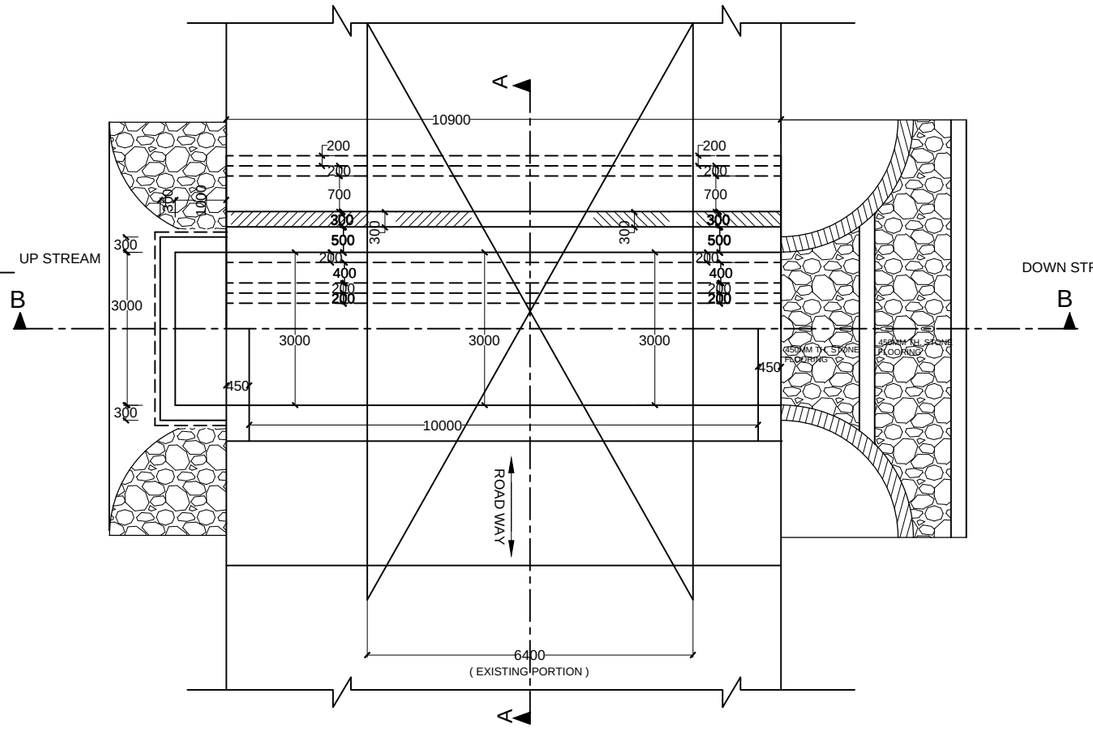
NOTE:- ALL DIMENSION ARE IN MM



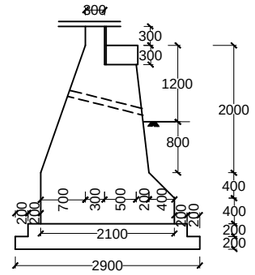
LONGITUDINAL SECTION AT B-B



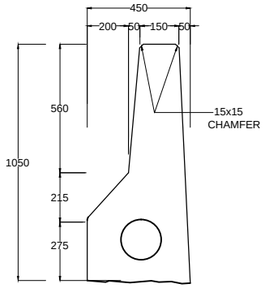
SECTIONAL ELEVATION



HALF TOP & HALF BOTTOM PLAN



DETAILS OF ABUTMENT



DETAIL OF CRASH BARRIER

GRADE OF CONCRETE

ABUTMENT (PCC)	M 20
CATCH PIT (PCC)	M 20

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

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TITLE: PLAN,ELEVATION & SECTION OF SLAB CULVERT(3.0M SPAN ,1.2 HT). (SHOWING CATCH PIT & CASCADING) WIDENING BOTH SIDES

CONSULTANT :-

S.M. CONSULTANTS
An ISO 9001 Company
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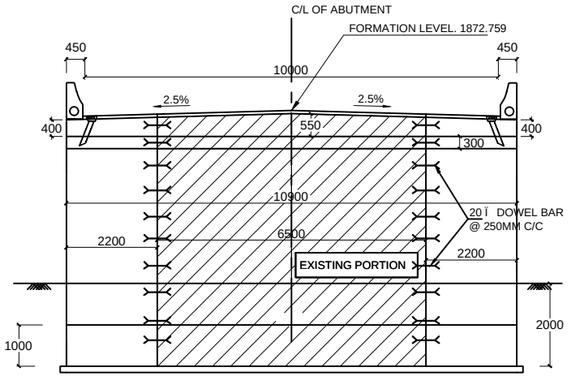
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

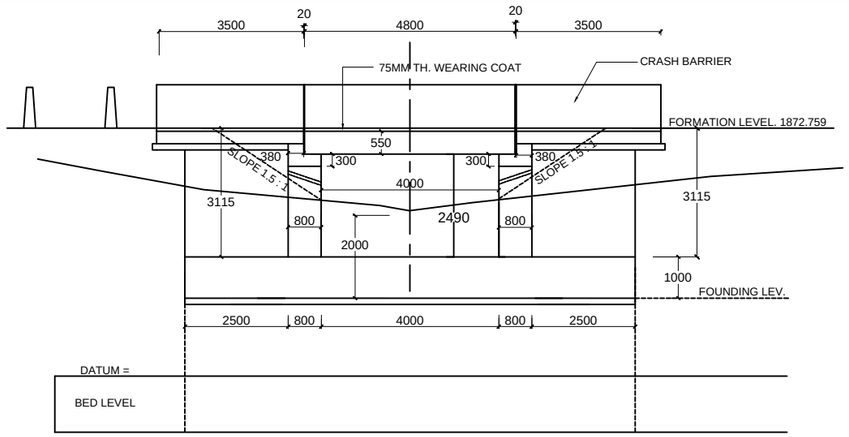
Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE: NOV. - 2017

DRG. NO.: SMC/UKHRUL/SLAB -21



CROSS SECTION
(AT ABUTMENT)



