



GOVERNMENT OF ODISHA
WORKS DEPARTMENT

CIVIL WORKS CONTRACT
PACKAGE No. OSRP-Bal-P01A

For

***Widening of Strengthening of Existing Carriageway to 2 Lane Road
from Bhawanipatna to Khariar***
(2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work)

under

Odisha State Roads Project

between

Chief Engineer, World Bank Projects, Odisha
(on behalf of Works Department, Government of Odisha)

and

M/s BARBRIK Project Limited
Nehru Park Road, Surajpur, Chhatisgarh, INDIA

Agreement Value: Rs. 84,50,54,599

*Project Management Unit, Odisha State Roads Project
Office of the Engineer-in-Chief (Civil), Odisha,
Nirman Soudha, Keshari Nagar, Unit – V, Bhubaneswar – 751 001*

Dated: 05 July, 2013

CONTENTS OF CONTRACT

Volume-I : Sections No- 3, 4 & 6

Volume-II : Sections No- 5, 7 & Work Programme



BARBRUK Project Limited
Contractor


Chief Engineer
World Bank Project
O/o the E. Chief Engineer
World Bank Projects, Odisha



BARBRIK Project Limited
Cuttack


Chief Engineer
World Bank Project
On the E.J.C.(Civil), Odisha
Bhubaneswar
Chief Engineer
World Bank Projects, Odisha

भारतीय गैर न्यायिक

एक सौ रुपये

रु. 100



सत्यमेव जयते

Rs. 100

ONE
HUNDRED RUPEES

भारत INDIA
INDIA NON JUDICIAL

उड़ीसा ORISSA

F 241916

AGREEMENT

This AGREEMENT, made the 5th day of July 2013, between the **Chief Engineer, World Bank Projects, Odisha**, office of the Engineer-in-Chief(Civil), Odisha, Nirman South, Unit-V, Kesari Nagar, Bhubaneswar-751001 on behalf of Odisha Works Department, Government of Odisha (hereinafter called "the Employer") of the one part and **M/s BARBRIK Project Limited**, Nehru Park Road, Surajpur, Chhatisgarh (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous that the Contractor execute Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work), Package No-OSRP-Bal-P01A (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a contract price of **Rs. 84,50,54,599** /- (Rupees Eighty-four Crore Fifty lakh Fifty-four thousand Five hundred and ninety-nine) only.



[Signature]
Chief Engineer
World Bank Projects, Odisha
075, the E. I. C. (Civil), Bhubaneswar
Bhubaneswar

x M. Harichanduh

led

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RECEIVED BY THE TREASURY
MINISTRY OF FINANCE
BIRBHAR, BHUBANESWAR
27 JUN 2013
TREASURY OFFICER

Handwritten signature or initials.



Handwritten signature and text: "Chief Engineer, World Bank Project, O/o the E.C. (Civil), Bhubaneswar"

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

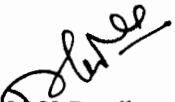
- i) Letter of Acceptance;
- ii) Contractor's Bid;
- iii) Contract Data;
- iv) Conditions of contract (including Special Conditions of Contract);
- v) Specifications;
- vi) Drawings;
- vii) Bill of Quantities; and
- vii) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.


For and on behalf of Employer i.e Works Department, Government of Odisha




Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Chief Engineer
World Bank Projects, Odisha

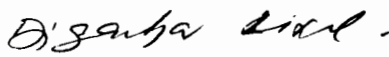

Er. N K Pradhan
Chief Engineer,
World Bank Projects, Odisha

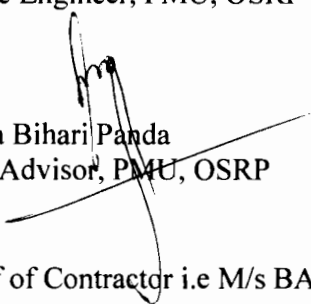
For and on behalf of the Contractor i.e M/s BARBRIK Project Limited


Mr. Rajesh Agrawal
Managing Director,
M/s BARBRIK Project Limited

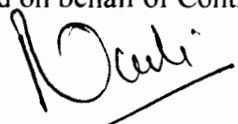
Witness


For and on behalf of Employer i.e Works Department, Government of Odisha


1. Er. Digambar Biswal
Executive Engineer, PMU, OSRP


2. Mr. Kunja Bihari Panda
Financial Advisor, PMU, OSRP

For and on behalf of Contractor i.e M/s BARBRIK Project Limited


1. Mr. R. K. Gupta
Vice Prtesident (Projects)


2. Mr. D.K. Sonakia




Chief Engineer,
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar
Chief Engineer
World Bank Projects, Odisha

**OFFICE OF THE ENGINEER-IN-CHIEF (CIVIL), ODISHA
NIRMAN SOUDHA, KESHARI NAGAR, UNIT – V, BHUBANESWAR – 751 001**

Letter No. PMU-WB-12/2013 –

27517

June 28, 2013

Letter of Acceptance

From

Er. Nalini Kanta Pradhan
Chief Engineer, World Bank Projects, Odisha
Tel.: +91 674 239 6783 / Fax.: +91 674 239 0080
Email: pmuosrp@gmail.com

To

M/s BARBRIK Project Limited.,
Nehru Park Road, Surajpur,
Chhatisgarh.
Email: rpur@barbrik.in

Dear Sir,

This is to notify you that your Bid dated April 20, 2013 for execution of the Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work), Package No-OSRP-Bal-P01A for the Contract Price of Rs. 84,50,54,599 /- (Rupees Eighty-four Crore Fifty lakh Fifty-four thousand Five hundred and ninety-nine) only as corrected in accordance with the Instructions to Bidders is hereby accepted by the undersigned.

We note that as per bid, you do not intend to subcontract any component of work.

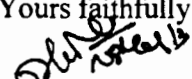
You are hereby requested to furnish Performance Security in the form detailed in Para 34.1 of ITB for an amount of Rs. 4,22,53,000.00 (Rupees Four Crore Twenty-two lakh Fifty-three thousand) only within 21 days of the receipt of this letter of acceptance valid upto 28 days from the date of expiry of Defects Liability Period i.e. upto 13.08.2016 and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

We have reviewed the construction methodology submitted by you alongwith the bid in response to ITB Clause 4.3[k] and our comments are given in the attachment. You are requested to submit the following as per Clause 27 of General Conditions of Contract within 14 days of receipt of this letter.

1. A revised methodology incorporating the comments.
2. A revised Resource Based Work Program.
3. An Environmental Management Plan.

Encl: As above

Yours faithfully,


Chief Engineer

World Bank Projects, Odisha



GOVERNMENT OF ODISHA
WORKS DEPARTMENT

No. 6720 /W., Bhubaneswar, Dated, the 25th June, 2013
07180400422013

From
Smt S. Biswal,
AFA-cum-Under Secretary to Govt

To
The Chief Engineer, World Bank Projects, Odisha,
Nirman Soudha, Bhubaneswar

Sub:- Widening of Strengthening of Existing Carriage way to 2-Lane Road from Bhawanipatna to Khariar(2/000kmt to 27/200km& 30/000km to 70/000km of SH-16)(Balance Work).

Sir,

I am directed to invite a reference to your Letter No.20065 dated 17.05.2013 on the subject noted above and to convey the approval of Government to the lowest substantially responsive evaluated bid of M/s BARBABRIK Project Ltd. amounting to Rs.84,50,00,000.00 (Rupees Eighty Four Crore Fifty Lakh Fifty Four Thousand Five hundred Ninety nine) only being 1.3% Less than the estimated cost of Rs.85,62,10,644.00 subject to the condition that leave of the Learned Court of District Judge, Khurda shall be obtained in ARBP No.169/2012, prior to signing of contract

A copy of the proceedings of the Tender Committee meeting, held on 21.05.2013 for the above work is enclosed for reference.

Tender documents received with your letter under reference are returned herewith, the receipt of which may please be acknowledged.

Yours faithfully,

Encl: As above

Mr 29/6/13
AFA-cum Under Secretary to Govt.



29/6/13
Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar
Chief Engineer
World Bank Projects, Odisha

Chief Engineer, World Bank Projects, Odisha

From: <rrohathgi@worldbank.org>
To: "N Pradhan" <pmuosrp@gmail.com>; "Chief Engineer, World Bank Projects, Odisha" <ceworldbankprojects@gmail.com>
Cc: <workssec@ori.nic.in>; <stadimalla@worldbank.org>; <kchoudhary@worldbank.org>; <smohanty1@worldbank.org>
Sent: Wednesday, May 15, 2013 12:10 PM
Subject: NO OBJECTION : Odisha State Roads Project- Package No. OSRP-Bal-P01A- Submission of BID Evaluation Report

Dear Mr Pradhan

Thank you for your e-mail dated May 10, 2013 requesting Bank's review of the Bid Evaluation Report for "Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work)." under Package- P01A of OSRP.

We have reviewed the subject BER and based on the information provided by you, we have no objection to your recommendation for award of contract for Civil Works under Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work), Package-P01A, on M/s. BARBRIK Project Ltd, Chhatisgarh, at a total contract price of INR 845,054,599/-, subject to the following :

- (i) Ensure that schedule of handing over encumbrance free land to the contractor as per provisions of Bidding Document.
- (ii) Ensure availability of major equipment with the Contractor at the time of signing of the contract, as per provisions of Bidding document.
- (iii) We have experienced severe delays in award of contract after Bank's no objection. This should be minimized and the award results needs to be published on the Project website and UNDB online within 15 days from Bank's no objection.

We look forward to a copy of signed Contract Agreement along with copy of performance security and prior review checklist to enable issuance of WBR No. for claiming disbursement against this contract.

regards

Rajesh Rohatgi
Senior Transport Specialist
The World Bank
South Asia Sustainable Development Unit (Transport)
18-20, Kasturba Gandhi Marg,
New Delhi-110 001
Tel: 91-11-49247773 (Direct), 49247000 (Reception)
Fax: 91-11-49247639
Cell: 91-9818457485
rrohathgi@worldbank.org

Si M.R. Mishra
Re. prob up
OD
16/5/13



OD
Chief Engineer
World Bank
5/16/2013
O/o the Chief Engineer
World Bank Projects, Odisha

1

Contractor's Bid

Description of the Works:

Widening & strengthening of existing carriageway to 2-lane road from Bhawanipatna to Khariar (Km. 2/000 to Km. 27/200 and Km. 30/000 to Km. 70/000 of SH - 16) (Balance Work)

BID

To : *Chief Engineer, World Bank Projects, Odisha on behalf of Works Department, Government. Of Odisha [the Employer]*
Address : Office of the E.I.C.(Civil), Odisha, Nirman Soudha, Keshari Nagar, Bhubaneswar- 751001 Odisha.

GENTLEMEN,

Having examined the bidding documents including addendum, we offer to execute the Works described above in accordance with the Conditions of Contract, Specifications, Drawings and Bill of Quantities accompanying this Bid for the Contract Price of **INR 8600.00 Lakhs (Original PAC)(Eighty Six Crores) [in letters].⁸**

The advance Payment required is: ~~Rupees Nil~~ *As per contract Data Approved*

We accept the appointment of *Sri Basudev Sahoo*, Chief Engineer (Retd.), Works Department, Odisha as the Adjudicator.

[Handwritten signature]
12/14/2013

(OR)

~~We do not accept the appointment of _____ as the Adjudicator and propose instead that _____ be appointed as Adjudicator whose daily fees and biographical data are attached.~~

This Bid and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

We also undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below :

- 1 To be filled in by the Employer before issue of the Bidding Documents.
- 2 To be filled in by the Employer before issue of the Bidding Documents.
- 3 To be filled in by the Bidder, together with his particulars and date of submission at the bottom of the Form of Bid.



21
20-7-2013



TRUE COPY
M
MD. AYYUB KHAN
OATH COMMISSIONER
AMBIKAPUR, SURAJPUR (O.G.)

15 APR 2013

[Handwritten signature]
Chief Engineer
World Bank Project
Office of the E.I.C.(Civil), Odisha
World Bank Projects, Odisha
Bhubaneswar

2

Name and address of agent

Amount

Purpose of Commission or gratuity

None

None

None

(if none, state "none")

We hereby confirm that this Bid complies with the Eligibility, Bid Validity and Bid Security required by the Bidding documents.

Yours faithfully,

Authorized Signature:





Name of Signatory: Dhruv Kumar Agrawal

Title of Signatory: Director

Name of Bidder: Barbrik Project Limited

Address: Nehru Park Road, Surajpur, Chhattisgarh- 497229

21



TRUE COPY
MD. AYYUB KHAN
OATH COMMISSIONER
AMBIKAPUR, SURGUJA (C.G.)

1 - APR 20




Chief Engineer
World Bank Project
O/o the Chief Engineer
World Bank Projects, Odisha

EXTRACT OF RESOLUTION PASSED AT MEETING OF THE BOARD OF DIRECTORS OF BARBRIK PROJECT LIMITED AT HEAD OFFICE: NEHRU PARK ROAD, SURAJPUR, [CHHATTISGARH]-497229, ON 09.03.2013 AT 4:00 P.M.

RESOLVED THAT Shri Ramesh Kumar Agrawal, Shri Kanhaiya Lal Agrawal, Shri Dhruv Kumar Agrawal, Shri Mahesh Kumar Agrawal and Shri Rajesh Kumar Agrawal, all having resident at Nehru Park Road, Surajpur, [Chhattisgarh] – 497229, and director(s) of the Company be and are hereby individually and/or jointly authorized to execute, sign & submit all qualification documents, agreements, deeds etc and to represent on all matters relating to qualification & bidding/tendering process and all negotiation including all clarification required to be submitted to the employer on all the matter relating to qualification and bidding/tendering and to do all that is required necessary for the tendering/bidding of any Works/Projects etc invited by National Highway, Central Public Works Departments (CPWD), Public Works Departments (PWD), Water Resource Department (WRD), Rural Road Development Agency, Public Health Engineering (PHE), Municipal Corporation, Corporation, Authority, Agency etc of the Chhattisgarh Government or any other State Government or Central Government or any Central Agency or any other Government Authority whether any State or Central or by any Public Sector Undertaking or any Public Limited Company or any Private Limited Company or any Organization etc in India, as they deem fit and find better, on behalf of and in the interest of the Company.

FURTHER RESOLVED THAT Shri Ramesh Kumar Agrawal, Shri Kanhaiya Lal Agrawal, Shri Dhruv Kumar Agrawal, Shri Mahesh Kumar Agrawal, and Shri Rajesh Kumar Agrawal be and are hereby authorized to explore the business for the company in India or aboard, in the best interest of the Company.


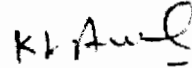
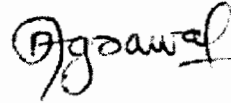
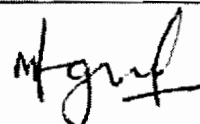
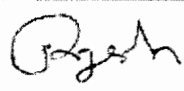
FURTHER RESOLVED THAT Shri Ramesh Kumar Agrawal, Shri Kanhaiya Lal Agrawal, Shri Dhruv Kumar Agrawal, Shri Mahesh Kumar Agrawal, and Shri Rajesh Kumar Agrawal be and are hereby authorized to execute the power of attorney in favour of



any director or officer of the Company or any other person as they may think suitable to execute the above said work on behalf of and in the best interest of the Company.

FURTHER RESOLVED THAT, these resolutions be communicated to the concerned departments and remain in full force until duly rescinded or upto 31.03.2014 whichever is earlier.

For the identification purpose the specimen signature of the entire authorized persons are attested herein below.

Name of authorized person	Specimen Signature
Ramesh Kumar Agrawal	
Kanhaiya Lal Agrawal	
Dhruv Kumar Agrawal	
Mahesh Kumar Agrawal	
Rajesh Kumar Agrawal	

//CERTIFIED TRUE COPY//

For, BARBRIK PROJECT LIMITED


[DIRECTOR]



GUARANTEE FOR RS.50,000/- AND ABOVE IS VALID ONLY WHEN SIGNED BY TWO OFFICERS
(To be stamped as an agreement in accordance with the Stamp Act in force)



STATE BANK OF INDIA
SURAJPUR Branch



The Chief Engineer, World Bank
Projects, Odisha, Onbehalf of Work
Department, Govt. of Odhisha



Form No. BG/09

Date: 01.07.2013

Dear Sir,

Guarantee No. 2013-14/13

Amount of Guarantee ₹.42253000/-

Guarantee cover from 01.07.2013 to 13.08.2016

Last date for lodgement of claim - 13.08.2016

This Deed of guarantee executed by the State Bank of India constituted under the State Bank of India Act, 1955 having its Central Office at Nariman Point, Mumbai and other places a branch at Surajpur (0576) (hereinafter referred to as 'the Bank') in favour of The Chief Engineer, World Bank Projects, Odisha, Onbehalf of Work Department, Govt. of Odhisha (hereinafter referred to as 'the Beneficiary') for an amount not exceeding ₹. 42253000/- (Rupees Four Crore Twenty Two lacs Fifty Three Thousand Only only) at the request of M/s Barbrik Project Limited (hereinafter referred to as 'the Contractor /(s)

This Guarantee is issued subject to the condition that the liability of the bank under this Guarantee is limited to a maximum of ₹.42253000/- (Rupees Four Crore Twenty Two lacs Fifty Three Thousand Only only) and the Guarantee shall remain in full force up to 13.08.2016 (date of expiry) and can not be invoked otherwise than by a written demand or claim under this Guarantee served on the Bank or or before the 13.08.2016, last date of claim).

कृते भारतीय स्टेट बैंक

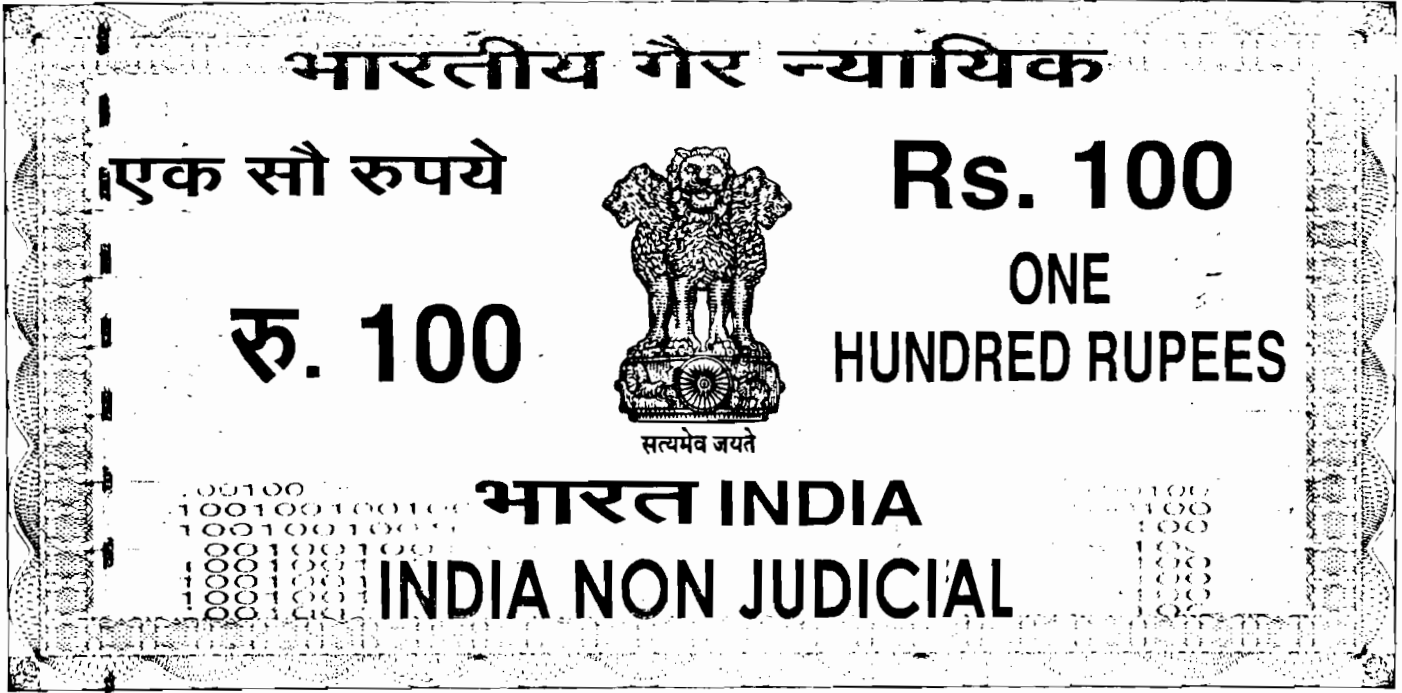
मुख्य प्रबंधक
सुरजपुर शाखा, जि. सरगजा (छ.ग.)
25/7/13

SUBJECT TO AS AFORESAID
(Main Guarantee matter may be typed hereafter)



DAYALU PATIL
PF-4344850
P-9223

Chief Engineer
World Bank Project
Under the E.I.C.(Civil), Odisha
Barbrik Project Limited
Chief Engineer
World Bank Projects, Odisha



छत्तीसगढ़ CHHATTISGARH

D 928395

Annexure B

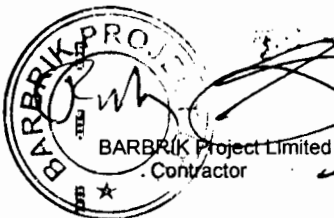
PERFORMANCE BANK GUARANTEE

To,
The Chief Engineer,
World Bank Projects, Odisha
On behalf of Works Department, Government of Odisha.

Address:

Office of the E.I.C. (Civil),
Odisha, Nirman Soudha, Keshari Nagar, Bhubaneswar- 751001, Odisha.
Email: pmuosrp@gmail.com,
Website: www.osrp.gov.in, Tel: 0674-2396783, Fax: 0674-2390080

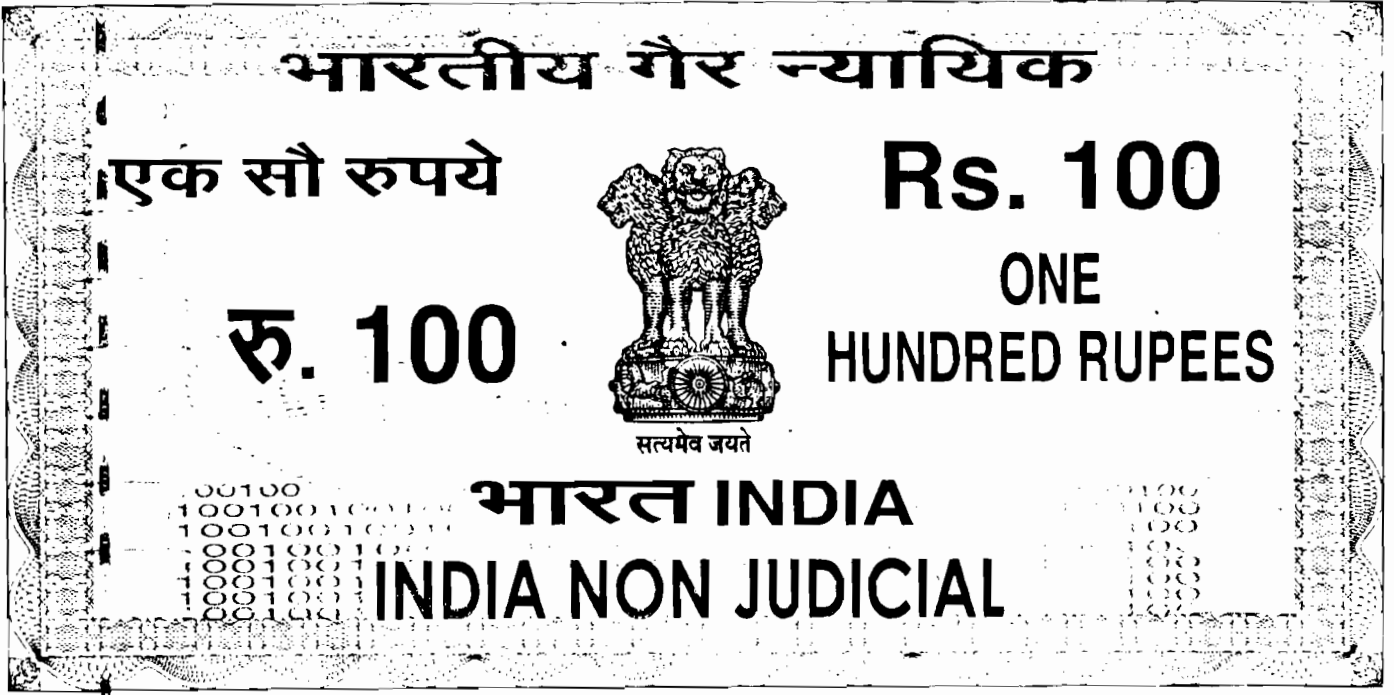
WHEREAS **BARBRIK PROJECT LIMITED**, Nehru Park Road, Surajpur, (Chhattisgarh)-497229 (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No./Letter of Acceptance No.PMU-WB-12/2013-27517 dated 28.06.2013 to execute "**Widening and Strengthening of existing Carriage way to 2-lane road from Bhawanipatna to Khariar (2/000 Km to 27/200 Km & 30/000 to Km. 70/000 of Sh-16**" (Balance works) Package No.OSRP-Bal-P01A (hereinafter called "the Contract");



Page 1 of 4

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[Signature]
GANALU PATH
World Bank Project
O/o the Chief Engineer
World Bank Projects, Odisha



छत्तीसगढ़ CHHATTISGARH

D 928396

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE, we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of **Rs.4,22,53,000/- [In Words Rupees Four Crores Twenty Two Lakhs and fifty Three Thousands Only]**, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of **Rs.4,22,53,000/- (In Words Rupees Four Crores Twenty Two Lakhs and fifty Three Thousands Only)**, as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

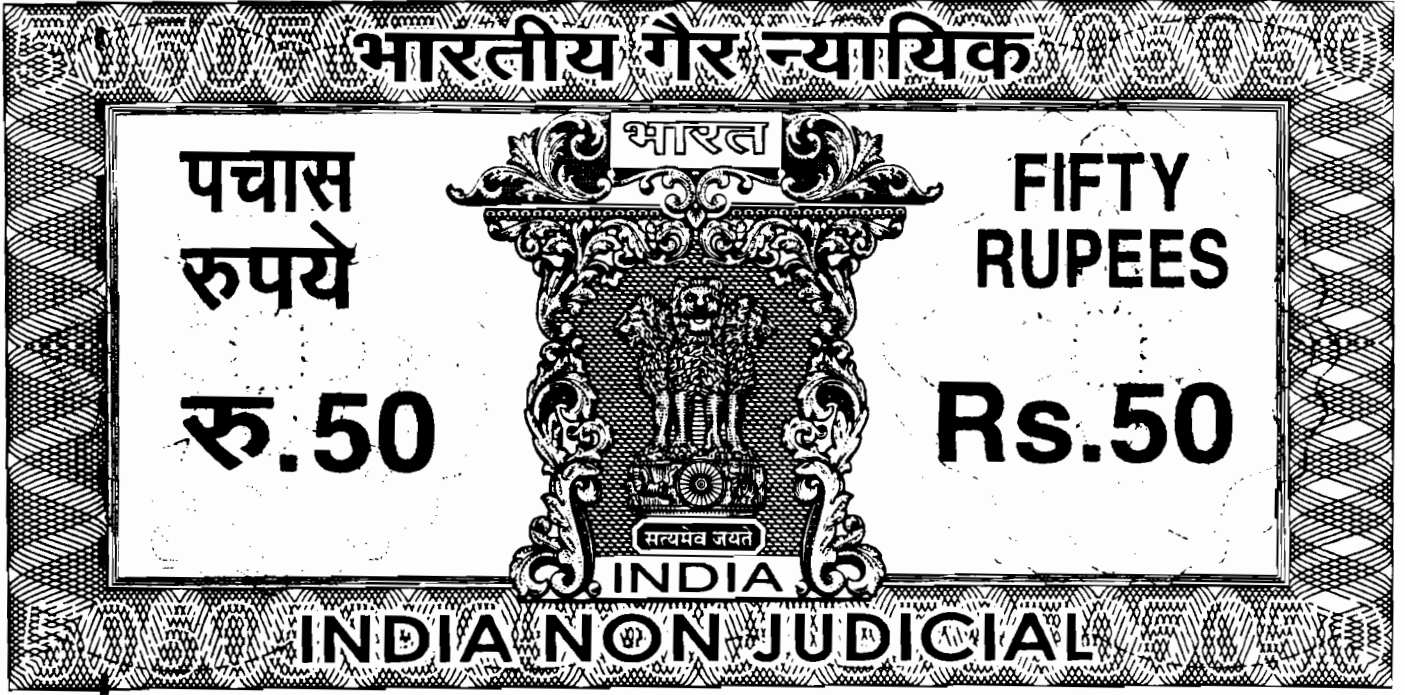


BARBRIK Project Limited
Contractor

Page 2 of 4

Page 16 of 247


Chief Engineer
World Bank Projects, Odisha



छत्तीसगढ़ CHHATTISGARH

G 646751

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until **13.08.2016** [i.e. 28 days from the date of expiry of the Defects Liability Period].

Signature and seal of the guarantor: _____

Name of Bank: State Bank of India

Address: Main Road, Surajpur, (Chhattisgarh)-497229

Date: 01/07/2013



DAYALU PATIL
PF-4344650
P-9223
Chief Engineer
World Bank Project
Odisha
Bhubaneswar.

(1. An amount shall be inserted by the guarantor, representing the percentage of the contract price specified in the contract and denominated in Indian Rupees.)

NOTWITHSTANDING ANYTHING CONTAINED HEREIN:

1. Our liability under this guarantee shall not exceed **Rs.4, 22, 53,000/- [In Words Rupees Four Crores Twenty Two Lakhs and fifty Three Thousands Only]**.
2. This bank guarantee shall be valid up to **13.08.2016** and,
3. We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before **13.08.2016**.

कृते भारतीय रू
मुख्य
सुरजपुर शाखा, फ.स.



DAYALU PATIL
PF-4344850
P-9223



Minimum required availability of the following manpower by the contractor

No.	Position	Minimum Work Experience (years)	Experience in Similar Works (years)	Minimum Qualification
1	Project Manager – 1 No	10	5	Degree in Civil Engg.
2	Highway Engineer – 1 No	5	3	Degree/ Diploma in Civil Engg.
3	Bridge Construction Engineer – 1 No	5	3	Degree/ Diploma in Civil Engg.
3	Material Engineer – 1 No	5	3	Degree/ Diploma in Civil Engg.
4	Quantity Surveyor – 1 No	5	3	Degree/ Diploma in Civil Engg.
5	Mechanical /Equipment. Maintenance Engineer – 1 No	5	3	Diploma in Mech. Engg.
6	Environment and Safety Officer – 1 No	3	1	Graduate with skill and experience in handling the Health, Environment, Safety issues



Schedule of Key and Critical Equipment to be deployed on the Work by the Contractor.

Item of Equipment	Requirement		Availability Proposals			Remarks if any (7)
	Nos.	Capacity	Owned/leased/ to be procured	Nos/ capacity	Age/ condition	
Hot Mix Plant (Batch Mix Type)	1	-	To be procured	1	New/ Good	
WMM Mixing Plant	1	-	Owned	2	4 Years/ Good	
Motor Grader	2	200 Cum/Hr.	Owned	3	3 Years/ Good	
Mechanical Bitumen Sensor Paver	1	100TPH	Owned	1	5 Years/ Good	
Pnumatic Tyred Roller	1	9 wheeled 12 Ton	Owned	1	5 Years/ Good	
Vibratory Roller	2	8 Ton	Owned	2	4 Years/ Good	
Soil Compactor	2	8-10 Ton	Owned	2	1 Years/ Good	
Bitumen Sprayer	1	1750 Sqm/hr.	Owned	1	4Years/ Good	
Water Tanker	5	10 KL	Owned	5	3 Years/ Good	
Tipper	25	10 Cum	Owned	30	2Years/ Good	
Cone Crushing Unit	1	200 TPH	Owned	1	1 Years/ Good	
Concrete Batch Mix Plant	1	100 TPH	Owned	1	2 Years/ Good	
Transit Mixer	2	6 Cum	Owned	2	3 Years/ Good	
Front End Loader	2	6 Cum	Owned	2	4 Years/ Good	
Dozer	1	150 Cum/Hr.	Owned	1	5 Years/ Good	
Mechanical Paver	1	100 TPH	Owned	1	5Years/ Good	
Concrete Pump	1	20 Cum/Hr.	Owned	1	2Years/ Good	
Hydraulic Excavator	2	60 Cum/hr.	Owned	2	1 Years/ Good	



Qualifications and experience of key personal proposed for administration and execution of the Contract.

Position	Name	Qualifications	Years of Experience (General)	Years of experience in proposed position
Project Manager	Manoj Kumar Bagaria	B.E.Civil	22 Years	12 Years
Highway Engineer	Ritesh Kumar	Diploma in Civil Engineering	13 Years	8 years
Bridge Construction Engineer	Sarat Ghose	A.M.I.E. (Civil)	10 Years	7 Years
Material Engineer	Rohit Sinha	Diploma in Civil Engineering	7 Years	5 Years
Quantity Surveyor	Anirudh sarkar	Diploma in Civil Engineering	13 Years	9 Years
Mechanical Engineer/ Equipment Maintenance Engineer	M.G.K.Nair	Diploma in Mechanical Engineering	31 Years	22 Years
Environment & Safety Officer	Nityanand pandey	B.Sc.	12 Years	8 Years




 Chief Engineer
 World Bank Project
 O/o the E.I.C.(Civil), Odisha
 Chief Engineer
 World Bank Projects, Odisha



भारतीय स्टेट बैंक
State Bank of India

भारतीय स्टेट बैंक

शाखा / Branch : सुरजपुर शाखा (0576)
जिला - सरगुजा (छ.ग.)
कूट क्र. / Code : 0775-266314, 266328
जिला / District :

तार / Telegram :

दूरभाष / Telephone :

फैक्स / Fax/E-mail :

क्रमांक / No. : BB/NDV/2013-14/16

दिनांक / Date : 16.04.2013

BANK CERTIFICATE

This is to certify that M/s. **Barbrik Project Limited** is a reputed company with a good financial standing.

If the contract for the work, namely **Widening & strengthening of existing carriageway to 2 lane road from Bhawanipatna to Khariar (Km. 2/000 to Km. 27/200 and Km. 30/000 to Km. 70/000 of SH - 16) - (Balance Work)** { funded by the World Bank } is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. 15,00,00,000.00 (Rs. Fifteen Crore Only) to meet their working capital requirements for executing the above contract.

{Name of Bank}

Senior Bank Manager

{Address of the Bank}

21



Proposed subcontracts and firms involved.

Sections of the works	Value of Sub-contract	Sub-contractor (name and address)	Experience in similar work
NIL			



M. S. Sachdeva & Co.
 Authorised dealers H.P.C Ltd
 Petroleum Products & Lubricants
 Ghudaghat Chowk
 Bhawanipatna- 756001
 Kalahandi (Orissa)



Fax 06770 223352
 Phone 06770 200452 (O)
 234558 (R)
 Mob 94870 70485
 Email ms.sachdeva@gmail.com

Ref No. MSS/2012

Date 03.07.13
 @y

To
 Barbank project limited
 Rasposi

USD Rate for the month of March. 13.

From	01.03.12	To	22.3.12	Rs	51.91
	22.03.12	To	31.3.12	Rs	52.44

(Signature)
 M.S. SACHDEVA & CO.
 BHAWANIPATNA



Monthly Wholesale Price Index

Base Year 2004-05 = 100



Name of Commodity : Grey Cement

Type : Individual Commodity

Weight : 1.26347

Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	168.8	170.3	172.9	172.3	170.1							
2012	160.1	160.4	163.1	164.6	164.4	167.3	169.5	171.9	171.5	170.7	168.3	164.9
2011	147.9	150.9	153.7	154.4	155.3	153.6	153	151.7	152.2	157.9	160.8	161.7
2010	147.6	150.6	151.3	151.8	152.5	150.3	153.8	151.6	150.3	151.5	148.3	147.8

1. Figure 9999.9 may be treated as index for particular item not-available

2. Figures for the latest two months are provisional. Latest two months are to be reckoned with reference to the latest monthly press release issued.

Senior Economic Adviser,

Room No. 126-E, Ministry of Commerce and Industry,
Udyog Bhawan, Rafi Marg, New Delhi - 110 011, INDIA
Telephone : 91-11-2306 2721 Fax : 91-11-2306 3502
E-mail to the Senior Economic Adviser



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[Signature]
Chief Engineer
World Bank Project
Oro the E.I.C. Chief Engineer
World Bank Projects, Odisha

Monthly Wholesale Price Index

Base Year 2004-05 = 100



Name of Commodity : Steel Rods

Type : Individual Commodity

Weight : 0.08639

Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	141.7	141.7	141.9	142.9	141.9							
2012	143.5	144.9	144.7	148.8	149	150.7	150.7	146.2	143.6	142.3	142.3	141.7
2011	136	141.1	137.8	138.2	138.2	139.3	139.3	139.6	135.4	140	140.4	142.7
2010	141.2	140.7	138.3	137.1	132.8	133.7	133.7	133.7	132.4	132.8	132.8	132.2

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Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

Monthly Wholesale Price Index

Base Year 2004-05 = 100



Name of Commodity : c. CONSTRUCTION MACHINERY

Type : Group Item

Weight : 0.04487

Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	136.5	136.5	136.7	136.9	136.9							
2012	131.8	131.8	131.9	132.5	134.4	135.9	135.3	135.6	136	136.3	136.3	136.5
2011	132.6	130.4	131	131	131	131.7	131.8	131.8	131.8	131.8	131.8	131.8
2010	130	130	133	131.9	132.1	132.1	131.8	131.8	131.8	131.8	131.8	131.8

1. Figure 9999.9 may be treated as index for particular item not-available
2. Figures for the latest two months are provisional. Latest two months are to be reckoned with reference to the latest monthly press release issued.

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[Signature]
Chief Engineer
World Bank Project
O/o the E.I.C. (Civil), Odisha
Bhubaneswar
Chief Engineer
World Bank Projects, Odisha

Monthly Wholesale Price Index

Base Year 2004-05 = 100



Name of Commodity : ALL COMMODITIES

Type : Group Item

Weight : 100

Month/Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	170.3	170.9	170.1	171.5	171.6							
2012	158.7	159.3	161	163.5	163.9	164.7	165.8	167.3	168.8	168.5	168.8	168.8
2011	148	148.1	149.5	152.1	152.4	153.1	154.2	154.9	156.2	157	157.4	157.3
2010	135.2	135.2	136.3	138.6	139.1	139.8	141	141.1	142	142.9	143.8	146

1. Figure 9999.9 may be treated as index for particular item not-available
2. Figures for the latest two months are provisional. Latest two months are to be reckoned with reference to the latest monthly press release issued.

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Applicable from: March 16, 2013

BITUMEN (BULK)	GRADES		
	VG-10	VG-30	VG-40
PORT REF (Mumbai/Manglore/Kochi)	35580	36380	38930
KOYALI	35580	36380	38930
MATHURA	36780	37580	40130
PANIPAT	37080	37880	40430
PORT REF (Haldia/Vizag/Chennai)	35680	36480	39030
BARAUNI	36710	37510	
BITUMEN (PACKED)			
PORT REF (Mumbai/Manglore/Kochi)	38580	39380	41930
KOYALI	38580	39380	41930
MATHURA	39780	40580	43130
PANIPAT	40080	40880	43430
PORT REF (Haldia/Vizag/Chennai)	38680	39480	42030

Note:

(1) Above Prices are in Rs./MT

(2) Above prices are excluding Duties, State Specific Cost and Local Taxes.

Ex-Refinery prices exclusive of taxes (Rs./Metric tonne)



The Odisha Gazette

EXTRAORDINARY
PUBLISHED BY AUTHORITY

No. 1942, CUTTACK, TUESDAY, OCTOBER 9, 2012/ ASWINA 17, 1934

LABOUR & ESI DEPARTMENT

NOTIFICATION

The 6th October, 2012

No.8536—LL-I(AR)-2/12/LESI. —Whereas certain proposals to revise the minimum rates of wages payable to certain categories of employees employed in 83 employments were published as required under clause (b) of sub-section (1) of Section 5 of the Minimum Wages Act, 1948 (11 of 1948) in the Extraordinary issue No. 785, dated the 23rd April, 2012 of the *Odisha Gazette* under the notification of the Government of Odisha in the Labour & E.S.I. Department No.3146—LL-I(AR) 2/12/LESI., dated the 20th April, 2012 inviting objections and suggestions from all persons likely to be affected thereby within a period of two months from the date of publication of the said notification in the *Odisha Gazette*.

And, whereas, the representations containing objections and suggestions received within the specified period of two months in respect of the said draft have been duly considered by the State Government and the Advisory Board appointed under section 7 of the said Act, has also been consulted.

Now, therefore, in exercise of the powers conferred by clause(b) of sub-section (1) of Section 3 read with Section 4 and sub-section (2) of Section 5 of the said Act and in supersession of all previous notifications issued in this regard the State Government do hereby revise the minimum rates of wages payable to the Unskilled, Semi Skilled, Skilled, Highly Skilled categories of employees employed in 83 employments as mentioned in the schedule to this notification in the whole State to ₹ 150.00, ₹ 170.00, ₹ 190.00 and ₹ 205.00 per day respectively. In the case of Agricultural Sector of the Schedule of employment, ₹126.00 and ₹ 150.00 shall be paid as daily wages to the Non-Ploughing and Ploughing Workers respectively. In addition to the said rate of wages, a special allowance called as Variable Dearness Allowance shall be payable @ ₹ 2.50 (Rupees two and paise fifty) only per day for every 50 point rise in the All India Consumer Price Index Number

BARBRIK Project Limited
Contractor



Chief Engineer
World Bank Projects, Odisha
O.D.M.E. (Civil), Odisha
Bhubaneswar.

(Base 2001-100) for industrial workers or on the expiry of every block period of two years from the date of coming into force of this notification whichever is earlier as may be notified by the Labour Commissioner, Odisha in the official gazette of the State and the same shall be uniformly applicable to the categories of employees specified above to be effective from the date as may be directed by the Labour Commissioner, Odisha in the said notification.

It is further directed that this notification shall come into force on date of its publication in the *Odisha Gazette*.

SCHEDULE

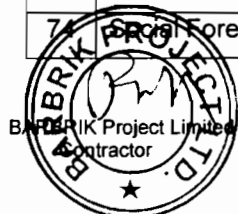
Sl. No. (1)	Name of the ESI (2)	Categories of Employees (3)	Proposed minimum rates of wages per day (4)
1	Agriculture		
2	Automobile Servicing, repairing garages and workshops.		
3	Ayurvedic and Unani Pharmacy		
4	Bakeries and Confectionaries including Biscuit making		
5	Bamboo Forest Establishment	Non Agriculture Sector	
6	Brass and Bell metal Industry	Unskilled	₹ 150.00
7	Carpet Weaving Industry	Semi-skilled	₹ 170.00
8	Cashew processing establishments	Skilled	₹ 190.00
9	Cement pipe making and allied products industry	Highly skilled	₹ 205.00
10	Ceramic and Pottery Industry		
11	Chemical Industry		
12	Cinema Industry		
13	Clay pottery		
14	Coil Industry		
15	Collection of Sal Seeds		
16	Construction or maintenance of Dams, Embankments, Irrigation Projects and sinking of wells and tanks.	Agriculture Sector	
		Non-ploughing	₹ 126.00
		Ploughing	₹ 150.00
17	Construction or maintenance of roads or in building Operations.		
18	Contingent and Casual employees in Government and other establishments.		
19	Cotton Ginning and Pressing Industry		



(1)	(2)	(3)	(4)
20	Dispensary of Medical Practitioner in any establishment of medical consultant or in any Chemical or Pathological Laboratory.		
21	Distilleries		
22	Electricity Board		
23	Finishing Dyeing of yarn and fabrics, Painting, Knitting and Embroidery.		
24	Fisheries and Sea food Industry		
25	Forest produce such as Genduli gum, Mahua making of coal and resin.		
26	Foundry Industry with or without attached machine shop.	Non Agriculture Sector	
27	Glass Industries	Unskilled ₹ 150.00	
28	Gold and Silver ornaments and articles of artistic design.	Semi-skilled ₹ 170.00	
29	Graphite Industry including beneficiation	Skilled ₹ 190.00	
30	Handloom and Hosiery	Highly skilled ₹ 205.00	
31	Hotels, Eating Houses and Restaurants		
32	Ice Factory and Cold Storage		
33	Jute Industry and Jute Twine Industry		
34	Kendu Leaf collection		
35	Khadi Village Industries including manufacture of Khandasari and other products.		
36	Laundry including dry-washing		
37	Leather Industry		
38	Liquefied Petroleum Gas manufacture and distribution.		
39	Local Authority	Agriculture Sector	
40	Manufacture of brush and brooms	Non-ploughing ₹ 126.00	
41	Manufacture of Coke and Burning Coals	Ploughing ₹ 150.00	
42	Manufacture of Cold drinks, Soda and other allied products.		
43	Manufacture of Electrical Bulbs		
44	Manufacture of matches, fire works and explosives.		
45	Manufacture of nails and pins		



(1)	(2)	(3)	(4)
46	Manufacture of paints and varnishes		
47	Manufacture of plastic products including toys.		
48	Manufacture of Radio by assembling with parts		
49	Manufacture of ropes		
50	Manufacture of Utensils including Aluminum and Hindalium products.		
51	Metal Industry (except the cottage and village scale units).		
52	Minor Engineering Industry (ESI less than 50 persons)		
53	Motor Body Building		
54	Oil Mill	Non Agriculture Sector	
55	Paper and Cardboard Industry	Unskilled	₹ 150.00
56	Petrol and Diesel Oil Pumps	Semi-skilled	₹ 170.00
57	Pharmaceutical Industry	Skilled	₹ 190.00
58	Power Loom Industry	Highly skilled	₹ 205.00
59	Printing Press		
60	Private Road Transport		
61	Private Security Agency and Private Security Services.		
62	Public Health Engineering		
63	Public Motor Transport		
64	Readymade Garments Industries including Mechanized Trade of Readymade Garment Industry.		
65	Refractory Industry		
66	Regulated markets, Marketing Societies, Co-operative Societies and Banks.		
67	Rice Mill, Flour Mill or Dal Mill	Agriculture Sector	
68	Rubber and Rubber Products Industry	Non-ploughing	₹ 126.00
69	Salt Pans	Ploughing	₹ 150.00
70	Saw Mills		
71	Shops and Establishments		
72	Siali Leaf Pluckers		
73	Soap and Detergent Manufactory		
74	Forest Forestry		



(1)	(2)	(3)	(4)
75	Spinning Mills		
76	Stone breaking or stone Crushing		
77	Tamarind Collection		
78	Tile and Brick Making		
79	Timber Trading (excluding felling and sawing)		
80	Timber Trading (including felling and sawing)		
81	Tobacco (including Bidi making) Manufactory		
82	Trunks, Suitcase and Bucket Manufactory		
83	Wood works and furniture making industries		

Explanation:— for the purpose of this notification:—

1. The minimum rates of wages are all inclusive rates including the basic rates, the cost of living allowances and the cash value of the concessional supply if any of essential commodities.
2. The daily minimum rates of wages shall be inclusive of wages payable for the weekly day of rest.
3. The minimum rates of wages are applicable to employees employed by contractors also.
4. The minimum rates of wages for disabled persons shall be same as payable to the workers of the appropriate category.
5. There shall not be any discrimination between male and female workers in the matters of payment of minimum wages in any category of ESI.
6. (a) "Unskilled" work means work which involves simple operation requiring little or no skill or experience on the job;
- (b) "Semi-skilled" work means work which involves some degree of skill or competence acquired through experience on the job and which is capable of being performed under the supervision or guidance of a skilled employee and includes un-skilled supervisory work;
- (c) "Skilled" work means work which involves skill or competence acquired through experience on the job or through training as an apprentice or in a technical or vocational institute and the performance of which calls for initiative and



(d) "Highly Skilled" work means work which calls for a high degree of performance and full competence in the performance of certain tasks, acquired through intensive technical or professional training or practices, work experience for long years and also required for workers to assure full responsibility for the judgment or decisions involved in the execution of these tasks.

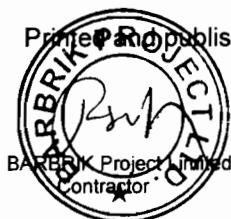
7. An adult employee shall work for 8 (eight) hours per day excluding half an hour of rest.

By Order of the Governor

C.T.M. SUGUNA

Commissioner-cum-Secretary to Government.

Printed and published by the Director, Printing, Stationery and Publication, Odisha, Cuttack-10
Ex. Gaz. 1389-193+300




Chief Engineer
World Bank PROJECT
Chief Engineer
World Bank Projects, Odisha
Bhubaneswar

8

(Name of the Project)
(Declaration regarding customs/excise duty exemption for materials/
construction equipment bought for the work)

Form

(Bidder's Name and Address)
**Barbrik Project Limited,
Nehru Park Road, Surajpur,
Chhattisgarh -497229, India**

To: **Chief Engineer, World Bank Projects,
Odisha on behalf of Works Department,
Government Of Odisha**
(Name of the Employer)

Dear Sir:

Re: *[Name of Work]* **Widening & strengthening of existing carriageway to 2-lane road from Bhawanipatna to
Khariar (Km. 2/000 to Km. 27/200 and Km. 30/000 to Km. 70/000 of SH - 16) (Balance
Work)**

Certificate for Import/Procurement of Goods/Construction Equipment

- We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Employer will not compensate us.
- We are furnishing below the information required by the Employer for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. 108/95 and Customs Notification No. 85/99.
- The goods/construction equipment for which certificates are required are as under:

Items	Make/ Brand Name	Capacity [where applicable]	Quantity	Value	State whether it will be procured locally or imported [if so from which country]	Remarks regarding justification for the quantity and their usage in works
Goods						
[a] Bitumen	As required or directed by The Engineer					
[b] Others						
Construction Equipment						
[a]	As required or directed by The Engineer					
[b]						
[c]						
[d]						

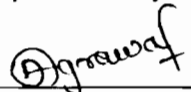
- We agree that no modification to the above list is permitted after bids are opened.
- We agree that the certificate will be issued only to the extent considered reasonable by the Employer for the work, based on the Bill of Quantities and the construction programme and methodology as furnished by us alongwith the bid.
- We confirm that the above goods will be exclusively used for the construction of the above work and construction equipment will not be sold or otherwise disposed of in any manner for a period of five years from the date of acquisition.

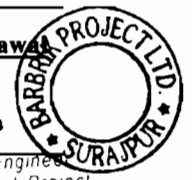
Date: 15th April
Place: Surajpur (C.G.)

TRUE COPY

**MD. AYYUB KHAN
OATH COMMISSIONER
AMBIKAPUR, SURAJPUR (C.G.)**

15 APR 2013

(Signature) 
(Printed Name) **Dhruv Kumar Agrawal**
(Designation) **Director**
(Common Seal) _____




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World Bank Project Signed
Contractor


 Chief Engineer
 World Bank Project
 Chief Engineer
 World Bank Projects, Ghana

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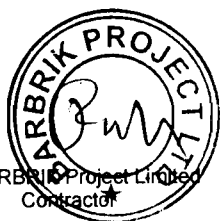


SECTION 3: CONDITIONS OF CONTRACT



BARBRIK Project Limited
Contractor


Chief Engineer
World Bank Projects, Odisha
G/O the E.I.C. (C.M.), Bhubaneswar



BARBRIK Project Limited
Contractor

A handwritten signature in black ink, likely belonging to the Chief Engineer.

Chief Engineer
World Bank Projects, Odisha
for the E.I.C. (Civil), Odisha
Bhubaneswar

A. General

1. Definitions

- 1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in Clauses 24 and 25. The name of the Adjudicator is defined in the Contract Data.

Bill of Quantities means the priced and completed **Bill of Quantities** forming part of the Bid.

Compensation Events are those defined in Clause 44 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 55.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Employer.

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; **months** are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

The **Engineer** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the execution of the works and administering the Contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The



Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Site Investigation Reports are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Engineer which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

- 2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about the Conditions of Contract.
- 2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:
- (1) Agreement
 - (2) Letter of Acceptance, notice to proceed with the works
 - (3) Contractor's Bid
 - (4) Contract Data
 - (5) Conditions of Contract including Special Conditions of Contract



- (6) Specifications
- (7) Drawings
- (8) Bill of Quantities and
- (9) any other document listed in the Contract Data as forming part of the Contract.

3. Language and Law

- 3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions

- 4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. Delegation

- 5.1 The Engineer may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

- 6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting

- 7.1 The Contractor may subcontract with the approval of the Engineer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors

- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors. The Contractor shall as referred to in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modification.

9. Personnel

- 9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.



- 9.2 If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Employer's and Contractor's Risks

- 10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

- 11.1 The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer's country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor's design.

12. Contractor's Risks

- 12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Insurance

- 13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant and Materials;
- (b) loss of or damage to Equipment;
- (c) loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
- (d) personal injury or death.

- 13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

- 13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

- 13.4 Alterations to the terms of an insurance shall not be made without the approval of the Engineer.

Both parties shall comply with any conditions of the insurance policies.



14. Site Investigation Reports

- 14.1 The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

15. Queries about the Contract Data

- 15.1 The Engineer will clarify queries on the Contract Data.

16. Contractor to Construct the Works

- 16.1 The Contractor shall construct and install the Works in accordance with the Specification and Drawings, and as per instructions of Engineer.

17. The Works to Be Completed by the Intended Completion Date

- 17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. Approval by the Engineer

- 18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them if they comply with the Specifications and Drawings.
- 18.2 The Contractor shall be responsible for design of Temporary Works.
- 18.3 The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.
- 18.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works where required.
- 18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer before their use.

19. Safety

- 19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

- 20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. Possession of the Site

- 21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.



22. Access to the Site

- 22.1 The Contractor shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. Instructions

- 23.1 The Contractor shall carry out all instructions of the Engineer which comply with the applicable laws where the Site is located.

23.2 Inspections and Audits by the Bank

The Contractor shall permit the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records of the Contractor and its subcontractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank. The Contractor's attention is drawn to Clause 64 [Corrupt or Fraudulent Practices] which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 23.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Procurement Guidelines).

24. Disputes

- 24.1 If the Contractor believes that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Engineer's decision.

25. Procedure for Disputes

- 25.1 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 25.2 The Adjudicator shall be paid daily at the rate specified in the Contract Data together with reimbursable expenses of the types specified in the Contract Data and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.
- 25.3 The arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

26. Replacement of Adjudicator

- 26.1 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not fulfilling his functions in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the Contract Data at the request of either party, within 14 days of receipt of such request.



B. Time Control

27. Program

- 27.1 Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Program including Environmental Management Plan showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.
- 27.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.
- 27.3 The Contractor shall submit to the Engineer, for approval, an updated Program at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
- 27.4 The Engineer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Engineer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

- 28.1 The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- 28.2 The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Deleted

30. Delays Ordered by the Engineer

- 30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

31. Management Meetings

- 31.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 31.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.



32. Early Warning

- 32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.
- 32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

C. Quality Control

33. Identifying Defects

- 33.1 The Engineer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.
- 33.2 The contractor shall permit the Employer's Technical auditor to check the contractor's work and notify the Engineer and Contractor of any defects that are found. Such a check shall not affect the Contractor's or the Engineer's responsibility as defined in the Contract Agreement.

34. Tests

- 34.1 If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

35. Correction of Defects

- 35.1 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
- 35.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer's notice.

36. Uncorrected Defects

- 36.1 If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

Note: Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Engineer will certify payments to Contractor accordingly.



D. Cost Control

37. Bill of Quantities

- 37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the contractor.
- 37.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

38. Changes in the Quantities

- 38.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1% of Initial Contract Price, the Engineer shall adjust the rate to allow for the change.
- 38.2 The Engineer shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the Prior approval of the Employer.
- 38.3 If requested by the Engineer, the Contractor shall provide the Engineer with a detailed cost breakdown of any rate in the Bill of Quantities.

39. Variations

- 39.1 All Variations shall be included in updated Programs produced by the Contractor.

40. Payments for Variations

- 40.1 The Contractor shall provide the Engineer with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.
- 40.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in form of new rates for the relevant items of work.
- 40.3 If the Contractor's quotation is unreasonable (or if the contractor fails to provide the Engineer with a quotation within a reasonable time specified by the engineer in accordance with Clause 40.1), the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer's own forecast of the effects of the Variation on the Contractor's costs.
- 40.4 If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- 40.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.



41. Cash flow forecasts

- 41.1 When the Program is updated, the contractor is to provide the Engineer with an updated cash flow forecast.

42. Payment Certificates

- 42.1 The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously alongwith details of measurement of the quantity of works executed in a tabulated form as approved by the Engineer.
- 42.2 The Engineer shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 51(3) of the Contract Data (Secured Advance).
- 42.3 The value of work executed shall be determined by the Engineer after due check measurement of the quantities claimed as executed by the contractor.
- 42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed..
- 42.5 The value of work executed shall include the valuation of Variations and Compensation Events.
- 42.6 The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

43. Payments

- 43.1 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made upto the date when the late payment is made at 8% per annum.
- 43.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
- 43.3 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

44. Compensation Events

- 44.1 The following are Compensation Events unless they are caused by the Contractor:
- (a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.



- (b) The Employer modifies the schedule of other contractors in a way which affects the work of the contractor under the contract.
- (c) The Engineer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
- (d) The Engineer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
- (e) The Engineer unreasonably does not approve for a subcontract to be let.
- (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of Letter of Acceptance from the information issued to Bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
- (g) The Engineer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The advance payment is delayed.
- (j) The effect on the Contractor of any of the Employer's Risks.
- (k) The Engineer unreasonably delays issuing a Certificate of Completion.
- (l) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

44.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Engineer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

44.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Engineer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Engineer shall adjust the Contract Price based on Engineer's own forecast. The Engineer will assume that the Contractor will react competently and promptly to the event.

44.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.

45. Tax

45.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

46. Currencies

46.1 All payments shall be made in Indian Rupees.



47. Price Adjustment

- 47.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in the contract data:
- The price adjustment shall apply for the work done from the start date given in the contract data upto end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
 - The price adjustment shall be determined during each quarter from the formula given in the contract data.
 - Following expressions and meanings are assigned to the work done during each quarter:

R = Total value of work done during the quarter. It would include the amount of secured advance for materials paid for (if any) during the quarter, less the amount of the secured advance recovered, during the quarter. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.
- 47.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

48. Retention

- 48.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.
- 48.2 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
- 48.3 On completion of the whole works, the contractor may substitute retention money (*balance half*) with an "on demand" Bank guarantee.

49. Liquidated Damages

- 49.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.
- 49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the over payment calculated from the date of payment to the date of repayment at the rates specified in Sub Clause 43.1.



50. Deleted

51. Advance Payment

- 51.1** The Employer shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.
- 51.2** The Contractor is to use the advance payment only to pay for Equipment, Plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.
- 51.3** The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance (mobilization and equipment only) payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, or Liquidated Damages.

51.4 Secured Advance:

The Engineer shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the Contract Data.

52. Securities

- 52.1** The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The Performance Security shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.

53. Deleted

54. Cost of Repairs

- 54.1** Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.



E. Finishing the Contract

55. Completion

55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

56. Taking Over

56.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

57. Final Account

57.1 The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's revised account.

58. Operating and Maintenance Manuals

58.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

59. Termination

59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2 Fundamental breaches of Contract include, but shall not be limited to the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Engineer;
- (b) the Engineer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer's certificate;
- (e) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
- (f) the Contractor does not maintain a security which is required;



- (g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
- (h) if the Contractor, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in CC Clause 64, in competing for or in executing the Contract.

59.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

59.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

60. Payment upon Termination

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due

to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply . If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

60.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

61. Property

61.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor's default.

62. Release from Performance

62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

63. Suspension of World Bank Loan or Credit

63.1 In the event that the World Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:



- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the World Bank's suspension notice.
- (b) If the Contractor has not received sums due to it upon the expiration of the 28 days for payment provided for in Sub-Clause 43.1, the Contractor may immediately issue a 14-day termination notice.

64. Corrupt or Fraudulent Practices:

64.1 If the Employer determines that the Contractor has engaged in corrupt, fraudulent, collusive coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 59 shall apply.

Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9 [Personnel].

For the purposes of this Sub-Clause:

- (i) "corrupt practice"¹ is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- (ii) "fraudulent practice"² is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
- (iii) "collusive practice"³ is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- (iv) "coercive practice"⁴ is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- (v) "obstructive practice" is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

¹ "another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

² a "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.


³ "parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

⁴ "party" refers to a participant in the procurement process or contract execution.



- (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 23.2 [Inspections and Audits by the Bank]."




Chief Engineer
World Bank Project
Oro the E.C. (Civil), Odisha
Chief Engineer
World Bank Projects, Odisha

F. Special Conditions of Contract

1. Labour :

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

2. Compliance with Labour Regulations :

During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

Salient Features of Some Major Labour Laws

(Applicable to establishments engaged in building and other construction work; the law as current on the date of bid opening will apply)

a) Workmen Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.



c) Employees P.F. and Miscellaneous Provision Act 1952 (since amended): The Act Provides for monthly contributions by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are :

- (i) Pension or family pension on retirement or death, as the case may be.
- (ii) Deposit linked insurance on the death in harness of the worker.
- (iii) payment of P.F. accumulation on retirement/death etc.

d) Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.

f) Minimum Wages Act 1948: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.

g) Payment of Wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) Equal Remuneration Act 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

i) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/-per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/-per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

j) Industrial Disputes Act 1947: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

k) Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment



by the Employer on matters provided in the Act and get the same certified by the designated Authority.

l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home upto the establishment and back, etc.

o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and The Building and Other Construction workers Welfare Cess Act of 1996: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate of 1% of the cost of construction as notified by the Labour & Employment Department, Government of Odisha in December, 2008.

p) Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.



3. Sub-Contracting (CC Clause 7)

Please add the following as Clause 7.2:

The contractor shall not be required to obtain any consent from the employer for:

- a) the sub-contracting of any part of the Works for which the Sub-contractor is named in the contract;
- b) the provision of labour; and
- c) the purchase of materials which are in accordance with the standards specified in the Contract.

Beyond this if the contractor proposes sub-contracting any part of the work during execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, the Engineer will consider the following before according approval:

- The contractor shall not sub-contract the whole of the Works.
- The contractor shall not sub-contract any part of the Work without prior consent of the Engineer. Any such consent shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
- The Engineer should satisfy whether (a) the circumstances warrant such sub-contracting; and (b) the sub-contractors so proposed for the Work possess the experience, qualifications and equipment necessary for the job proposed to be entrusted to them in proportion to the quantum of work to be sub-contracted.
- If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that this arrangement does not alter the contractor's liability or obligations under the contract.

(Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 20 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished along with the bid to enable the employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for subcontracting is not acceptable. [b] In any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.



4. Arbitration (CC Clause 25.3)

The procedure for arbitration will be as follows :

- 25.3 (a) In case of Dispute or difference arising between the Employer and a domestic contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the Secretary, Indian Roads Congress, New Delhi, India.
- (b) In the case of dispute with a Foreign contractor the dispute shall be settled in accordance with provisions of UNCITRAL Arbitration Rules. The Arbitral Tribunal shall consist of three Arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties, and shall act a presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding arbitrator shall be appointed by the Secretary, Indian Roads Congress, New Delhi, India.
- (c) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) and (b) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the * Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Dispute Resolution (India), both in cases of the Foreign Contractor as well as Indian Contractor, shall appoint the arbitrator. A certified copy of the order of the Secretary, Indian Roads Congress, New Delhi, India, making such an appointment shall be furnished to each of the parties.
- (d) Arbitration proceedings shall be held at Bhubaneswar, Odisha, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
- (e) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation, etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
- (f) Where the value of the contract is Rs.50 millions and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority, namely the Secretary, Indian Roads Congress, New Delhi, India.
- (g) Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the owners shall not be withheld, unless they are the subject matter of the arbitration proceedings.



5. Protection of Environment:

Add the following as CC Clause 16.2:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

Salient features of some of the major laws that are applicable are given below :

The Water (Prevention and Control of Pollution) Act, 1974, This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981, This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986, This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Public Liability Insurance Act, 1991, This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

[Employers should note that the Loan Agreement between IBRD and the borrowing country may establish specific measures to be taken during construction of the Works for the protection of the environment. Sub-clause 16.2 should be modified/expanded to take into account such specific measures or other measures considered appropriate by the Employer]



6. Liquidated Damages:

Sub-clause 49.1:

Please substitute the last sentence with the following:

“Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones or from any other of the contractor’s obligations and liabilities under the contract.”



SECTION 4: CONTRACT DATA




Chief Engineer
World Bank Project
for the E.I.C. (Civil), Odisha
Bh. Chief Engineer
World Bank Projects, Odisha




Chief Engineer
World Bank Projects, Odisha
Rajnabeswar


Contract Data

(Items marked "N/A" do not apply in this Contract.)

Sl. No.	Conditions	Data	Clause Reference
1	The following documents are also part of the Contract:		
	a. The Schedule of Operating and Maintenance Manuals	N/A	[58]
	b. The Schedule of Other Contractors	N/A	[8]
	c. The Schedule of Key Personnel	Attached	[9]
	d. The Methodology and Program of Construction & Environmental Management Plan	Attached	[27]
	e. The Schedule of Key and Critical equipment to be deployed on the work as per agreed program of construction	Attached	[27]
	f. Site Investigation reports		[14]
2	The Borrower is	Government of Odisha through Government of India	[1.1]
3	The World Bank means	<i>International Bank for Reconstruction and Development (IBRD)</i> and loan refers to an <i>IBRD Loan</i> .	[1.1]
4	The Employer is	Name: <i>Chief Engineer, World Bank Projects, Odisha</i> on behalf of <i>Works Department, Government. of Odisha</i> Address: Office of the E.I.C.(Civil), Odisha, Nirman Soudha, Keshari Nagar, Bhubaneswar-751001 Odisha. Email: pmuosrp@gmail.com , website : www.osrp.gov.in , Tel:: 0674-239 6783 Fax : 0674-239 0080	[1.1]
	Name of authorized Representative:	N/A	[1.1]



ORBIK Project Limited
Contractor


 Chief Engineer
 World Bank Project
 Office of the E.I.C.(Civil), Odisha
 Bhubaneswar
 Chief Engineer
 World Bank Projects, Odisha

5	The Engineer is	The Resident Engineer, M/s MSV International Inc, USA in JV with UPHAM International Corporation Sree Harinagar, Plot No-1320/ 1988, Padampur Road, Raj Khariar, Nuapada, Odisha-766107 Email: msvkhariar@gmail.com	[1.1]
	Name of Authorized Representative:	N/A	[1.1]
6	The Adjudicator appointed jointly by the Employer and Contractor is:	Name : Sri Basudev Sahoo, Chief Engineer (Retd.), Works Department, Odisha Address : Plot No. 437, Sahid Nagar, Bhubaneswar	[1.1]
7	The name and identification number of the Contract is [insert name and number as indicated in the Invitation for Bids (or Prequalification, if any)]	Name: Widening & strengthening of existing carriageway to 2-lane road from Bhawanipatna to Khariar (Km. 2/000 to Km. 27/200 and Km. 30/000 to Km. 70/000 of SH – 16) (Balance Work) Identification No- OSRP-Bal-P01A	[1.1]

8. The Works consist of :

This road located in the South Western part of Odisha and having a total length of 70 Km, takes off from NH 201 at 140/0 km and terminates on 355/0 km on NH 217 at Khariar. The road passes through Kalahandi, Bolangir and Nuapada districts. This area experiences rainfall of average 900mm to 1200mm per annum and bulk of the rainfall occurs during June to October, which is the monsoon period in Odisha. Highest temperature in the area during, March to May is 47 degree Celsius and the temperature dips to the lowest of 6 degree Celsius during winter season. This road passes through the towns of Bhawanipatana and Khariar. Bhawanipatana is the district head quarter of Kalahandi district. Major river in the area are river Tel, which crosses the project road at 29th Km and river Under at 59th km.

The work was awarded in December, 2008 Vide Agreement No-5/2008-09 of C.E, World Bank Projects, Odisha. The work was terminated in November 21, 2012. About 42 Kms of work has been attempted in the previous contract. There are incomplete stretches of work and un-attempted stretches of work. CD works & Bridges are also in incomplete shape. Bidders are encouraged to visit the site to have first hand feel of the site conditions before bidding.

The proposed construction package to be taken up is as follows:

Sl.	Package No.	Name of the Road	Approximate Length of Construction in Km	Period of Construction
1	OSRP-Bal- P01A	Widening & strengthening of existing carriageway to 2-lane road from Bhawanipatna to Khariar (Km. 2/000 to Km. 27/200 and Km. 30/000 to Km. 70/000 of SH – 16) (Balance Work)	65 kms	24 Months



The civil works shall broadly comprise of the following, as required, mostly along existing alignments.

- a. Improvement of road geometry;
- b. Raising & Widening of embankments considering drainage and road geometry
- c. Sub base, base and bituminous pavement with limited concrete pavements in built up areas and toll plazas;
- d. Widening and paving of carriageway and shoulders;
- e. Improvement of side drainage & improvement to or replacement and widening of culverts;
- f. Repair and rehabilitation of bridges;
- g. Construction of new Culverts and Bridges;
- h. Traffic safety features;
- i. Road signs and road markings;
- j. Environmental protection and management measures during construction stage;
- k. Traffic diversion and management during the construction;
- l. Routine Maintenance of Project Corridors during the construction period;
- m. Construction and maintenance of Diversion roads

Sl. No.	Conditions	Data	Clause Reference
9	The Start Date	Shall be the date of issue of notice to proceed with the work.	[1.1]
10	The Intended Completion Date for the whole of the Works is	24 Months from the Start date with the following milestones given below:	[17, 28]

Milestone dates:

	<u>Physical works to be completed</u>	<u>Period from the date of issue of notice to proceed with the work</u>
Milestone 1	Section-I contains the following stretches : *35/000 Km to 50/000 Km, *50/550 Km to 52/550 Km, *53/250 Km to 55/000 Km, *55/750 Km to 57/500 Km and *59/500 Km to 67/000 Km (Total-28 Km)	14 (Fourteen) Months from Commencement of Works
Milestone 2	Section-II contains the following stretches : 11/000 Km to *27/000 Km and *30/000 Km to 35/000 Km (Total-21 Km)	19 (Nineteen) Months from Commencement of Works
Milestone 3	Section-III contains the following stretches: 2/000 Km to 11/000 Km, 50/000 Km to 50/550 Km, 52/550 Km to 53/250 Km, 55/000 Km to 55/750 Km, 57/500 Km to 59/500 Km and 67/000 Km to 70/000 Km (Total-16 Km)	24 (Twenty-four) Months from Commencement of Works

Note:- * Some parts of this stretch has been taken up in previous contract.



Sl. No.	Conditions	Data	Clause Reference
11	The following documents also form part of the Contract: The Contractor shall submit a revised Program including Environmental Management Plan for the Works (in such form and detail as the engineer shall reasonably prescribe) <i>[This program should be in adequate detail and generally conform to the program submitted alongwith bid in response to ITB Clause 4.3 (k). Deviations if any from that should be clearly explained and should be satisfactory to the Engineer]</i>	within 14 days of delivery of the Letter of Acceptance.	[2.3] [27]
12	The Site Possession Dates shall be:	<p><u>Section-I</u> The 28 Kms stretch will be handed over for execution prior to issuance of advance payments under Clause 51 as detailed below. The section includes incomplete stretches and CD works done by the previous contractor & other encumbrance free stretches. 35/000 Km to 50/000 Km, *50/550 Km to 52/550 Km, *53/250 Km to 55/000 Km, *55/750 Km to 57/500 Km and *59/500 Km to 67/000 Km (Total-28 Km)</p> <p><u>Section-II</u> The 21 Kms stretch will be handed over for execution as detailed below <u>within one month of date of commencement</u>. The section includes incomplete stretches and CD works taken up by the previous contractor & other encumbrance free stretches. 11/000 Km to *27/000 Km and *30/000 Km to 35/000 Km (Total-21 Km)</p> <p><u>Section-III</u> The balance 16.0 Kms stretch will be handed over for execution <u>within three months of date of commencement</u> as detailed below. 2/000 Km to 11/000 Km, 50/000 Km to 50/550 Km, 52/550 Km to 53/250 Km, 55/000 Km to 55/750 Km, 57/500 Km to 59/500 Km and 67/000 Km to 70/000 Km (Total-16 Km)</p> <p><u>Within two weeks of handing over of the each stretch, contractor needs to</u></p>	[21]



		<u>examine and provide acceptance of receiving encumbrance free land or inform the employer otherwise with any deficiencies. Minor changes to the section may be done by the Employer.</u>	
13	The Site is located at	In the Kalahandi, Bolangir and Nuapada Districts of Odisha and is defined in Drawings provided in Section- 6	[1]
14	The Defect Liability Period is	365 days from the date of certification of completion of works. (where sectional completion certificate is issued, this will apply from those dates for those sections).	[35]
15	Insurance requirements are as under:	<u>Minimum Cover for Insurance</u>	<u>Maximum deductible for Insurance</u>
	(i) Works and Plant and Materials	Equal to Contract Amount	0.2% of Contract Amount
	(ii) Loss or damage to Equipment	10% of Contract Amount	0.1% of Contract Amount
	(iii) Other Property	5% of Contract Amount	0.1% of Contract Amount
	(iv) Personal injury or death insurance for Contractor's Employees	Rs. 8 Lakh	0.1% of Contract Amount
	(v) Personal injury or death insurance for other people	In accordance with the statutory requirements applicable to India	
16	The following events shall also be Compensation Events:	N/A	[44]
17	The period between Program updates shall be	90 days	[27]
18	The amount to be withheld for late submission of an updated Program shall be	Rs. 5,00,000/-	[27]
19	The language of the Contract documents is	English	[3]
20	The law which applies to the Contract is	the laws of Union of India	[3]
21	The currency of the Contract is	Indian Rupees	[46]
22	Fees and types of reimbursable expenses to be paid to the Adjudicator	(a) Monthly Retainer Fees:- Rs. 10,000/- (b) Daily Fee of Rs. 4,000/- shall be paid for each day of site visit . (c) Rs.2,000/- per day shall be paid during travel time upto a maximum of two days in each direction for journey Travelling expenses as per actual.	[25]
	Appointing Authority for the	Secretary General, Indian Roads	[26]



	Adjudicator	Congress, New Delhi	
24	The formula(e) for adjustment of prices are:	As indicated below	[47]

The formula(e) for adjustment of prices are: [47]

R = Value of work as defined in Clause 47.1 of Conditions of Contract.

Adjustment for labour component

- (i) Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

$$V_L = 0.85 \times P_l/100 \times R \times (L_i - L_o)/L_o$$

V_L = increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local labour.

L_o = The Minimum Wage for the quarter preceding the date of opening of Bids as notified by the Labour and Employment Department, Government of Odisha

L_i = The Revised Minimum Wage for the quarter under consideration as notified by the Labour and Employment Department, Government of Odisha

P_l = Percentage of labour component of the work.

Adjustment for cement component

- (ii) Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula.

$$V_c = 0.85 \times P_c/100 \times R \times (C_i - C_o)/C_o$$

V_c = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for cement

C_o = The all India average wholesale price index for cement for the quarter preceding the date of opening of Bids as published by the Office of the Economic Advisor, Ministry of Finance, Government of India

C_i = The all India average wholesale price index for cement for the quarter under consideration as published by the Office of the Economic Advisor, Ministry of Finance, Government of India

P_c = Percentage of cement component of the work

Adjustment for steel component

- (iii) Price adjustment for increase or decrease in the cost of steel procured by the Contractor shall be paid in accordance with the following formula:

$$V_s = 0.85 \times P_s/100 \times R \times (S_i - S_o)/S_o$$



V_s = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for steel

S_o = The all India average wholesale price index for steel (Bars and Rods) for the quarter preceding the date of opening of Bids as published by the Office of the Economic Advisor, Ministry of Finance, Government of India

S_i = The all India average wholesale price index for steel (Bars and Rods) for the quarter under consideration as published by Office of the Economic Advisor, Ministry of Finance, Government of India

P_s = Percentage of steel component of the work

Note: For the application of this clause, index of Bars and Rods has been chosen to represent steel group.

Adjustment of Bitumen component

- (iv) Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

$$V_b = 0.85 \times P_b/100 \times R \times (B_i - B_o)/B_o$$

V_b = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rate for bitumen.

B_o = The official ex-depot retail price of bulk bitumen VG 30 Grade at the IOC depot at Haldia on the day 30 days prior to date of opening of Bids.

B_i = The average ex-depot retail price of bulk bitumen VG 30 Grade at the IOC depot at Haldia for the quarter under consideration.

P_b = Percentage of bitumen component of the work.

Adjustment of POL (fuel and lubricant) component

- (v) Price adjustment for increase or decrease in cost POL (fuel and lubricant) shall be paid in accordance with the following formula:

$$V_f = 0.85 \times P_f/100 \times R \times (F_i - F_o)/F_o$$

V_f = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for fuel and lubricants.

F_o = The average official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC at , Bhawanipatna on the day thirty days prior to the date of opening of Bids.

F_i = The average official retail price of HSD at the existing consumer pumps of IOC at Bhawanipatna for the quarter under consideration.

P_f = Percentage of fuel and lubricants component of the work.

Note: For the application of this clause, the price of High Speed Diesel oil has been chosen to represent fuel and lubricants group.



Adjustment for Plant and Machinery Spares component

- (vi) Price adjustment for increase or decrease in the cost of plant and machinery spares procured by the Contractor shall be paid in accordance with the following formula:

$$V_p = 0.85 \times P_p/100 \times R \times (P_i - P_o)/P_o$$

V_p = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for plant and machinery spares

P_o = The all India average wholesale price index for heavy machinery and parts for the quarter preceding the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi

P_i = The all India average wholesale price index for heavy machinery and parts for the quarter under consideration as published by Ministry of Industrial Development, New Delhi

P_p = Percentage of plant and machinery spares component of the work

Note: For the application of this clause, index of Heavy Machinery and Parts has been chosen to represent the Plant and Machinery Spares group.

Adjustment of Local materials

- (vii) Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen and POL procured by the contractor shall be paid in accordance with the following formula:

$$V_m = 0.85 \times P_m/100 \times R \times (M_i - M_o)/M_o$$

V_m = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M_o = The all India average wholesale price index (all commodities) for the quarter preceding the date of opening of Bids, the Office of the Economic Advisor, Ministry of Finance, Government of India

M_i = The all India average wholesale price index (all commodities) for the quarter under consideration as published by the Office of the Economic Advisor, Ministry of Finance, Government of India

P_m = Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

The following percentages will govern the price adjustment for the entire contract:

1.	Labour - P_l	05 %
2.	Cement - P_c	12 %
3.	Steel - P_s	08 %
4.	Bitumen - P_b	25 %
5.	POL - P_f	20 %
6.	Plant & Machinery Spares - P_p	15 %
7.	Other materials - P_m	15 %
	Total	100%



Sl. No.	Conditions	Data	Clause Reference
25	The proportion of payments retained (retention money) shall be	10% from each bill subject to a maximum of 5% of contract price	[48]
26	The liquidated damages for the whole of the works are:	For milestone 1 @ Rs. 1,18,000/-per day For milestone 2 @ Rs.1,76,000/- per day For milestone 3 @ Rs.1,34,000/- per day In case the Contractor delays in any of the sections but completes the total work within total completion period then the liquidated damages deducted for delay in a particular section shall be refunded back to the Contractor.	[49]
27	The maximum amount of liquidated damages for the whole of the works is	10% percent of contract price.	[49]
28	The amounts of the advance payment are:		[51]
	a. Mobilization	5 % of the Accepted Contract Amount payable in the currencies and proportions in which the Accepted Contract Amount is payable, in one installment after due acceptance of encumbrance free land of Section-I by the contractor and on submission of un-conditional Bank Guarantee.	
	b. Equipment	90% for new and 50% of depreciated value for old equipment after equipment is brought to site as per agreed construction program (provided the Engineer is satisfied that the equipment is required for performance of the contract) and on submission of unconditional Bank Guarantee for amount of advance. Total amount will be subject to a maximum of 10% of the Contract price. This advance is not applicable for equipment already owned or hired/ leased by the contractor.	
	c. Secured advance for non-perishable materials brought to site <i>(The advance payment will be paid to the Contractor no later than 15 days after fulfillment of the above conditions).</i>	On the following materials, subject to maximum of 2% of the accepted contract amount, at any point of time, as required for utilization in the works on submission of un-conditional Bank Guarantee. 1. Reinforced Steel 2. Processed Aggregates 3. Bitumen/ Modified bitumen complying with the following conditions. a) The materials are in-accordance with the specification for Works;	



		<p>b) Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks.;</p> <p>c) The Contractor's records of the requirements, orders, receipt and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer;</p> <p>d) The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof;</p> <p>e) Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted an Indemnity Bond in an acceptable format; and</p> <p>f) The quantity of materials are not excessive and shall be used within a reasonable time as determined by the Engineer.</p>	
29	Repayment of advance payment for mobilization:	The advance shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 20% of the Contract Price or 6 months from the date of payment of advance, whichever period concludes earlier, and shall be made at the rate of 10 percent of the amounts of all Interim Payment Certificates until such time as the advance has been repaid, always provided that the advance shall be completely repaid prior to 70% of the completion of the work.	[51]
30	Repayment of secured advance:	The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid pursuant to Clause 51.4 of C.C. and 28(c) of Contract Data on pre-page] have been incorporated into the Works.	[51]
31	The Securities shall be for the following minimum amounts		[52]



	equivalent as a percentage of the Contract Price:		
	a. Performance Security	5 per cent of contract price plus additional security for unbalanced bids if any to be intimated in the Letter of Acceptance	[in terms of ITB Clause 29.5].
	b. The standard form of Performance Security	An unconditional Bank Guarantee of the types as presented in Section 8 of the Bidding Documents acceptable to the Employer	
32	The date by which operating and maintenance manuals are required	N/A	[58]
33	The manner and date by which "as-built" drawings shall be submitted	a. In the same scale in which the working drawings have been issued. b. Both in hard and soft form within 28 days of issue of certificate of completion of whole or section of the work, as the case may be.	[58]
34	The amount to be withheld for failing to supply "as built" drawings by the date specified	Rs. 25 lakh	[58]
35	The following events shall also be fundamental breach of contract:	1. The Contractor has contravened Sub-clause 7 of CC read with SCC and Clause 9.0 of CC. 2. The contractor does not adhere to the agreed construction program and agreed environmental management plan (Clause 27 of CC) and also fails to take satisfactory remedial action as per agreements reached in the management meetings (Clause 31) for a period of 30 days. The contractor fails to carry out of the instructions of Engineer within a reasonable time determined by the Engineer in accordance with CC Clause 16.1 and 23.1.	[59.2]
36	The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be	20 %	[60]
37	Penalty for non performance of following items		
37(a)	Failure to Maintain the Road during construction	The contractor's obligations for maintenance of the road stretches shall be limited to the portions/ stretches/ structures handed over to him by the Employer. Other stretches not handed over to him shall be maintained by the Employer till handing	



		<p>over.</p> <p>In case of failure to execute the same, the following amount shall be deducted from the payment certificates of the contractor.</p> <p>1. Road Surface : In case of failure to maintain the road surface pot hole free, a penalty shall be levied at the rate Rs.1500/- per km per day.</p> <p>2. Shoulders : In case of failure to maintain the shoulders , a penalty shall be levied at the rate Rs.500/- per km per day.</p>	
37(b)	Failure to take up Road Safety measures during construction	<p>The Contractor has to follow all traffic safety measures as defined in the Technical Specifications. In case of failure to execute the same, the work shall be taken up by the department through other agency, and the following amount shall be deducted from the payment certificates of the contractor.</p> <p>1. Diversion:- (a) Penalty @ Rs.5000/- per day per location shall be imposed from the date of occurrence till installation of the safety items.</p> <p>(a) One time deduction for non-performance @ Rs. 1,20,000/- per location towards installation of safety measures</p> <p>(b) Penalty @ Rs.1500/- per day per location towards maintenance of safety measures from the date of installation till removal</p> <p>2. Part Road Barricading:-</p> <p>(a) Penalty @ Rs.5000/- per day per location shall be imposed from the date of occurrence till installation of the safety items.</p> <p>(b) One time deduction for non-performance @ 75,000/- per location of 250 mtr. long road stretch or less towards installation of safety measures</p> <p>(c) Penalty @ Rs.1500/- per day per location towards maintenance of safety measures from the date of installation till removal</p>	[18], [19]
37(c)	Failure to adhere to Environmental Mitigation Measures during construction	<p>The Contractor has to follow all Environmental Mitigation Measures as defined in the Technical Specifications . A penalty shall be levied at the rate indicated below for non-conformity of the following items.</p> <p>1. Not filling up of the post of Environment and Safety Officer- Penalty @ Rs. 50,000/- per month</p>	



		<p>2.No proper sanitation & waste disposal arrangements at the labour camp site- Penalty @ Rs. 10,000/- per single violation compounded to Rs. 50,000/- at any single instance</p> <p>3.No dust control measures at site- Penalty @ Rs. 5,000/- per location per single violation compounded to Rs. 50,000/- at any single instance</p> <p>4.No pollution and / or noise control of crusher, hot mix plant, batch mix plant- Penalty @ Rs. 10,000/- per single violation compounded to Rs. 50,000/- at any single instance</p> <p>5.Improper disposal of debris/ residues- Penalty @ Rs. 10,000/- per single violation compounded to Rs. 50,000/- at any single instance</p> <p>6.Spillage of oil at camp site not arrested- Penalty @ Rs. 10,000/- per single violation compounded to Rs. 50,000/- at any single instance</p> <p>7.Persons not using Personal Protective Equipments (PPE)- Penalty @ Rs. 200/- per single violation per person</p> <p>8.Burrow area/ quarry management not done- Penalty @ Rs. 10,000/- per location per instance</p>	
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Chief Engineer
World Bank Projects, Odisha
Bhubaneswar.

SECTION 6: DRAWINGS



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Under the E.I.C.(Civil), Odisha
Bhubaneswar.
Chief Engineer
World Bank Projects, Odisha




Chief Engineer
World Bank Project
Odisha, Odisha
Bhubaneswar

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	UNDER WORLD BANK ASSISTANCE		SH. NO.	DATE : 28/12/2012
			SCALE	R1
		REV :	REV R0	INDEX OF HIGHWAYS
			PREPARED BY:	PREPARED BY:
			CEG Ltd.	EE/PMU
				APPROVED
				CE, World Bank Projects.

[Handwritten Signature]

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129	General Notes (For Slab Bridges)	OSRP/CEG/SH-16/BR/NOTES/01	149	BRIDGE AT PROPOSED CH. 58+900 General Arrangement Drawing	OSRP/CEG/SH-16/BR/58+900-1
130	General Notes (For RCC T-Beam Bridges)	OSRP/CEG/SH-16/BR/NOTES/02	150	Reinforcement Details of sub structure	OSRP/CEG/SH-16/BR/58+900-2
131	General Notes (For PSC Girder)	OSRP/CEG/SH-16/BR/NOTES/03	151	Site plan	OSRP/CEG/SH-16/BR/58+900-3
132	BRIDGE AT PROPOSED CH. 8+600 General Arrangement Drawing	OSRP/CEG/SH-16/BR/8+600-1	152	BRIDGE AT PROPOSED CH. 63+650 General Arrangement Drawing	OSRP/CEG/SH-16/BR/63+650-1
133	BRIDGE AT PROPOSED CH. 10+500 General Arrangement Drawing	OSRP/CEG/SH-16/BR/8+600-2	153	Site plan	OSRP/CEG/SH-16/BR/63+650-2
134	BRIDGE AT PROPOSED CH. 13+750 General Arrangement Drawing	OSRP/CEG/SH-16/BR/10+500-1	REHABILITATION DRAWINGS		
135	Dimensions and Reinforcement Details of Sub-Structure	OSRP/CEG/SH-16/BR/10+500-2	154	BRIDGE AT KM. 3+050 Rehabilitation Bridge Details	OSRP/CEG/SH-16/BR/03+050-1
136	Site plan	OSRP/CEG/SH-16/BR/13+750-1	155	BRIDGE AT KM. 4+450 Rehabilitation Bridge Details	OSRP/CEG/SH-16/BR/04+450-1
137	BRIDGE AT PROPOSED CH. 17+120 General Arrangement Drawing	OSRP/CEG/SH-16/BR/13+750-2	156	BRIDGE AT KM. 59+100 Rehabilitation Bridge Details	OSRP/CEG/SH-16/BR/59+100-1
138	Site Plan	OSRP/CEG/SH-16/BR/17+120-1	157	BRIDGE AT KM. 59+400 Rehabilitation Bridge Details	OSRP/CEG/SH-16/BR/59+400-1
139	BRIDGE AT PROPOSED CH. 21+000 General Arrangement Drawing	OSRP/CEG/SH-16/BR/17+120-2	158	BRIDGE AT KM. 69+300 Rehabilitation Bridge Details	OSRP/CEG/SH-16/BR/69+300-1
140	Dimensions and Reinforcement Details of Sub-Structure	OSRP/CEG/SH-16/BR/21+000-1	CULVERTS DRAWINGS		
141	Site plan (Sheet 1 of 2)	OSRP/CEG/SH-16/BR/21+000-2	159	For R.C.C. Single pipe culverts (1x1.0m Dia)	OSRP/CEG/SH-16/BR/69+300-1
142	Site plan (Sheet 2 of 2)	OSRP/CEG/SH-16/BR/21+000-3	160	For R.C.C. Double pipe culverts (2x1.0m Dia)	OSRP/CEG/SH-16/PIPE CUL-01
143	BRIDGE AT PROPOSED CH. 45+700 General Arrangement Drawing	OSRP/CEG/SH-16/BR/21+000-4	161	Typical Widening Arrangement by Extension of Pipes	OSRP/CEG/SH-16/PIPE EXT-01
144	Site Plan	OSRP/CEG/SH-16/BR/45+700-1	RCC BOX CULVERTS		
145	BRIDGE AT PROPOSED CH. 54+791 General Arrangement Drawing	OSRP/CEG/SH-16/BR/45+700-2	162	General Arrangement Drawing	OSRP/CEG/SH-16/BOX CUL-01
146	Dimension & Reinforcement Details of Sub structure	OSRP/CEG/SH-16/BR/54+791-1	163	Reinforcement Details of Single cell Box	OSRP/CEG/SH-16/BOX CUL-02
147	Dimension & Reinforcement Details of Sub structure	OSRP/CEG/SH-16/BR/54+791-2	164	Details of Crash Barrier, Expansion Joint, approach Slab & Drainage Spout	OSRP/CEG/SH-16/BR/MISC-01
148	Site plan	OSRP/CEG/SH-16/BR/54+791-3	165	GAD: Typical Details of floor protection wall	OSRP/CEG/SH-16/BR/FPW/01
		OSRP/CEG/SH-16/BR/54+791-4	166	GAD: Typical Details of CURTAINWALL	OSRP/SH-16/BR/SCW

BARBANK Project Limited
Contractor

Chief Engineer
World Bank Projects, Odisha
Go the E.I.C. (Civil), Odisha
Bhubaneswar.