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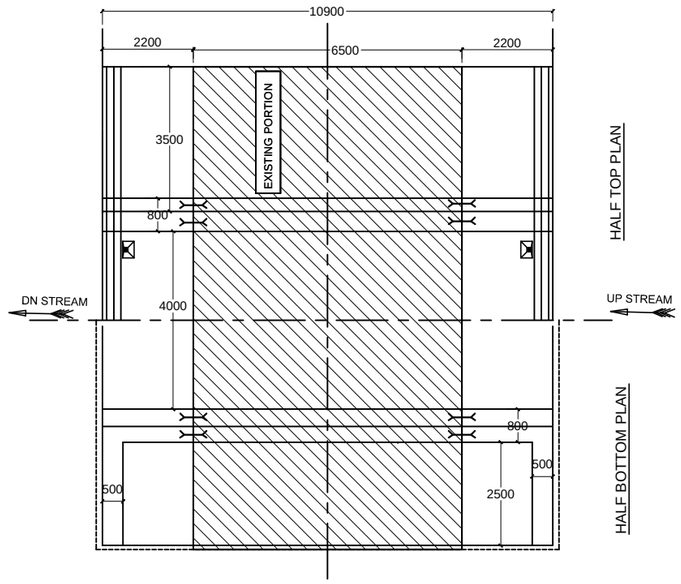
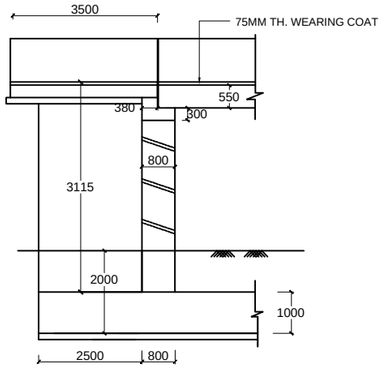
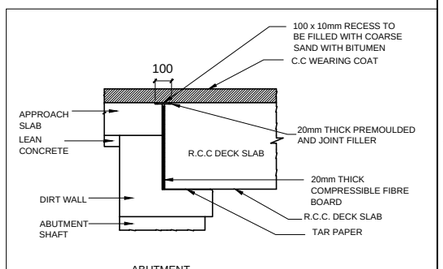




DETAIL OF ABUTMENT

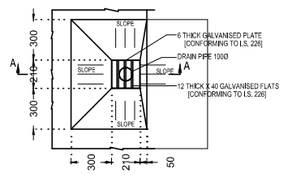
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

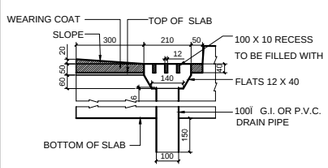


ABUTMENT

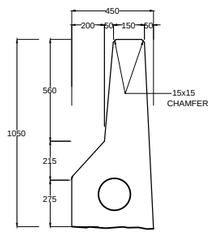
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

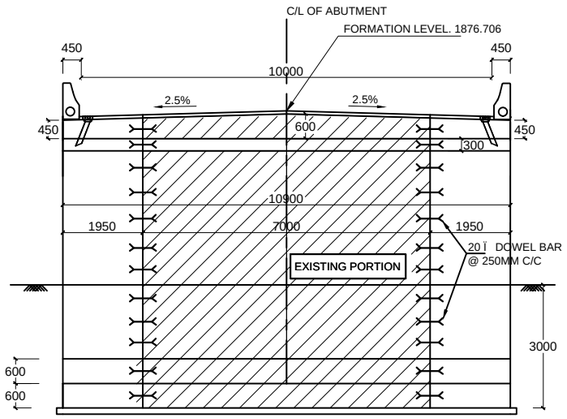
(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

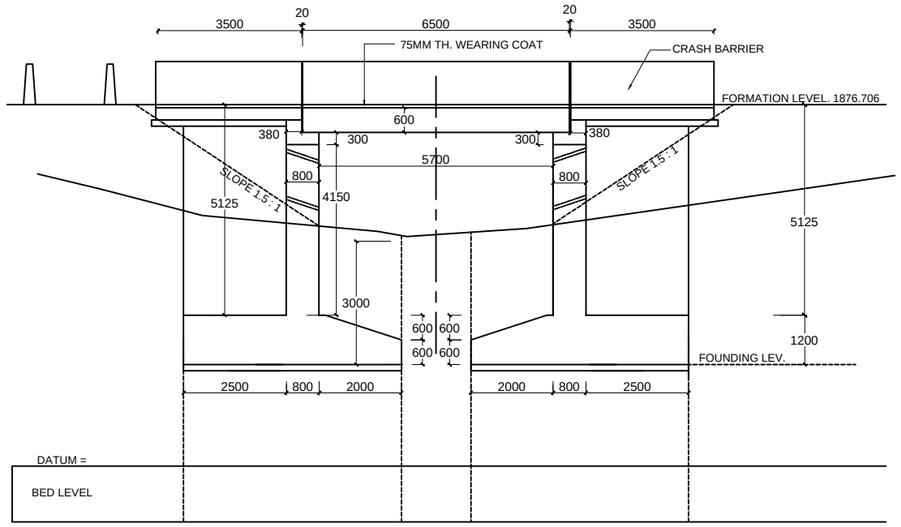
(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

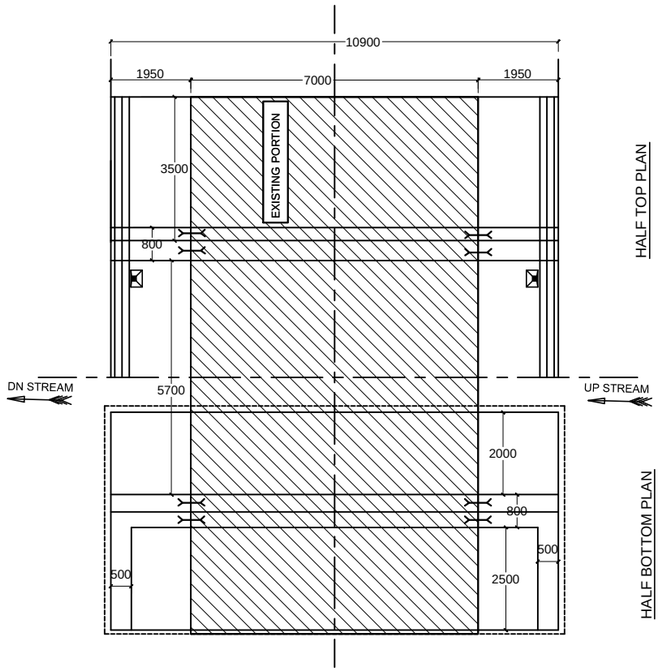
CLIENT NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith Earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE GENERAL ARRANGEMENT DRAWING 1X4.0 M SPAN AT 63 / 605 KM (WIDENING BOTH SIDES)	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com	Scale:- 1:100 Drn. by JYOTI Chkd. by SARMISTHA Aprvd. by DATE DEC. - 2017 DRG. NO. SMC/UKHRUL/SLAB -05



CROSS SECTION
(AT ABUTMENT)

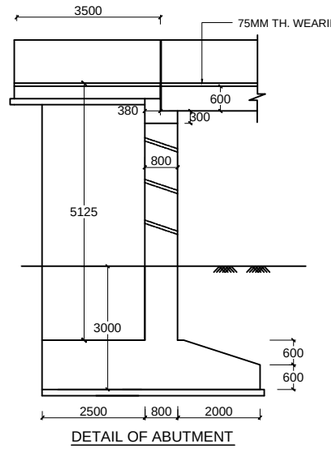


LONGITUDINAL SECTION



HALF TOP PLAN

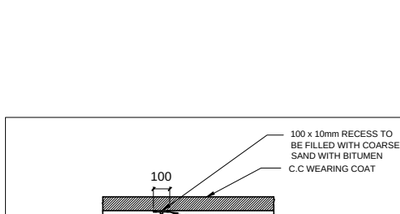
HALF BOTTOM PLAN



DETAIL OF ABUTMENT

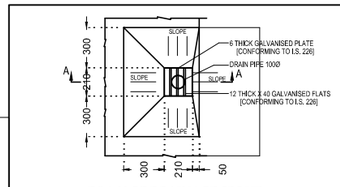
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

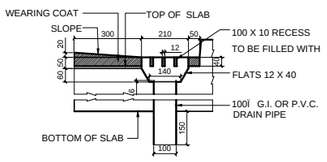


ABUTMENT

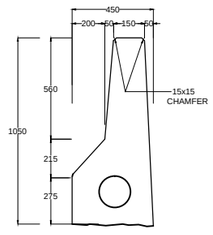
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

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(B) DESIGN CRITERIA

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2. LIVE LOAD CONSIDERED IN THE DESIGN ;
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4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE,THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith Earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

GENERAL ARRANGEMENT DRAWING
1X5.7 M SPAN AT 64 / 685 KM

(WIDENING BOTH SIDES)

CONSULTANT :-

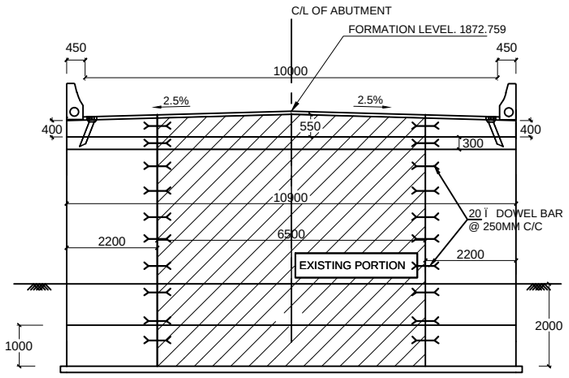
S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

Drn. by	JYOTI
Chkd. by	SARMISTHA
Aprvd. by	

DATE
DEC. - 2017

DRG. NO.
SMC/UKHRUL/SLAB -06



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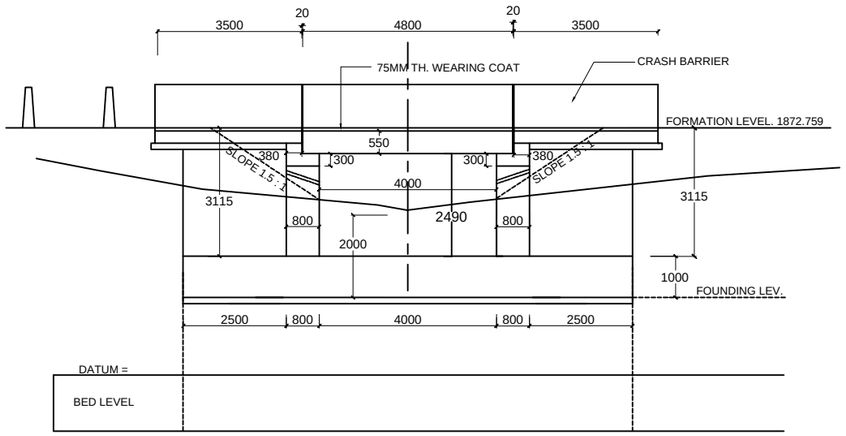
(AT ABUTMENT)



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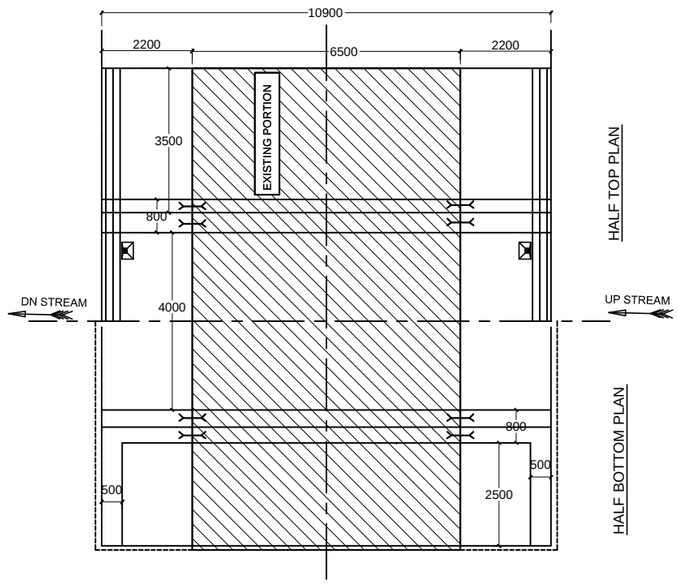
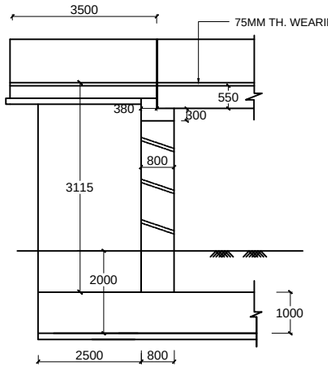


HALF TOP PLAN

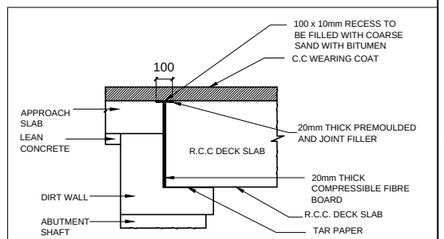
HALF BOTTOM PLAN



DETAIL OF ABUTMENT

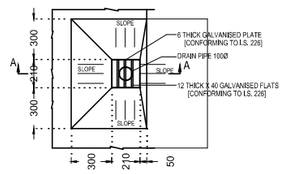
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

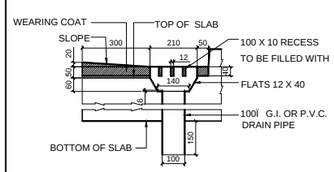


ABUTMENT

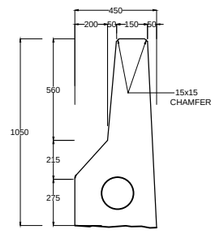
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT I OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

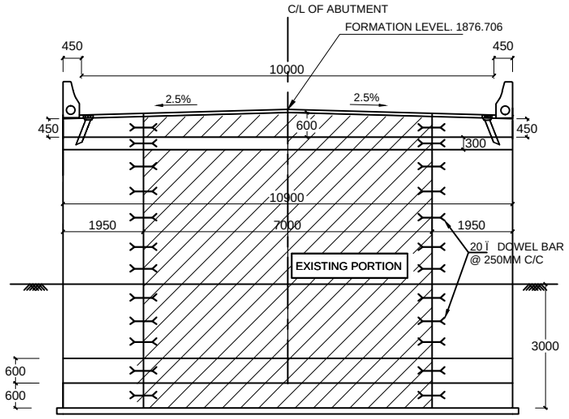
(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