PROJECT:-		Index of Drawings of Structures		REV R1	APPROVED
DRG NO.	OSRP/CEG/SH-16/INDEX/03	REV R0	PREPARED BY:	EE/PMU	CE, World Bank Projects.
SH.NO.	DATE : 28/12/2012	REV :	CEG Ltd.		
SCALE		R1			

List of Culverts for Balance Work (with Status)

S. No.	Chainage	Span	Type	Present Status	S. No.	Chainage	Span	Type	Present Status	S. No.	Chainage	Span	Type	Present Status
31	18831	1/340	RCC Box	Not started	61	40089	1/230	RCC Box	Railing item left.					
32	19661	1 x 1.0	Pipe	Items like Stone pitching to be done	62	41037	1/220	RCC Box	- do -					
33	20112	1/430	RCC Box	Not started	63	41409	1/230	RCC Box	- do -					
34	20337	1/430	RCC Box	- do -	64	41789	1/450	RCC Box	- do -					
35	21607	1/430	RCC Box	- do -	65	42320	1/440	RCC Box	- do -					
36	22135	2 x 1.0	Pipe	Items like curtain wall & stone pitching to be done	66	42635	1 x 1.0	Pipe	Items like Stone pitching to be done					
37	22380	2 x 1.0	Pipe	Items like Stone pitching to be done	67	43159	1/330	RCC Box	Items like Curtain wall, pitching & Railing to be done					
38	23061	2 x 1.0	Pipe	Items like Stone pitching to be done	68	44261	1/220	RCC Box	- do -					
39	23200	1 x 1.0	Pipe	- do -	69	44954	1/340	RCC Box	- do -					
40	23321	1/340	RCC Box	Not started	70	45296	1 x 1.0	Pipe	Items like Stone pitching to be done					
41	23538	2 x 1.0	Pipe	Items like curtain wall & stone pitching to be done	71	45711	1/230	RCC Box	Stone pitching and railing item left.					
42	24062	1 x 1.0	Pipe	- do -	72	46047	1/630	RCC Box	Railing item left.					
43	24402	-	Pipe	- do -	73	46325	2 x 1.0	Pipe	Items like curtain wall & stone pitching to be done					
44	24513	1/430	RCC Box	Not started	74	46514	1/220	RCC Box	Railing item left.					
45	25723	2 x 1.0	Pipe	Items like curtain wall & stone pitching to be done	75	47165	1/220	RCC Box	Stone pitching and railing item left.					
46	26695	2 x 1.0	Pipe	- do -	76	47322	1 x 1.0	Pipe	Items like curtain wall & stone pitching					
47	27045	1 x 1.0	Pipe	Not started	77	49726	1/230	RCC Box	Stone pitching and railing item left.					
48	27175	1 x 1.0	Pipe	- do -	78	50287	1/440	RCC Box	Items like Curtain wall, pitching & Railing to be done					
49	30830	1/230	RCC Box	- do -	79	50499	1/230	RCC Box	Items like Retaining Wall, Railing & floor protection to be done					
50	31300	1/230	RCC Box	- do -	80	51174	1 x 1.0	Pipe	Items like curtain wall & stone pitching to be done					
51	32044	1/230	RCC Box	- do -	81	51409	2 x 1.0	Pipe	- do -					
52	33238	1/230	RCC Box	- do -	82	51580	2 x 1.0	Pipe	- do -					
53	33800	1/230	RCC Box	- do -	83	51760	1/340	RCC Box	Stone pitching and railing item left.					
54	34732	2 x 1.0	Pipe	Items like Stone pitching to be done	84	52068	1 x 1.0	Pipe	Items like curtain wall & stone pitching to be done					
55	36050	1/220	RCC Box	Stone pitching and railing item left.	85	52296	2 x 1.0	Pipe	- do -					
56	36961	1 x 1.0	Pipe	Items like Stone pitching to be done	86	52424	1 x 1.0	Pipe	- do -					
57	37214	1/340	RCC Box	Stone pitching and railing item left.	87	52844	1/430	RCC Box	Not started					
58	37563	2 x 1.0	Pipe	Items like Stone pitching to be done	88	52630	1 x 1.0	Pipe	Items like curtain wall & stone pitching to be done					
59	38383	1/230	RCC Box	Stone pitching and railing item left.	89	53679	1 x 1.0	Pipe	- do -					
60	39150	2 x 1.0	Pipe	Completed	90	54148	1/230	RCC Box	Stone pitching and railing item left.					

List of Culverts for Balance Work (with Status)

DRG NO.	SH.NO.	SCALE	OSRP/CEG/SH-16/LOS/01	DATE : 28/12/2012	REV :	REV R1	REV R0	PREPARED BY :	CEG Ltd.	REV R1	PREPARED BY :	EE/PMU	APPROVED	CE, World Bank Projects.
						R1								



List of Culverts for Balance Work (with Status)				
S. No.	Chainage	Type	Span	Present Status
96	54606	RCC Box	1/44/0	- do -
97	55420	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
98	56270	RCC Box	1/64/0	Items like Curtain wall, pitching & Railing to be done
99	56390	RCC Box	1/22/0	Stone pitching and railing item left.
100	56587	Pipe Extn	-	Completed except curtain wall & pitching
101	57150	RCC Box	1/22/0	Not started
102	57321	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
103	57360	Pipe	-	Not required
104	57664	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
105	58025	RCC Box	1/22/0	Not started
106	59625	RCC Box	1/23/0	Completed except RH Rwall & floor protection
107	59915	RCC Box	1/33/0	Stone pitching left & Railing
108	60567	RCC Box	1/34/0	- do -
109	61373	RCC Box	1/23/0	Items like Curtain wall, pitching & Railing to be done
110	62100	RCC Box	1/33/0	Stone pitching left & Railing
111	62962	Pipce	1 x 1.0	Items like curtain wall & stone pitching to be done
112	63300	RCC Box	-	Stone pitching left & Railing
113	63700	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
114	64622	Pipe	1 x 1.0	Items like Stone pitching to be done
115	64891	Pipe	1 x 1.0	- do -
116	65122	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
117	65430	Pipe	1 x 1.0	- do -
118	65624	RCC Box	1/23/0	Stone pitching left & Railing
119	66027	RCC Box	1/22/0	- do -
120	66161	RCC Box	1/63/0	Items like Curtain wall, pitching & Railing to be done
121	66500	RCC Box	1/23/0	- do -
122	67100	RCC Box	1/22/0	Stone pitching left & Railing
123	67325	Pipe	1 x 1.0	Items like curtain wall & stone pitching to be done
124	67620	RCC Box	1/23/0	Stone pitching left & Railing
125	68010	RCC Box	1/23/0	Items like Retaining Wall, Railing & floor protection to be done
126	68445	RCC Box	1/22/0	- do -



 ORISSA STATE ROAD PROJECT
 Chief Engineer
 World Bank Project
 O/o the Chief Engineer
 World Bank Projects, Orissa

List of Minor/Major Bridges for Balance Work (with status)				
S. No.	Chainage	Span (No. x m)	Type	Present Status
1	3050	3 x 8.8	RCC Slab - R/R - To be retained	Not started
2	4450	4 x 9.9	RCC Slab - R/R - To be retained	- do -
3	8600	1 x 8.0	RCC Box - Replacement	- do -
4	10537	1 x 8.0	RCC Box - Replacement	- do -
5	17046	1 x 8.0	RCC Box - Replacement	- do -
6	20979	1 x 12.6	RCC T Beam Girder - Replacement	- do -
7	27650	2 x 32.2	PSC Girder - Replacement - New Alignment	Design finalized - Not started
8	27949	8 x 32.2	PSC Girder - Replacement - New Alignment	- do -
9	28928	1 x 32.2	PSC Girder - Replacement - New Alignment	- do -
10	29239	2 x 32.2	PSC Girder - Replacement - New Alignment	- do -
11	45993	1 x 8.0	RCC Box - Replacement	Completed except Railing
12	54791	3 x 10.8	RCC Slab - Replacement - New Alignment	Completed
13	58761	1 x 21.6	RCC T Beam Girder - Replacement - New Alignment	Not started
14	59100	7x32.7 + 1x7.6	PSC Girder - R/R - To be retained	- do -
15	59400	5 x 4.0	RCC Box - To be retained	- do -
16	63300	1 x 8.0	RCC Box - Replacement	Completed except Railing, Stone pitching
17	69300	1 x 7.2	RCC Slab - R/R - To be retained	Not started

List of Minor/Major Bridges for Balance Work (with status)				
DRG NO.	SHI NO.	SCALE	REV :	REV :
OSRP/CEG/SH-16/105/02			R1	R1
DATE : 28/12/2012				
REV R0	PREPARED BY:	CEG Ltd.	REV R1	PREPARED BY
			EE/PMU	
				APPROVED
				CE, World Bank Projects.

Kilometer-wise Details of Attempted* Highway Works for Balance Work

Chainage	Earthwork in mtr.		Sub-Grade in mtr.		GSB in mtr.		WMM in mtr.		DBM in mtr.		BC in mtr.	
	From	To	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS
30.000	31.000	1000	1000	1000	1000	950	840	800	750	610	470	
31.000	32.000	1000	1000	1000	1000	880	880	880	880	880	880	640
32.000	33.000	1000	1000	1000	1000	450	450	450	450	450	450	450
33.000	34.000	1000	1000	1000	1000	960	960	960	960	600	235	
34.000	35.000	1000	1000	1000	1000	1000	930	930	930	930	930	
35.000	36.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	973
36.000	37.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
37.000	38.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
38.000	39.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	470
39.000	40.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
40.000	41.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
41.000	42.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
42.000	43.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
43.000	44.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
44.000	45.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
45.000	46.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
46.000	47.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
47.000	48.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	650
48.000	49.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
49.000	50.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50.000	51.000	500	500	450	450	450	450	450	450	450	450	250
51.000	52.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	710
52.000	53.000	600	600	550	550	550	550	550	550	550	550	480
53.000	54.000	750	750	750	750	750	750	750	750	750	750	465
54.000	55.000	1000	1000	960	960	960	960	960	960	960	960	960
55.000	56.000	300	300	260	260	260	260	260	260	260	260	280
56.000	57.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
57.000	58.000	600	600	550	550	550	550	550	550	550	550	450
58.000	59.000											
59.000	60.000	350	350	350	350	350	350	350	350	290	280	
60.000	61.000	1000	1000	1000	1000	930	930	930	930	930	930	
61.000	62.000	1000	1000	1000	1000	870	870	870	870	870	870	
62.000	63.000	1000	1000	1000	1000	920	920	920	920	920	920	
63.000	64.000	1000	1000	1000	1000	890	890	890	890	890	890	
64.000	65.000	1000	1000	1000	1000	890	890	890	890	890	890	870
65.000	66.000	1000	1000	1000	1000	810	810	810	810	810	810	930
66.000	67.000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
67.000	68.000	550	550	550	550	450	450	450	450	450	450	360
68.000	69.000											
69.000	70.000											
Total		33650	33365	33420	33175	31770	31450	31550	31360	30840	29930	7153
Grand Total		42050	41765	39320	39075	37320	37000	36740	36550	32050	31550	7153

* Attempted means work has been started and in partial or fully completed state.



PROJECT:-		OSRR/PMU/SH-16/AS/01	APPROVED
ORISSA STATE ROAD PROJECT		DATE : 28/12/2012	CE, World Bank Projects.
UNDER WORLD BANK ASSISTANCE		REV R1	
DRG NO.	SH NO.	PREPARED BY	
		EE/PMU	
SCALE			

Chief Engineer
Orissa State Road Project, Odisha
Sub Engineer

HORIZONTAL CURVE DETAILS

Curve No.	Curve Direction	Transition Start Chainage TS	Curve Start Chainage CS	HIP Details			Total Deflection Angle D	Design Speed V (km/hr)	Curve Radius R (m)	Transition Length La (m)	Circular Length Lc (m)	Tangent Distance Ts (m)	Apex Distance Ea (m)	Shift S	Super Elevation e (%)
				Chainage	Easting	Northing									
1	Right		2345.559	2366.030	67655.733	2173458.518	0d 28' 9.0"	100	5000	0	40.94	20.47	0.04	0	-2.50
2	Left		2644.804	2661.099	67379.042	2173561.024	0d 22' 24.4"	100	5000	0	32.59	16.30	0.03	0	-2.50
3	Right	2817.047	2824.090	67135.894	2173659.975	2173659.975	0d 39' 41.9"	65	200	60	92.41	110.40	16.26	0.8	7.00
4	Left	3114.729	3174.729	67000.323	2173896.844	2941550.9"	0d 15' 50.9"	65	2000	60	42.15	82.39	7.48	0.8	7.00
5	Right		3590.392	3690.111	66662.821	2174134.982	0d 34' 34.8"	100	15000	0	37.44	18.72	0.01	0	-2.50
6	Left		3819.983	3839.846	66472.656	2174265.656	0d 17' 4.3"	100	8000	0	39.73	19.86	0.03	0	-2.50
7	Left		4427.406	4458.277	65961.230	2174613.363	0d 10' 36.8"	100	20000	0	61.74	30.87	0.02	0	-2.50
8	Right		4936.183	4948.654	65555.017	2174887.707	0d 14' 3.7"	100	6000	60	58.21	89.70	5.33	0.4	7.00
9	Right	5029.156	5089.529	65355.462	65159.723	2175314.464	0d 17' 49.8"	100	10000	0	51.86	25.93	0.03	0	-2.50
10	Left		5089.529	5089.529	64804.936	2175764.862	0d 24' 48.4"	80	300	75	37.12	94.35	6.11	0.8	7.00
11	Left		6015.465	6109.050	63836.122	2176352.036	0d 58' 22.1"	80	1000	30	91.70	75.93	1.89	0	2.84
12	Right	7196.232	7196.232	7242.113	63436.621	2176661.690	0d 49' 22.6"	100	5000	0	71.82	35.91	0.13	0	-2.50
13	Right		7711.603	7747.512	62927.413	2177069.603	0d 34' 29.5"	100	10000	0	100.33	50.17	0.13	0	-2.50
14	Right		8349.791	8399.956	62552.013	2177376.560	0d 18' 42.0"	100	20000	0	108.80	54.40	0.07	0	-2.50
15	Left		9273.034	9302.999	62226.888	2177639.470	0d 41' 12.3"	100	5000	0	59.93	29.97	0.09	0	-2.50
16	Left		9560.363	9689.563	61923.412	2178278.915	0d 14' 1.4"	100	12000	0	258.39	129.20	0.70	0	-2.50
17	Left		9978.597	10002.829	61681.705	2178078.215	0d 55' 32.1"	100	3000	0	48.46	24.23	0.10	0	-2.50
18	Left		10250.288	10291.947	61455.697	2178268.519	0d 57' 19.5"	100	5000	0	83.38	41.69	0.17	0	-2.50
19	Right		10574.355	10589.985	61225.846	2178446.245	0d 53' 43.9"	100	2000	0	85.37	42.89	0.16	0	-2.50
20	Right		10884.033	10926.719	60962.833	2178658.519	0d 58' 41.8"	100	5000	0	85.37	42.89	0.16	0	-2.50
21	Right		11913.308	11968.308	60139.477	2179336.285	0d 15' 33.3"	80	400	55	49.78	80.23	3.77	0.3	7.00
22	Right	12205.767	12250.767	12289.982	59872.002	2179464.758	0d 17' 32.5"	80	500	45	78.27	84.47	3.99	0.2	5.69
23	Left		12988.914	13024.861	59297.159	2179922.788	0d 30' 53.6"	100	10000	0	71.89	35.95	0.08	0	-2.50
24	Left		13465.590	13537.727	58894.239	2180240.081	0d 49' 35.8"	100	8000	0	144.27	72.14	0.26	0	-2.50
25	Left		13853.826	13889.463	58614.794	2180453.694	0d 16' 20.1"	100	15000	0	71.27	35.64	0.04	0	-2.50
26	Right		15028.179	15056.524	57689.283	2181164.649	0d 38' 58.6"	100	5000	0	58.69	28.35	0.08	0	-2.50
27	Left		15283.708	15329.244	57471.901	2181329.314	0d 44' 45.1"	100	5000	50	91.01	95.63	2.60	0.1	4.44
28	Right		16011.851	16039.764	56972.343	2181634.184	0d 47' 18.8"	80	300	75	55.67	104.04	8.06	0.8	7.00
29	Right		16518.688	16575.497	56781.686	2182334.694	0d 39' 4.8"	100	10000	0	113.68	56.84	0.16	0	-2.50
30	Left		17287.217	17342.217	56476.230	2183120.414	0d 31' 16.5"	80	400	55	151.10	132.97	13.98	0.3	7.00
31	Left		17694.878	17760.898	56216.565	2183345.907	0d 15' 41.1"	80	600	35	61.99	66.11	2.05	0.1	4.74
32	Right		18379.537	18448.505	55763.946	2183693.590	0d 18' 58.0"	100	25000	0	137.84	68.87	0.10	0	-2.50
33	Left		18870.366	18905.875	55461.625	2184206.794	0d 12' 12.4"	100	20000	0	71.02	35.51	0.03	0	-2.50
34	Right		19267.635	19302.749	55197.327	2184502.738	0d 20' 16.9"	100	600	80	70.15	115.52	5.18	0.4	7.00
35	Left		20902.120	20935.406	54760.653	2184807.730	0d 32' 41.6"	100	7000	0	66.57	33.29	0.08	0	-2.50
36	Right		20902.120	20935.406	54536.418	2184964.940	0d 25' 55.9"	100	5000	0	37.72	18.86	0.04	0	-2.50
37	Right		20248.629	20265.141	54409.459	2185055.396	0d 22' 42.4"	100	5000	0	33.03	16.51	0.03	0	-2.50
38	Left		20512.737	20525.374	54196.519	2185204.977	0d 43' 26.5"	100	2000	0	25.27	12.64	0.04	0	-2.50
39	Left		21141.944	21162.760	53670.376	2185564.748	0d 28' 37.4"	100	5000	0	41.63	20.82	0.04	0	-2.50
40	Right		21402.571	21443.826	53438.412	2185723.415	0d 12' 4.5"	100	800	60	82.44	101.42	3.37	0.2	5.56
41	Left		21790.445	21830.750	53087.644	2185986.830	0d 27' 42.7"	100	10000	0	80.61	40.31	0.08	0	-2.50
42	Right		22238.024	22262.820	52896.379	2186070.125	0d 34' 5.8"	100	5000	0	49.59	24.80	0.06	0	-2.50
43	Right		23198.165	23224.420	51834.619	2186495.295	0d 32' 22.8"	80	250	90	50.31	117.40	11.58	1.4	7.00
44	Left		24199.099	24250.449	51280.158	2187358.054	0d 35' 18.3"	100	10000	0	102.70	51.35	0.13	0	-2.50
45	Left		24513.188	24534.673	51126.348	2187597.065	0d 14' 46.3"	100	10000	0	42.97	21.49	0.02	0	-2.50
46	Right		24786.204	24804.779	50981.157	2187824.830	0d 12' 46.3"	100	10000	0	37.15	18.58	0.02	0	-2.50
47	Left		25287.940	25320.344	50702.009	2188258.543	0d 14' 51.2"	100	15000	0	64.81	32.40	0.04	0	-2.50
48	Right		25834.772	25845.649	50420.307	2188701.673	0d 2' 59.5"	100	25000	0	21.75	10.88	0.00	0	-2.50
49	Right		26914.774	26933.166	49937.082	2189619.574	0d 12' 38.8"	100	10000	0	36.75	18.39	0.02	0	-2.50
50	Right		27065.494	27080.112	49757.020	2189743.311	0d 20' 6.1"	100	5000	0	28.24	14.62	0.02	0	-2.50
51	Left		27493.946	27510.963	49520.453	2190102.250	0d 29' 35.5"	80	240	90	33.98	108.72	9.69	1.5	7.00
52	Left		27744.498	27875.808	49203.227	2190281.555	0d 29' 22.2"	80	1200	0	26.58	131.31	7.16	0	-2.50
53	Left		28767.216	28876.449	48334.786	2190524.122	0d 51' 44.4"	100	2000	0	18.47	9.23	0.02	0	-2.50
54	Left		28819.742	28835.561	48277.708	2190539.498	0d 54' 22.9"	100	2000	0	31.64	15.82	0.06	0	-2.50
55	Right		28948.285	29059.638	48064.110	2190606.540	0d 34' 21' 39.7"	65	300	40	139.81	112.82	14.24	0.2	6.26
56	Right		29352.085	29445.378	47808.002	2190898.211	0d 18' 8.9"	80	300	75	36.54	94.05	6.05	0.8	7.00
57	Left		30256.912	30300.793	47057.903	2191307.353	0d 15' 12.25"	80	280	90	87.05	133.75	15.02	1.3	7.00
58	Right		30696.265	30729.609	46630.900	2191271.282	0d 15' 16.4"	100	15000	0	56.65	33.32	0.04	0	-2.50
59	Right		31132.156	31150.261	46211.975	2191227.964	0d 4' 58.8"	100	25000	0	36.21	18.11	0.01	0	-2.50
60	Right		31632.834	31688.089	45677.087	2191171.804	0d 18' 59.7"	100	20000	0	110.51	55.25	0.07	0	-2.50
61	Left		32359.862	32304.482	44068.622	2191011.906	0d 20' 26.6"	100	15000	0	89.20	44.60	0.08	0	-2.50
62	Left		33647.637	33682.132	43893.053	2190972.313	0d 17' 26.0"	100	5000	0	66.99	34.50	0.12	0	-2.50
63	Left		34409.484	34435.223	42945.828	2190883.101	0d 17' 41.8"	100	10000	0	51.48	25.740	0.033	0.0	-2.50



BARBRIK Project Limited
Contractor

World Bank Project
Rhubaneswar

PROJECT:-

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Chief Engineer
World Bank Project
Rhubaneswar

HORIZONTAL CURVE DETAILS
BHAWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/0)

DRG NO. 089P/320/SH-16/KC/02	DESIGNED BY	DRAWN BY	REVISED	APPROVED
SH. NO. F	DATE 11.12.12	REV R3	CEG	EE, PMU
SCALE	NTS		CEG	CE, WBP

HORIZONTAL CURVE DETAILS

Curve No.	Curve Direction	Transition Start TS	Curve Start CS	HIP Details		Total Deflection Angle D	Design Speed V (Kmph)	Curve Radius R (m)	Transition Length Ls (m)	Circular Length Lc (m)	Tangent Distance Ts (m)	Apex Distance Es (m)	Shift S	Super Elevation e (%)
				Chainage	Chainage									
66	Right	35337.667	34798.742	34857.337	42526.954	2190830.903	80	15000	117.19	117.19	11.111	0.0	0.14	
67	Left	36101.626	35427.667	35449.677	41840.628	2190752.682	100	240	43.90	114.091	11.111	1.5	7.00	
68	Right	36955.378	36101.626	36181.603	41362.055	2190304.970	100	800	39.95	80.048	1.751	0.2	5.56	
69	Left	37645.151	36955.378	37054.473	40623.996	2189939.582	100	5000	45.54	22.768	0.052	0.0	-2.50	
70	Right	38514.540	37645.151	37781.822	40195.864	2189522.844	80	300	46.09	100.064	19.903	0.8	7.00	
71	Left	39428.307	38514.540	38604.872	39395.030	2189106.673	80	240	92.19	141.245	19.903	0.8	7.00	
72	Right	40080.087	39428.307	39486.527	38646.259	2188597.780	100	15000	30.64	90.991	5.504	0.8	0.50	
73	Left	40761.211	40080.087	40135.087	39381.019	2188184.333	100	5000	69.20	34.602	0.120	0.0	-2.50	
74	Right	41548.974	40761.211	40803.545	37440.629	2187724.923	100	400	119.40	116.171	10.019	0.3	7.00	
75	Left	42308.709	41548.974	41566.132	36684.938	2187263.363	100	15000	55.34	42.334	0.060	0.0	-2.50	
76	Right	42911.795	42308.709	42352.562	38002.372	2186807.919	100	2000	40.31	20.158	0.102	0.0	-2.50	
77	Left	43719.105	42911.795	42932.500	35326.617	2186353.336	100	5000	31.74	15.871	0.025	0.0	-2.50	
78	Right	44379.105	43719.105	43340.222	34921.699	2185903.603	100	2000	41.41	20.705	0.043	0.0	-2.50	
79	Left	45006.414	44379.105	44383.769	34432.047	2185454.160	100	60	107.17	113.908	4.575	0.2	5.56	
80	Right	45685.752	45006.414	45021.823	28665.972	2185009.214	100	10000	42.69	21.346	0.023	0.0	-2.50	
81	Left	46367.324	45685.752	45727.815	32544.359	2184564.774	100	5000	90.29	45.144	0.068	0.0	-2.50	
82	Right	47034.879	46367.324	46443.556	29870.604	2184120.423	100	15000	29.12	14.561	0.021	0.0	-2.50	
83	Left	47713.253	47034.879	47088.383	30534.741	2183676.584	100	5000	83.59	122.361	0.067	0.4	7.00	
84	Right	48304.881	47713.253	47768.917	28118.079	2183232.228	100	20000	48.16	24.079	0.014	0.0	-2.50	
85	Left	48996.838	48304.881	48443.556	25887.687	2182787.912	100	15000	64.47	32.235	0.104	0.0	-2.50	
86	Right	49689.079	48996.838	49038.917	23746.634	2182343.546	100	5000	110.26	55.130	0.101	0.0	-2.50	
87	Left	50381.117	49689.079	49411.704	28207.242	2181899.188	100	300	125.49	141.901	18.391	0.8	7.00	
88	Right	51073.155	50381.117	50424.155	25962.971	2181454.821	100	2000	25.85	12.926	0.004	0.0	-2.50	
89	Left	51765.193	51073.155	51118.193	23717.243	2181010.454	100	3000	46.57	23.264	0.090	0.0	-2.50	
90	Right	52457.231	51765.193	51810.231	21464.441	2180566.087	80	900	186.15	128.642	8.893	0.1	3.16	
91	Left	53149.269	52457.231	52499.269	19244.459	2180121.720	100	5000	36.02	18.010	0.032	0.0	-2.50	
92	Right	53841.307	53149.269	53191.307	17024.459	2179677.353	100	15000	39.75	19.876	0.040	0.0	-2.50	
93	Left	54533.345	53841.307	53883.345	14804.459	2179232.986	100	5000	96.91	48.454	0.078	0.0	-2.50	
94	Right	55225.383	54533.345	54575.383	12584.459	2178788.619	100	25000	51.57	25.784	0.013	0.0	-2.50	
95	Left	55917.421	55225.383	55267.421	10364.459	2178344.252	80	300	130.97	144.992	19.418	0.8	7.00	
96	Right	56609.459	55917.421	55959.459	8144.459	2177900.000	100	5000	55.99	27.997	0.078	0.1	3.56	
97	Left	57301.497	56609.459	56649.497	5924.459	2177455.753	100	800	115.48	97.983	3.876	0.1	3.56	
98	Right	57993.535	57301.497	57343.535	3704.459	2177011.506	100	1500	45.30	22.851	0.051	0.0	-2.50	
99	Left	58685.573	57993.535	58027.573	1484.459	2176567.259	100	3000	43.14	56.578	0.543	0.0	2.86	
100	Right	59377.611	58685.573	58419.611	1264.459	2176123.012	80	400	115	53.63	143.341	1.4	7.00	
101	Left	60069.649	59377.611	59419.649	1044.459	2175678.765	100	240	84.05	136.529	18.193	1.5	7.00	
102	Right	60761.687	60069.649	60111.687	824.459	2175234.518	100	1000	90.93	75.542	1.868	0.0	2.84	
103	Left	61453.725	60761.687	60803.725	604.459	2174790.271	100	3000	20.67	10.335	0.027	0.0	-2.50	
104	Right	62145.763	61453.725	61487.763	384.459	2174345.924	80	240	97.46	144.329	21.061	1.5	7.00	
105	Left	62837.791	62145.763	62179.791	164.459	2173901.677	100	4000	39.88	19.940	0.050	0.0	-2.50	
106	Right	63529.829	62837.791	62871.829	142.459	2173457.430	100	300	55.26	103.711	7.986	0.8	7.00	
107	Left	64221.867	63529.829	63563.867	120.459	2173013.183	100	900	55	88.26	9.998	0.1	4.94	
108	Right	64913.905	64221.867	64249.905	98.459	2172568.936	100	600	35	55.76	62.972	1.805	0.1	4.74
109	Left	65605.943	64913.905	64939.943	76.459	2172124.689	100	240	40.25	20.124	0.051	0.0	-2.50	
110	Right	66297.981	65605.943	65631.981	54.459	2171680.442	100	4000	61.72	30.860	0.079	0.0	-2.50	
111	Left	66990.019	66297.981	66323.019	32.459	2171236.195	100	550	118.04	109.707	6.672	0.2	5.17	
112	Right	67682.057	66990.019	67008.057	10.459	2170791.948	100	10000	63.65	31.626	0.051	0.0	-2.50	
113	Left	68374.095	67682.057	67706.095	10.459	2170347.701	100	20000	62.04	31.022	0.024	0.0	-2.50	
114	Right	69066.133	68374.095	68398.133	10.459	2169903.454	80	800	46.02	53.041	0.951	0.0	3.96	
115	Left	69758.171	69066.133	69090.171	10.459	2169459.207	100	3000	30	46.02	53.041	0.0	3.96	
116	Right	70450.209	69758.171	69774.209	10.459	2169014.960	100	10000	50	50.47	25.236	0.0	4.44	
117	Left	71142.247	70450.209	70466.247	10.459	2168570.713	100	3000	46.75	23.375	0.027	0.0	-2.50	
118	Right	71834.285	71142.247	71150.285	10.459	2168126.466	100	5000	50.47	25.236	0.032	0.0	-2.50	
119	Left	72526.323	71834.285	71842.323	10.459	2167682.219	100	10000	40.74	17.666	0.027	0.2	4.59	
120	Right	73218.361	72526.323	72536.361	10.459	2167237.972	100	620	408.04	265.099	45.024	0.2	4.59	
121	Left	73910.399	73218.361	73220.399	10.459	2166793.725	100	50	50.47	25.236	0.032	0.0	-2.50	
122	Right	74602.437	73910.399	73912.437	10.459	2166349.478	100	40	88.79	44.995	0.099	0.0	-2.50	
123	Left	75294.475	74602.437	74604.475	10.459	2165905.231	100	700	187.31	165.174	12.288	0.3	6.35	
124	Right	75986.513	75294.475	75296.513	10.459	2165460.984	100	5000	34.62	17.310	0.030	0.0	-2.50	
125	Left	76678.551	75986.513	75988.551	10.459	2165016.737	100	2000	24.85	12.424	0.039	0.0	-2.50	
126	Right	77370.589	76678.551	76680.589	10.459	2164572.490	100	650	337.75	209.18	27.75	0.1	4.38	

DRG. NO.	DATE	REV.	R3
SCALE	NTS	CEG	CEG
DESIGNED BY	DRWN BY	REV. BY	APPROVED
EE, PMU	CEG	CEG	CE, WBP

HORIZONTAL CURVE DETAILS
BHAWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/Q)

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

CONSULTING ENGINEERS, WB GROUP
 E-12, Moji Colony, Malkiya, Nagar, Jaipur-17
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CEG



VERTICAL CURVE DETAILS

Curve No.	Curve Type	VIP Details		Curve Length m	K	Curve Start		Curve End		Start Gradient %	End Gradient %	Grade Difference %
		Chainage	Level			Chainage	Level	Chainage	Level			
1	Hog	2790.144	270.672	110	134.088	2735.144	270.951	2845.144	269.941	-0.509	-1.329	-0.820
2	Sag	3028.020	267.510	60	45.145	2998.020	267.909	3058.020	267.510	-1.329	0.000	1.329
3	Sag	3123.174	267.510	60	82.202	3093.174	267.510	3153.174	267.729	0.000	0.729	0.729
4	Hog	3261.315	268.518	60	48.945	3231.315	268.299	3291.315	268.370	0.729	-0.496	-1.225
5	Sag	3595.337	266.862	60	219.200	3565.337	267.011	3625.337	266.795	-0.496	-0.222	0.274
6	Hog	4069.111	265.809	100	137.574	4019.111	265.920	4119.111	265.334	-0.222	-0.949	-0.727
7	Sag	4370.122	262.952	60	63.217	4340.122	263.237	4400.122	262.952	-0.949	0.000	0.949
8	Sag	4555.049	262.952	85	41.860	4512.549	262.952	4597.549	263.815	0.000	2.031	2.031
9	Hog	4800.996	267.946	225	75.349	4688.496	265.662	4913.496	266.871	2.031	-0.955	-2.986
10	Hog	5345.920	262.739	120	138.275	5285.920	263.313	5405.920	261.645	-0.955	-1.823	-0.868
11	Sag	5582.310	258.429	100	44.977	5532.310	259.341	5632.310	258.629	-1.823	0.400	2.223
12	Hog	6064.360	260.357	200	148.186	5964.360	259.957	6164.360	259.408	0.400	-0.950	-1.350
13	Sag	6466.689	256.537	60	83.448	6436.689	256.822	6496.689	256.468	-0.950	-0.231	0.719
14	Sag	7077.639	255.128	235	138.303	6960.139	255.399	7195.139	256.853	-0.231	1.472	1.703
15	Hog	7388.372	259.691	365	136.282	7205.872	257.011	7570.872	257.483	1.472	-1.210	-2.682
16	Sag	7762.105	255.170	60	49.597	7732.105	255.532	7792.105	255.170	-1.210	0.000	1.210
17	Hog	7942.541	255.170	180	134.417	7852.541	255.170	8032.541	253.964	0.000	-1.339	-1.339
18	Sag	8462.999	248.200	120	89.611	8402.999	249.003	8522.999	248.200	-1.339	0.000	1.339
19	Sag	8636.000	248.200	60	77.396	8606.000	248.200	8666.000	248.433	0.000	0.775	0.775
20	Hog	8902.610	250.267	60	438.777	8872.610	250.034	8932.610	250.458	0.775	0.638	-0.136
21	Hog	9218.574	252.284	150	142.744	9143.574	251.805	9293.574	251.975	0.638	-0.412	-1.051
22	Hog	9837.574	249.732	285	137.300	9695.074	250.319	9980.074	246.186	-0.412	-2.487	-2.075
23	Sag	10112.611	242.889	100	50.890	10062.611	244.133	10162.611	242.627	-2.487	-0.523	1.964
24	Sag	10454.568	241.100	60	114.711	10424.568	241.257	10484.568	241.100	-0.523	0.000	0.523
25	Hog	10609.374	241.100	65	133.750	10576.874	241.100	10641.874	240.942	0.000	-0.486	-0.486
26	Sag	10793.680	240.204	90	43.132	10748.680	240.423	10838.680	240.925	-0.486	1.601	2.087
27	Hog	11898.871	257.894	430	136.113	11683.871	254.453	12113.871	254.543	1.601	-1.558	-3.159
28	Sag	12606.286	246.869	75	57.910	12568.786	247.454	12643.786	246.770	-1.558	-0.263	1.295
29	Hog	13044.789	245.714	285	136.905	12902.289	246.089	13187.289	242.372	-0.263	-2.345	-2.081
30	Sag	13309.923	239.496	60	50.729	13279.923	240.200	13339.923	239.148	-2.345	-1.162	1.182
31	Sag	13688.149	235.100	60	51.619	13658.149	235.449	13718.149	235.100	-1.162	0.000	1.162
32	Sag	13916.485	235.100	60	148.973	13866.485	235.100	13946.485	235.221	0.000	0.403	0.403
33	Hog	14565.385	237.713	230	135.761	14450.385	237.250	14680.385	236.228	0.403	-1.291	-1.694
34	Sag	14857.164	233.945	95	43.107	14809.664	234.559	14904.664	234.379	-1.291	0.912	2.203
35	Hog	15074.195	235.926	180	137.751	14984.195	235.104	15164.195	235.571	0.912	-0.394	-1.306
36	Sag	15263.293	235.180	80	42.629	15223.293	235.338	15303.293	235.773	-0.394	1.482	1.876
37	Hog	15522.347	239.020	235	134.549	15404.847	237.278	15639.847	238.710	1.482	-0.264	-1.746
38	Hog	16054.141	237.615	60	133.121	16024.141	237.694	16084.141	237.401	-0.264	-0.715	-0.451
39	Hog	16340.190	235.570	85	134.717	16297.690	235.874	16382.690	234.998	-0.715	-1.346	-0.631
40	Sag	16992.840	226.786	60	44.580	16962.840	227.190	17022.840	226.786	-1.346	0.000	1.346
41	Sag	17093.557	226.786	85	41.329	17051.057	226.786	17136.057	227.660	0.000	2.057	2.057
42	Hog	17297.407	230.979	105	61.641	17244.907	229.899	17349.907	231.164	2.057	-0.353	-1.704
43	Hog	17763.662	232.626	110	60.643	17708.662	232.431	17818.662	231.822	-0.353	-1.461	-1.814
44	Sag	18058.165	228.324	120	43.455	17998.165	229.200	18118.165	229.104	-1.461	1.301	2.762
45	Hog	18400.461	232.777	250	68.723	18275.461	231.151	18525.461	229.855	1.301	-2.336	-3.638

PROJECT:-

CONSULTING ENGINEER, WBPROU LTD
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION
 OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

VERTICAL CURVE DETAILS

BHWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/0)	
DRG. NO. GSP/200/SH-16/AC/01	DESIGNED BY
SH. NO. G	DATE 31.12.12
SCALE	REV R3
CEG	CEG
EE, PMU	APPROVED
CE, WBP	



BARBRIK PROJECTS LIMITED
 Contractor

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VERTICAL CURVE DETAILS

Curve No.	Curve Type	VIP Details		Curve Length m	K	Curve Start		Curve End		Start Gradient %	End Gradient %	Grade Difference %
		Chainage	Level			Chainage	Level	Chainage	Level			
46	Sag	18714.524	225.437	100	44.060	18664.524	226.606	18764.524	225.403	-2.336	-0.067	2.269
47	Sag	19086.086	225.187	80	42.419	19046.086	225.214	19126.086	225.914	-0.067	1.819	1.887
48	Hog	19312.266	229.300	210	64.745	19207.266	227.391	19417.266	227.804	1.819	-1.425	-3.244
49	Sag	19938.896	220.371	75	45.602	19901.396	220.906	19976.396	220.454	-1.425	0.220	1.645
50	Hog	20315.925	221.200	60	273.024	20285.925	221.134	20345.925	221.200	0.000	0.000	-0.220
51	Hog	21049.132	221.200	60	297.489	21019.132	221.200	21079.132	221.139	0.000	-0.202	-0.202
52	Sag	21643.758	220.001	80	42.952	21603.758	220.081	21683.758	220.665	-0.202	1.661	1.863
53	Hog	21885.696	224.019	215	60.618	21778.196	222.234	21993.196	221.992	1.661	-1.888	-3.550
54	Sag	22074.948	220.450	90	45.887	22029.948	221.298	22119.948	220.484	-1.888	0.075	1.964
55	Sag	22437.971	220.724	100	44.397	22387.971	220.686	22487.971	221.887	0.075	2.328	2.253
56	Hog	22757.679	228.166	230	60.651	22642.679	225.489	22872.679	226.482	2.328	-1.465	-3.793
57	Sag	23280.213	220.514	200	74.929	23180.213	221.978	23380.213	221.719	-1.465	1.205	2.669
58	Hog	24094.989	230.331	185	62.331	24002.489	229.216	24187.489	228.700	1.205	-1.763	-2.968
59	Sag	24496.554	223.250	150	45.796	24421.554	224.573	24571.554	224.384	-1.763	1.512	2.376
60	Hog	25061.286	231.790	460	135.814	24831.286	228.312	25291.286	227.478	1.512	-1.875	-3.387
61	Sag	25625.468	221.213	350	119.072	25450.468	224.494	25800.468	223.076	-1.875	1.064	2.939
62	Hog	26115.799	226.433	430	136.318	25900.799	224.144	26330.799	221.940	1.064	-2.090	-3.154
63	Sag	26427.356	219.922	60	39.997	26397.356	220.549	26457.356	219.745	-2.090	-0.589	1.501
64	Sag	26690.309	218.372	60	76.127	26660.309	218.549	26720.309	218.431	-0.589	0.199	0.788
65	Hog	26871.447	218.731	90	150.596	26826.447	218.642	26916.447	218.552	0.199	-0.399	-0.598
66	Sag	27508.401	216.189	60	150.328	27478.401	216.309	27538.401	216.189	-0.399	0.000	0.399
67	Sag	27716.176	216.189	60	21.022	27686.176	216.189	27746.176	217.045	0.000	2.860	2.860
68	Hog	27784.498	218.139	60	21.022	27754.498	217.283	27814.498	218.139	2.860	0.000	-2.860
69	Sag	28086.404	218.139	60	43.748	28056.404	218.139	28116.404	218.550	0.000	1.377	1.377
70	Hog	28162.525	219.183	60	43.748	28132.525	218.772	28192.525	219.183	1.377	0.000	-1.377
71	Hog	28732.614	219.183	95	34.878	28685.114	219.183	28780.114	217.889	0.000	-2.723	-2.723
72	Sag	28842.535	216.189	115	42.221	28785.035	217.755	28900.035	216.189	-2.723	0.000	2.723
73	Sag	29305.753	216.189	60	126.105	29275.753	216.189	29335.753	216.332	0.000	0.476	0.476
74	Sag	29754.931	218.326	60	124.401	29724.931	218.183	29784.931	218.614	0.476	0.958	0.482
75	Hog	30206.506	222.653	75	152.497	30169.006	222.293	30244.006	222.828	0.958	0.466	-0.492
76	Hog	30551.343	224.261	220	136.819	30441.343	223.748	30661.343	223.005	0.466	-1.142	-1.608
77	Sag	30819.903	221.195	85	43.229	30777.403	221.680	30862.403	221.545	-1.142	0.824	1.966
78	Hog	31054.756	223.131	185	137.513	30962.256	222.368	31147.256	222.650	0.824	-0.521	-1.345
79	Sag	31377.618	221.450	105	41.186	31325.118	221.723	31430.118	222.515	-0.521	2.030	2.551
80	Hog	31692.690	227.842	440	136.820	31472.690	223.379	31912.690	225.230	2.030	-1.187	-3.216
81	Sag	32005.107	224.133	110	42.675	31950.107	224.786	32060.107	224.898	-1.187	1.390	2.577
82	Hog	32501.487	231.035	500	186.682	32251.487	227.559	32751.487	227.815	1.390	-1.288	-2.678
83	Sag	33110.125	223.196	250	202.210	32985.125	224.806	33235.125	223.132	-1.288	-0.052	1.236
84	Sag	33491.142	223.000	60	67.995	33461.142	223.015	33521.142	223.249	-0.052	0.831	0.883
85	Sag	34109.094	228.135	60	139.905	34079.094	227.885	34139.094	228.513	0.831	1.260	0.429
86	Hog	34373.023	231.460	210	139.906	34268.023	230.137	34478.023	231.207	1.260	-0.241	-1.501
87	Sag	34807.971	230.412	75	39.908	34770.471	230.502	34845.471	231.026	-0.241	1.639	1.880
88	Sag	35213.218	237.051	60	53.560	35183.218	236.560	35243.218	237.879	1.639	2.758	1.120
89	Hog	35473.571	244.233	125	61.777	35411.071	242.509	35536.071	244.693	2.758	0.735	-2.024
90	Hog	35776.847	246.463	230	135.203	35661.847	245.617	35891.847	245.352	0.735	-0.966	-1.701

PROJECT:-


CONSULTING ENGINEERS/WBPROUP LTD
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION
 OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

VERTICAL CURVE DETAILS


BHAWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/0)

DRG. NO. 089/50/SH-16/KC/02	DESIGNED BY	CEG	CEG	CEG	EE, PMU	APPROVED
SH. NO. 1	DATE 31.12.12	REV	R3			
SCALE	NTS					




 Chief Engineer
 World Bank Project
 O/o the Chief Engineer
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 Bhubaneswar.

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VERTICAL CURVE DETAILS

Curve No.	Curve Type	VIP Details		Curve Length m	K	Curve Start		Curve End		Start Gradient %	End Gradient %	Grade Difference %
		Chainage	Level			Chainage	Level	Chainage	Level			
91	Sag	36123.485	243.114	130	41.565	36058.485	243.742	36188.485	244.519	-0.966	2.162	3.128
92	Hog	36508.070	251.427	470	135.519	36273.070	246.348	36743.070	248.357	2.162	-1.306	-3.469
93	Sag	37016.057	244.790	200	133.550	36916.057	246.097	37116.057	244.982	-1.306	0.191	1.497
94	Hog	38169.205	246.993	125	145.543	38106.705	246.874	38231.705	246.576	0.191	-0.668	-0.859
95	Sag	39301.029	239.435	400	139.494	39101.029	240.771	39501.029	243.834	-0.668	2.200	2.868
96	Hog	39780.833	249.989	410	137.990	39575.833	245.480	39985.833	248.408	2.200	-0.772	-2.973
97	Sag	40242.276	246.427	300	117.589	40092.276	247.586	40392.276	249.098	-0.772	1.782	2.554
98	Hog	40542.054	251.764	245	60.919	40419.554	249.584	40664.554	249.018	1.782	-2.242	-4.024
99	Sag	40927.477	243.123	95	41.651	40879.977	244.188	40974.977	243.141	-2.242	0.039	2.281
100	Hog	41122.141	243.198	95	135.653	41074.641	243.180	41169.641	242.884	0.039	-0.661	-0.700
101	Sag	41360.076	241.624	60	53.928	41330.076	241.823	41390.076	241.760	-0.661	0.451	1.112
102	Hog	42051.494	244.743	435	134.700	41833.994	243.762	42268.994	238.700	0.451	-2.778	-3.229
103	Sag	42388.987	235.366	95	41.365	42341.487	236.686	42436.487	235.138	-2.778	-0.482	2.296
104	Sag	42694.502	233.895	60	186.955	42664.502	234.039	42724.502	233.846	-0.482	-0.161	1.432
105	Sag	43270.762	232.988	200	139.608	43170.762	233.129	43370.762	234.240	-0.161	1.272	1.002
106	Hog	43580.238	236.904	150	149.756	43505.238	235.950	43655.238	237.107	1.272	0.270	-1.002
107	Hog	43918.756	237.819	175	74.996	43831.256	237.582	44006.256	236.013	0.270	-2.063	-2.333
108	Sag	44283.875	230.285	200	55.788	44183.875	232.348	44383.875	231.807	-2.063	1.519	3.582
109	Hog	44604.399	235.162	400	135.000	44404.355	232.118	44804.443	232.278	1.519	-1.441	-2.960
110	Sag	44889.349	231.054	105	42.738	44836.849	231.811	44941.849	231.587	-1.441	1.015	2.456
111	Hog	45203.764	234.245	60	234.921	45173.764	233.940	45233.764	234.473	1.015	0.759	-0.256
112	Hog	45432.022	235.978	260	135.539	45302.022	234.991	45562.022	234.472	0.759	-1.159	-1.918
113	Sag	45786.547	231.870	60	62.008	45756.547	232.218	45816.547	231.813	-1.159	-0.192	0.967
114	Sag	45927.877	231.600	60	313.883	45897.877	231.657	45957.877	231.600	-0.192	0.000	0.997
115	Hog	46060.122	231.600	60	151.175	46030.122	231.600	46090.122	231.481	0.000	-0.397	-0.397
116	Sag	46458.173	230.020	60	58.713	46428.173	230.139	46488.173	230.208	-0.397	0.625	1.022
117	Hog	46894.627	232.748	190	134.478	46799.627	232.154	46989.627	232.000	0.625	-0.788	-1.413
118	Sag	47108.176	231.066	60	62.910	47078.176	231.302	47138.176	231.115	-0.788	0.166	0.955
119	Sag	47446.664	231.627	60	43.803	47416.664	231.578	47476.664	232.086	0.166	1.535	1.369
120	Hog	47698.632	235.497	120	112.515	47638.632	234.575	47758.632	235.778	1.535	0.469	-1.066
121	Hog	48091.553	237.340	60	255.009	48061.553	237.199	48121.553	237.410	0.469	0.234	-0.235
122	Sag	48344.680	237.932	60	83.725	48314.680	237.862	48374.680	238.217	0.234	0.951	0.717
123	Hog	48620.248	240.551	135	139.184	48552.748	239.910	48687.748	240.538	0.951	-0.020	-0.970
124	Sag	48890.415	240.499	60	52.776	48860.415	240.504	48920.415	240.834	-0.020	1.117	1.137
125	Hog	49175.395	243.683	230	136.912	49060.395	242.398	49290.395	243.036	1.117	-0.563	-1.680
126	Sag	49761.094	240.389	300	79.829	49611.094	241.232	49911.094	245.182	-0.563	3.195	3.757
127	Hog	50117.352	251.773	290	60.179	49972.352	247.139	50262.352	249.419	3.195	-1.624	-4.818
128	Sag	50549.737	244.754	160	41.761	50469.737	246.052	50629.737	246.520	-1.624	2.210	3.833
129	Hog	50825.441	250.841	360	135.419	50645.441	246.867	51005.441	250.030	2.210	-0.450	-2.660
130	Sag	51154.461	249.359	60	52.402	51124.461	249.494	51184.461	249.567	-0.450	0.695	1.145
131	Hog	51610.444	252.526	250	138.154	51485.444	251.658	51735.444	251.132	0.695	-1.115	-1.810
132	Sag	52056.214	247.555	115	43.933	51998.714	248.196	52113.714	248.419	-1.115	1.503	2.618
133	Hog	52285.931	251.007	165	59.731	52203.431	249.767	52368.431	249.967	1.503	-1.260	-2.762
134	Sag	52850.971	243.888	165	41.991	52768.471	244.927	52933.471	246.090	-1.260	2.670	3.929
135	Hog	53234.776	254.134	450	94.645	53009.776	248.127	53459.776	249.443	2.670	-2.085	-4.755

VERTICAL CURVE DETAILS
 BHAWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/0)

DESIGNED BY: CEG
 CHECKED BY: CEG
 APPROVED BY: CEG

DATE: 31.12.12
 REV: R3
 NTS

SCALE: _____

SH. NO. _____
 URG. NO. _____
 DATE: _____
 REV: _____
 R3

PROJECT:-
 CONSULTING ENGINEER, WB GROUP LTD
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

Chief Engineer
 World Bank Project
 On the E.C.C. (Civil) Office
 Chief Engineer

Page 93 of 247

World Bank Projects, Odisha

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VERTICAL CURVE DETAILS

Curve No.	Curve Type	VIP Details		Curve Length m	K	Curve Start		Curve End		Start Gradient %	End Gradient %	Grade Difference %
		Chainage	Level			Chainage	Level	Chainage	Level			
136	Sag	53707.058	244.287	90	44.939	53662.058	245.225	53752.058	244.250	-2.085	-0.082	2.003
137	Hog	54081.553	243.978	60	238.722	54051.553	244.003	54111.553	243.878	-0.082	-0.334	-0.251
138	Sag	54701.738	241.909	60	179.822	54671.738	242.009	54731.738	241.909	-0.334	0.000	0.334
139	Sag	55583.221	241.909	300	105.568	55433.221	241.909	55733.221	246.172	0.000	2.841	2.841
140	Hog	55949.985	252.332	260	59.867	55819.985	248.637	56079.985	250.380	2.841	-1.501	-4.342
141	Sag	56369.097	246.040	100	56.032	56319.097	246.791	56419.097	246.182	-1.501	0.283	1.784
142	Sag	56744.466	247.104	75	71.084	56706.966	246.998	56781.966	247.606	1.338	1.338	1.055
143	Hog	57060.659	251.337	185	137.329	56968.159	250.098	57153.159	251.329	1.338	-0.009	-1.347
144	Sag	57425.629	251.305	85	41.620	57383.129	251.309	57468.129	252.170	-0.009	2.032	2.040
145	Sag	57583.751	254.521	215	136.292	57476.251	252.335	57691.251	255.012	2.032	0.455	-1.576
146	Hog	57799.885	255.507	100	60.441	57749.885	255.279	57849.885	254.908	0.455	-1.199	-1.654
147	Sag	57945.248	253.765	135	41.388	57877.748	254.574	58012.748	255.158	-1.199	2.065	3.263
148	Hog	58223.647	259.510	335	59.858	58056.147	256.054	58391.147	253.592	2.065	-3.533	-5.597
149	Sag	58621.577	245.451	150	42.456	58546.577	248.101	58696.577	245.451	-3.533	0.000	3.533
150	Sag	58809.175	245.451	60	42.785	58779.175	245.451	58839.175	245.872	0.000	1.400	1.400
151	Hog	58895.459	246.661	85	60.613	58852.959	246.065	58937.959	246.661	1.400	0.000	-1.400
152	Hog	59242.660	246.661	80	60.643	59202.660	246.661	59282.660	246.133	0.000	-1.319	-1.319
153	Sag	59459.308	243.803	60	45.483	59429.308	244.199	59489.308	243.803	-1.319	0.000	1.319
154	Hog	59581.697	243.803	60	409.516	59551.697	243.803	59611.697	243.759	0.000	-0.147	-0.147
155	Sag	60022.096	243.158	100	68.272	59972.096	243.231	60072.096	243.817	-0.147	1.318	1.465
156	Hog	60450.984	248.811	135	137.907	60383.484	247.922	60518.484	249.040	1.318	0.340	-0.979
157	Sag	60723.726	249.737	60	76.530	60693.726	250.904	61102.646	250.074	0.340	-1.123	-0.783
158	Hog	60965.146	252.449	275	105.425	60827.646	250.904	61102.646	250.407	1.123	-1.486	-2.609
159	Sag	61322.363	247.143	300	119.023	61172.363	249.371	61472.363	248.696	-1.486	1.036	2.522
160	Hog	61688.410	250.933	295	136.261	61540.910	249.406	61835.910	249.267	1.036	-1.130	-2.165
161	Sag	62005.071	247.356	60	59.683	61975.071	247.695	62035.071	247.319	-1.130	0.000	1.005
162	Sag	62171.670	247.149	105	42.648	62119.170	247.214	62224.170	248.376	-0.125	2.338	2.463
163	Hog	62423.831	253.044	215	134.782	62316.331	250.531	62531.331	253.842	2.338	0.743	-1.596
164	Hog	62684.948	254.982	175	135.821	62597.448	254.333	62772.448	254.505	0.743	-0.546	-1.289
165	Hog	62958.011	253.492	75	143.642	62920.511	253.696	62995.511	253.091	-0.546	-1.068	-0.522
166	Sag	63262.068	250.244	60	56.176	63232.068	250.564	63292.068	250.244	-1.068	0.000	1.068
167	Sag	63417.498	250.244	60	304.863	63387.498	250.244	63447.498	250.303	0.000	0.197	0.197
168	Sag	63739.449	250.878	75	45.233	63701.949	250.804	63776.949	251.573	0.197	1.855	1.658
169	Hog	64037.589	256.408	165	135.773	63955.089	254.878	64120.089	256.935	1.855	0.640	-1.216
170	Hog	64762.480	261.044	235	135.558	64644.980	260.293	64879.980	259.759	0.640	-1.094	-1.734
171	Sag	65157.056	256.728	150	93.219	65082.056	257.548	65232.056	257.114	-1.094	0.515	1.610
172	Hog	65656.276	259.300	160	137.747	65576.276	258.888	65736.276	258.783	0.515	-0.646	-1.162
173	Sag	66065.125	256.657	60	92.824	66035.125	256.851	66095.125	256.657	-0.646	0.000	0.646
174	Sag	66188.755	256.657	70	233.280	66158.755	256.657	66218.755	256.734	0.000	0.257	0.257
175	Sag	66542.441	257.567	70	45.143	66507.441	257.477	66577.441	258.199	0.257	1.808	1.550
176	Hog	67267.952	270.683	265	134.793	67135.452	268.287	67400.452	270.473	1.808	-0.158	-1.966
177	Hog	67777.051	269.878	105	136.525	67724.551	269.961	67829.551	269.391	-0.158	-0.927	-0.769
178	Hog	68489.005	263.276	60	89.613	68459.005	263.555	68519.005	262.797	-0.927	-0.670	-0.670
179	Sag	68692.985	260.019	60	51.842	68662.985	260.498	68722.985	259.887	-1.597	-0.439	1.158
180	Sag	68923.582	259.006	60	136.549	68893.582	259.138	68953.582	259.006	-0.439	0.000	0.439
181	Sag	69076.877	259.006	70	44.103	69041.877	259.006	69111.877	259.562	0.000	1.587	1.587
182	Hog	69381.456	263.840	140	138.000	69311.456	262.729	69451.456	264.241	1.587	0.573	-1.014
183	Sag	69076.877	259.006	70	44.109	69041.877	259.006	69111.877	259.561	0.000	1.587	1.587
184	Hog	69422.316	264.488	110	76.896	69367.316	263.615	69477.316	264.574	1.587	0.156	-1.431
185	Sag	69611.965	264.785	70	43.592	69576.965	264.730	69646.965	265.402	0.156	1.762	1.606
186	Hog	69865.225	269.248	130	61.332	69800.225	268.102	69930.225	269.016	1.762	-0.357	-2.120

PROJECT:-

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

VERTICAL CURVE DETAILS

BHAWANIPATNA - KHARIAR (SH-16 KM 2/0 TO KM 70/0)	
DESIGNED BY	CEG
CHECKED BY	CEG
DATE	31.12.12
REV	R3
SCALE	NTS
APPROVED	EE, PMU
CEG	CE, WBP



CEG
CONSULTING ENGINEER, WBP GROUP
 E-12, Maji Colony, Malviya Nagar Jaipur-17
 Tel: +91-141-2520899, 2521899, 2520556
 Fax: 2521348, e-mail: ceg@ceginia.com

TO BHAWAMPATNA

TO KHARIAR

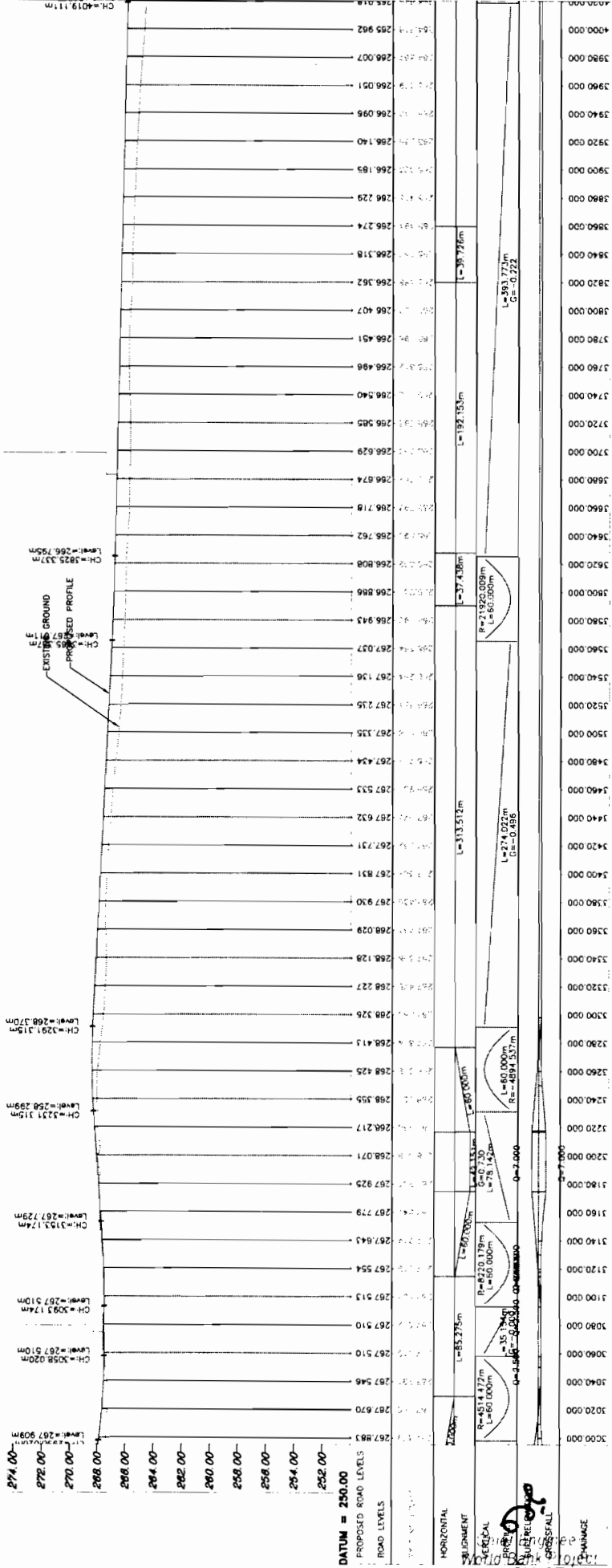
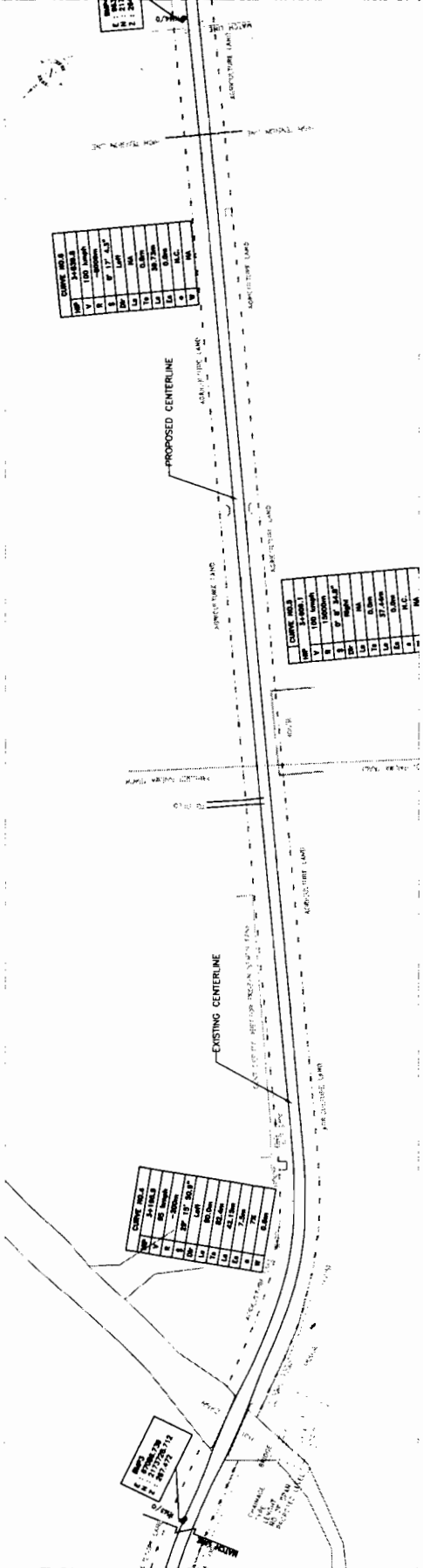


Table with columns for stationing (3500.000 to 4000.000) and elevations (267.893 to 269.982). Includes vertical curve data and a legend.

PROJECT: WIDENING AND STRENGTHENING TO TWO LANE Package OSRP-CW-Y1-P01-BALANCE WORK (SH-16) KM 3/000 TO KM 4/000

CONSULTING ENGINEER, WBPROUP LTD. ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

LEGEND: Symbols for centerline, agricultural land, etc.

Chief Engineer, World Bank Project, Odisha

TO BHAMANIPATNA

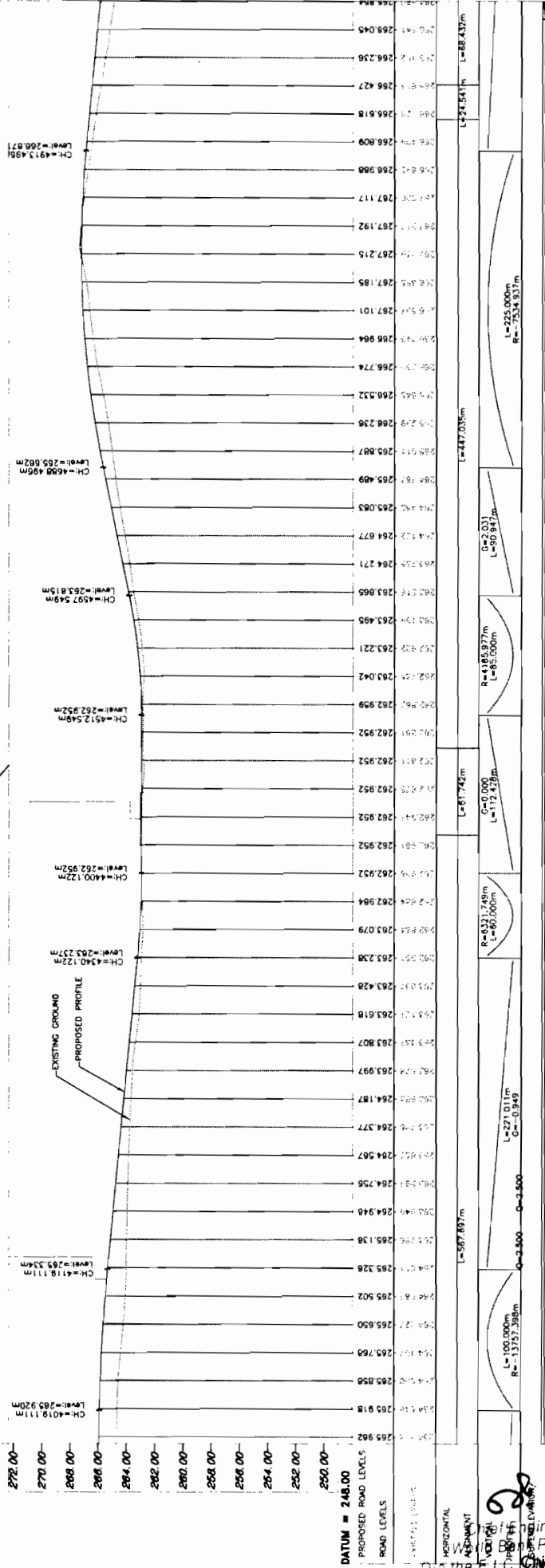
TO KHARIAR

NO.	CH	LEVEL	CH	LEVEL
1	CH	4018.111m	CH	4913.496m
2	CH	4119.111m	CH	4608.499m
3	CH	4300.122m	CH	4597.549m
4	CH	4521.254m	CH	4597.549m
5	CH	4608.499m	CH	4597.549m
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19	CH	4608.499m	CH	4597.549m
20	CH	4608.499m	CH	4597.549m

NO.	CH	LEVEL	CH	LEVEL
1	CH	4018.111m	CH	4913.496m
2	CH	4119.111m	CH	4608.499m
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19	CH	4608.499m	CH	4597.549m
20	CH	4608.499m	CH	4597.549m



RBRIK PROJECT Limited
Contract



STATION	EXISTING GROUND (m)	PROPOSED PROFILE (m)
0+000	259.982	259.982
0+020	259.918	259.918
0+040	259.850	259.850
0+060	259.764	259.764
0+080	259.650	259.650
0+100	259.502	259.502
0+120	259.328	259.328
0+140	259.138	259.138
0+160	258.948	258.948
0+180	258.756	258.756
0+200	258.567	258.567
0+220	258.377	258.377
0+240	258.187	258.187
0+260	257.997	257.997
0+280	257.807	257.807
0+300	257.618	257.618
0+320	257.428	257.428
0+340	257.238	257.238
0+360	257.048	257.048
0+380	256.858	256.858
0+400	256.668	256.668
0+420	256.478	256.478
0+440	256.288	256.288
0+460	256.098	256.098
0+480	255.908	255.908
0+500	255.718	255.718

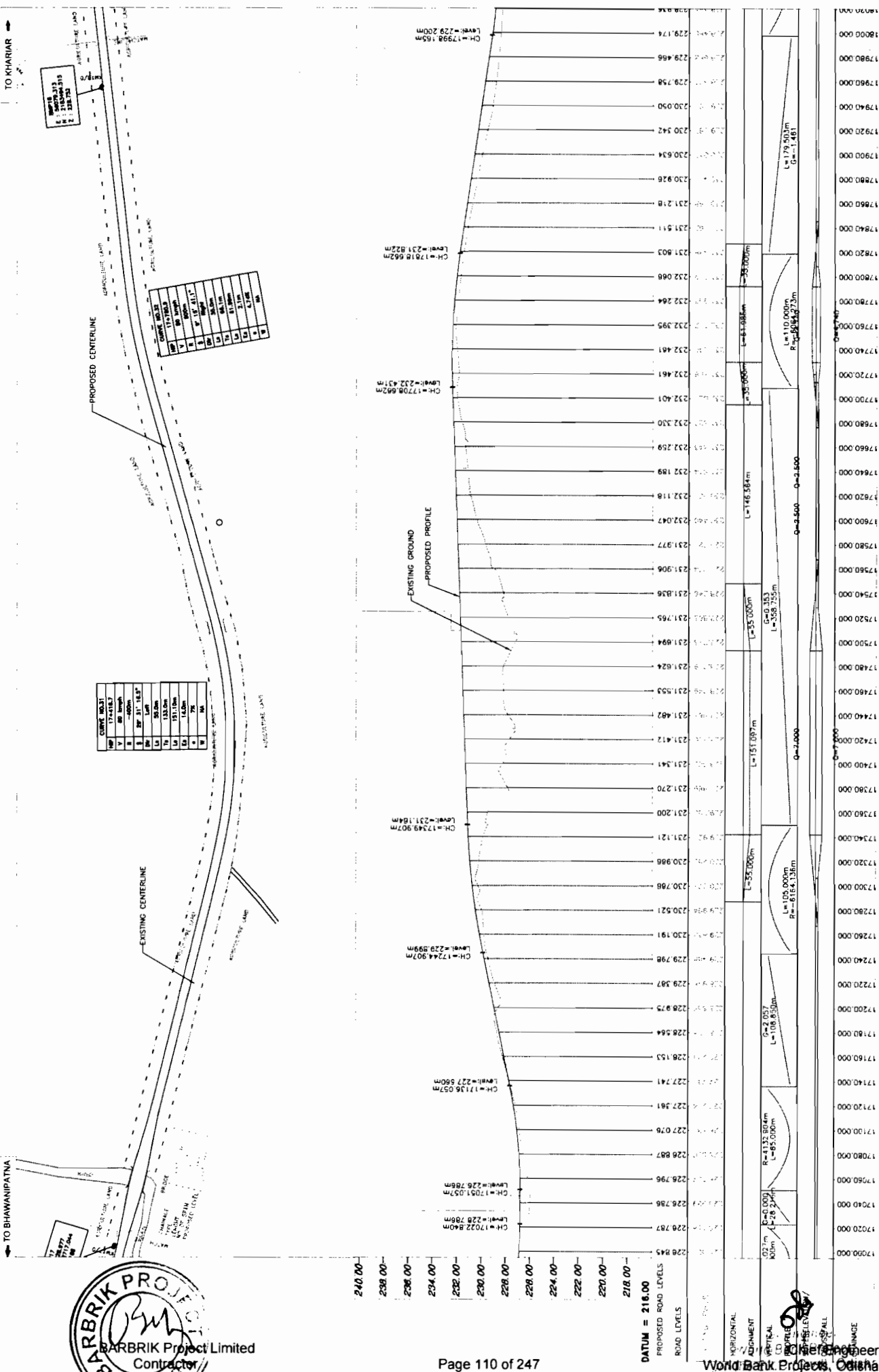
WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-P01-BALANCE WORK
(SH-16) KM 4/000 TO KM 5/000
DATE 31.12.12
SCALE HORIZONTAL: 1:10000 VERTICAL: 1:1000

PROJECT:
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS
WB GROUP LTD.
E-12, May Colony, Bhubaneswar, Odisha-751005
Tel: 91-25208987, 2521889, 2520556
Fax: 2521346, e-mail: ce@wbgroup.com

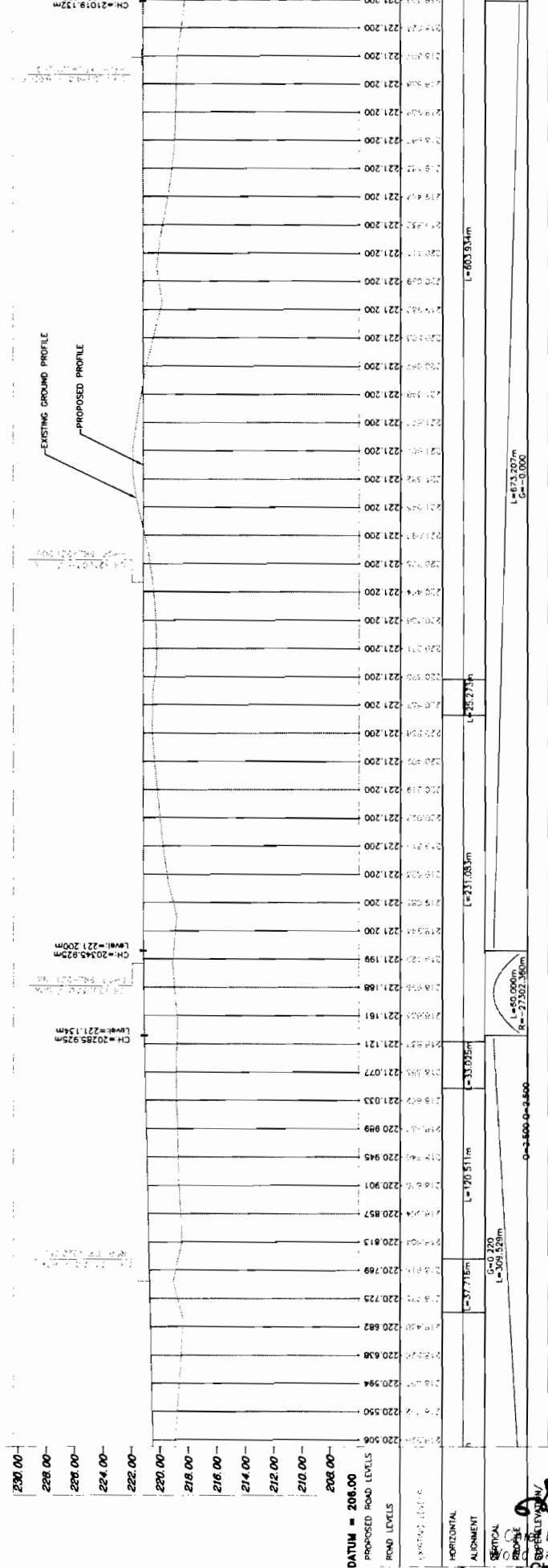
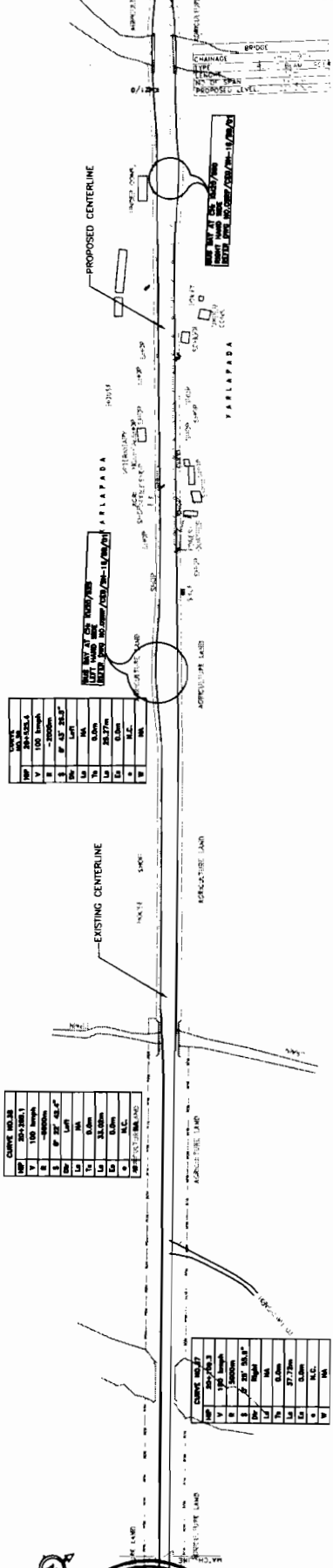
LEGEND
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 [Symbol] PROPOSED ROAD
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 [Symbol] PROPOSED PROFILE

TYPE	CURVE NO.18
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TO BHAWANIPATNA

TO KHARIAR



STATION	EXISTING PROFILE	PROPOSED PROFILE
20000.000		
20020.000		
20040.000		
20060.000		
20080.000		
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ARBRIK PROJECT Limited
Contractor

CONSULTING ENGINEER, WBPROUD LTD.
E-12, Maj Colony, Malika, Nagajogapur-17
Tel: +91-141-2520899, 2521899, 2520558
Fax: 2521348, e-mail: ce@ceindia.com

PROJECT:-
WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-PO1-BALANCE WORK
(SH-16) KM 20/000 TO KM 21/000

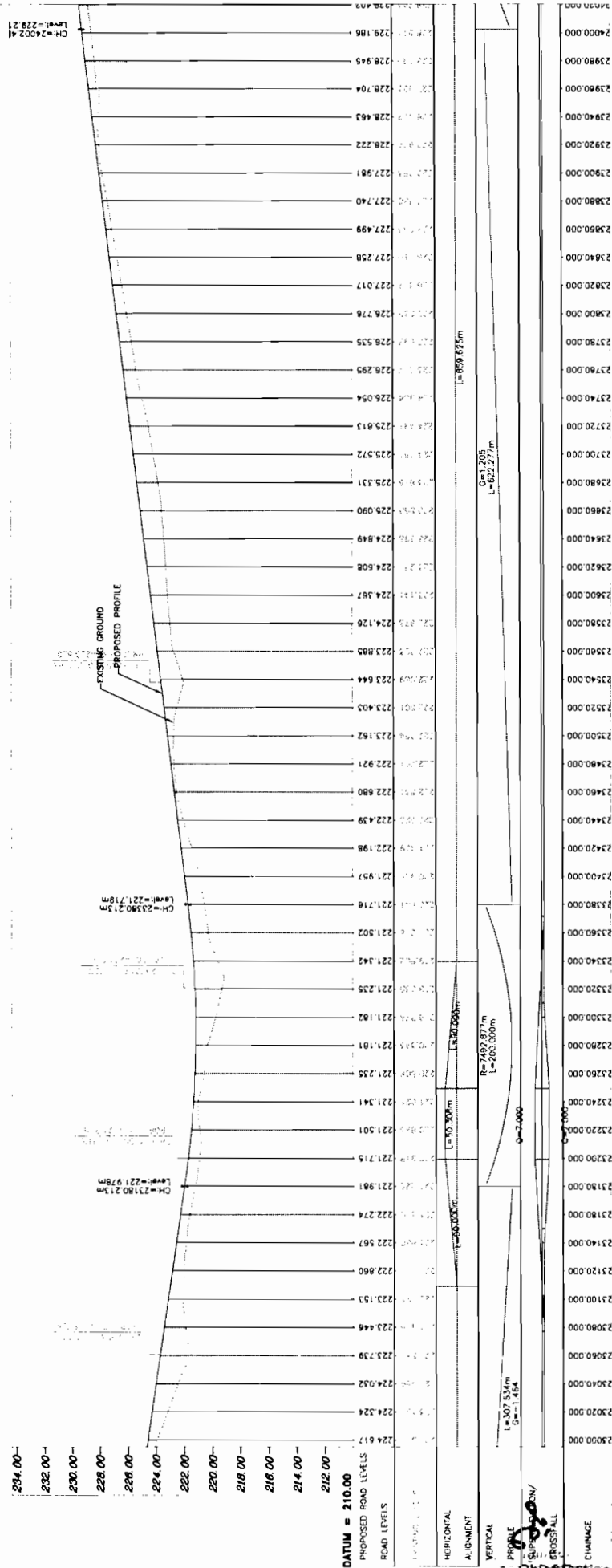
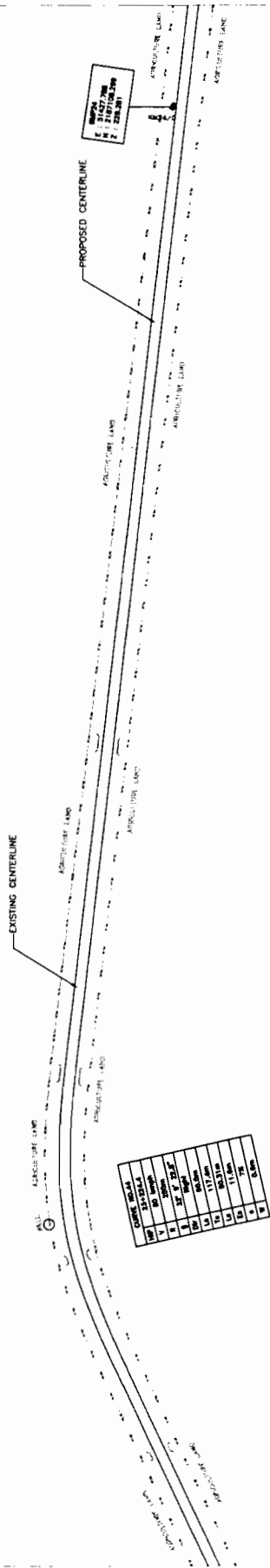
LEGEND

Symbol	Description
□	Right of Way
□	Proposed Road
□	Existing Road
□	Proposed Centerline
□	Existing Centerline
□	Proposed Profile
□	Existing Profile
□	Proposed Ground Profile
□	Existing Ground Profile
□	Proposed Road Levels
□	Existing Road Levels
□	Proposed Road
□	Existing Road
□	Proposed Centerline
□	Existing Centerline
□	Proposed Profile
□	Existing Profile
□	Proposed Ground Profile
□	Existing Ground Profile
□	Proposed Road Levels
□	Existing Road Levels

DATE: 31.12.13
SCALE: HORIZONTAL: 1:1000, VERTICAL: 1:100

TO BHAWANIPATNA

TO KHARIAR



PROJECT:-
WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1 - P01 - BALANCE WORK
(SH-16) KM 23/000 TO KM 24/000

CONSULTING ENGINEER, WB GROUP LTD.
 E-12, Maj Colony, Malviya Nagar, Gurgaon-17
 Tel: +91-141-2520889, 2521899, 2520556
 Fax: 2521348, e-mail: conge@wbgroup.com

LEGEND

EXISTING CENTERLINE	Centerline of existing road
PROPOSED CENTERLINE	Centerline of proposed road
EXISTING ROAD WIDTH	Width of existing road
PROPOSED ROAD WIDTH	Width of proposed road
EXISTING ROAD PROFILE	Profile of existing road
PROPOSED ROAD PROFILE	Profile of proposed road
EXISTING ROAD CROSS-FALL	Cross-fall of existing road
PROPOSED ROAD CROSS-FALL	Cross-fall of proposed road
EXISTING ROAD CHANGING	Changing of existing road
PROPOSED ROAD CHANGING	Changing of proposed road

DATE = 21.00
PROPOSED ROAD LEVELS
ROAD LEVELS

DATUM = 210.00

Horizontal Alignment
 R=7492.877m
 L=205.000m
 G=1.250%

Vertical Profile
 L=307.334m
 G=1.100%

Scale
 HORIZONTAL: 1:1000
 VERTICAL: 1:100

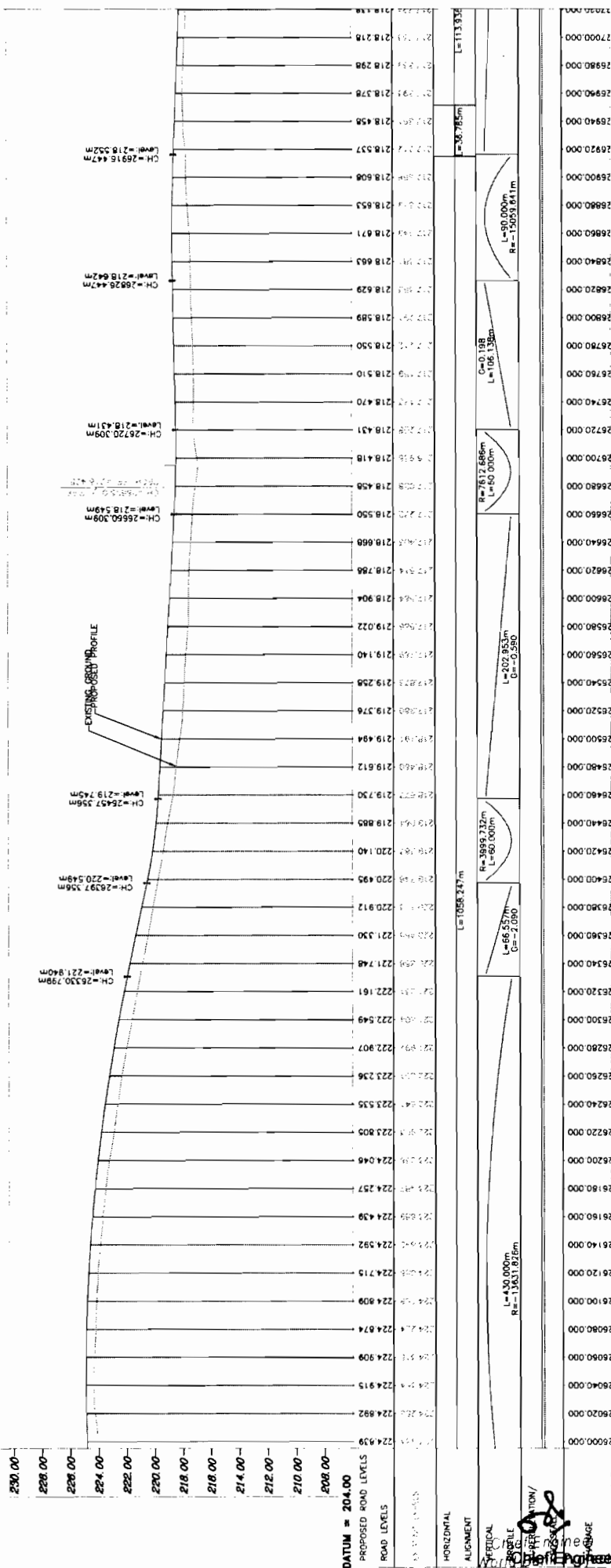
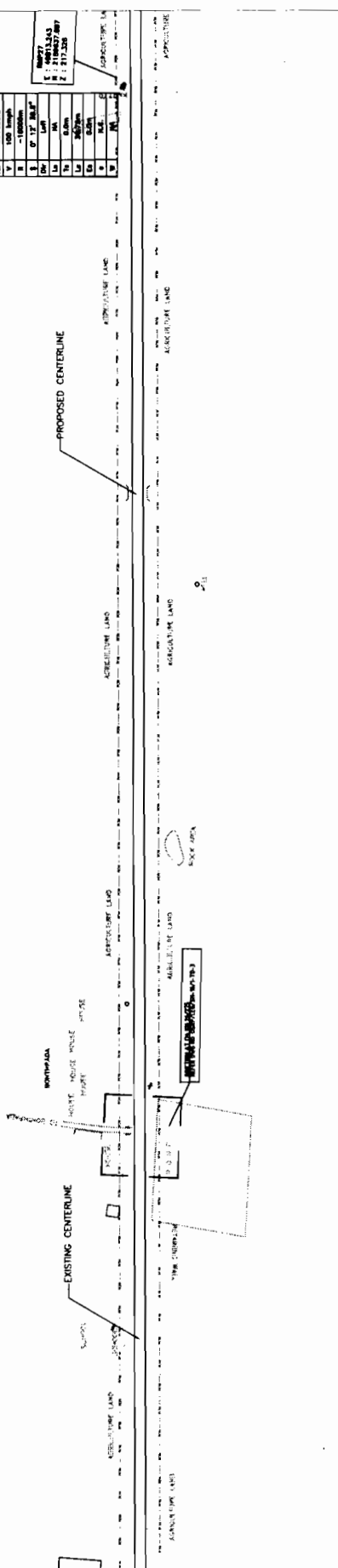
Checked by: [Signature]
Chief Engineer
World Bank Projects, Odisha
 Bhubaneswar