CLIENT NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith Earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE GENERAL ARRANGEMENT DRAWING 1X4.0 M SPAN AT 63 / 605 KM (WIDENING BOTH SIDES)	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com	Scale:- 1:100 Drn. by JYOTI Chkd. by SARMISTHA Aprvd. by DATE DEC. - 2017 DRG. NO. SMC/UKHRUL/SLAB -05



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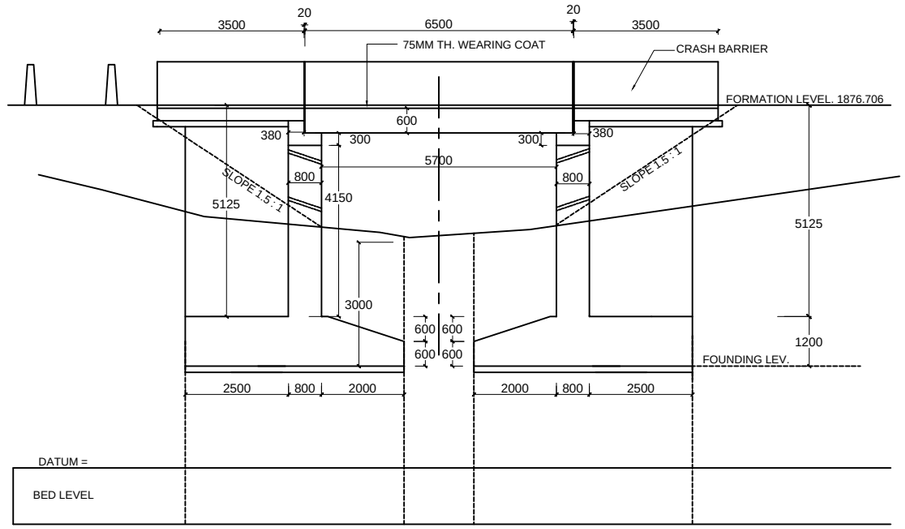

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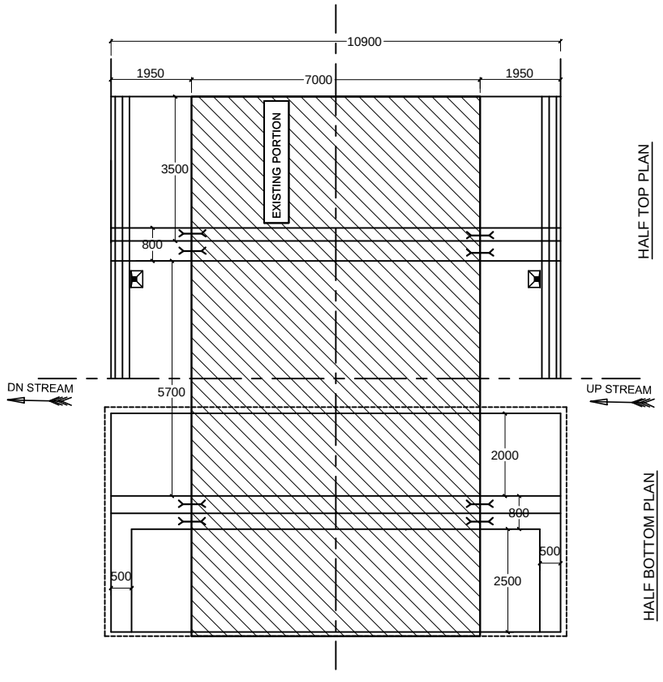
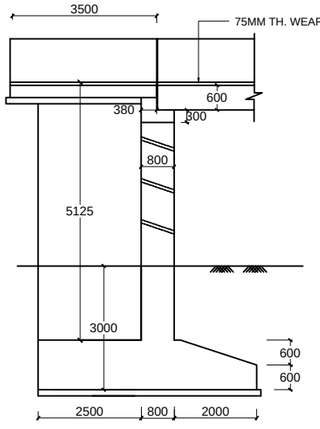


HALF TOP PLAN

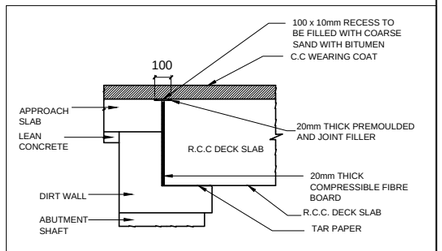
HALF BOTTOM PLAN



DETAIL OF ABUTMENT

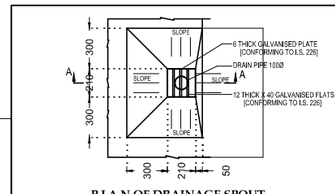
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

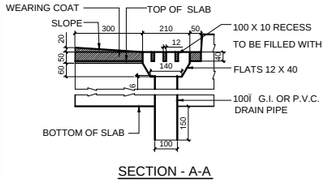


ABUTMENT

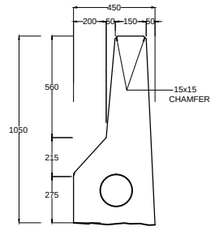
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM**, B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND/OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

(D.) DETAILING

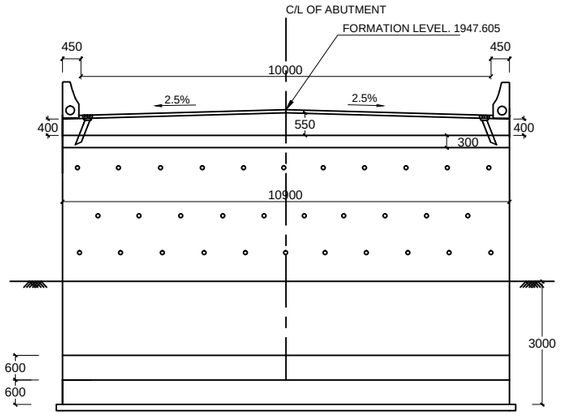
1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

(E.) SPECIFICATIONS

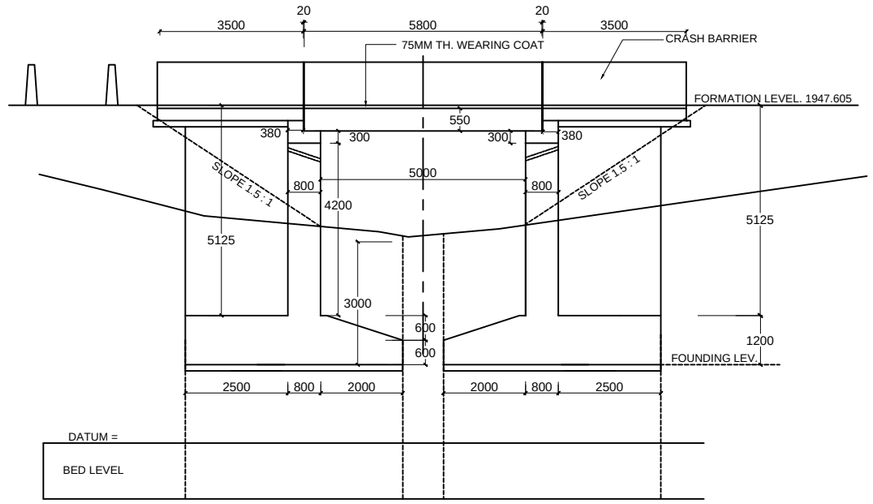
THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE: GENERAL ARRANGEMENT DRAWING 1X5.7 M SPAN AT 64 / 685 KM (WIDENING BOTH SIDES)	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company. Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi. Web : http / www.smcindia.com , e-mail : support@smcindia.com

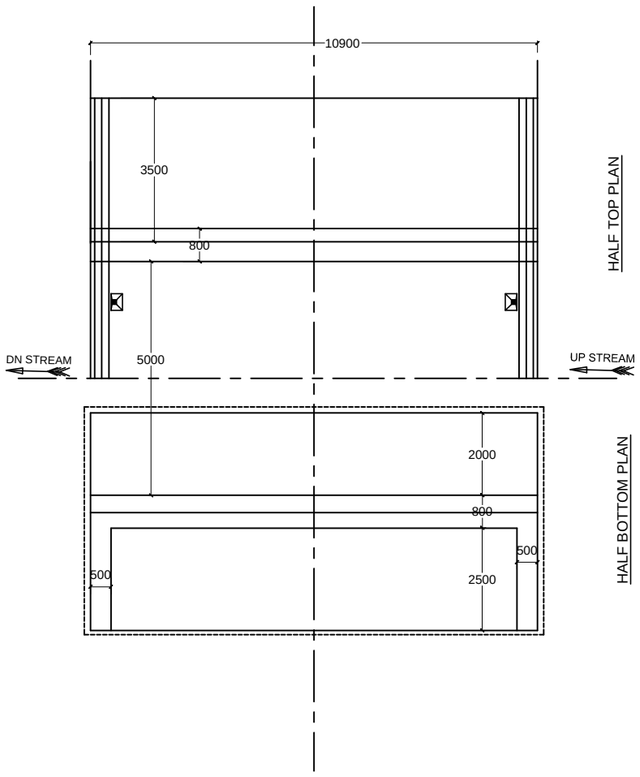
Scale:- 1:100	Drn. by	JYOTI	DATE: DEC. - 2017
	Chkd. by	SARMISTHA	
	Aprvd. by		DRG. NO. SMC/UKHRUL/SLAB -06



CROSS SECTION
(AT ABUTMENT)

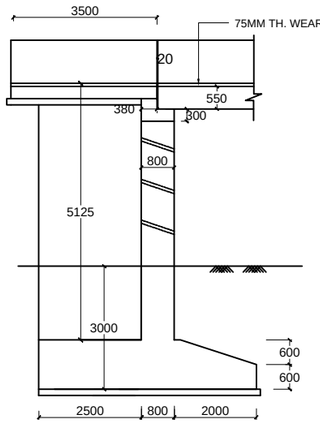


LONGITUDINAL SECTION



HALF TOP PLAN

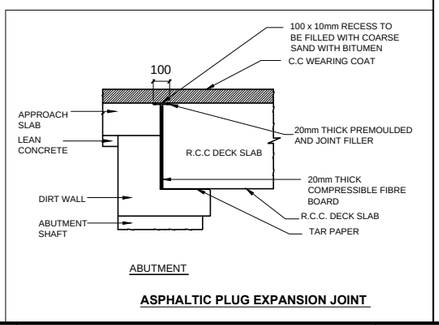
HALF BOTTOM PLAN



DETAIL OF ABUTMENT

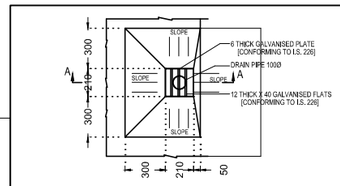
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

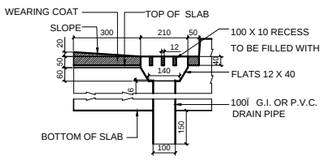


ABUTMENT

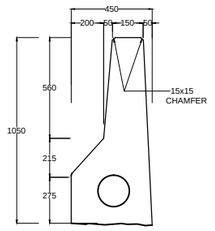
ASPHALTIC PLUG EXPANSION JOINT



P LA N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

CLIENT

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

PROJECT

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.

TITLE

GENERAL ARRANGEMENT DRAWING
1 X 5.0 M SPAN AT 67 / 310 KM

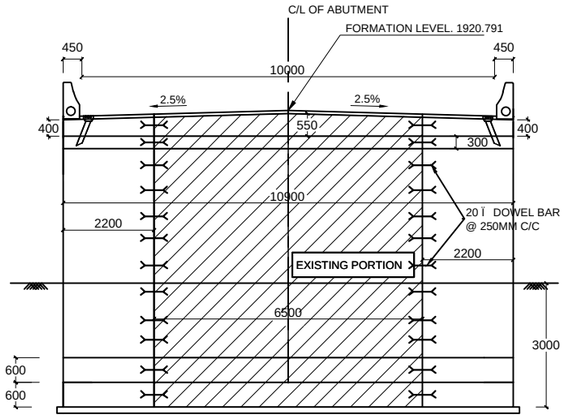
(NEW CONSTRUCTION)

CONSULTANT :-

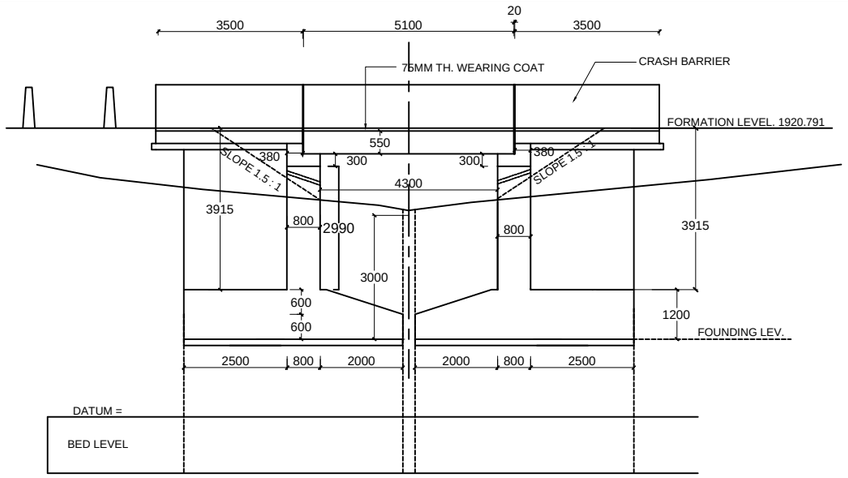
S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100

Drn. by	JYOTI	DATE: DEC. - 2017
Chkd. by	SARMISTHA	
Aprvd. by		DRG. NO. SMC/UKHRUL/SLAB -07



CROSS SECTION
(AT ABUTMENT)