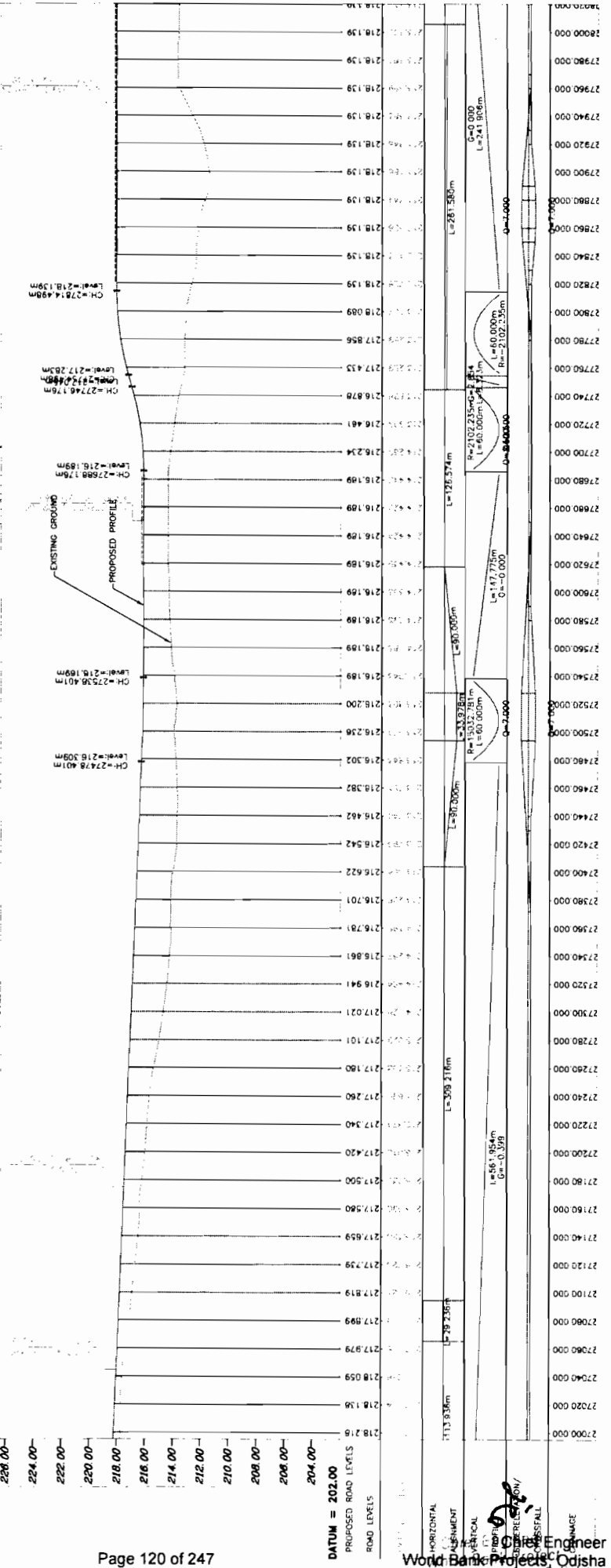
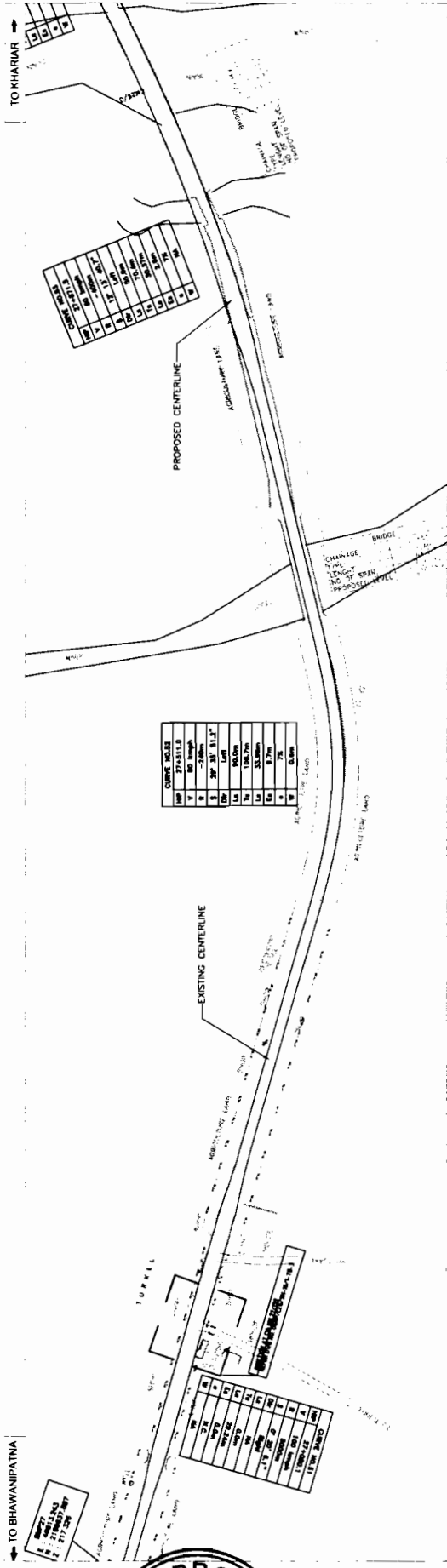


TO BHAWANIPATNA

TO KHARIAR

NO.	CHISEL MARK
1	24-433.2
2	1000mm
3	0' 11" 8.8"
4	1000mm
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50	1000mm





STATION	PROPOSED ROAD LEVELS	ROAD LEVELS
218+216	218.216	218.150
218+218	218.218	218.152
218+220	218.220	218.154
218+222	218.222	218.156
218+224	218.224	218.158
218+226	218.226	218.160
218+228	218.228	218.162
218+230	218.230	218.164
218+232	218.232	218.166
218+234	218.234	218.168
218+236	218.236	218.170
218+238	218.238	218.172
218+240	218.240	218.174
218+242	218.242	218.176
218+244	218.244	218.178
218+246	218.246	218.180
218+248	218.248	218.182
218+250	218.250	218.184
218+252	218.252	218.186
218+254	218.254	218.188
218+256	218.256	218.190
218+258	218.258	218.192
218+260	218.260	218.194
218+262	218.262	218.196
218+264	218.264	218.198
218+266	218.266	218.200
218+268	218.268	218.202
218+270	218.270	218.204
218+272	218.272	218.206
218+274	218.274	218.208
218+276	218.276	218.210
218+278	218.278	218.212
218+280	218.280	218.214
218+282	218.282	218.216
218+284	218.284	218.218
218+286	218.286	218.220
218+288	218.288	218.222
218+290	218.290	218.224
218+292	218.292	218.226
218+294	218.294	218.228
218+296	218.296	218.230
218+298	218.298	218.232
219+000	219.000	218.234
219+002	219.002	218.236
219+004	219.004	218.238
219+006	219.006	218.240
219+008	219.008	218.242
219+010	219.010	218.244
219+012	219.012	218.246
219+014	219.014	218.248
219+016	219.016	218.250
219+018	219.018	218.252
219+020	219.020	218.254
219+022	219.022	218.256
219+024	219.024	218.258
219+026	219.026	218.260
219+028	219.028	218.262
219+030	219.030	218.264
219+032	219.032	218.266
219+034	219.034	218.268
219+036	219.036	218.270
219+038	219.038	218.272
219+040	219.040	218.274
219+042	219.042	218.276
219+044	219.044	218.278
219+046	219.046	218.280
219+048	219.048	218.282
219+050	219.050	218.284
219+052	219.052	218.286
219+054	219.054	218.288
219+056	219.056	218.290
219+058	219.058	218.292
219+060	219.060	218.294
219+062	219.062	218.296
219+064	219.064	218.298
219+066	219.066	218.300
219+068	219.068	218.302
219+070	219.070	218.304
219+072	219.072	218.306
219+074	219.074	218.308
219+076	219.076	218.310
219+078	219.078	218.312
219+080	219.080	218.314
219+082	219.082	218.316
219+084	219.084	218.318
219+086	219.086	218.320
219+088	219.088	218.322
219+090	219.090	218.324
219+092	219.092	218.326
219+094	219.094	218.328
219+096	219.096	218.330
219+098	219.098	218.332
220+000	220.000	218.334



World Bank Project
Civil Engineer
Odisha

PROJECT:-
WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-P01-BALANCE WORK
(SH-16) KM 27/000 TO KM 28/000

CONSULTING ENGINEER
ENGINEERING GROUP LTD.
E-12, 1st Floor, Colony Malviya, Nagoa, Cuttack-751005
Tel: 491-141-2520899, 2521899, 2520556
Fax: 2521346, e-mail: ce@egnltd.com

LEGEND

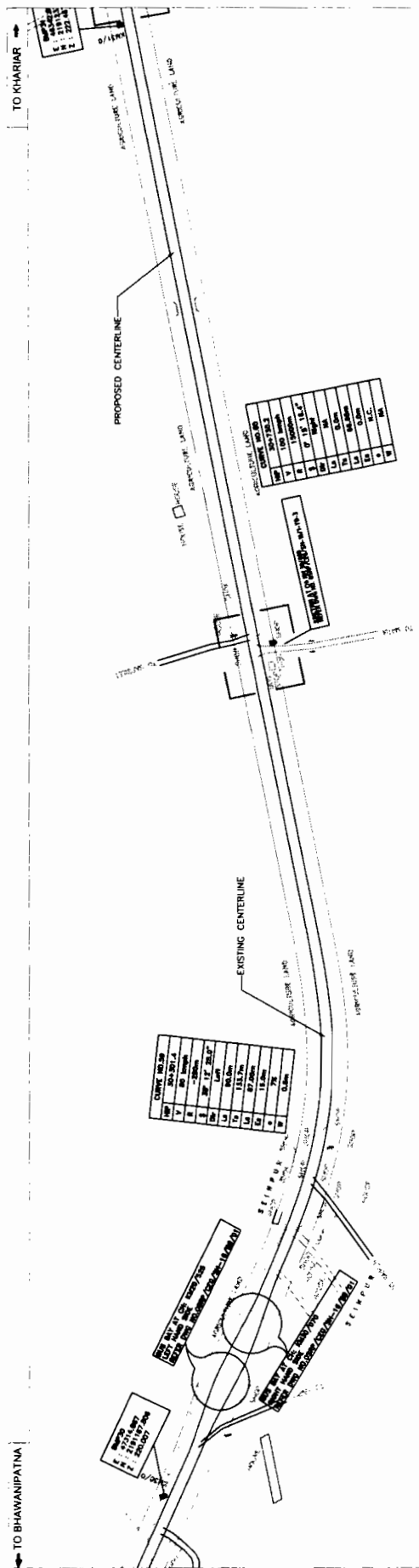
EXISTING CENTERLINE	EXISTING ROAD	EXISTING GRADE	EXISTING PROFILE
PROPOSED CENTERLINE	PROPOSED ROAD	PROPOSED GRADE	PROPOSED PROFILE
PROPOSED GRADE	PROPOSED PROFILE	PROPOSED GRADE	PROPOSED PROFILE

DATE: 11.12.12
REV: R3
SCALE: HORIZONTAL: 1:1000, VERTICAL: 1:100

APPROVED BY: [Signature]
DATE: 11.12.12

DRG NO: [Blank]
SH. NO. 26: [Blank]
DATE: 11.12.12
REV: R3

CCG: [Blank]
CE/PMU: [Blank]
CE/WRP: [Blank]



TO BHAWANIPATNA

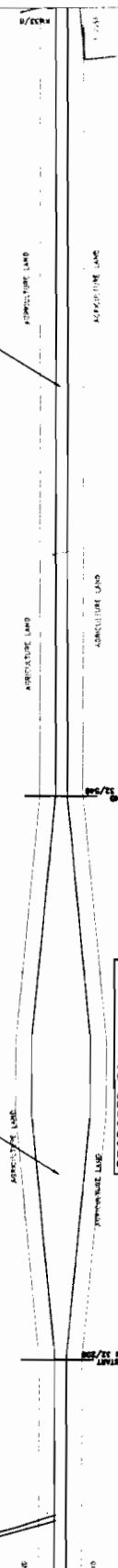
TO KHARIAH



SCALE
E: 1:1000
H: 1:100
V: 1:100

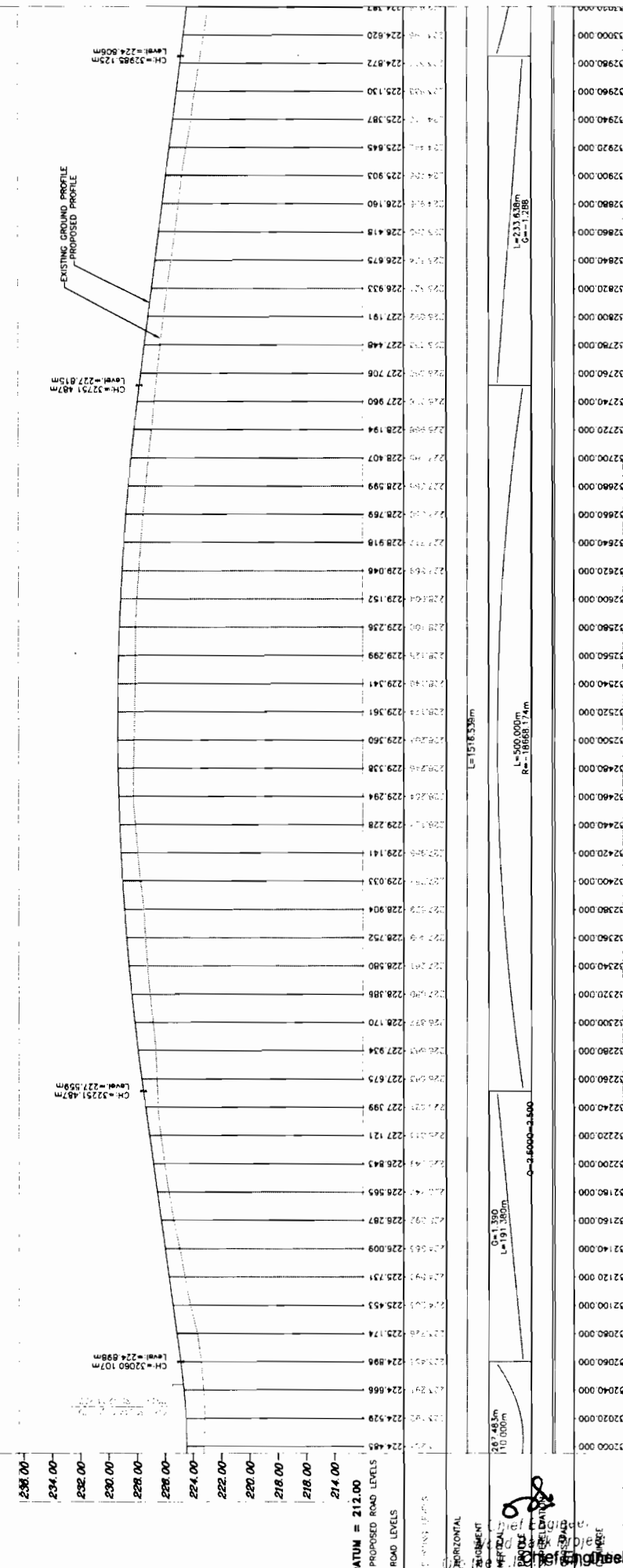
EXISTING CENTERLINE
PROPOSED TOLL PLAZA
NOTE: DATE 14/07/2011 TO 17/07/2011

PROPOSED CENTERLINE



TOLL PLAZA ONE
CHANNEL: 10/2/08

TOLL PLAZA START
CHANNEL: 10/2/08



CH = 32251.487m
Level = 227.559m

Level = 227.915m
CH = 32251.487m

CH = 32985.125m
Level = 226.806m

DATUM = 212.00
PROPOSED ROAD LEVELS
ROAD LEVELS

267.483m
110.000m

G=1.350
L=191.385m

G=3.600-3.600

L=500.000m
Re=16681.74m

L=15183.36m

L=233.636m
G=-1.285

Table with columns for stationing (e.g., 12000.000, 12020.000, 12040.000) and corresponding elevation values.

LEGEND table with symbols for various road features like centerline, agricultural land, and toll plaza.

CONSULTING ENGINEER, WB GROUP LTD. ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

PROJECT: WIDENING AND STRENGTHENING TO TWO LANE Package OSRP-CW-Y1-P01-BALANCE WORK (SH-16) KM 32/000 TO KM 33/000

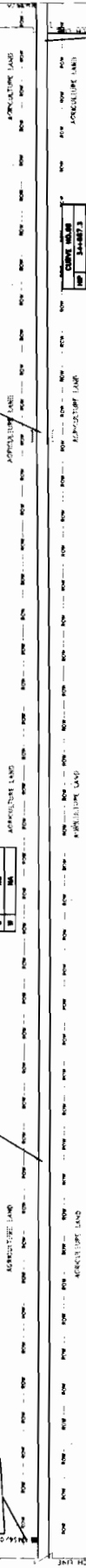
TO BHAWANIPATNA

TO KHARIAR

CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
1	2	3	4	5	6	7	8	9	10	11	12	13

EXISTING CENTERLINE

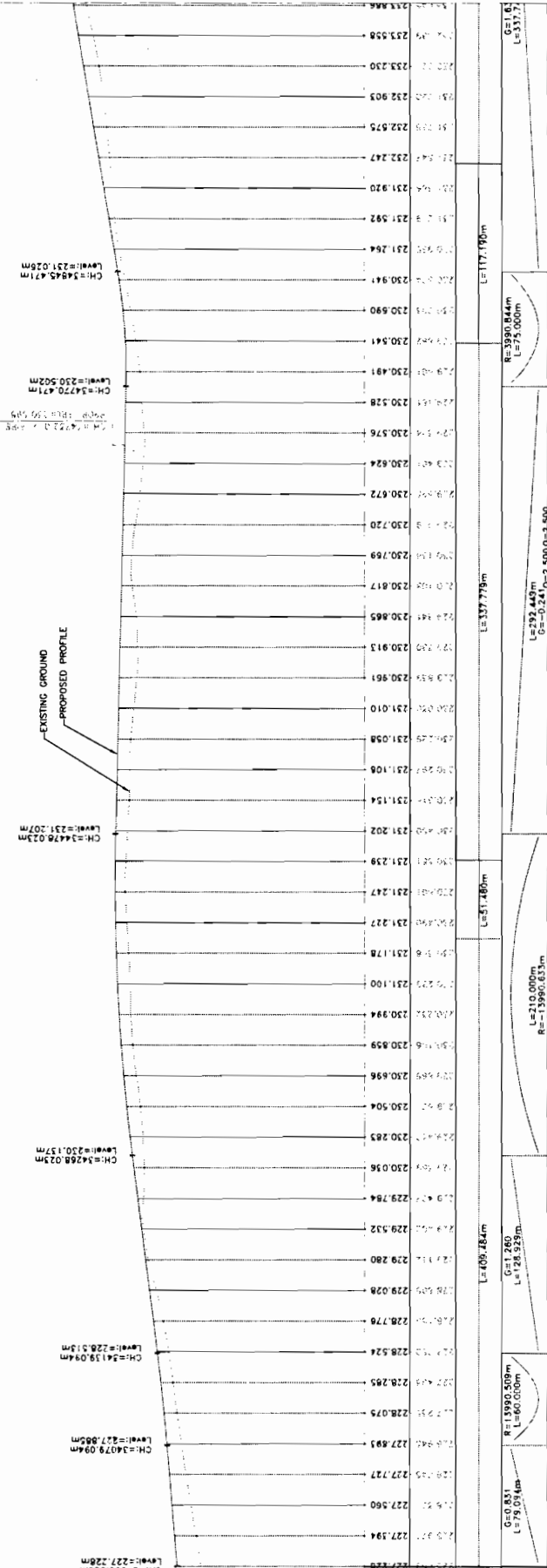
PROPOSED CENTERLINE



CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
1	2	3	4	5	6	7	8	9	10	11	12	13

DATUM = 215.00

PROPOSED ROAD LEVELS	EXISTING GROUND
241.0	
239.00	
237.00	
235.00	
233.00	
231.00	
229.00	
227.00	
225.00	
223.00	
221.00	
219.00	
217.00	



DATUM = 215.00

PROPOSED ROAD LEVELS	EXISTING GROUND
241.0	
239.00	
237.00	
235.00	
233.00	
231.00	
229.00	
227.00	
225.00	
223.00	
221.00	
219.00	
217.00	



PROJECT:
WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-P01-BALANCE WORK
(SH-16) KM 34/000 TO KM 35/000

DIR. NO. 33 DATE 31.12.12 REV R3
SCALE HORIZONTAL 1:5000 VERTICAL 1:1000

DESIGNED BY: S. S. PANDA
CHECKED BY: S. S. PANDA
APPROVED BY: S. S. PANDA

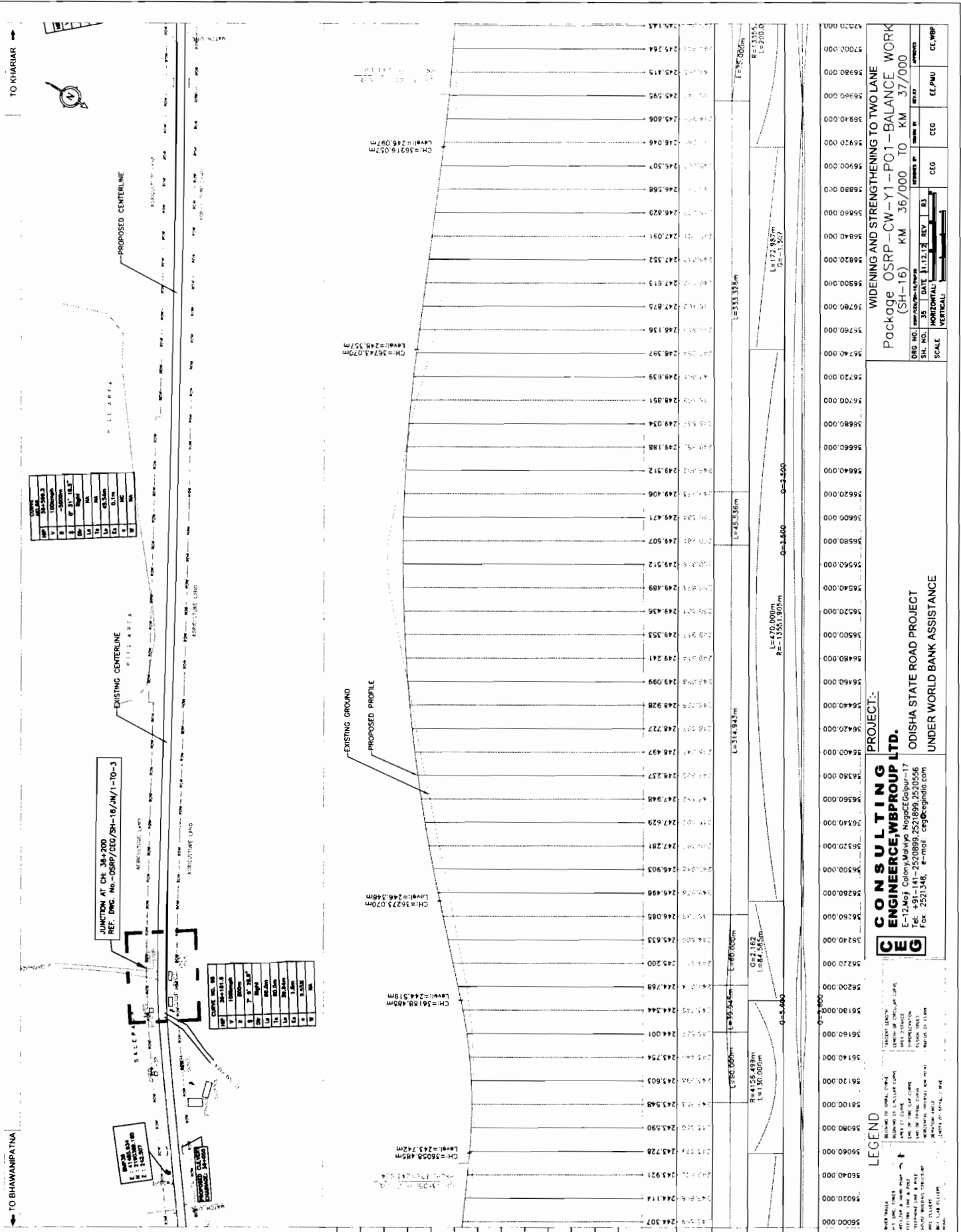
CED
ENGINEERING, WB GROUP LTD.
E-12, Maj Colony, Malviya Nagar, Gurgaon-17
Tel: +91-141-2520898, 2521899, 2520556
Fax: 2521348, e-mail: ceg@egindia.com

LEGEND:

---	EXISTING CENTERLINE
---	PROPOSED CENTERLINE
---	EXISTING ROAD PROFILE
---	PROPOSED ROAD PROFILE
---	EXISTING GROUND PROFILE
---	PROPOSED GROUND PROFILE
---	EXISTING BANK
---	PROPOSED BANK
---	EXISTING DRAINAGE
---	PROPOSED DRAINAGE
---	EXISTING UTILITY
---	PROPOSED UTILITY

CON CONSULTING ENGINEERS, WB GROUP LTD.
E-12, Maj Colony, Malviya Nagar, Gurgaon-17
Tel: +91-141-2520898, 2521899, 2520556
Fax: 2521348, e-mail: ceg@egindia.com

UNDER WORLD BANK ASSISTANCE



TO BHAWANIPATNA

TO KHARIAR

BA BRIK PROJECT LTD.
Contractor

Chief Engineer
World Bank Projects, Odisha
Rhubaneswar.

CEG

CONSULTING PROJECT:-
ENGINEERING, WB GROUP LTD.
E-12, Major Colony, Malviya Nagar, Gurgaon-17
Tel: +91-1241-2520899, 2520899, 2520556
Fax: 2521346, e-mail: ceg@ceginfoc.com

WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-P01-BALANCE WORK
(SH-16) KM 36/000 TO KM 37/000

DATE: 11/11/13
SCALE: HORIZONTAL: 1:12.5, VERTICAL: 1:10

REVISIONS:

NO.	DESCRIPTION	DATE	BY	CHKD
1	ISSUED FOR TENDER	11/11/13

UNDER WORLD BANK ASSISTANCE

TO BHAWANIPATNA

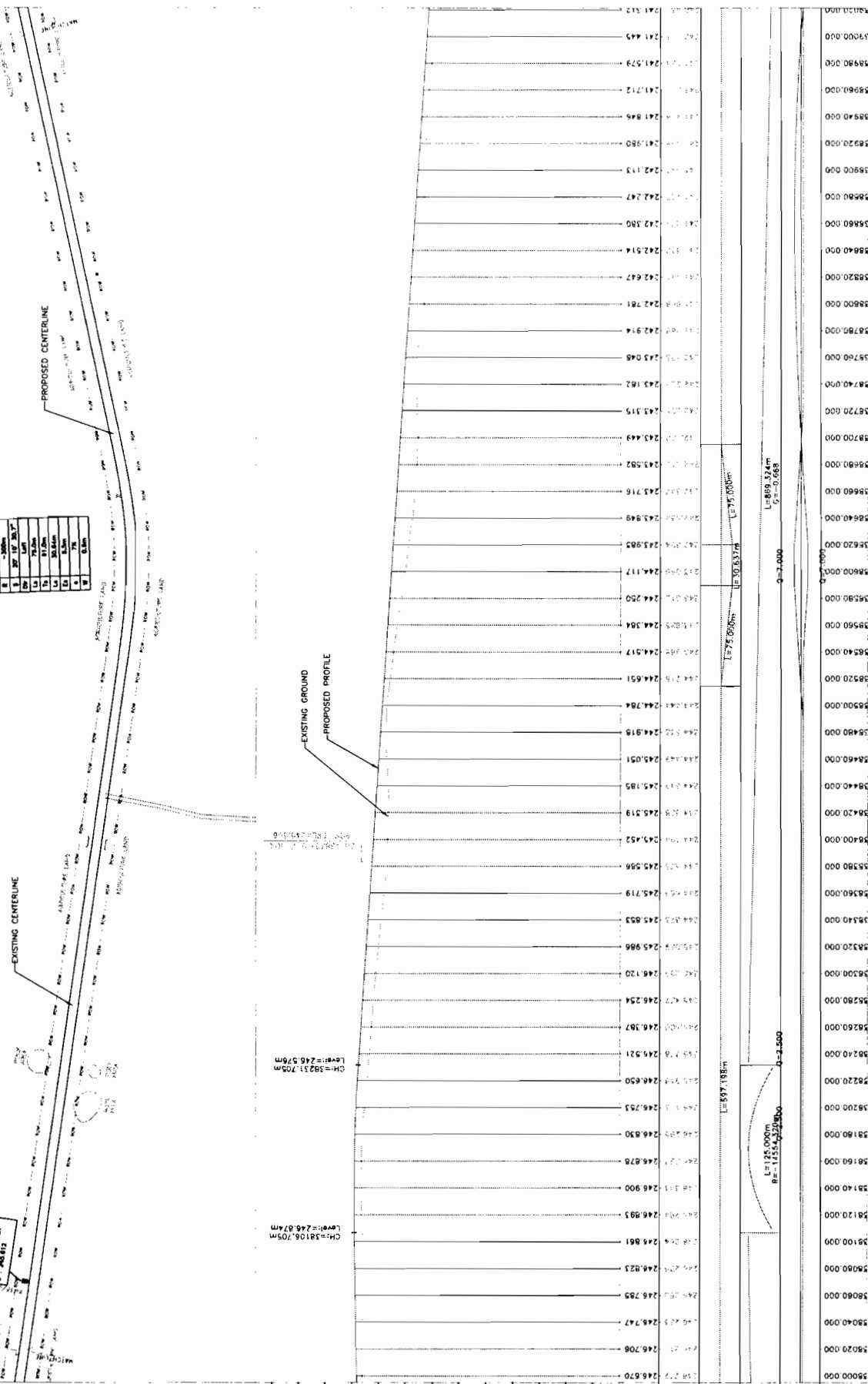
TO KHARIARI

CH. NO.	CH. DIST.	CH. BEARING	CH. LENGTH
1	0+00	N 89° 15' 30" E	10.00m
2	0+10	N 89° 15' 30" E	10.00m
3	0+20	N 89° 15' 30" E	10.00m
4	0+30	N 89° 15' 30" E	10.00m
5	0+40	N 89° 15' 30" E	10.00m
6	0+50	N 89° 15' 30" E	10.00m
7	0+60	N 89° 15' 30" E	10.00m
8	0+70	N 89° 15' 30" E	10.00m
9	0+80	N 89° 15' 30" E	10.00m
10	0+90	N 89° 15' 30" E	10.00m

CH. NO.	CH. DIST.	CH. BEARING	CH. LENGTH
1	0+00	N 89° 15' 30" E	10.00m
2	0+10	N 89° 15' 30" E	10.00m
3	0+20	N 89° 15' 30" E	10.00m
4	0+30	N 89° 15' 30" E	10.00m
5	0+40	N 89° 15' 30" E	10.00m
6	0+50	N 89° 15' 30" E	10.00m
7	0+60	N 89° 15' 30" E	10.00m
8	0+70	N 89° 15' 30" E	10.00m
9	0+80	N 89° 15' 30" E	10.00m
10	0+90	N 89° 15' 30" E	10.00m



RBRIK PROJECT LIMITED
Odisha, India



CH-38231.705m
L=848.77m

CH-38106.705m
L=848.77m

CH-38231.705m
L=848.77m

CH-38106.705m
L=848.77m

DATUM = 227.00

PROPOSED ROAD LEVELS

STATIONING	PROPOSED ROAD LEVELS
0+00	246.570
0+10	246.708
0+20	246.747
0+30	246.785
0+40	246.823
0+50	246.861
0+60	246.899
0+70	246.937
0+80	246.974
0+90	247.011

HORIZONTAL ALIGNMENT VERTICAL PROFILE

VERTICAL CURVE DATA

STATIONING	VERTICAL CURVE DATA
0+00	L=125.000m
0+10	P=-125.000m
0+20	L=125.000m
0+30	P=-125.000m
0+40	L=125.000m
0+50	P=-125.000m
0+60	L=125.000m
0+70	P=-125.000m
0+80	L=125.000m
0+90	P=-125.000m

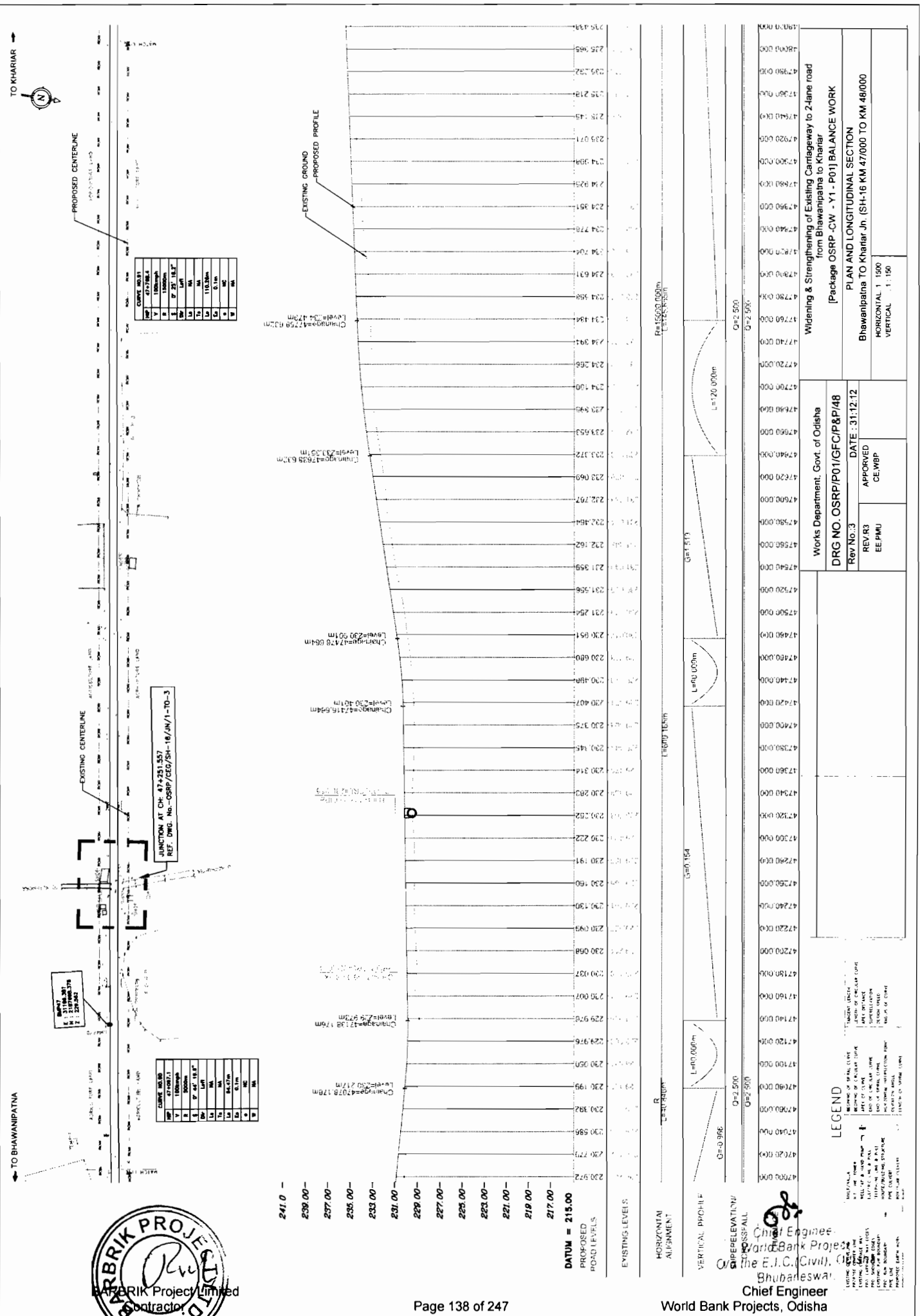
STATIONING	EXISTING GROUND	PROPOSED PROFILE
0+00	246.570	246.570
0+10	246.708	246.708
0+20	246.747	246.747
0+30	246.785	246.785
0+40	246.823	246.823
0+50	246.861	246.861
0+60	246.899	246.899
0+70	246.937	246.937
0+80	246.974	246.974
0+90	247.011	247.011

WIDENING AND STRENGTHENING TO TWO LANE
Package OSRP-CW-Y1-PO1-BALANCE WORK
(SH-16) KM 38/000 TO KM 39/000

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS WB GROUP LTD.
E-12, Mof Colony, Malviya Nagar, New Delhi-110017
Tel: 491-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceeg@egindia.com

LEGEND
SYMBOLS FOR
PROPOSED ROAD LEVELS
EXISTING GROUND
VERTICAL CURVE DATA
HORIZONTAL ALIGNMENT
PROPOSED CENTERLINE
EXISTING CENTERLINE
PROPOSED PROFILE
EXISTING PROFILE
SCALE: HORIZONTAL 1:1000, VERTICAL 1:100



NO	1	2	3	4	5	6	7	8	9	10
GRADE	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
MIN	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
MAX	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%

JUNCTION AT CH. 47+211.537
REF. DRG. No.-OSRP/CE/SSA-18/JN/1-TO-3

NO	1	2	3	4	5	6	7	8	9	10
GRADE	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
MIN	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
MAX	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%



LEGEND

SYMBOL	DESCRIPTION
(Symbol)	BOUNDARY OF ROAD
(Symbol)	BOUNDARY OF EXISTING ROAD
(Symbol)	BOUNDARY OF NEW ROAD
(Symbol)	BOUNDARY OF EXISTING CANAL
(Symbol)	BOUNDARY OF NEW CANAL
(Symbol)	BOUNDARY OF EXISTING FENCE
(Symbol)	BOUNDARY OF NEW FENCE
(Symbol)	BOUNDARY OF EXISTING WALL
(Symbol)	BOUNDARY OF NEW WALL
(Symbol)	BOUNDARY OF EXISTING CURB
(Symbol)	BOUNDARY OF NEW CURB
(Symbol)	BOUNDARY OF EXISTING DRAIN
(Symbol)	BOUNDARY OF NEW DRAIN
(Symbol)	BOUNDARY OF EXISTING UTILITY
(Symbol)	BOUNDARY OF NEW UTILITY

Chief Engineer
World Bank Projects
E. J. C. (Civil),
Bhubaneswar

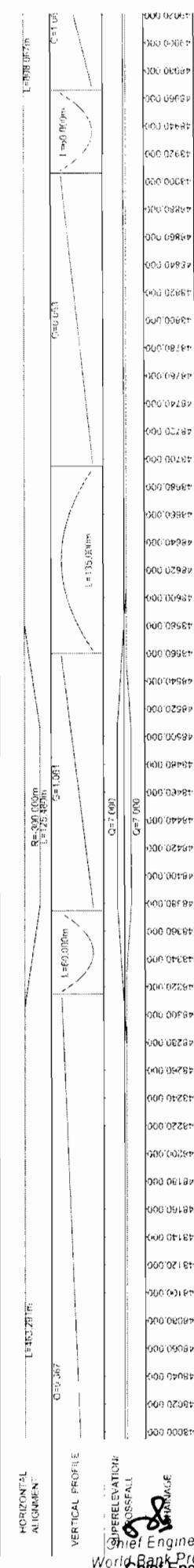
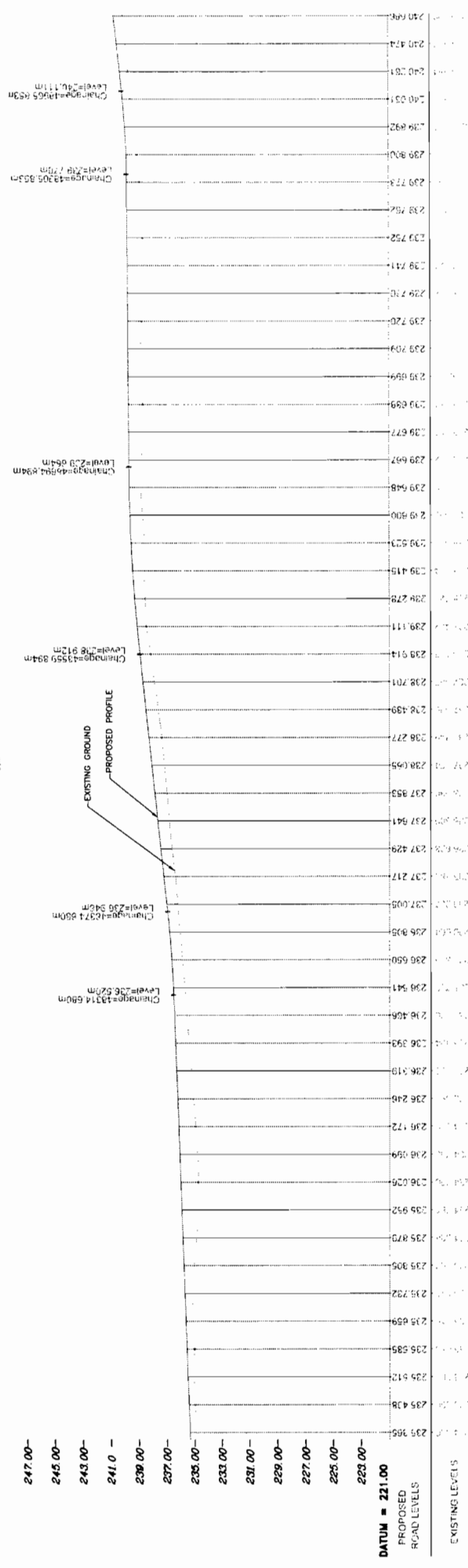
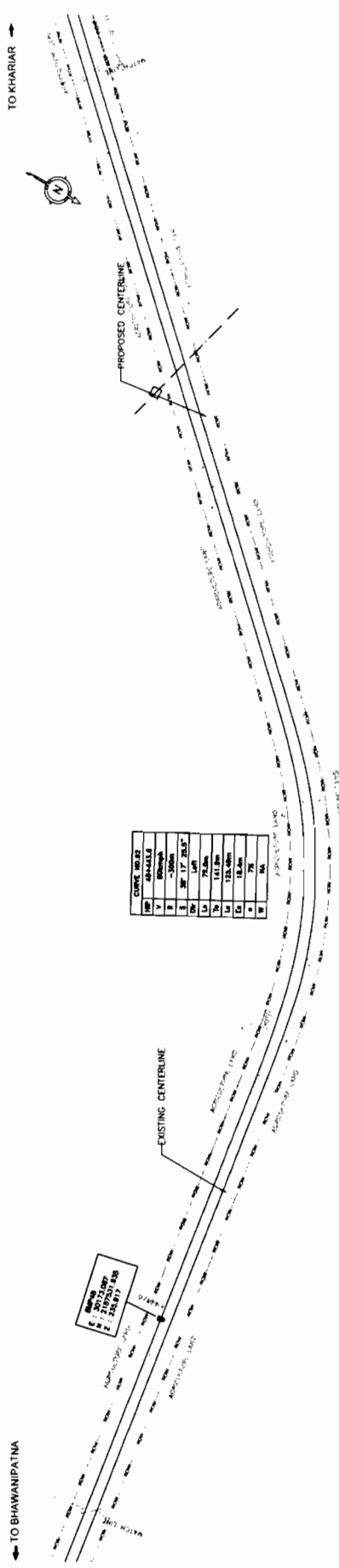
Chief Engineer
World Bank Projects, Odisha

Works Department, Govt. of Odisha	
DRG NO. OSRP/PO1/GFC/PP&P/48	DATE: 31.12.12
REV No. 3	APPROVED
EE (PMU)	CE (WBP)
Widening & Strengthening of Existing Carriageway to 2-lane road from Bhawanipatna to Khariar	
[Package OSRP - CW - Y1 - P01] BALANCE WORK	
PLAN AND LONGITUDINAL SECTION	
Bhawanipatna TO Khariar Jn. (SH-16 KM 47/000 TO KM 48/000)	
HORIZONTAL	1:500
VERTICAL	1:150

Works Department, Govt. of Odisha	
DRG NO. OSRP/PO1/GFC/PP&P/48	DATE: 31.12.12
REV No. 3	APPROVED
EE (PMU)	CE (WBP)

Works Department, Govt. of Odisha	
DRG NO. OSRP/PO1/GFC/PP&P/48	DATE: 31.12.12
REV No. 3	APPROVED
EE (PMU)	CE (WBP)

Works Department, Govt. of Odisha	
DRG NO. OSRP/PO1/GFC/PP&P/48	DATE: 31.12.12
REV No. 3	APPROVED
EE (PMU)	CE (WBP)



LEGEND	
—	EXISTING CENTERLINE
- - -	PROPOSED CENTERLINE
—	EXISTING GROUND
- - -	PROPOSED PROFILE
—	EXISTING ROAD LEVELS
- - -	PROPOSED ROAD LEVELS
—	EXISTING GROUND
- - -	PROPOSED PROFILE
—	EXISTING ROAD LEVELS
- - -	PROPOSED ROAD LEVELS

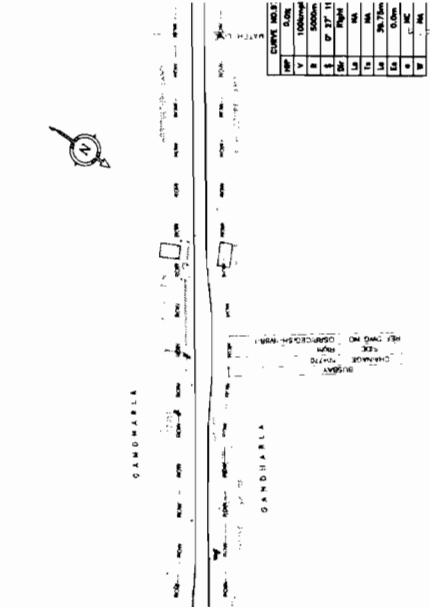
Works Department, Govt. of Odisha	
DRG NO. OSR/PO1/GFC/P&P/49	DATE: 31.12.12
REV NO. 3	APPROVED
EE PMU	CE WBP
Widening & Strengthening of Existing Carttegrway to 2-lane road from Bhawanipatna to Khariar [Package OSRP - CW - Y1 - P01] BALANCE WORK	
PLAN AND LONGITUDINAL SECTION	
Bhawanipatna TO Khariar, Jn. (SH-16 KM 48/000 TO KM 49/000)	
HORIZONTAL 1 : 500	VERTICAL 1 : 150



Chief Engineer
 World Bank Project
 Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar.

TO KHARIAR

TO BHAWANIPATNA



TO KHARIAR

TO BHAWANIPATNA

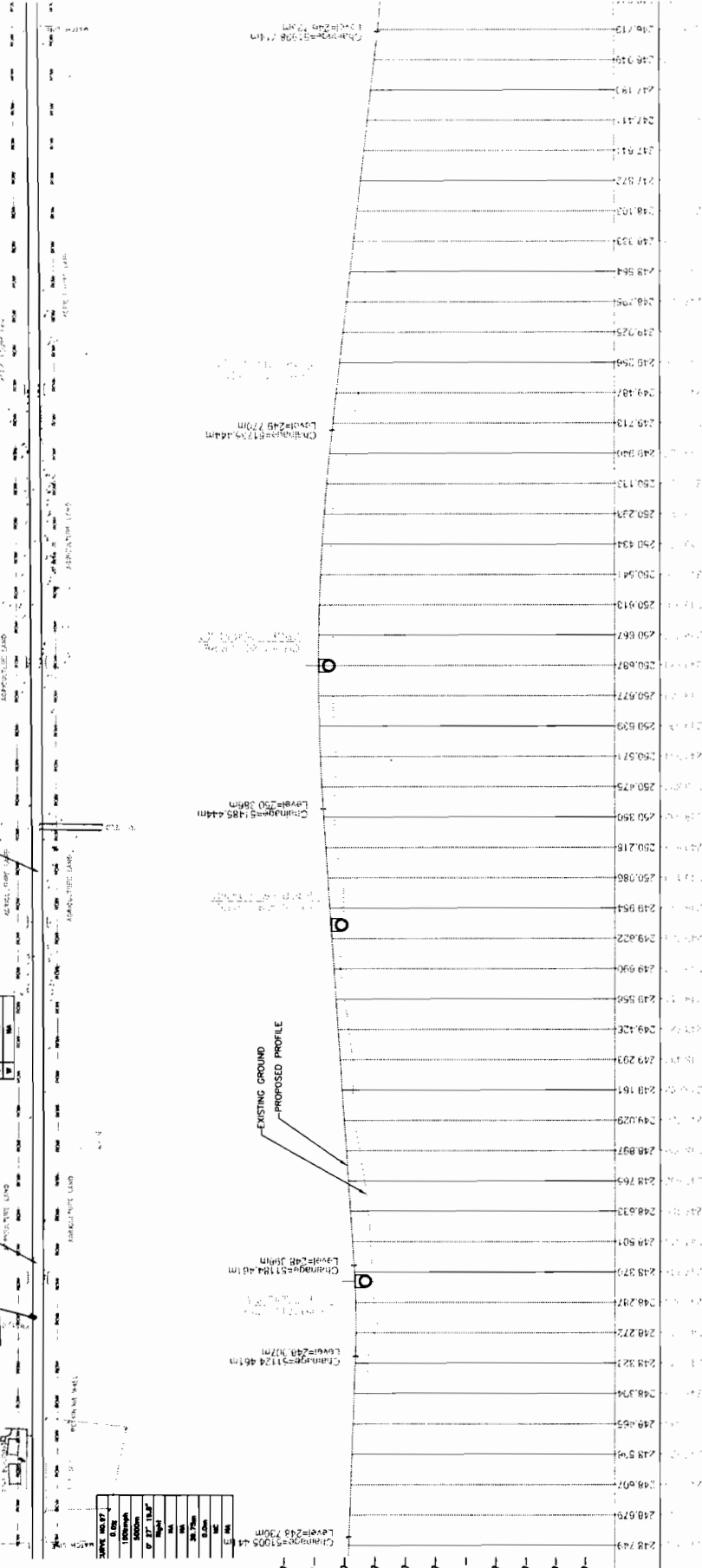


CHISEL	100.00
HP	31.33%
V	1000mm
S	1000mm
P	27.13%
W	1000mm
L	1000mm
U	1000mm
Q	1000mm
R	1000mm
S	1000mm
T	1000mm
U	1000mm
V	1000mm
W	1000mm
X	1000mm
Y	1000mm
Z	1000mm

CHANGING
E: 2700.00
L: 248.00
R: 244.00

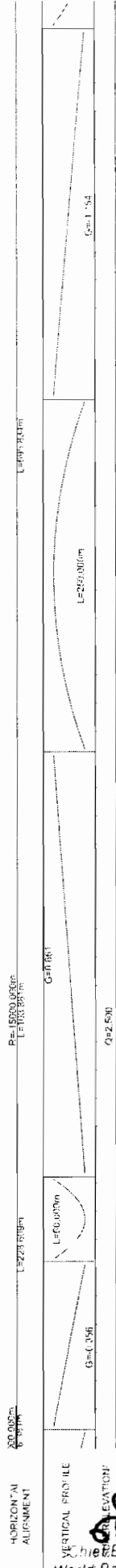
EXISTING CENTERLINE

PROPOSED CENTERLINE



CHISEL	100.00
HP	31.33%
V	1000mm
S	1000mm
P	27.13%
W	1000mm
L	1000mm
U	1000mm
Q	1000mm
R	1000mm
S	1000mm
T	1000mm
U	1000mm
V	1000mm
W	1000mm
X	1000mm
Y	1000mm
Z	1000mm

EXISTING LEVELS
 253.00
 251.00
 248.00
 247.00
 246.00
 243.00
 241.0
 238.00
 237.00
 235.00
 233.00
 DATUM = 231.00
 PROPOSED ROAD LEVELS



Works Department, Govt. of Odisha		Widening & Strengthening of Existing Carriageway to 2-lane road from Bhawanipatna to Khariar	
DRG NO. OSRP/P01/GFC/P&P/52		[Package OSRP - CW - Y1 - P01] BALANCE WORK	
Rev No. 3	DATE : 31.12.12	PLAN AND LONGITUDINAL SECTION	
REV R3	APPROVED	Bhawanipatna TO Khariar, (SH-16 KM 51000 TO KM 52000)	
EE PMU	CE WBP	HORIZONTAL : 1:500 VERTICAL : 1:150	

LEGEND

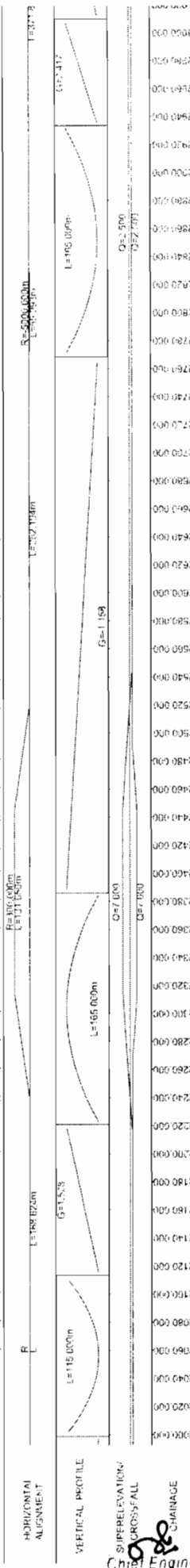
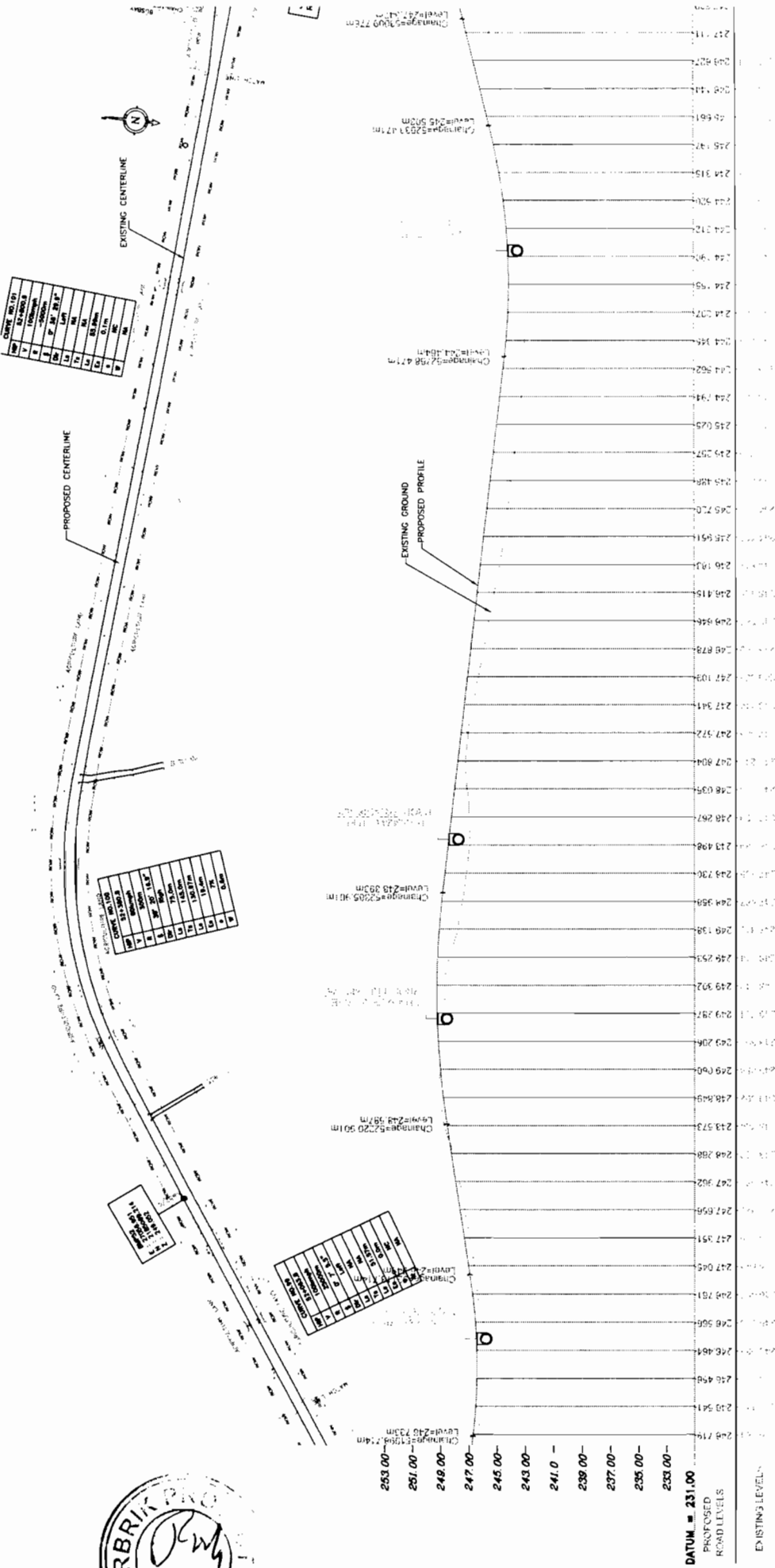
- PROPOSED PROFILE
- EXISTING GROUND
- PROPOSED ROAD LEVELS
- EXISTING ROAD LEVELS
- PROPOSED CENTERLINE
- EXISTING CENTERLINE
- PROPOSED CHANGING
- EXISTING CHANGING
- PROPOSED CHANGING
- EXISTING CHANGING
- PROPOSED CHANGING
- EXISTING CHANGING



Chief Engineer
World Bank Project
Odisha

TO KHARIAR

TO BHAWANIPATNA



STATION	EXISTING LEVELS	PROPOSED ROAD LEVELS
206+715	206.715	206.715
207+000	207.000	207.000
208+500	208.500	208.500
210+000	210.000	210.000
211+500	211.500	211.500
213+000	213.000	213.000
214+500	214.500	214.500
216+000	216.000	216.000
217+111	217.111	217.111

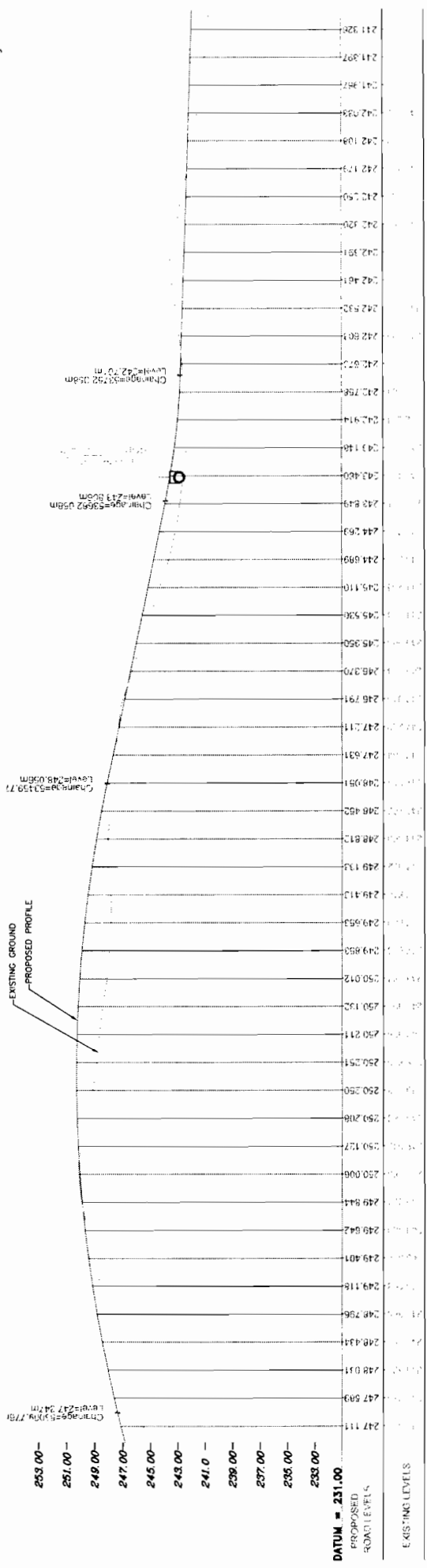
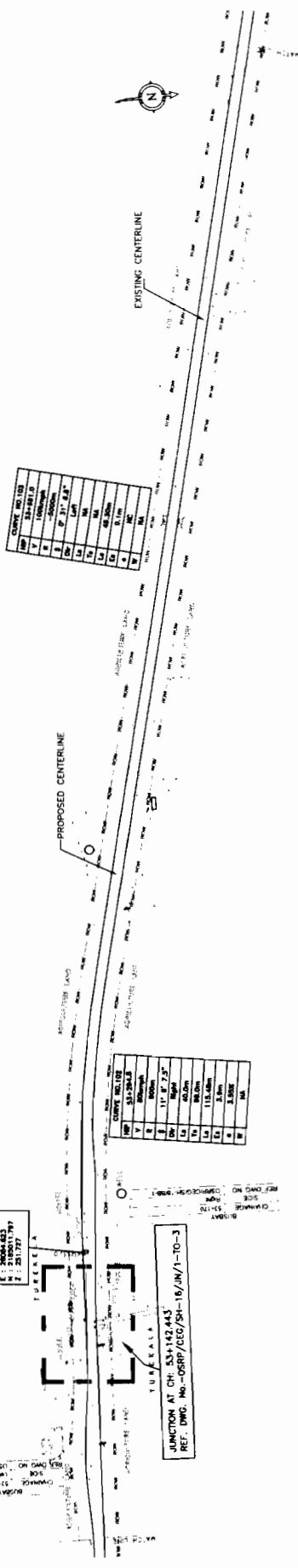


LEGEND

EXISTING GROUND	PROPOSED PROFILE
EXISTING CENTERLINE	PROPOSED CENTERLINE
EXISTING ROAD WIDTH	PROPOSED ROAD WIDTH
EXISTING SIDEWALK	PROPOSED SIDEWALK
EXISTING DRAINAGE	PROPOSED DRAINAGE
EXISTING UTILITIES	PROPOSED UTILITIES
EXISTING OBSTACLES	PROPOSED OBSTACLES
EXISTING VEGETATION	PROPOSED VEGETATION
EXISTING FENCES	PROPOSED FENCES
EXISTING SIGNAGE	PROPOSED SIGNAGE
EXISTING LIGHTING	PROPOSED LIGHTING
EXISTING SAFETY	PROPOSED SAFETY

Works Department, Govt. of Odisha	
DRG NO. OSRP/P01/GFC/P&P/53	DATE: 31-12-12
REV/R3	APPROVED
EE/PMU	CE/WBP

[Package OSRP - CW - Y1 - P01] BALANCE WORK	
Widening & Strengthening of Existing Cartageway to 2-lane road from Bhawanipatna to Khariar	
PLAN AND LONGITUDINAL SECTION	
Bhawanipatna TO Khariar Jn. (SH-16 KM 52/000 TO KM 53/000)	
HORIZONTAL: 1:1500	VERTICAL: 1:150



STATION	EXISTING LEVELS	PROPOSED ROAD LEVELS	CHANGING
247.11	247.11	247.11	
248.03	248.03	248.03	
249.18	249.18	249.18	
249.47	249.47	249.47	
249.84	249.84	249.84	
250.06	250.06	250.06	
250.17	250.17	250.17	
250.21	250.21	250.21	
250.13	250.13	250.13	
250.07	250.07	250.07	
249.83	249.83	249.83	
249.53	249.53	249.53	
249.47	249.47	249.47	
249.13	249.13	249.13	
248.87	248.87	248.87	
248.42	248.42	248.42	
248.01	248.01	248.01	
247.91	247.91	247.91	
248.70	248.70	248.70	
248.90	248.90	248.90	
244.69	244.69	244.69	
243.40	243.40	243.40	
243.10	243.10	243.10	
242.94	242.94	242.94	
242.78	242.78	242.78	
242.67	242.67	242.67	
242.50	242.50	242.50	
242.40	242.40	242.40	
242.30	242.30	242.30	
242.19	242.19	242.19	
242.10	242.10	242.10	
242.03	242.03	242.03	
241.87	241.87	241.87	
241.97	241.97	241.97	
241.32	241.32	241.32	



LEGEND

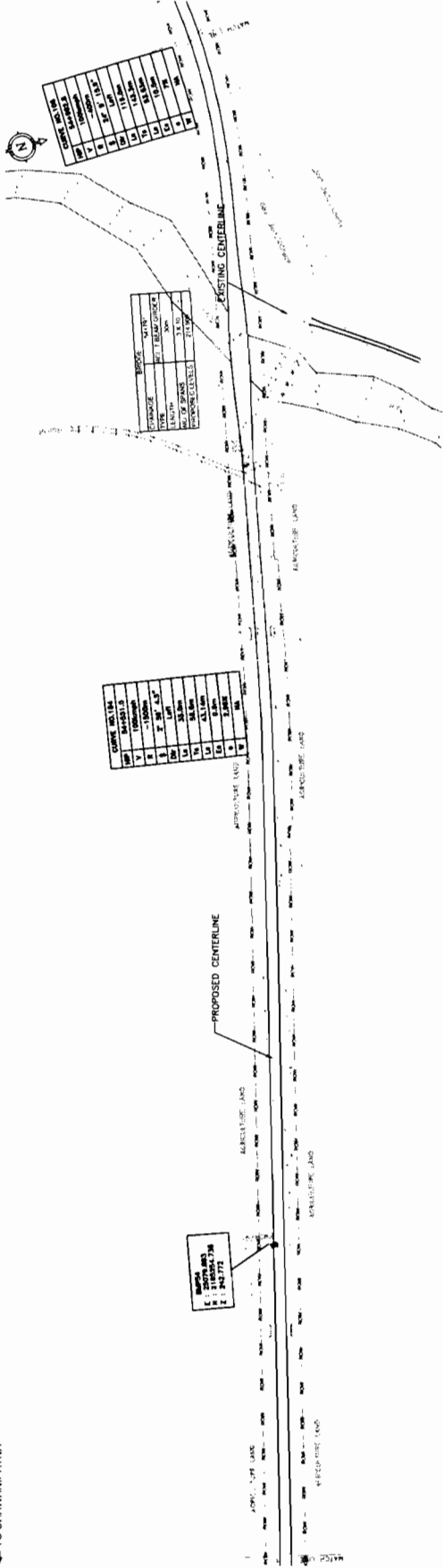
- EXISTING CENTERLINE
- PROPOSED CENTERLINE
- EXISTING GROUND PROFILE
- PROPOSED ROAD PROFILE
- VERTICAL ALIGNMENT
- HORIZONTAL ALIGNMENT
- CHANGING

Works Department, Govt. of Odisha
DRG NO. OSRPP01/GFC/P&P/54
 DATE: 31.12.12
 APPROVED: CE, WBP
 REV/R3: EE, PMU

Widening & Strengthening of Existing Carriageway to 2-lane road from Bhawanipatna to Khariar
 [Package OSRP -CW - Y1 - P01] BALANCE WORK
 PLAN AND LONGITUDINAL SECTION
 Bhawanipatna TO Khariar Jn. (SH-16 KM 53/000 TO KM 54/000)
 HORIZONTAL: 1:1500
 VERTICAL: 1:150

TO BHAWANIPATNA

TO KHARIAR



Curve No.	Radius	Length	Grade
1	1000	100	1:1
2	1000	100	1:1
3	1000	100	1:1
4	1000	100	1:1
5	1000	100	1:1
6	1000	100	1:1
7	1000	100	1:1
8	1000	100	1:1
9	1000	100	1:1
10	1000	100	1:1
11	1000	100	1:1
12	1000	100	1:1
13	1000	100	1:1
14	1000	100	1:1
15	1000	100	1:1
16	1000	100	1:1
17	1000	100	1:1
18	1000	100	1:1
19	1000	100	1:1
20	1000	100	1:1
21	1000	100	1:1
22	1000	100	1:1
23	1000	100	1:1
24	1000	100	1:1
25	1000	100	1:1
26	1000	100	1:1
27	1000	100	1:1
28	1000	100	1:1
29	1000	100	1:1
30	1000	100	1:1
31	1000	100	1:1
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33	1000	100	1:1
34	1000	100	1:1
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36	1000	100	1:1
37	1000	100	1:1
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43	1000	100	1:1
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95	1000	100	1:1
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99	1000	100	1:1
100	1000	100	1:1

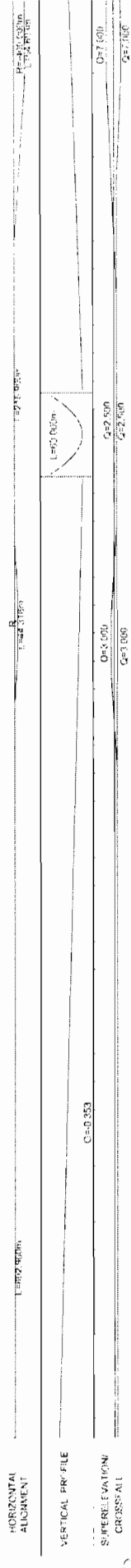
Curve No.	15
Radius	1000
Length	100
Grade	1:1

248.00-
247.00-
246.00-
245.00-
244.00-
241.00-
239.00-
237.00-
235.00-
233.00-
DATUM = 231.00
PROPOSED ROAD LEVELS
EXISTING LEVELS

Change = 457.738m
L=29.455m

Change = 231.738m
L=29.155m

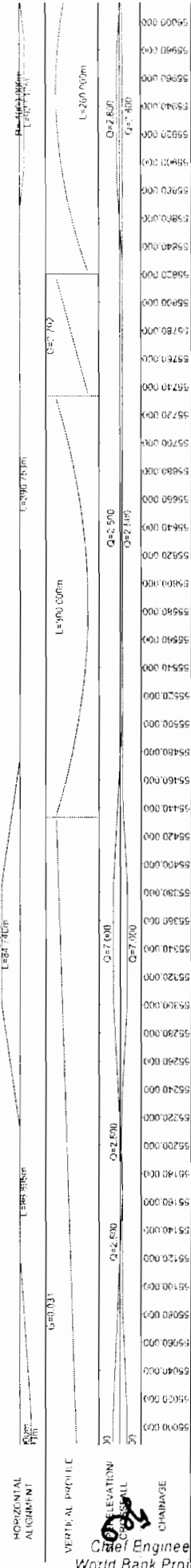
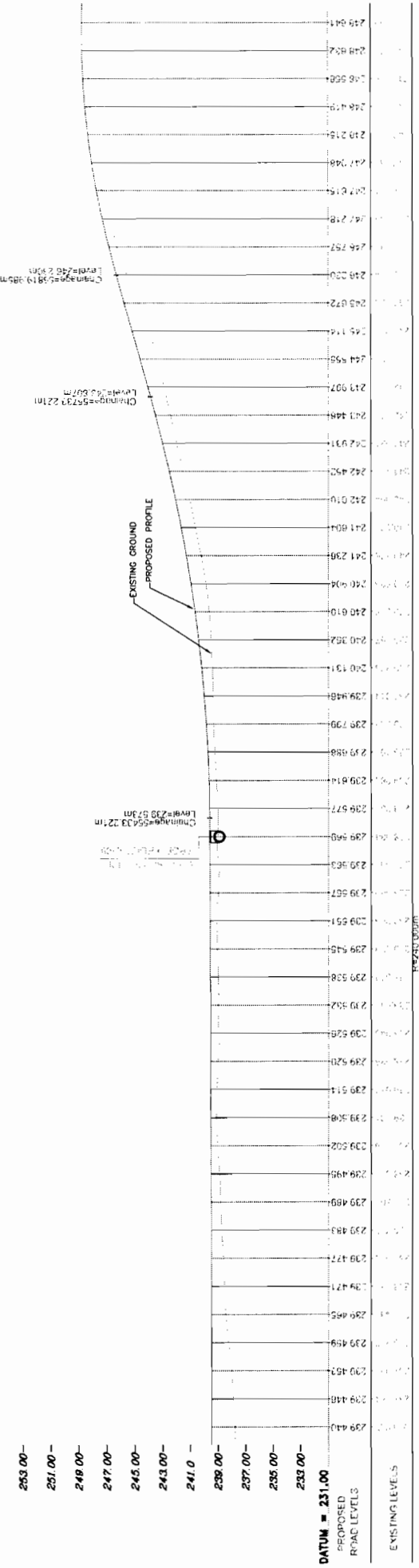
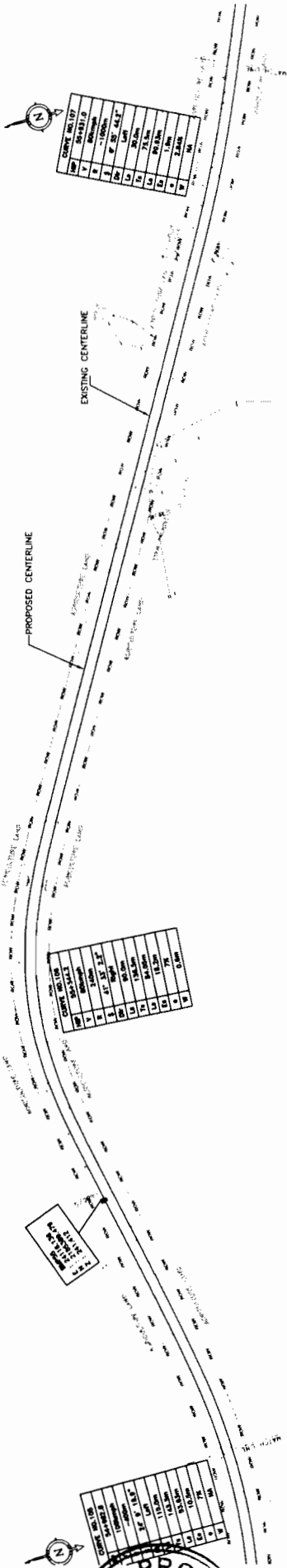
EXISTING GROUND
PROPOSED PROFILE



55002.000	54997.000	54992.000	54987.000	54982.000	54977.000	54972.000	54967.000	54962.000	54957.000	54952.000	54947.000	54942.000	54937.000	54932.000	54927.000	54922.000	54917.000	54912.000	54907.000	54902.000	54897.000	54892.000	54887.000	54882.000	54877.000	54872.000	54867.000	54862.000	54857.000	54852.000	54847.000	54842.000	54837.000	54832.000	54827.000	54822.000	54817.000	54812.000	54807.000	54802.000	54797.000	54792.000	54787.000	54782.000	54777.000	54772.000	54767.000	54762.000	54757.000	54752.000	54747.000	54742.000	54737.000	54732.000	54727.000	54722.000	54717.000	54712.000	54707.000	54702.000	54697.000	54692.000	54687.000	54682.000	54677.000	54672.000	54667.000	54662.000	54657.000	54652.000	54647.000	54642.000	54637.000	54632.000	54627.000	54622.000	54617.000	54612.000	54607.000	54602.000	54597.000	54592.000	54587.000	54582.000	54577.000	54572.000	54567.000	54562.000	54557.000	54552.000	54547.000	54542.000	54537.000	54532.000	54527.000	54522.000	54517.000	54512.000	54507.000	54502.000	54497.000	54492.000	54487.000	54482.000	54477.000	54472.000	54467.000	54462.000	54457.000	54452.000	54447.000	54442.000	54437.000	54432.000	54427.000	54422.000	54417.000	54412.000	54407.000	54402.000	54397.000	54392.000	54387.000	54382.000	54377.000	54372.000	54367.000	54362.000	54357.000	54352.000	54347.000	54342.000	54337.000	54332.000	54327.000	54322.000	54317.000	54312.000	54307.000	54302.000	54297.000	54292.000	54287.000	54282.000	54277.000	54272.000	54267.000	54262.000	54257.000	54252.000	54247.000	54242.000	54237.000	54232.000	54227.000	54222.000	54217.000	54212.000	54207.000	54202.000	54197.000	54192.000	54187.000	54182.000	54177.000	54172.000	54167.000	54162.000	54157.000	54152.000	54147.000	54142.000	54137.000	54132.000	54127.000	54122.000	54117.000	54112.000	54107.000	54102.000	54097.000	54092.000	54087.000	54082.000	54077.000	54072.000	54067.000	54062.000	54057.000	54052.000	54047.000	54042.000	54037.000	54032.000	54027.000	54022.000	54017.000	54012.000	54007.000	54002.000	53997.000	53992.000	53987.000	53982.000	53977.000	53972.000	53967.000	53962.000	53957.000	53952.000	53947.000	53942.000	53937.000	53932.000	53927.000	53922.000	53917.000	53912.000	53907.000	53902.000	53897.000	53892.000	53887.000	53882.000	53877.000	53872.000	53867.000	53862.000	53857.000	53852.000	53847.000	53842.000	53837.000	53832.000	53827.000	53822.000	53817.000	53812.000	53807.000	53802.000	53797.000	53792.000	53787.000	53782.000	53777.000	53772.000	53767.000	53762.000	53757.000	53752.000	53747.000	53742.000	53737.000	53732.000	53727.000	53722.000	53717.000	53712.000	53707.000	53702.000	53697.000	53692.000	53687.000	53682.000	53677.000	53672.000	53667.000	53662.000	53657.000	53652.000	53647.000	53642.000	53637.000	53632.000	53627.000	53622.000	53617.000	53612.000	53607.000	53602.000	53597.000	53592.000	53587.000	53582.000	53577.000	53572.000	53567.000	53562.000	53557.000	53552.000	53547.000	53542.000	53537.000	53532.000	53527.000	53522.000	53517.000	53512.000	53507.000	53502.000	53497.000	53492.000	53487.000	53482.000	53477.000	53472.000	53467.000	53462.000	53457.000	53452.000	53447.000	53442.000	53437.000	53432.000	53427.000	53422.000	53417.000	53412.000	53407.000	53402.000	53397.000	53392.000	53387.000	53382.000	53377.000	53372.000	53367.000	53362.000	53357.000	53352.000	53347.000	53342.000	53337.000	53332.000	53327.000	53322.000	53317.000	53312.000	53307.000	53302.000	53297.000	53292.000	53287.000	53282.000	53277.000	53272.000	53267.000	53262.000	53257.000	53252.000	53247.000	53242.000	53237.000	53232.000	53227.000	53222.000	53217.000	53212.000	53207.000	53202.000	53197.000	53192.000	53187.000	53182.000	53177.000	53172.000	53167.000	53162.000	53157.000	53152.000	53147.000	53142.000	53137.000	53132.000	53127.000	53122.000	53117.000	53112.000	53107.000	53102.000	53097.000	53092.000	53087.000	53082.000	53077.000	53072.000	53067.000	53062.000	53057.000	53052.000	53047.000	53042.000	53037.000	53032.000	53027.000	53022.000	53017.000	53012.000	53007.000	53002.000	52997.000	52992.000	52987.000	52982.000	52977.000	52972.000	52967.000	52962.000	52957.000	52952.000	52947.000	52942.000	52937.000	52932.000	52927.000	52922.000	52917.000	52912.000	52907.000	52902.000	52897.000	52892.000	52887.000	52882.000	52877.000	52872.000	52867.000	52862.000	52857.000	52852.000	52847.000	52842.000	52837.000	52832.000	52827.000	52822.000	52817.000	52812.000	52807.000	52802.000	52797.000	52792.000	52787.000	52782.000	52777.000	52772.000	52767.000	52762.000	52757.000	527
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← TO BHAWANIPATNA

→ TO KHARIAR



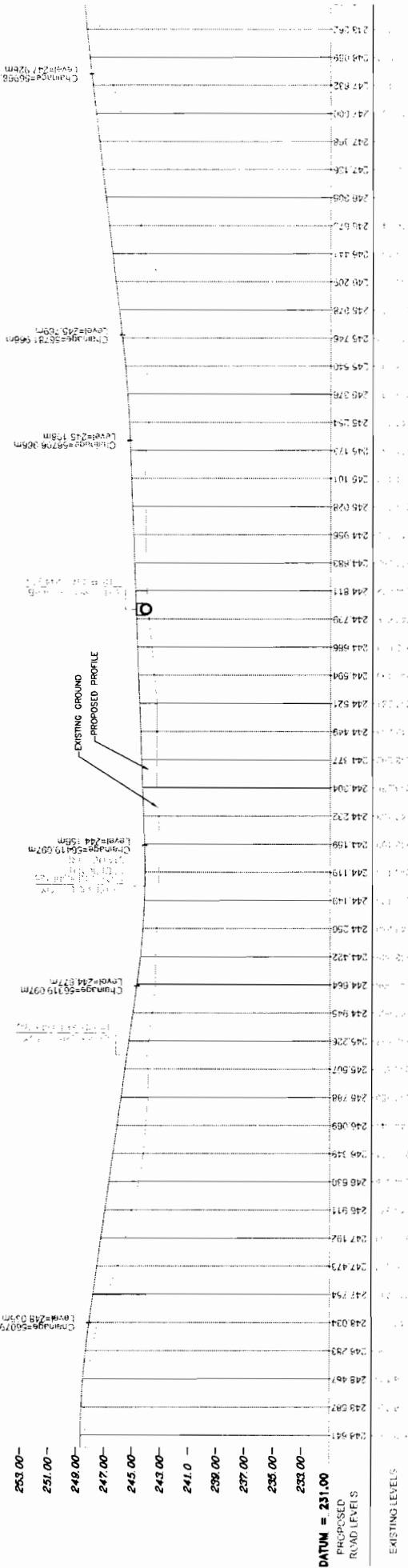
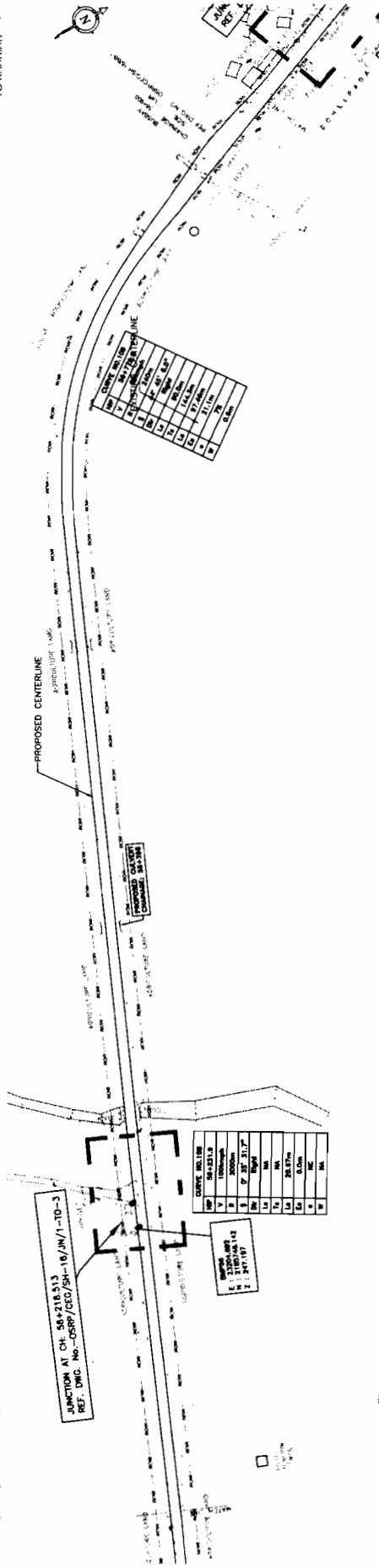
Works Department, Govt. of Odisha DRG NO. OSRP/P01/GFC/P&P/56 Rev No. 3 DATE: 31.12.12 REV/R3 EE, PMU APPROVED CE, WBP		Widening & Strengthening of Existing Cartageway to 2-lane road from Bhawanipatna to Khariar [Package OSRP -CW - Y1 - P01] BALANCE WORK PLAN AND LONGITUDINAL SECTION Bhawanipatna TO Khariar Jn. (SH-16 KM 55/000 TO KM 56/000) HORIZONTAL: 1:1500 VERTICAL: 1:150
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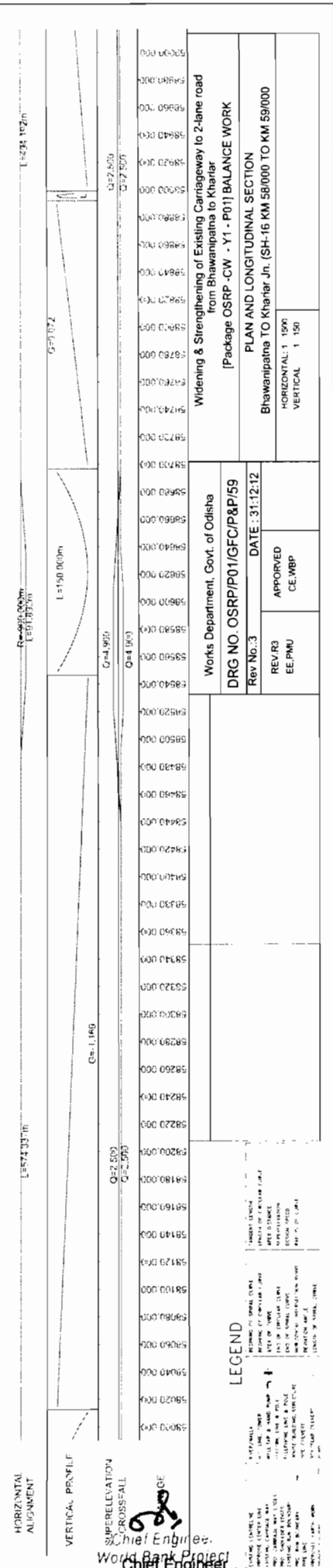
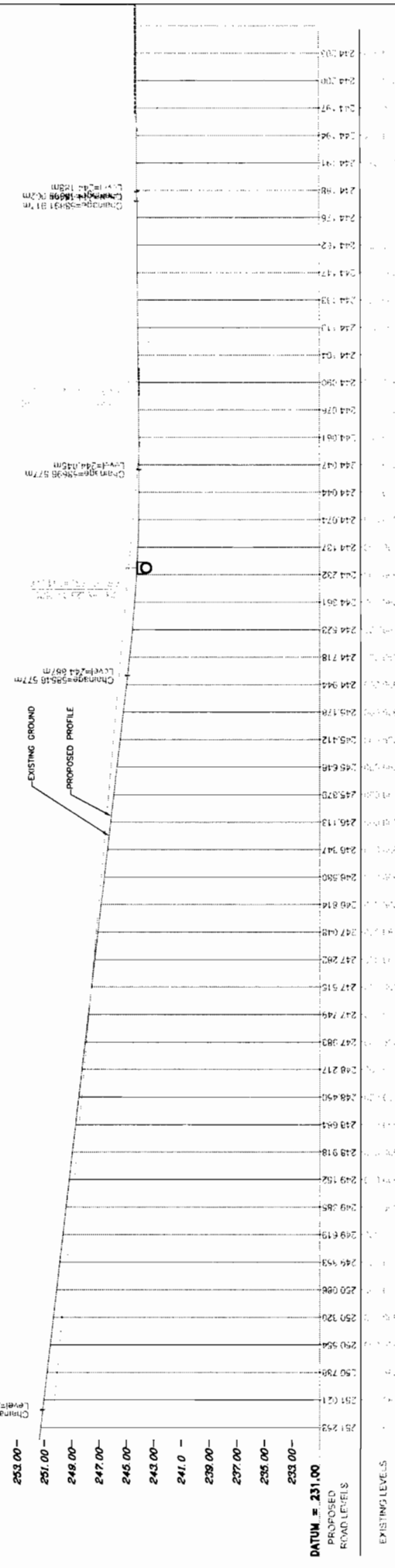
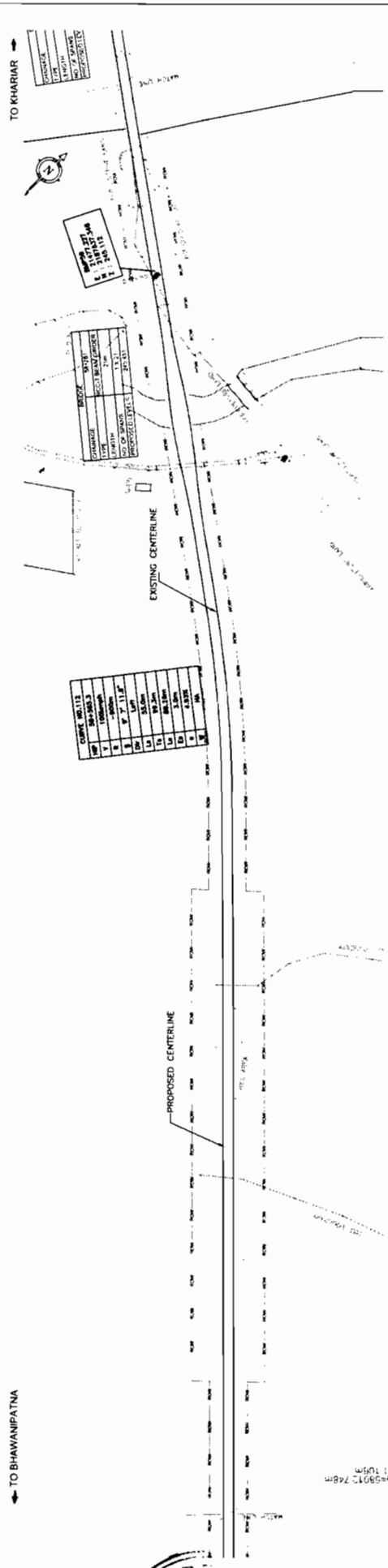


Chief Engineer
World Bank Project
O/o the E. Chief Engineer
World Bank Project, Odisha

TO KHARIAR →

← TO BHAWANIPATNA



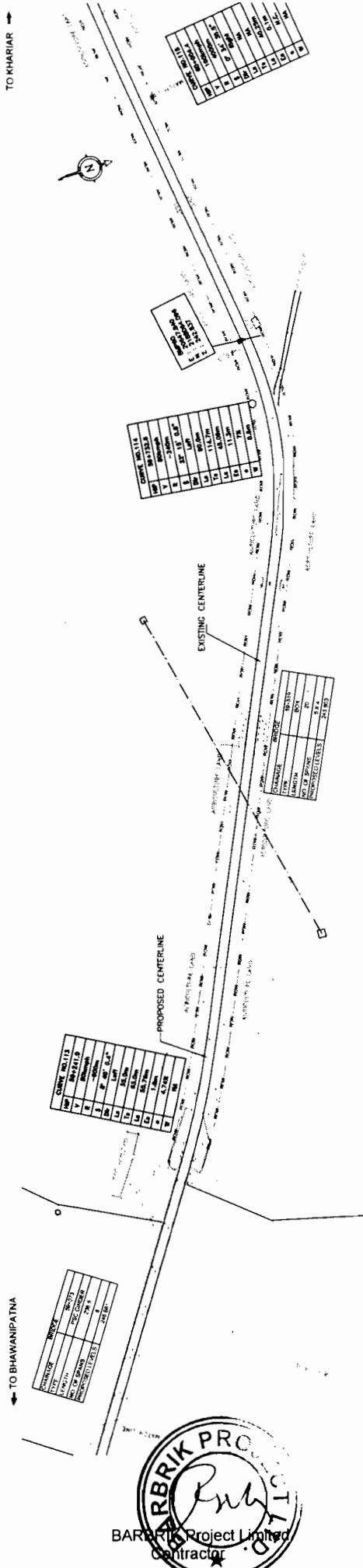


Chief Engineer
 Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

Widening & Strengthening of Existing Carriageway to 2-lane road from Bhawanipatna to Kharhar
 [Package OSRP - CW - Y1 - P01] BALANCE WORK
 PLAN AND LONGITUDINAL SECTION
 Bhawanipatna TO Kharhar Jn., (SH-16 KM 58/000 TO KM 59/000)
 HORIZONTAL: 1 : 500
 VERTICAL: 1 : 50

Works Department, Govt. of Odisha
 DRG NO. OSRP/P01/GFC/P&P/59
 Rev No. 3
 DATE : 31.12.12
 APPROVED
 CE/WBP

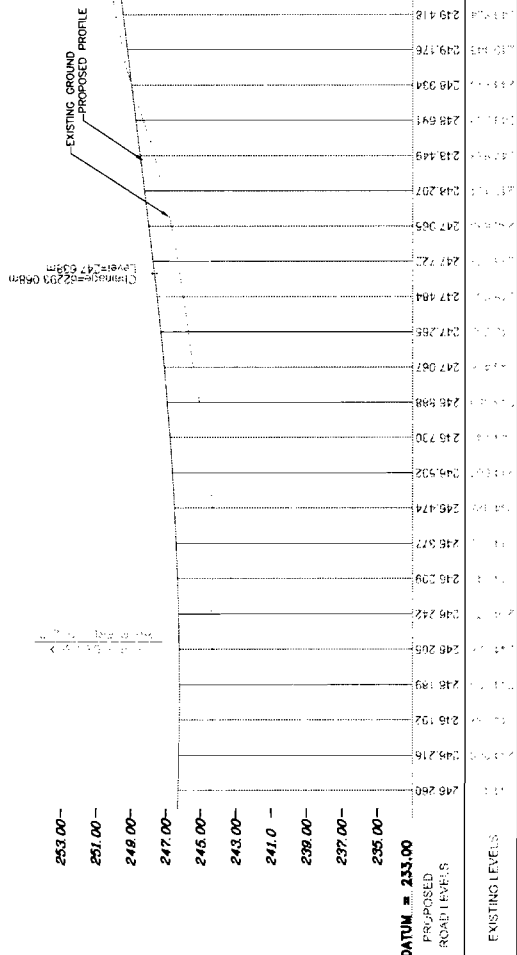
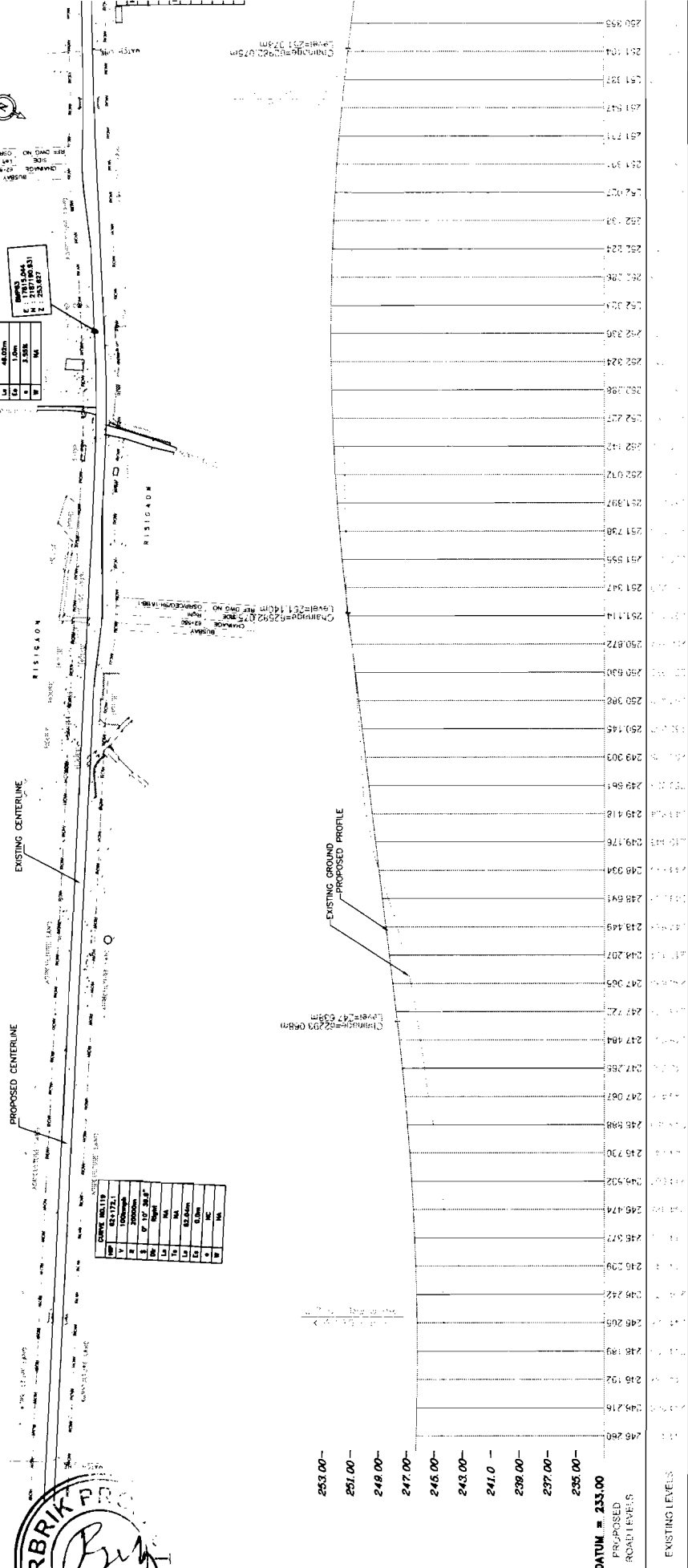
LEGEND
 1. EXISTING GROUND
 2. PROPOSED ROAD PROFILE
 3. PROPOSED CENTERLINE
 4. EXISTING CENTERLINE
 5. EXISTING ROAD WIDTH
 6. PROPOSED ROAD WIDTH
 7. EXISTING ROAD CROSS-SLOPE
 8. PROPOSED ROAD CROSS-SLOPE
 9. EXISTING ROAD SURFACE
 10. PROPOSED ROAD SURFACE
 11. EXISTING ROAD DRAINAGE
 12. PROPOSED ROAD DRAINAGE
 13. EXISTING ROAD FENCE
 14. PROPOSED ROAD FENCE
 15. EXISTING ROAD LIGHTING
 16. PROPOSED ROAD LIGHTING
 17. EXISTING ROAD SIGNAGE
 18. PROPOSED ROAD SIGNAGE
 19. EXISTING ROAD UTILITIES
 20. PROPOSED ROAD UTILITIES
 21. EXISTING ROAD OBSTACLES
 22. PROPOSED ROAD OBSTACLES
 23. EXISTING ROAD LANDSCAPE
 24. PROPOSED ROAD LANDSCAPE
 25. EXISTING ROAD ENVIRONMENT
 26. PROPOSED ROAD ENVIRONMENT



TO KHARIAR

TO BHAWANIPATNA

Curve No.	Radius (m)	Length (m)	Start Station	End Station
1	100.00	10.00	250+00	251+00
2	100.00	10.00	251+00	252+00
3	100.00	10.00	252+00	253+00
4	100.00	10.00	253+00	254+00
5	100.00	10.00	254+00	255+00
6	100.00	10.00	255+00	256+00
7	100.00	10.00	256+00	257+00
8	100.00	10.00	257+00	258+00
9	100.00	10.00	258+00	259+00
10	100.00	10.00	259+00	260+00
11	100.00	10.00	260+00	261+00
12	100.00	10.00	261+00	262+00
13	100.00	10.00	262+00	263+00
14	100.00	10.00	263+00	264+00
15	100.00	10.00	264+00	265+00
16	100.00	10.00	265+00	266+00
17	100.00	10.00	266+00	267+00
18	100.00	10.00	267+00	268+00
19	100.00	10.00	268+00	269+00
20	100.00	10.00	269+00	270+00



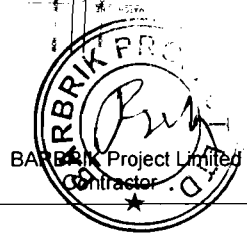
Stationing	Existing Levels (m)	Proposed Road Levels (m)	Change (m)
250+00	248.280	248.205	-0.075
250+10	248.180	248.242	+0.062
250+20	248.192	248.380	+0.188
250+30	248.300	248.520	+0.220
250+40	248.474	248.660	+0.186
250+50	248.532	248.800	+0.268
250+60	248.730	248.940	+0.210
250+70	248.980	249.080	+0.100
250+80	249.176	249.220	+0.044
250+90	249.418	249.360	-0.058
251+00	249.861	249.500	-0.361
251+10	249.303	249.640	+0.337
251+20	251.145	249.780	-0.365
251+30	251.750	249.920	-0.830
251+40	251.997	250.060	-1.937
251+50	252.000	250.200	-1.800
251+60	252.000	250.340	-1.660
251+70	252.000	250.480	-1.520
251+80	252.000	250.620	-1.380
251+90	252.000	250.760	-1.240
252+00	252.000	250.900	-1.100
252+10	252.000	251.040	-0.960
252+20	252.000	251.180	-0.820
252+30	252.000	251.320	-0.680
252+40	252.000	251.460	-0.540
252+50	252.000	251.600	-0.400
252+60	252.000	251.740	-0.260
252+70	252.000	251.880	-0.120
252+80	252.000	252.020	+0.020
252+90	252.000	252.160	+0.160
253+00	252.000	252.300	+0.300

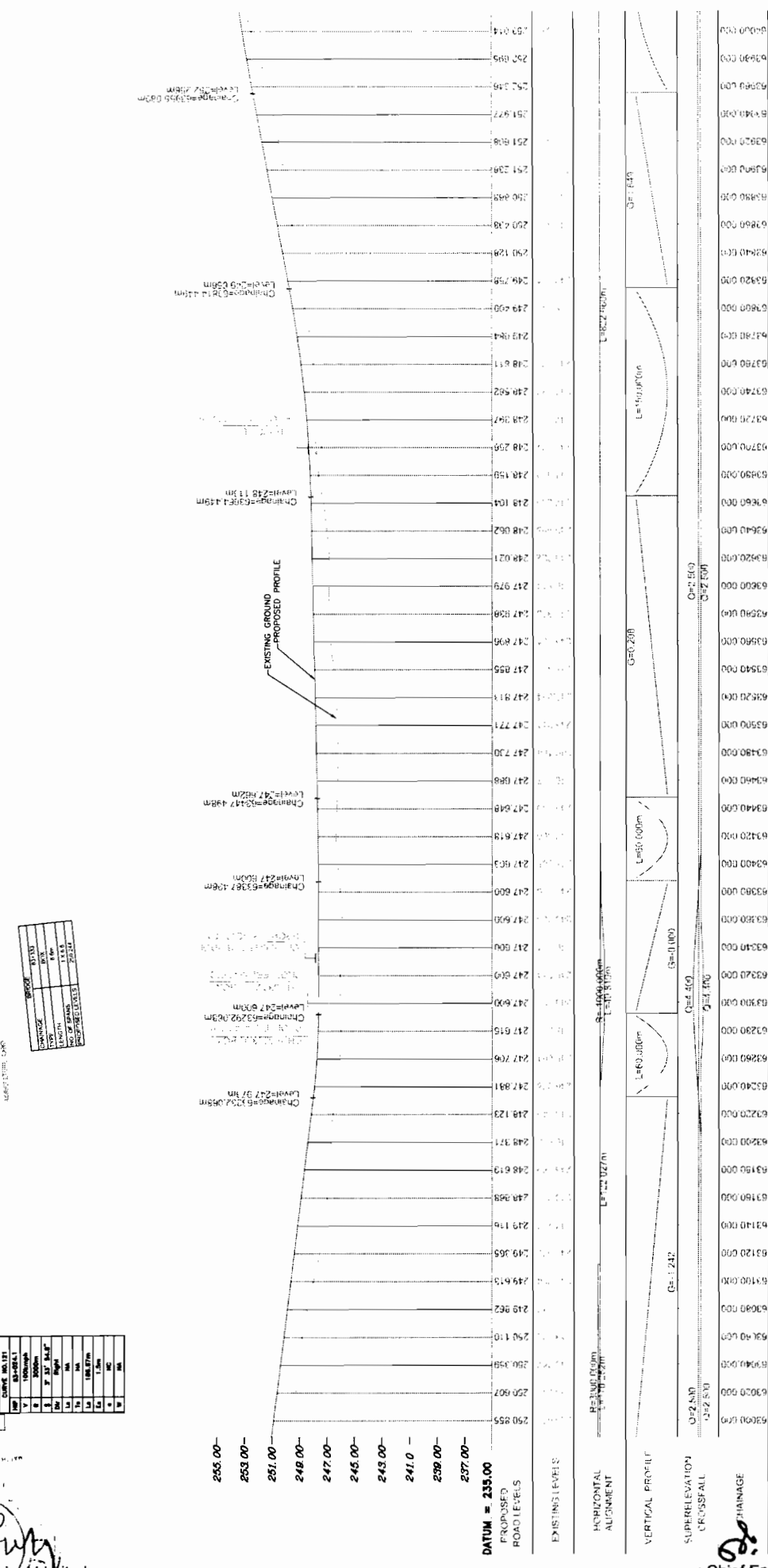
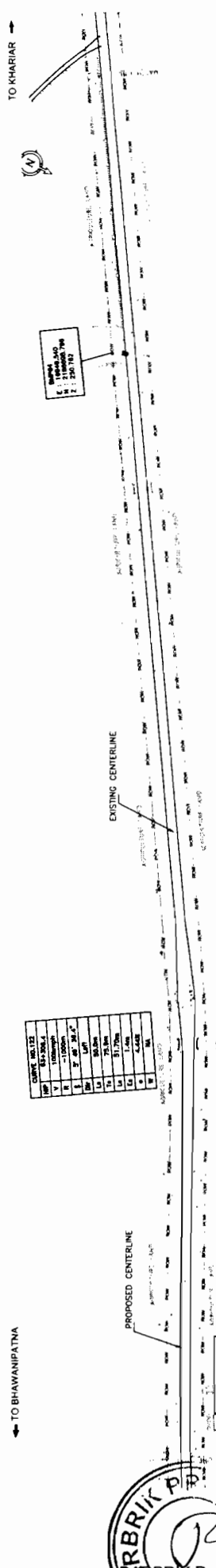
HORIZONTAL ALIGNMENT
 VERTICAL PROFILE
 ELEVATION
 CHANGE

LEGEND

- EXISTING CENTERLINE
- PROPOSED CENTERLINE
- EXISTING GROUND
- PROPOSED PROFILE
- VERTICAL CURVE
- CHANGING

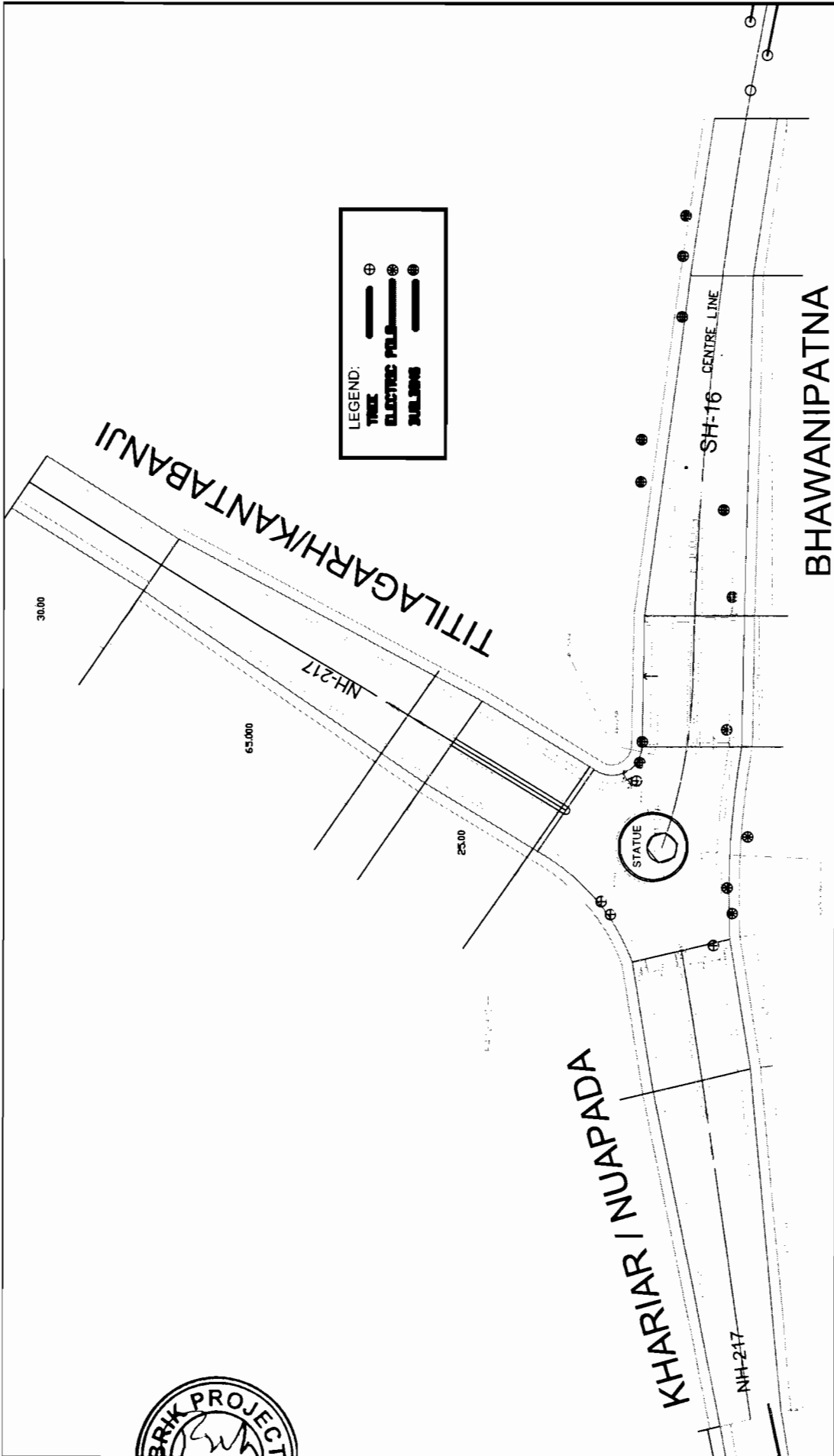
Works Department, Govt. of Odisha DRG NO. OSRP/P01/GFC/P&P/63 Rev No: 3 REV R3 EE PMU	Widening & Strengthening of Existing Cartageway to 2-lane road from Bhawanipatna to Khariar [Package OSRP - CW - Y1 - P01] BALANCE WORK PLAN AND LONGITUDINAL SECTION Bhawanipatna TO Khariar Jn. (SH-16 KM 62/000 TO KM 63/000) HORIZONTAL: 1:1500 VERTICAL: 1:150
--	--





Works Department, Govt. of Odisha		Widening & Strengthening of Existing Camberway to 2-lane road from Bhawanipatna to Khariar	
DRG NO. OSRP/P01/GFC/P&P/64		[Package OSRP - CW - Y1 - P01] BALANCE WORK	
Rev No. 3	DATE: 31.12.12	PLAN AND LONGITUDINAL SECTION	
REV R3	APPROVED	Bhawanipatna TO Khariar Jn. (SH-16 KM 63000 TO KM 64000)	
EE/PMU	CE/WBP	HORIZONTAL 1 : 1500	
		VERTICAL 1 : 150	





Chief Engineer,
World Bank Project
for the State Road Project, Odisha
Bhubaneswar.

PROJECT:
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

JUNCTION AT KHARIAR(KM.70+000)
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG. NO.	DSRP/CEG/BK-68KM/JN	REV. #1	APPROVED
SH. NO.	51	DATE	DEC,12
SCALE	R1	REV	R1
		PREPARED BY	CEG. IAS.
		NTS	CE. WBP

SCHEDULE OF SIGN POSTS

Sign Post ID	Description of the sign Board	chainage	location			Remarks	Sign Post ID	Description of the sign Board	chainage	location			Remarks
			LL	RL	CR					CR*	Median	LL	
SP-10(b)	Right Hand Curve	59394					5P-12	Pedestrian Crossing	5595				
		59935							5920				
		61210							7190				
		59394							7885				
		59394							8875				
		59394							9060				
		59394							20520				
		59394							20860				
		59394							30080				
		59394							39810				
		2727							39985				
		4939							43410				
		12116							43615				
		15847							49915				
		17605							50260				
		23019							50595				
		37555							50780				
		39990							52995				
		52149							53180				
		55122							57180				
		56547							57615				
SP-10(a)	Left Hand Curve	3119							60605				
		5297							61010				
		12464							61415				
		162333							61640				
		17917							62560				
		23429							62855				
		38007							65895				
		40399							66015				
		52610							5695				
		55566							6020				
		57005							7290				
		4846							7985				
		26825							8975				
		54751							9160				
		5297							20620				
SP-10(f)	Right Reverse	63472							20960				
		55596							30180				
		2727							39910				
		62841							40085				
		3367							43715				
		63472							50015				
									50360				
									50695				
									50880				



Chief Engineer,
World Bank Project
for the E.I. City
World Bank Projects, Odisha
Sambalpur.

PROJECT:-		SCHEDULE OF SIGN POSTS - 02	
DRG NO.	OSRP/CEG/SH-16/SCH/02	REV : R1	APPROVED
SH.NO.	DATE : 28/12/2012	PREPARED BY	EE/PNU
SCALE	NTS	DESIGNED BY	CEG
		CE, World Bank Projects.	

SCHEDULE OF SIGN POSTS

Sign Post ID	Description of the sign Board	chainage	location			Remarks
			LL	RL	CR*	
SP-12	PEDESTRIAN CROSSING	53095	✓			
		53280	✓			
		57280	✓			
		57715	✓			
		60705	✓			
		61110	✓			
		61515	✓			
		61740	✓			
		62660	✓			
		629555	✓			
		95995	✓			
		66115	✓			



SCHEDULE OF SIGN POSTS


Sign Post ID	Description of the sign Board	chainage	location			Remarks
			LL	RL	CR*	
SP-14(b)	Y-INTERSECTION	6000	✓			
		7308	✓			
		6240	✓			
		7548	✓			
		8717	✓			
		39856	✓			
		49990	✓			
		56948	✓			
		8957	✓			
		40096	✓			
		50230	✓			
		57188	✓			

SCHEDULE OF SIGN POSTS

Sign Post ID	Description of the sign Board	chainage	location			Remarks
			LL	RL	CR*	
SP-17	STATE ROUTE MARKER	2,000	✓			
		70000	✓			
SP-19	REASSURANCE SIGN	12000	✓			
		54000	✓			
		13000	✓			
		46000	✓			
SP-23	HOSPITAL	7210	✓			
		7420	✓			
		26620	✓			
		7310	✓			
		7520	✓			
		26720	✓			

SCHEDULE OF SIGN POSTS -03

DRG NO.	SH.NO.	SCALE	DESIGNED BY		REV R1	APPROVED
			CEG	EE/PMU		
			REV : R1	PREPARED BY		
			DATE : 28/12/2012	EE/PMU		
			NTS			
ODISHA STATE ROAD PROJECT						
PROJECT						


 Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

SCHEDULE OF SIGN POSTS

Sign Post ID	Description of the sign Board	chainage	location			Remarks
			LL	RL	CR*	
SP-16(A)	ROAD HUMP	5750	✓			
		7210	✓			
		7420	✓			
		20650	✓			
		25980	✓			
		26620	✓			
		32890	✓			
		33000	✓			
		5850	✓			
		7310	✓			
		7520	✓			
		20750	✓			
		26080	✓			
		26720	✓			
		32990	✓			
		33100	✓			
		6120	✓			
		7428	✓			
		7574	✓			
		8837	✓			
		12958	✓			
		18353	✓			
		18523	✓			
		21194	✓			
		24785	✓			
		25835	✓			
		26275	✓			
		30600	✓			
		30150	✓			
		36200	✓			
		39976	✓			
		43539	✓			
		46854	✓			
		47252	✓			
		50110	✓			
		53142	✓			
		56217	✓			
		57068	✓			
		57161	✓			
		60918	✓			
		69419	✓			

MINOR ROAD INTERSECTION

SCHEDULE OF EXTRA-WIDENING

LEFT C/W				
Sl.	START	END	ADDL. WIDTH	Length
1	2877.047	2969.454	0.300	92.407
2	3174.729	3216.88	0.300	42.151
3	6090.465	6127.587	0.300	37.122
4	16011.851	16067.516	0.300	55.665
5	23199.165	23249.474	0.300	50.309
6	30257.474	30344.527	0.300	87.053
7	35427.667	35471.564	0.300	43.897
8	37030.378	37078.465	0.300	48.087
9	37735.151	37827.342	0.300	92.191
10	38589.540	38620.177	0.300	30.637
11	48379.881	48505.369	0.300	125.488
12	52314.253	52445.226	0.300	130.973
13	55301.717	55385.764	0.300	84.047
14	56217.186	56824.644	0.300	607.458
15	57785.929	57840.971	0.300	55.042
16	59709.991	59755.081	0.3	45.09

RIGHT C/W				
Sl.	START	END	ADDL. WIDTH	Length
17	2877.047	2969.454	0.300	92.407
18	3174.729	3216.88	0.300	42.151
19	6090.465	6127.587	0.300	37.122
20	16011.851	16067.516	0.300	55.665
21	23199.165	23249.474	0.300	50.309
22	30257.474	30344.527	0.300	87.053
23	35427.667	35471.564	0.300	43.897
24	37030.378	37078.465	0.300	48.087
25	37735.151	37827.342	0.300	92.191
26	38589.540	38620.177	0.300	30.637
27	48379.881	48505.369	0.300	125.488
28	52314.253	52445.226	0.300	130.973
29	55301.717	55385.764	0.300	84.047
30	56217.186	56824.644	0.300	97.458
31	57785.929	57840.971	0.300	55.042
32	59709.991	59755.081	0.300	45.090

SCHEDULE OF LOCATIONS FOR GUARD POSTS

GUARD POSTS					GUARD POSTS				
Sl.	START	END	LENGTH		Sl.	START	END	LENGTH	
1	3011	3061	50		32	45870	46150	280	
2	3088	3138	50		33	49720	49760	40	
3	4369	4509	140		34	50230	50340	110	
4	4600	4630	30		35	51130	51180	50	
5	4670	4770	100		36	51735	51770	35	
6	6490	6570	80		37	53340	53380	40	
7	6600	6800	200		38	54410	54680	270	
8	6830	7080	250		39	54760	54840	80	
9	9430	9530	100		40	56140	56240	100	
10	10400	10450	50		41	56830	56910	80	
11	10470	10520	50		42	57240	57360	120	
12	10541	10680	139		43	58690	59300	610	
13	15700	15950	250		44	59458	59580	122	
14	17380	17580	200		45	63200	63240	40	
15	18770	18970	200		46	64620	64650	30	
16	20060	20360	300		47	66200	66250	50	
17	20830	21230	400		48	67970	68000	30	
18	21490	21690	200		49	68953	69060	107	
19	23290	23350	60						
20	24300	24380	80						
21	30690	30750	60						
22	31160	31200	40						
23	37180	37270	90						
24	37500	37710	210						
25	40060	40120	60						
26	41690	41890	200						
27	42250	42360	110						
28	43100	43130	30						
29	44740	44870	130						
30	44960	45040	80						
31	45300	45330	30						

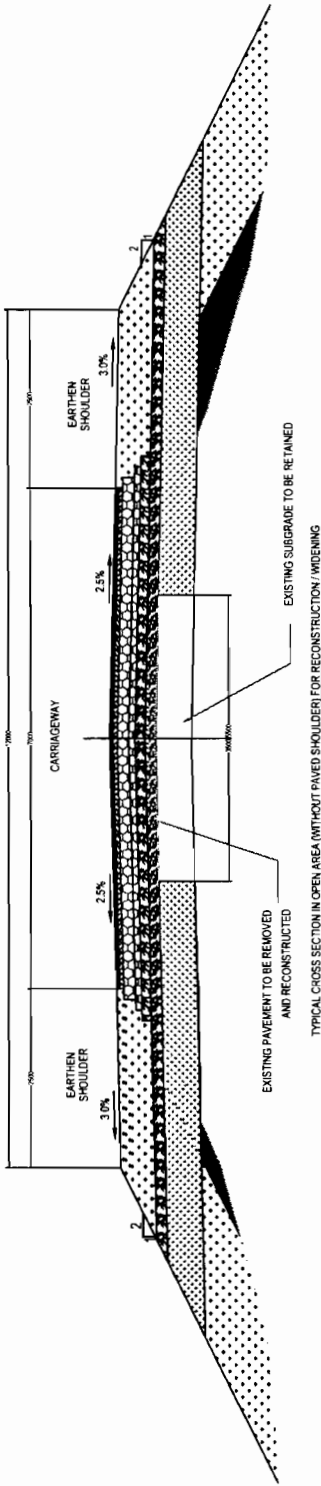
SCHEDULE FOR EXTRA WIDENING & GUARD POSTS

PROJECT	DRG NO.	OSRP/CEG/SH-16/SCH/16	REV :	R1	DESIGNED BY	CEG	REV R1	APPROVED
	SH.NO.		DATE :	28/12/2012	NTS	PREPARED BY	EE/PMU	CE. World Bank Projects
ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE	SCALE							



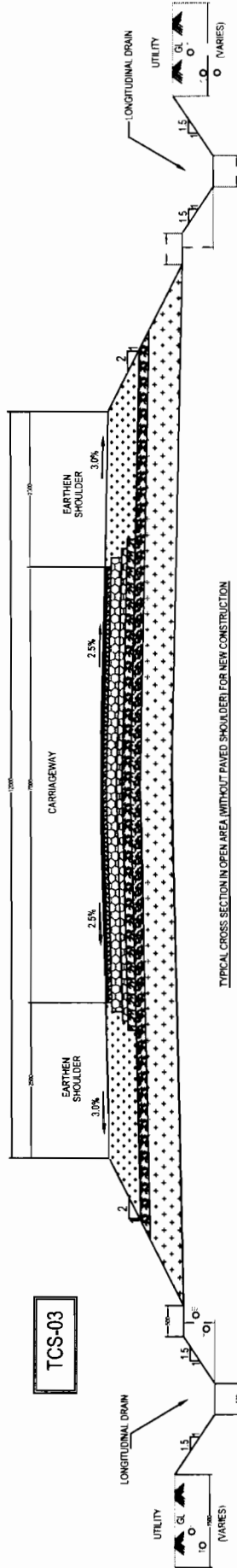
Chief Engineer
World Bank Project
Bhubaneswar.

TCS-02



TYPICAL CROSS SECTION IN OPEN AREA (WITHOUT PAVED SHOULDER) FOR RECONSTRUCTION/WIDENING

TCS-03



TYPICAL CROSS SECTION IN OPEN AREA (WITHOUT PAVED SHOULDER) FOR NEW CONSTRUCTION

LEGENDS

- 1) BC
- 2) DBM
- 3) WMM
- 4) GSB
- 5) SUBGRADE
- 6) DLC
- 7) PCC
- 8) EARTH FILL
- 9) SAND FILL
- 10) E - Electricity Cable
- 11) T - Telecom Cable
- 12) W - Water Supply Line
- 13) G - Gas Line
- 14) S - Sewer

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

TYPICAL CROSS-SECTION

TCS - 02 & TCS - 03
(BHAWANIPATNA - KHARIAR)

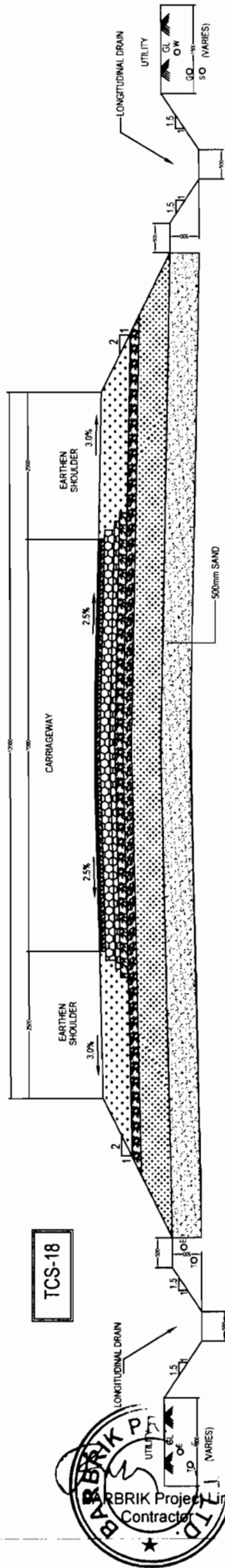
DRG NO.	05P/CEG/CS/02/10	DRAWN BY	CEG	APPROVED	
SH. NO.	01	DATE	12/12/12	REV	R-1
SCALE			NTS		
		ISSUED BY	CEG	PREPARED BY	EE(PMU)
				CEG	CE.WBP



Chief Engineer
World Bank Project
Chief Engineer
Barbik Project, Odisha
Bhubaneswar.

CONSULTING ENGINEERS GROUP LTD.
E-12, Mojil Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegindia.com





LEGENDS

1. BK	1. B.C.	11. A. Area Under 1m
2. DM	1. P.C.	12. G. G. Jm
3. DM	1. P.C.	13. S. Stone
4. DM	1. P.C.	14. S. Stone
5. B.M.	1. P.C.	15. S. Stone
6. B.M.	1. P.C.	16. S. Stone
7. B.M.	1. P.C.	17. S. Stone
8. B.M.	1. P.C.	18. S. Stone
9. B.M.	1. P.C.	19. S. Stone
10. B.M.	1. P.C.	20. S. Stone

TYPICAL CROSS SECTION IN OPEN AREA (WITHOUT PAVED SHOULDER) FOR NEW CONSTRUCTION IN EXPANSIVE CLAYS

TCS-18



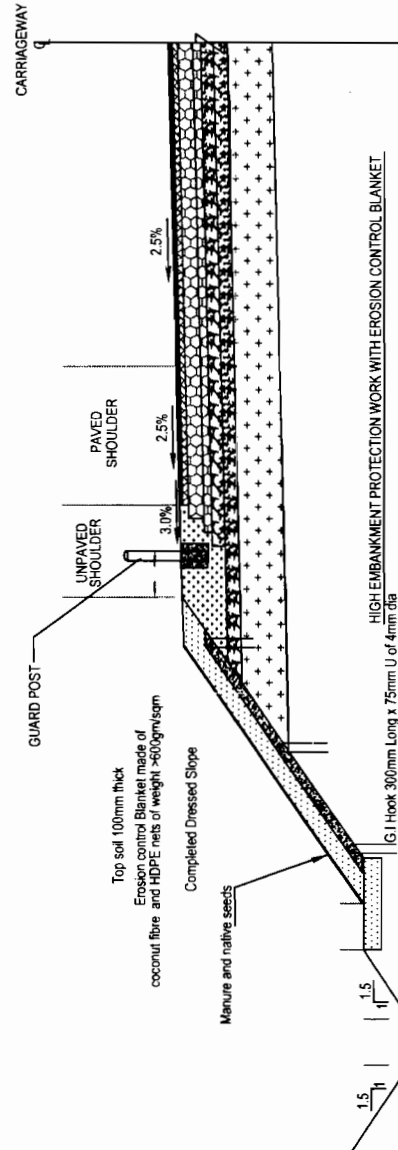
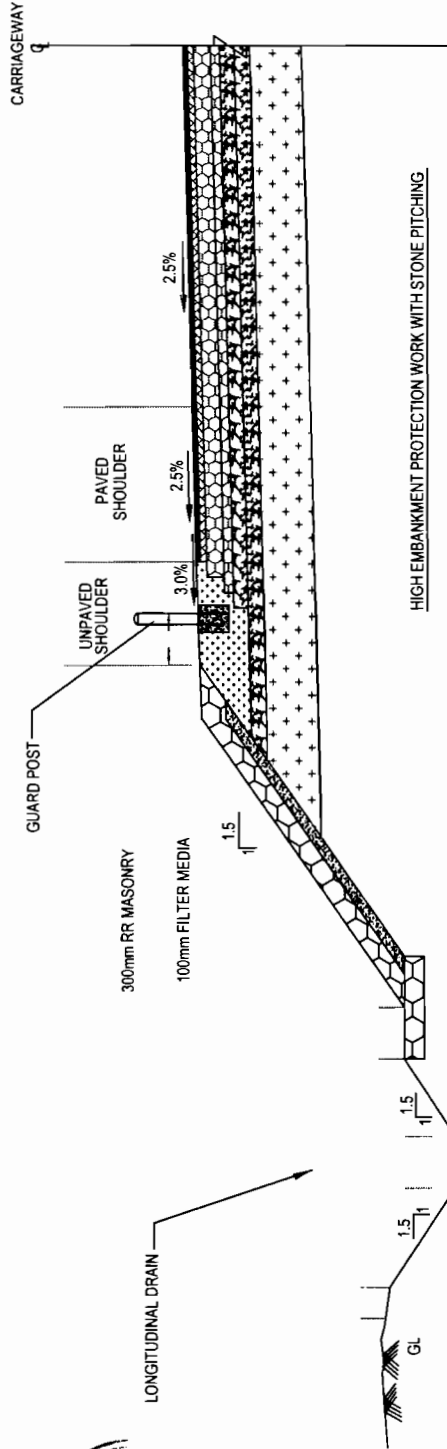
1. ALL DIMENSIONS ARE IN MILLIMETERS
 2. FOR DRAIN DETAILS REFER DRAWING NO. OSR/PC/EGOR
 3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
 4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO. OSR/PC/EGRIGID/02
 5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSR/PC/EGOD
- FOR PCC PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
- THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, WHICH MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

DRG NO. OSR/PC/PC/CS/18		DATE	12/12/12	REV	R-1	APPROVED
SH. NO.	05	DATE	12/12/12	REV	R-1	PREPARED BY
SCALE	NTS					EE(PMU)
TYPICAL CROSS-SECTION TCS - 18 (BHAWANIPATNA-KHARIAR-BALANCE WORK)						CE. WBP

PROJECT:-
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

CEG ENGINEERS GROUP LTD.
E-12, Moji Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@ceginidia.com





SCHEDULE

Sl. No.	Chainage From	Chainage To	Length	Sides
1	41700	41900	200	BOTH
2	42200	42300	100	BOTH

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.
E-12, Moji Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegroupindia.com



STANDARD DRAWINGS PROTECTION WORK &
WITH EROSION BLANKET
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG NO.	DATE	REV	SCALE	DESIGNED BY	DRAWN BY	REV BY	APPROVED
11	12/12/12	R-1		CEG	CEG	EE(PMU)	CE/WBP





BARBRIK Project Ltd
 * Consultant

SCHEDULE OF LINED DRAIN	
FROM	TO
15200	300
21010	660
27200	150
43150	4800
44600	300
50900	300
57300	400
65900	600
66500	6800
66500	350

1. FOR DETAILS OF LINED DRAINS REFER DWG NO. OSRP/CEG/DR
2. THE PROVISION AND LENGTH OF THE LINED DRAIN SHALL BE RE-ASSESSED DURING THE TIME OF CONSTRUCTION
3. FOXHOLE BARRIERS SHALL BE PROVIDED AS PER DWG. NO. OSRP/CEG/FR
4. FOR BARRIAGES OPENING SHALL BE PROVIDED
5. LINED DRAIN SCHEDULE SUPPLIED THE PLAN
6. ALL REINFORCEMENTS SHALL BE CONFIRMED TO FF-500

Chief Engineer
 World Bank Project
 Bhubaneswar



CONSULTING ENGINEERS GROUP LTD.

E-12, Moji Colony, Malviya Nagar Jaipur-17
 Tel: +91-141-2520899, 2521899, 2520556
 Fax: 2521348, e-mail: ceg@cegroupindia.com

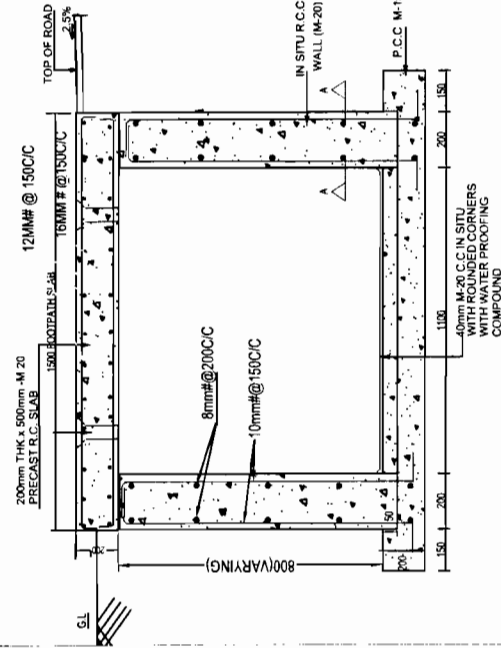
PROJECT:-

ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

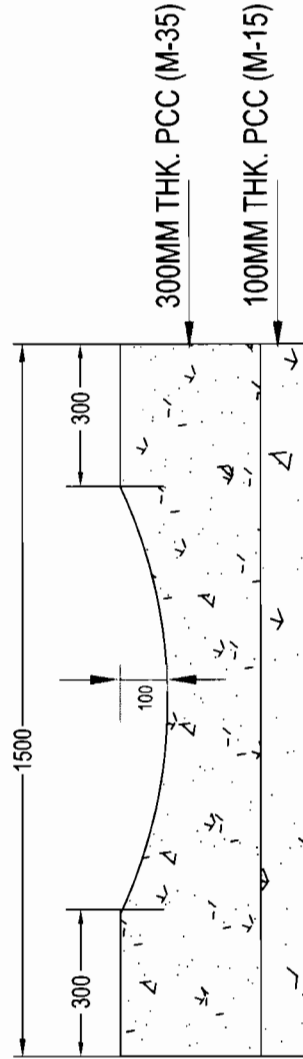
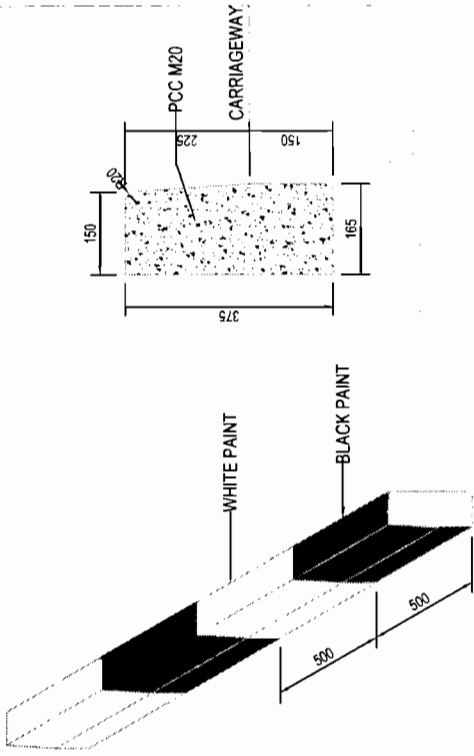
**STANDARD DRAWINGS
 DETAILS OF DRAIN AND KERB**

(BHAWANIPATNA-KHARIAR-BALANCE WORK)

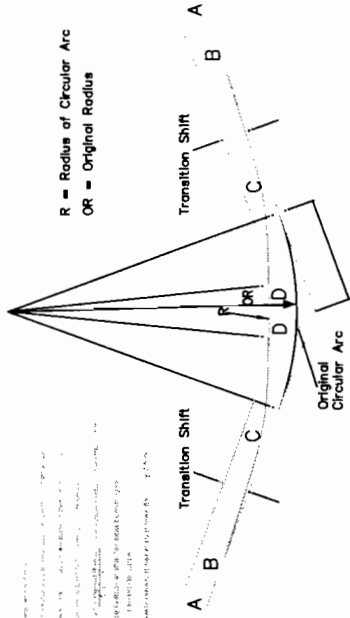
DRG NO.	OSRP/CEG/DR	DESIGNED BY	DRAWN BY	REV. RT	APPROVED
SH. NO.	16	DATE	12/12/12	REV	R-1
SCALE	NTS			CEG	CEG
				PREPARED BY	EE(PMU)
					CE,WBP



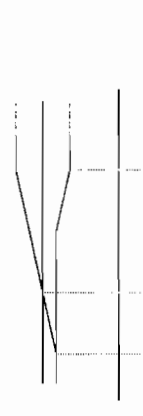
DETAIL OF BOX DRAIN



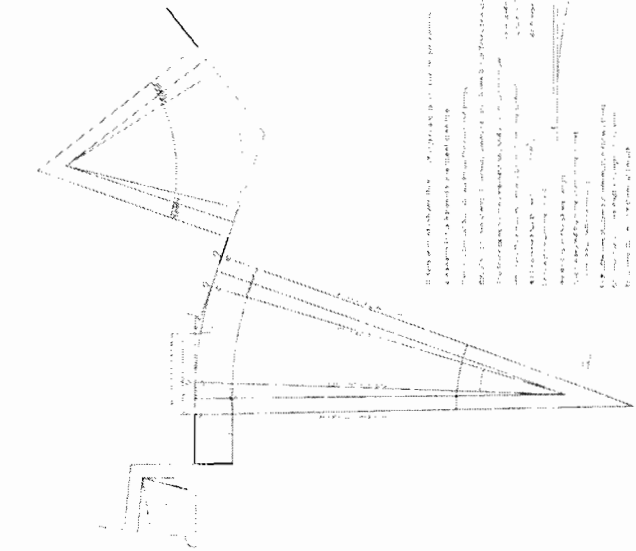
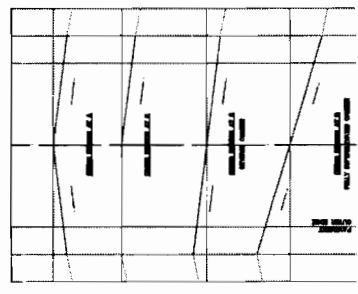
PRECAST SAUCER DRAIN



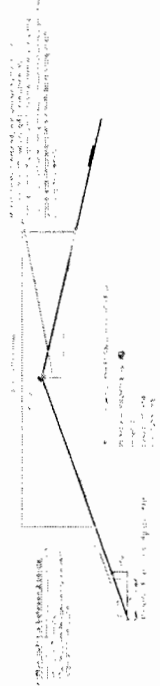
APPLICATION OF SUPERELEVATION



LONGITUDINAL SECTION THROUGH HORIZONTAL CURVE



It has been assumed that the transition curve is a cubic parabola. The length of the transition curve is 100m. The radius of the circular arc is 1000m. The super-elevation is 10%. The diagram shows the transition curve and the circular arc. The transition curve is a cubic parabola. The length of the transition curve is 100m. The radius of the circular arc is 1000m. The super-elevation is 10%. The diagram shows the transition curve and the circular arc.



PROJECT:-

**ODISHA STATE ROAD PROJECT
UNDER WORLD BANK**

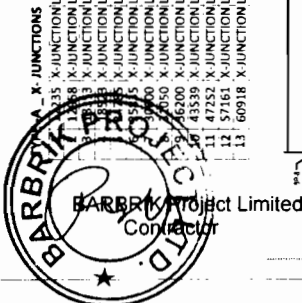
**CONSULTING
ENGINEERS GROUP LTD.**
E-12, M6J Colony, Malviya Nagar Jaipur-17
Teli: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@ceginidia.com

DETAILS OF APPLICATION OF SUPERELEVATION

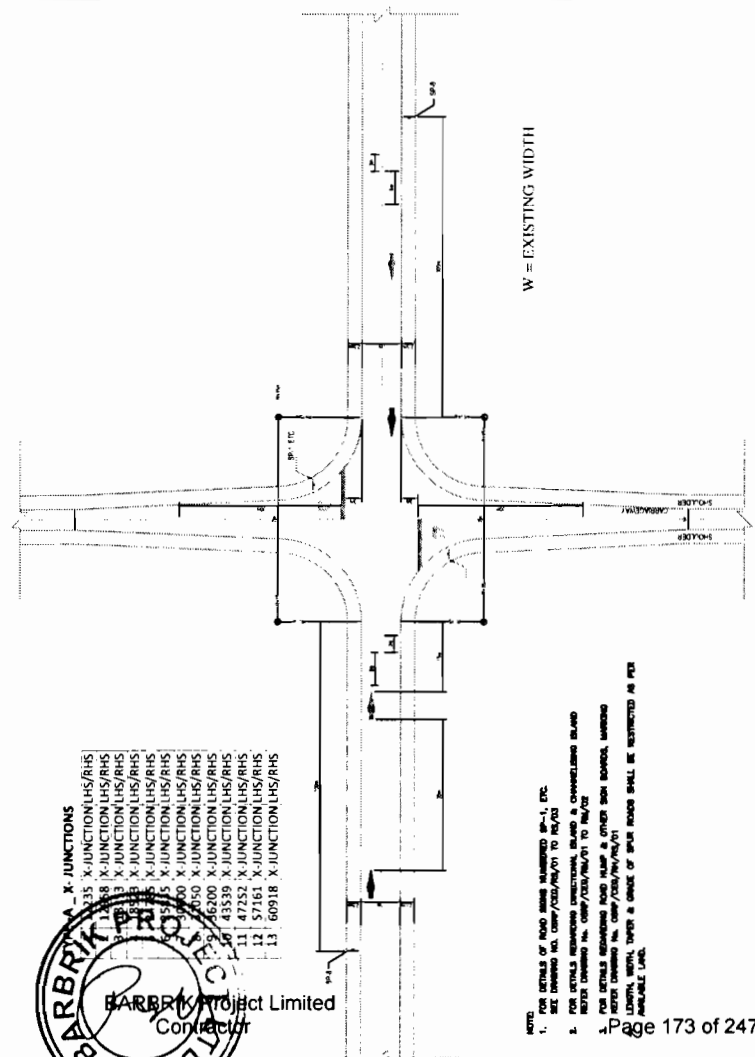
DRG NO.	DATE	DESIGNED BY	DRAWN BY	REV'D BY	APPROVED
SH. NO.	DATE	DESIGNED BY	DRAWN BY	REV'D BY	APPROVED
SCALE	DATE	DESIGNED BY	DRAWN BY	REV'D BY	APPROVED
	17	CEG	CEG	CEG	EE(PMU)
	12/12/12	CEG	CEG	CEG	EE(PMU)
	REV	CEG	CEG	CEG	EE(PMU)
	R-1	CEG	CEG	CEG	EE(PMU)
	NTS	CEG	CEG	CEG	EE(PMU)

Chief Engineer
World Bank Project
On the E.C.C. Civil, Odisha
Chief Engineer
World Bank Projects, Odisha

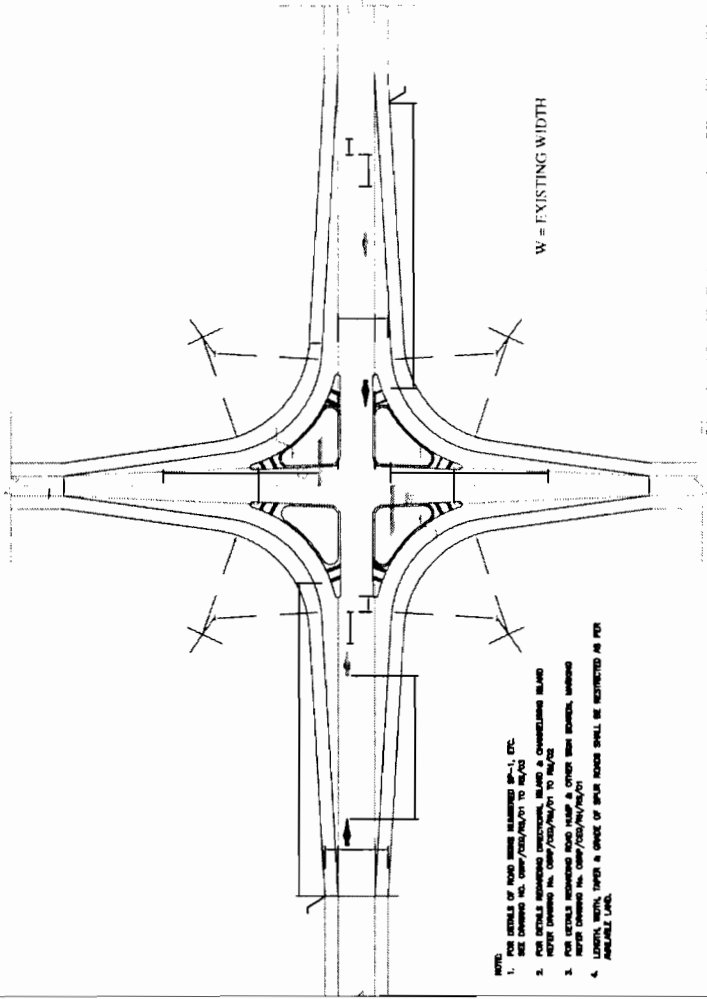




- 1. 235 X-JUNCTION LHS/RHS
- 2. 128 X-JUNCTION LHS/RHS
- 3. 123 X-JUNCTION LHS/RHS
- 4. 123 X-JUNCTION LHS/RHS
- 5. 123 X-JUNCTION LHS/RHS
- 6. 123 X-JUNCTION LHS/RHS
- 7. 123 X-JUNCTION LHS/RHS
- 8. 123 X-JUNCTION LHS/RHS
- 9. 123 X-JUNCTION LHS/RHS
- 10. 123 X-JUNCTION LHS/RHS
- 11. 43539 X-JUNCTION LHS/RHS
- 12. 57161 X-JUNCTION LHS/RHS
- 13. 60918 X-JUNCTION LHS/RHS



- NOTE:
1. FOR DETAILS OF ROAD MARKINGS SEE-1, ETC. SEE DRAWING NO. CWP/2020/PA/01 TO PA/03
 2. FOR DETAILS REGARDING INTERSECTION, ISLAND & CHANNELISED ISLAND REFER DRAWING NO. CWP/2020/PA/01 TO PA/02
 3. FOR DETAILS REGARDING ROAD MARK & OTHER SIGN BOARD, MARKING REFER DRAWING NO. CWP/2020/PA/01 TO PA/02
 4. LIGHTS, SIGN, TOWER & GRADE OF ROAD SHALL BE RESTRICTED AS PER AVAILABLE LAND.



- NOTE:
1. FOR DETAILS OF ROAD MARKINGS SEE-1, ETC. SEE DRAWING NO. CWP/2020/PA/01 TO PA/03
 2. FOR DETAILS REGARDING INTERSECTION, ISLAND & CHANNELISED ISLAND REFER DRAWING NO. CWP/2020/PA/01 TO PA/02
 3. FOR DETAILS REGARDING ROAD MARK & OTHER SIGN BOARD, MARKING REFER DRAWING NO. CWP/2020/PA/01 TO PA/02
 4. LIGHTS, SIGN, TOWER & GRADE OF ROAD SHALL BE RESTRICTED AS PER AVAILABLE LAND.

W = EXISTING WIDTH

PROJECT:-

**ODISHA STATE ROAD PROJECT
UNDER WORLD BANK**

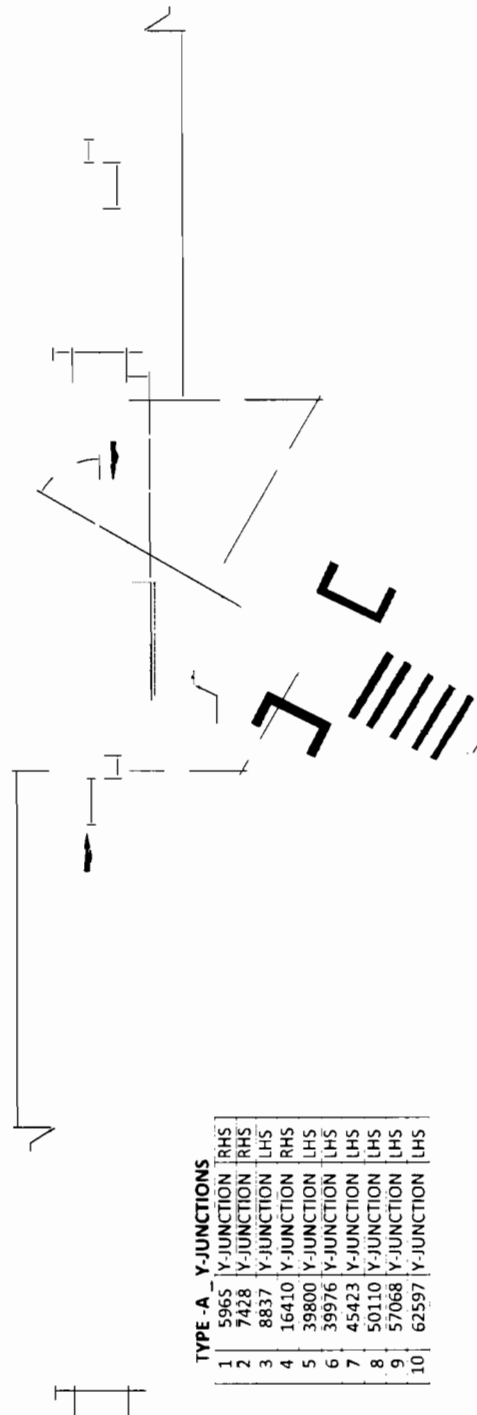
**STANDARD DRAWINGS
TYPICAL 4-LEGGED INTERSECTION WITH
WITH SINGLE LANE BT ROAD
(BHWANIPATNA-KHARIAR-BALANCE WORK)**

DRG NO.	DATE	REV	APPROVED
SH. NO.	18	31/12/12	R-1
SCALE			NTS
DESIGNED BY	CEG		
DRAWN BY	CEG		
PREPARED BY	EE(PMU)		
REV/01			APPROVED
			CE WBP

**CONSULTING
ENGINEERS GROUP LTD.**
E-12, Moji Colony, Matviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegindia.com



Chief Engineer
World Bank Projects, Odisha
Bhubaneswar.



TYPE - A - Y-JUNCTIONS

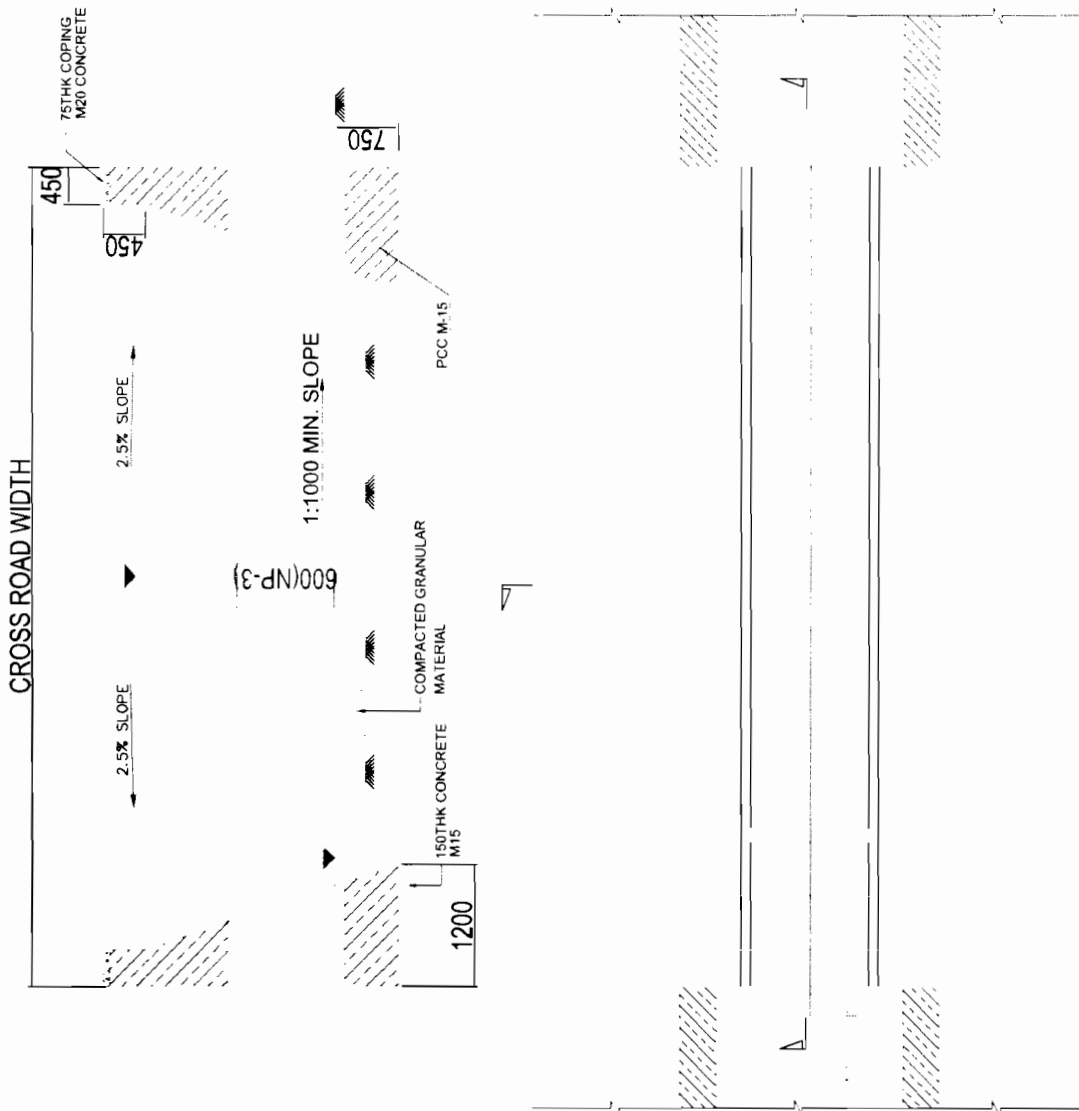
1	5965	Y-JUNCTION	RHS
2	7428	Y-JUNCTION	RHS
3	8837	Y-JUNCTION	LHS
4	16410	Y-JUNCTION	RHS
5	39800	Y-JUNCTION	LHS
6	39976	Y-JUNCTION	LHS
7	45423	Y-JUNCTION	LHS
8	50110	Y-JUNCTION	LHS
9	57068	Y-JUNCTION	LHS
10	62597	Y-JUNCTION	LHS

DRG NO.	DATE	REV	CEG	CEG	FF/PMU	CF-WBP
SH. NO.	20	31/12/12	R-1	CEG	CEG	FF/PMU
SCALE	NTS					

PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

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 Fax: 2521348, e-mail: ceg@cegroupindia.com

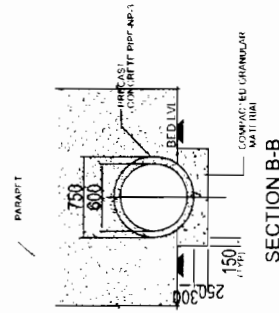
Chief Engineer
 World Bank Projects, Odisha
 Rhubaneswar



St. No.	Change	Left	Right	Junction
1	5.965	-	Right	Junction
2	6.115	-	Right	Junction
3	7.42	-	Right	Junction
4	7.58	Left	-	Junction
5	8.83	Left	-	Junction
6	12.235	-	Right	Junction
7	12.975	-	Right	Junction
8	16.41	-	Right	Junction
9	18.33	-	Right	Junction
10	18.52	Left	-	Junction
11	21.19	-	Right	Junction
12	24.785	Left	-	Junction
13	25.825	Left	-	Junction
14	26.385	Left	-	Junction
15	27.118	Left	-	Junction
16	30.605	Left	-	Junction
17	31.045	-	Right	Junction
18	36.2	Left	-	Junction
19	39.8	Left	-	Junction
20	39.976	Left	-	Junction
21	41.247	Left	-	Junction
22	43.516	Left	-	Junction
23	45.423	Left	-	Junction
24	46.85	-	Right	Junction
25	47.25	-	Right	Junction
26	50.105	Left	-	Junction
27	52.224	-	Right	Junction
28	53.14	-	Right	Junction
29	56.207	Left	-	Junction
30	57.024	Left	-	Junction
31	57.17	Left	-	Junction
32	60.916	-	Right	Junction
33	62.597	Left	-	Junction
34	64.5	Left	-	Junction
35	67.5	Left	-	Junction
36	69.413	Left	-	Junction

SECTION B-B

Sheet	Change	Type of Junction	Direction	No.
1	701-000	Manot-Jn		03



STANDARD DRAWINGS
TYPICAL - CROSS DRAIN
SINGLE LANE BT ROAD/EARTHEN ROAD
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG NO.	DATE	REV	BY	CHKD BY	APP'D BY
SH. NO. 21	31/12/12	R-1			
SCALE	NTS		CEG	CEG	FF(PMU) CE:WBP

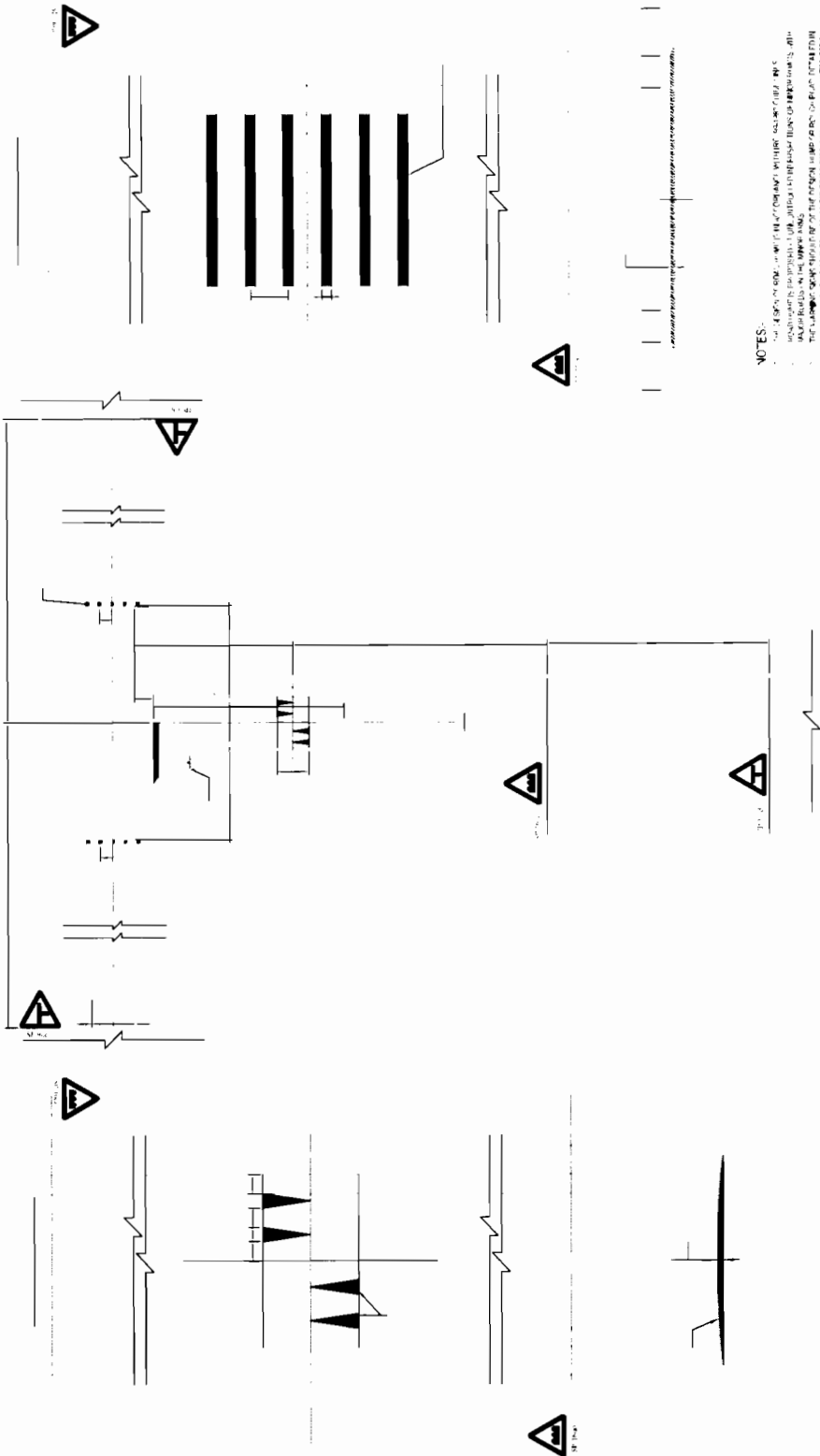
PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.

E-12, Moji Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegroupindia.com





- NOTES:**
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 2. THE ROAD SURFACE SHALL BE FINISHED TO THE PROPOSED FINISH LEVEL.
 3. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 4. THE RUMBLE STRIPS SHALL BE SPACED AS SHOWN IN THE DRAWING.
 5. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 6. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 7. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 8. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 9. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.
 10. THE RUMBLE STRIPS SHALL BE OF THE TYPE AS SHOWN IN THE DRAWING.

SCHEDULE AT DRG. NO. ORP/CEG/SH-16/SCH._RH & RS

STANDARD DRAWINGS
DETAILS OF ROAD HUMP AND RUMBLE STRIPS

(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG NO.	ORP/CEG/SH-16	DATE	31/12/12	REV	R-1	DESIGNED BY	CEG	CHECKED BY	CEG	APPROVED BY	CE.WBP
SCALE	NTS										

PROJECT:-
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

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CEG



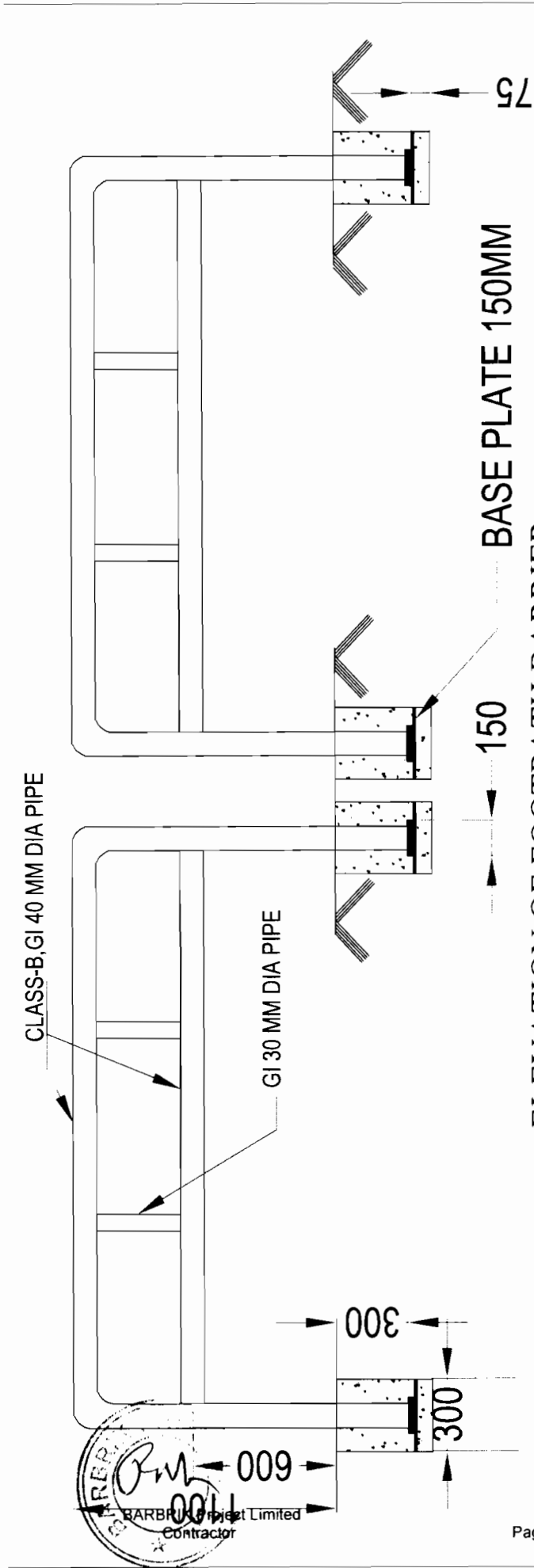
Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar
Chief Engineer

SCHEDULE OF ROAD HUMPS		
Sl. No.	Chainage	LHS/RHS
1	5.965	Right
2	6.115	Right
3	7.42	Right
4	7.58	Left
5	8.83	Left
6	12.235	Right
7	12.925	Right
8	16.41	Right
9	18.33	Right
10	18.52	Left
11	21.19	Right
12	24.785	Left
13	25.825	Left
14	26.285	Left
15	27.118	Right
16	30.605	Left
17	31.045	Right
18	36.2	Left
19	39.8	Left
20	39.976	Left
21	41.247	Right
22	43.516	Left
23	45.423	Left
24	46.85	Right
25	47.25	Right
26	50.105	Left
27	52.224	Right
28	53.14	Right
29	56.207	Left
30	57.024	Left
31	57.12	Left
32	60.916	Right
33	62.597	Left
34	64.5	Left
35	67.5	Left
36	69.413	Left

SCHEDULE OF RUMBLER STRIPS		
SL. NO.	CHAINAGE	REMARKS
1	5800	SCHOOL ZONE
2	7260	SCHOOL ZONE & HOSPITAL ZONE
3	7470	HOSPITAL ZONE
4	20700	SCHOOL ZONE
5	26030	SCHOOL ZONE
6	26670	HOSPITAL ZONE
7	32940	SCHOOL ZONE
8	33050	SCHOOL ZONE



SCHEDULE OF HUMPS & RUMBLER STRIPS			
PROJECT	OSRP/CEG/SCH-RH&RS	REV :	REV RI
ODISHA STATE ROAD PROJECT		R1	APPROVED
DRG NO.		DATE :	PREPARED BY
SH.NO.		28/12/2012	CE/PMU
SCALE		NTS	DESIGNED BY
			CEG
			CE, World Bank Projects



ELEVATION OF FOOTPATH BARRIER

NOTE : Leave openings for entrances to properties and spur roads

SCHEDULE OF FOOTPATH BARRIES

Sl. No.	FROM	TO	LENGTH	LHS/RHS
1	14900	15200	300	BOTH
2	20350	21000	650	BOTH
3	27050	27200	150	BOTH
4	43150	44000	850	BOTH
5	44600	44900	300	BOTH
6	50000	50300	300	BOTH
7	56900	57300	400	BOTH
	60700	61800	1100	BOTH
	65650	66000	350	BOTH

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

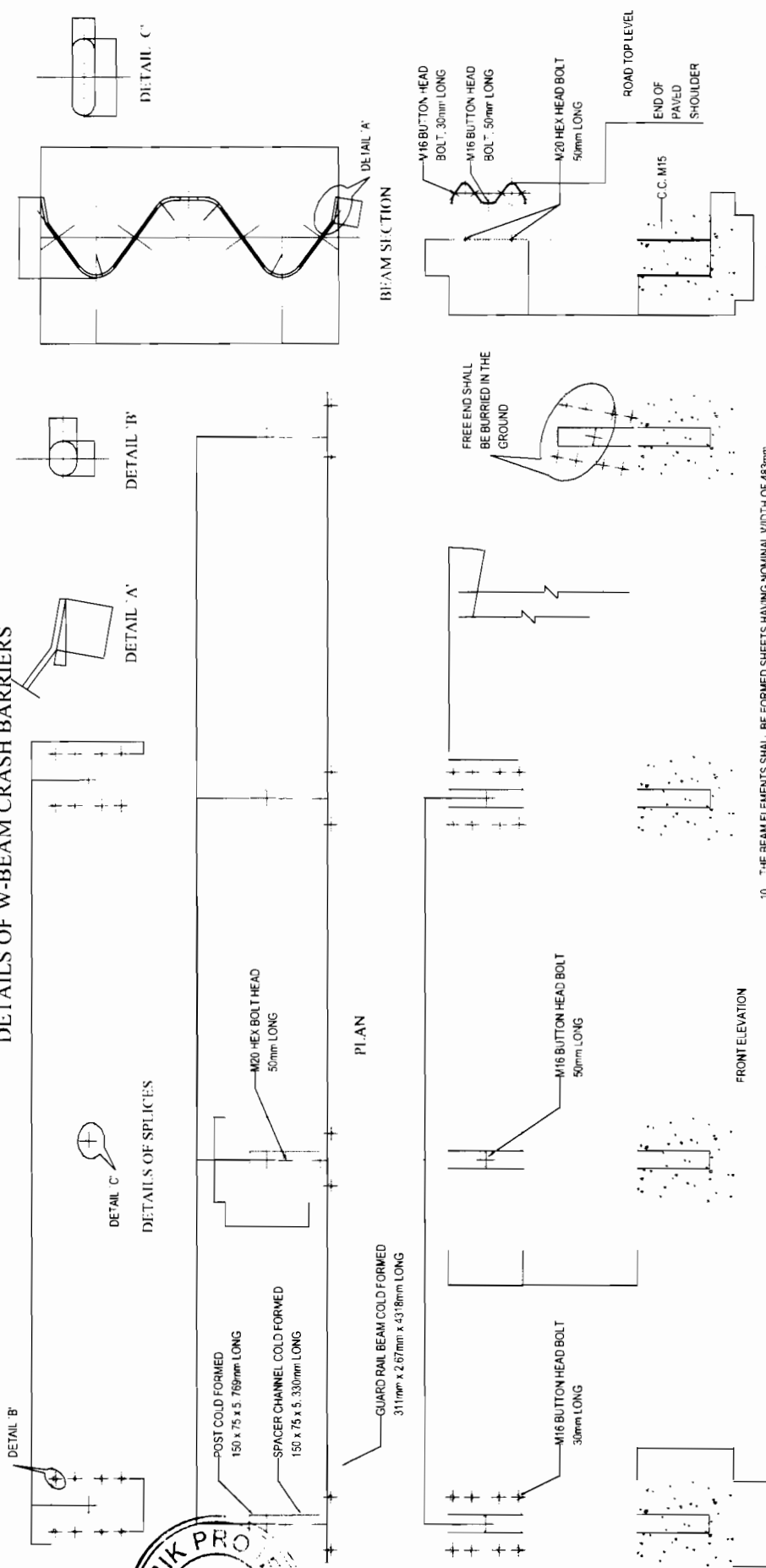
C O N S U L T I N G
E N G I N E E R S G R O U P L T D .
E-12, Moji Colony, Malviya Nagar, Jaipur-17

Tel: +91-141-2520899, 2521899, 2520556
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STANDARD DRAWINGS DETAILS OF FOOTPATH BARRIERS			
(BHAWANIPATNA-KHARIAR-BALANCE WORK)			
DRG NO.	DATE	DESIGNED BY	APPROVED
SH NO.	31/12/12	CEG	EE(IPMU)
SCALE	NTS	CEG	CE-WBP

DETAILS OF W-BEAM CRASH BARRIERS



1. HEIGHT OF POSTS SHOULD BE 785mm LONG ABOVE THE FINISHED ROAD LEVEL.
 2. SPACING OF POSTS SHOULD BE 2.0m C.C.
 3. 1 No. SPACER CHANNEL SHOULD BE PLACED AT EACH POST.
 4. W-PERFLE FORMED CORRUGATED BEAMS (EFFECTIVE LENGTH OF 4378mm), 311mm x 83mm.
 5. POST CONSISTS OF FORMED CHANNEL OF SIZE 150 x 75 x 5, 785mm LONG ABOVE GROUND LVL.
 6. SPACER CONSISTS OF FORMED CHANNEL OF SIZE 150 x 75 x 5, 330mm LONG.
 7. BUTTION HEAD BOLTS M16 x 30mm LONG, 8 Nos FOR THE SPLICING OF THE W PROFILE AT EACH LOCATION.
 8. BUTTION HEAD BOLTS M16 x 50mm LONG, 1 Nos AT THE CONNECTION OF THE W BEAM TO SPACER.
 9. HEX HEAD BOLTS M20 x 50mm LONG, 2 Nos AT THE CONNECTION OF THE SPACER TO POST.
10. THE BEAM ELEMENTS SHALL BE FORMED SHEETS HAVING NOMINAL WIDTH OF 483mm.
 11. THE BASE MATERIAL OF THE CORRUGATED BEAM SHALL COMPLY TO FOLLOWING MECHANICAL PROPERTIES:
 - i. TENSILE STRENGTH: MIN=183 MPA
 - ii. ELONGATION IN 2 INCHES: MIN = 17%
 - iii. YIELD: MIN=145 MPA
 12. ALL MEMBERS OF THE SYSTEM SHOULD BE HOT DIPPED GALVANIZED AND TO HAVE A MINIMUM COATING OF 55g/ Sq.m. EACH FACE IN CONFORMANCE TO M.O.R.T & H SPECIFICATIONS (CLAUSE 610).
 13. BEAMS TO BE ERRECTED ON A RADIUS OF 46m (150') OR LESS SHALL BE SHAPE CURVED TO APPROPRIATE CURVATURE.
 14. CRASH BARRIERS ARE POSTED ON ALL SECTION OF EMBANKMENT WHOSE HEIGHT IS >= TO 3m. HORIZONTAL CURVES OF RADIUS < 170m AND ALSO AT ALL BRIDGE APPROACHES FOR LENGTH OF 20m ON BOTH SIDES.
 15. BEAM SURFACE FACING THE TRAFFIC IS PAINTED WITH ALTERNATE BANDS (500mm WIDE) OF BLACK & YELLOW COLOR REFLECTOR PAINT CONFORMING CL.803.5 OF M.O.R.T & H SPEC.
- SCHEDULE**
 AT 1 MAJOR BRIDGES: 100M AT 2 SIDES ON BOTH WAYS
 AT 6 MINOR BRIDGES: 50M AT 2 SIDES ON BOTH WAYS

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

STANDARD DRAWINGS
METAL BEAM CRASH BARRIER DETAILS
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG NO.	100/11/11/11	DATE	12/12/12	REV	R-1
SH NO.	24	SCALE	N/S		
DESIGNED BY	CEG	CHECKED BY	CEG	APPROVED BY	EE(IPMU)
DRAWN BY	CEG	PROJECT MANAGER	CEG	CF-WRP	

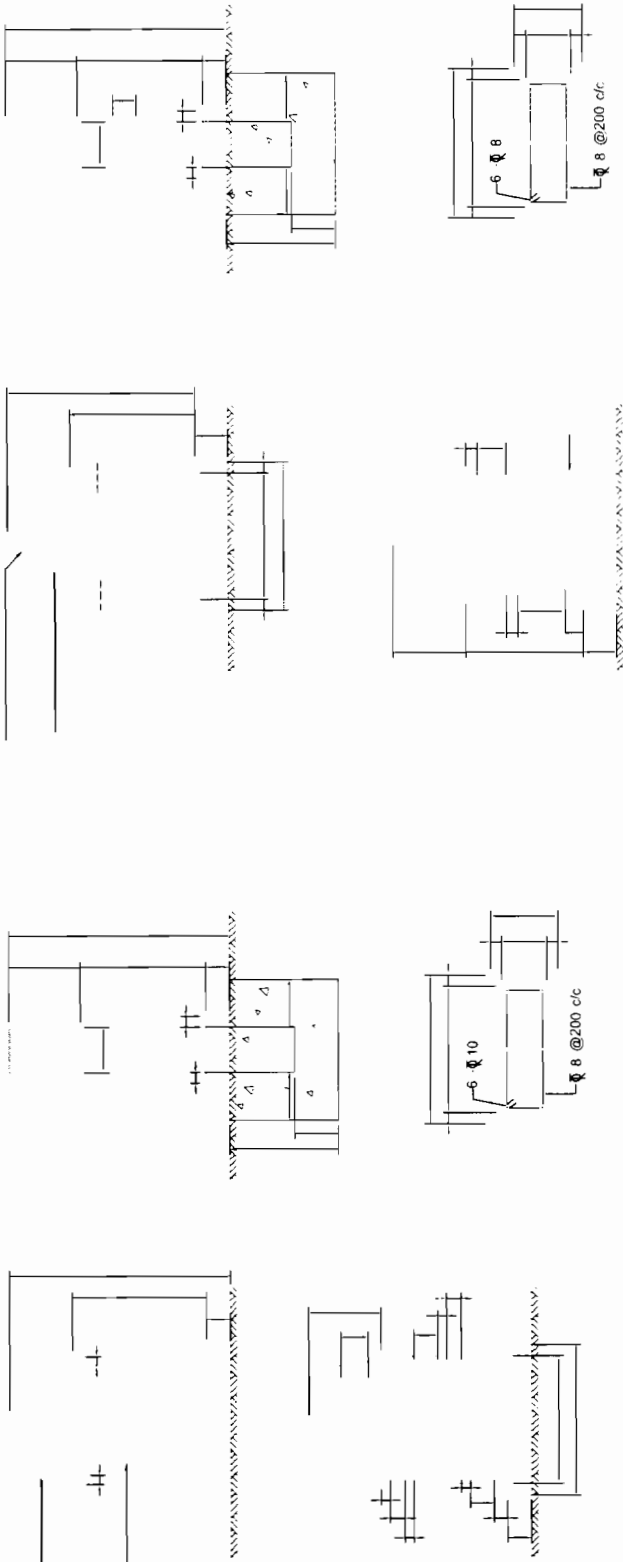
CON S U L T I N G
ENGINEERS GROUP LTD.
E-12, Moji Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegroupindia.com

CEG

Chief Engineer
World Bank Projects, Odisha
Bhubaneswar



RBRBIK Project Limited
Contractor

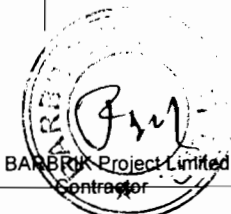


1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFLECTORISED PAINT SHALL BE IN ACCORDANCE WITH CL 803.5 OF M.O.R.T & H SPEC.
3. FOR TYPE & STYLE SIZE OF LETTERING RELEVANT IRC CODE OF PRACTICE SHALL BE REFERRED
4. LETTERING IS DONE WITH APPROVED QUALITY BLACK ENAMEL PAINT USING STENCIL

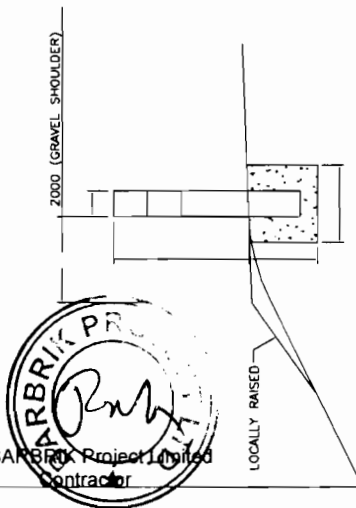
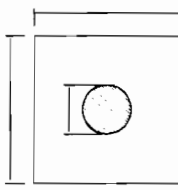
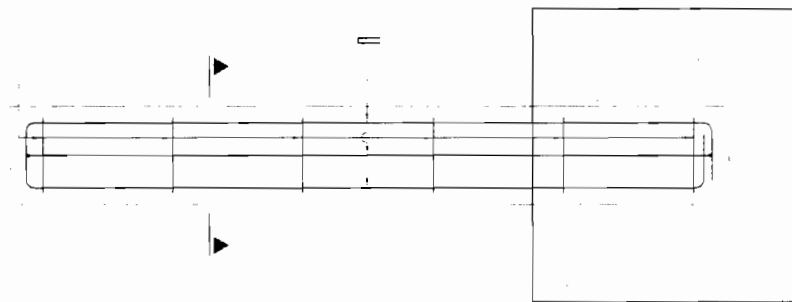
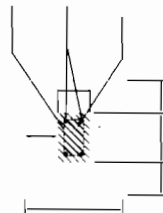
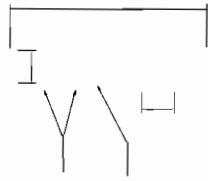
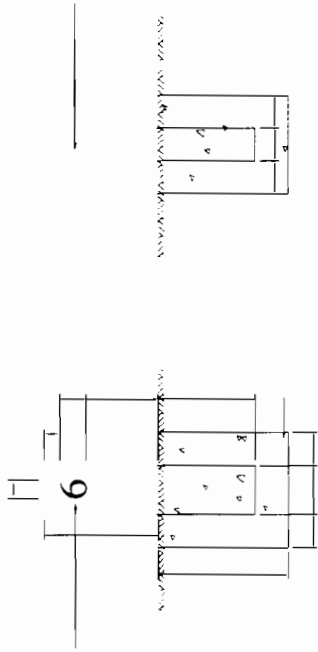
DRG NO.	PROJECT CODE	DATE	REV	SCALE	DATE	REV	SCALE	DATE	REV	SCALE
SH NO.	25	12/12/12	R-1							
NTS					CEG	CEG	CEG	CEG	CEG	CEG
STANDARD DRAWINGS					TYPICAL KM STONE & 5TH KM STONE					
					(BHAWANIPATNA-KHARIAR-BALANCE WORK)					
					DATE	REV	SCALE	DATE	REV	SCALE
					12/12/12	R-1				
					CEG	CEG	CEG	CEG	CEG	CEG
					EE9PMUJ	EE9PMUJ	EE9PMUJ	EE9PMUJ	EE9PMUJ	EE9PMUJ
					CE WBP	CE WBP	CE WBP	CE WBP	CE WBP	CE WBP

PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

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 Fax: 2521348, e-mail: ceg@cegroupindia.com



Chief Engineer,
 World Bank Project
 into the Chief Engineer
 World Bank Projects, Odisha



FIXING DETAILS OF GUARD POST

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFLECTORISED PAINT SHALL BE IN ACCORDANCE WITH CI. 803.5 OF M.O.R.T. & H.S.P.F.C.
3. FOR TYPE & STYLE SIZE OF LETTERING RELEVANT IRC CODE OF PRACTICE SHALL BE REFERRED.
4. LETTERING IS DONE WITH APPROVED QUALITY BLACK ENAMEL PAINT USING STENCIL

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED.
2. R.C.C. GUARD POSTS IS INSTALLED WHERE EMBANKMENT HEIGHT IS GREATER THAN 3 M. AT OTHER HAZARD LOCATIONS.