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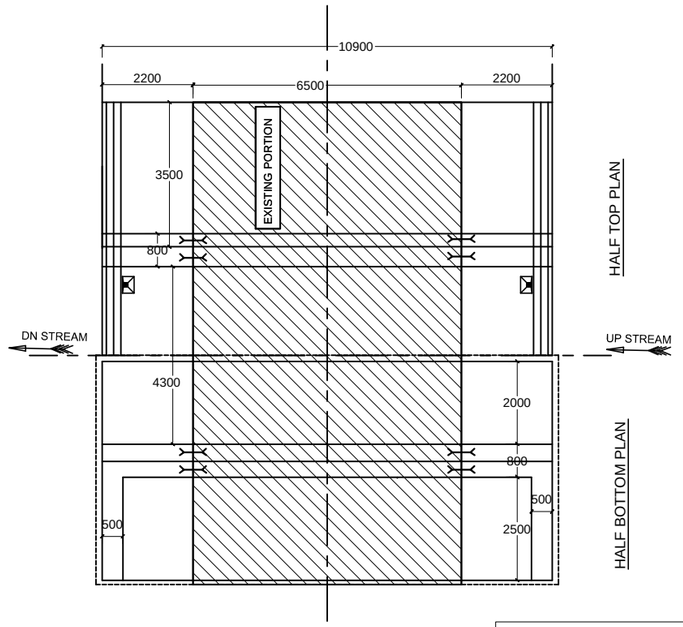
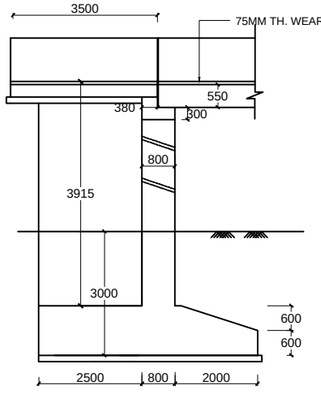
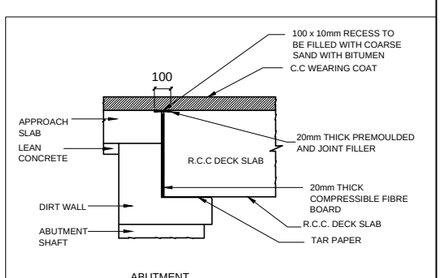




DETAIL OF ABUTMENT

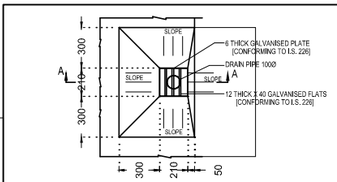
GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

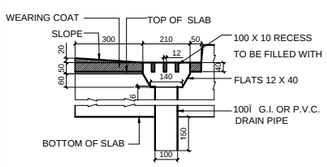


ABUTMENT

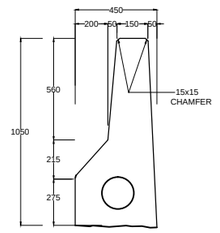
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
   a) IRC: 5 - 1998 b) IRC: 6 - 2014 c) IRC:112 - 2011 d) IRC: 78 - 2014
2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

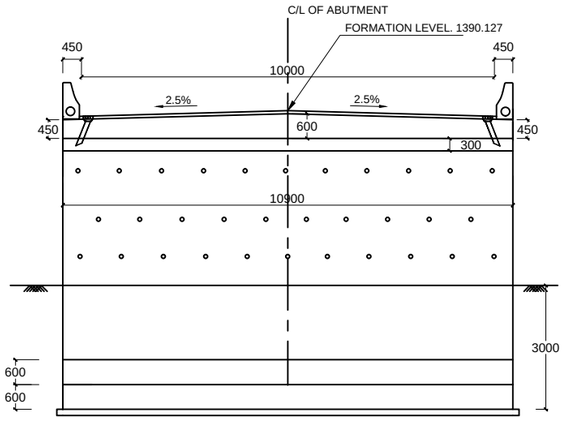
(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

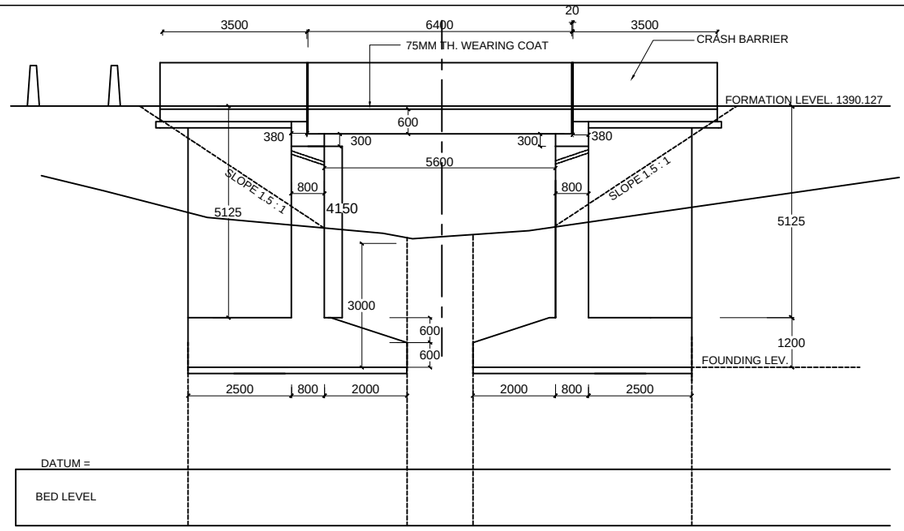
(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

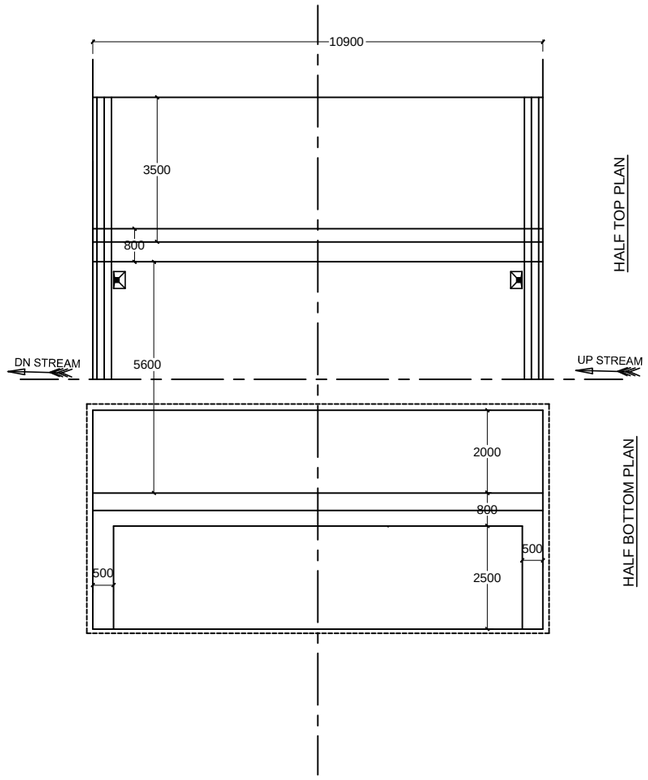
CLIENT: NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	PROJECT: Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	TITLE: GENERAL ARRANGEMENT DRAWING 1X4.3 M SPAN AT 68 / 290 KM (WIDENING BOTH SIDES)	CONSULTANT :- S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com	Scale:- 1:100
				Drn. by: JYOTI
				Chkd. by: SARMISTHA
				Aprvd. by:
				DATE: DEC. – 2017
				DRG. NO.: SMC/UKHRUL/SLAB –08