3. FOR SCHEDULE REFER DRAWING NO. OSRP/CEG/SH9A&SH-9/SCH-GP



Chief Engineer
World Bank Project
On the E.C. Chief Engineer
World Bank Projects, Odisha

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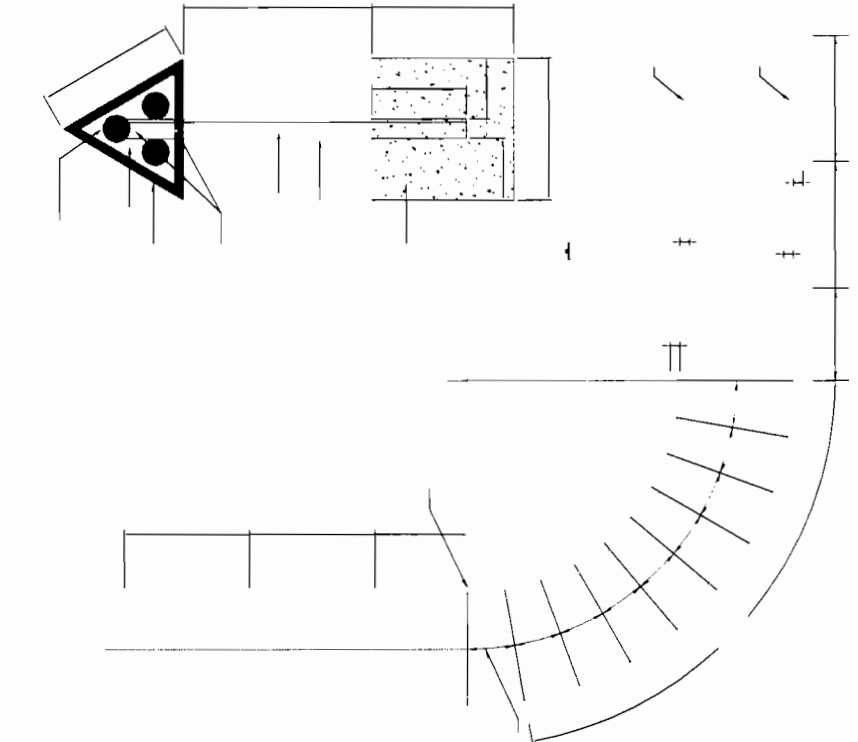
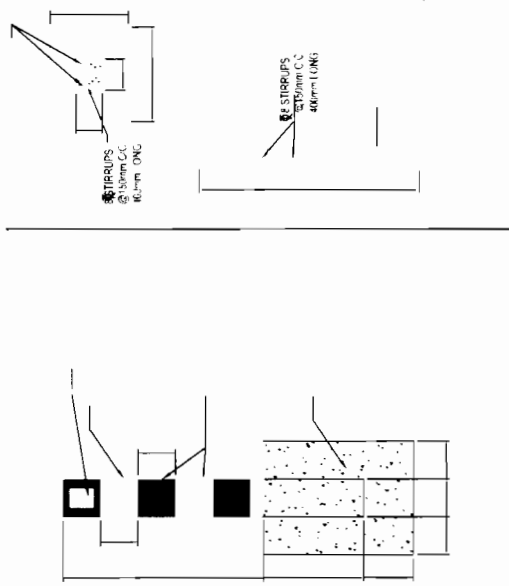
**STANDARD DRAWINGS
TYPICAL DETAILS OF 200M STONE & GUARD POST
(BHAWANIPATNA-KHARIAR-BALANCE WORK)**

DRG NO.	DATE	DATE	REV	R-1	DATE	DATE	DATE	DATE
SH. NO.	26	12/12/12	REV	R-1	12/12/12	12/12/12	12/12/12	12/12/12
SCALE	NTS			CFG	CFG	CFG	CFG	CFG
							EE (PMU)	CE-WBP

SCHEDULE OF ROAD DELINEATORS AT CURVES UPTO 100M

Sl. No.	START	END	RADIUS	ARC LENGTH	SPACING	TOTAL
1	2877.047	2969.454	200	92.407	20	13
2	3174.729	3216.88	200	42.151	20	9
3	5089.156	5147.361	360	58.205	25	9
4	6090.465	6137.587	300	37.122	25	8
5	7196.232	7287.931	1000	91.699	50	9
6	11968.31	12018.09	400	49.784	30	8
7	12329.77	12329.04	500	78.27	35	8
8	15283.71	15374.72	1000	91.009	50	9
9	16011.85	16067.52	300	55.665	25	9
10	17342.22	17493.31	400	151.097	30	14
11	17729.88	17791.86	600	61.985	38	8
12	19267.64	19337.78	600	70.148	38	9
13	21402.57	21485.01	800	82.437	45	9
14	23199.17	23249.47	250	50.309	20	10
15	27493.95	27527.92	240	33.978	20	9
16	27856.35	27886.71	400	30.637	30	8
17	28988.85	29128.76	300	139.914	25	14
18	29427.65	29464.19	300	36.539	25	8
19	30257.47	30344.53	280	87.053	20	13
20	35427.67	35471.56	240	43.897	20	9
21	36161.63	36201.57	800	39.945	45	7
22	37030.38	37078.47	300	48.087	25	9
23	37735.15	37827.34	240	92.191	20	13
24	38589.54	38620.18	300	30.637	25	8
25	40135.09	40254.48	400	119.394	30	12
26	43779.11	43896.27	800	107.167	45	10
27	45685.75	45759.34	600	83.59	38	9
28	48379.88	48505.37	300	125.488	25	14
29	50121.41	50307.57	900	186.151	48	12
30	52314.25	52445.23	300	130.973	25	14
31	53236.92	53352.4	800	115.48	45	10
32	54955.9	55009.51	400	53.629	30	9
33	55301.72	55385.76	240	84.047	20	12
34	55885.48	55976.41	1000	90.933	50	9
35	56727.19	56824.64	240	97.458	20	13
36	57785.93	57840.97	300	55.042	25	9
37	58521.18	58609.44	900	88.256	48	9
38	59213.11	59268.87	600	55.758	38	8
39	59709.99	59755.08	240	45.09	20	9
40	60951.76	61069.8	550	118.039	35	11
41	62726.81	62772.83	800	46.021	45	8
42	63280.53	63332.23	1000	51.697	50	8
43	65017.39	65425.42	620	408.035	38	22
44	68043.81	68231.12	700		42	13

SCALE:-
 1 FOR THE DETAILS OF ROAD DELINEATORS REFER DWG. NO. DRP/14/02
 2. ROAD DELINEATORS SHALL BE PROVIDED AS PER THE GUIDE LINES IN THE DRAWING



Sl. No.	NUMBER OF CURVE METERS	SPACING OF CURVE METERS (METERS)
1	19	9
2	20	8
3	190	14
4	200	23
5	300	26
6	400	33
7	500	36
8	600	38
9	700	47
10	800	45
11	900	48
12	1000	51

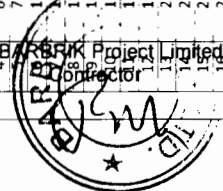
- NOTES:-
1. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
 2. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
 3. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
 4. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
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 11. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
 12. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.
 13. ALL DELINEATORS SHALL BE PROVIDED AS PER THE DRAWING.

PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.
 E-12, Moji Colony, Malviya Nagar, Jaipur-17
 Tel: +91-141-2520899, 2521899, 2520556
 Fax: 2521348, e-mail: ceg@ceegindia.com

STANDARD DRAWINGS
 DETAILS OF ROAD DELINEATORS
 (BHAWANIPATNA-KHARIAR-BALANCE WORK)

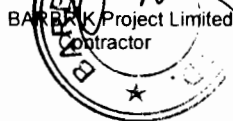
DWG. NO.	DATE	DATE	DATE	DATE	DATE	DATE	DATE
SH. NO.	27	12/12/12	RFV	R-1	CEG	CEG	CEG
SCALE	NTS			NTS	NTS	NTS	NTS



Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar.

RRPMs AT SHARP CURVES

Sl. No	START	END	RADIUS	ARC LENGTH
1	2877.047	2969.454	200	90
2	3174.729	3216.88	200	40
3	35427.67	35471.56	240	40
4	37735.15	37827.34	240	90
5	55301.72	55385.76	240	80
6	56727.19	56824.64	240	100
7	59709.99	59755.08	240	50
8	23199.17	23249.47	250	50
9	30257.47	30344.53	280	90
10	6090.465	6127.587	300	40
11	16011.85	16067.52	300	60
12	28988.85	29128.76	300	140
13	29427.65	29464.19	300	40
14	37030.38	37078.47	300	50
15	38589.54	38620.18	300	30
16	48379.88	48505.37	300	130
17	52314.25	52445.23	300	130
18	57785.93	57840.97	300	60



SCHEDULE OF SAUCER DRAIN

Sl.	FROM	TO	LENGTH
1	14900	15200	300
2	20350	21010	660
3	43150	44000	850
4	44600	44900	300
5	50000	50300	300
6	56900	57300	400
7	60700	61800	1100
8	65650	66000	350

JUNCTION

1	69+865	250
---	--------	-----

Spur Road Junction

Sl. No.	Change	Left	Right
1	2,935	Left	-
2	3,495	Left	-
3	5,195	-	Right
4	5,207	Left	-
5	5,905	Left	-
6	5,965	Left	Right
7	6,05	Left	-
8	6,1	Left	-
9	6,115	-	Right
10	6,265	-	Right
11	6,7	-	Right
12	7,42	-	Right
13	7,58	Left	-
14	8,025	Left	-
15	8,05	Left	-
16	8,83	Left	-
17	9,01	Left	Right
18	9,145	Left	-
19	9,18	Left	Right
20	10,25	Left	-
21	12,23	Left	-
22	12,235	-	Right
23	12,735	Left	-
24	12,925	-	Right
25	12,95	Left	-
26	14,31	Left	-
27	14,945	Left	-
28	15,25	Left	-
29	16,41	-	Right
30	17,31	-	Right
31	18,33	-	Right
32	18,34	Left	-
33	18,515	-	Right
34	18,52	Left	-
35	20,2	-	Right
36	21,19	-	Right
37	21,235	Left	-
38	22,655	Left	-
39	24,78	-	Right
40	24,785	Left	-
41	25,816	-	Right
42	25,825	Left	-
43	26,285	Left	-

Spur Road Junction

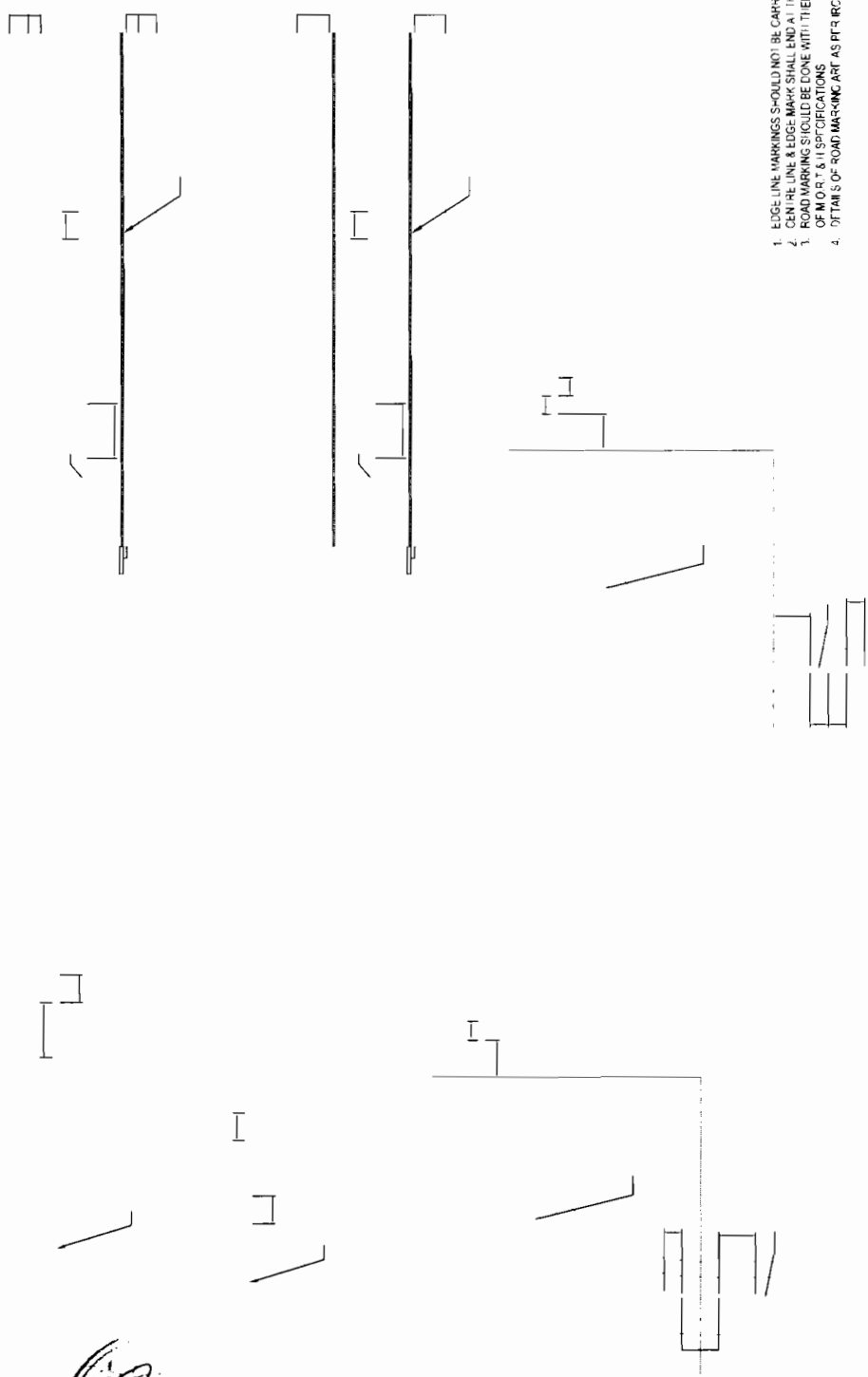
Sl. No.	Change	Left	Right
44	30,05	-	Right
45	30,185	-	Right
46	30,205	-	Right
47	30,235	-	Right
48	30,6	-	Right
49	30,605	Left	-
50	31,045	Left	-
51	31,045	Left	Right
52	32,1	Left	-
53	33,177	-	Right
54	33,47	Left	-
55	35	-	Right
56	35,503	Left	-
57	36,162	-	Right
58	36,2	Left	-
59	37,827	-	Right
60	38,416	-	Right
61	39,8	Left	-
62	39,975	Left	-
63	41,247	Left	Right
64	42,895	Left	-
65	43,5	-	Right
66	43,516	Left	-
67	43,92	-	Right
68	45,164	-	Right
69	45,185	Left	-
70	45,423	Left	-
71	45,884	Left	-
72	46,665	Left	-
73	46,85	-	Right
74	47,25	-	Right
75	47,25	Left	-
76	49,92	-	Right
77	50,067	Left	-
78	50,075	-	Right
79	50,105	Left	-
80	50,224	-	Right
81	51,458	-	Right
82	52,224	-	Right

Spur Road Junction

Sl. No.	Change	Left	Right
81	52,487	-	Right
82	53,14	-	Right
83	54,7	Left	-
84	56,207	Left	-
85	56,911	-	Right
86	57,024	Left	-
87	57,12	Left	-
88	57,125	-	Right
89	57,495	-	Right
90	57,707	-	Right
91	58,723	Left	-
92	59,755	-	Right
93	60,727	-	Right
94	60,916	-	Right
95	60,916	Left	-
96	61,741	-	Right
97	62,496	-	Right
98	62,597	Left	-
99	62,727	Left	Right
100	62,73	Left	-
101	64,016	Left	-
102	64,335	-	Right
103	64,5	Left	-
104	64,513	-	Right
105	65,71	Left	-
106	65,897	-	Right
107	67,18	Left	-
108	67,76	Left	-
109	69,413	Left	-

SCHEDULE OF RRPM			
DRG NO.	OSRP/CEG/RPM/01	REV.	DATE
		R1	28/12/2012
SH. NO.	DATE	DESIGNED BY	CEG
			CEG
SCALE	NTS	PREPARED BY	LC/PMU
PROJECT			
ODISHA STATE ROAD PROJECT			
			APPROVED
			CC, World Bank Projects

Chief Engineer
World Bank Projects
Odisha
Bhubaneswar



1. EDGE LINE MARKINGS SHOULD NOT BE CARRIED ACROSS THE MOUNDS OF SIDE ROADS
2. CENTRE LINE & EDGE MARK SHALL END AT THE STOP LINE & SHALL NOT BE CONTINUED
3. ROAD MARKING SHOULD BE DONE WITH THERMOPLASTIC PAINT CONFORMING TO CL. 801.4 OF M.O.R.T. & H SPECIFICATIONS
4. DETAILS OF ROAD MARKING ART AS PER IRC 35-1997 CODE OF PRACTICE FOR ROAD MARKINGS

CEG
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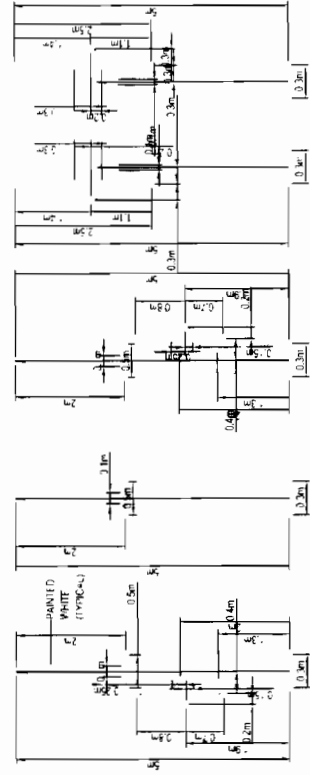
PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

STANDARD DRAWINGS
TYPICAL ROAD MARKING DETAILS
(SHEET 1 OF 2)

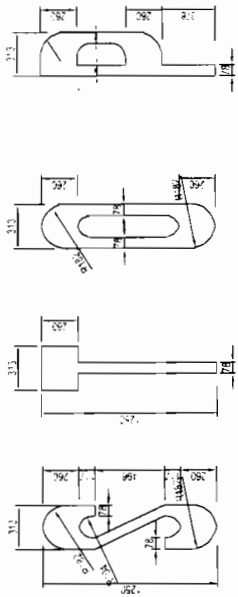
DRG NO.	10308/1/EG/10308	DATE	12/12/12	REV	R-1	SCALE	NTS	THROUGH	CEG	REVISION	CEG	APPROVED BY	EE(PMU), CE, WBP
SH NO.	29	DATE	12/12/12	REV	R-1	SCALE	NTS	THROUGH	CEG	REVISION	CEG	APPROVED BY	EE(PMU), CE, WBP



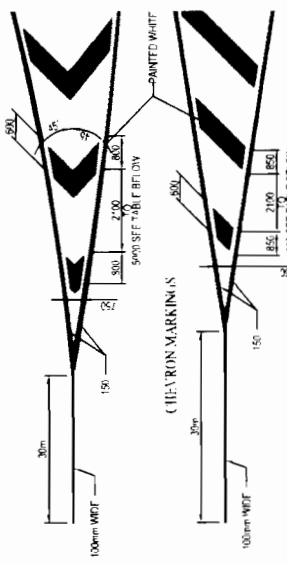
DIRECTIONAL ARROWS



SIZE OF LETTERS



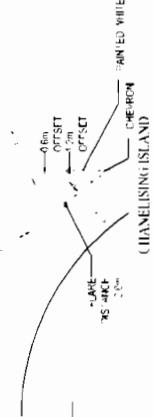
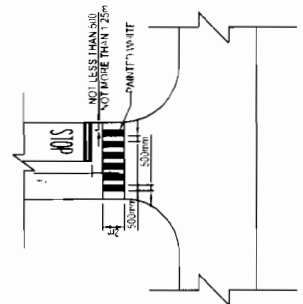
DIAGONAL MARKINGS



TOTAL LENGTH OF MARKING (mm)	WIDTH OF MARKING (mm)	SPACING BETWEEN MARKINGS (mm)	SPACING BETWEEN MARKING GROUPS (mm)
400	100	100	100
400	100	100	100
400	100	100	100
400	100	100	100
400	100	100	100

SCHEDULE OF MAJOR JUNCTIONS

PEDESTRIAN CROSSING



NOTE

1. ALL LENGTHS AND SPACINGS IN THE TABLE ARE MEASURED PARALLEL TO ROAD CENTRELINE.
2. FIRST DIAGONAL OR CHEVRON IS TO BE LOCATED AT LEAST 10M TO ITS WIDTH.
3. WIDTH OF ALL DIAGONALS & CHEVRONS MEASURED AT RIGHT ANGLES TO THE DIAGONALS OR CHEVRONS IS 100MM.
4. FOR CENTRELINE AND BUSLINES MARKING A BUS BAY LOCAL AUTHORITY DRAWING NO. GS/SP/CE/BB/01.
5. ROAD MARKING SHOULD BE DONE WITH 'HEMPHAST' PAINT CONFORMING TO I.C.C. R-14 FOR MOTOR VEHICLES & SPECIFICATION.
6. DETAILS OF MARKING AT INTERSECTIONS ARE AS PER I.C.C. 2.4.10.1. DETAILS FOR INTERSECTIONS ON NATIONAL HIGHWAYS.

PEDESTRIAN CROSSING

1 YEAR SCHEDULE OF PEDESTRIAN XING REFER DRAWING NO: OSRP/CEG/SCH-P.Xing

PROJECT:-

**ODISHA STATE ROAD PROJECT
UNDER WORLD BANK**

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Chief Engineer,
World Bank Project,
Odisha
Bhubaneswar

**STANDARD DRAWINGS
TYPICAL ROAD MARKING & CHEVRON MARKING DETAILS
(SHEET 2 OF 2)**

DRG NO.	DATE	REV	BY	CHKD BY	APPD BY
CEG/MS/001/001	30	01/12/12	CEG	CEG	EE(PMAJ)
SCALE	NTS				

SCHEDULE OF PEDESTRIAN CROSSING

SCHOOL ZONE	HOSPITAL ZONE	BUS BAYS
5800	7260	5970
20700	7470	7195
26030	26670	7895
32940		8925
33050		20910
		30130
		39860
		43460
		499965
		50310
		50830
		53230
		57230
		57640
		60655
		61060
		61465
		62610
		65945



SCHEDULE FOR PEDESTRIAN X-ING

DRG NO.	OSRP/SCH-P.Xing	REV :	R1	REV R1	APPROVED
SH.NO.		DATE :	28/12/2012	PREPARED BY	EE/PMU
SCALE		NTS		DESIGNED BY	CEG

PROJECT
ODISHA STATE ROAD PROJECT

Chief Engineer
World Bank Projects, Odisha
Bhubaneswar

CE, World Bank Projects



SP-1

BARBANK Project Limited
Contractor



SP-4(c)



SPEED LIMIT

SP-4(d)



SPEED LIMIT

SP-1(c)



SPEED LIMIT

SP-2



COMPULSORY
KEEP LEFT

SP-2(a)



RESTRICTION ENDS

SP-3



GIVE WAY

SP-4(a)



SPEED LIMIT

SP-4(b)



SPEED LIMIT

SP-7



COMPULSORY
SOUND HORN

SP-5(a)



OVERTAKING
PROHIBITED

SP-5(b)



ONE WAY

SP-5(c)



ONE WAY

SP-9(a)



RIGHT SIDE ROAD

SP-9(b)



LEFT SIDE ROAD

SP-10(a)



RIGHT HAND
CURVE

SP-10(b)



LEFT HAND
CURVE

SP-10(c)



RIGHT HAIR PIN
BEND

SP-10(d)



LEFT HAIR PIN
BEND

SP-10(e)



RIGHT REVERSE
BEND

SP-10(f)



LEFT REVERSE
BEND

SP-11



T-INTERSECTION

SP-12



PEDESTRIAN
CROSSING

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PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

STANDARD DRAWINGS

TYPICAL ROAD SIGNS (SHEET 1 OF 4)

DRG NO.	SCALE	DATE	REV	APPROVED BY	DATE	APPROVED
SIL NO.	31	12/12/12	R-1	CEG	CEG	EE(PMU)
SCALE			NTS		CE/WBP	

SP-13(a)



STAGGERED INTERSECTION

SP-13(b)



STAGGERED INTERSECTION

SP-13(c)



MAJOR ROAD AHEAD

SP-13(d)



MAJOR ROAD AHEAD

SP-13(e)



Y-INTERSECTION

SP-14(b)



Y-INTERSECTION

SP-14(c)



Y-INTERSECTION

SP-14(d)



GAP IN MEDIUM

SP-14(e)



OVERHEAD CABLE

SP-15(a)



SERIES OF BENDS

SP-15(b)



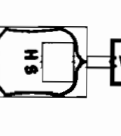
HUMP OR ROUGH ROAD

SP-15(c)



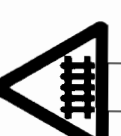
BARRIER AHEAD

SP-15(d)



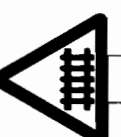
STATE ROUTE MARKER SIGN

SP-15(e)



DUAL C'WAY STARTS

SP-15(f)



DUAL C'WAY ENDS

SP-24



PUBLIC TELEPHONE

SP-22



PETROL BUNK

SP-23



HOSPITAL

SP-25



DISPENSARY

SP-26

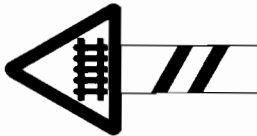


EATING PLACE

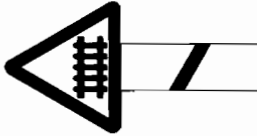
LEGEND

- WHITE SHEET
- BLACK SHEET
- RED SHEET
- BLUE SHEET

GUARDED RAILWAY CROSSING AT 200m



GUARDED RAILWAY CROSSING AT 50-100m



PROJECT:-

ODISHA STATE ROAD PROJECT UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.

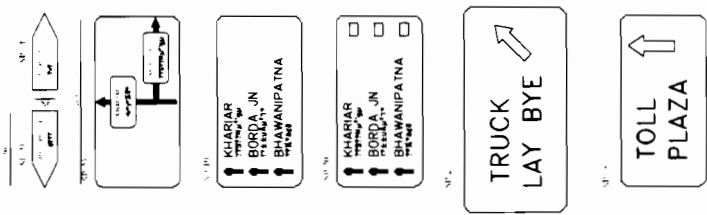
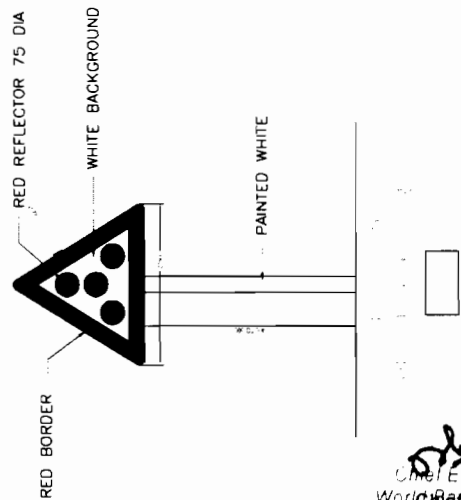
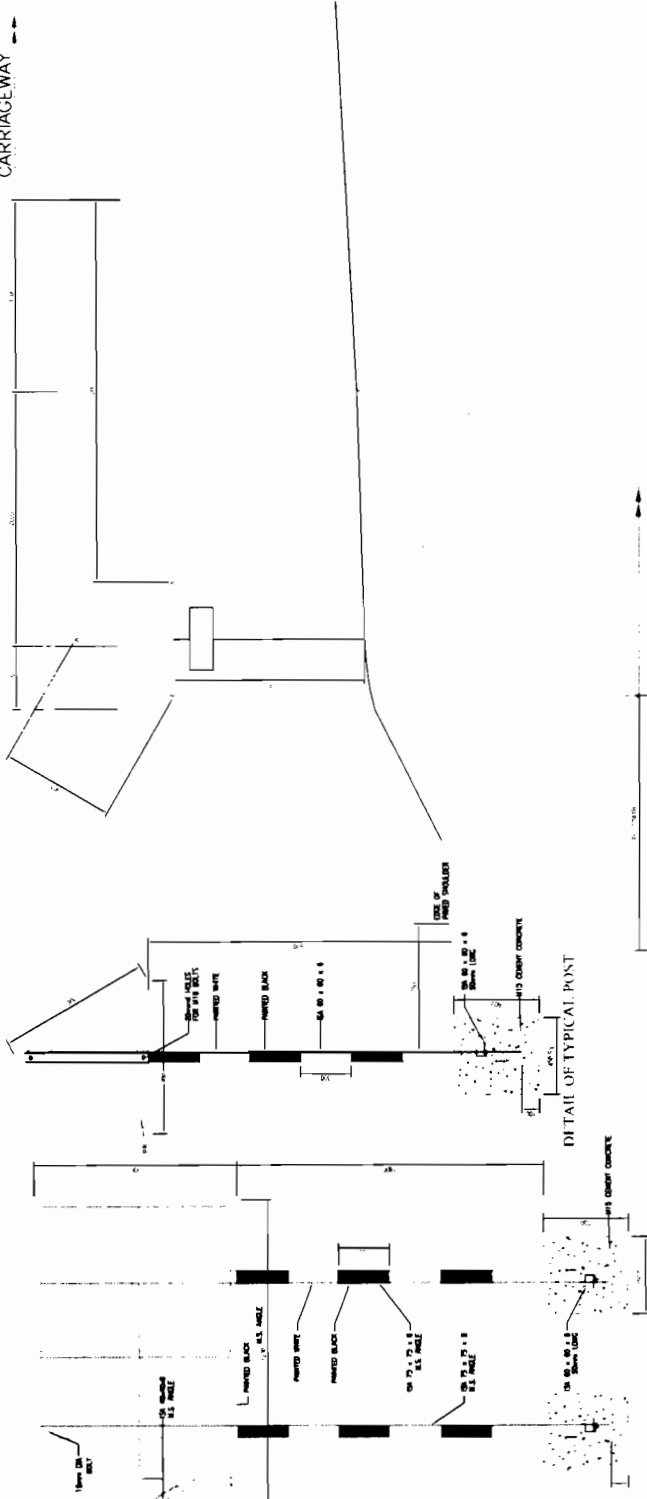
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STANDARD DRAWINGS
TYPICAL ROAD SIGNS (SHEET 2 OF 4)

DRG NO.	U.S.P.R.-CEG-SP-22	DATE	12/12/12	REV	R-1	SCALE	NTS	APPROVED BY	CEG	CEG	CEG	CEG	CEG
SH. NO.	32	DATE	12/12/12	REV	R-1	SCALE	NTS	APPROVED BY	CEG	CEG	CEG	CEG	CEG
SCALE		DATE		REV		SCALE		APPROVED BY					

CARRIAGEWAY



NOTES

1. ALL DIMENSIONS ARE IN MM, UNLESS INDICATED OTHERWISE
2. ROAD SIGNS, SIZES OF ARROWS, LETTERS & NUMERALS IS AS PER IRC (87-200)
3. ALL ROAD SIGNS ARE NORMALLY BE PLACED AT RIGHT ANGLES TO THE LINE OF TRAVEL OF THE APPROACHING TRAFFIC.
4. ALL WARNING SIGNS ARE NORMALLY BE LOCATED AT 120M IN ADVANCE OF THE HAZARD MARKED AGAINST IN NON-URBAN LOCATIONS. IN URBAN LOCATIONS, THE WARNING SIGNS ARE LOCATED AT ABOUT 50M AWAY FROM THE POINT OF HAZARD.
5. ALL ROAD SIGNS ARE RETRO-REFLECTIVE SHEET OF HIGH INTENSITY GRADE WITH ENCAPSULATED LENSE FIXED OVER ALUMINIUM SHEET AS PER MORTH SPECIFICATIONS
6. ROUTE MARKER SIGN FOR NH IS AS PER IRC, 2-1988
7. SIGNS WITH AN AREA UP TO 0.9sq. m. SHALL BE MOUNTED ON A SINGLE POST, AND FOR GREATER AREA TWO OR MORE SUPPORTS SHALL BE PROVIDED
8. POST ANGLES USED TO SUPPORT THE SIGN BOARD SHALL BE PAINTED WITH (2-COATS) APPROVED QUALITY (ANTI-CORRODED ENAMEL PAINT OVER TWO COATS OF GOOD QUALITY PRIMER

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

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World Bank Projects, Odisha
Bhubaneswar

STANDARD DRAWINGS
TYPICAL ROAD SIGNS (SHEET 3 OF 4)

DRG NO. / 05M/11/12/12	DATE / 12/12/12	REV	R-1	CEG	CEG	EE(PMU)	CE(WBP)
SH. NO. / 33	SCALE	NTS					





BARBRIK Project Limited
Contractor

Chief Engineer,
World Bank Project
O/o the E.I. Concretors,
World Bank Project, Odisha



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PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

STANDARD DRAWINGS

TYPICAL ROAD SIGNS (SHEET 4 OF 4)

DRG NO.	PROJECT NO.			DATE	REV	BY	DATE	BY	DATE	BY
SH NO.	34	12/12/12	12/12/12	12/12/12	R-1	CEG	CEG	CEG	CEG	CEG
SCALE	NTS									
								APPROVED		
								EE(PMU)	CE(WBP)	

SP-29

SP-30

SP-31

SP-32

SP-33

SP-34

SP-35

SP-36

SP-37

SP-38

SP-39

SP-40

SP-41

SP-42

SP-43

SP-44

SP-45

SP-46

SP-47

SP-48

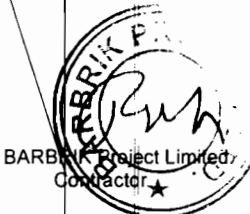
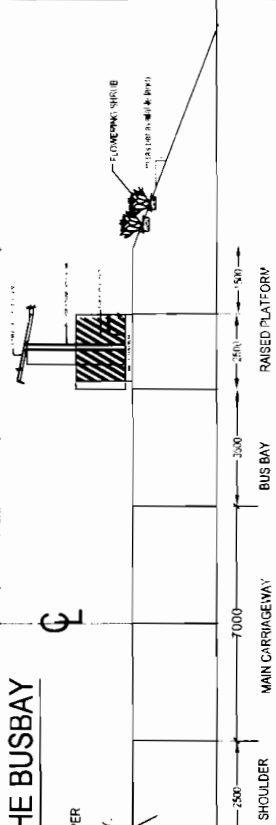
SP-49

SP-50

SP-51

SECTION AT THE BUSBAY

SECTION TO BE ADOPTED AS PER THE SECTION OF THE HIGHWAY.



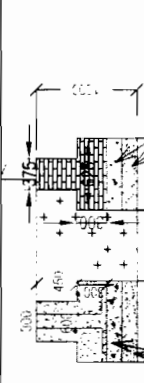
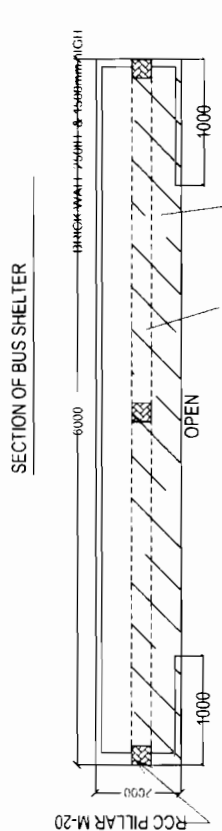
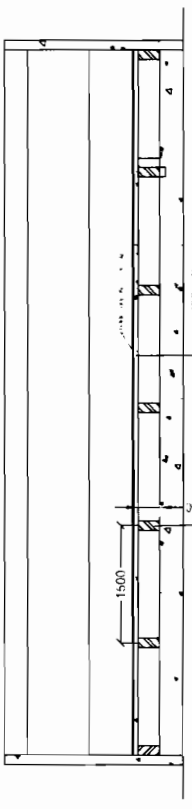
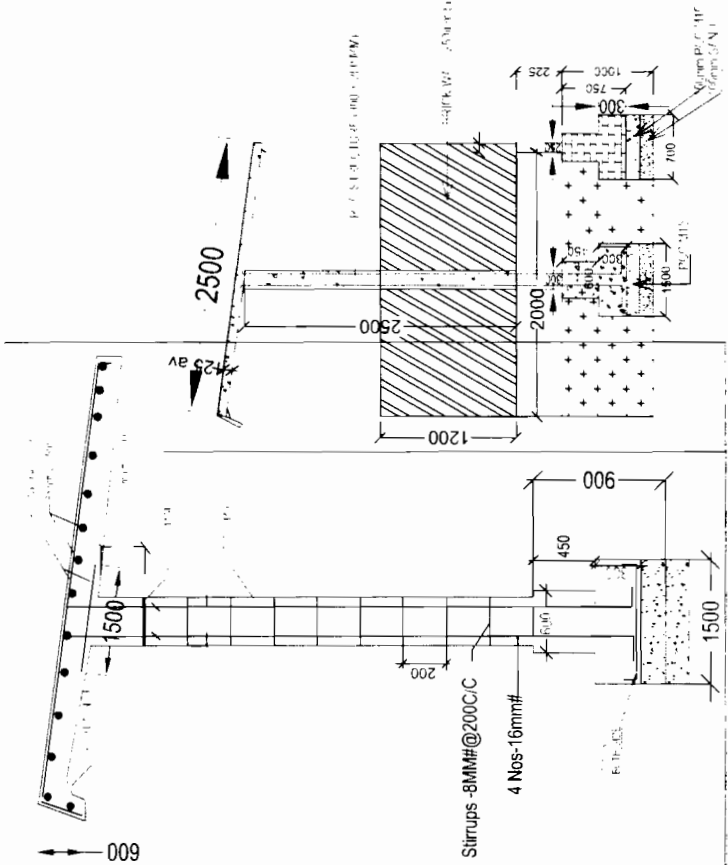
SCHEDULE OF BUS BAYS

NO	START	END	TYPE	NO	START	END	TYPE
1	1935	6040	1	1	1935	6040	1
2	2150	2285	1	2	2150	2285	1
3	7820	7965	1	3	7820	7965	1
4	8880	8985	1	4	8880	8985	1
5	70525	70640	1	5	70525	70640	1
6	30050	30155	1	6	30050	30155	1
7	43820	43775	1	7	43820	43775	1
8	43820	43775	1	8	43820	43775	1
9	49920	50005	1	9	49920	50005	1
10	50600	50705	1	10	50600	50705	1
11	53000	53105	1	11	53000	53105	1
12	5600	5705	1	12	5600	5705	1
13	57820	57775	1	13	57820	57775	1
14	57580	57685	1	14	57580	57685	1
15	61420	61525	1	15	61420	61525	1
16	62860	62965	1	16	62860	62965	1
17	65900	66005	1	17	65900	66005	1

SCHEDULE OF BUS BAYS

NO	START	END	TYPE	NO	START	END	TYPE
1	1935	6040	1	1	1935	6040	1
2	2150	2285	1	2	2150	2285	1
3	7820	7965	1	3	7820	7965	1
4	8880	8985	1	4	8880	8985	1
5	70525	70640	1	5	70525	70640	1
6	30050	30155	1	6	30050	30155	1
7	43820	43775	1	7	43820	43775	1
8	43820	43775	1	8	43820	43775	1
9	49920	50005	1	9	49920	50005	1
10	50600	50705	1	10	50600	50705	1
11	53000	53105	1	11	53000	53105	1
12	5600	5705	1	12	5600	5705	1
13	57820	57775	1	13	57820	57775	1
14	57580	57685	1	14	57580	57685	1
15	61420	61525	1	15	61420	61525	1
16	62860	62965	1	16	62860	62965	1
17	65900	66005	1	17	65900	66005	1

NOTE:
 1. THE DETAILS OF THE BUS BAYS ARE TO BE AS PER THE DETAILS SHOWN IN THE DRAWING.
 2. THE DETAILS OF THE BUS BAYS ARE TO BE AS PER THE DETAILS SHOWN IN THE DRAWING.
 3. THE DETAILS OF THE BUS BAYS ARE TO BE AS PER THE DETAILS SHOWN IN THE DRAWING.
 4. THE DETAILS OF THE BUS BAYS ARE TO BE AS PER THE DETAILS SHOWN IN THE DRAWING.
 5. THE DETAILS OF THE BUS BAYS ARE TO BE AS PER THE DETAILS SHOWN IN THE DRAWING.
 6. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.



TYPICAL BUS BAY SHEET - 2

(BHAWANIPATNA-KHARIAR-BALANCE WORK)

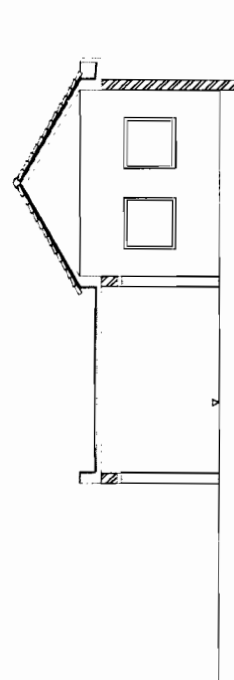
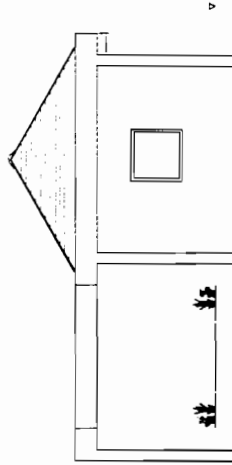
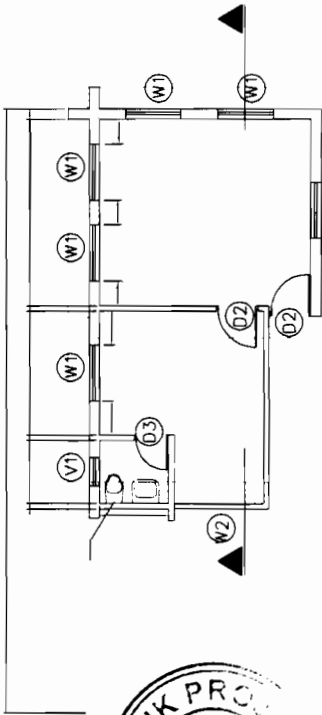
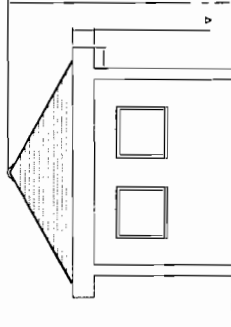
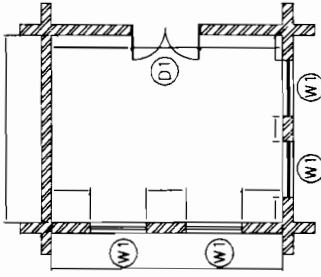
DRG NO.	DATE	REV	BY	CHKD	APP'D
CEG	12/12/12	R-1	CEG	CEG	R.R.D.K
SH. NO.	36	DATE	12/12/12	REV	R-1
SCALE	NTS			CEG	S G

PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.
 E-12, Moji Colony, Malviya Nagar Jaipur-17
 Tel: +91-141-2520899, 2521899, 2520556
 Fax: 2521348, e-mail: ceg@cegroupindia.com

CEG

Chief Engineer
 World Bank Project
 Chief Engineer
 World Bank Project
 Shubanshu



SCHEDULE OF DOORS & WINDOWS

S. NO	MASONRY TYPE	OPENING		LINTEL LEV
		WIDTH	HEIGHT	
1.	D1	1500	2100	0.0
2.	D2	900	2100	0.0
3.	D3	750	2100	0.0
4.	W1	1200	1200	+900
5.	W2	900	1200	+900
6.	V1	600	600	+1500

PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE.

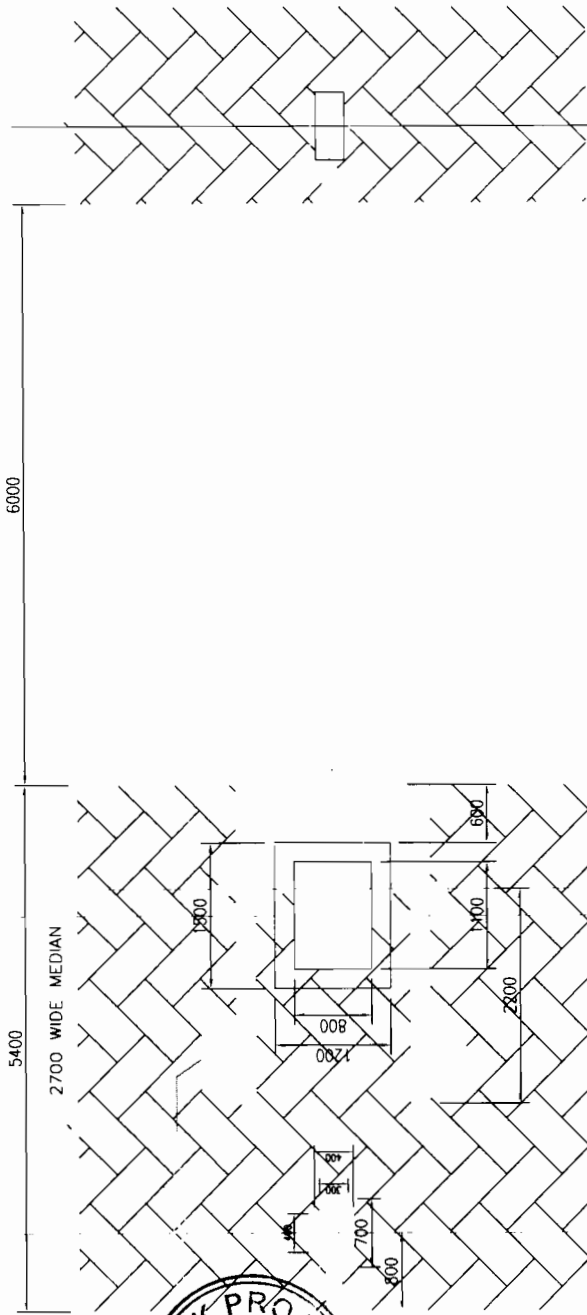
STANDARD DRAWINGS
TOLL PLAZA MAIN OFFICE
TOLL PLAZA LOCATION -KM.32+200 TO KM.32+540
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG. NO.	16	DATE	DEC.12	REV	R1	PREPARED BY	CEG/SH	REV. BY	EL/PM	APPROVED	CE/MP
SH. NO.											
SCALE	NTS										

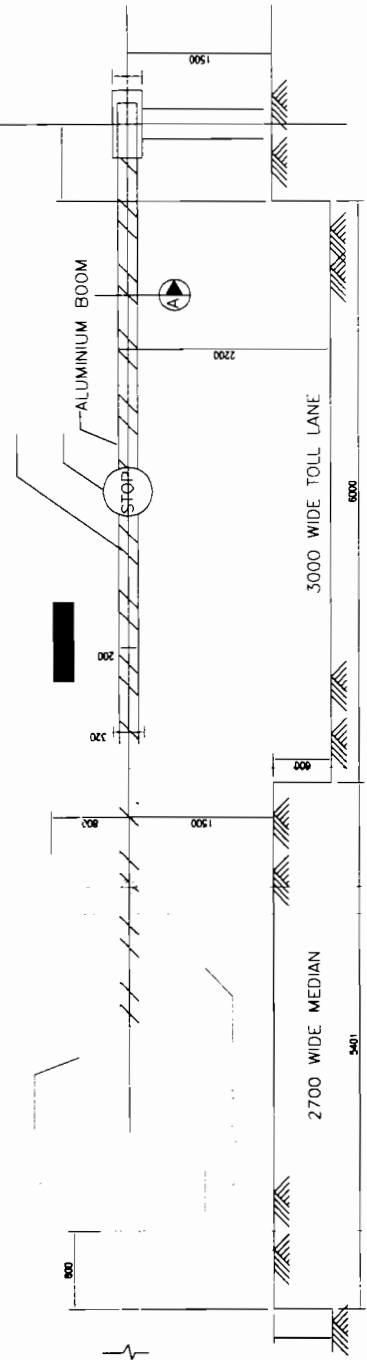


BARBRIK PROJECT LIMITED
Contractor

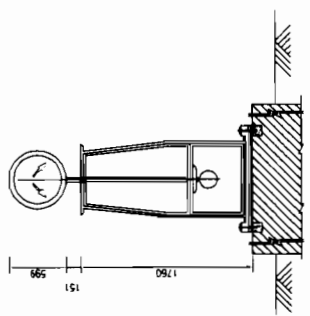
Chief Engineer
World Bank Project
Odisha



PLAN SHOWING LAYOUT OF GATE FOUNDATION ON MEDIAN



DETAIL A



TYPICAL DETAILS OF BOLLARD

STANDARD DRAWINGS
 BARRIER GATE FOR TOLL PLAZA
 TOLL PLAZA LOCATION: KM:32+200 TO KM:32+540
 (BHAWANIPATNA-KHARIAR-BALANCE WORK)

PROJECT:-
 ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK ASSISTANCE.

DRG NO.	DATE	REV	REV	APPROVED BY	APPROVED
S11.10	48	DEC.12	R1	EE/PMU	CE. HBP
SCALE	NTS				

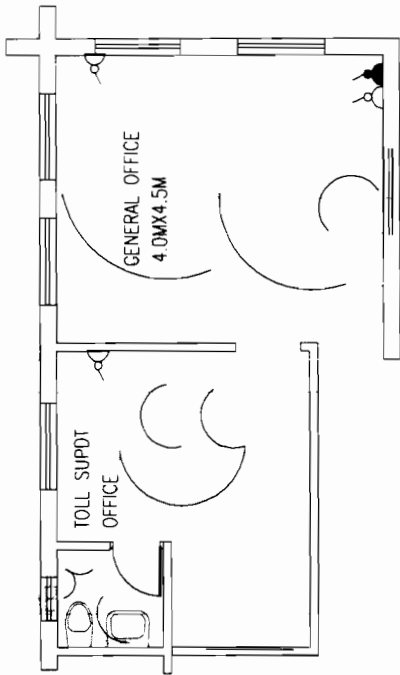


Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar



RBRL Project Limited
Contractor

(Signature)
Chief Engineer
World Bank Projects, Odisha



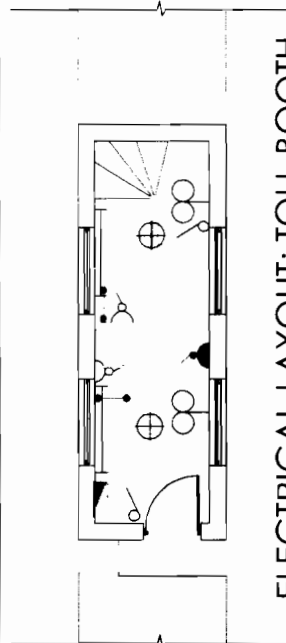
USE FOR FUTURE PROVISION

- 5 A ONE WAY SWITCH/SWITCH BOARD (1000 MM FROM FFL)
- 5 A TWO WAY SWITCH/SWITCH BOARD (1000 MM FROM FFL)
- 5 A SOCKET WITH SWITCH (150 MM FROM FFL)
- 15 A POWER SOCKET WITH SWITCH (150 MM FROM FFL)
- GEYSER 15 A SOCKET
- 15 A SWITCH FOR GYSER
- 25 A A/C OUTLET (150 MM FROM FFL)
- 5 A LIGHT PLUG WITHOUT SWITCH FOR EXHAUST FAN (1900 MM FROM FFL)
- TELEPHONE OUTLET (150 MM FROM FFL)
- TV OUTLET (150 MM FROM FFL)
- CALL BELL SWITCH (1000 MM FROM FFL)
- BELL BUZZER (2100 MM FROM FFL)
- CEILING LIGHT
- BRACKET LIGHT (2100 MM FROM FFL)
- MIRROR LIGHT
- 1 x 36 W SINGLE TUBE LIGHT



USE FOR FUTURE PROVISION

ELECTRICAL LAYOUT: TOLL PLAZA MAIN OFFICE



ELECTRICAL LAYOUT: TOLL BOOTH

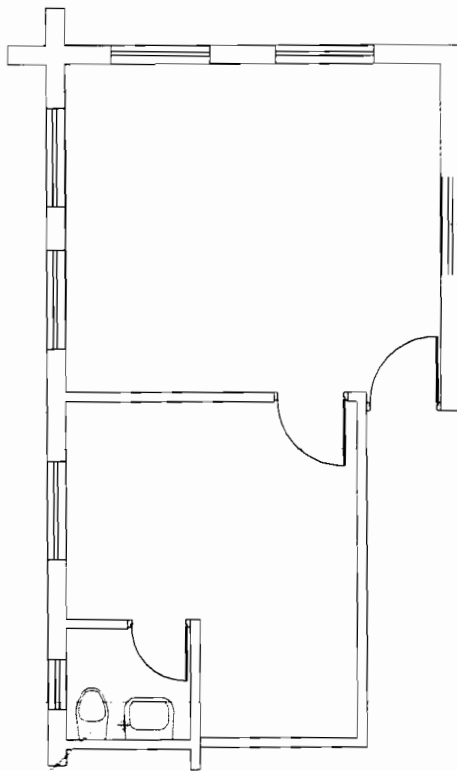
PROJECT:-

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE.


STANDARD DRAWINGS
ELECTRICAL LAYOUT (KM32+200 TO KM32+540)
TOLL PLAZA AND MAIN OFFICE

DRG NO.	19	DATE	DEC.12	REV	R1	APPROVED
SH. NO.						PREPARED BY
SCALE	NTS					EE/PAU
						CE. WBP

(BHAWANIPATNA-KHARIAR-BALANCE WORK)




BARBRICK Project Limited
 Contractor


 Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

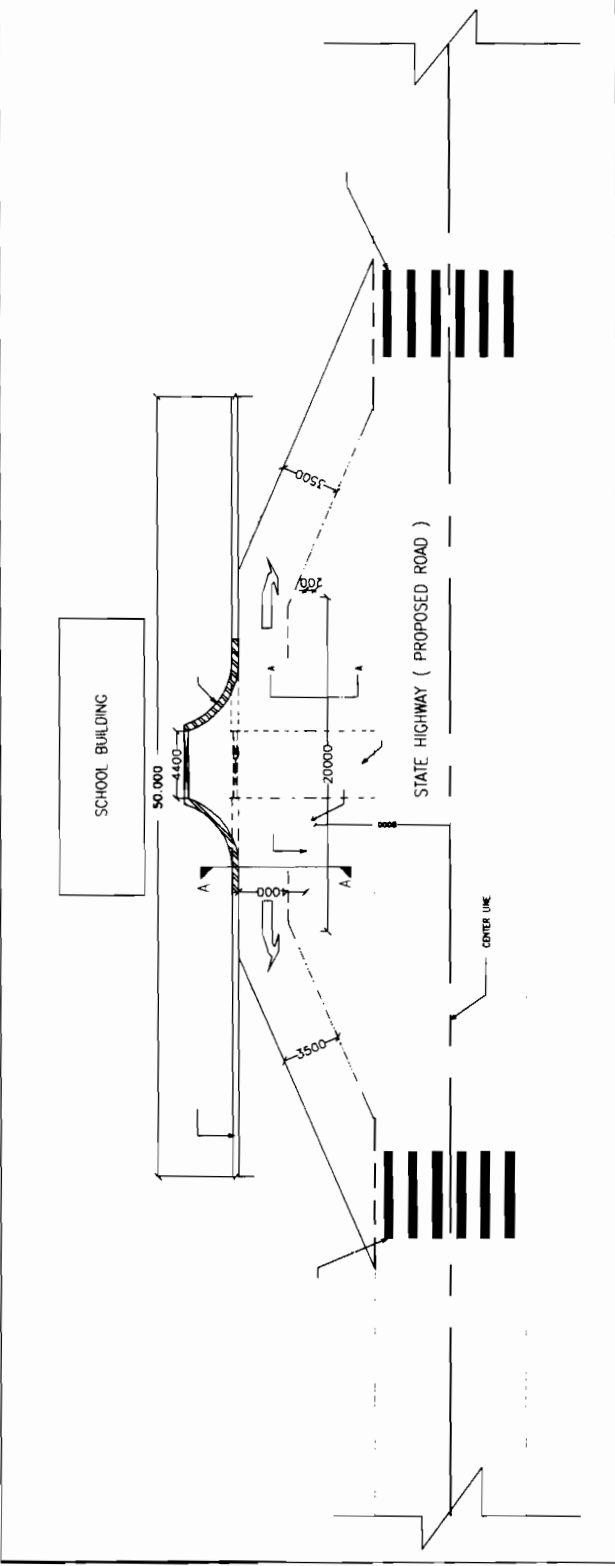
PROJECT:-

ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK ASSISTANCE.

STANDARD DRAWINGS
PLUMBING LAYOUT - TOLL PLAZA(KM.32+200 TO KM.32+540)
 (BHAWANIPATNA-KHARIAR-BALANCE WORK)

DRG NO.	DATE			REV	R1	PREPARED BY	REV. R1	APPROVED
SH. NO.	51	DEC	12	DEC	12	DEC	12	DEC
SCALE	NTS			DEC	12	DEC	12	CE, WBP

1	School	54.915
2	School	56.27
3	School	60.79
4	School	62.02
5	School	62.06
6	School	62.225
7	School	64.625
8	School	66.715
9	School	68.97
10	School	69.15
11	School	71.51
12	School	71.63
13	Sikhsya Niketan	75.18
14	School	81.275
15	School	82.02
16	School	82.035
17	Saraswati Sasu Mandir	48.685



- THERE SHALL BE RUMBLER STRIPS & SPEED BREAKERS 150m & 10m AWAY FROM PEDESTRIAN CROSSINGS NEAR SCHOOLS, COLLEGES, HOSTELS, TEMPLES, HOSPITALS, DISPENSARIES AND OLD AGE HOMES, WEEKLY MARKET AREA, G.P MARKET COMPLEX ADJACENT TO THE ROAD WITHIN 25m TO 50m DISTANCE FROM CENTRE LINE. THE BOUNDARY WALL SHOULD HAVE G.I ANGLE POSTS WITH G.I WIRE MESH GRILL/ STRINGS FOR GROWING CREEPERS TO MUFFLE NOISE AND DUST.
- CREEPERS WITH SCENTED/COLOURFUL FLOWERS TO BE PLANTED WHICH HAVE TOMENTOSE LEAVES TO ABSORB MORE DUST AND NOISE.
- THE BOUNDARY WALL PLASTERING TO HAVE VERTICAL GROOVES TO DEFELECT NOISE TOWARDS THE ROAD WHICH WILL ACT AS A COUNTER NOISE SOURCE TO DAMPEN THE HIGH WAY NOISE LEVEL.
- VEGETATIVE SHRUBS AND BUSHES WHICH ARE NON BROWSABLE AND HAVING SCENTED FLOWERS TO BE PLANTED ON THE PERIPHERY OR EDGE OF THE APPROACH ROAD TO SUCH PLACES. THE BOUNDARY ENTRY POINT TO BE SHIFTED IN WORDS IN CASE OF CLOSE WITH NAME OF THE INSTITUTION ENGRAVED.
- PROXIMITY AND DIRECT ENTRY TO THE ROAD WITH AND A BARRICADE WALL SHALL BE ERECTED 4m AWAY FROM THE ENTRY POINT INFRONT OF THE GATE

Chief Engineer
World Bank
Chief Engineer
Projects, Odisha
Bhubaneswar

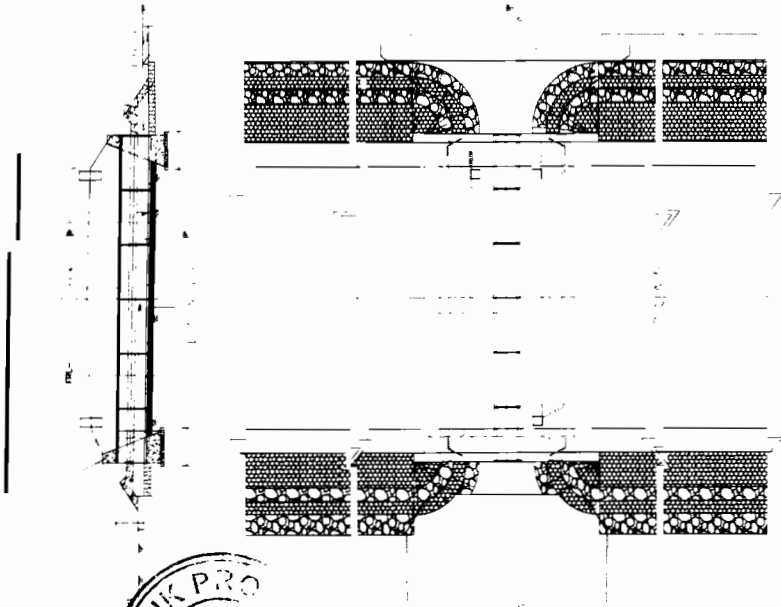
PROJECT:-
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

CONSONSULTING ENGINEERS GROUP LTD.
E-12, Moji Colony, Malviya Nagar, Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegindia.com

METAL BARRICADES FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.
(BHAWANIPATNA-KHARAR-BALANCE WORK)

DRG NO. OSRP/CEG/SH-16/ENV/05	DESIGNED BY	DRAWN BY	PREPARED BY	APPROVED
SH. NO.	DATE 31/12/12	REV R-1	CEG	EE, PMU
SCALE	NTS		CEG	CE, WBP

REPTILE UNDER PASS-PIPE CULVERT (GEN.)



SCHEDULE	
Sl. No.	Proposed Change
1	4-112
2	TR-R37
3	22-736

BARBIK PRO
Barrik
 BARBIK Project Limited
 Contractor

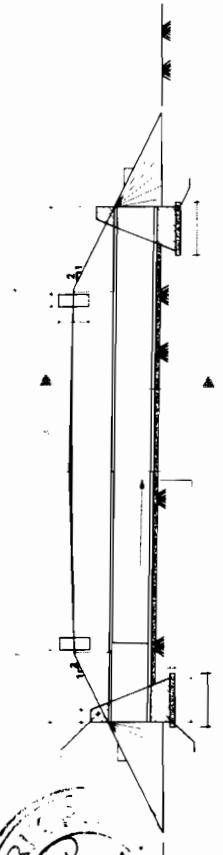
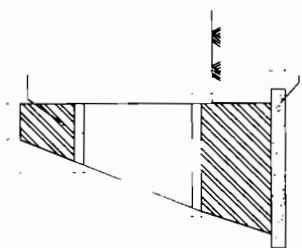
[Signature]
 Chief Engineer
 World Bank Projects, Odisha
 O/o the E.M.C. Office, Odisha
 Bhubaneswar.

REPTILE UNDER PASS-PIPE CULVERT (GEN.)

DRG. NO. :	OSRPIENV-14	PREPARED BY	APPROVED
SCALE :	MTB	BY/DAU	CE, WBP

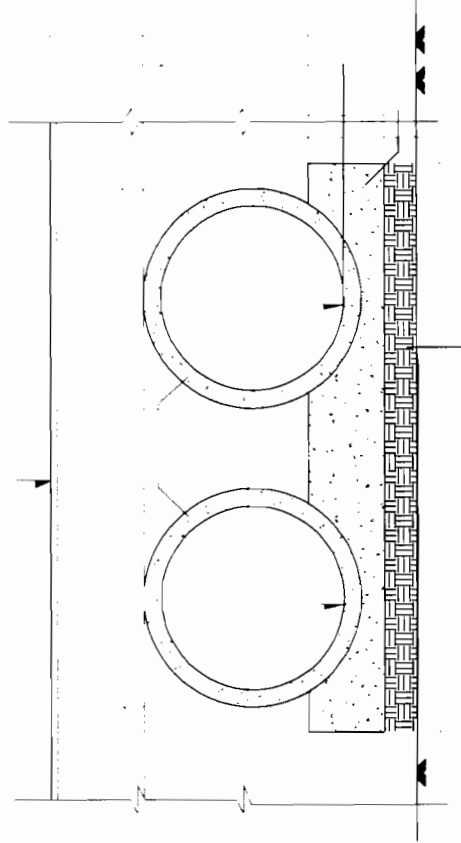
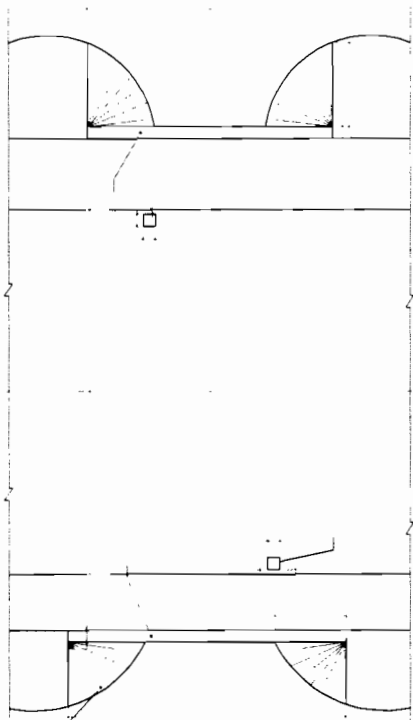
Rev No. :	DATE : DEC, 2012
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ODISHA STATE ROADS PROJECT
 Works Department, Govt. of Odisha



SCHEDULE OF UTILITY DUCTS

Sl. No.	Chainage	Sl. No.	Chainage
1	14840	10	44960
2	15225	11	49900
3	20300	12	50340
4	21050	13	56880
5	26940	14	57340
6	27200	15	60620
7	43120	16	61860
8	44080	17	65400
9	44500	18	66060



PROJECT:-
ODISHA STATE ROAD PROJECT
UNDER WORLD BANK

CONSULTING ENGINEERS GROUP LTD.
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 Tel: +91-141-2520899, 2521899, 2520556
 Fax: 2521348, e-mail: ceg@cegroupindia.com

UTILITY DUCT
(BHAWANIPATNA-KHARIAR-BALANCE WORK)

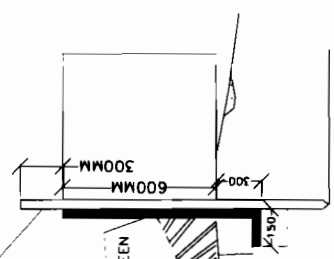
DRG NO.	36	DATE	31/12/12	REV	R-1	DESIGNED BY	CEG	CHECKED BY	RRDK	APPROVED BY	S.G
SH. NO.						SCALE	NTS				

FENCE POST 75MM DIA @ 2500MM C/C

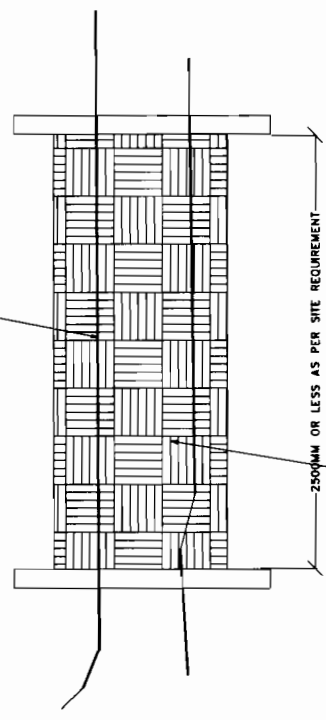
BARBRIK Project Limited
Contractor



FABRIC SECURED TO POST WITH METAL FASTENERS WITH REINFORCEMENT DRAW STRINGS BETWEEN FENCE POSTS, FASTENERS & FABRIC



DRAW STRING RUNNING THROUGH FABRIC



2500MM OR LESS AS PER SITE REQUIREMENT

SHEET MADE OF COCONUT FIBER WITH HDPE NETS OF WEIGHT > 600GM/SQM

SILT FENCE SEDIMENT BARRIER

NO SCALE

SCHEDULE:

LENGTH :- LUMP SUM QNTY - 2000M

PROJECT:-

**ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE**

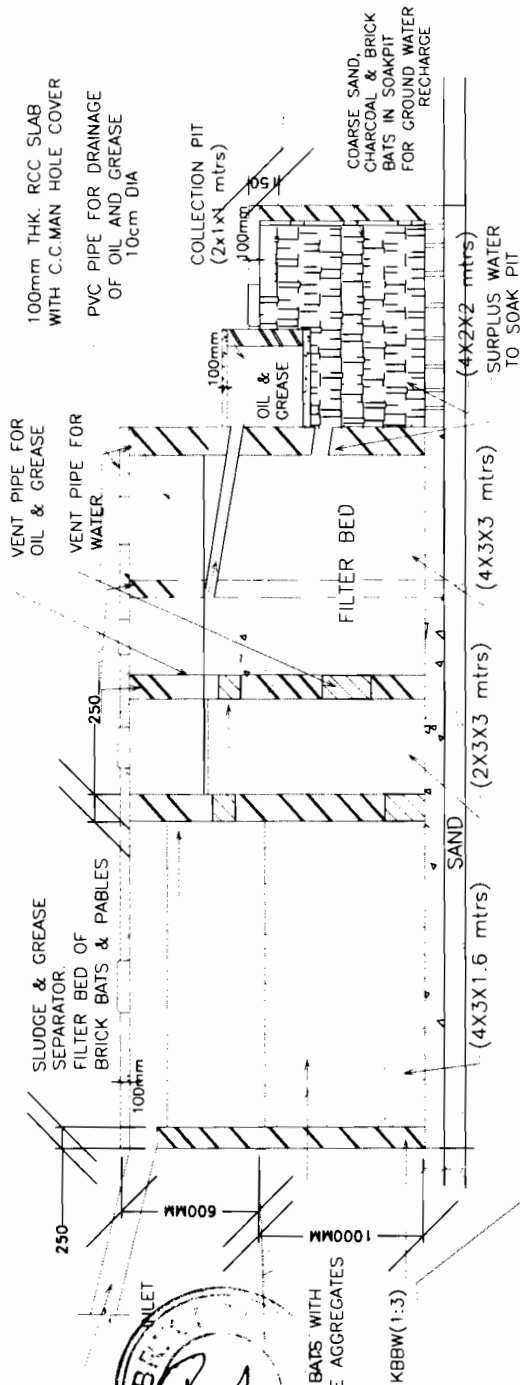
TYPICAL STANDARD DRAWING FOR SILT FENCE

**CONSULTING
ENGINEERS GROUP LTD.**
E-12, Ma Ji Colony, Malviya Nagar Jaipur-17
Tel: +91-141-2520899, 2521899, 2520556
Fax: 2521348, e-mail: ceg@cegindia.com

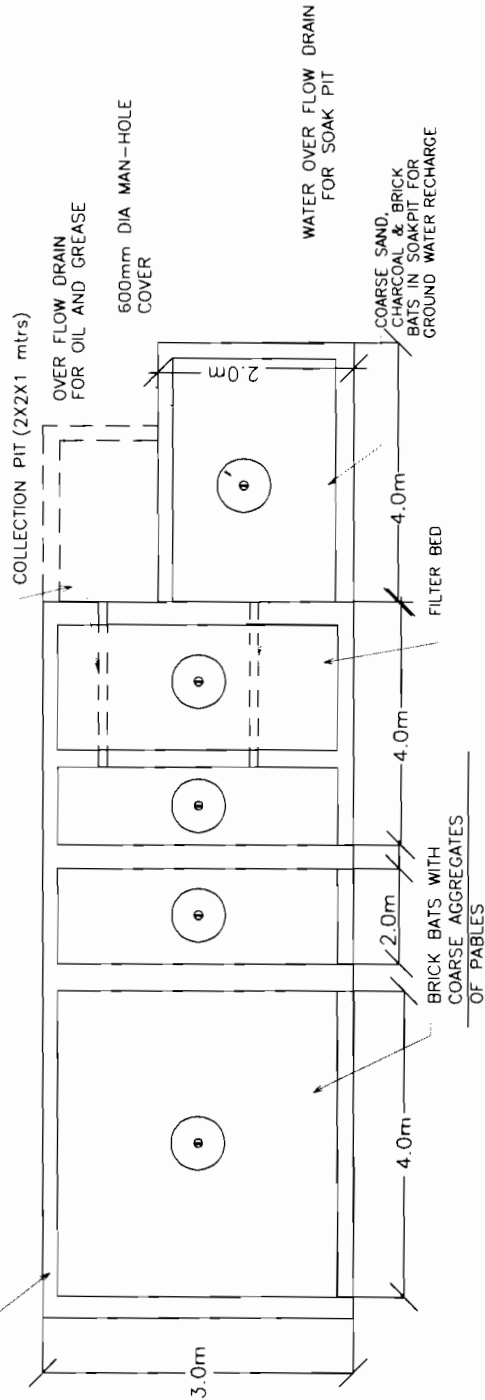
(BHAWANIPATNA-KHARAR-BALANCE WORK)

DRG NO.	DSRP/CEG/SH/EN/03	DESIGNED BY	CEG	CEG	CEG	PREPARED BY	APPROVED
SH. NO.		DATE	31/12/12	REV	R-1		EE, PMU CE, WBP
SCALE	NTS						

Chief Engineer
World Bank
Projects, Odisha
Shubaneswar



SECTION OF SOAK PIT



PLAN OF SOAK PIT

NOTE: PROVIDE AT CONTRACTOR'S PLANT SITE.

PROJECT:-

**ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE**

OIL & GREASE TRAP FOR PLANT SITE

(BHAWANIPATNA - KHARJAR-BALANCE WORK)

DRG. NO.	OSRP/CEG/SH-16/ENV/06	DESIGNED BY	CEG	CEG	CEG	EE, PMU	CE, WBP
SH. NO.		DATE	31/12/12	REV	R-1		
SCALE		NTS					



GENERAL

1. THESE NOTES ARE APPLICABLE FOR RCC T-BEAM BRIDGES.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DRAWING SHALL BE SCALED.

DESIGN CRITERIA:

- (a) IRC : 83-1987 (PART-I)
- (b) IRC : 78-2000
- (c) IRC : 91-2000
- (d) IRC : 54-2000
- (e) IRC : 78-2000
- (f) IRC : 83-1987 (PART-II)

THE FOLLOWING LOADS HAVE BEEN CONSIDERED IN THE DESIGN:

- (a) IRC 70R TRACKED & ONE LANE OF CLASS A
- (b) IRC 70R WHEELED & ONE LANE OF CLASS A
- (c) THREE LANE OF CLASS A
- (d) WEARING COAT LOAD OF 2.20 KN/50. M.
- (e) TEMPERATURE VARIATION = +25°

III THE DESIGN ARE APPLICABLE FOR 'MODERATE' CONDITIONS OF EXPOSURE.

4. WEARING COAT SHALL CONSIST OF THE FOLLOWING
 - a. A COAT OF MASTIC ASPHALT 6mm THICK WITH A PRIME COAT OVER THE TOP OF DECK IS TO BE PROVIDED BEFORE THE WEARING COAT IS LAD.
 - b. 50mm THICK ASPHALT CONCRETE WEARING COAT AS PER CLAUSE 512 OF MOST'S SPECIFICATIONS FOR ROADS AND BRIDGE WORKS (THIRD REV -1995).
5. NO PUBLIC UTILITY SERVICES SHALL BE CARRIED OUT OVER THE BRIDGE.

CONCRETE

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAYS CHARACTERISTIC STRENGTH ON 150MM CUBES FOR ALL ELEMENTS OF STRUCTURES AS INDICATED IN DRAWING FOR MODERATE CONDITIONS OF EXPOSURE
2. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS:8112 OR ORDINARY PORTLAND CEMENT CONFORMING TO IS:269 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
3. THE MINIMUM CEMENT CONCRETE AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY FOR 'MODERATE' CONDITIONS OF EXPOSURE
4. TO IMPROVE WORKABILITY OF CONCRETE USE OF ADMIXTURES CONFIRMING TO IS 9103 MAY BE MADE WITH APPROVAL OF ENGINEER INCHARGE.
5. AGGREGATE SHALL CONFORM TO CL 302.3 OF IRC:21-2000

REINFORCEMENT

1. ALL REINFORCEMENT SHALL BE HIGH YIELD STRENGTH DEFORMED BARS (GRADE DESIGNATION S 500) CONFORMING TO IS:1786 CONFIGURATION IS SHOWN AS :
 - TOR BAR # 10 @ 200C/C
 - DIA OF BAR 1 SPACING OF BARS

SPACING GIVEN FOR ALL REINFORCEMENT IS PERPENDICULAR TO BAR UNLESS OTHERWISE SHOWN ON DRAWINGS.

EARTH FILL/EMBANKMENT

BACK FILLING MATERIAL SHOULD CONFORM TO CL 305.2 OF McRT&H'S SPECIFICATION (FOURTH REVISION 2001).

WATER

1. WATER TO BE USED IN CONCRETING AND CURING SHALL BE CONFORMING TO CLAUSE 302.4 OF IRC 21-2000.

EXPANSION JOINT

1. THE EXPANSION JOINTS MUST BE ROBUST, DURABLE, WATER TIGHT AND REPLACEABLE. IT MUST BE PROVIDED OVER THE FULL WIDTH OF SUPERSTRUCTURE INCLUDING KERB AND FOOTPATH, FOLLOWING THE PROFILE OF THE SAME (WHERE RELEVANT). EXPANSION JOINTS SHALL BE OBTAINED ONLY FROM APPROVED MANUFACTURERS.
2. THE EXPANSION JOINT SHALL CATER FOR A TOTAL MOVEMENT OF 20 mm WITH ORIGINAL GAP OF 40mm BETWEEN CONCRETE FACE.
3. FABRICATED STEEL PARTS IN THE NOISING OF EXPANSION JOINT SHALL BE POSITIONED ACCURATELY BEFORE THE CONCRETING OF THAT PORTION OF THE DECK SLAB
4. PRESENCE OF MANUFACTURER'S REPRESENTATIVE AT THE TIME OF CONCRETING OF NOISING AND INSTALLATION OF EXPANSION JOINTS IS MANDATORY.

BEARING

1. ELASTOMERIC BEARINGS SHALL CONFORM TO IRC. 83-1987 (PART-II)

WORKMANSHIP/DETAILING

1. MINIMUM CLEAR COVER TO ANY REINFORCEMENT INCLUDING STIRRUPS SHALL BE 50 MM UNLESS OTHERWISE SHOWN IN THE DRAWINGS.
2. FOR ENSURING PROPER COVER OF CONCRETE TO REINFORCEMENT SPECIALLY MADE POLYMER COVER BLOCKS SHALL BE USED.

CONSTRUCTION JOINTS:

1. CONSTRUCTION JOINTS SHALL BE PROVIDED ONLY AT LOCATIONS SHOWN ON THE DRAWING. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY UP TO THE CONSTRUCTION JOINTS
2. 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.
3. 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 REMOVED DEBRIS/LANTANCE AND MADE ROUGH SO THAT 1/4 OF THE SIZE OF THE AGGREGATE IS EXPOSED.
 - (b) FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET.
 - (c) THE OLD SURFACE SHALL BE SMOOTH WITH WATER WITHOUT LEAVING PUDDLES IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT THE ABSORPTION OF WATER FROM NEW CONCRETE.
4. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT.
5. WELDING OF REINFORCEMENT BARS SHALL NOT BE PERMITTED.
6. LAPS IN REINFORCEMENT:
 - (a) MINIMUM LAP LENGTH OF REINFORCEMENT SHALL BE DECIDED AS PER THE REINFORCEMENT ARRANGEMENT BASED ON THE CLAUSE - 304.6.6 OF IRC:21-2000.
 - (b) NOT MORE THAN 50 % OF REINFORCEMENT SHALL BE LAPPED AT ANY ONE LOCATION

5. BENDING OF REINFORCEMENT BARS SHALL BE AS PER IS:2502
6. SUPPORTING CHAIRS OF 12 MM DIAMETER SHALL BE PROVIDED AT SUITABLE INTERVALS AS PER IS:2502.
7. CONCRETE SHALL BE PRODUCED IN A MECHANICAL MIXER OF CAPACITY NOT LESS THAN 200 LITRS HAVING INTEGRAL WEIGH-BATCHING FACILITY AND AUTOMATIC WATER MEASURING AND DISPENSING DEVICE
8. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FORM AND/OR NEEDLE VIBRATORS USE OF FULL WIDTH SCREW VIBRATORS FOR COMPACTION OF CONCRETE IN DECK SLAB SHALL BE ENSURED.
9. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
10. SHARP EDGES OF CONCRETE SHALL BE CHAMFERED
11. THE LOCATION OF JACKS FOR LIFTING UP THE SUPPER STRUCTURE TO REPLACE BEARING ETC. IS SHOWN THUS. THIS SHALL BE DISTINCTLY ETCHAKED ON END CROSS GIRDER AND PEIR / ABUTMENT CAPS
12. FILTER MEDIA SHOULD BE PROVIDED IN ACCORDANCE TO CLAUSE 2504.2.2 OF MOST SPECIFICATIONS (FOURTH REV. 2001).
13. IN PRESENCE OF SOIL WITH AGGRESSIVE SOIL CONDITION, THE CONCRETE FACES IN CONTACT WITH EARTH SHALL BE PROTECTED WITH APPROVED BITUMINOUS PAINT OR COATING AS DECIDED BY THE ENGINEER-IN-CHARGE.

GENERAL SPECIFICATIONS:

1. THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH McRT&H'S SPECIFICATION FOR ROAD AND BRIDGE WORKS (FOURTH REVISION 2001) EXCEPT WHEREVER OTHERWISE MENTIONED.

FOUNDATION :-

1. FOR OPEN FOUNDATIONS RESTINGS ON ROCKS THE MINIMUM DEPTH OF EMBEDMENT SHALL BE 0.6 M FOR HARD ROCK WITH ULTIMATE CRUSHING STRENGTH OF 10 MPa OR ABOVE AND 1.5 M FOR OTHER TYPE ROCKS.
2. IN CASE OF EXCAVATION IN ROCK, THE TRENCHES AROUND THE FOOTING SHALL BE FILLED UP WITH CEMENT CONCRETE OF M-15 GRADE UP TO THE TOP OF THE ROCK. DEPTH OF FILL IN EXCESS OF 1.5 M IN SOFT ROCK OR 0.6 M IN HARD ROCK MAY BE FILL BY CONCRETE OR BY BOULDERS GROUTED WITH CEMENT.