CROSS SECTION
(AT ABUTMENT)

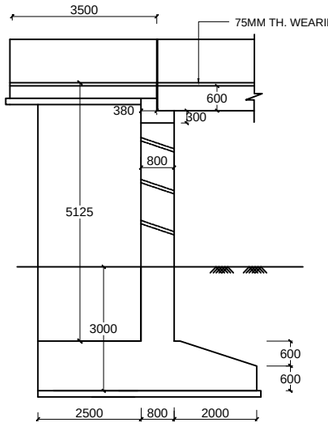


LONGITUDINAL SECTION



HALF TOP PLAN

HALF BOTTOM PLAN



DETAIL OF ABUTMENT

GRADE OF CONCRETE

SUPERSTRUCTURE - RCC	M 30
WEARING COAT - RCC	M 25
CRASH BARRIER	M 25
SUBSTRUCTURE	M 25
FOUNDATION	M 25
RETRN WALL / WING WALL	M 25

(A) GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED. NO DRAWING SHALL BE SCALED.
2. **SITE SPECIFICATION NOTES ARE MENTIONED IN THE RESPECTIVE GAD.**
3. **THE LEVELS MAY BE CONFIRMED PRIOR TO EXECUTION. THE ROAD GEOMETRIES AS ENVISAGED IN THE PROJECT ADJACENT TO THE BRIDGE MAY BE RECONFIRMED WHILE FINALISING THE LEVELS OF THE BRIDGE.**

(B) DESIGN CRITERIA

1. THE DESIGN HAS BEEN CARRIED OUT ACCORDING TO FOLLOWING CODES.
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2. LIVE LOAD CONSIDERED IN THE DESIGN ;
   - ONE LANE OF IRC CLASS 70R OR TWO LANES OF IRC CLASS A ON CARRIAGEWAY, WHICHEVER GOVERNS.
3. THE DESIGN HAS BEEN TAKEN UP CONSIDERING MODERATE CONDITION OF EXPOSURE.
4. NO PUBLIC UTILITY SERVICES IS ALLOWED TO BE CARRIED OVER THE BRIDGE SUPER STRUCTURE.THE CRASH BARRIERS SHALL ACCOMMODATE 2NOS 150MM DIA PVC PIPES FOR LAYING OF CABLES.
5. HYDRAULIC DATA CONSIDERED FOR DESIGN ARE MENTIONED IN THE RESPECTIVE GAD.

ALLOWABLE BEARING CAPACITY AT FOUNDING STRATA HAS BEEN ASSUMED TO BE 25T/SQM.

(C) MATERIAL SPECIFICATIONS

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH IN 150MM CUBES AS **25 MPa** FOR ALL SUBSTRUCTURE AND **30 MPa** FOR SUPERSTRUCTURE.
2. CEMENT TO BE USED SHALL BE ANY OF THE FOLLOWING TYPES WITH THE PRIOR APPROVAL OF THE ENGINEER.

a) ORDINARY PORTLAND CEMENT,33 GRADE,CONFIRMING TO IS:269.
b) ORDINARY PORTLAND CEMENT,43 GRADE, CONFIRMING TO IS:8112.
c) ORDINARY PORTLAND CEMENT, 53 GRADE CONFIRMING TO IS:12269.
d) SULPHATE RESISTING PORTLAND CEMENT, CONFIRMING TO IS:12330.
e) PORTLAND POZZOLANA CEMENT (FLY ASH BASED) CONFIRMING TO IS:1489(PART 1)
f) PORTLAND SLAG CEMENT CONFIRMING TO IS:455.

3. TO IMPROVE WORKABILITY OF CONCRETE, ADMIXTURES CONFORMING TO IS:6925 AND IS: 9103 MAY BE PERMITTED SUBJECT TO SATISFACTORY PROVEN USE. ADMIXTURES GENERATING HYDROGEN, NITROGEN, ETC SHOULD NOT BE USED.
4. CEMENT CONTENT IN CONCRETE SHALL : A) NOT BE LESS THAN **310KG/CUM,** B) NOT EXCEED **540KG/CUM.**
5. MAXIMUM WATER CEMENT RATIO SHALL BE **0.45**
6. TOTAL WATER SOLUBLE SULPHATE CONTENT OF THE CONCRETE MIX SHALL NOT EXCEED 4% BY MASS OF CEMENT USED IN THE MIX.
7. TOTAL CHLORIDE CONTENT OF THE CEMENT EXPRESSED AS CHLORIDE ION SHALL NOT EXCEED 0.30% BY MASS OF CONCRETE USED.

REINFORCEMENT

ALL REINFORCING STEEL SHALL BE OF HIGH YIELD STRENGTH DEFORMED STEEL BARS (**GRADE Fe 500**) CONFORMING TO IS; 1786-2008.

AGGREGATES

ALL COURSE AGGREGATE AND FINE AGGREGATES SHALL CONFORM TO IS:383 AND SHALL BE TESTED TO CONFORM IS:2386 PARTS I TO VIII.

WATER

WATER TO BE USED IN CONCRETING AND CURING SHALL CONFORM TO IRC: 112-2011.

(D.) WORKMANSHIP

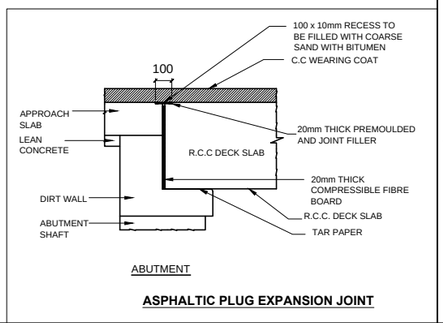
1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT BAR CLOSEST TO THE CONCRETE SURFACE SHALL BE **40MM**.
2. ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL ONLY BE USED.
3. CONSTRUCTION JOINTS
   I. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY.
   II. IF CONSTRUCTION JOINT IS UNAVOIDABLE IT SHOULD BE PROVIDED AT PREDETERMINED LOCATIONS.
   III. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
   IV. BEFORE NEW CONCRETE IS POURED, THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER
      a. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT ı OF THE SIZE OF AGGREGATE IS EXPOSED BUT WITHOUT DISLODGING THE AGGREGATE OR STRUCTURALLY DAMAGING THE CONCRETE.
      b. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT ABSORPTION OF WATER FROM NEW CONCRETE.
   V. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT
4. WELDING OF REINFORCING BARS SHALL NOT BE PERMITTED.
5. LAPS IN REINFORCEMENT
   I. LAP LENGTH OF REINFORCEMENT SHALL BE PROVIDED AS PER IRC 112-2011.
   II. NOT MORE THAN 50% OF REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
   III. FOR CLOSELY SPACED BARS LAPPING MAY BE AVOIDED BY PROVIDING SUITABLE TYPE OF MECHANICAL DEVICES
6. LENGTH OF ANCHORAGE WHEREVER REQUIRED SHALL BE AS PER I.R.C. - 112: 2011
7. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
8. SUPPORTING CHAIRS OF 12MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502
9. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITERS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE.
10. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND /OR NEEDLE VIBRATORS. USE OF FULL WIDTH SCREED VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
11. SHUTTERING PLATES SHALL SUITABLY BE STIFFENED TO ENABLE THE COMPACTION BY FORM VIBRATORS.
12. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED.

(D.) DETAILING

1. **WEEP HOLES :**
   WEEP HOLES SHALL BE PROVIDED WITH 100MM DIA A.C. PIPES EXTENDING TO FULL WIDTH OF CONCRETE WITH A SLOPE OF 1 IN 20 TOWARDS THE DRAINING FACE FOR ABUTMENTS AND WING WALLS. THE SPACING OF WEEP HOLES SHALL BE 1M ON EITHER DIRECTION WITH THE LOWEST AT ABOUT 150MM ABOVE THE L.W.L. OR L.B.L. WHICH EVER IS HIGHER.
2. **FILTER MEDIA FOR DRAINAGE :**
   FILTER MEDIA WITH 40MM DOWN GRADED STONE AGGREGATES OF 600MM THICK WITH SMALLER SIZED MATERIALS TOWARDS THE SOIL AND BIGGER SIZED MATERIALS TOWARDS THE WALL BE PROVIDED OVER THE ENTIRE SURFACE BEHIND THE ABUTMENT AND WING WALLS TO THE FULL HEIGHT.
4. **BEARING**
   TWO LAYERS OF MESH REINFORCEMENTS ONE AT 20MM FROM TOP AND THE OTHER AT 100MM FROM TOP EACH CONSISTING 8MM BARS AT 100MM C/C BOTHWAYS SHALL BE PROVIDED DIRECTLY UNDER THE BEARING IN THE ABUTMENT CAP / PIER CAP.
   TAR PAPER OVER A BITUMEN COAT SHALL BE USED AS BEARING.
5. **EXPANSION JOINTS**
   ASPHALTIC PLUG TYPE EXPANSION JOINTS AS SHOWN IN THE DRAWING SHALL BE FOLLOWED.
6. **DRAINAGE SPOUT:**
   THE SPOUTS SHALL NOT BE LESS THAN 100MM IN DIA AND MADE UP OF CORROSION RESISTANT MATERIAL. DISCHARGE FROM DRAINAGE SPOUT SHALL BE AWAY FROM BEARINGS.
7. **BACK FILLING:**
   BACK FILLING BEHIND THE ABUTMENT AND WING WALL MAY BE CARRIED OUT USING SOIL GROUP OF GW, GP, GM, SW WITH A MAXIMUM DRY DENSITY OF 1850 KG/CUM TO 2280 KG/CUM.
8. **APPROACH SLAB :**
   THE MINIMUM LENGTH OF APPROACH SLAB SHALL BE 3.5M AND MINIMUM THICKNESS SHALL BE 300MM. THE APPROACH SLAB BE LAID OVER 100MM THICK CEMENT CONCRETE OF GRADE M10. THE GRADE OF CONCRETE FOR APPROACH SLAB SHALL BE **M25**.
9. **WEARING COURSE :**
   THE WEARING COURSE SHALL COMPRISE OF 75mm TH CONCRETE OF M30 WITH TEMPERATURE REINFORCEMENT.
10. **RAILINGS :**
    CONCRETE CRASH BARRIER SHALL BE VERTICAL WITH A TOLERANCE NOT TO EXCEED 6MM IN 3M. AND GRADE OF CONCRETE SHALL BE M-30.
11. **GUARD POSTS:**
    150MM DIA 1.5M HEIGHT GUARD POSTS AT 1M INTERVAL MAY BE USED.
12. **PITCHING / REVETMENT OF SLOPES :**
    STONE PITCHING WITH MINIMUM THICKNESS OF 300MM SHALL BE CARRIED OUT AS PER I.R.C. 89-1997. THE PITCHING SHALL BE LAID OVER A LAYER OF FILTER MEDIA OF 150MM THICK AND SHALL SATISFY THE GRADING REQUIREMENT OF CLAUSE NO. 5.3.6. I.R.C. 89-1997. THE SIZE AND WEIGHT OF THE STONES SHALL NOT BE LESS THAN 40 KG AND SPALLS FOR FILLING INTERSTICES SHALL NOT BE LESS THAN 25MM.
13. **PAINTINGS**
    THE CONCRETE CRASH BARRIERS AND GUARD POSTS SHALL BE PAINTED WITH 300 MM WIDE ALTERNATE BAND OF YELLOW AND BLACK PAINTS.

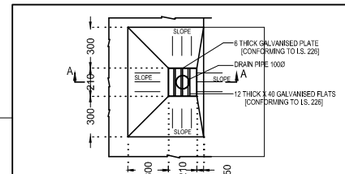
(E.) SPECIFICATIONS

THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS BY MINISTRY OF ROAD TRANSPORT AND HIGHWAYS EXCEPT WHEREVER OTHERWISE MENTIONED.

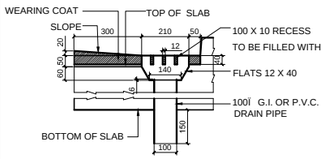


ABUTMENT

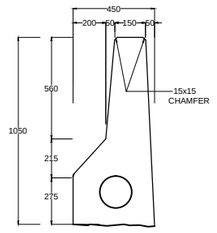
ASPHALTIC PLUG EXPANSION JOINT



P L A N OF DRAINAGE SPOUT
(SCALE 1 : 25)



SECTION - A-A



DETAIL OF CRASH BARRIER

CLIENT	PROJECT	TITLE	CONSULTANT :-
NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.	Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project and Providing Pre- Construction Services in respect of Two LaningWith earthen Shoulder Of Yaingangpokpi -Jessami Road On NH- 202 On Engieering ,Procurement and Construction Mode in the State Of Manipur.	GENERAL ARRANGEMENT DRAWING 1X6.0 M SPAN AT 93 / 765 KM (RECONSTRUCTION)	S.M. CONSULTANTS An ISO 9001 Company Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi Web : http / www.smcindia.com , e-mail : support@smcindia.com

Scale:- 1:100	Drn. by	JYOTI	DATE DEC. - 2017
	Chkd. by	SARMISTHA	
	Aprvd. by		DRG. NO. SMC/UKHRUL/SLAB -09