DATE	NO.	REVISION	BY	CHKD	APPD

GENERAL NOTES
(FOR RCC T-BEAM BRIDGES)

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

Chief Engineer,
World Bank Project
Odisha
Dy. Engr. (Civil) / Dy. Engr. (Mechanical) / Dy. Engr. (Electrical) / Dy. Engr. (Surveying) / Dy. Engr. (Traffic) / Dy. Engr. (Water Supply) / Dy. Engr. (Sanitation) / Dy. Engr. (Roads) / Dy. Engr. (Bridges) / Dy. Engr. (Tunnels) / Dy. Engr. (Dams) / Dy. Engr. (Ports) / Dy. Engr. (Airports) / Dy. Engr. (Railways) / Dy. Engr. (Canals) / Dy. Engr. (Irrigation) / Dy. Engr. (Power) / Dy. Engr. (Telecom) / Dy. Engr. (Metals) / Dy. Engr. (Non-Metals) / Dy. Engr. (Chemical) / Dy. Engr. (Petroleum) / Dy. Engr. (Nuclear) / Dy. Engr. (Space) / Dy. Engr. (Aerospace) / Dy. Engr. (Marine) / Dy. Engr. (Agriculture) / Dy. Engr. (Forestry) / Dy. Engr. (Fisheries) / Dy. Engr. (Livestock) / Dy. Engr. (Food Processing) / Dy. Engr. (Textiles) / Dy. Engr. (Apparel) / Dy. Engr. (Leather) / Dy. Engr. (Paper) / Dy. Engr. (Printing) / Dy. Engr. (Publishing) / Dy. Engr. (Media) / Dy. Engr. (Advertising) / Dy. Engr. (Marketing) / Dy. Engr. (Sales) / Dy. Engr. (Distribution) / Dy. Engr. (Retail) / Dy. Engr. 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(Printing) / Dy. Engr. (Publishing) / Dy. Engr. (Media) / Dy. Engr. (Advertising) / Dy. Engr. (Marketing) / Dy. Engr. (Sales) / Dy. Engr. (Distribution) / Dy. Engr. (Retail) / Dy. Engr. (Wholesale) / Dy. Engr. (E-commerce) / Dy. Engr. (Finance) / Dy. Engr. (Banking) / Dy. Engr. (Insurance) / Dy. Engr. (Investment) / Dy. Engr. (Real Estate) / Dy. Engr. (Construction) / Dy. Engr. (Architecture) / Dy. Engr. (Interior Design) / Dy. Engr. (Landscape Architecture) / Dy. Engr. (Urban Planning) / Dy. Engr. (Transportation) / Dy. Engr. (Infrastructure) / Dy. Engr. (Energy) / Dy. Engr. (Renewable Energy) / Dy. Engr. (Fossil Fuels) / Dy. Engr. (Nuclear Energy) / Dy. Engr. (Space) / Dy. Engr. (Aerospace) / Dy. Engr. (Marine) / Dy. Engr. (Agriculture) / Dy. Engr. (Forestry) / Dy. Engr. (Fisheries) / Dy. Engr. (Livestock) / Dy. Engr. (Food Processing) / Dy. Engr. (Textiles) / Dy. Engr. (Apparel) / Dy. Engr. (Leather) / Dy. Engr. (Paper) / Dy. Engr. (Printing) / Dy. Engr. (Publishing) / Dy. Engr. (Media) / Dy. Engr. (Advertising) / Dy. Engr. (Marketing) / Dy. Engr. (Sales) / Dy. Engr. (Distribution) / Dy. Engr. (Retail) / Dy. Engr. (Wholesale) / Dy. Engr. (E-commerce) / Dy. Engr. (Finance) / Dy. Engr. (Banking) / Dy. Engr. (Insurance) / Dy. Engr. (Investment) / Dy. Engr. (Real Estate) / Dy. Engr. (Construction) / Dy. Engr. (Architecture) / Dy. Engr. (Interior Design) / Dy. Engr. (Landscape Architecture) / Dy. Engr. (Urban Planning) / Dy. Engr. (Transportation) / Dy. Engr. (Infrastructure) / Dy. Engr. (Energy) / Dy. Engr. (Renewable Energy) / Dy. Engr. (Fossil Fuels) / Dy. Engr. (Nuclear Energy) / Dy. Engr. (Space) / Dy. Engr. (Aerospace) / Dy. Engr. (Marine) / Dy. Engr. (Agriculture) / Dy. Engr. (Forestry) / Dy. Engr. (Fisheries) / Dy. Engr. (Livestock) / Dy. Engr. (Food Processing) / Dy. Engr. (Textiles) / Dy. Engr. (Apparel) / Dy. Engr. (Leather) / Dy. Engr. (Paper) / Dy. Engr. (Printing) / Dy. Engr. (Publishing) / Dy. Engr. (Media) / Dy. Engr. (Advertising) / Dy. Engr. (Marketing) / Dy. Engr. (Sales) / Dy. Engr. (Distribution) / Dy. Engr. (Retail) / Dy. Engr. (Wholesale) / Dy. Engr. (E-commerce) / Dy. Engr. (Finance) / Dy. Engr. (Banking) / Dy. Engr. (Insurance) / Dy. Engr. (Investment) / Dy. Engr. (Real Estate) / Dy. Engr. (Construction) / Dy. Engr. (Architecture) / Dy. Engr. (Interior Design) / Dy. Engr. (Landscape Architecture) / Dy. Engr. (Urban Planning) / Dy. Engr. (Transportation) / Dy. Engr. (Infrastructure) / Dy. Engr. (Energy) / Dy. Engr. (Renewable Energy) / Dy. Engr. (Fossil Fuels) / Dy. Engr. (Nuclear Energy) / Dy. Engr. (Space) / Dy. Engr. (Aerospace) / Dy. Engr. (Marine)

NOTES :-

- 1 ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE MENTIONED
- 2 TYPE OF ANCHORAGE -12113 CONFORMING TO IS 6006
 TYPE OF ONE CABLE - Z24.8 T
 MODULUS OF ELASTICITY OF HIGH TENSILE STEEL STRANDS = 2.0×10^6 Kg/Cm²
 TYPE OF SHEATHING - BRIGHT METAL SHEATHING 75 mm ID CONFORMING TO
 IRC 18 (APPENDIX-1)
- 3 LENGTH OF PRESTRESSING CABLES GIVEN IN TABLE - IT INCLUDES AN EXTRA
 LENGTH OF 750 mm AT EACH END REQUIRED FOR ATTACHING THE STRANDS TO JACK
- 4 ABSCESSA OF ALL SALIENT POINTS ON CABLE PROFILE ARE GIVEN WITH REFERENCE TO
 MID SPAN. ORDINATES OF ALL SALIENT POINTS ON CABLE PROFILE ARE GIVEN WITH
 REFERENCE TO BOTTOM OF GIRDER
- 5 MAXIMUM ELONGATION OF CABLES SHOULD NOT EXCEED 1.05 TIMES THE CALCULATED
 ELONGATION ALSO MAXIMUM PRESSURE SHOULD NOT EXCEED 1.05 TIMES THE GAUGE
 PRESSURE
- 6 IF ACTUAL VALUE OF AREA A1 AND /OR MODULUS OF ELASTICITY E1 ARE DIFFERENT
 FROM ASSUMED VALUES (A = 1184.4 mm² AND E = 2×10^6 Kg/Cm²) THEORETICAL ELONGATION
 SHALL BE MODIFIED AS UNDER REVISED $\Delta = \Delta \times (A1/E1) \times (AE/A1E1)$ WHERE A & E ARE
 ASSUMED VALUES IN DESIGN AND A1 & E1 ARE ACTUAL VALUES AT SITE
- 7 STRESSING OF CABLES SHALL BE DONE FROM BOTH THE ENDS SIMULTANEOUSLY
 ELONGATIONS GIVEN IN THIS DRAWING ARE WITHOUT SLIP. TO BE MEASURED AT THE TIME
 OF STRESSING
- 8 EXTRA LENGTH OF THE STRAND PROJECTING BEYOND END BLOCK SHALL NOT BE CUT
 AFTER THE STRESSING THESE SHALL BE CUT ONLY WHEN INSTRUCTIONS FOR
 GROUTING ARE ISSUED BY ENGINEER
- 9 GROUTING SHALL BE DONE AS PER RELEVANT PROVISIONS OF IRC 18 AS EARLY AS
 POSSIBLE AFTER COMPLETING STRESSING OF ALL CABLES AND APPROVAL OF STRESSING RESULTS
 OBTAINED FROM ENGINEER
- 10 THE START OF TENSIONING OPERATION FROM BOTH THE ENDS SHALL BE SIMULTANEOUS
 AT EACH STAGE AND RATE OF INCREASE OF STRESS IN THE TENDON AT BOTH ENDS
 SHALL BE EQUAL
- 11 ANCHORAGE RECESSES TO BE SEALED WITH PREPACKED NON SHRINK MORTAR
 END FACES OF GIRDERS TO BE COATED WITH 2 COATS OF EPOXY
- 12 CONCRETE MIX SHALL BE M - 40
- 13 REINFORCEMENT H Y S D CONFORMING TO IS 1786 Fe = 4.15N/mm²
- 14 LAP LENGTH 65x DIA OF BAR
- 15 NOT MORE THAN 25% OF BARS SHALL BE LAPPED AT A SECTION AND LAPPING
 SHALL BE STAGGERED
- 16 CLEAR COVER TO ANY REINFORCEMENT = 4.0mm
- 17 SLIP ASSUMED = 6mm
- 18 CONCRETE SHALL BE CONTROLLED CONCRETE WITH DESIGN MIX AS PER IS 10262

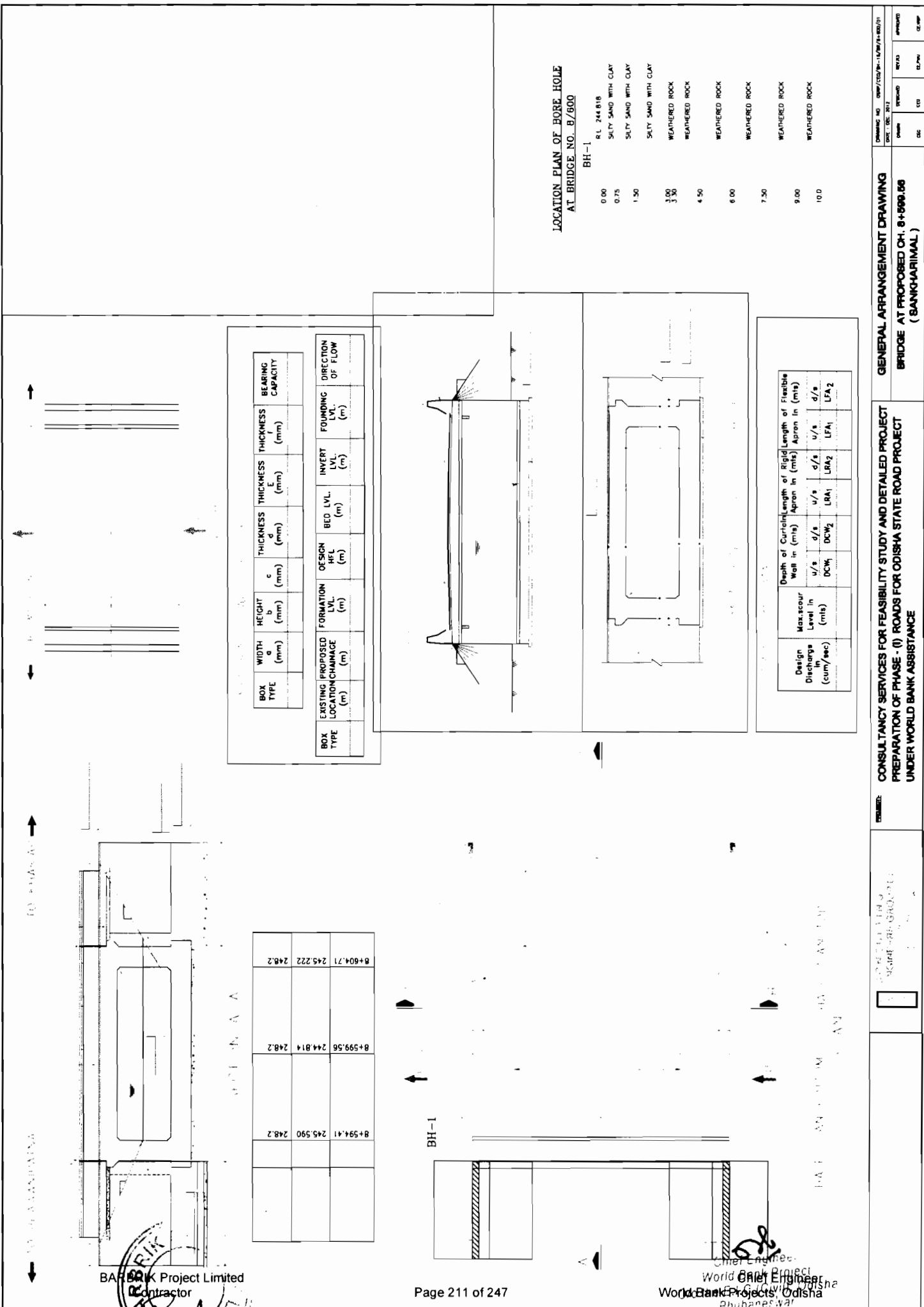
IMPORTANT NOTES :-

- 1 IF THE CALCULATED ELONGATION Δ IS REACHED BEFORE THE GIVEN GAUGE READING σ_s
 FOR THE CABLE. CONTINUE STRESSING TILL σ_s IS ACHIEVED PROVIDED THE ELONGATION DOES
 NOT EXCEED 1.05 Δ IN CASE THE ELONGATION 1.05 Δ IS REACHED BEFORE σ_s STOP
 STRESSING AND INFORM ENGINEER IN-CHARGE
- 2 IF AT THE GAUGE READING σ_s FOR A CABLE THE ELONGATION Δ HAS NOT BEEN REACHED
 CONTINUE STRESSING BY INTERVALS OF 5 Kg/Cm² UNTIL THE ELONGATION Δ HAS BEEN
 REACHED OR A PRESSURE NOT GREATER THAN 1.05 σ_s IS ACHIEVED



Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		GENERAL NOTES FOR PSC GIRDERS	
DATE	SCALE	DATE	SCALE



LOCATION PLAN OF BORE HOLE
AT BRIDGE NO. 8/600

BH-1

0.00	BL 244.818
0.75	SILTY SAND WITH CLAY
1.50	SILTY SAND WITH CLAY
3.00	SILTY SAND WITH CLAY
3.50	WEATHERED ROCK
4.50	WEATHERED ROCK
6.00	WEATHERED ROCK
7.50	WEATHERED ROCK
9.00	WEATHERED ROCK
10.00	WEATHERED ROCK

BOX TYPE	WIDTH (mm)	HEIGHT (mm)	THICKNESS (mm)	THICKNESS (mm)	THICKNESS (mm)	BEARING CAPACITY
	a	b	c	d	e	f

BOX TYPE	EXISTING LOCATION (m)	PROPOSED LOCATION CHANGE (m)	FORMATION LVL. (m)	DESIGN HFL. (m)	BED LVL. (m)	INVERT LVL. (m)	FOUNDING LVL. (m)	DIRECTION OF FLOW

Design Discharge (cum/sec)	Max. scour Level in (mts)	Depth of Curtailment		Length of Rigid Apron in (mts)		Length of Flexible Apron in (mts)	
		DCW	DCW2	u/s	d/s	u/s	d/s
		LRA1	LRA2	LFA1	LFA2		

CHAINAGE	START	END	WIDTH (m)	HEIGHT (m)	THICKNESS (mm)	THICKNESS (mm)	THICKNESS (mm)	BEARING CAPACITY
8+594.41	245.590	248.2						
8+599.56	244.814	248.2						
8+604.71	245.222	248.2						

BARAK Project Limited
Contractor

Chief Engineer
World Bank Project
Odisha
Bhubaneswar

GENERAL ARRANGEMENT DRAWING
BRIDGE AT PROPOSED CH. 8+599.56
(BANK-ABUTMENT)

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

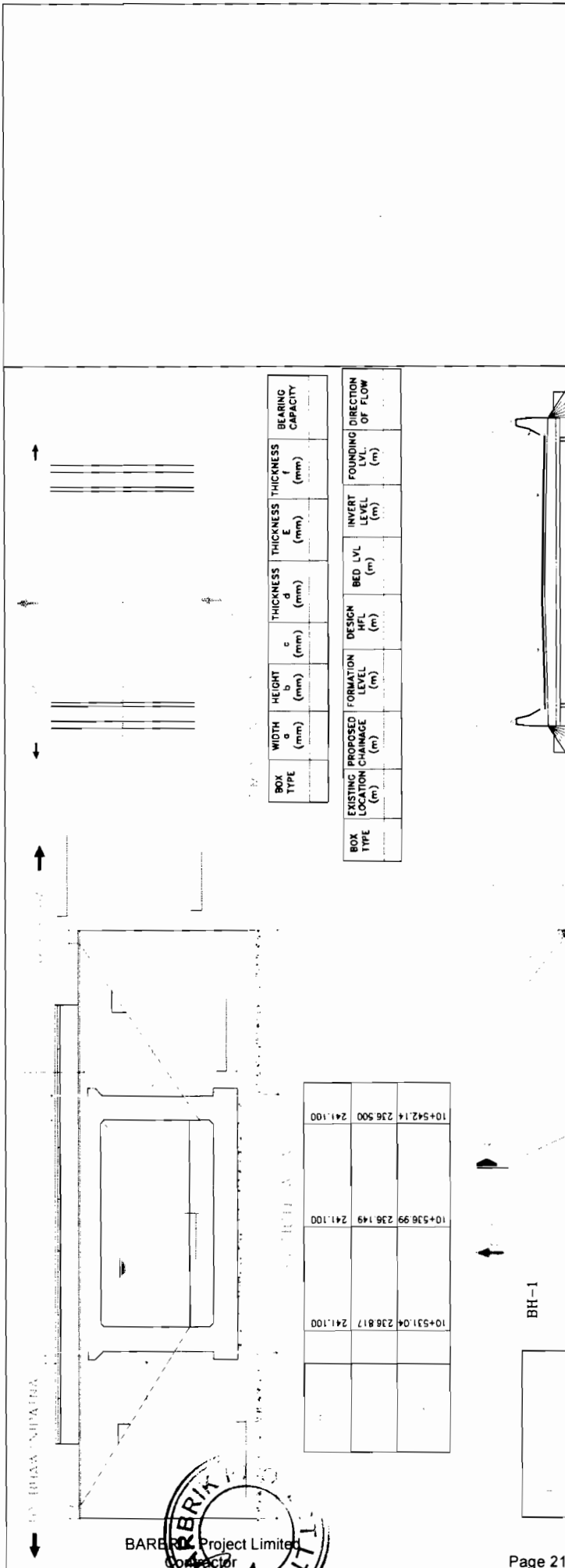
DATE: 02.12.17

PROJECT NO. 100/000/00-10/000/00/01

SCALE: AS SHOWN

APPROVED: [Signature]

DATE: 02.12.17



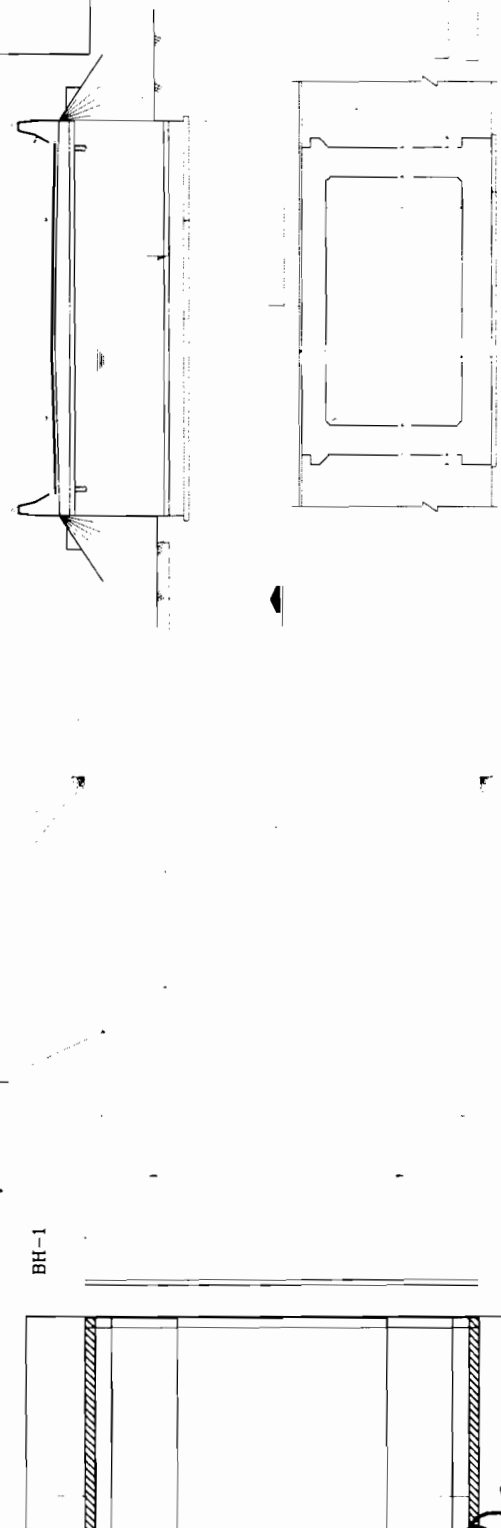
BAREILAP Project Limited
 Consultant



10+542.14	236.500	241.100
10+536.99	236.149	241.100
10+531.04	236.817	241.100

BOX TYPE	WIDTH (mm)	HEIGHT (mm)	THICKNESS (mm)	THICKNESS (mm)	THICKNESS (mm)	BEARING CAPACITY

EXISTING LOCATION CHARGE (m)	PROPOSED FORMATION LEVEL (m)	DESIGN H/L (m)	BED LVL (m)	INVERT LEVEL (m)	FOUNDING LVL (m)	DIRECTION OF FLOW



LOCATION PLAN OF BORE HOLE
 AT BRIDGE NO. 10/500

BH-1	
0.00	R.L. 236.761
0.75	SILTY SAND
1.50	SILTY SAND
3.00	SILTY SAND WITH CLAY
3.70	SILTY SAND WITH CLAY
4.50	SANDY SILT
5.30	WEATHERED ROCK
6.00	WEATHERED ROCK
7.00	WEATHERED ROCK
8.00	WEATHERED ROCK

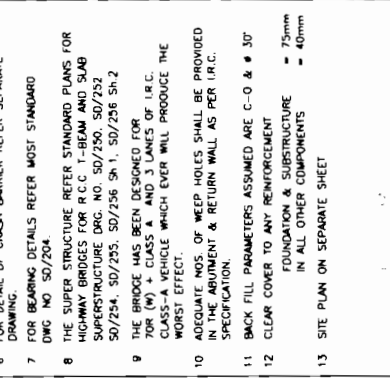
Design Discharge (cum/Sec)	Maximum Level (m)	Depth of Cut/Length of Rigid Length of Flexible Wall in (mts)					
		DCM	DCW	d/a	u/a	DBA	DBA2

Chief Engineer
 World Bank Project
 Odisha

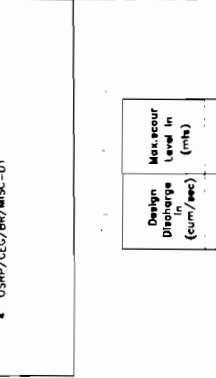
NOTES:-

- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METRES.
- 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- 3 THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS & RETURN WALL SHALL BE 85.33 T/M² AS PER GEO-TECHNICAL REPORT.
- 4 GRADE OF CONCRETE - M-25
OPEN FOUNDATION - M-30
ABUTMENT/ABUTMENT CAP - M-25
DIRT WALL - M-30
APPROACH SLAB - M-30
CRASH BARRIER - M-40
RETURN WALL - M-30
PEDESTAL - M-35
- 5 REINFORCEMENT H.T.S.D. BARS IN CONFORM TO IS:1786 GRADE - F₈-500
- 6 FOR DETAIL OF CRASH BARRIER REFER SEPARATE DRAWING.
- 7 FOR BEARING DETAILS REFER MOST STANDARD DMC NO. SO/204.
- 8 THE SUPER STRUCTURE REFER STANDARD PLANS FOR HIGHWAY BRIDGES FOR R.C.C. T-BEAM AND SLAB SUPERSTRUCTURE DMC. NO. 50/250, 50/252, 50/254, 50/255, 50/256 SH.1, 50/256 SH.2
- 9 THE BRIDGE WAS BEING DESIGNED FOR TOR (M) + CLASS 'A' AND 3 LANES OF L.R.C. CLASS-A VEHICLE WHICH EVER WILL PRODUCE THE WORST EFFECT.
- 10 ADEQUATE NOS. OF WEEP HOLES SHALL BE PROVIDED IN THE ABUTMENT & RETURN WALL AS PER I.R.C. SPECIFICATION.
- 11 BACK FILL PARAMETERS ASSUMED ARE C-0 & ϕ 30°
- 12 CLEAR COVER TO ANY REINFORCEMENT FOUNDATION & SUBSTRUCTURE - 75mm
IN ALL OTHER COMPONENTS - 40mm
- 13 SITE PLAN ON SEPARATE SHEET

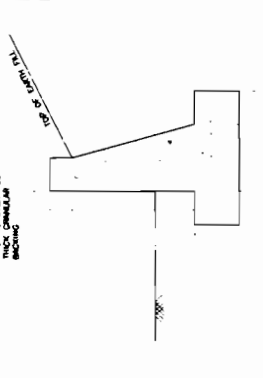
LOCATION PLAN OF BORE HOLE AT BRIDGE NO. 13/750



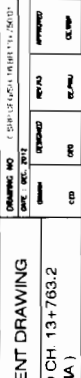
LONGITUDINAL SECTIONAL ELEVATION



CROSS SECTION AT A, B, C



KEY PLAN



GENERAL ARRANGEMENT DRAWING

BRIDGE AT PROPOSED CH. 13+763.2 (BADAPOLLA)

- 1 OSRP/CEG/SH-16/BR/13+750/02
- 2 OSRP/CEG/SH-16/BR/13+750/03
- 3 OSRP/CEG/SH-16/BR/NOTES/02
- 4 OSRP/CEG/BR/MISC-01

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

ENGINEERS GROUP LTD
E-12(A6) Colony, Malda, West Bengal-74
Tel: +91-141-2570089, 2571899, 2520308
Fax: 2521542, E-mail: CGE@EGCLtd.com

Chief Engineer
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World Bank Projects, Odisha

NOTES:-

TO KHARIAR

TO BHAWANIPATNA

PROPOSED NEW TWO LANE
BRIDGE AT CH. 13+763.22
SPAN 1X14.6m SKEW
ANGLE 0°

15+900

13+800

13+700

13+500

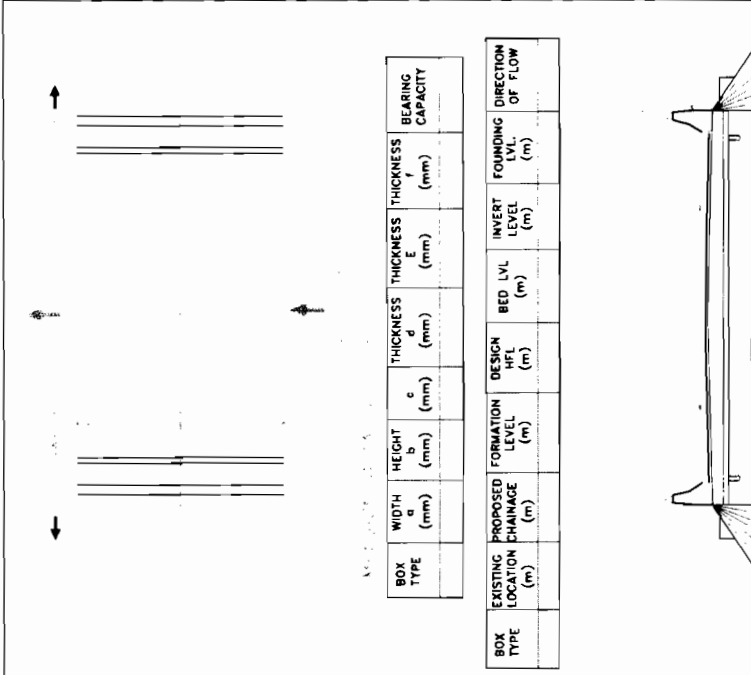
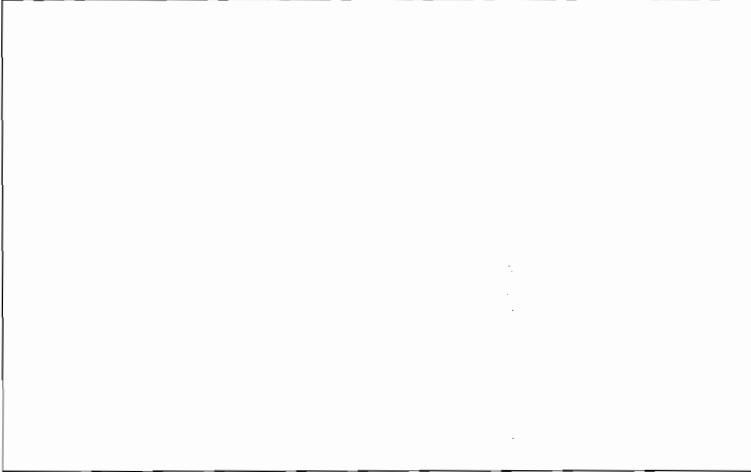
SITE PLAN



Chief Engineer
World Bank Projects, Odisha

PROJECT: CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE	SITE PLAN BRIDGE AT PROPOSED CH. 13+763.2 (BADAPOLLA)		DRAWING NO. : ROAD/FEAS/13/0013/0001 DATE : DEC. 2012
	PREPARED BY : CHECKED BY : DATE :	DESIGNED BY : DATE :	APPROVED BY : DATE :

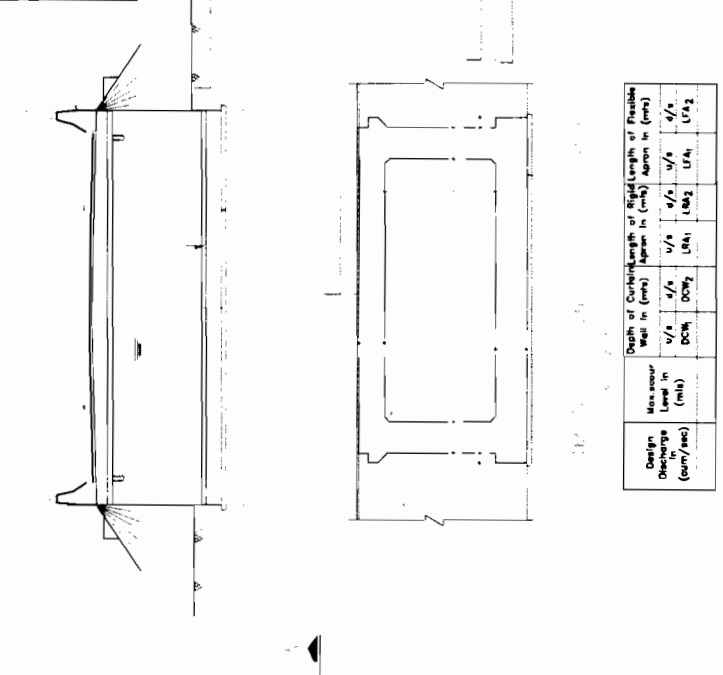
CONSULTING ENGINEERS GROUP LTD
 Plot No. 17, Sector-17, Badli, Gurgaon, Haryana-122002
 Tel: 2951348, 1-800-130627
 Fax: 2951348, E-mail: info@ceg-ltd.com



BOX TYPE	WIDTH (mm)	HEIGHT (mm)	THICKNESS (mm)	THICKNESS (mm)	THICKNESS (mm)	BEARING CAPACITY
	a	b	c	d	e	

BOX TYPE	EXISTING LOCATION (m)	PROPOSED LOCATION CHAINAGE (m)	FORMATION LEVEL (m)	DESIGN HFL (m)	BED LVL (m)	INVERT LEVEL (m)	FOUNDING LVL. (m)	DIRECTION OF FLOW

Station	17+040.90	17+046.05	17+051.20
Value	224.517	222.855	224.528
Value	226.786	226.786	226.786

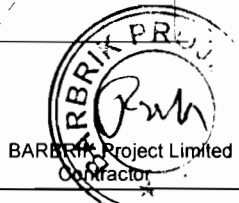


Design Discharge (cum/sec)		Max. water Level in (m)		Depth of Cut		Length of Right		Length of Flexible	
U/s	D/s	U/s	D/s	U/s	D/s	U/s	D/s	U/s	D/s
0.75	0.75	1.30	1.30	0.75	0.75	0.75	0.75	0.75	0.75

LOCATION PLAN OF BORE HOLE AT BRIDGE NO. 17/120

BH-1

0.85	SILTY SAND WITH CLAY
0.75	SILTY SAND WITH CLAY
1.30	SILTY SAND WITH CLAY
2.20	SILTY SAND WITH CLAY
3.00	SILTY SAND WITH CLAY
4.30	WEATHERED ROCK
	WEATHERED ROCK
	WEATHERED ROCK
6.00	WEATHERED ROCK
7.50	WEATHERED ROCK
8.50	WEATHERED ROCK
9.00	WEATHERED ROCK
10.0	WEATHERED ROCK



BARBRIK PROJECT LIMITED
Contractor

Chief Engineer
World Bank Projects, Odisha
Bhubaneswar

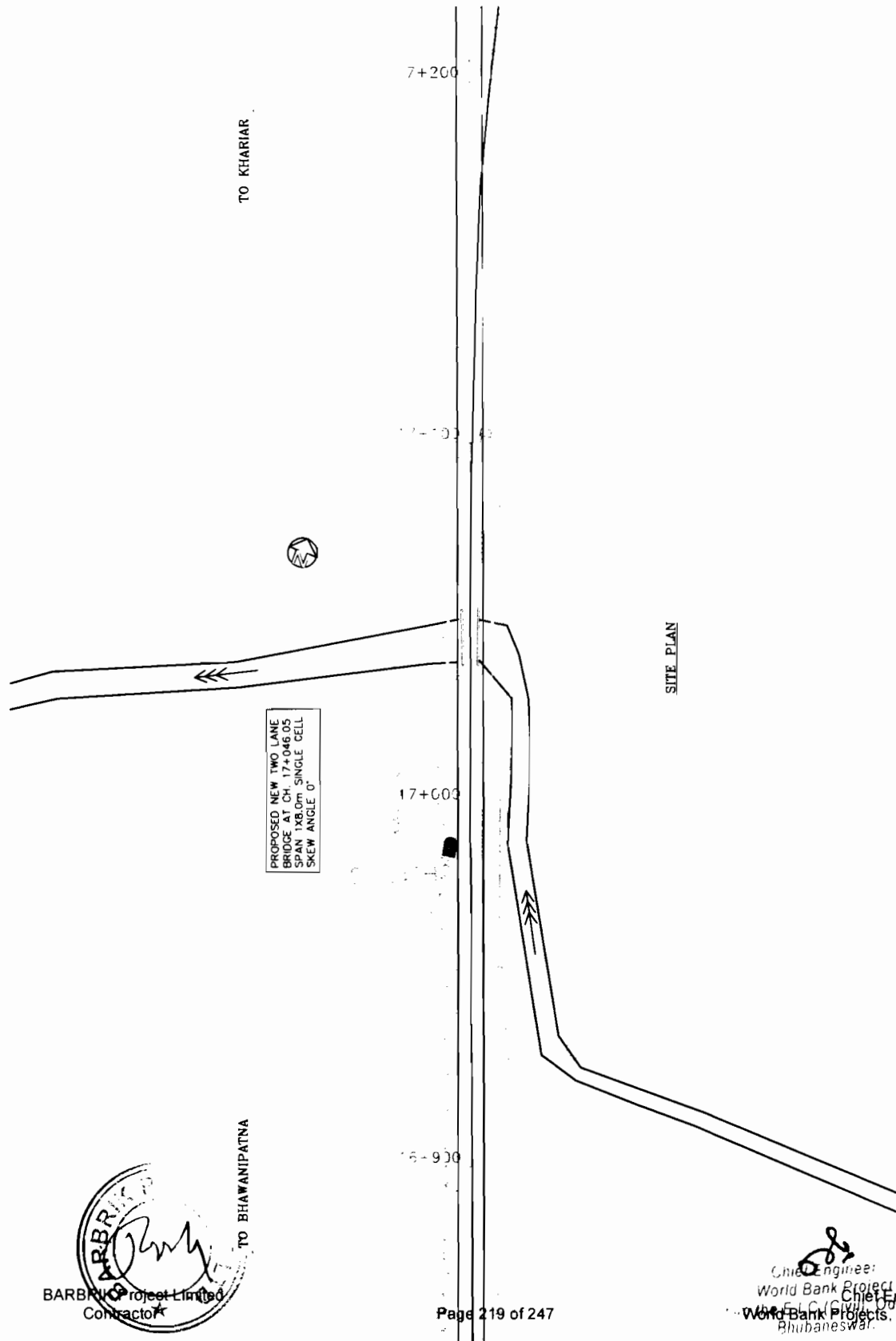
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

GENERAL ARRANGEMENT DRAWING
BRIDGE AT PROPOSED CH. 17.1046.05 (MANIGAH)

DATE: 11/11/2014

NO.	DESCRIPTION	DATE	BY	CHECKED	DATE
001					
002					
003					

NOTES:-




BARBRI Project Limited
 Contractor


 Chief Engineer
 World Bank Project
 E.L.C. (C) Group
 World Bank Projects, Odisha
 Bhubaneswar.

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE	PROJECT NO. / DRAWING NO. / SHEET NO. / DATE	
	SITE PLAN BRIDGE AT PROPOSED CH. 17+046.05 (MANIGAH)	DATE
CONSULTING ENGINEERS GROUP LTD E-2/40/1 Century Square, Indraprastha, New Delhi-110028 Ph: 2321348, E-Mail: ceg@cegroup.com	PROJECT NO. / DRAWING NO. / SHEET NO. / DATE	DATE

- NOTES:-**
- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METRES.
 - 2 DIMENSIONS ARE NOT TO BE FOLLOWED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
 - 3 THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS & PIERS SHALL BE 45.3 T/M² AS PER GEO-TECHNICAL REPORT.
 - 4 GRADE OF CONCRETE:
 - M-25
 - M-30
 - M-35
 - 5 REINFORCEMENT H.Y.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-500.
 - 6 FOR DETAIL OF CRASH BARRIER REFER SEPARATE DRAWING.
 - 7 FOR BEARING DETAILS REFER MOST STANDARD OMC. NO. 50/204.
 - 8 THE SUPER STRUCTURE REFER STANDARD PLANS FOR SUPERSTRUCTURE OMC NO. 50/260, 50/265, 50/264, 50/265, 50/266 SH.1, 50/266 SH.2.
 - 9 THE BRIDGE HAS BEEN DESIGNED FOR 70R (W) + CLASS A AND 3 LANES OF I.R.C. CLASS-A VEHICLE WHICH EVER WILL PRODUCE THE WORST EFFECT.
 - 10 ADEQUATE NOS. OF WEEP HOLES SHALL BE PROVIDED IN THE ABUTMENT & RETURN WALL AS PER I.R.C. SPECIFICATION.
 - 11 BACK FILL PARAMETERS ASSUMED ARE C-O & # 30.
 - 12 CLEAR COVER TO ANY REINFORCEMENT FOUNDATION & SUBSTRUCTURE = 75mm IN ALL OTHER COMPONENTS = 40mm
 - 13 SITE PLAN ON SEPARATE SHEET

- 1 OSRP/CEG/SH-16/BR/21+000/02
- 2 OSRP/CEG/SH-16/BR/21+000/03
- 3 OSRP/CEG/SH-16/BR/NOTES/02
- 4 OSRP/CEG/BR/MISC-01

Design Discharge (cum/sec)	Max. scour Level (m/s)

LOCATION PLAN OF ROBE HOLE AT BRIDGE NO. 21/000

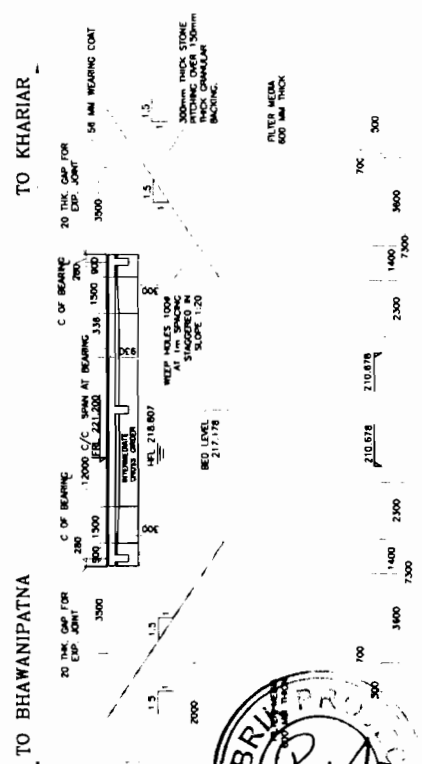
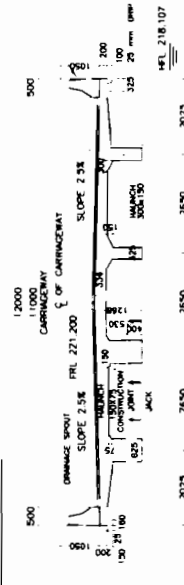
Design Discharge (cum/sec)	Max. scour Level (m/s)
0.00	0.15
0.75	0.75
1.50	1.50
3.00	3.00
3.50	3.50
4.00	4.00
5.30	5.30
6.00	6.30
7.50	7.50
8.00	8.00

TO BHAWANIPATNA D/S TO KHARIAR

C/L OF PROPOSED CARRIAGEWAY

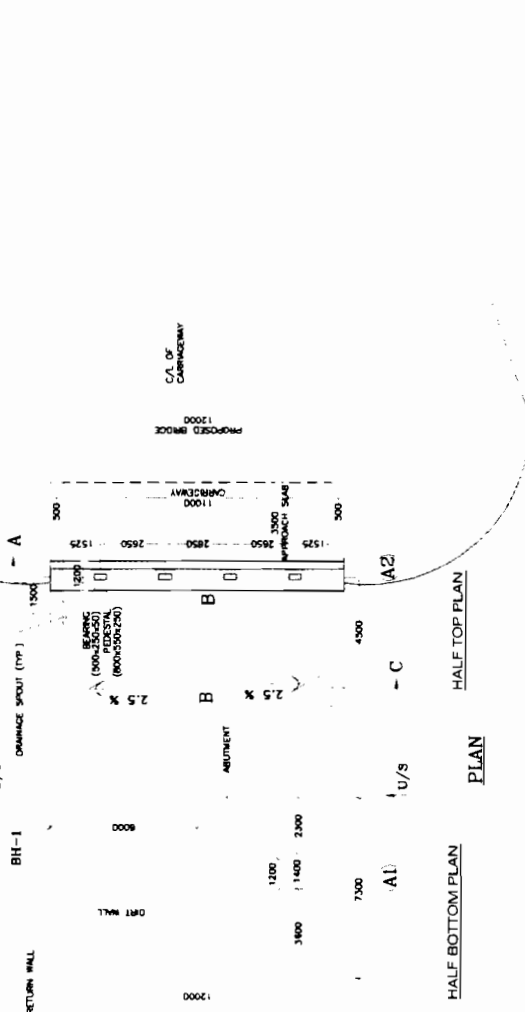
A1 U/S A2

KEY PLAN



LONGITUDINAL SECTIONAL ELEVATION

Station	Level	Station	Level
20+972.81	217.967	20+979.11	217.178
20+982.41	217.967	20+982.41	222.362



PROPOSED SECTION

CROSS SECTION AT A B C

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD.
 E-12, 1st Floor, Green Park, Sector 17, Gurgaon, Haryana - 122002
 Ph. 2621348, E-Mail: wbs@cegroup.com

GENERAL ARRANGEMENT DRAWING
 BRIDGE AT PROPOSED CH. 20+979.11 (KARLA PADA)

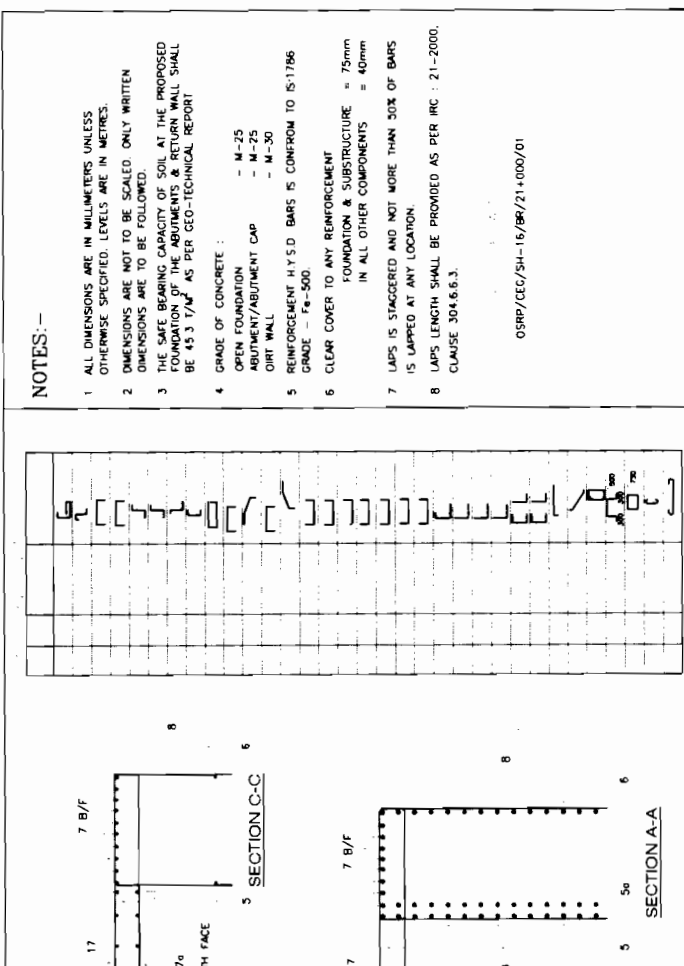
DATE	REV.	BY	CHKD.



NOTES:-

- 1 ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METERS.
- 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- 3 THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS & RETURN WALL SHALL BE 45.3 T/M² AS PER GEO-TECHNICAL REPORT
- 4 GRADE OF CONCRETE :
OPEN FOUNDATION - M-25
ABUTMENT/ABUTMENT CAP - M-25
DIRT WALL - M-30
- 5 REINFORCEMENT H.Y.S.D BARS IS CONFORM TO IS-1786 GRADE - Fe-500.
- 6 CLEAR COVER TO ANY REINFORCEMENT FOUNDATION & SUBSTRUCTURE = 75mm
IN ALL OTHER COMPONENTS = 40mm
- 7 LAPS IS STAGGERED AND NOT MORE THAN 50% OF BARS IS LAPPED AT ANY LOCATION.
- 8 LAPS LENGTH SHALL BE PROVIDED AS PER IRC : 21-2000, CLAUSE 304.6.6.3.

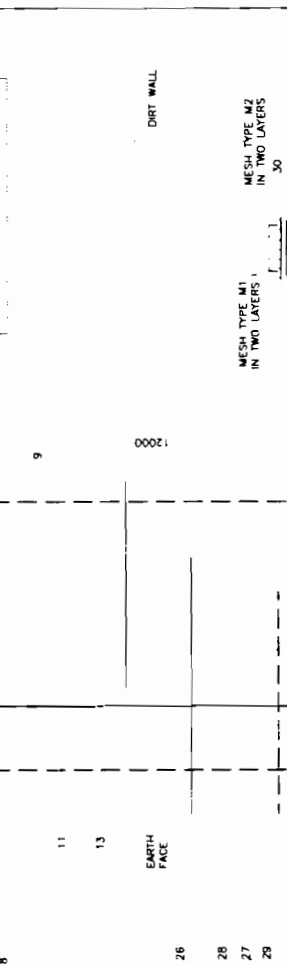
OSRP/CEG/SH-16/06/21+000/01



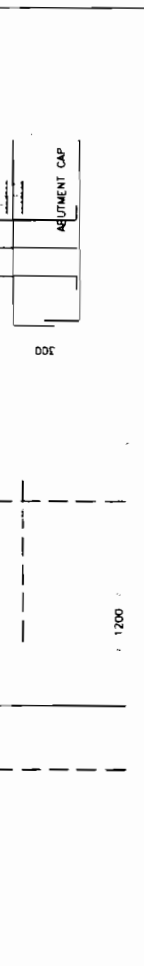
ELEVATION SHOWING REINFORCEMENT OF RETURN WALL



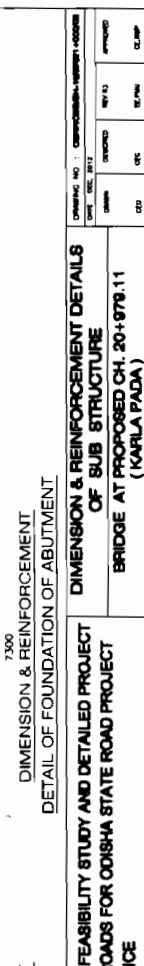
DIMENSION DETAIL OF RCC ABUTMENT



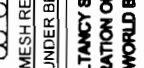
ELEVATION SHOWING REINFORCEMENT OF RCC ABUTMENT



DIMENSION DETAIL OF RCC ABUTMENT



DIMENSION DETAIL OF RCC ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT



DETAIL OF FOUNDATION OF ABUTMENT

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD.
E-12, May Colony, Asha Vihar, Nagpur-47
Tel: 091-141-2520999, 2521099, 25210506
Fax: 2521346, E-Mail: ce@cegroup.com

OSRP/CEG/SH-16/06/21+000/01

BRIDGE AT PROPOSED CH. 20+979.11 (KARLA PADA)



NOTES:-

TO KHARIAR

TO BHAWANIPATNA

PROPOSED NEW TWO LANE
BRIDGE AT CH. 20+979.11
SPAN 1X12.0m SKEW
ANGLE 0°

21+000

21+000

20+900

20+800

21+142

SITE PLAN



BARBRIK Project Limited
Contractor

Signature
Chief Engineer
World Bank Projects, Odisha
World Bank Project
Jr. to the E.I.C.(Civil), Odisha
Bhubaneswar

DATE	NO.	REVISION

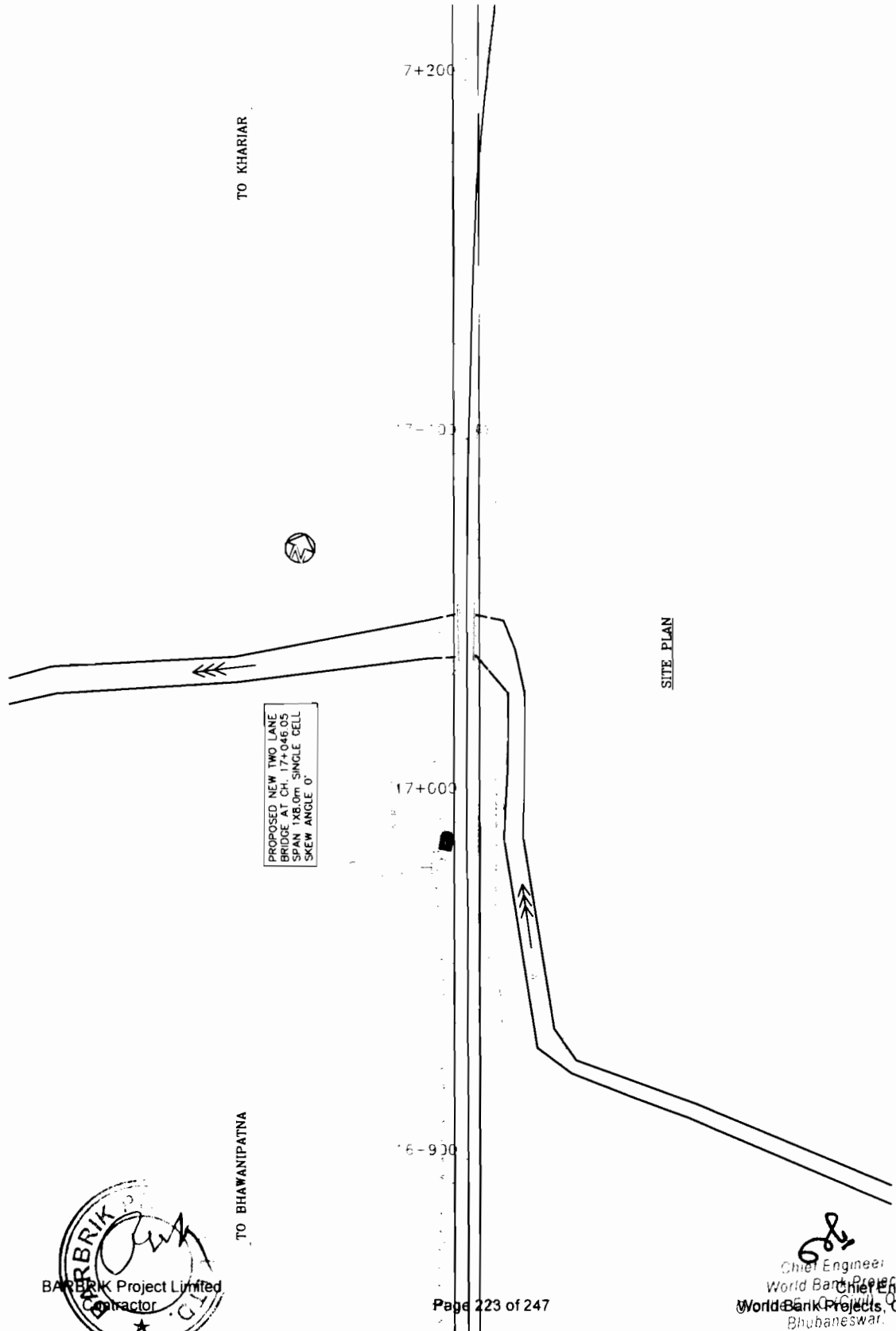
SITE PLAN
BRIDGE AT PROPOSED CH. 20+979.11
(KARLA PADA)

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT
PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD
E-12, Mahatma Jyoti Baspur, Bhubaneswar-751005
Tel: 91-674-2520999, 2521000, 2520036
Fax: 2521348, E-mail: ceg@cegroup.com

BARBRIK PROJECT LIMITED
Contractor

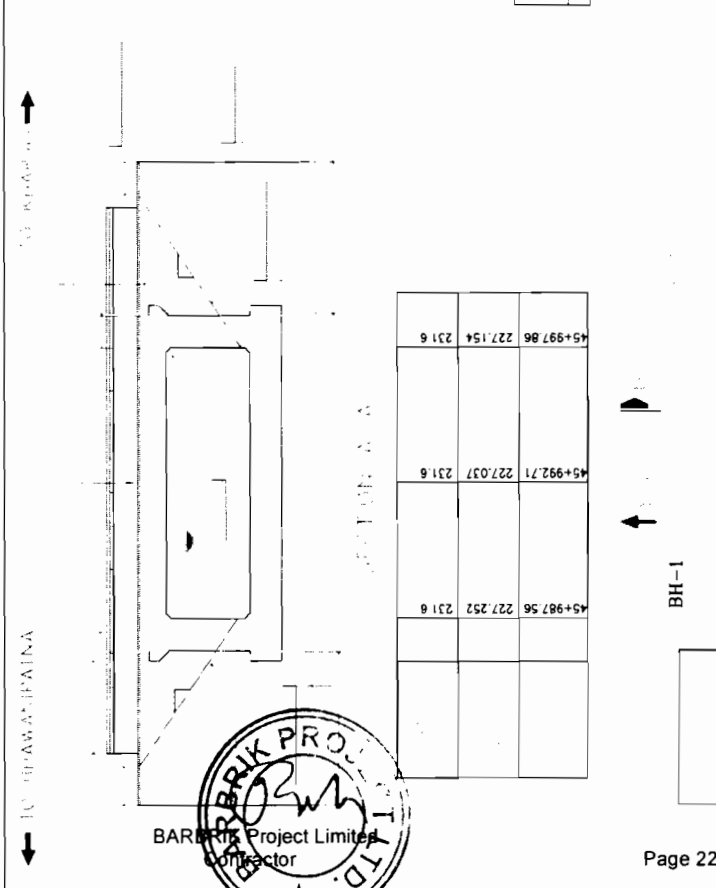
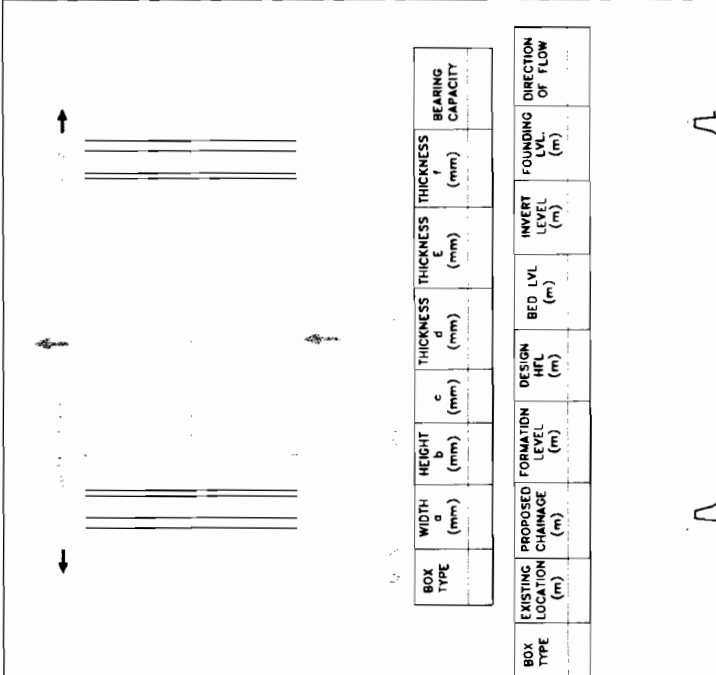
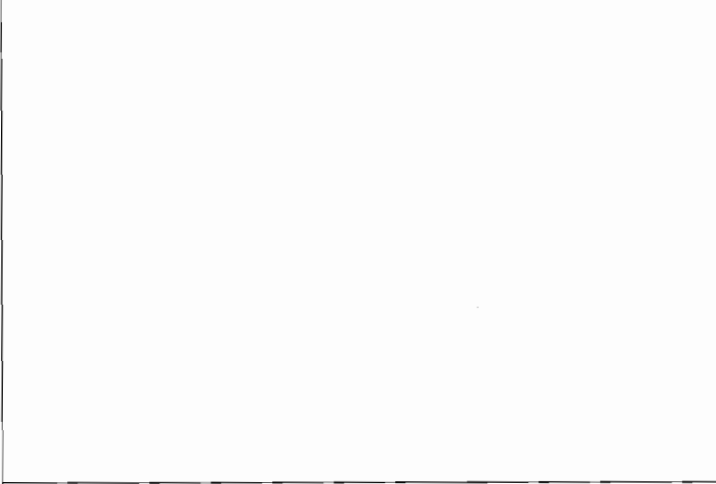
NOTES:-



Chief Engineer
World Bank Project
Chief Engineer
World Bank Projects, Odisha
Bhubaneswar.

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		SITE PLAN		BRIDGE AT PROPOSED CH. 17+046.05 (MANIGAH)	
DATE	BY	CHECKED	DATE	BY	CHECKED

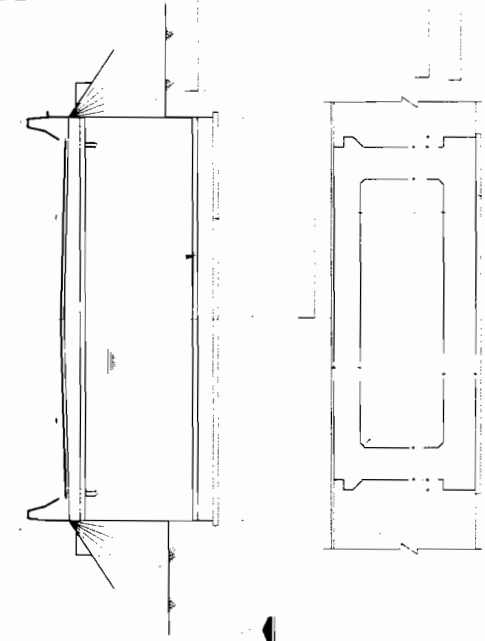
CONSULTING ENGINEERS GROUP LTD.
E-12, 1st Colony, Bhubaneswar, Odisha - 751006
Ph: 2571148, E-Mail: ceg@cegroup.com



**LOCATION PLAN OF BORE HOLE
AT BRIDGE NO. 45/700**

- BH-1
- 0.00 SILTY SAND WITH CLAY
 - 0.35 SILTY SAND WITH CLAY
 - 0.75 SILTY SAND WITH CLAY
 - 1.50 SILTY SAND WITH CLAY
 - 2.00 SILTY SAND WITH CLAY
 - 3.00 SILTY SAND WITH GRAVEL
 - 3.50 SILTY SAND WITH GRAVEL
 - 4.00 SILTY SAND WITH GRAVEL
 - 4.50 SILTY SAND WITH GRAVEL
 - 6.00 SILTY SAND WITH GRAVEL
 - 6.50 SILTY SAND WITH GRAVEL
 - 7.50 WEATHERED ROCK
 - 8.00 WEATHERED ROCK

BOX TYPE	PROPOSED LOCATION (m)	PROPOSED CHANNAGE (m)	FORMATION LEVEL (m)	DESIGN HFL (m)	BED LVL (m)	INVERT LEVEL (m)	FOUNDING LVL. (m)	DIRECTION OF FLOW
	45+987.56	227.252	231.6					
	45+992.71	227.037	231.6					
	45+997.86	227.154	231.6					



Design Discharge (cum/Sec)	Maximum Level in (m)	Depth of Current		Length of Right Apron in (m)		Length of Flexible Apron in (m)	
		w/s	d/s	w/s	d/s	w/s	d/s
		0.0%	0.0%	10m	10m	0.0%	0.0%



Chief Engineer
World Bank Project
Odisha
Projects, Odisha

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

GENERAL ARRANGEMENT DRAWING
BRIDGE AT PROPOSED CH. 45+992.71
(CHAND TARA)

DATE: 10/01/2017
SCALE: 1:100
DRAWN BY: [Signature]
CHECKED BY: [Signature]
APPROVED BY: [Signature]

NOTES:-

TO KHARIAR

NM 46/0

46+100

46+000

PROPOSED NEW TWO LANE
BRIDGE AT CH. 45+992.71
SPAN 1X8.0m SINGLE CELL
SKEW ANGLE 0°

45+900

TO BHAWANIPATNA

SITE PLAN



Chief Engineer
World Bank Project
Rhubaneswar

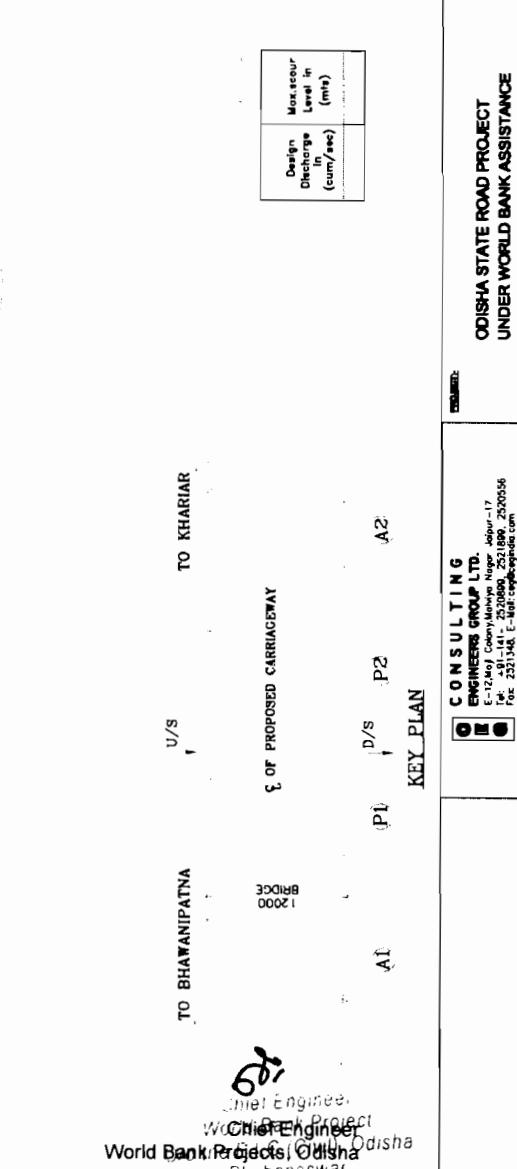
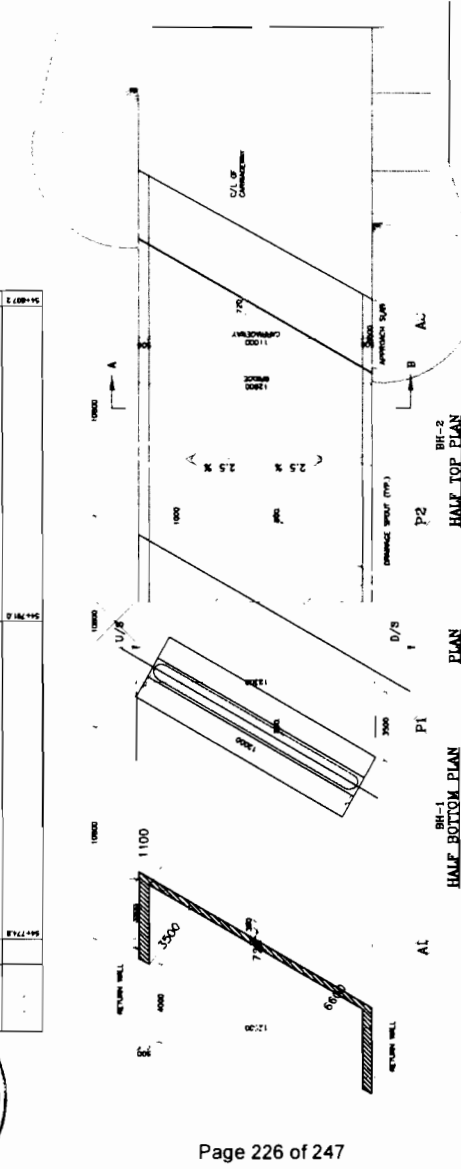
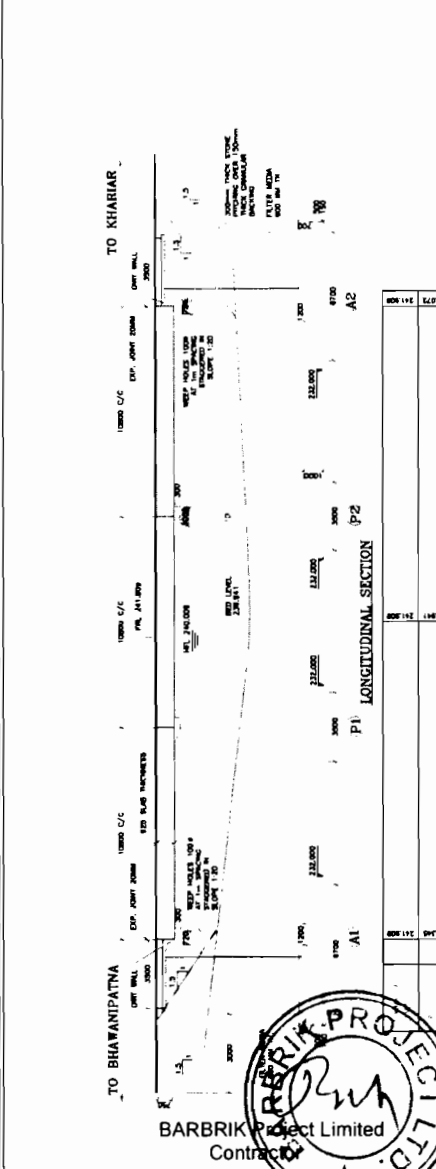
CONSULTING ENGINEERS GROUP LTD Plot No. 17, Sector-10, GATEWAY, Bhubaneswar-751006 Tel: 2511401-2512000, 2511899, 2510056 Fax: 2511401, E-Mail: cegroup@egs.com	CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE	SITE PLAN		DRAWING NO. - CP/2014/10/11/10/16, 10/10/17	
		BRIDGE AT PROPOSED CH. 45+992.71 (CHAND TARA)		DATE	REVISED
		DATE	BY	CHKD	APPROVED

LOCATION PLAN OF BORE HOLE AT BRIDGE NO. 54/600

- BH-1
- 0.00 R.L. 235.941 SILTY SAND
 - 0.75 SILTY SAND
 - 1.45 SILTY SAND
 - 2.10 SILTY SAND
 - 2.85 WEATHERED ROCK
 - 3.00 WEATHERED ROCK
 - 4.50 WEATHERED ROCK
 - 6.00 WEATHERED ROCK
 - 7.50 WEATHERED ROCK
 - 9.00 WEATHERED ROCK
 - 10.0 WEATHERED ROCK

LOCATION PLAN OF BORE HOLE AT BRIDGE NO. 54/600

- BH-2
- 0.00 R.L. 233.96 SILTY SAND
 - 0.75 SILTY SAND WITH GRAVEL
 - 1.50 SILTY SAND WITH GRAVEL
 - 2.25 SILTY SAND WITH GRAVEL
 - 3.00 WEATHERED ROCK
 - 4.50 WEATHERED ROCK
 - 6.00 WEATHERED ROCK
 - 7.50 WEATHERED ROCK
 - 9.00 WEATHERED ROCK
 - 10.0 WEATHERED ROCK



NOTES:-

- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METRES
- 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- 3 THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS & RETURN WALL SHALL BE 37.6 T/M² & FOR PIER SHALL BE 37.6 T/M² AS PER GEO-TECHNICAL REPORT
- 4 GRADE OF CONCRETE - M-25
OPEN FOUNDATION - M-25
ABUTMENT - M-25
PIER - M-25
PIER CAP - M-25
CURT WALL - M-30
APPROACH SLAB - M-25
SOLID SLAB - M-25
CRASH BARRIER - M-40
RETURN WALL - M-30
- 5 REINFORCEMENT H.Y.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-500
- 6 FOR DETAIL OF CRASH BARRIER REFER SEPARATE DRAWING
- 7 TAR PAPER BEARING SHALL BE USED.
- 8 THE SUPER STRUCTURE REFER MOST STANDARD DRAWING FOR ROAD BRIDGES FOR R.C.C. SOLID SLAB STRUCTURE ORG. NO. SD/1114
- 9 THE BRIDGE HAS BEEN DESIGNED BY FOR ONE LANE OF 19C CLASS 70-84 CLASS A VEHICLE AND 3 LANES OF I.R.C. CLASS-A VEHICLE WHICH EVER WILL PRODUCE THE WORST EFFECT
- 10 ADEQUATE NOS. OF WEEP HOLES SHALL BE PROVIDED IN THE ABUTMENT & RETURN WALL AS PER I.R.C. SPECIFICATION
- 11 BACK FILL PARAMETERS ASSUMED ARE C-0 & ϕ 30
- 12 CLEAR COVER TO ANY REINFORCEMENT IN BASE SLAB = 75mm
IN ALL OTHER COMPONENTS = 40mm
- 13 SITE PLAN ON SEPARATE SHEET

- 1 OSRP/CEG/SH-16/BR/54+600/02
- 2 OSRP/CEG/SH-16/BR/54+600/03
- 3 OSRP/CEG/SH-16/BR/54+600/04
- 4 OSRP/CEG/SH-16/BR/NOTES/01
- 5 OSRP/CEG/BR/MISC-01

BARBRIK PROJECT Limited
Contractor

Chief Engineer
World Bank Projects, Odisha
Rhubaneswar.

GENERAL ARRANGEMENT DRAWING
BRIDGE AT PROPOSED CH. 54+791
(KUNDA NALLA)

ODISHA STATE ROAD PROJECT
UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD.
E-24/9 Colony, Mohana Nagar, Bhubaneswar-751006
Ph: 2331148, E-Mail: ceg@cegroup.com

DESIGNED BY: [Signature]
CHECKED BY: [Signature]
DATE: 20/11/2017

56mm WEARING COAT
 APPROACH SLAB
 300 mm THICK
 LEVELING COURSE
 150 mm THICK

FRL 241.909
 3000

DIRT WALL

300
 1720
 WEEP HOLES 100mm
 AT 1m SPACING
 IN
 SLOPE 1:20
 239.345

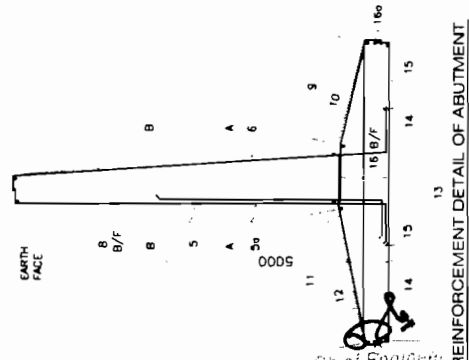


FILTER MEDIA
 600 MM TH.

232.000
 150

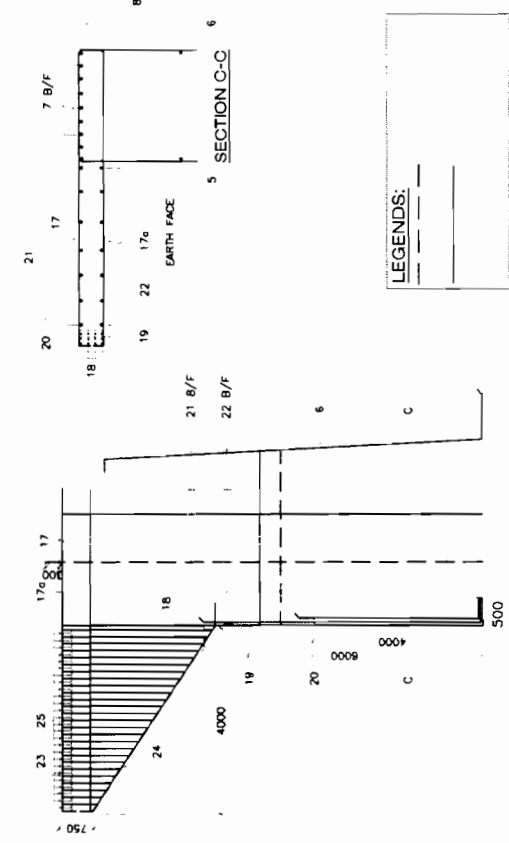
P.C.C. 1:2:4
 (M-15)

150 3500 6700 1200 2000 150
 DIMENSION DETAIL OF RCC ABUTMENT



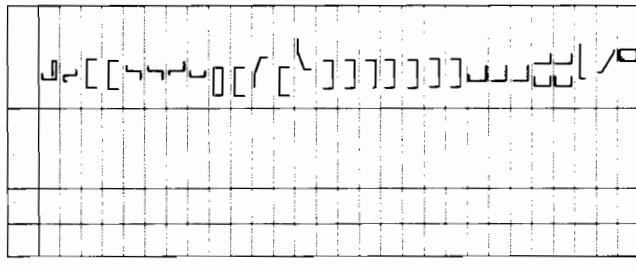
REINFORCEMENT DETAIL OF ABUTMENT

Chief Engineer
 World Bank Project
 Chief Engineer
 World Bank Projects, Odisha
 Phulbani

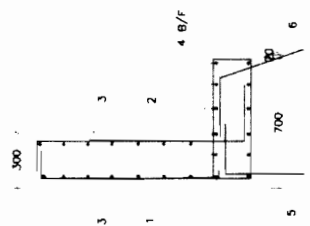


ELEVATION SHOWING REINFORCEMENT
 OF RETURN WALL

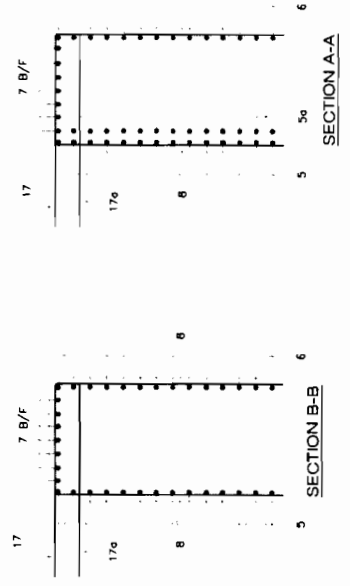
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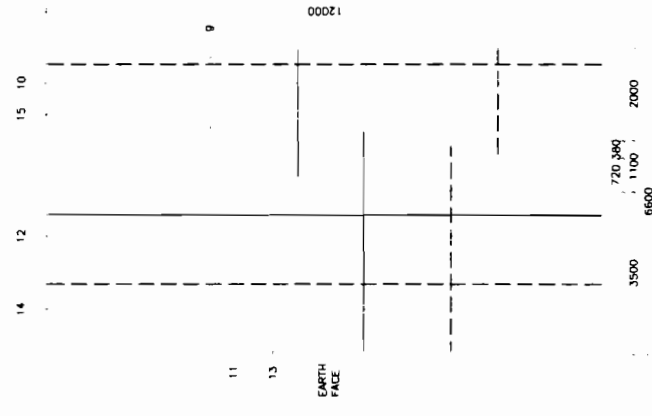
SECTION C-C



DIMENSION & REINFORCEMENT
 DETAILS OF ABUTMENT CAP & DIRT WALL



SECTION A-A



DIMENSION & REINFORCEMENT
 DETAIL OF FOUNDATION OF ABUTMENT

- NOTES:-**
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METRES.
 - DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
 - THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED SITE OF ABUTMENT & RETURN WALL SHALL BE 36.7 T/M² & FOR PIER SHALL BE 37.6 T/M² AS PER GEOTECHNICAL REPORT.
 - GRADE OF CONCRETE :
 OPEN FOUNDATION - M-25
 ABUTMENT - M-25
 DIRT WALL - M-30
 APPROACH SLAB - M-30
 - REINFORCEMENT H.Y.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-500
 - TAR PAPER BEARING SHALL BE USED.
 - CLEAR COVER TO ANY REINFORCEMENT IN BASE SLAB = 75mm
 IN ALL OTHER COMPONENTS = 40mm

OSRP/CEG/SH-16/BR/54+600/01

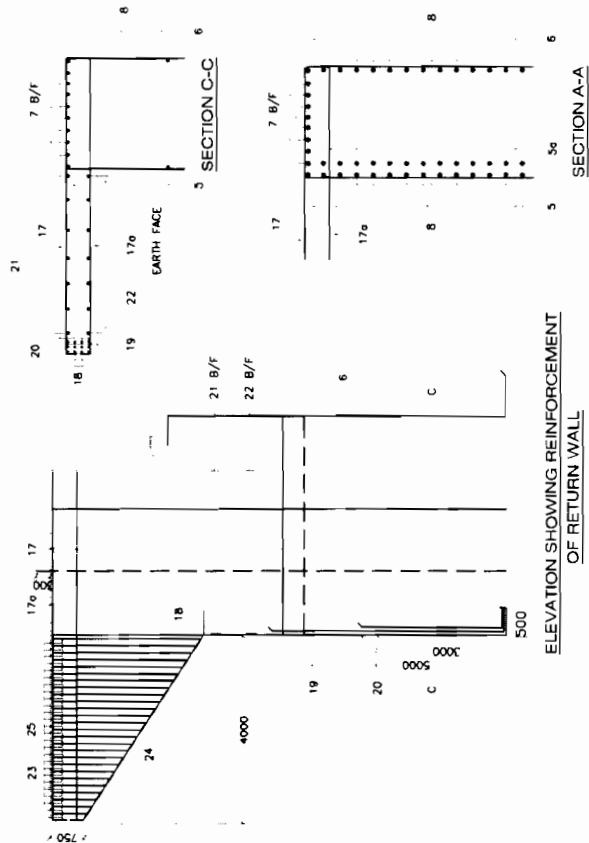
Drawing No.	OSRP/SH-16/BR/54+600/01
Date	24.02.2017
Scale	As per
Sheet No.	11 of 11
Rev.	01
Drawn by	CLP
Checked by	CLP

**DIMENSION & REINFORCEMENT DETAILS
 OF SUB STRUCTURE
 BRIDGE AT PROPOSED CH. 54+781
 (KUNDA NALLA)**

**ODISHA STATE ROAD PROJECT
 UNDER WORLD BANK ASSISTANCE**

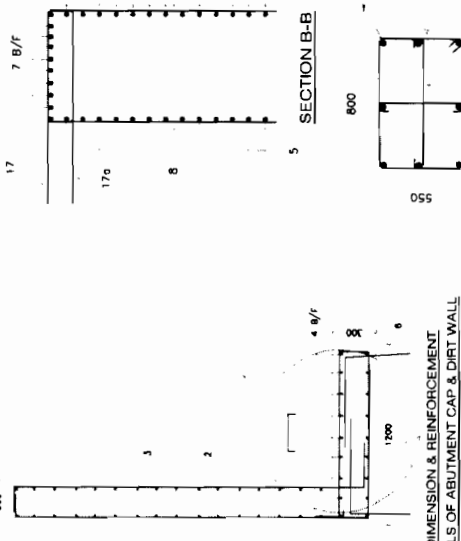
**CONSULTING
 ENGINEERS GROUP LTD.**
 E-12, 1st Floor, Chhatrapati Rajguru Marg, Bhubaneswar-751005
 Ph: 2531144, E-mail: ceg@cegroup.com

35mm WEARING COAT
 APPROACH SLAB
 300 mm THICK
 LEVELING COURSE
 150 mm THICK

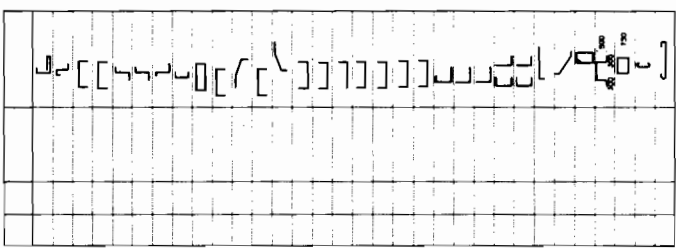
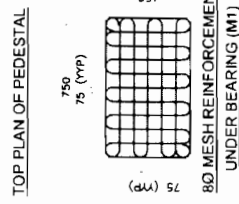
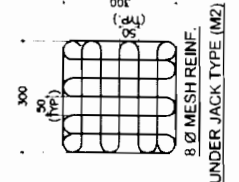


ELEVATION SHOWING REINFORCEMENT OF RETURN WALL

DIMENSION DETAIL OF RCC ABUTMENT



DETAILS OF ABUTMENT CAP & DIRT WALL

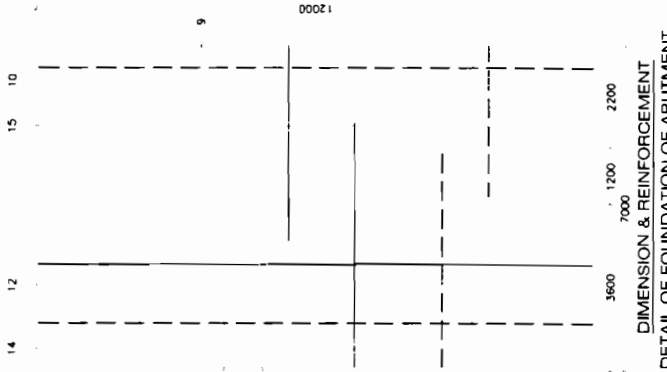
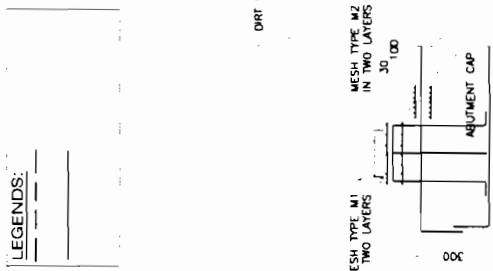


NOTES:-

- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED LEVELS ARE IN METRES.
- 2 DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED
- 3 THE SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS & RETURN WALL SHALL BE 32.0 T/M² AS PER GEO-TECHNICAL REPORT.
- 4 GRADE OF CONCRETE :
 OPEN FOUNDATION - M-25
 ABUTMENT/ABUTMENT CAP - M-25
 DIRT WALL - M-30
- 5 REINFORCEMENT H.T.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-500
- 6 CLEAR COVER TO ANY REINFORCEMENT FOUNDATION & SUBSTRUCTURE - 75mm IN ALL OTHER COMPONENTS - 40mm
- 7 LAPS IS STAGGERED AND NOT MORE THAN 50% OF BARS IS LAPPED AT ANY LOCATION
- 8 LAPS LENGTH SHALL BE PROVIDED AS PER IRC : 21-2000, CLAUSE 304.6.6.3.

OSRP/CEG/SH-16/BR/58+900/01

LEGENDS:



DIMENSION & REINFORCEMENT DETAIL OF FOUNDATION OF ABUTMENT

CONSULTING ENGINEERS GROUP LTD.
 E-12, 1st Colony, Bhubaneswar, Odisha - 751006
 Ph: 7521248, E-mail: cegroup@rediffmail.com

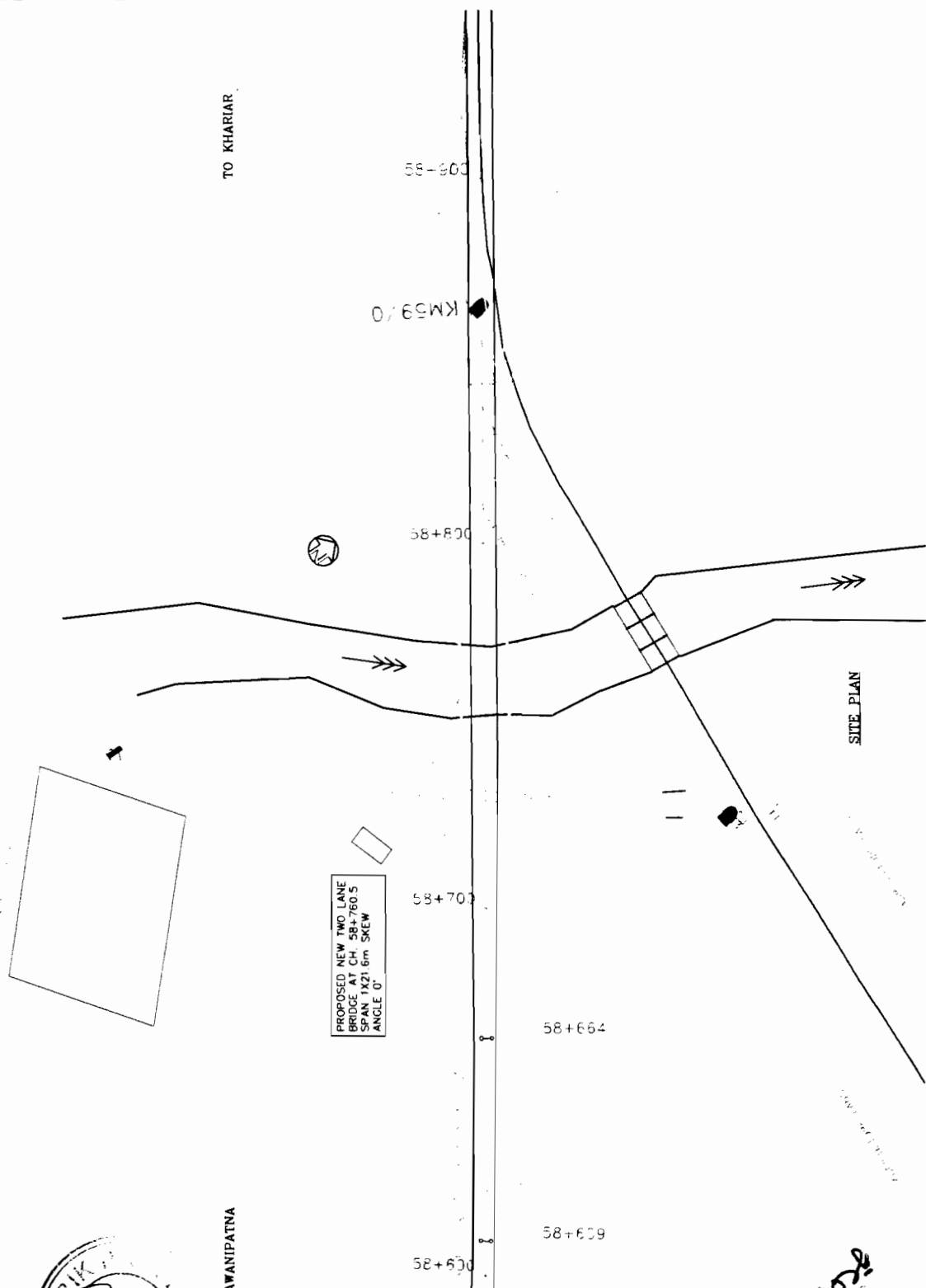
PROJECT: CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

REVISIONS:

NO.	DATE	BY	CHKD.	REASON
1	10/11/2013	OSRP	CEG	ISSUED

DIMENSION & REINFORCEMENT DETAILS OF SUB STRUCTURE BRIDGE AT PROPOSED CH-58+780.5 (CHANDHEL)

NOTES:-



PROPOSED NEW TWO LANE
BRIDGE AT CH. 58+760.5
SPAN 1X21.6m SKEW
ANGLE 0°

TO KHARIAR

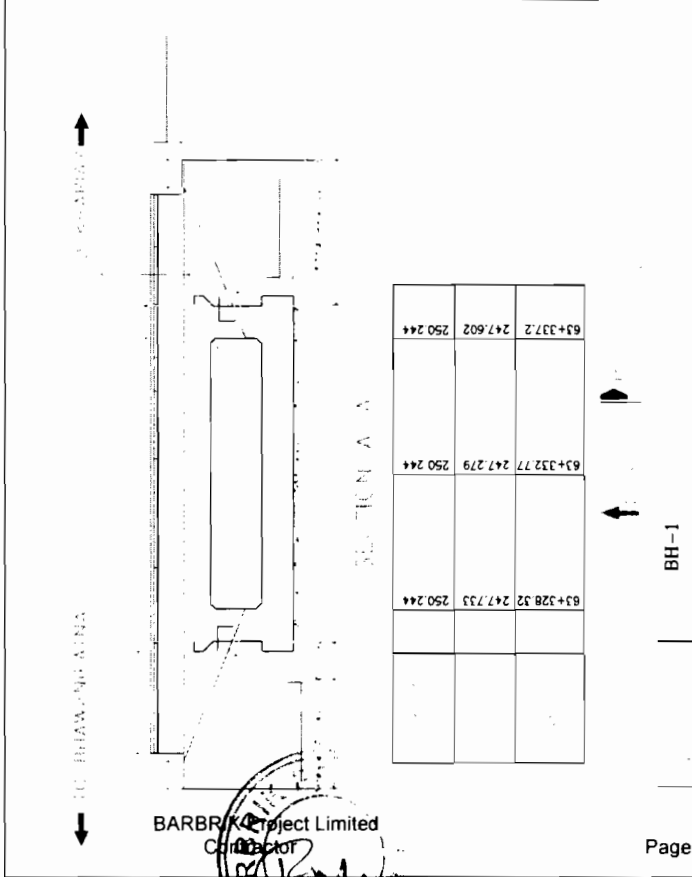
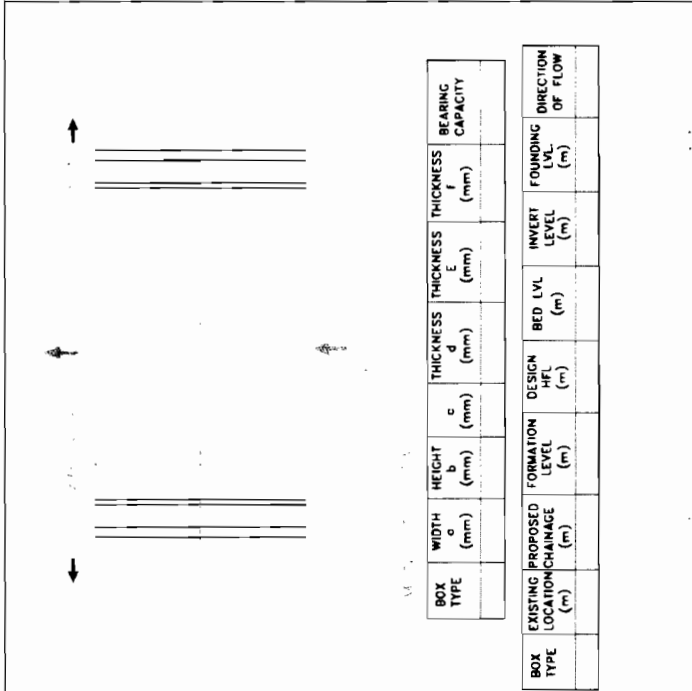
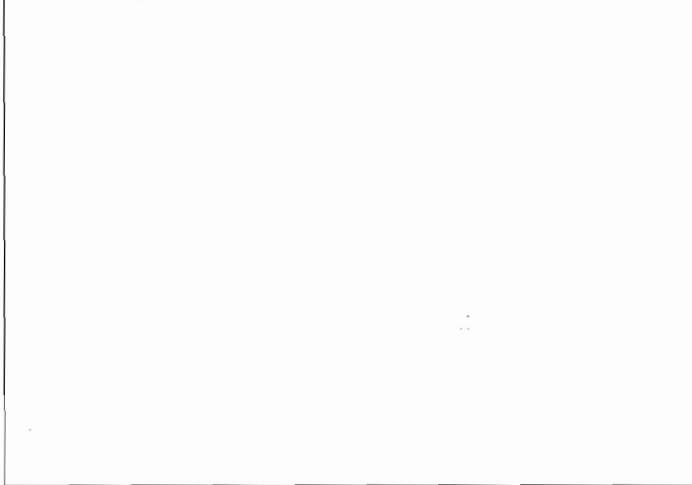
TO BHAWANIPATNA

SITE PLAN



Chief Engineer
World Bank Project
Or the E.I.C.(Civil), Odisha
Chief Engineer
World Bank Projects, Odisha

CONSULTING		ENGINEERS GROUP LTD		Jalpur-17	
E-12, 1st Floor, Colony, Jalpur, Bhubaneswar-751009		Ph. 2531348, 2531349		Fax. 2531348, 2531349	
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		SITE PLAN		BRIDGE AT PROPOSED CH.58+760.5 (CHANDEL)	
Drawing No.	Scale	Date	Checked	Approved	For use



LOCATION PLAN OF BORE HOLE AT BRIDGE NO. 63/650

BH-1

0.00	R.L. 247.33	SILTY SAND WITH CLAY
0.75	0.75	SILTY SAND WITH CLAY
1.50	1.50	SILTY SAND WITH CLAY
3.00	3.00	SILTY SAND WITH CLAY
3.50	3.50	SILTY SAND WITH GRAVEL
4.00	4.00	WEATHERED ROCK
4.50	4.50	WEATHERED ROCK
6.00	6.00	WEATHERED ROCK
7.50	7.50	WEATHERED ROCK
8.00	8.00	WEATHERED ROCK

BOX TYPE	WIDTH (mm)	HEIGHT (mm)	THICKNESS (mm)			BEARING CAPACITY
			a	b	c	
			d	e	f	

BOX TYPE	EXISTING PROPOSED LOCATION CHAINAGE (m)	DESIGN HFL (m)	BED LVL (m)	INVERT LEVEL (m)	FOUNDING LVL (m)	DIRECTION OF FLOW

Design Discharge (cum/sec)	Measure length in (m)	Depth of Compensate Length of Flexible					
		u/s	d/s	u/s	d/s	u/s	d/s
		DC ₁₀	LHA ₁	UB ₁	UF ₁	UF ₁	UF ₁
		DC ₁₀	LHA ₂	UB ₂	UF ₂	UF ₂	UF ₂

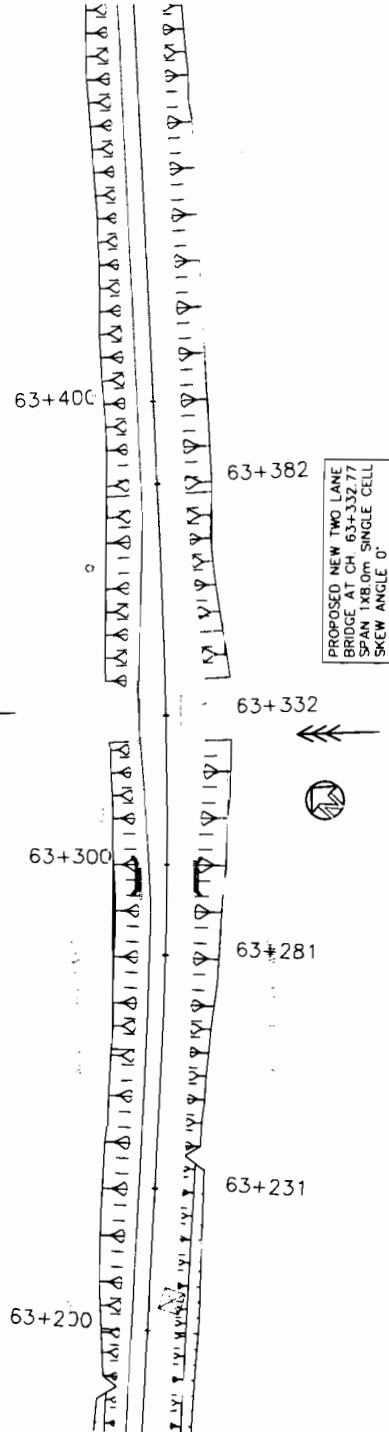
BARBRA Project Limited
 Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

Chief Engineer
 World Bank Projects, Odisha
 Bhubaneswar

NOTES:-

TO KHARIAR

TO BHAWANIPATNA



SITE PLAN



Chief Engineer
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Chief Engineer
World Bank Projects, Odisha
Bhubaneswar

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		SITE PLAN	
BRIDGE AT PROPOSED CH. 63+332.77 (RASIGAON NALLAH)		DATE: 10/07/2017	
DESIGNED BY	CHECKED BY	DATE	APPROVED BY

CONSULTING ENGINEERS GROUP LTD
E-12/80/1 Colony, Andhra Nagar, Jabpur-17
Tel: 691-141, 2320899, 2321899, 2320054
Fax: 2321348, E-Mail: ceg@cegroupdi.com

1. CLINTING SHALL BE DONE AS PER CLAUSE 2807 OF NORTH SPECIFICATIONS FOR ROAD AND BRIDGE WORKS.

EXISTING BRIDGE DETAILS

1	Existing Location	31050
2	Proposed Clearance	1-061.58
3	Name of the nullah	Pipli Nullah
4	Year of construction	1998
5	Type of bridge	High level Bridge
6	Existing span arrangement	3 x 8.8 m
7	Existing carriage way width	7.2 m
8	Thickness of superstructure	0.67 m
9	Type of foundation	Open foundation
10	Type of substructure	PCC wall type
11	Type of superstructure	RCC solid slab
12	Existing Formation Level	767.510 m
13	Final Formation Level	267.510 m
14	Bed Level	261.081 m
15	Distance of P.C.L. w.r.t E.C.L.	0.042 m Left

REHABILITATION MEASURES SUGGESTED

S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Bed protection	Bed protection to be rebore and curtain wall shall be provided on both U/S & D/S sides	OSRPL (EG-SH-16) BR-FPW-02
2	Expansion joint	Expansion joint not functional and shall be replaced by asphaltic plug type expansion joint	OSRPL (EG-HR-MISC-03)
3	Wearing coat	CC wearing coat shall be replaced	MOST STANDARD PLANS FOR HIGHWAY BRIDGES DRG. NO. SD-206
4	Pitching & tie wall	Tie wall to be reconstructed and pitching shall be done in all four sides	OSRPL (EG-SH-16) BR-FPW-02
5	Distress on super-structure	Both edges of deck slab to be grouted by 75 mm thick	
6	Dismantling	Existing abutment on right side (Bhawani palna & Khairat side) shall be dismantled (approx. quantity 200 cum. masonry)	

TO BHAWANIPATNA

TO KHARIAR

(A1) P1 P2 A2

KEY PLAN

HYDROLOGICAL DATA

Design Discharge In (cum/sec)	Depth of curtain Wall in (mts)		Length of Rigid Apron in (mts)		Length of Flexible Apron in (mts)	
	u/s	d/s	u/s	d/s	u/s	d/s
	DCW ₁	DCW ₂	DCW ₁	DCW ₂	LFA ₁	LFA ₂



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to the E.I.C. (Chief Engineer
World Bank Projects, Odisha

REHABILITATION BRIDGE DETAILS

BRIDGE AT CH. 31050

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

DATE	DATE	DATE	DATE
10/01/2007	10/01/2007	10/01/2007	10/01/2007
DESIGNED	CHECKED	APPROVED	APPROVED
DATE	DATE	DATE	DATE
10/01/2007	10/01/2007	10/01/2007	10/01/2007

EXISTING BRIDGE DETAILS

1	Existing Location	4/450
2	Proposed Chainage	41418.87
3	Name of the nallah	Bulat Nallah
4	Year of construction	1987
5	Type of bridge	Submersible Bridge
6	Existing span arrangement	4 x 9.9 m
7	Existing carriage way width	6.7 m
8	Thickness of superstructure	0.8 m
9	Type of foundation	Open foundation
10	Type of substructure	PCC wall type
11	Type of superstructure	RCC solid slab
12	Existing Formation Level	262.952 m
13	Final Formation Level	262.952 m
14	Bed Level	255.901 m
15	Distance of PCL w.r.t ECL	0.16 Left

REHABILITATION MEASURES SUGGESTED

S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Expansion joint	Expansion joint not functioning due to overlay of BT to be replaced by asphaltic plug type	OSRP/CEG/BR/MISC-02
2	Wearing coat	Heavy cracks seen on BT wearing coat and shall be replaced completely by 56 mm thick bituminous wearing coat	OSRP/CEG/BR/MISC-02
3	Railing	Guard post shall be replaced by crash barrier	OSRP/CEG/BR/MISC-02



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O/o the E.C.(Civil), Odisha
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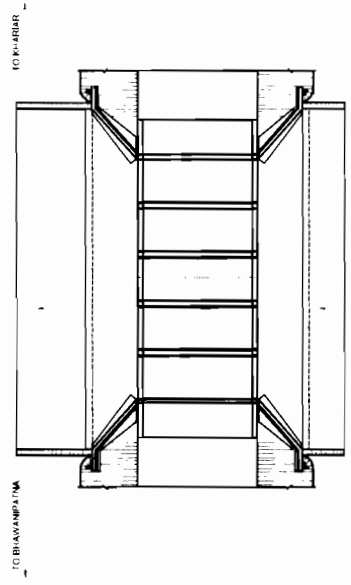
REHABILITATION BRIDGE DETAILS		BRIDGE AT CH. 41450	
SHEET NO. : 096/05C/01-16/BR/11/20/01	DATE : 07/07/2011	DESIGNED	CHECKED
APPROVED	DATE	DATE	DATE

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

1. GRUNTING SHALL BE DONE AS PER CLAUSE 2807 OF MORTH SPECIFICATIONS FOR ROAD AND BRIDGE WORKS.
2. GRROUTING SHALL BE DONE AS PER CLAUSE 2806 OF MORTH SPECIFICATIONS FOR ROAD AND BRIDGE WORKS.

EXISTING BRIDGE DETAILS	
1	Existing Location 59+400
2	Proposed Change 50+506.50
3	Name of the road Tukuda
4	Year of construction 1970
5	Type of bridge High level Bridge
6	Existing span arrangement 5 x 40 ft
7	Existing carriage way width 7.8 m
8	Thickness of superstructure 0.65 m
9	Type of foundation RCC box cell
10	Type of structure RCC box cell
11	Existing Formation Level 243.803 m
12	Final Formation Level 241.803 m
13	Bed Level 239.050 m
14	Distance of P.C.T. w.r.t E.C.L. 0.09 m Left

S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Bed protection	No bed protection seen; bed protection shall be done on both U/S and D/S	OSRPA/GEN/16-03R/CPW/03
2	Railing	Touch up repair in railings	
3	Substructure	Grouting of all faces of walls of five cell box shall be done	
4	Approach Slab	Foundation has been washed and grouting shall be done on approach slabs to be constructed on both sides	OSRPA/GEN/16-03R/CPW/03
5	Retaining Wall	Splayed wing wall on all four sides shall be constructed	MOEST/STANDARD SHEET OF CUTTINGS NO. SD/11/SHT. 2 (0-04) (SIT 3 OF 6)
6	Distress on superstructure	Edge of the kerbs and top slab of box cell shall be grouted by 40 mm thick	



Design Discharge (cum/ sec)	Max. scour Level in (mts)	Depth of curtain Wall in (mts)		Length of Rigid Apron in (mts)		Length of Flexible Apron in (mts)	
		u/s DCW ₁	d/s DCW ₂	u/s	d/s	u/s	d/s
						LFA ₁	LFA ₂



1. GROUTING SHALL BE DONE AS PER CLAUSE 2807 OF MORTH SPECIFICATIONS FOR ROAD AND BRIDGE WORKS
2. GROUTING SHALL BE DONE AS PER CLAUSE 2806 OF MORTH SPECIFICATIONS FOR ROAD AND BRIDGE WORKS.
3. CORE CUTTING SHALL BE DONE IN THE EXISTING DECK SLAB DURING EXECUTION

EXISTING BRIDGE DETAILS	
1	Existing Location 69+300
2	Proposed Change 69+005.40
3	Name of the Infill Bochi Nullah
4	Year of Construction 1975
5	Type of bridge High level Bridge
6	Existing span arrangement 1 X 7.2 m
7	Existing carriageway width 8.5 m
8	Thickness of superstructure 0.5 m
9	Type of foundation Open foundation
10	Type of substructure RR Stone Masonry wall type
11	Type of superstructure RCC solid slab
12	Existing Formation Level 250.000 m
13	Final Formation Level 250.000 m
14	Bed Level 257.529 m
15	Distance of P.C.T. w.r.t. E.C.L. 0.03 m Right

REHABILITATION MEASURES SUGGESTED

SI no.	Items	Rehabilitation Measures	Reference Drawings
1	Grouting	Grouting to be done for entire slab with polymer modified cementitious material.	
2	Grouting	Grouting followed by 40 mm th CC to be done for slab.	
3	Pitching & Toe wall	Pitching and toe walls shall be provided on all sides of the existing bridge.	OSRP CEG SHE-10 BR-FW-07
4	Bed protection	Bed protection to be redone and curtain wall shall be provided on both U.S. & D.S. sides.	OSRP CEG SHE-10 BR-FW-08

TO BHAWANIPATNA

TO KHARIAR

(A1)

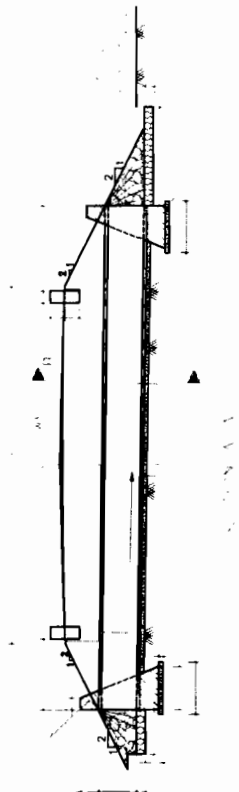
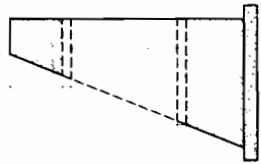
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KEY PLAN

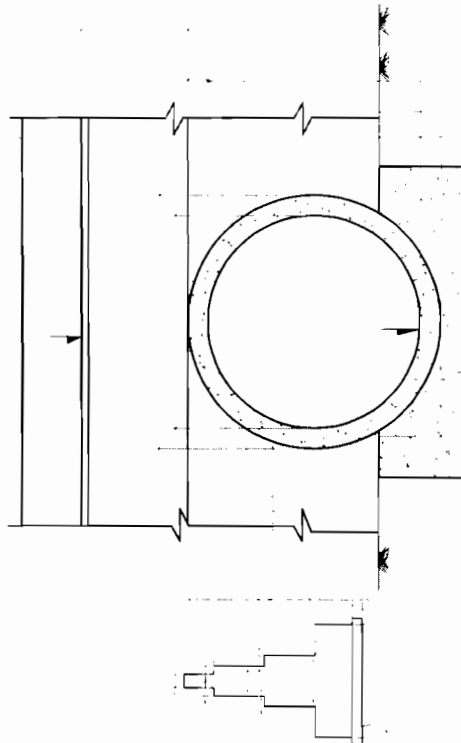
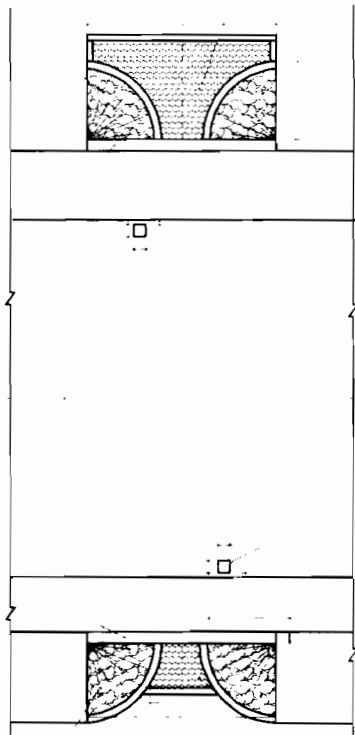
Design Discharge (cum/sec) in	Max. scour Level in (mts)	Depth of curtain Wall in (mts)				Length of Rigid Apron in (mts)				Length of Flexible Apron in (mts)			
		u/s	d/s	DCW ₁	DCW ₂	u/s	d/s	DCW ₁	DCW ₂	u/s	d/s	LFA ₁	LFA ₂



Chief Engineer
World Bank Project
for the E.C.G.C. Odisha
World Bank Projects, Odisha



BARBRIK Project Limited
Contractor



Chief Engineer
World Bank Projects, Odisha
Bhubaneswar

Sl. No.	Location	Proposed Chainage	Proposed Formation Level	Bed level		Camber/Superelevation		Height of Fill		LW1	RW1	Direction of flow	Total Length	No. of Pipes
				Left	Right	Left	Right	Left (H1)	Right (H2)					
1	4/100	4112	265.418	263.376	263.646	-2.5%	-2.5%	1.1	1.1	2.2	2.2	L TOR	16.4	6.5
2	5/450	5494	260.021	257.602	257.518	-2.5%	-2.5%	1.5	1.5	3.0	2.9	R TOR	17.9	7
3	7/015	7030	255.414	251.780	252.050	-2.5%	-2.5%	2.7	2.7	5.4	5.4	L TOR	22.8	9
4	10/700	10698	240.660	236.670	237.790	-2.5%	-2.5%	3.0	3.1	6.1	6.1	L TOR	24.2	10
5	11/650	11700	254.701	251.242	252.447	-2.5%	-2.5%	2.5	2.5	5.0	5.0	R TOR	22.1	9
6	12/600	12599	247.162	245.360	245.270	-2.5%	-2.5%	0.9	0.9	1.7	1.7	L TOR	15.4	6
7	12/750	12746	246.504	244.300	245.030	-2.5%	-2.5%	1.3	1.3	2.5	2.5	L TOR	17.0	7
8	12/800	12826	246.293	244.870	244.420	-2.5%	-2.5%	0.6	0.6	1.2	1.1	R TOR	14.3	6
9	15/005	14950	235.156	233.550	233.560	-2.5%	-2.5%	0.7	0.7	1.3	1.3	L TOR	14.6	6
10	15/250	15191	235.469	232.620	232.720	-2.5%	-2.5%	1.9	1.9	3.8	3.8	L TOR	19.6	8
11	19/700	19661	224.345	222.793	222.560	-2.5%	-2.5%	0.7	0.7	1.4	1.4	R TOR	14.8	6
12	23/250	23200	221.715	219.040	220.100	7.0%	-7.0%	2.3	2.3	4.6	4.6	R TOR	21.2	8.5
13	24/100	24062	229.644	227.310	228.620	-2.5%	-2.5%	1.4	1.4	2.8	2.8	L TOR	17.6	7
14	27/100	27045	218.039	216.110	216.110	-2.5%	-2.5%	1.0	1.0	2.0	2.0	L TOR	15.9	6.5
15	27/250	27175	217.520	214.870	214.870	-2.5%	-2.5%	1.7	1.7	3.4	3.4	L TOR	18.8	7.5
16		36961	245.586	243.851	243.751	-2.5%	-2.5%	1.7	1.7	3.4	3.4	L TOR	18.8	7.5
17	42/550	42635	234.181	231.849	232.721	-2.5%	-2.5%	1.4	1.4	2.8	2.8	L TOR	17.6	7
18	45/150	45296	234.938	232.165	231.964	-2.5%	-2.5%	1.8	1.8	3.7	3.6	R TOR	19.3	8
19	47/200	47322	231.720	229.204	229.271	-2.5%	-2.5%	1.6	1.6	3.1	3.2	L TOR	18.3	7.5
20	51/025	51174	249.510	247.830	247.753	-2.5%	-2.5%	0.7	0.7	1.5	1.5	R TOR	14.9	6
21	51/900	52068	247.975	246.399	245.738	-2.5%	-2.5%	0.6	0.6	1.3	1.3	R TOR	14.5	6
22	52/250	52424	249.254	246.893	246.662	7.0%	-7.0%	2.0	2.0	4.0	4.0	R TOR	19.9	8
23		52630	245.800	242.300	242.286	7.0%	-7.0%	2.0	2.0	4.0	4.0	R TOR	19.9	8
24	53/500	53679	244.887	242.579	242.444	-2.5%	-2.5%	1.4	1.4	2.7	2.7	R TOR	17.5	7
25	55/250	55420	241.909	240.353	240.245	4.4%	-4.4%	1.0	1.0	2.1	2.0	R TOR	16.1	6.5
26	57/150	57321	249.516	249.486	248.256	-2.5%	-2.5%	0.9	0.9	1.8	1.8	L TOR	15.5	6.5
27	57/500	57360	251.311	249.516	249.740	-2.5%	-2.5%	0.9	0.8	1.7	1.7	R TOR	15.4	6
28	57/900	57664	254.867	253.039	252.666	-2.5%	-2.5%	0.9	0.9	1.8	1.8	L TOR	15.5	6.5
29	62/900	62962	253.495	251.769	250.898	-2.5%	-2.5%	0.8	0.8	1.6	1.6	R TOR	15.1	6
30	63/900	63700	250.800	249.157	249.090	-2.5%	-2.5%	0.7	0.7	1.4	1.4	R TOR	14.8	6
31	64/600	64622	260.145	258.486	258.570	-2.5%	-2.5%	0.7	0.7	1.4	1.4	L TOR	14.9	8
32	64/825	64891	259.679	256.742	256.101	-2.5%	-2.5%	2.0	2.0	4.0	4.0	R TOR	20.0	8
33	65/100	65122	257.190	255.370	255.377	7.0%	-7.0%	1.5	1.4	2.9	2.9	R TOR	17.8	7
34	65/350	65430	258.134	255.928	256.231	-2.5%	0.5%	1.3	1.3	2.5	2.5	R TOR	17.0	7
35	67/550	67325	270.381	267.297	268.696	-2.5%	-2.5%	2.1	2.1	4.3	4.3	R TOR	20.6	8.5

Project:

ODISHA STATE ROAD PROJECT
Under World Bank Assistance

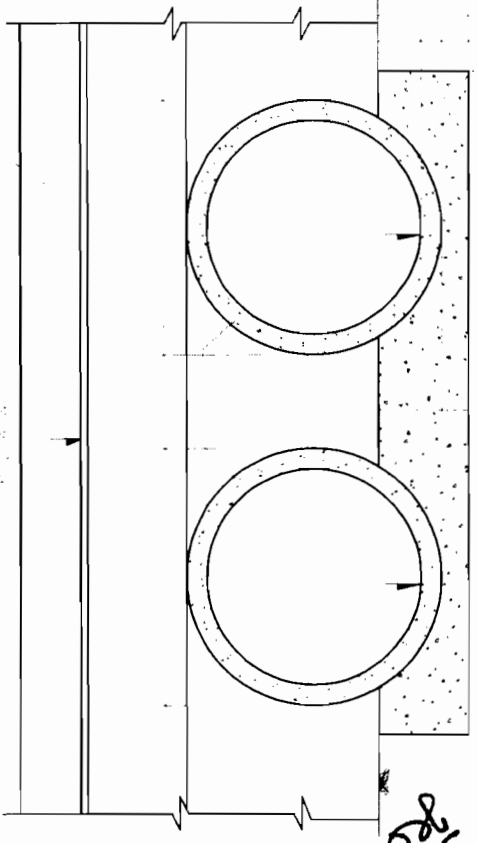
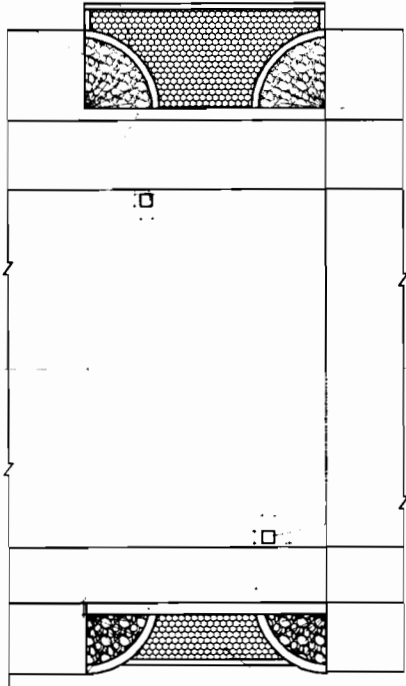
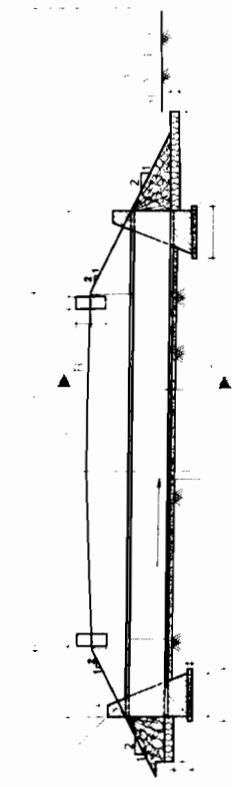
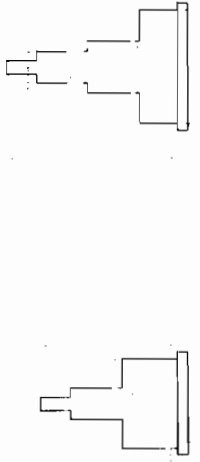
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TYPICAL ARRANGEMENT

FOR R.C.C SINGLE PIPE CULVERTS (1.0m DIA)
(HEIGHT OF FILL VARYING FROM 0.6 TO 4.0 M)

DATE	BY	REVISION	DATE	BY	REVISION



Sl. No	Location	Proposed Chaining	Proposed Formation Level	Bed level		Height of Fill		Direction of flow	Total Length Pipes			
				Left	Right	Left (ft)	Right (ft)					
1	37450	3883	268.662	264.741	264.919	-2.5%	1.0	1.9	2.0	L TO R	15.9	13
2	167050	6802	237.738	238.170	238.110	6.1%	1.2	1.2	2.3	R TO L	16.6	13.5
3	181100	1847	278.762	227.162	227.510	-2.5%	0.7	0.6	1.3	R TO L	11.6	17
4	181100	22135	228.762	227.162	227.510	-2.5%	0.7	0.6	1.3	R TO L	14.6	12
5	22350	27380	270.680	218.350	218.500	-2.5%	1.4	1.4	2.8	R TO L	17.5	14
6	23650	23061	273.724	271.717	271.701	-2.5%	1.3	1.3	2.5	R TO L	17.1	14
7	23650	23538	273.644	271.439	272.200	-2.5%	1.3	1.3	2.5	R TO L	17.1	14
8	29750	25723	222.512	219.950	219.970	-2.5%	1.6	1.5	3.2	R TO L	18.5	15
9	26750	26635	218.123	216.150	216.170	-2.5%	1.3	1.3	2.6	R TO L	17.3	14
10	34700	34732	230.600	228.701	228.104	-2.5%	0.9	0.9	1.9	L TO R	15.8	13
11	39100	39150	240.530	238.641	238.644	-2.5%	0.9	0.9	1.9	L TO R	15.8	13
12	46700	46725	230.559	228.358	228.355	-2.5%	0.8	0.8	1.7	R TO R	15.7	12.5
13	51300	51300	231.114	229.375	229.375	-2.5%	0.8	0.8	1.8	R TO L	15.7	12.5
14	51430	51506	251.904	249.489	249.515	-2.5%	1.6	1.6	3.1	R TO L	18.2	14.5
15	523100	52206	240.441	238.975	238.630	5.3%	1.0	1.0	2.0	R TO L	16.0	13

BARBRIK
Project Limited
Contractor

World Bank Project
Under the E.I.C. (Civil), Odisha
Chief Engineer
World Bank Projects, Odisha

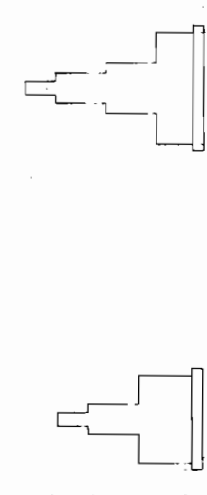
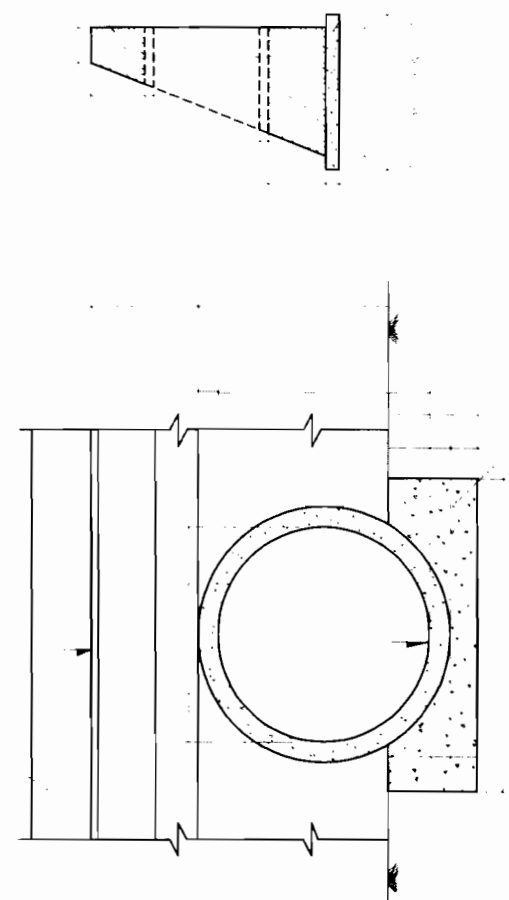
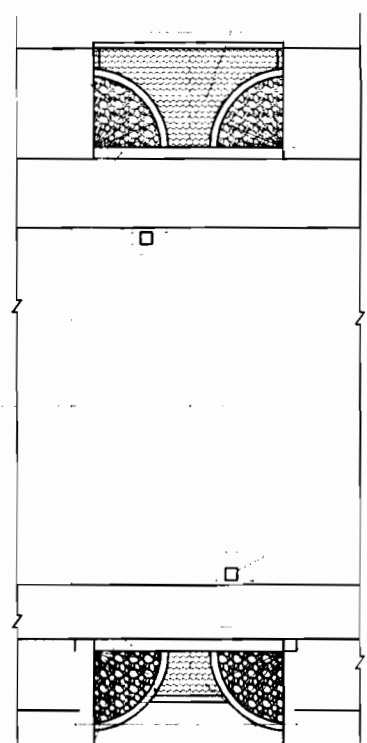
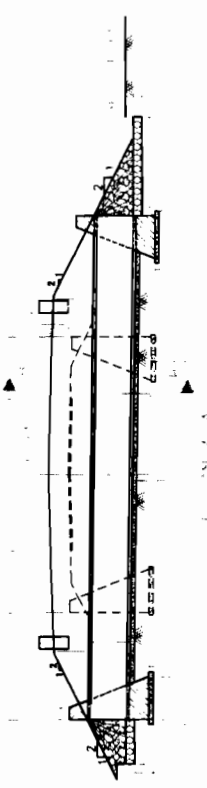
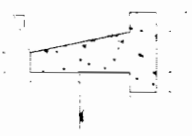
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CEG

ODISHA STATE ROAD PROJECT
Under World Bank Assistance

TYPICAL ARRANGEMENT
FOR R.C.C DOUBLE PIPE CULVERTS (1.0m DIA)
(HEIGHT OF FILL VARYING FROM 0.6 TO 4.0 M)

Drawing No.: ...
Scale: 1:100
Date: ...



Sl. No.	Location	Proposed Change	Dia of existing pipe	Proposed Formation Level		Bed level		Camber/Super elevation		LWS	Height of fill		Total widening		No. of Pipes	
				Left	Right	Left	Right	Left	Right		Left	Right	Left	Right	Left	Right
1	17000	0.351	1.810	239.567	247.447	237.215	255	2.56	0.9	0.6	R 10.0 L	0.6	2.2	1	1	
2	20450	2.402	3.812	241.935	247.769	242.000	255	2.56	0.3	2.0	L 10.0 R	7.4	4.1	1.5	2	
3	56000	5.957	1.800	246.662	243.967	241.596	255	2.56	3.5	0.6	R 10.0 L	3.7	4.0	1.5	1.5	

BARBRIK PROJECTS LTD.
 Project Limited
 Director

Chief Engineer
 World Bank Project
 Under the F.L.C. (C) of Odisha
 Chief Engineer
 World Bank Projects, Odisha

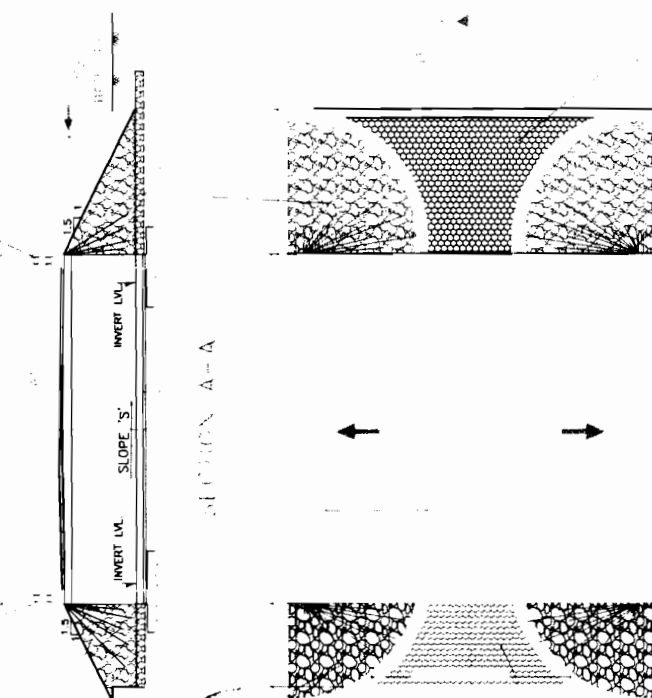
CE **EG**

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 Tel: +91-11-2208862, 2271899, 23205206
 Fax: 2321348, e-mail: ce@cegroupindia.com

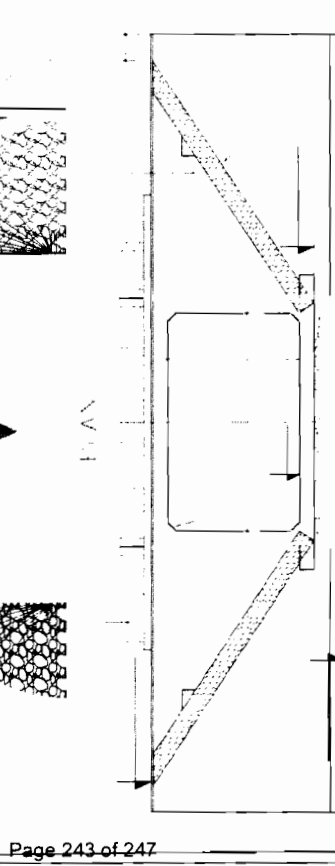
TYPICAL WIDENING ARRANGEMENT
 FOR R.C.C SINGLE PIPE CULVERTS (1.0m DIA)
 (HEIGHT OF FILL VARYING FROM 0.6 TO 4.0 M)

ODISHA STATE ROAD PROJECT
 Under World Bank Assistance

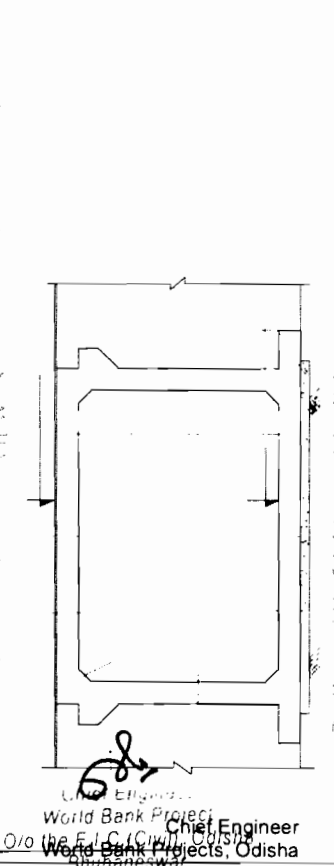
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 DESIGNED BY: [Signature]
 CHECKED BY: [Signature]
 DATE: [Signature]
 DATE: [Signature]



SIN	Location	Proposed Formation	Proposed Change	Bed level		Invert Level		Direction of flow	Clear Height	Thick ness	Thick ness	Thick ness	Height of Return Wall	Length of Return Wall
				Left	Right	Left	Right							
1	5840	5835	5835	241.90	241.90	240.20	240.20	L	2.5	1.0	1.0	0.42	0.30	4.1
2	5850	5845	5845	242.00	242.00	240.30	240.30	L	2.5	1.0	1.0	0.42	0.30	4.1
3	5860	5855	5855	242.10	242.10	240.40	240.40	L	2.5	1.0	1.0	0.42	0.30	4.1
4	5870	5865	5865	242.20	242.20	240.50	240.50	L	2.5	1.0	1.0	0.42	0.30	4.1
5	5880	5875	5875	242.30	242.30	240.60	240.60	L	2.5	1.0	1.0	0.42	0.30	4.1
6	5890	5885	5885	242.40	242.40	240.70	240.70	L	2.5	1.0	1.0	0.42	0.30	4.1
7	5900	5895	5895	242.50	242.50	240.80	240.80	L	2.5	1.0	1.0	0.42	0.30	4.1
8	5910	5905	5905	242.60	242.60	240.90	240.90	L	2.5	1.0	1.0	0.42	0.30	4.1
9	5920	5915	5915	242.70	242.70	241.00	241.00	L	2.5	1.0	1.0	0.42	0.30	4.1
10	5930	5925	5925	242.80	242.80	241.10	241.10	L	2.5	1.0	1.0	0.42	0.30	4.1
11	5940	5935	5935	242.90	242.90	241.20	241.20	L	2.5	1.0	1.0	0.42	0.30	4.1
12	5950	5945	5945	243.00	243.00	241.30	241.30	L	2.5	1.0	1.0	0.42	0.30	4.1
13	5960	5955	5955	243.10	243.10	241.40	241.40	L	2.5	1.0	1.0	0.42	0.30	4.1
14	5970	5965	5965	243.20	243.20	241.50	241.50	L	2.5	1.0	1.0	0.42	0.30	4.1
15	5980	5975	5975	243.30	243.30	241.60	241.60	L	2.5	1.0	1.0	0.42	0.30	4.1
16	5990	5985	5985	243.40	243.40	241.70	241.70	L	2.5	1.0	1.0	0.42	0.30	4.1
17	6000	5995	5995	243.50	243.50	241.80	241.80	L	2.5	1.0	1.0	0.42	0.30	4.1
18	6010	6005	6005	243.60	243.60	241.90	241.90	L	2.5	1.0	1.0	0.42	0.30	4.1
19	6020	6015	6015	243.70	243.70	242.00	242.00	L	2.5	1.0	1.0	0.42	0.30	4.1
20	6030	6025	6025	243.80	243.80	242.10	242.10	L	2.5	1.0	1.0	0.42	0.30	4.1
21	6040	6035	6035	243.90	243.90	242.20	242.20	L	2.5	1.0	1.0	0.42	0.30	4.1
22	6050	6045	6045	244.00	244.00	242.30	242.30	L	2.5	1.0	1.0	0.42	0.30	4.1
23	6060	6055	6055	244.10	244.10	242.40	242.40	L	2.5	1.0	1.0	0.42	0.30	4.1
24	6070	6065	6065	244.20	244.20	242.50	242.50	L	2.5	1.0	1.0	0.42	0.30	4.1



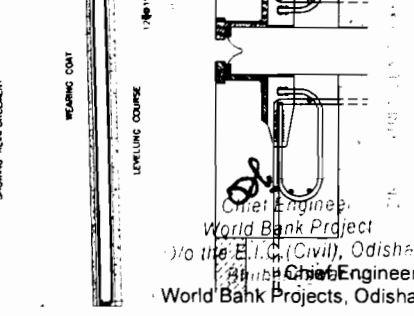
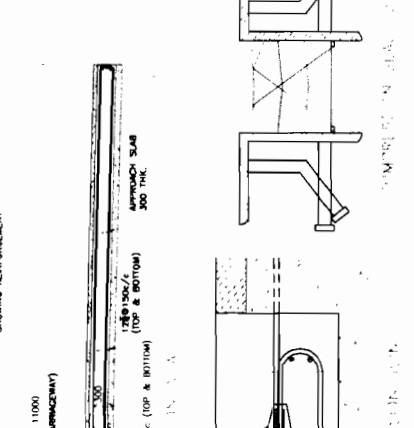
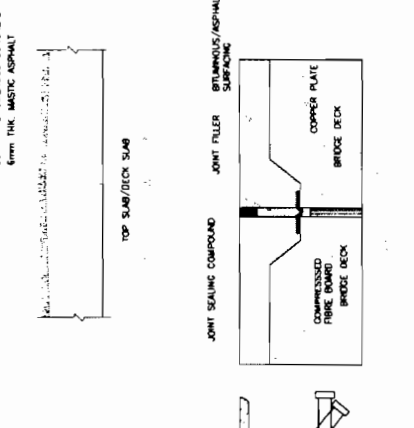
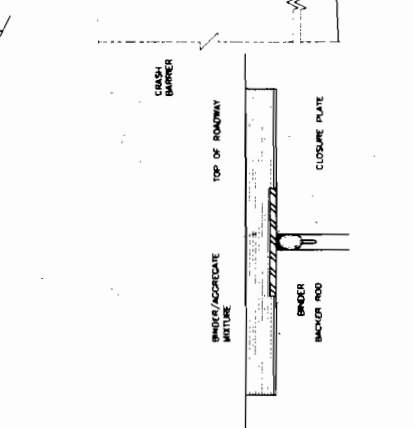
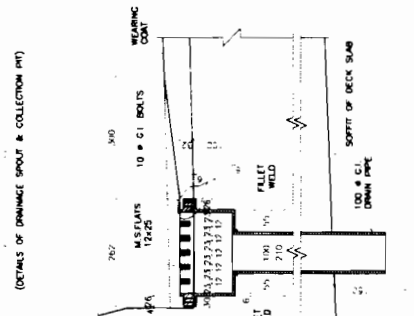
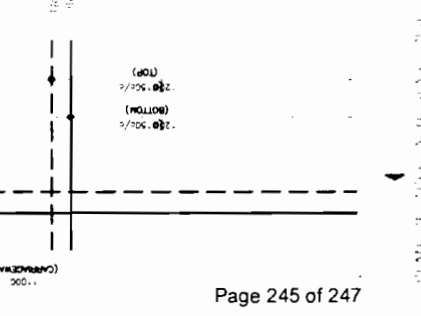
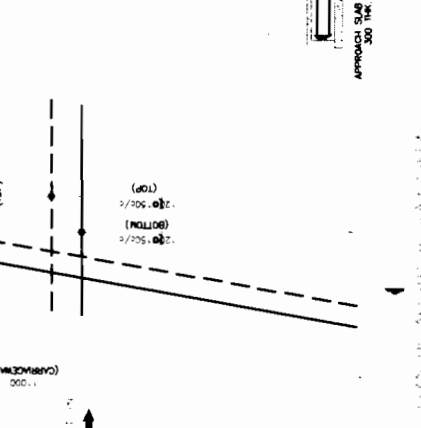
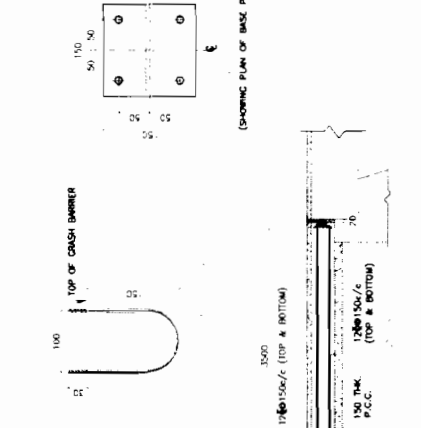
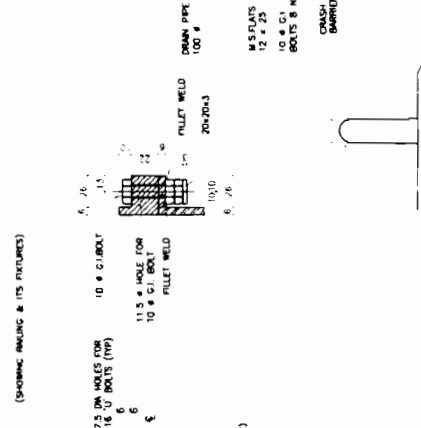
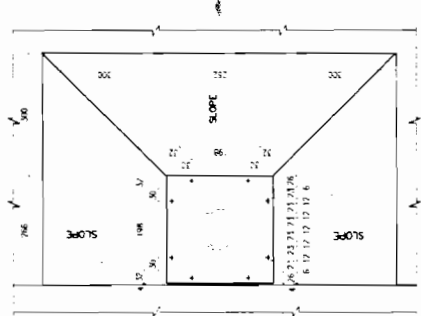
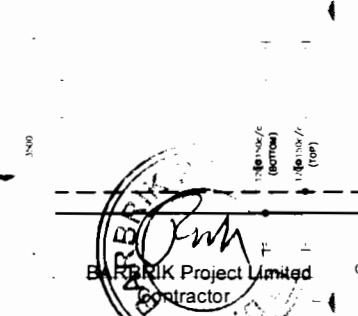
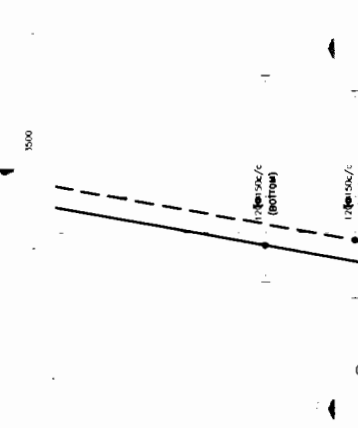
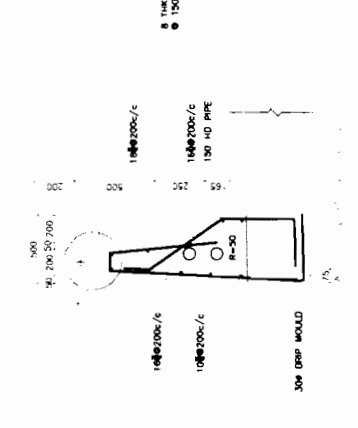
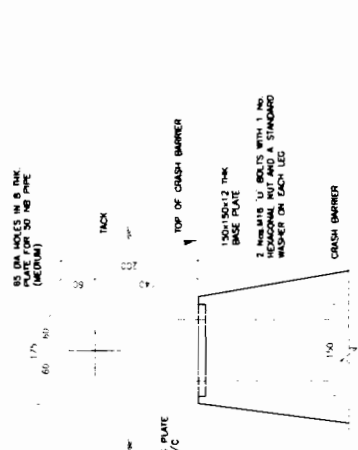
SIN	Location	Proposed Formation	Proposed Change	Bed level		Invert Level		Direction of flow	Clear Height	Thick ness	Thick ness	Thick ness	Height of Return Wall	Length of Return Wall
				Left	Right	Left	Right							
1	5850	5845	5845	242.00	242.00	240.30	240.30	L	2.5	1.0	1.0	0.42	0.30	
2	5860	5855	5855	242.10	242.10	240.40	240.40	L	2.5	1.0	1.0	0.42	0.30	
3	5870	5865	5865	242.20	242.20	240.50	240.50	L	2.5	1.0	1.0	0.42	0.30	
4	5880	5875	5875	242.30	242.30	240.60	240.60	L	2.5	1.0	1.0	0.42	0.30	
5	5890	5885	5885	242.40	242.40	240.70	240.70	L	2.5	1.0	1.0	0.42	0.30	
6	5900	5895	5895	242.50	242.50	240.80	240.80	L	2.5	1.0	1.0	0.42	0.30	
7	5910	5905	5905	242.60	242.60	240.90	240.90	L	2.5	1.0	1.0	0.42	0.30	
8	5920	5915	5915	242.70	242.70	241.00	241.00	L	2.5	1.0	1.0	0.42	0.30	
9	5930	5925	5925	242.80	242.80	241.10	241.10	L	2.5	1.0	1.0	0.42	0.30	
10	5940	5935	5935	242.90	242.90	241.20	241.20	L	2.5	1.0	1.0	0.42	0.30	
11	5950	5945	5945	243.00	243.00	241.30	241.30	L	2.5	1.0	1.0	0.42	0.30	
12	5960	5955	5955	243.10	243.10	241.40	241.40	L	2.5	1.0	1.0	0.42	0.30	
13	5970	5965	5965	243.20	243.20	241.50	241.50	L	2.5	1.0	1.0	0.42	0.30	
14	5980	5975	5975	243.30	243.30	241.60	241.60	L	2.5	1.0	1.0	0.42	0.30	
15	5990	5985	5985	243.40	243.40	241.70	241.70	L	2.5	1.0	1.0	0.42	0.30	
16	6000	5995	5995	243.50	243.50	241.80	241.80	L	2.5	1.0	1.0	0.42	0.30	
17	6010	6005	6005	243.60	243.60	241.90	241.90	L	2.5	1.0	1.0	0.42	0.30	
18	6020	6015	6015	243.70	243.70	242.00	242.00	L	2.5	1.0	1.0	0.42	0.30	
19	6030	6025	6025	243.80	243.80	242.10	242.10	L	2.5	1.0	1.0	0.42	0.30	
20	6040	6035	6035	243.90	243.90	242.20	242.20	L	2.5	1.0	1.0	0.42	0.30	
21	6050	6045	6045	244.00	244.00	242.30	242.30	L	2.5	1.0	1.0	0.42	0.30	
22	6060	6055	6055	244.10	244.10	242.40	242.40	L	2.5	1.0	1.0	0.42	0.30	
23	6070	6065	6065	244.20	244.20	242.50	242.50	L	2.5	1.0	1.0	0.42	0.30	



SIN	Location	Proposed Formation	Proposed Change	Bed level		Invert Level		Direction of flow	Clear Height	Thick ness	Thick ness	Thick ness	Height of Return Wall	Length of Return Wall
				Left	Right	Left	Right							
1	5850	5845	5845	242.00	242.00	240.30	240.30	L	2.5	1.0	1.0	0.42	0.30	
2	5860	5855	5855	242.10	242.10	240.40	240.40	L	2.5	1.0	1.0	0.42	0.30	
3	5870	5865	5865	242.20	242.20	240.50	240.50	L	2.5	1.0	1.0	0.42	0.30	
4	5880	5875	5875	242.30	242.30	240.60	240.60	L	2.5	1.0	1.0	0.42	0.30	
5	5890	5885	5885	242.40	242.40	240.70	240.70	L	2.5	1.0	1.0	0.42	0.30	
6	5900	5895	5895	242.50	242.50	240.80	240.80	L	2.5	1.0	1.0	0.42	0.30	
7	5910	5905	5905	242.60	242.60	240.90	240.90	L	2.5	1.0	1.0	0.42	0.30	
8	5920	5915	5915	242.70	242.70	241.00	241.00	L	2.5	1.0	1.0	0.42	0.30	
9	5930	5925	5925	242.80	242.80	241.10	241.10	L	2.5	1.0	1.0	0.42	0.30	
10	5940	5935	5935	242.90	242.90	241.20	241.20	L	2.5	1.0	1.0	0.42	0.30	
11	5950	5945	5945	243.00	243.00	241.30	241.30	L	2.5	1.0	1.0	0.42	0.30	
12	5960	5955	5955	243.10	243.10	241.40	241.40	L	2.5	1.0	1.0	0.42	0.30	
13	5970	5965	5965	243.20	243.20	241.50	241.50	L	2.5	1.0	1.0	0.42	0.30	
14	5980	5975	5975	243.30	243.30	241.60	241.60	L	2.5	1.0	1.0	0.42	0.30	
15	5990	5985	5985	243.40	243.40	241.70	241.70	L	2.5	1.0	1.0	0.42	0.30	
16	6000	5995	5995	243.50	243.50	241.80	241.80	L	2.5	1.0	1.0	0.42	0.30	
17	6010	6005	6005	243.60	243.60	241.90	241.90	L	2.5	1.0	1.0	0.42	0.30	
18	6020	6015	6015	243.70	243.70	242.00	242.00	L	2.5	1.0	1.0	0.42	0.30	
19	6030	6025	6025	243.80	243.80	242.10	242.10	L	2.5	1.0	1.0	0.42	0.30	
20	6040	6035	6035	243.90	243.90	242.20	242.20	L	2.5	1.0	1.0	0.42	0.30	
21	6050	6045	6045	244.00	244.00	242.30	242.30	L	2.5	1.0	1.0	0.42	0.30	
22	6060	6055	6055	244.10	244.10	242.40	242.40	L	2.5	1.0	1.0	0.42	0.30	
23	6070	6065	6065	244.20	244.20	242.50	242.50	L	2.5	1.0	1.0	0.42	0.30	

SIN	Location	Proposed Formation	Proposed Change	Bed level		Invert Level		Direction of flow	Clear Height	Thick ness	Thick ness	Thick ness	Height of Return Wall	Length of Return Wall
				Left	Right	Left	Right							
1	5850	5845	5845	242.00	242.00	240.30	240.30	L	2.5	1.0	1.0	0.42	0.30	
2	5860	5855	5855	242.10	242.10	240.40	240.40	L	2.5	1.0	1.0	0.42	0.30	
3	5870	5865	5865	242.20	242.20	240.50	240.50	L	2.5	1.0	1.0	0.42	0.30	
4	5880	5875	5875	242.30	242.30	240.60	240.60	L	2.5	1.0	1.0	0.42	0.30	
5	5890	5885	5885	242.40	242.40	240.70	240.70	L	2.5					

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. DO NOT SCALE THE DIMENSIONS, ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED
3. JOINT FILLER IS COMPARED TO IS: 1838 ONLY BE USED IN CONCRETE JOINTS
4. DRAINAGE SPOUT AND COLLECTION PIT ASSEMBLY IS APPROVED BY THE ROAD DEVELOPMENT AUTHORITY, ODISHA. THE SLOPE OF THE SPOUT SHALL BE 1:10. THE SLOPE OF THE COLLECTION PIT SHALL BE 1:10. THE SLOPE OF THE DRAINAGE SPOUT SHALL BE 1:10. THE SLOPE OF THE COLLECTION PIT SHALL BE 1:10.
5. THE REINFORCEMENT OF THE DECK SLAB IS SUITABLY ADJUSTED TO ACCOMMODATE THE DRAINAGE SPOUT
6. GRADE OF CONCRETE
 - 14-15
 - 16-18
 - 19-20
 - 21-22
 - 23-24
 - 25-26
 - 27-28
 - 29-30
 - 31-32
 - 33-34
 - 35-36
 - 37-38
 - 39-40
 - 41-42
 - 43-44
 - 45-46
 - 47-48
 - 49-50
 - 51-52
 - 53-54
 - 55-56
 - 57-58
 - 59-60
 - 61-62
 - 63-64
 - 65-66
 - 67-68
 - 69-70
 - 71-72
 - 73-74
 - 75-76
 - 77-78
 - 79-80
 - 81-82
 - 83-84
 - 85-86
 - 87-88
 - 89-90
 - 91-92
 - 93-94
 - 95-96
 - 97-98
 - 99-100
7. CLEAR COVER TO REINFORCEMENT = 40mm
8. ALL DIMENSIONS ARE TO BE COMFORMED TO IS: 1789



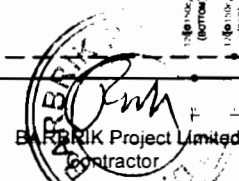
DATE	NO.	BY	CHKD.	APPD.

DETAILS OF CRASH BARRIER, EXPANSION JOINT, APPROACH SLAB & DRAINAGE SPOUT

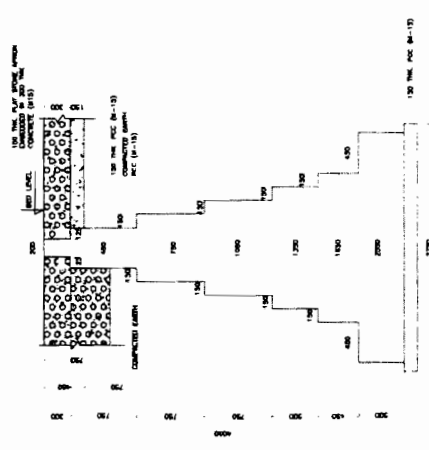
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CHIEF ENGINEER
 WORLD BANK PROJECT
 CHIEF ENGINEER
 WORLD BANK PROJECTS, ODISHA

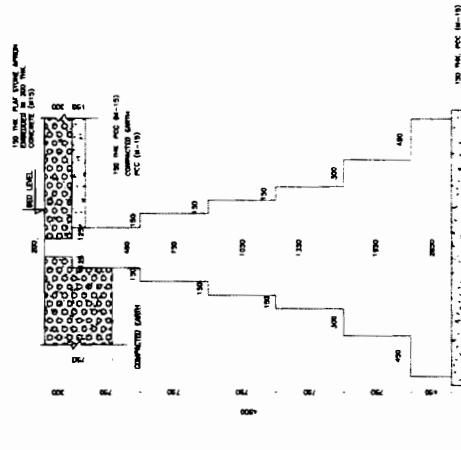
CHIEF ENGINEER
 WORLD BANK PROJECTS, ODISHA



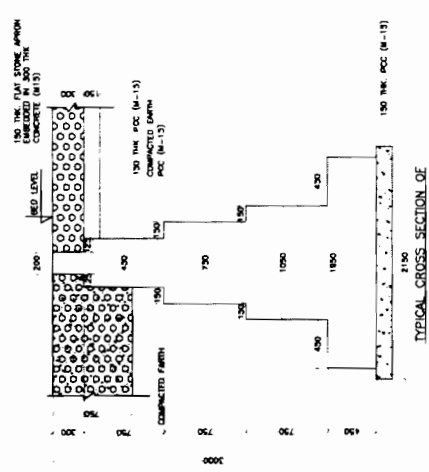
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- 2. OSRP/CEC/SH-9A/BR/61+200/01
- 3. OSRP/CEC/SH-9A/BR/63+400/01
- 4. OSRP/CEC/SH-9A/BR/66+700/01
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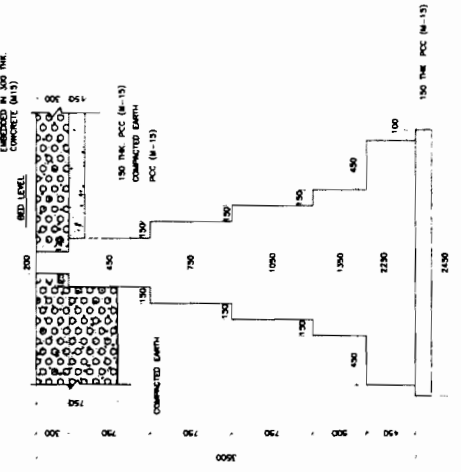
TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - I



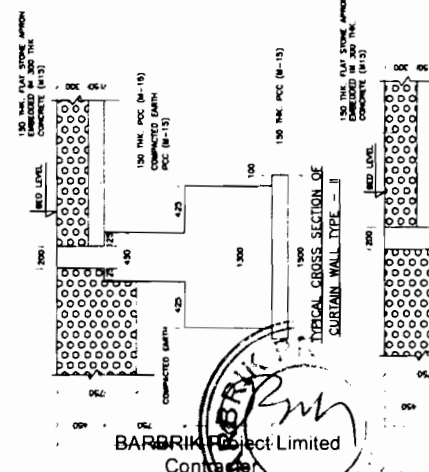
TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - II



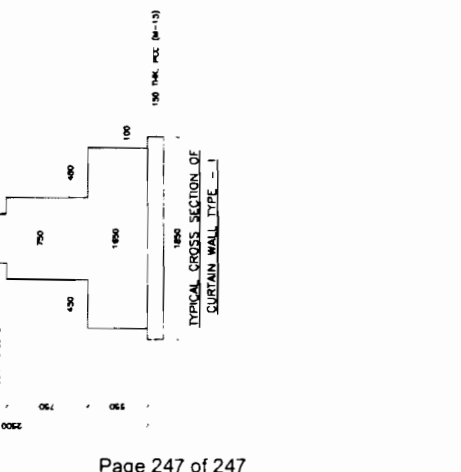
TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - III



TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - IV

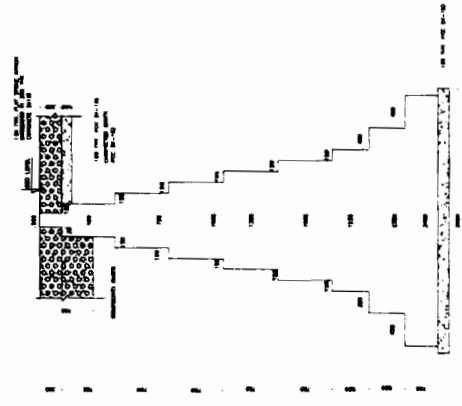


TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - V

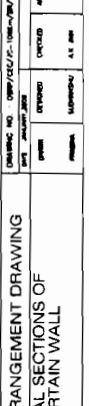


TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - VI

TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - VII



TYPICAL CROSS SECTION OF CURTAIN WALL TYPE - VIII



BARBRIK Project Limited
Contract No.

Chief Engineer
World Bank Project
O/o the E.I.C. Chief Engineer
World Bank Project, Odisha

GENERAL ARRANGEMENT DRAWING
TYPICAL SECTIONS OF CURTAIN WALL

PROJECT: CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ODISHA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD

DATE	REVISION	BY	CHKD



GOVERNMENT OF ODISHA
WORKS DEPARTMENT

CIVIL WORKS CONTRACT
PACKAGE No. OSRP-Bal-P01A

For

***Widening of Strengthening of Existing Carriageway to 2 Lane Road
from Bhawanipatna to Khariar***

(2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work)

under

Odisha State Roads Project

between

Chief Engineer, World Bank Projects, Odisha
(on behalf of Works Department, Government of Odisha)

and

M/s BARBRIK Project Limited
Nehru Park Road, Surajpur, Chhatisgarh, INDIA

Agreement Value: Rs. 84,50,54,599

*Project Management Unit, Odisha State Roads Project
Office of the Engineer-in-Chief (Civil), Odisha,
Nirman Soudha, Keshari Nagar, Unit – V, Bhubaneswar – 751 001*

Dated: 05 July, 2013




Chief Engineer,
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

CONTENTS OF CONTRACT

Volume-I : Sections No- 3, 4 & 6
Volume-II : Sections No- 5, 7 & Work Programme



M/s BARBRAK Project Limited,
Contractor



Chief Engineer,
World Bank Projects,
O-o the E.I.C.(Civil),
Bhubaneswa

Chief Engineer,
World Bank Projects, Odisha

SECTION 5: TECHNICAL SPECIFICATIONS



M/s BARBRIK Project Limited,
Contractor


Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha -
Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

GENERAL TECHNICAL REQUIREMENTS

1.0. GENERAL REQUIREMENTS

The Technical Specifications in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor, and comprise of the following:

1.1 PART – I - General Technical Specifications

The General Technical Specifications shall be the “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS” (FOURTH REVISION – 2001, Reprint 2006), as corrected in the original issued by the Ministry of Shipping , Road Transport & Highways(MORTH), Government of India and published by the Indian Roads Congress (IRC), with a cross reference to relevant Bureau of Indian Standards (BIS) for materials or other aspects not covered by the IRC.

1.2 PART - II - Supplementary Technical Specifications

The Supplementary Technical Specifications shall comprise various Amendments/Modifications/Additions to the “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS” referred to in PART - I above and also **Additional Specifications** for particular item of works not already covered in PART-I.

1.2.1 A particular Clause or a part thereof in “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FOURTH REVISION - 2001, Reprint 2006)” as corrected in the original referred in PART - I above, where Amended/Modified/Added upon, and incorporated in PART-II, referred to above, such Amendment/Modification/Addition supersedes the relevant Clause or part of the Clause.

1.2.2 When an Amended/Modified/Added Clause supersedes a Clause or part thereof in the said Specifications, then any reference to the superseded Clause shall be deemed to refer to the Amended/Modified/Added Clause or part thereof.

1.2.3 In so far as Amended/Modified/Added Clause may come in conflict or be inconsistent with any of the provisions of the said Specifications under reference, the Amended/Modified/Added Clause shall always prevail.

1.2.4 The Additional Specifications shall comprise specifications for particular item of works not already covered in PART - I.

1.2.5 The Sub-Clauses of the following Sections in the “Specifications for Road and Bridge Works (Fourth Revision – 2001, Reprint 2006) have been amended/modified/added upon 100, 200, 300, 400, 500, 600, 800, 900, 1000, 1500, 1600, 1700, 2000, 2200, 2600 & 2800.

1.2.6 Additional Specifications

The following Clauses have been added to the 'SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FOURTH REVISION – 2001, Reprint 2006)'.

- A-1 Diversion and filling of existing water courses along the road alignment.
- A-2 Plantation of trees.
- A-3 Void Former.
- A-4 Embankment Construction with Fly Ash Modified Soil

1.2.7 In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specifications of IRC and IS in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the Engineer and in case of any dispute arising out of the interpretation of the above, the decision of the Engineer shall be final and binding on the Contractor.

1.2.8 The provisions of special conditions of contract, those specified elsewhere in the tender document, as well as execution drawings and notes, or other specifications issued in writing by the Engineer shall form part of the technical specifications of this project.

1.3 PART – III- Specifications for Building Works

1.4 PART – IV- Specifications and Guidelines for Environment Mitigation Plan

PART – I

The General Technical Specifications shall be the “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS” (FOURTH REVISION – 2001, Reprint 2006), as corrected in the original issued by the Ministry of Shipping , Road Transport & Highways(MORTH), Government of India and published by the Indian Roads Congress (IRC), with a cross reference to relevant Bureau of Indian Standards (BIS) for materials, testing acceptance or other such aspects not covered by the IRC.



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PART- II SUPPLEMENTARY TECHNICAL SPECIFICATION

(AMENDMENTS/ ALTERATIONS/ MODIFICATIONS/ ADDITIONS/DELETIONS
TO EXISTING CLAUSES OF GENERAL TECHNICAL SPECIFICATIONS-PART-I)

SECTION 100 GENERAL

Clause 102 Definitions

The following abbreviations shall be added in this Clause.

“MORTH” - Ministry of Road Transport & Highways (This has been renamed as Ministry of Shipping, Road Transport and Highways)

“WBM” - Water Bound Macadam

“WMM” - Wet Mix Macadam

“MDD” - Maximum Dry Density (as per IS: 2720-Part 8)

“OMC” - Optimum Moisture Content

Wherever in the Specification, the phrase “Condition of Contract” is Mentioned, it shall mean Conditions of Contract part-I and II Contained in Section.. of Bidding Documents.

Clause 103 Add at the end of the clause

The latest edition of these standards or any other relevant standards till 30 (thirty) days before the final date of submission of the tender shall be adopted.

Clause 105 Scope of Work

Clause 105.3 Add the following below the existing clause

The contractor shall establish, adhere to monitor and maintain an adequate Quality Management Plan (QMP).

The QMP shall provide input to the overall project management plan and shall include quality control, quality assurance, and continuous process improvement approaches for the project. The QMP shall cover the quality assurance aspects of all services rendered, all items to be supplied and all construction activities to be performed under the Contract, also including temporary structures and equipment which will influence the quality of the completed works or the progress of the Contract.

The QMP shall provide input to the overall project management plan and shall include Quality Control Checklists, Quality Assurance Plan, and continuous process improvement approaches for the project. The QMP shall be reviewed by the Engineer to ensure that decisions are



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based on accurate information and to assure reduction of cost and schedule overruns caused by *rework*. The Contractor's Quality Assurance Plan describes the methods and procedures which the Contractor will apply for the execution of the Contract, including how the contractor will:

- (a) identify the quality requirements specific to the contract,
- (b) plan and execute the work to satisfy those requirements
- (c) inspect and/or test the work to ensure compliance with the quality requirements
- (d) ensure strict document control and structured filing of contract administration documents
- (e) record and monitor the results as evidence of compliance
- (f) monitor the material supply and delivery processes;
- (g) ensure the ability to trace materials incorporated in the works;
- (h) undertake testing and measurement requirements;
- (i) provide evidence of testing apparatus being recently calibrated;
- (j) demonstrate manufacturer's specification confirming compliance of materials;
- (k) record of required testing, measurement and design sheets;
- (l) document all non-conformances and ensure that prompt action is taken to correct non-compliance.

The Contractor's Quality Management Plan must clearly describe the systems, procedures and methods that will be used to deliver and monitor compliance of the Services.

The QMP shall also cover subjects listed below:

- Organization and Management Responsibility
- Document and data control
- Construction programme
- Method statements
- Process Control
- Working, inspection, testing and documentation procedures
- Safety and emergency procedures
- Control and documentation of purchasing and handling of materials
- Non-conformity and corrective action.
- Internal quality audits
- Servicing
- Education and training of staff
- Site Environment Plan




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The general procedures of the QMP shall be submitted to the Employer and Engineer for approval not later than TWENTY EIGHT DAYS after the date of receipt of letter of acceptance. The special part of the QMP shall be submitted successively to the effect that it shall have been approved prior to the commencement of the activities to which the program shall apply.

Clause 105.4

Add the following sentence

“If the Quality Assurance plan of the project as finalized and approved by the Engineer demands other time schedule for various submissions and approvals, the QA plan requirement will prevail”.

Clause 106 (a)

Add the following sentence.

“The trial run is to be carried out laying the relevant pavement material and it is not to be part of the permanent works. The trial is to be carried out on prior approval of equipment by the Engineer-in-Charge.”

Clause 106 (b)

Add the following sentence

“The Contractor shall furnish to the engineer the detailed technical literature and other relevant documents regarding the performance of plant/equipment to Engineer for approval prior to its purchase or mobilization on site.”

Clause 107

Contract Drawings

Clause 107.1

Add the following after the end of the para

Contractor shall ensure that the design and drawings for the bridges are approved by Engineer through the Employer.

Clause 107.3

Add the following after the end of the para

After careful study of the drawings issued by the Engineer, the Contractor shall, prepare, where necessary all supplementary and working drawings with necessary field/construction information and check for adequacy of construction methods and procedure etc. and shall submit the same to the Engineer for approval prior to construction. Engineer shall be given not more than 7 days for review of these supplementary/working drawings and as directed, the contractor shall modify the drawings incorporating the comments and requirements of the Engineer.

The Contractor shall prepare detailed construction drawings for each culvert on the basis of the drawings given in Bid Documents and get them approved by the Engineer. The drawings shall be submitted to the engineer at least **7 days** before commencement of construction of culverts.



Clause 109

Setting Out

Clause 109.8

**Add the following Para in the end of Clause 109.8
Surveying Equipments and Personnel**

The Contractor shall provide the necessary surveying equipment, accessories, and surveyors and labours required for setting out and related measurements, including making available these to the Engineer and his representatives at different stages of the work. The surveying equipments shall meet the quality standards and shall be approved by the Engineer, in good working condition, available in adequate numbers and shall include interaila the following.

- i) Precision automatic level with micrometer attachment with tripods and leveling staff reading to 5mm accuracy by direct observation .
- ii) Total station with 2 spare batteries, charger, tripod, data capturing prisms in sufficient numbers, electronic embedded device data recorder, data packs and all necessary software for operation.
- iii) 3 meter straight edge
- iv) Field Umbrellas
- v) Ranging rods 50mm dia. 3m long straight with one end each metallic conical and painted alternatively black and white along the length.
- vi) Sprit Levels, plumb bobs
- vii) Invar/Steel tape graduated in meters, centimeter and millimeter.
 - a) 5m long
 - b) 30m long
- viii) Reference markers and pegs

The Contractor shall maintain the surveying equipments in good condition and calibrated from authorized agencies during the works and replace the ones which get worn out otherwise become unworkable.


The surveying equipments and related resources shall be provided under the general obligations of the Contractor requiring no separate payment.

Clause 109.10

Add new sub-clause

“Before carrying out any survey work the Contractor shall submit to the Engineer in writing for the approval of programme and methodology for the calibration of all optical and electronic survey equipment to be used on site during construction of the works. The Contractor will maintain calibration records for all such equipment in his site office, available at all times for inspection by the Engineer.”




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Clause 110 Public Utilities

Clause 110.2 Revise the clause as under

The Contractor's programme must take into account the period of notice and duration of diversionary works of each body as existing at site. The Contractor must also allow for any effect or these services and alterations upon the Works and for arranging regular meetings with the various bodies at the commencement of the Contract and throughout the period of the Works in order to maintain the required co-ordination. During the period of the Works, the contractor shall have no objection if the public utility bodies vary their decisions in the execution of their proposals in terms of programme and construction, provided that, in the opinion of the Engineer, the Contractor has received reasonable notice thereof before the relevant alterations are put in hand.

Clause 110.3 Add the following paragraph at the end of this Sub-clause.

Any utility services likely to be affected by the contractor's work shall be brought to the notice of the Engineer/ Employer and such work shall be undertaken only after getting written clearance from the Engineer.

Clause 111 Precautions for Safeguarding the Environment

This whole clause shall be modified by following.

Clause 111.1 General

The clause shall be read as follows

The contractor shall take all precautions for safeguarding the environment during the course of the construction of works. He shall abide by all rules, regulations and laws in force governing pollution and environmental protection that are applicable to the area where the works are situated.

On completion of the Works, all areas disturbed by the Contractor's construction activities shall be restored in their original condition, or as per the plan agreed prior to commencement of construction activities. .

The cost of such restoration work shall be deemed to be included in the rates, unless specifically mentioned in the contract.

Clause 111.2 Burrow pits for Embankment Construction

The clause shall be read as follows

Burrow pits shall not be dug within the Right-of-Way of the road. The contractor will submit a Burrow Area Management Plan before opening up any burrow area to ensure the schedules of his excavation activities, safety arrangements during operation and rehabilitation after closure of the burrow pit. The contractor shall operate strictly adhering to the Burrow Area Management Plan.

The Contractor will ensure that proper excavation techniques are used to improve stability and safety of the burrow area. The excavation shall be carried out in such a way that the area does not inundate during monsoons and generate cesspools of water for breeding site. The stipulations in Clause- 305.2.2 shall govern.

The cost of such safety and rehabilitation work shall be deemed to be included in the rates, unless specifically mentioned in the contract. Failure to adhere to the Environmental Mitigation Measures during construction will attract penalty as mentioned in the Contract data serial no. 37(c).

Clause 111.3

Quarry Operations

The clause shall be read as follows

The contractor shall obtain material from licensed quarries only after the consent of the forest department or other concerned authorities. The quarry operations shall be undertaken within the purview of the rules and regulations in force. Contractor shall ensure scheduling the movement of transport carrying material to and from site during non-peak hours. The contractor will ensure the schedules of his activities, safety arrangements during operation and rehabilitation after closure of the quarry. The contractor shall operate strictly adhering to the Burrow Area Management Plan.

The trucks carrying all types of construction material shall be covered with tarpaulin to prevent spillage and air pollution. Stockpiling of material shall be properly planned so as to ensure that no traffic jam takes place on the highway. In no case, overloading than the allowable capacity of vehicle shall be permitted.

The cost of such safety and rehabilitation work shall be deemed to be included in the rates, unless specifically mentioned in the contract. Failure to adhere to the Environmental Mitigation Measures during construction will attract penalty as mentioned in the Contract data serial no. 37(c).

Clause 111.5

Pollution from Hot Mix Plants and Batching Plants

Add the following paragraph at the end of this Sub-clause.


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The contractor shall ensure that noise, vibrations and emission conforms to the regulatory norms and be fitted with dust extraction unit. Failure to adhere to the norms will attract penalty as mentioned in the Contract data serial no. 37(c).

Clause 111.6 Substances hazardous to health

Add the following as 111.6.1 & 111.6.2

Clause 111.6.1 Precautions against Toxic Chemicals

The storage and use of any herbicide or other toxic chemical shall be strictly in accordance with the manufacture's instructions. The Engineer shall be given at least 7 working day's notice of the proposed use of any herbicide or toxic chemical.

A register of all herbicides and other toxic chemicals delivered to the site shall be kept and maintained up to date by the contractor. The register shall include name physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.

Clause 111.6.2 Precautions against generation of hazardous materials

The contractor shall not generally use or generate any material in the process work, which are hazardous to the health of persons, animals or vegetation. Where it is necessary to use some substance, which can cause injury to the health of the workers, the contractor shall provide suitable clothing or appliances to his workers, viz. ear plugs, helmets or dust masks or any other suitable devices.

Clause 112 Arrangement for Traffic during Construction

Clause 112.1 General

Delete the last sentence and add the following

“One week before undertaking work which would involve any obstruction whatsoever to traffic, the Contractor shall submit, for the Engineer's approval, a Traffic Control Plan.

The plan shall include:

- i) Typical drawing for temporary diversions in accordance with Sub Clause 112.3

- ii) Typical details of arrangements for construction under traffic including details of traffic arrangements proposed to be in place after the cessation of work each day.

Special consideration shall be given in the preparation of the Traffic Control Plan for the safety of pedestrian and works delineation of the roadway at night.

Temporary diversions will be constructed only with the approval of the Engineer.

Clause 112.2

Passage of Traffic along a part of the Existing Carriage way under improvement:

Replace the clause as follows


If the existing part road is used traffic movement during construction, then contractor will maintain it at his cost only.

Most of the carriageway of the project has intermediate/ double lane carriageway. Due to poor in geometries and drainage considerations, the finished road surface require raising. The average formation width in plain terrain is about 8m to 10m and in the hilly terrain about 7m to 10m. None of the roads have granular sub base extending to the full formation width. For strengthening/widening of existing carriage way, part of the existing carriage way & shoulders shall be used for passage of traffic.

For facilitating passage of traffic during construction, following methodology shall be followed. However the contractor may suggest any improved method to be approved by the Engineer. If in the opinion of the Engineer, the arrangement suggested by the Contractor is better and shall ease the traffic movement, the same shall be adopted. But in such case the Contractor shall furnish the full traffic management plan along with the methodology of construction. The method is for general locations and any site specific arrangement shall be finalized in consultation with the Engineer.

The work shall be carried out on half-half basis. The length of widening/strengthening work on one side shall be limited to 500m at a place for which the traffic diversion shall be provided. There should be minimum 20m gap between the two successive patches. In case longer stretches are allowed, trapezoidal passing places of 20m outer edge with granular base course overlaid with surface dressing for additional width of 2.5m shall be provided at every 500m interval. But in no case the total length of work on one side should exceed 1000m except in the case if permitted by the Engineer. The next length of 2000m or less may be planned on the opposite side with a minimum clear distance of 200m from the preceding patch.

The proposed centerline of the alignment shall be marked. The toe line of the embankment shall be marked on both sides of the alignment.


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After clearing & grubbing, benching the slope & compacting the original ground, earth work in embankment with approved material shall be taken up to the design sub grade level in the side on which the traffic is proposed to be allowed. The type of earth and compaction requirement shall match the requirement of embankment or sub grade for which the section has been planned, as this section shall be retained as part of the road section. GSB (two layers) as per design requirement, conforming to the specification requirement of clause 401 of MORTH shall be provided up to the end of formation level and compacted. Over this granular base lower layer (WMM1) shall be provided up to the end of formation level and compacted. Over this primer and surface dressing shall be provided to allow the vehicles to ply on the prepared surface. During such time the existing carriageway width of minimum 3.5m and one side of treated shoulder (total of 5.0 m) shall be left for plying of vehicles. The prepared surface for traffic flow should be min of 4.0m.


The work for the other side including the carriageway portion shall be taken up, up to the sub base/sub grade/embankment level to match with the sub base of the former side and if decided, continue construction of granular base (two layers). Bituminous work as per design requirement is taken up over the prepared granular base, to allow the vehicles to ply on the prepared surface. The work for the other side from the granular base second layer (upper layer) shall be taken up and constructed till all the layers to reach the proposed formation level. The Contractor in consultation with the Engineer shall decide whether the side allowed to traffic can be taken up for construction of Granular base layer.

The work of providing earth embankment, sub-grade and granular sub-base material so carried out shall be paid under relevant items of bill of quantities. It may be ensured to provide minimum availability of width of 4.0m for plying of vehicles. At the end of diversion, a suitable link with proper gradient should be provided.

The contractor shall maintain the bypass/diversion made with the granular base material during the period of construction by way of watering, compacting, and making good loss of material after filling up of the rutting/depression etc. by additional quantity of granular materials. The cost of maintenance, making good the loss of material, watering, compacting, leveling and dressing along with additional quantity of granular base material shall be considered as incidental to the work.

The side on which the traffic was plying till then shall be made good after rolling, leveling, dressing along with any additional material required to bring the same to the required camber or super-elevation as the case may be and compacted to achieve the desired density to receive the next course of granular sub-base or base to match the other half.




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The treated shoulder of the additional width if required to meet the minimum width criteria or passing of vehicles shall be either dismantled or retained. In case of dismantling the debris disposed off or reused as directed by the Engineer.


Where the excavation of the earth is required below the existing ground level, the toe line of the embankment shall be marked on both sides of the alignment. Then excavate the earth till the bottom of proposed sub grade level on one side from existing embankment toe line. Earth work in embankment with approved material shall be taken up to the design sub grade level in the side on which the traffic is proposed to be allowed. The type of earth and compaction requirement shall match the requirement of embankment or sub grade for which the section has been planned. Over this the same construction methodology should be adopted as mentioned above.

The work of providing earth embankment, sub-grade and granular sub-base material so carried out shall be paid under relevant items of bill of quantities. It may be ensured to provide minimum availability of width of 4.0m for plying of vehicles.

1. Traffic Safety Arrangements

The Contractor shall provide, fix in place & position adequate warning signs, speed breakers, barriers, marker posts etc., as per IRC: SP 55 - 2001 as well as other stipulations given in clause 112.4 to ensure safety of the traffic **at each part road location** as per the following table and maintain the same for the construction period. Provision of such traffic safety arrangements is mandatory and incidental to the work. No separate payment will be made on this account and no claim shall be entertained for providing the same. Non-performance of full or part of such items would lead to deductions pursuant to Clause 37(b) of Contract Data.

Sl. No	Item	Quantity
1.	Sign boards as per Technical Specifications Clause 801 including the Posts. Sheeting will be retro reflective type of high intensively grade with messages / borders/ signs etc.	
	(a) Men at Work (Triangular- 900mm side)	2 Nos
	(b) Overtaking Prohibited (Circular-600mm dia)	2 Nos
	(c) Compulsory turn (Circular-600mm dia)	2 Nos
	(d) Road Closed Take Part Road (Rectangular-1200x700mm)	2 Nos
2.	Wooden bullah delinator of 75mm dia and 2.0m height with white enamel painting	84 Nos


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	with 3nos reflecting sticker in each	
3.	Sand bag delinator containing 1 cft sand with 2nos reflecting sticker in each.	84 Nos
4.	Barricading tape	500 Rmt.

The Contractor shall be responsible for the dismantling and removal of all barricade and signages after completion of works.

Clause 112.3

Passage of Traffic along a Temporary Diversion

Replace the clause with following

Temporary diversion to carry traffic, either at the site of cross drainage structures which are to be replaced or at any other locations, shall comply with the following:

- a) Embankments as per clause 305. The use of fly ash in temporary diversions will not be permitted.
- b) Pavement 5.5m wide consisting of 150mm granular sub-base as per clause 401, 150mm granular base course as per clause 404, 405 or 406 and a 20mm premix carpet with seal coat as per clause 511 or mix seal surfacing as per clause 512
- c) Earth shoulders 2.5m wide on both side of the pavement as per clause 407
- d) Minimum horizontal radius on curves 50m
- e) Maximum gradient 5 percent and minimum camber of 2.5 percent
- f) Restriction of maximum speed to 30kmph
- g) Cross drainage structures (if any) shall be adequate to deal with the water flow using adequate numbers of 1.0m dia NP-4 RCC Hume pipes in sufficient rows at all seasons at that location. Care should be taken of the waterway area and other relevant parameters of the existing and proposed replacement structures as given in the drawings. Causeways may only be overtopped and the road closed to traffic for short periods in extreme flood conditions.
- h) Adequate erosion protection must be provided.
- i) The Contractor shall be responsible for the design of temporary diversions and submit the designs and drawings to the Engineer for his approval.
- j) If the contractor finds it necessary to construct part of any diversion outside the Right of Way the temporary use of additional land shall be arranged for by him at his expense.
- k) Any roadside trees that have to be removed for the construction of temporary diversions shall be the responsibility of the Contractor.
- l) **Traffic Safety Measures:-** The Contractor shall provide, fix in place & position adequate warning signs, speed breakers, barriers, marker posts etc., as per IRC: SP 55 - 2001 as well as



other stipulations given in clause 112.4 to ensure safety of the traffic **at each temporary diversion location** as per the following table and maintain the same for the construction period. Provision of such traffic safety arrangements is mandatory and incidental to the work. No separate payment will be made on this account and no claim shall be entertained for providing the same. Non-performance of full or part of such items would lead to deductions pursuant to Clause 37(b) of Contract Data.

Sl. No	Item	Quantity
1.	Sign boards as per Technical Specifications Clause 801 including the Posts. Sheeting will be retro reflective type of high intensively grade with messages / borders/ signs etc.	
	(a) Men at Work (Triangular- 900mm side)	4 Nos
	(b) Diversion Ahead (Rectangular-1200x700mm)	2 Nos
	(c) Overtaking Prohibited (Circular-600mm dia)	2 Nos
	(d) Compulsory turn (Circular-600mm dia)	2 Nos
	(e) Diversion (Rectangular-1200x700mm)	2 Nos
	(f) Road Close (Rectangular-1200x700mm)	2 Nos
	(g) One Way (Rectangular-1200x700mm)	2 Nos
2.	Type-III Barricade	2 Nos
3.	Wooden bullah delinator of 75mm dia and 2.0m height with white enamel painting with 3nos reflecting sticker in each	68 Nos
4.	Sand bag delinator containing 1 cft sand with 2nos reflecting sticker in each.	68 Nos
5.	Barricading tape	420 Rmt.

m) The Contractor shall be responsible for the dismantling, removal and disposal of all temporary diversions, barricade and signages when approved by the Engineer.

Clause 112.4


Traffic safety and Control

Add as the continuation of the first paragraph

If there is traffic jam during construction, measures shall be taken to relieve the congestion.



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Add the following sub-clauses under 112.4

Clause 112.4.1 Side Roads and Property Accesses

At all times, the Contractor shall provide safe and convenient passage for vehicles pedestrians and livestock to and from side roads.

Clause 112.4.2 Plant and Equipment

“During the day, plant and equipment working in a position adjacent to traffic and having a projection beyond the normal width of the item, for example, a grader blade shall have a fluorescent red marker attached to the outer end of the projection. During poor light conditions an additional traffic controller with an illuminated red marker shall direct traffic around such plant and equipment.

At night, all plant items and similar obstructions shall be removed from the normal path of vehicles, to provide a lateral clearance of at least 6m where practicable, with a minimum clearance of 1.2m.

Plant and equipment, within 6m of the normal path of vehicles, shall be lit by not less than two yellow steady lamps suspended vertically from the point of the obstruction nearest to a traffic lane, and one yellow steady lamp at each end of the obstruction on the side farthest away from the traffic lane”.

Clause 112.6 Measurements for Payments and Rate

Add below the second paragraph as follows

The contract rate also includes traffic safety and control as per clause 112.4 and maintenance of diversion of Traffic control devices as per clause 112.5. Failure to carry out the above activities, contractor shall be liable to be imposed with penalty for the first week of non-compliance report as mentioned in the contract documents. Beyond first week the same work will be carried out by third party, the cost of which is to be deducted from the contractor’s IPC in the same month.

Clause 113 General Rules for the Measurement of Works for Payment:

Clause 113.2 Measurements for Lead of Materials

Delete this Clause and replace with

“The rates in the Bill of Quantities are deemed to include the costs of haulage from source of supply to the plant as well as to the construction site as the case may be for all materials required for the Works.”




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Clause 114 Scope of Rates for Different Items of Work

Clause 114.2 Item (ii) of clause 114.2 shall read as follows

A detailed Resource Based Construction Programme (using Microsoft Project) shall be submitted, which facilitate control of the progress of the works and consequences of any changes in terms of time. The programme shall also include detailed network activities for the submission and approval of materials, procurement of critical materials and equipment fabrication of special products/ equipment and their installation and testing and for all activities of the Contractor that are likely to affect the progress of work etc. including updating all such activities on the basis of decisions taken at the periodic site review meetings or as directed by the Engineer. The Contractor shall submit data via electronic media to the engineer in a form approved by the Engineer.

Add the following as item (xvii) of the sub-clause 114.2

Cost of all provisions for executing the work safely including all protective clothing, barriers, earplugs, shoes ,helmets etc.

Clause 114.4 Add the following new Clause as 114.4

If any work executed by the Contractor does not meet the specifications, it shall be deemed as rejected. The Engineer, in his sole discretion, may consider a proposal by the Contractor to retain, the element or part of the structure. The Contractor's proposal shall be supported by calculations, drawings and other data to prove the soundness of the proposal and shall clearly describe the additional measures required to ensure the intended performance of the structure. Rate/ price for the rehabilitation structure shall be settle mutually between the Engineer and the Contractor and in case of failure to arrive at an agreed rate, the Engineer's decision regarding the rate shall be final and binding.

Clause 115 Methodology and Sequence of Work

The Clause shall be read as follows

The Contractor shall submit methods statement. The methods statement shall be submitted in two parts.

The General part of the methods statement shall describe the Contractor's proposals regarding preliminary works, common facilities, and items that require consideration at the early stage of the contract. The General part shall be issued along with the first issue of the construction programme (refer clause 114.2) and shall include information on


- a) Sources of materials like coarse aggregate and fine aggregate, quantity and quality of materials available in different sources.
- b) Sources of manufactured materials like cement, steel, bitumen, emulsion, expansion joints, and bearings etc.. The contractor shall identify at least two sources for each of the items, he shall also submit samples/ test certificates of recently manufactured materials for the consideration of the Engineer.
- c) Location of site accommodation facilities, batching plant, hot mix plant, aggregate processing plant, WMM plant, field laboratory.
- d) Details of facilities/approaches for transportation of men, equipment and materials like concrete for construction of pavements, foundations and substructure in river bed.
- e) Information on procedures to be adopted by the contractor for prevention and mitigation of negative environmental impact due to construction activities.
- f) Any other information required by the Engineer subsequent to the scrutiny of method statement submitted along with the bid.

The general part of the Q.A. Programme shall accompany the methods statement.

Special parts of the methods statement shall be submitted to the Engineer by the Contractor for each important item of work like construction of embankment and sub-grade, flexible & Rigid pavements, drain, pile foundations, concreting, repair and rehabilitation of existing structures, maintenance of project roads, diversions, concrete superstructure and for any other item as directed by the Engineer. These statements shall be submitted at least **28 days** in advance of the commencement of the activity or item of work, unless otherwise stipulated in the contract. The statement shall give information on

- i) Details of personnel both for execution and quality control of the work.
- ii) Equipment deployment with details of number of units, capacity, standby arrangements.
- iii) Sequence of construction, details of temporary or enabling work like diversions, cofferdams, formwork including specialized formwork for superstructure, details of burrow area, method of construction of embankment and sub-grade, pavements, piles, concreting procedures, details of proprietary process and products (e.g. details of proprietary pilling systems, bearings, expansion joints etc.) and details of equipment to be deployed. Wherever necessary, technical literature, design calculations and drawings shall be included in the methods statement.
- iv) Testing and acceptance procedures including documentation.
- v) Special part of the Q.A. programme referred in clause 105.3 for the particular item of work shall be submitted along with the methods statement for the concerned activity.




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- vi) Engineer shall examine and approve the methods statement or direct the contractor to resubmit the statement with required modifications. The modified statement shall be submitted within **4 days** of receipt of Engineer's comments.

The sole responsibility for the safety and adequacy of the methods adopted by the contractor shall rest on the contractor irrespective of any approval given by the Engineer.

Clause 115.1

Approval of proprietary product/ process/ system

Only proprietary products proven by International usage in comparable projects shall be permitted to be used. Fully authenticated details of licensing and collaboration arrangement shall be submitted by the manufacturer, where relevant.

Within 90 days of award of work the contractor shall submit the following information for all proprietary products for approval by the Engineer.

- i) Name of manufacturer name of product/ process/ system complete details of the manufacturer of the product/ process / system shall be furnished. Details of projects where similar product/ process / system have been successfully used shall be furnished. Authenticated copies of license/ collaboration agreement shall be furnished.
- ii) General features of the product/ product process/ system Detailed write up with methods statements shall be furnished for each product/process/ system. This shall include complete working drawings & installation drawings, technical specifications covering fabrication, materials, system of corrosion protection etc.
- iii) Details of product development and development testing
- iv) Acceptance test and criteria
Manufacturer shall submit a quality assurance system document. Details of acceptance test and criteria of acceptance shall be furnished in this document.
- v) Installation procedure& demonstration
- vi) Maintenance procedure and schedule
- vii) Warranty proposal

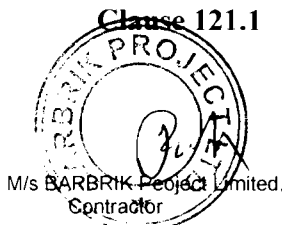
The Engineer may order any additional test for the purpose of accepting the product. The facility for such additional tests shall be made available by the manufacturer. The charges of these additional tests shall be borne by the Employer.

Clause 121

Field Laboratory

Clause 121.1

Add the following at the end of the clause



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This facility including its erection, running will be provided and maintained by the Contractor, as incident to work and no separate payment shall be made for this item.

Clause 121.2

Description

Delete this Clause and replace with

“The Contractor shall construct a fully furnished and equipped field laboratory. All equipment shall conform to accepted national and international standards and shall be subject to the approval of the Engineer.

The laboratory will be located at a site approved by the Engineer and must be of adequate size to perform all the tests required under the contract including sufficient light, uninterrupted electricity and water supply etc. Office space of about 30 Sqm must be provided in the laboratory for the exclusive use of the Engineer and Employer / Employer’s representative with adequate facilities such as toilets, Air conditioners, first aid box, uninturrepted power and water supply etc.

The contractor shall provide the field laboratory within one month from the date of the commencement of the work. Prior to this, the contractor must make suitable alternative arrangements for the testing of materials at his cost, which are acceptable to the Engineer.

The Contractor shall be responsible for the provision of adequately experienced and qualified laboratory staff, in sufficient numbers to be able to meet all testing requirements to the approval of the Engineer, and for the supply of all transportation of staff, testing equipment and sample necessary to allow the testing to be performed in a time scale compatible with the needs of the Site.

Contractor shall arrange to maintain the laboratory in satisfactory manner and will carry stocks of spare equipment and laboratory consumables until the issue of Taking Over Certificate.

Clause 121.3

Laboratory Equipment

This Clause shall read as under

“The following items of laboratory equipment procured from reputed manufacturers duly approved by the Engineer shall be provided in the field laboratory.”

Laboratory equipment shall be provided by the Contractor for laboratory, sufficient to carry out all the field and site quality acceptance testing required in the Specifications. It shall include the following:



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- A. General**
- i) Balance**
- a) 10 kg capacity semi-self indicating type – Accuracy 1 gm
- Electronic 1 No.
- Mechanical 1 No.
- b) 500 gm capacity – Accuracy 0.01 gm
- Electronic 1 No.
- Mechanical (semi-self indicating) 1 No.
- c) Chemical balance (electronic) 100 gm capacity
- Accuracy 0.001 gm 1 No.
- d) Pan balance 5 kg capacity Accuracy 0.5 gm. 3 Nos.
- e) Platform scale – 300 kg capacity 1 No.
- f) Triple beam balance – 25 kg capacity Accuracy 1 gm 2 Nos.
- ii) Oven-electrically operated, thermostatically controlled (including thermometer), stainless steel interior**
- a) Temperature range ambient to 300° C, Sensitivity 1° C, capacity 120 Litre. 1 No.
- b) Temperature range, ambient to 150° C, sensitivity 1° C, capacity 250 Litre. 1 No.
- iii) Sieves : As per IS 460:1962**
- a) Test sieve of G.I 450mm internal dia. as per IS complete with lid and pan of hole sizes 75mm, 63mm, 53mm, 37.5mm, 26.5mm, 13.2mm, 9.5mm, 6.7mm, and 4.75mm. 2 Sets
- b) Test sieve set 200mm internal dia (brass frame and steel/or brass wire cloth mesh) as per IS complete with lid and pan of aperture sizes 2.36mm, 2mm, 1.18mm, 600micron, 425micron, 300micron, 150micron ,90 micron and 75micron. 2 Sets
- iv) Sieve shaker capable of taking 200mm and 450mm dia sieves-electrically operated with time switch assembly 1 No.**
- v) 200 tonnes compression testing machine electric cum manually operated 2 Nos.**
- vi) Stop watches 1/5 sec. accuracy 2 Nos.**



vii)	Glassware comprising beakers, pipettes, dishes, measuring cylinders (100 to 1000cc capacity) glass rods and funnels, glass thermometers range 0° C to 100° C and metallic thermometers range upto 300° C.	1 Doz. Each
viii)	Hot plates 200mm dia (1500 watt.)	6 Nos.
ix)	Enamel trays	
	a) 600mm x 450mm x 50mm	6 Nos.
	b) 450mm x 300mm x 40mm	6 Nos.
	c) 300mm x 250mm x 40mm	6 Nos.
	d) Circular plates of 250mm dia	6 Nos.
x)	Water still, 3litre/hr. with fittings and accessories	1 Set
xi)	Aluminium Tins	
	a) 50mm x 30mm	36 Nos.
	b) 55mm x 35mm	36 Nos.
	c) 70mm x 45mm	36 Nos.
	d) 70mm x 50mm	36 Nos.
	e) 80mm x 50mm	36 Nos.
xii)	Riffle box of slot size 50mm	1 No.
xiii)	Spatula set of 100 and 200 long	3 Sets
xiv)	Water testing kit	1 Set
xv)	Chemicals solutions and consumable	As reqd.
xvi)	Chloride Testing kit for chemical analysis of chloride content	1 No.
xvii)	ION Exchange kit for rapid determination of sulphate content	1 No.
xviii)	First aid box	1 Set

B. For Soils and Aggregates

i)	Liquid limit and plastic limit	
	a) Liquid limit device with Casagrande and grooving tools and as per IS – 2720	2 Nos.
	b) Single point LL device	1 No.
	c) Moisture content cans	50 Nos.
	d) Ground glass plate with rounded edges 600mm x 600mm x 10mm	2 Nos.
ii)	Hydrometer analysis	
	a) High speed stirrer with stainless still beaker	1 No.
	b) Soil hydrometer set including jar	1 Set
iii)	Sampling pipettes fitted with pressure and suction inlets, 10ml. Capacity	1 Set

- iv) Laboratories compaction
- a) Compaction apparatus (Proctor) complete with collar, base plate & 2.5kg rammer 2 Nos.
- b) Compaction apparatus (heavy) complete with collar, base plate and 4.5kg rammer 3 Nos.
- v) Sand pouring cylinder (150mm) with conical funnel and top and base plate (with 152mm dia of sand cone) 4 Sets
- vi) Sampling tins with lids 100mm dia x 75mm ht. 1/2kg capacity 30 Nos.
- vii) Laboratory C.B.R. testing equipment to the requirements of IS and consisting of following : 1 Set
- a) Floor mounted electro-mechanical load frame 5 tonne capacity with automatic strain control 1 No.
- b) CBR moulds complete with collar, base plate, etc. 18 Nos.
- c) Swell stands for holding dial gauge 9 Nos.
- d) CBR plunger with penetration dial gauge holder 1 No.
- e) Surcharge weight with central hole of 2 kg. weight 40 Nos.
- f) Spacer disc with handle 2 Nos.
- g) Perforated brass swell plate with adjustable cap on handle 18 Nos.
- h) Soaking tank for accommodating 9 CBR moulds 1 No.
- i) High tensile steel calibrated proving rings of 1000 kg. 2500 kg and 5000 kg capacity 1 Set
- j) Dial gauge, 25mm travel-0.01mm/division 12 Nos.
- x) Nuclear gauge for density and moisture content determination 1 Set
- xii) Speedy moisture tester complete with carrying case and supply of reagent 2 Nos.
- xiii) Sand equivalent apparatus complete along with chemicals to the requirements of IS 1 Set
- xiv) Reagent grade Sodium Sulphate for soundness test of aggregate chemical Sodium Sulphate 30 kgs.
- xvii) Core cutter apparatus 10cm dia. 10/15cum length height complete with 20kg hammer 1 Set
- xix) Standard measures of 30, 15, 3 litre capacity along with tamping rod 1 Set
- xx) Unconfined compression test apparatus 1 Set
- xxi) Flakiness index test apparatus 1 No.
- xxii) Elongation index test apparatus 1 No.
- xxiii) Aggregate crushing value / impact test apparatus 1 No.



xxiv)	Los-Angeles abrasion apparatus as per IS 2386 (Part 4) 1963	1 No
xxv)	Standard Penetration equipment	1 No

C. For Bitumen and Bituminous Mixes

i)	Constant temperature water bath for accommodating bitumen test specimen, electrically operated, and thermostatically controlled, stainless steel interior, temperature range ambient to 80° C	1 No.
ii)	Bitumen penetrometer automatic type, including adjustable weight arrangement, and needles	1 Set
iii)	Centrifugal type motorized bitumen extraction apparatus with stock of solvent & filter papers	1 Set
iv)	Bitumen laboratory mixer planetary action, 2 litre capacity, including required accessories electrically operated and fitted with heating jacket	1 No.
v)	Marshall compaction apparatus and complete with electrically operated automatic loading unit, compaction pedestal, heating unit, head breaking assembly, flow meter, load transfer bar, specimen moulds 100mm dia with base plate, collars, specimen extractor, compaction hammer 4.53kg x 457mm fall, (excluding constant temperature bath)	1 Set
vi)	Digital type thermometer reading 0-300° C range, accuracy 2° C	2 Nos.
viii)	Ring and Ball Apparatus as per IS 1205 - 1978	1 Set
x)	Tar Viscometer IS 1206 (Part III) – 1978	1 Set
xi)	Apparatus for Determination of Ductility Test as per IS 1208 – 1978	1 Set
xii)	Pen Sky – Marten closed Tester for testing flash and fire point as per IS 1209 – 1978	1 Set
xv)	Apparatus for Determination of Loss on Heating IS-1212-1978	1 Set
xvi)	Apparatus of Determination of specific Gravity IS-1202-1978	1 Set
xv)	Automated Asphalt content gauge (Nuclear or equivalent)	1 Set

D. For control of profile and surface evenness

iii)	Towed Fifth Wheel Bump Integrator	1 No.
iv)	Camber templates 3-lane straight run cross-section	4 Sets.

E. For Cement, Cement Concrete and other Materials

ii)	Test needle apparatus for setting time with plungers, as per IS-269-	1Set
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ii)	Moulds	
	a) 150 mm x 300 mm ht. Cylinder with capping component along with the capping set and compound as per IS	48 Nos.
	b) Cube 150 mm, moulds and 100 mm (each size) as per IS	36 Nos.
	c) Beams 750 mm x 150 mm x 150 mm moulds	18 Nos.
iii)	High frequency mortar cube vibrator for cement testing	1 No.
iv)	Concrete mixer power driven, 1 cu. ft. capacity	1 No.
v)	Variable frequency and amplitude vibrating table as per the relevant IS	1 No.
vi)	Equipment for slump test /compacting factor Apparatus complete	4 Nos.
vii)	Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3) 1963	4 Nos.
viii)	Flexural attachment to compression testing machine.	1 Nos.
ix)	Core cutting machine with 10cm dia diamond cutting tool	1 No.
x)	Needle vibrator	1 No.
xi)	Air entrainment meter	1 No.
xii)	Le-Chatelier apparatus for Soundness testing of cement	1 Set
xiii)	Blain Air Permeability apparatus	1 No.

All equipments shall conform to accepted National/ International standards and shall be subject to the approval of the Engineer.

Full complement of listed equipment procured from an internationally reputed manufacturer, after procurement and approval of Engineer shall be incidental to the work and no payment shall be made to the Contractor.

Clause 121.3.5 Add New Sub-Clause:

For Control of Profile and Surface Evenness

i)	Theodolite	2 sets
ii)	Total Station	2 sets
iii)	Precision automatic level	4 sets
iv)	Precision staff	4 sets
iv)	Camber templates full width and half width	
	a) Crown type cross-section	4 sets each
	b) Straight run cross-section	4 sets each
	Invar /Steel Tape a) 3 m long	4 sets
	b) 5 m	4 sets
	c) 10 m	4 sets




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d) 20 m	4 sets
e) 30m	4 sets
f) 50m	4 sets

Clause 121.3.6 Add New Sub-Clause:

In addition to clause 121.3, any equipment which is not mentioned in this clause but which is necessary for the work for complying with the provisions of the contract and Section 900 of MORTH specifications or as required by the engineer shall be provided by the contractor. No extra payment shall be made to the contractor and it will be considered as incidental to the work.

Clause 121.6 Deleted.

Clause 121.7 Substitute this Sub-Clause by the following:

“There is no separate item in the Bill of Quantities for establishing and maintenance of the laboratory and supply, erection maintenance of equipment and also running cost of testing. The rates quoted for the items in the BOQ by the Contractor shall be deemed to cover the cost of all these items.”

Clause 122 Deleted

Clause 124 Deleted

Clause 125.2 Replace the last but one line with :

The contractor shall supply the digital form of the printed photographs clearly recorded in CD.

Clause 125.3 Replace the first para as :

Supply of two copies of colour record photographs mounted in the albums and the digital form of the printed photographs recorded in a CD shall be measured in number of record photographs supplied.

Clause 125.4 Replace the 1st line of the last para

The photographs and materials including digital version in CD shall form a part


Clause 126.1 Replace the last line of the 1st para

The video data in form of DVD shall be of acceptable quality and the file shall be capable of producing colour pictures.

Clause 126.2 Replace this para with :



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The measurement shall be by number of sets of edited master DVD each with four copies thereof.

Clause 126.3 **Replace the word Cassette with DVD**

SECTION 200 **SITE CLEARANCE**

Clause 201 **Clearing and Grubbing**

Clause 201.1 **Scope**

Replace with following para

This work shall consist of cutting removing and disposing of all materials such as trees of girth up to 300 mm bushes shrubs stumps, roots, grass weeds etc. and top soil 150mm minimum thickness rubbish etc. which in the opinion of Engineer is unsuitable for incorporation in the work including draining out stagnant water if any from the area of road land, drain, cross drainage structure and other area as specified in the drawing by Engineer. It shall include necessary excavation by harrow discs or any other suitable equipment back filling of the pits, by suitable soil, resulting from uprooting of trees & stumps and making the surface in proper grade by suitable equipment and compacted by power roller to required compaction as per Clause 300. The work also includes handling salvaging and disposable of cleared material. Clearing and grubbing shall be performed less than one month in advance of earthworks operation and in accordance with requirement of these specification. Areas requiring cleaning and grubbing shall be determined by the Engineer.

Clause 201.5 **Measurements for Payment**

Add at the end of first para

“Cutting including removal of foundation of sign boards, hoarding boards, concrete posts, km stones etc. and back filling of pits shall be considered incidental to the clearing and grubbing operations”

Add the following paragraph:


“The removal from site and disposal of all materials obtained from clearing and grubbing operations, which in the opinion of the engineer cannot be used or auctioned shall be included in the Contract unit rate”.

Clause 201.6 **Rates**

Clause 201.6.1 **Replace the second sentence as follows**



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These will also include removal of stumps of trees of any girth left after cutting of trees carried out by any agency, removal of sign boards, hoarding boards, concrete post, km stones including their foundation, excavation and back filling to required density, where necessary and handling, salvaging and piling and disposing of the cleared materials with all lifts and up to all lead.

Clause 202.5

Disposal of Materials

Replace the para with the following

“All materials obtained by dismantling shall be the property of the contractor. The materials may be reused in the works in part or in full quantity if permitted by the Engineer for which no cost towards value of material, transportation etc. shall be charged to the contractor, nor the contractor shall pay any salvage value to the Employer. The materials which have to be disposed off, shall be done by the contractor at his own cost at the approved location as per direction and approval of the Engineer.

No material , on account of dismantling shall be returned back to the Employer. The dismantled materials shall be completely removed form the site.”

Clause 202.7

Rates

Add the following at the end of the para

“The cost of carriage of materials to disposal sites is deemed to be included in the rates for dismantling.”

SECTION 300

EARTH WORK, EROSION CONTROL AND DRAINAGE

Clause 301


Excavation for Roadway and Drains

Clause 301.3.7

This clause shall be read as under:

“In works involving widening of existing pavements or providing paved shoulders the existing shoulder/verge/ median shall be removed to its full width. The sub-grade material within 0.2m deep from the lowest part of the pavement for widened portion or paved shoulders shall be loosened and re-compacted as per Clause 305 to a density not less than 97% of maximum dry density determined according to Is: 2720 (Part 8). Any unsuitable material encountered in this portion of subgrade shall be removed and replaced with suitable material and compacted in accordance with Clause 305”.




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Clause 301.3.11 Disposal of excavated materials

Replace the last para

Unsuitable and Surplus material which in the opinion of the Engineer cannot be used in the works, shall be removed from site by the Contractor and disposed of at the nearest pit or other approved disposal location **with all lead and lifts** in accordance with all statutory requirements.”

Clause 301.8 Delete item (v) of last para and replace with:

(v) Disposal of surplus material with all lead and lifts ...cum’

Clause 301.9 Rates

Clause 301.9.2 This Clause shall read as under

“The Contractor unit rate for loosening and re-compacting at sub-grade level shall include full compensation for loosening to the specified depth, removing the loosened soil outside the roadway excavation, rolling the surface below, breaking the clods, spreading the excavated soil in layers watering where necessary and compacting to the requirements.”

Clause 305 Embankment Construction

Clause 305.2 Materials and General Requirements

Clause 305.2.1 Physical requirements

Clause 305.2.1.5 Add the following at the end of first sentence

The material to be used in sub-grade should satisfy the requirement of 4 day soaked design **CBR not less than 10%** ,when tested as per IS: 2720 (Part 16) at 97% of maximum laboratory dry density (IS:2720-Part 8).

Clause 305.2.2.2 Burrow materials

The first Para graph of this clause shall be read as under

“No burrow area shall be made available by the Employer for this work and Burrow pits along the road and with in the Right of Way (ROW) is prohibited. The arrangement for the source of supply of the material for embankment meeting the prescribed specifications as well as compliance to the different environmental requirements in respect of excavation and burrow areas as stipulated from time to time by the Ministry of Environment and Forest, Government of India and the



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local bodies, as applicable shall be the sole responsibility of the Contractor.”

Add after the second para

The top soil of the burrow area selected by the contractor shall be removed and preserved. Care shall be taken not to create any low lying area; if any burrow pit is created, the same shall be filled up with pond/flyash/inertslag covered with 0.5m thick soil wherever technically feasible. In all cases the top soil shall be placed over the burrow area and watered for three days. No part of the burrow area shall be left uncovered to expose scar marks. The Table 300-2 shall be read as under

Table 300-2: Compaction requirements for embankment and sub-grade

Sl. No.	Type of Work/Material	Relative compaction as % of max. laboratory dry density as per Is: 2720 (Part 8)
1.	Sub-grade and earthen shoulders	Not less than 97
2.	Embankment	
	a) Up to 6m height	Not less than 95
	b) High embankment (exceeding 6m height)	Not less than 97
3.	Expansive clays (DFS <50%)	
	a) Subgrade and 500mm portion just below the subgrade	Not allowed
	b) Remaining portion of the Embankment	Not less than 90

Para 8 of this clause given below Table 300-2 shall read as under
 “the contractor shall, at least 7 working days before commencement of compaction, submit the following to the Engineer for approval:

- (i) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 8) for each fill materials he intends to use.
- (ii) The graphs showing values of density against moisture content from which each of the values in (i) above of the maximum dry density and optimum moisture content were determined.
- (iii) The dry density –moisture content –CBR relationships for heavy compactive efforts corresponding to IS: 2720 (Part 8) for each of the fill materials he intends to use in the sub-grade.”



Clause 305.4.3 Earth work over existing road surface

Add at the end as (iv)

(iv) Where the existing bituminous layer to be scarified, the scarification shall be done by using suitable equipment as per direction of Engineer.

Dismantled materials shall be re-used in the new pavements if it conforms to the specifications requirements. The following uses of dismantled materials are suggested.

1. The surplus materials, reclaimed from the existing bituminous layer may be used in the sub-grade of service road, intersection and junctions after breaking in to pieces of less than 75mm particle size and as directed by the Engineer. If directed by the Engineer the material shall be mixed with materials brought from burrow area. Compaction shall be carried out to the requirements of clause 305.3.6.
2. The dismantled bituminous material may be used as fill in the earthen shoulder; diversion roads and intersections/ junction of feeder roads provided the material conforms to the relevant clauses of earthwork.
- 3.

Clause 305.4.4 Embankment and Sub-grade around structures.

Para-3 delete the last line and substitute it with

“compacted thoroughly to 98% MDD”.

Clause 305.4.6 Embankment construction under water.

Insert the following as the second para

At locations where water table is high and the soil has potential for rapid and relatively great migration of moisture by capillarity, provision of sand blanket of 100mm thickness of approved grain size shall be provided at a level of 200 mm below bottom of subgrade by way of cut off extending across the full width of the embankment so that the same will act as an effective capillary cut off as per IRC:34

Clause 305.4.7 Earth work for High embankment

The second para shall be read as follows

To ensure stability during construction, it is necessary to control rate of construction especially in both side approaches of ROB's and Bridges which is achieved by stage construction i.e. each period of construction

activity is followed by a period of inactive period. The embankment foundation shall be prepared and a drainage layer provided.

No embankment work shall proceed until the foundation have been inspected by the Engineer-in-Charge and approved. In the first month the total height of construction should be limited to maximum 6.0metre only. The balance embankment construction should be done after a rest period of two months for strength gain and consolidation. The rest period need not be given in case the construction of initial 6-metre height of embankment takes more than 4 months time. However, based on the available subsoil data the contractor may suggest his loading schedule or any other method to take care of the excessive settlement problem for approval of the engineer.

Clause 305.9.1 Add “including removal of top soil” after word “materials” appearing in first line of item (v).

Clause 306 Soil Erosion and Sedimentation Control

Clause 306.4 Measurement for payment

Substitute Clause 306.4 as follows

“ All temporary sedimentation and pollution control works shall be deemed as incidental to the earthwork and other items of work and as such no separate payment shall be made for the same.”

Clause 306.5 Rates

This Clause shall be deleted

SECTION 400 SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS

Clause 401 GRANULAR SUB BASE

Clause 401.2 Materials
Replace the clause with the following.

The Materials to be used for the work shall be crushed stone aggregate only. The materials shall be free from organic or other deleterious constituent and confirm to Grading I of Table 400-2.

Clause 406. WET MIX MACADAM SUB-BASE/BASE

Clause 406.2. MATERIALS

Clause 406.2.1 Aggregate




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Clause 406.2.1.1 Physical requirements:

Add at the end of first paragraph

The fraction of materials passing through 4.75 mm sieve shall be crusher run screening only. The river sand or quarry sand shall not be permitted either as such or mixed with crusher-run-screening in the Wet Mix Macadam.

Add the following at the end of the paragraph:

Soundness test shall be carried out in accordance with IS : 2386 (Part-5). The average loss of weight of coarse aggregate after 5 cycles shall not exceed 12% when tested with sodium sulphate and 18% when tested with magnesium sulphate as specified in IS: 383.

Clause 406.3. CONSTRUCTION OPERATIONS

Clause 406.3.1. Preparation of base

404.3.1 shall be applicable by replacing the work “Water Bound Macadam” by “Wet Mix Macadam”.

Clause 406.3.3 Replace first para with :

Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced/positive mixing arrangement like pugmill. .

Add the following at end of 2nd para

Unless otherwise instructed by the Engineer , the moisture content at the time of compaction shall be between 80% and 120% of the optimum moisture content

Clause 406.3.4 Add after the second para with the following:


All the layers of WMM course shall be spread only by a Mechanical Paver Finisher and compacted as per clause no. 406.3.5.

Clause 406.3.5. Delete second sentence of first para.

Substitute para 7 of this clause as follows :

Rolling shall be continued till the density achieved over the full thickness of the material laid is at least 98% of the maximum dry density as determined by the method outlined in I.S.:2720(part 8) and satisfies the requirements of Sub Clause 903.3.




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Clause 407 SHOULDERS, ISLANDS AND MEDIAN

Clause 407.2 Materials

Add after first para as follows

The hard shoulder shall consists of minimum 150mm thick granular/ moorum layer having liquid limit less than 25% and PI between 3% to 6%.

Replace second para with :

Median/Traffic islands shall be raised and kerbed at the perimeter and the enclosed area filled with agriculture soil and suitably covered with grass turf/shrubs as per clause 307 and/or paved as per clause 409.3.4 or 409.3.5.

Clause 407.4 Construction Operations

Clause 407.4.1 Shoulder

Add as follows after para 4

The hard shoulder shall be compacted not less than 98% of maximum laboratory dry density as per IS:2720 (Part-8).

Clause 502 PRIME COAT OVER GRANULAR BASE

Clause 502.1 Scope

Add the clause as follows

The work shall consist of Priming (spraying) of liquid bituminous materials on the surface of non-bituminous granular base course. Prime coat is not to be regarded as a substitute for tack coat, the objective of which is to ensure a proper bond between the surface being paved and the new bituminous course being placed over it.

Clause 502.2 Materials

Cationic bitumen emulsion SS-1 grade conforming to IS:8887 shall be used as primer. The quantity of bitumen emulsion for WMM types of surfaces shall be 0.7-1.0 Kg/m².

The correct quantity of primer will be the maximum amount that can be absorbed by the surface without causing run-off of excessive primer (some times referred as "finger" to form at the lower edges of the primed area) and is to be decided by the supervising engineer at the site.



Clause 502.3 Weather and Seasonal limitations

Replace the clause as follows

Bitumen emulsion grade SS-1 as well as Cutback Bitumen as Primer shall not be applied on wet surface. The moisture content in the surface to be primed shall not exceed 3.5%. Primer shall not be applied during dust storm, rainy, foggy or windy weather. The ambient temperature during priming by bitumen emulsion should be above 10⁰C.

Clause 502.4 Construction

Clause 502.4.1 Equipment

Replace the clause as follows

All equipment required for execution of priming work shall be in good working condition at site. The primer distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at specified rates and temperature. Hand spraying of small areas using pressure hand sprayer may be permitted at specific strategic locations, where distributor is not accessible or if narrow strips of granular surface are to be primed. Pouring of Primer using perforated can should not be permitted. SS-1 grade bitumen emulsion stored at site in the tank shall have arrangement like circulation pump to ensure its proper mixing before withdrawal from tank and transfer to browser.

Clause 502.4.2 Preparation of road surface

Replace the clause as follows

The base course surface to be primed shall be swept clean and made free from dust. All loose material and other foreign material on the surface shall be removed completely. Power brooms or mechanical sweepers may be used for cleaning of surface. The surface to be primed (whether with SS-1 emulsion or cutback bitumen) should be kept dry. If Soil /Moorum binder has been used in the WBM surface, part of this should be brushed and removed up to a depth of 2mm so as to provide good bond.

The dilution of SS-1 bitumen emulsion is not permitted.

Clause 502.4.3 Application of Primer

Replace the clause as follows

After the base to be primed has been prepared as in section 502.4.2, the primer shall be uniformly applied using the appropriate equipment at



application rate. The spraying should preferably be carried out using pressure sprayer or distributor. The quantity of primer shall be checked periodically using tray coating test. The method of application of primer will also depend on the type of equipment to be used, size of nozzles, pressure at spray bar and speed of the forward movement of vehicle. A trial section shall be laid to check the efficacy of equipment and penetration depth of the primer.

Temperature of Application of primer :

No heating of SS-1 Bitumen Emulsion is permitted at site.

In case of cutback bitumen, temperature of application of primer should be high enough to permit the prime to be sprayed effectively through the jets of the spray bar and to cover the base course surface effectively. The temperature of product at the time of application should be more than 10⁰C.

Clause 502.4.4 Curing of Primer and opening for traffic

Replace the clause as follows

The primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before any subsequent surface treatment or mix is laid. Excessive and unabsorbed primer if any shall be blotted with an application of sand using the minimum quantity possible. A primed surface shall not be opened for traffic other than that necessary to lay the next bituminous course.

Clause 503 Tack Coat

Clause 503.1 Scope

Replace the clause as follows

The work shall consist of a very light application of liquid bituminous material to an existing bituminous, cement concrete or primed granular surface to ensure a bond between the surface being paved and the overlaying course. The tack coat material is not expected to penetrate into pavement and for this reason; the applications should be very light to provide adequate bond strength between two layers.

Clause 503.2 Materials

Replace the clause as follows

The binder used for tack coat shall be Cationic Bitumen Emulsion RS-1 confirming to IS 8887.



Clause 503.3 Weather and Seasonal Limitations

Replace the clause as follows

Bituminous material shall not be applied during a dust storm or when the weather is foggy, rainy or windy or when the ambient temperature is less than 10⁰C.

The surface should be totally dry. However, when using bitumen emulsion as tack coat, the surface should be slightly damp, but not wet.

Clause 503.4. Construction

Clause 503.4.3. Application of Tack Coat

Add the following after the end of para:

Heating and dilution of RS-1 Bitumen Emulsion is not permitted. The quantity of bitumen emulsion to be applied over primer treated WMM surfaces shall be 0.25-.35 Kg/m².

Clause 503.4.4 Curing the tack coat

Replace the clause as follows

After application of the Emulsion as tack coat, allow the bitumen emulsion to break i.e. turn black before placing the bituminous mixture or overlay. Traffic should be kept off of the area where tack coat is being sprayed. No Plant or vehicles shall be allowed on the tack coat other than those essential for construction.

Clause 503.8 Rate

Replace 0.2 kg /m². with 0.30 kg/m² in fourth line.

Clause 507.3.4 Add the following line at the end of the clause.

The mix shall be produced only in a **batch type hot mix plant** of required capacity. **In no case materials from drum type hot mix plants shall be entertained.**

Clause 509.1

Add the following after 2nd line of this para.

Where modified bitumen is specified to be used as a binder shall have a softening point not less than 60⁰ C & specification as prescribed in IRC SP 2002 Cl.7 for CRMB or PMB as approved by the Engineer. "Modified bitumen shall be product from the refinery".



Clause 509.2.5 In **Table 500.18**, for grading 2 ,for 13mm nominal size aggregate, the cumulative % by weight of total aggregate passing against 13.2 sieve will be 90-100 instead of 79-100 .

Clause 509.3 **Mixture Design**

Clause 509.3.1 The requirements set out in table **500-19** will be replaced by table **500-11(A) & 500-11(B)**.

SECTION 600 CONCRETE PAVEMENTS

Clause 601 **Dry Lean Cement Concrete sub-base**

Clause 601.1 **Scope**

Clause 601.1.1 **The para will be replaced as follows:**

The work shall consist of construction of dry lean concrete sub base for cement concrete pavement in accordance with the requirements of these Specifications as well as of IRC:15 and in conformity with the lines, grades and cross-sections shown on the drawings or as directed by the Engineer. The work shall include furnishing of all plant and equipment, materials and labour and performing all operations, in connection with the work, as approved by the Engineer.

Clause 601.5. **Construction**

Clause 601.5.2 **Batching and Mixing**

Add as new sub-clause

Clause 601.5.2.1 **Semi-Mechanised and Labour-Oriented Construction Technique**

Clause 601.5.2.1.1 **General**

Use of very sophisticated paving machines and high capacity concrete batch mixer is not possible in small concrete road projects and also in remote hilly terrains. But with the use of such machineries and plants the end product is always of better quality. Without these advanced equipments concrete roads can be constructed using semi-mechanized and labour-intensive constructions but the resulting quality and surface may not be the same as achieved with mechanized constructions.

Clause 601.5.2.1.2: Forms:

The fixed-forms made of steel channels or fabricated steel sections are generally made use of.

Clause 601.5.3.1 Semi-mechanized method of construction:



Clause 601.5.3.1.1 Hauling of mix (New Clause)

Transporting of concrete mix from mixer to paving site with steel pans should be avoided. The mix tends to get segregated during such handling. It is desirable to use wheel-barrows or trolleys for carrying mix to the paving site. The workability of the mix can be controlled better with the use of wheel-barrows.

Clause 601.5.3.1.2. Plants, equipments and tools:

The plants and equipments considered essential even in semi-mechanized and labour-oriented constructions are:

A couple of tilting type drums mixers of at least 0.2 cum capacity. The number of mixers to be employed in a project shall be decided on the basis of the size of the project. Vibratory or smooth wheeled roller of 8-10t capacity Fixed side forms measuring at least 100-150 m length. Stop-end and start-end made of steel or wooden sections.

Clause 602. CEMENT CONCRETE PAVEMENT

Clause 602.2.4.3

Add as last paragraph

Although IS:383 permits the fines passing 75 microns up to 15 per cent, this provision should be used only when crushed stone dust is used as fine aggregate and when the mix produced in the Laboratory and the field is satisfactory in all respects and complies with the requirement of Specification.

Clause 602.2.6

Mild Steel Bars for dowels and tie bars

Add to the end of paragraph

“The steel shall be coated with epoxy paint for protection against corrosion.”

Clause 602.2.8.

Joint sealing Compound:

Add at the end of para as follows


and IS: 11433.(Refer Appendix –C of IRC:15 for specifications of sealing compound)

Clause 602.3.4

Workability

Clause 602.3.4.2

Add after fourth sentence of the clause



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The slump of concrete mix for pavements compacted in manual construction using needle vibrators for compaction, the slump shall not be more than 40 mm.

Add as last paragraph

In case the concrete is to be carried for long distances, liquid plasticiser shall be used having slight retardation effect. The plasticisers conforming to IS: 9103- 1999 are generally desirable for road works. The quantity of admixtures shall be determined by trials.

Clause 602.4 Sub-base

Replace the 602.4 clause as follows

Clause 602.4.1 Sub-base provided under the concrete slabs shall be of two layers consisting of upper sub-base of dry Lean Concrete as specified under clause 601 and lower sub-base as specified under clause 401 constructed in accordance with the respective specification and the surface finished to the required lines, levels and cross-section. The Concrete pavement shall mostly be undertaken in urban area and if the sub-grade in the widening portion consists of heavy clay (L.L.>50 and/or DFS >50), such as, black cotton soil, the sub-base should be laid over a 22.5 cm thick blanket course consisting of local sand. The sub-base or blanket course, as the case may be, shall be laid over a properly compacted sub-grade to give uniform support. The blanket course of sand shall not be provided at the edges but should be replaced with suitable filter of graded granular material.

Clause 602.4.2 The sub-base shall be in a moist condition at the time the concrete is placed. There shall, however, be no pools of water or soft patches formed on the sub-base surface. In case where a sand layer is placed between the sub-base and pavement concrete, a layer of water-proof paper shall be laid over the sand layer. No moistening of the sub-base shall be done in this case.

Clause 602.4.3 If the sub-base is found damaged at some places or it has cracks wider than 10 mm, it shall be repaired with fine cement concrete or bituminous concrete before laying separation layer. Prior to laying of concrete it shall be ensured that the separation membrane as per Clause 602.5 is placed in position and the same is clean of dirt or other extraneous materials and free from any damage.

Clause 602.5 Separation Membrane

Add after the first line:

It shall be white in colour and transparent.



Clause 602.6.4. Longitudinal Joints

Clause 602.6.4.1 Add to the clause no 602.6.4.1 in end of the clause

These joints known as warping joints shall be:
Plain butt type and shall be formed by placing the concrete against the face of the slab concreted earlier. The face of the slab concreted earlier, shall be painted with bitumen before placing of fresh concrete.

Formed by a joint cutting machine when a pavement width of more than one lane is laid and to relieve warping stresses when the pavement width exceeds 4.5 m.

Add as new sub-clause

Clause 602.6.4.3. Longitudinal joint with shoulder:

This is one of the critical areas which are generally not given proper treatment. The joint widens after the concrete slabs have shrunk and this wide joint allows water to seep to the lower layers. Whether the shoulder is rigid or flexible type, the joint should be treated with sealant after widening.

Clause 602.6.4.4. Transition slabs:

At the interface of rigid and flexible pavement, at least 3 m long reinforced buried slab should be provided to give a long lasting joint at the interface. The details are shown in Fig. 3 of IRC 15: 2002.

Clause 602.6.5 Dowel bars:

Clause 602.6.5.1 Add after first sentence of the clause

Epoxy coating shall treat these or any approved anti-corrosion treatment.

Clause 602.6.5.5 The first two sentences shall read as follows

“Dowel bars shall be covered by a thin plastic sheath for at least 60 per cent of the length from one end for dowel bars in contraction. The sheath shall be tough, durable and of an average thickness not greater than 0.5 mm and shall have closed end. The sheathed bar shall comply with the following pull out test.”

Clause 602.8. Side Forms, Rails and Guide wires:



Clause 602.8.1 Replace the first three sentence of the clause as follows:

All side forms shall be of mild steel of depth equal to the thickness of pavement minus the level tolerance stipulated for the lower layer. The forms can be placed on a series of steel packing plates or shims to take care of irregularity of sub-base. They shall be sufficiently robust with a minimum thickness of 6 mm and rigid to support the weight and pressure exerted by the paving equipment.

Clause 602.9. Construction

Clause 602.9.1: General

Replace the clause as follows

“A systems approach may be adopted for construction of the pavement, and the Method Statement for carrying out the work, detailing all the activities including indication of time-cycle, equipment, personnel, etc. These shall be got approved from the Engineer before the commencement of the work. The above shall include the type, capacity and make of the batching and mixing plant/ Concrete mixer with integrated weighing mechanism/portable mixing plant besides the hauling arrangement and paving equipment. The capacity of crusher, batching plant the cement storage, silos and the paver shall be matching so that the rate of paving shall not be less than 60 metre per hour and paving can progress without any stoppage. During planning stage, it should be noted that constructing multilane pavement is better than constructing single lane at a time from the point of view of riding quality. Therefore, the capacity of plants should be planned accordingly. “

Add as new clause

Clause 602.9.1.1 Existing Pavement

When concrete pavement is to be laid over an existing bituminous pavement which is known as white-topping, it shall be ensured that the existing road extends over the required width and has a minimum thickness of 150 mm. Where the general unevenness of the surface varies within 25 &, it can be provided with an overlay of dense bituminous macadam (DBM) with the help of a paver operating with electronic sensor to achieve the desired level, grade and alignment. The thickness of DBM shall be decided on basis of undulations present on the existing road. Where the width of the existing pavement falls short of the width to be concreted and the condition of the surface is sound enough for receiving the paving concrete, the extra width may be made up by placing at least 150 mm depth of lean cement concrete or lime-puzzolana concrete or lime-fly ash concrete or lean cement concrete as per clause 6.2.1(c) in trenches of required width at the sides of the existing metalling after taking care to see that the bottom of such



trenches is well compacted with 100 mm WBM or WMM layer. The soil below shall be watered and well compacted before placing WBMIWMM material by suitable tampers before placing of the new sub-base material. The correction to the unevenness of the surface and for camber shall follow the same lines as in the preceding paragraph.

Clause 602.9.1.2 Work on Gradients

The progress on gradient of all operations of placing, compacting and finishing of concrete should proceed from the lower to the higher reaches. The concrete mix shall be stiffer than that used on level reaches. Therefore, slump of concrete mix in such gradients should be adjusted from field trials.

Clause 602.9.9. Curing of Concrete

Clause 602.9.9.1 Replace the first paragraph as follows

Immediately after the surface texturing, the surface and sides of the slab shall be cured by the application of approved resin-based aluminised reflective curing compound or white pigmented curing compound which hardens into an impervious film or membrane with the help of a mechanical sprayer.

Curing can be done by one of the following two methods:

By application of curing compound followed by spreading of wet hessian and moistening it regularly. In case of arid areas where water is extremely scarce, two applications of curing compound without moist curing by wet hessian may be allowed at the discretion of the Engineer. For small works, curing can be done by manual methods using wet hessian which is kept moist during curing period. Curing shall be done for a minimum period of 7 days.

The water used for curing shall also be free from all injurious chemicals, like, chlorides and sulphate and shall meet the requirements of IS:456.

Clause 602.9.9.2.

Add as last sentence of the clause

Arrangements should be made to spray the curing compound on the sides of the slab.

Add as new clause

Clause 602.9.9.5. Curing by manual methods:

After completion of the finishing operations, the surface of the pavement shall be entirely covered with wet hessian cloth (minimum of two layers), burlap or jute mats. The coverings used shall be of such



length (or width) that when laid will extend at least 500 mm beyond the edges of the slab, shall be so placed that the entire surface and both the edges of the slab are completely covered. They shall be placed as soon as the concrete has set sufficiently to prevent marring of the surface. Prior to their being placed, the coverings shall be thoroughly wetted with water and placed with the wettest side down. They shall be so weighed down as to cause them to remain in intimate contact with the surface covered. They shall be maintained fully wetted and in position for 24 hours after the concrete has been placed, or until the concrete is sufficiently hard to be walked upon without suffering any damage. To maintain the coverings wet, water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove the coverings for cutting the joints, the concrete slab shall not be kept exposed for a period of more than half an hour. Worn coverings or coverings with holes shall not be permitted. If the covering is furnished in strips, the strips shall be laid to overlap at least 150 mm. Covering shall be placed from suitable wooden bridges (IRC: 43). Walking on freshly laid concrete to facilitate placing coverings will not be permitted. Upon the removal of the wet covering at the end of 24 hours, the slab shall be thoroughly wetted and then cured by ponding or sprinklers. Exposed edges of the slab shall be banked with a substantial berm of earth. Upon the slab shall then be laid a system of transverse and longitudinal dykes of clay about 50 mm high, covered with a blanket of sandy soil free from stones to prevent the drying up and cracking of clay. Before constructing clay dykes, the joints formed in concrete slabs shall be temporarily sealed with jute ropes, or synthetic back-up rods so that no foreign material, like, clay or sand enters the joint. The rest of the slab shall be covered with sufficient sandy soil so as to produce a blanket of earth not less than 40 mm depths after wetting. The earth covering shall be thoroughly wetted while it is being placed on the surface and against the sides of the slab and kept thoroughly saturated with water for 7 days and thoroughly wetted down during the morning of the 8th day and shall thereafter remain in place until the concrete has attained the required strength and permission is given to open the pavement to traffic. When such permission is granted, the covering shall be removed and the pavement swept clean. If the earth covering becomes displaced during the curing period, it shall be replaced to the original depth and re-saturated.

Clause 602.10. Trial Length

Clause 602.10.5.3. Density

Replace the clause as follows

“In-situ density shall be assessed as described in Clause 602.3.3 from at least 3 cores drilled when the concrete is not less than 7 days old. Should any of the cores show honey-combing in the concrete, the trial length shall be rejected and further use of the spreading and



compacting unit shall not be permitted until further trials have shown that modification can be made which will result in adequate compaction"

Clause 602.10.5.5 Temperature Measurement (New Clause)

"The temperature development in the concrete slab during hardening shall be recorded. The temperature shall be measured in the middle of the slab (vertically) at a horizontal distance of at least 1000 mm from any free edge. The temperature shall be recorded every 3 hours after installment of the thermometer and the temperature-age relationship shall be determined. The maximum recorded temperature shall not exceed 700C. If the temperature exceeds 700C the trial length shall be condemned and the Contractor shall propose methods to reduce the temperature development and carry out a new trial length at his own expense.

Add as a new clause

Clause 602.10.5.6.

Construction of trial sections is considered obligatory on the part of the Contractor and the entire cost of construction, dismantling and transportation of debris is to be borne by the Contractor.

Clause 602.10.6. Approval and acceptance

Add as the first sentence to the clause.

Compliance for the position and alignment of tie bars shall be checked by drilling additional cores from the slab unless they can be determined from cores taken for density.

Clause 602.11. Preparation and Sealing of Joint Grooves

Clause 602.11.2.2. Replace the last two sentences as follows

If spalling occurs or the angle of the former is greater than 10 degrees, the joint sealing groove shall be sawn wider and perpendicular to the surface to encompass the defects up to a maximum width, including any chamfer, of 25 mm for transverse joints and 15 mm for longitudinal joints. If the spalling cannot be so eliminated then the same shall be repaired by an approved thin bonded repair using cementitious materials, like, epoxy or polymer concrete.

Clause 602.11.3.3. Add to the last of the paragraph

The groove configuration is different for polysulphide and silicone. Silicone, a single chemical formula, hardens by absorbing moisture from the air and hence it should be placed in a thinner layer **vis-à-vis**



polysulphide. Accordingly, the depth width ratio of grooves should be modified. Besides the curing time of silicone is more than that of polysulphide.

Clause 602.13. Opening to Traffic

Replace the clause as follows

Clause 602.13 Opening to Traffic

Replace the entire Clause with:

"In general, traffic shall be excluded from the newly constructed pavement for a period of 28 days where Ordinary Portland Cement, Portland Blast Furnace Slag Cement and Portland Pozzolana Cement are used or for a period of 7 days where Rapid Hardening Cement is used. In all cases, before the pavement is opened to traffic it shall be cleaned and the joints shall be sealed as per Clause 602.11. No vehicular traffic (including the Contractor's vehicles) shall be allowed on the finished surface until a field flexural strength of minimum 4.0 MPa has been achieved. It is the responsibility of the Contractor to produce a sufficient number of series of test specimens to verify the field flexural strength. Each series of test specimens for measurement of field flexural strength shall consist of minimum 3 test specimens. The specimen shall be cured at conditions similar to the field conditions. The method for curing and storing of the test specimen in order to imitate field conditions shall be proposed by the Contractor and approved by the Engineer. The required minimum field flexural strength of 4.5 MPa is achieved when the average flexural strength of minimum 3 specimens exceeds $4.0 + 1.65 s$ where s is the standard of the group."

SECTION 800 TRAFFIC SIGNS, MARKING & OTHER ROADS APPURTENANCES

Clause 801 Traffic Signs

Clause 801.1.2. This Clause shall be read as under

"All road signs shall be of retro-reflectorised type with super high-intensity retro-reflective sheeting. The sheeting is typically unmetallised micro-prismatic retro-reflective element material or any other type as approved by the Engineer.

Clause 803.3.2 This Sub clause is substituted to read as under :

The road marking shall be laid with appropriate road marking machinery




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Clause 803.6.6

Add as a new clause

General

Road traffic markings shall be constructed to accuracy within the tolerances given below:

- a. The width of lines and other markings shall not deviate from the specified width by more than 5%.
- b. The position of lines, letters, figures, arrows and other markings shall not deviate from the true position specified by more than 20mm.
- c. The alignment of any edge of a longitudinal line shall not deviate from the true alignment by more than 10 mm. in 15 m.
- d. The length of segments of broken longitudinal lines shall not deviate from the specified length by more than 150 mm.
- e. In broken lines, the length of segments and the gap between segments shall be as indicated on the Drawings. If these lengths are altered by the Engineer, the ratio of the lengths of the painted sections shall remain the same.
- f. Line and curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

Faulty Workmanship or Materials

If any material not complying with the requirements is delivered at the site or used in the Works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer, at the Contractor's own cost. Rejected traffic markings and paint that has been splashed or has dripped onto the surfacing, kerbs, structures or other such surfaces shall be removed by the Contractor at his own cost, in such a way that the markings of split paint will not show up again later.

Clause 804.3

The first sentence of this Clause shall be read as under :

The hectometer/kilometer stones shall be made of concrete of M20 grade.

SECTION 900

QUALITY CONTROL FOR ROAD WORKS

Clause 903

Quality Control Tests During Construction

Clause 903.4

Tests on Bituminous Constructions

In Table 900-4, Tests mentioned at serial No.4 & 6 for Bituminous Macadam/Dense Bituminous Macadam/Semi Dense Bituminous Concrete and for Bituminous Concrete, **add the following at the end** in the frequency column:

"10% of the density tests shall be done within 300mm width from edges."



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Add new sub clause as 903.4.3 as follows

Clause 903.4.3

Bituminous mix shall be spread with paver fitted with electronic sensing device and string line arrangement (supported by steel pegs @ 5 m apart) on either side of paving width for automatic levelling, surface evenness and profile control. Use of string line is compulsory to provide signal to the electronic sensing device fitted with the Paver Finisher.

Bituminous works shall be tested immediately after finishing for:

- a) Thickness (compacted) measured by extracting cores shall be dealt in accordance with MORTH Specification Section 900.
- b) Density (compaction) test as performed on the extracted cores
- c) Workmanship test by measuring roughness of the finished layer by duly calibrated Towed Fifth Wheel Bump Integrator.

Note: Contractor shall arrange the core extraction machine at his cost and shall take cores of the executed bituminous works jointly with Engineer without any extra cost.

The result of tests shall be compared with the prescribed acceptable values. The payment of all such works executed shall be based on the test results. In case test results for parameters (b) & (c) above fall below the required values in accordance with specification, deductions as specified below here under shall apply limiting to 'Nil' payment for the executed bituminous works. Separate deductions shall be made for each attribute i.e. Density Test and Workmanship test.

b) Density (Compaction Test):


Reduction in Core Density	Deduction in the payable rate
-Upto 1.00% from the required percentage	@ 5%
- Between 1.01% to 2.00% from the required percentage	@15%
- Between 2.01% to 3.00% from the required percentage	@30%
-By more than 3.01% from the required percentage	@ 100%. Such works shall be rejected and NIL payment shall be made

The minimum deduction in the payable rate shall be made for 250 Sqm for each failure.

c) Workmanship Test: Roughness measured longitudinally

Calibration of equipments and measurement of surface unevenness shall be done in accordance with IRC:SP:16-2004.




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The finished bituminous layers shall be tested for workmanship (immediately before allowing traffic) by measuring roughness, longitudinally separately for each lane with the Calibrated Towed Fifth Wheel Bump Integrator. The measured roughness shall not exceed a value of 1500 mm/km for finished DBM and BC layers.

In case DBM is laid in two separate lifts, the roughness shall be measured on the final DBM layer. Any completed layer (DBM and BC) having roughness in excess of the value 1500 mm/km shall be paid in accordance with the Deduction Formulae as specified below:

Measured Roughness	Deduction in the payable rate
- Upto 5.00% more than the required ment	Nil
-More than 5.01% and upto 30.00% more than the requirement	@ (10%+1% for every 1% in excess of 5%)
-More than 30% more than the requirement	Work shall be rejected. Complete re-work shall be done.

The area for which deduction in the payable rate shall apply shall be determined by the Engineer based on analysis of results. However, regardless of any other consideration, the minimum deduction shall not be less than one lane-km (3500 m²)

SECTION 1000 MATERIALS FOR STRUCTURES

Clause 1009 Steel For Pre-Stressing

Add (e) to the list of codes to which acceptable prestressing steel shall conform:

- (e) Uncoated Stress relieved low relaxation seven ply strand for prestressed concrete - IS: 14268

Clause 1009.3 Add the following note under table 1000-3

Thermo Mechanically Treated bars (TMT bars) conforming to IS: 1786 may also be used.

Clause 1010 Water

In para (c), the permissible limit for **Chloride (Cl)** shall be read as "500 mg/lit for Prestressed Concrete / Reinforced Cement Concrete Works."



The lines indicated with * shall be read as

“* In case of structures, for concrete works not containing embedded steel, the permissible limit of chlorides may be increased upto 1000mg/lit.”

Clause 1012

Concrete Admixtures

Add the following at the end of paragraph 2 of Clauses 1012.1

Admixtures shall not impair the durability of concrete; they shall not combine with the ingredients to form harmful compounds or endanger the protection of reinforcement against corrosion.

Add the following at the end of the clause.

After selecting a few acceptable brands & types of admixture based on the manufacturer's data/technical literature. Independent acceptance tests should be carried out for the same using the approved combinations of cement / sand / aggregates intended for use in the Project. After establishing the basic acceptability using strength criteria (compression & tensile strengths) a number of trial mixes be designed using different proportion of admixtures / cement / water etc. to establish the data bank on the behaviour of the admixture for the project site conditions. A spectroscopic signature of accepted product should be obtained and preserved for comparison for acceptance of the production lots.

Retrials should be conducted with change in source / type of cement.

Workmanship

The dosage should be finalised on the basis of field trial and special mechanical devices should be used for dispensing the admixture in the batching / mixing plant. No addition of admixture after dosage is permitted (including addition in transit mixers).

Manufacturer's experts should be available for consultation / trouble shooting of problems associated with their product. The conditions of storage, shelf life etc. as specified by the manufacturer should be strictly observed. The manufacturer's Quality Assurance Plan during process of production should be obtained and field for reference / record.

Clause 1015

Test and Standards of Acceptance

Add following as last paragraph :

Independent testing of prestressing steel shall be carried out by the contractor for each consignment from each source in the laboratory



approved by the Engineer before use. The tests shall be carried out for the properties as listed in clause 7.2.1 of BS-5896:1980. These tests are in addition to the tests carried out by the manufacturer.

SECTION 1500 FORMWORK

Clause 1502 Materials

Delete the last sentence of para one

Delete the word "or Timber" in 1st line of para 2

Clause 1503 Design of Form work

Clause 1503.2 The following shall be added to this Clause

"For distribution of load and load transfer to the ground through staging, an appropriately designed base plate must be provided which shall rest on firm sub-stratum. The loading from the form work shall be distributed to the soil or the permanent works below (e.g. pile cap) in such a manner that any total or differential settlement are within acceptable limits."

Clause 1508 Removal of Formwork

Add the following as para 5

For prestressed units, the side forms shall be released, as early as possible and the soffit forms shall permit without restraint deformation of the members, when prestress is applied. Form supports and forms for cast in situ members shall not be removed until sufficient prestress has been applied to carry the dead load and any formwork supported by the member and anticipated construction loads.

Clause 1510 Specialised Formwork

Replace the word "plywood" by "marine plywood" in the fourth paragraph of this clause.

Clause 1513 Rate

Add the following at the end of the first para

"The unit rate shall also include all cost for preparation of erection scheme, designs of false work and formwork and their approval."



SECTION 1600 STEEL REINFORCEMENT (UNTESIONED)

Clause 1605 Placing of Reinforcement

Paragraph (c) (i) of clause 1605 shall read as follows

Cover blocks shall be made of concrete or cement mortar with the same durability and strength properties as the surrounding concrete and with the same type of constituents. In visible surfaces, the cover blocks shall be of the same colour and texture as the surrounding concrete. The contractor's proposal for cover blocks shall be submitted to the engineer for acceptance.

Clause 1606 Bar Splices

Clause 1606.1 First sentence of Clause 1606.1 shall read as follows:

“To the extent possible, all reinforcement shall be furnished in full lengths as indicated in drawings.”

Clause 1606.2 Welding

Clause 1606.2.1 Add the following at the end of the paragraph.

In prestressed concrete members, when welding of untensioned reinforcement is permitted by the Engineer, it shall be carried out before insertion of the prestressing tendons.

SECTION 1700 STRUCTURAL CONCRETE

Add the following new clause 1704.6

Clause 1704.6 Materials for pumped concrete:

Materials for pumped concrete shall be batched consistently and uniformly. Maximum size of aggregate shall not exceed one-third of the internal diameter of the pipe.

Grading of aggregate shall be continuous and shall have sufficient ultra fine materials (materials finer than 0.25 mm). Proportion of the aggregate passing through 0.25 mm shall be between 15 and 30% and that passing through 0.125 mm sieve shall not be less than 5% of the total volume of aggregate. Admixtures to increase workability can be added. When pumping long distances and in hot weather set retarding admixtures can be use. Fluid mixes can be pumped satisfactory after adding plasticizers and super plasticizers. Suitability of concrete shall be verified by trial mixes and by performing pumping test.



Clause 1707 Equipment

Para 1 of this Clause shall read as under

“Unless specified otherwise, equipment for production, transportation and compaction of concrete shall be as under:

- a) For production of concrete: Batching and mixing of the concrete shall be done in a concrete batching and mixing plant fully automatic of a suitable capacity. The plant shall be approved by the Engineer.”

SECTION 2000 BEARINGS

Clause 2001 Description

Add the following as paragraph 2 of this clause

Within 90 days of award of work, the Contractor shall submit detailed specifications, designs and drawings including installation drawings and maintenance manual, for the approval of the Engineer. Designs shall also include review and modifications of designs and drawings of bearing pedestals and other elements required for installation. The installation of bearings shall be carried out under the supervision of the manufacturer of the bearings. The Contractor shall provide a warranty for 15 years from the manufacturers and the bearings shall be repaired or replaced free of cost by the Contractor / manufacturer, if any defects are observed during this period. The Employers decision regarding replacement/repairs shall be final and binding.

Clause 2005 Elastomeric Bearings

Clause 2005.3 Acceptance Specifications

In para 5, substitute the words "Engineer or his authorized representative" for the word "Inspector".

Clause 2005.3.5 Inspection Certificate

In para 4, substitute the words "Engineer or his authorized representative" for the word "Inspector."

Clause 2009 Measurements for Payment

Add the following after para 2

“POT and POT-cum-PTFE/ Sliding bearings shall be measured in metric tons of vertical load capacity.”

“Paper bearings shall be measured in square metres.”

Clause 2011 Add clause 2011 after the clause 2010 as under

Paper bearing

Paper bearing shall be reinforced bitumen laminated Kraft paper conforming to the requirements of IS- 1398.



SECTION 2200 SUB-STRUCTURE

Clause 2204 Piers and Abutments

Add the following paragraph at the end of clause

“Where necessary suitable cofferdams or other means shall be provided to exclude water from the construction area. The Contractor shall provide necessary pumping equipment for dewatering in working areas”.

Clause 2210 Rate

This clause shall be read as follows

The contract rate for masonry, concrete and reinforcement in substructure shall include all works as given in respective sections and cover the cost of incidental items like providing cofferdams, dewatering, providing special formwork, where necessary, and all other items for furnishing and providing substructure as mentioned in this section.”

SECTION 2600 EXPANSION JOINTS

A new clause shall be added as 2611 as follows:

Clause 2611 Asphaltic Plug Joint

Asphaltic plug joint shall consist of a polymer modified bitumen binder, carefully selected single size aggregate, closure/bridging metallic plate and heat resistant foam caulking/ backer rod. The specifications for general requirement, material, handling & storage, installation, tests and standards of acceptance etc. shall be as per IRC-SP:69-2005.

SECTION 2800 REPAIR OF STRUCTURE

Clause 2804 Epoxy Mortar for Replacement of Spalled Concrete

Add the following in Clause 2804.4 at the end as (c)

- (c) If reinforcement is exposed the same shall also be cleaned thoroughly. Sand blasting shall be done to clean the rusting on reinforcement. The reinforcement shall be coated with PMC slurry or epoxy phenolic based / epoxy based protective coating within one hour of cleaning to prevent rusting. The PMC or epoxy based protective coating shall be brush applied on the cleaned reinforcement ensuring that full surface area is covered in accordance with the manufacturers recommendation



Clause 2809 Dismantling of Concrete Wearing Coat

Clause 2809.2 This Clause shall read as follows:

The removal operations shall be carried out mechanically using pavement breakers and compressors. Removal shall be done carefully to avoid damage to any part of the existing structure. In delicate locations for example around spouts, removal shall be done by manual methods. After removal, the concrete deck surface shall be closely inspected for identifying any distress such as cracks, pockets of loose or honeycombed concrete etc. the deck surface shall be thoroughly cleaned with special efforts to remove any loose material. Expansion joints and spouts shall be removed carefully so that deck concrete is not damaged.

Clause 2809.3 Add the following at the end of Para

Dismantled material shall not be stacked on the deck nor shall it be thrown below the bridge. It shall be neatly piled at points designated by the Engineer with all lifts and lead up to 5000m. Materials, which can be used or auctioned, shall be stored in neat piles at locations designated by Engineer with all lifts and lead up to 2000m.

FOLLOWING NEW CLAUSES SHALL BE ADDED

Clause 2814 Dismantling of damaged and existing structures


The dismantling of various components of structure like railing, kerbs, footpath, approach slab, wing walls, piers, abutments, parapet, deck slab etc. shall be carried out as specified in drawings and as per directions of Engineer. The work shall be executed in accordance with MORTH specifications section 200, clause 202.

Clause 2815 Dowel bars

Dowel bars in deck slab at locations of parapet and expansion joint and grouting with epoxy resin locations shall be provided as shown in the drawings.

Holes shall be drilled vertically using rotary drill machines. Care shall be taken that the holes are drilled vertical and the deck concrete is not damaged. It shall be ensured that buried reinforcement of the deck is not damaged due to drilling by avoiding locations above reinforcement. Rebar detector shall be used for this purpose. 16 mm dia. dowel bars shall be inserted in the hole and kept in undisturbed position with appropriate fixture. The annular space shall be filled by epoxy grouting.




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Work of epoxy grouting shall be done in accordance with MORTH Specifications Section 2800 clause 2803. It shall be ensured that the inside of the hole is dry.

Epoxy resin shall be of following specifications:

Compressive strength	- min 35 MPa at 24 hours.
Tensile strength	- 15 - 20 MPa at 7days.
Flexural strength	- 30-40 MPa at 7 days
Viscosity @ 250C	- 900-1200 cps

Clause 2816

Railing / Parapets

Cast-in-situ railing/ parapets shall be constructed in accordance with the requirements of structural concrete section 1700. The reinforcement shall conform to section 1600. The formwork shall conform to section 1500. The work in general shall conform to section 2700 clause 2703.

The reinforcement of the railings/ parapets shall be welded with the existing reinforcement of the deck slab and with the dowel bars as shown in the drawings or as directed by the Engineer.

Clause 2817

Expansion Joint

The old expansion joint assemblies shall be removed carefully along the entire width of the carriageway as per MORTH Clause 2809.1 and recess of size shall be prepared as specified in drawing. The requirements of new expansion joint shall confirm to MORTH specifications section 2600.

Clause 2818

Drainage Spout

For existing bridge decks drainage spouts shall be replaced and new drainage spouts shall be provided as shown in the drawings. The waterproofing material shall be provided around the area of drainage spout from the top of the deck.

The work shall be executed in accordance with MORTH Specifications Section 2700 clause 2705 except to the extent modified below.

The work shall be done after the wearing coat is removed. The existing spouts shall be removed carefully with minimum damage to surrounding concrete. The pocket formed shall be sufficiently large to ensure good flow and compaction of concrete around the new spout. The area around the spout covering the pocket of new concrete adequately, approximately 500 mm x 500 mm shall be provided with a 5 mm thick polymer modified cementitious (PMC) brush topping layer.

Before commencing application of PMC brush topping the prepared concrete substrata shall be thoroughly soaked with clean water. The surface shall then be primed with PMC slurry. Before priming it should be ensured that any free surface water is removed. PMC mortar shall be applied before priming agent sets. The material shall be applied in accordance with manufacturer's recommendations.

The specifications for polymer modified cementitious (PMC) brush topping and polymer modified cementitious (PMC) mortar shall be as per clause 2822.

Clause 2819 Approach Slab

Approach slabs, which are cracked or otherwise damaged, shall be recasted after dismantling of the existing slab as specified in drawing. The work shall be executed in accordance with MORTH specifications section 2700 clause 2704. The approach slab shall be laid over lean concrete as per drawing after compacting the base properly.

Clause 2820 Repair of Exposed Surface of Masonry Work

Exposed masonry surface of existing wing walls / returns, abutments, piers etc. shall be provided with 20mm thick plaster in 1:3 cement mortar as specified in drawings or as directed by Engineer. The work shall be executed in accordance with MORTH specifications of section 1300/1400.

Clause 2821 Gabion Walls

The Gabion walls shall be provided at locations as specified in drawing or as per direction of Engineer as slope protection / floor protection measures. The work shall be executed in accordance with MORTH Specifications Section 2500 clause 2503. Excavation and back filling shall be done in accordance with MORTH Specifications Section 300.

Clause 2822 Polymer Modified Cementitious Brush Topping

The polymer latex, which is to be used, should consist of water based acrylic polymer and copolymer dispersion and special purpose chemicals. The polymer solid contents shall be 30 ± 1 percent. The particle shall be of nearly spherical shape with a diameter of 0.35 ± 0.05 micrometer. The manufacturer shall certify the above requirements about solid content and grain size. In order to keep control over the quality, the manufacturer shall provide infra red absorption spectrum analysis for the materials (polymer latex) to be supplied by them.

Portland Cement conforming to IS:8112 shall be used for production of polymer modified cement repair mortar and polymer modified



cementitious coating system, which is to be used as a bonding medium concrete substrata.

Acrylic polymer latex shall be used as the polymer for modifying and improving the properties of cement. The same product is to be used for various purposes such as in a slurry form with cement to form a bonding /priming medium and with sand to form PMC repair mortar. However, no additional water is to be added to PMC slurry or PMC repair mortar as the water which is present in the latex is sufficient for cement hydration and for this reason the latex cement ratio remain constant for all applications.

The sand which is to be used for constituting the PMC repair mortar should be Silica sand as the basic material which is categorized in two groups:

- a) Coarse Silica sand
- b) Fine Silica

The gradings of the above groups should follow the limits provided below.

Polymer Modified Cementitious (PMC) Mortar

The specifications for polymer modified cementitious material (PMC) shall be read as under

I. Mix Formulations

<u>PMC SLURRY</u>	
COMPONENT	PARTS BY WEIGHT
Cement	100
Acrylic polymer latex	52

<u>PMC REPAIR MORTAR</u>	
COMPONENT	PARTS BY WEIGHT
Cement	100
Acrylic polymer latex	52
Coarse Silica Sand	150
Fine Silica Sand	150

Curing of PMC WORK

This specification describes the cuing procedures to be followed for PMC Repair Mortar & Slurry

The curing procedures outlined apply to normal weather conditions. Under hot weather conditions take precautions to avoid drying. PMC work should be carried out at a temperature below 350C



Under unusual weather conditions e.g. high humidity and / or high wind velocity or imposed constraints special curing procedures shall be followed for which approval shall be obtained from the Engineer.

Air-drying shall be considered to be taken place only during favourable uninterrupted weather conditions existing throughout the existing recommended drying period. Some judgement shall be made in this respect and if conditions are deemed unfavourable for drying to occur, then drying must be prolonged for the full-recommended period after weather clears.

As PMC work proceeds, precautions shall be taken to prevent rapid drying of the PMC repair mortar. This is usually accomplished by covering the filled surfaces with an impermeable sheet shortly after the work has been done.

The sheet shall be kept in place until further work is carried out over the mortar or in case where the mortar is likely to be disturbed the sheet shall be kept in place for 24 hours.

No foot traffic for further work shall be allowed over mortar until 12 hours from the time of the completion of work.

Curing compound may also be used as curing membrane. Care shall be taken to ensure complete covering particularly around the interface with the host concrete.

For the first day the repaired concrete patch shall be protected from harsh environment by laying a polythene sheet over it, taping down the edges.

Mixing PMC

To mix PMC, it is necessary to have the following items

- i. A suitable sized mixing container
- ii. A high speed drill with mixing paddles
- iii. Premark batching containers for measuring out components to be mixed

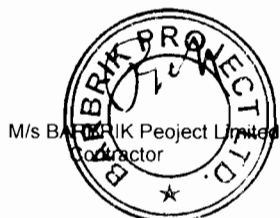
Pour all the liquid polymer latex into mixing container. After shaking the latex to disperse the solids uniformly throughout the liquid before use.

Begin mechanical mixing and while doing so, slowly add the dry components i.e. cement and sand.

Mix for about 5 minutes until solids have been well dispersed. The resulting mix should look uniform, feel creamy and be free from lumps and grits.

Precaution shall be taken not to entrap an excessive amount of air into the mix during mixing.

Since the desired consistency depends on type and brand of cement as well as weather conditions, start a trial mix with a reduced amount of cement. Once all components are mixed, add cement if necessary to



achieve the desired consistency. Record the amount of cement required and uses this for subsequent mixes. Do not reduce the quantity of cement noted in the mix proportions.

In case the slurry sets before application of mortar, a fresh coat of slurry shall be applied. Under no circumstances water shall be added in PMC repair mortar mix. Unused mortar or mortar which has partially set shall not be re-mixed and used.

I.S. Sieve No.	Percentage Passing by Weight		
	Coarse	Fine	Combined
10 mm	100	100	100
4.75 mm	95-100	100	98-100
2.36 mm	90-100	100	80-100
1.18 mm	40-60	100	70-80
600 micron	0-10	90-100	45-55
300 micron	0-4	40-60	20-30
150 micron	0-3	0 – 10	0-5
75 micron	3max	0-3	3max

In the event of using local sand, the sand to be used must satisfy the limits of deleterious materials and the requirements of soundness as given in Cl. 3.2.1 and Cl. 3.6 respectively of IS: 383. Confirmatory tests shall be conducted by the Contractor and sample kept for comparison by the Engineer.

II Mix Formulations

COMPONENT	PARTS BY WEIGHT
Cement	100
Acrylic polymer latex	52
Fine Silica Sand	100

Curing of PMC brush topping

This specification describes the curing procedures to be followed for various PMC systems.

The curing procedures outlined apply to normal weather conditions. Under hot weather conditions take precautions to avoid drying. PMC work should be carried out at a temperature below 35°C.

Under unusual weather conditions e.g. high humidity and/or high wind velocity or imposed constraints special curing procedures shall be followed, for which approval shall be obtained from the Engineer.

Air drying shall be considered to take place only during favourable uninterrupted weather conditions existing throughout the recommended drying period. Some judgement shall be made in this respect and if conditions are deemed unfavourable for drying to occur



then drying must be prolonged for the full-recommended period after the weather clears.

In unexposed and exposed areas the initial air drying of 4 to 6 hours shall be followed by moist curing for 24 hours by spraying or another approved curing method.

Following moist curing, the coating shall be allowed to air dry for 4 to 6 hours prior to the application of finishing coat.

Mixing PMC Slurries

To mix PMC slurries, it is necessary to have the following items:

- i) a suitable sized mixing container
- ii) A high speed drill with mixing paddles
- iii) Premark batching containers for measuring out components to be mixed.

Pour all the liquid polymer latex into the mixing container. Shake the latex to disperse the solids uniformly throughout the liquid before use.

Begin mechanical mixing and while doing so, slowly add the dry components, i.e. cement and sand for brush top coating.

Mix for about 5 minutes until all the solids have been well dispersed. The resulting mix should look uniform, feel creamy and be free from lumps and grit.

Precaution shall be taken not to entrap an excessive amount of air into the mix during mixing.

Since the desired consistency depends on type and brand of cement as well as weather conditions, start a trial mix with a reduced amount of cement. Once all components are mixed, add cement if necessary to achieve the desired consistency. Record the amount of cement required and use this for the subsequent mixes. Do not reduce the quantity of cement noted in the mix proportions.



PART III

TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

This part shall comprise the latest "Specifications for Building Works" Volume I to Volume IV, 1995 as published by the Central Public Works Department, Govt. of India and deemed to be bound into this document.




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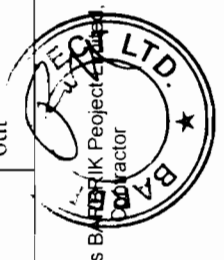
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PART-IV
ENVIRONMENTAL MANAGEMENT PLAN

Management Measures	
S. No.	Environmental Issue/Aspect
E.1	Tree Cutting
The Contractor shall not cut or damage trees except that are required to be felled for construction of traffic diversion works and facilities, after obtaining necessary permission for felling of the same from the authorities.	
E.2	Joint Field Verification
The Engineer and the Contractor will organize and carry out joint field verification to ascertain the possibility of saving environmental and community resources. The complaints/suggestions together with the observations and expert opinion of the joint verification team containing the need for additional protection measures or changes in design/scale/nature of protection/management measures shall be well documented with other requisite details such as date, time, place and signature of the individuals involved. Approval will be accorded by the Engineer in consultation with the Project Authority.	
E.3	Location and installation of Crushers, Hot-mix Plants and Batching Plants
All plants (hot-mix, crushers, batching plant, WMM or any other) shall be located at least 1000 mts. away from habitations, forests and wildlife movement areas, preferably in the downwind direction. The Contractor shall submit the proposed location plan (including survey number/s of the land parcel/s under consideration, area, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for setting-up such construction facilities. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer. The 'installation' of the plant/s shall commence after the contractor has obtained 'consent to establish' from the Orissa State Pollution Control Board. The 'operation' of the plant/s shall be permitted by the Engineer after the 'consent to operate' has been obtained from the SPCB. A copy of the application submitted to the SPCB and the consent/s received must be submitted to the Engineer, based on which the approvals will be accorded. Action/s by the Engineer against any non-compliance on this count shall be borne by the Contractor at his own risk and cost.	
E.4	Construction Camp/s – Selection, Design and Layout
No construction camps, including material stack yards and storage facility will not be proposed within 500 mts. From a. a settlement/habitation b. water source and c. reserved or protected forest limits	


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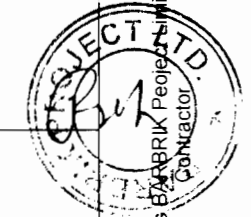
M/s B7 Contractor
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S. No.	Environmental Issue/Aspect	Management Measures
		<p>to avoid conflicts and stress on the local infrastructure facilities and natural resources.</p> <p>In case the contractor proposes setting-up of plant/s within a construction camp, clause P.3 will apply.</p> <p>The Contractor shall submit the proposed location plan (including survey number/s of the land parcel/s under consideration, area, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for setting-up construction camps. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer.</p> <p>Complete details about the pre-dominant wind direction and design of facilities, including circulation area, parking, material storage, kitchen/mess, sanitation, waste collection and disposal, drainage, electrical utility placement and water supply shall be provided by the Contractor as part of the documentation seeking approval of the Engineer on this count.</p>
E.5	Construction Vehicles, Equipment and Machinery	<p>All vehicles, equipment and machinery to be procured for construction shall conform to the relevant Bureau of India Standard (BIS) norms. The Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and conform to the emission standards specified by the CPCB. Certification issued for such contrivances by the designated/approved authorities shall be submitted to the Engineer.</p> <p>The Contractor shall maintain a proper record of Pollution Under Control Certificates for all vehicles and machinery used for works under the contract. Copies of such records shall be kept at the site office and shall be made available to the Engineer when sought.</p>
E.6	Identification, Operation and Rehabilitation of Burrow Areas	<p>The Contractor shall submit the proposed location plan (including site details, survey number/s of the land parcel/s under consideration, area and quantum of material proposed for extraction, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for opening burrow areas. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer. The Engineer will be required to inspect every proposed burrow area location and evaluate (parallel with technical examination) such proposals in accordance to environmental requirements as laid down in the EMP prior to issuing the 'approval' for use of such sites.</p> <p>No burrow areas shall be opened within 500 mts. from wildlife movement zones and forest areas. The burrow areas shall be at least 250 mts. from schools, human habitations (residential and commercial establishments), village access roads, state highways and other roads.</p> <p>No burrow area will be opened/operated without the written permission of the Engineer. The location, shape and size of the designated burrow areas will be as approved by the Engineer and in accordance to the IRC recommended practice for burrow.</p>




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Management Measures	
S. No.	Environmental Issue/Aspect
	<p>pits for road embankments (IRC 10: 1961). The 'format' for seeking Engineer's approval on environmental considerations will be as per the template provided in this EMP and will include a reference/location map; area, existing land use and haul road details; photograph of the site; and the proposed rehabilitation plan. The Contractor will not start burrowing earth from the approved burrow area/s until an agreement is signed between land owner/s and Contractor and a copy of this agreement is submitted to the Engineer.</p> <p>In burrow pits, the depth shall be regulated so that the sides of the excavation should not be steeper than 1:2, from the edge.</p> <p>All burrow areas whether in private, community or govt. land shall be restored as per the approved rehabilitation plan immediately after completion of the use of such a source. The Contractor shall plan and ensure rehabilitation work in such a manner that it is completed prior to the rainy season. 'Substantial completion' or 'completion' certificates for the civil work shall not be issued unless restoration and rehabilitation works have been completed by the Contractor and the same has been accorded a written approval by the Engineer.</p>
E.7	<p>Identification, Operation and Rehabilitation of Stone Quarry</p>
	<p>The Contractor shall submit the proposed location plan (including site details, survey number/s of the land parcel/s under consideration, area and quantum of material proposed to be used, land-use, photograph/s of the site and surrounding features within 500 mts.) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s in case of a new quarry site or with the owner/operator in case use of an existing quarry is proposed.</p> <p>No quarry and/or crusher units shall be 'selected' or 'used', which is within 1000 mts. from a human habitation, forest boundary and wildlife habitats/movement areas.</p> <p>The Contractor shall obtain necessary legal permission/s from Department of Mines, Govt. of Orissa and the District Administration, SPCB and local Tehsildar and submit a copy of the same to the Engineer. All quarry operations, including procurement, storage and use of blasting material/s will be undertaken within the rules and regulations in vogue.</p>
E.8	<p>Identification, and Operation of Sand Quarry</p>
	<p>The Contractor shall submit the proposed location plan (including details of the site/s under consideration, proposed quantum of material extraction and surrounding features) and seek prior approval of the Engineer. No sand quarry shall be opened within 500 mts. from wildlife movement zones and forest areas.</p> <p>In the event of selection of a new site for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority, the local Tehsildar and the Engineer keeping in view the objections and convenience of the local population. Where the supplier of sand is another party, the authentic copy of lease agreement that has been executed between the local Tehsildar and the supplier has to be submitted to the Engineer before any procurement of material is made from such a site.</p>




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Management Measures	
S. No.	Environmental Issue/Aspect
The procurement of material shall be allowed only from those sand quarry sites that are permitted by the local Tehsildar with the concurrence of the District Collector with due regard to Orissa Miner Mineral Concession Rules, 2004.	
E.9	<p>Arrangement for Construction Water</p> <p>The Contractor shall submit the proposed location plan (including site details; type of the source under consideration; its usage by other consumers; proposed quantum of water extraction) and seek prior approval of the Engineer. To avoid disruption/disturbance to other water users, the Contractor will extract water only from the approved locations and shall seek a written approval of the Engineer before finalizing and using any such water source – whether ground or at surface.</p> <p>Use of ground water facility shall be subject to the local legislation; ground water availability in the area and the granting of necessary permission by the Competent Authority. The Contractor shall pay the royalty for use of such water as decided under the relevant norms. A copy of the permission obtained from the Competent Authority shall be submitted to the Engineer prior to the use of any such source. The possibility/ permission for sinking of bore wells adjacent to nalas and streams may be examined, such that while the water requirement for the road construction activity is met and these structures when abandoned can help in ground water recharge after suitable modification.</p>
E.10	<p>Clearing and Grubbing</p> <p>All works shall be carried out by the Contractor in a manner such that the damage or disruption to flora is minimal. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from Engineer.</p>
E.11	<p>Stripping, stacking and preservation of top soil</p> <p>The top soil from all sites including road side widening and working area, cutting areas, quarry sites, burrows areas, construction camps, haul roads in agricultural fields (if any) and areas to be permanently covered shall be stripped to a specified depth of 150mm and stored in stockpiles for re-use. A portion of the temporarily acquired area (along the boundaries in a construction camp, burrow areas etc.) and along the road at the Right of Way edge will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of the Engineer.</p> <p>The following precautionary measures will be taken by the Contractor to preserve the stockpiles till they are re-used:</p> <p>(a) Stockpile will be such that the slope does not exceed 1:2 (vertical to horizontal), and height is restricted to 2 m. (b) To retain soil and to allow percolation of water, the edges of the pile will be protected by silt fence. (c) Multiple handling kept to a minimum to ensure that no compaction occurs. (d) Such stockpiles shall be covered with empty gunny bags or will be planted with grasses to prevent loss during rains.</p> <p>Such stockpiled topsoil will be utilized for -</p> <ul style="list-style-type: none"> ➤ Covering reclamation sites or other disturbed areas including burrow areas (other than those in barren areas)




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Management Measures	
S. No.	Environmental Issue/Aspect
	<p>➤ Top dressing of road embankment and fill slopes</p> <p>➤ Filling up of tree pits and</p> <p>➤ In the agricultural fields of farmers, acquired temporarily that need to be restored.</p> <p>Residual topsoil, if there is any, will be utilized for the plantation works along the road corridor.</p> <p>The utilization as far as possible shall be in the same area/close to the same area from where the top soil was removed. The stripping, preservation and reuse shall be closely supervised and properly recorded by the Engineer.</p>
E.12 Labour Camp Management	
E.12	Accommodation
12.1	<p>Prior to setting-up such a labour/worker's facility, the location, lay-out and basic provision of facilities to be provided at each labour camp site shall be submitted to the Engineer for approval. The construction or hiring of such facilities shall commence only after the written approval from the Engineer has been received by the Contractor.</p>
12.2	Potable Water
	<p>The Contractor shall ensure the fulfillment of the following conditions:</p> <p>a) Supply of sufficient quantity of potable water within the precincts of every workplace in a cool and shaded area. Such facilities shall be regularly maintained from health and hygiene point of view.</p> <p>b) All open wells will be entirely covered and will be provided with a trap door to prevent accidental fall and contamination from dust, litter etc. A reliable pump will be fitted to each covered well.</p> <p>The Engineer is required to inspect the labour camp once in a week to ensure compliance to the health and hygienic standards prescribed in the Labour Regulations and in the EMP.</p>
12.3	Sanitation and Sewage System
	<p>The Contractor shall ensure that -</p> <p>c) The provision of toilets and sewage system for the camp is to be designed, built and operated in such a fashion that no health hazard occurs and no pollution to the air, surrounding agricultural fields, ground water or adjacent water courses takes place.</p> <p>d) Separate toilets and bathrooms for women workers wherever required, screened from those of men, are provided with markings in vernacular language.</p> <p>e) All such facilities must have adequate water supply with proper drainage and disposal facility.</p> <p>f) All toilets in workplaces are to be maintained, cleaned and disinfected daily using proper disinfectants.</p> <p>g) Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas.</p>



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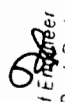

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Management Measures	
S. No.	Environmental Issue/Aspect
	<p>h) In the main camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site. All these facilities shall be inspected on a weekly basis by the Engineer to check the hygiene standards.</p> <p>The Contractor shall maintain properly (as directed by the Engineer) all roads (existing or constructed for the project), used for transporting construction materials, equipment and machineries for the works under this contract. It shall be the responsibility of the Contractor to ensure that all roads used for transportation of construction materials are clear from any dust, sand, soil, aggregates etc. that may have fallen from the transporting vehicles. The Contractor will arrange for regular water sprinkling, at least three times in a day, for dust suppression of all such roads and surfaces.</p> <p>All vehicles delivering goods to the site shall be covered to avoid spillage of materials and air pollution.</p> <p>The unloading of all materials at construction sites will be limited to day time only to avoid accidents. Screens of hessian cloth, agro-net and such other barricading material are to be erected along all dumping and stockpiling sites, so that generation of the dust in the vicinity of such locations can be minimized to a great extent.</p>
E.14 Worksite Safety Management	
14.1	<p>Traffic Diversions</p> <p>This shall be done according to the provisions of Technical Specifications Cl. 112.</p>
14.2	<p>Traffic Safety</p> <p>This shall be done according to the provisions of Technical Specifications Cl. 112</p>
14.3	<p>Safety of Workers</p> <p>The Contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The Contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract.</p> <p>The Contractor shall provide and ensure enforcement with zero tolerance on the following:</p> <ul style="list-style-type: none"> a) Protective footwear and protective goggles to all workers employed handling asphalt materials, cement, mortar, concrete, blasting and crusher operations. b) Welder's protective eye-shields and protective footwear to workers engaged in welding works. c) Earplugs to workers exposed to high noise levels.




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S. No.	Environmental Issue/Aspect	Management Measures
		<p>d) Hard hat or helmets to all workers, supervising staff and inspecting officials entering a construction site, plant area, quarry and engaged in loading/unloading operations.</p> <p>e) Protective goggles and clothing to workers engaged in stone breaking activities.</p> <p>f) Nettings below and on the sides of overhead construction and excavation work to prevent mishaps due to accidental fall of workmen and debris.</p> <p>g) 'No smoking' and other 'high risk' areas are to be provided with warning signage besides strict enforcement of PPE with zero tolerance limits.</p>
14.4	Risk from Electrical Equipment(s)	<p>All power transmission lines whether claded or sufficiently covered are potential hazards at construction sites. The Contractor shall take all required precautions to prevent danger from electrical cables, wires and equipment and ensure that –</p> <p>a) No material will be stacked or placed below/near power transmission lines, wires and equipment, which can be a potential danger to any road user, workman or public.</p> <p>b) All such electrical installations and wirings shall be barricaded in manner that ensures safety of the road users, workers, operating vehicles/equipment (such as cranes, excavators, loaders, fabricating units) and wildlife.</p> <p>c) Necessary fencing, illumination and proper insulation of the electrical lines shall be ensured by the contractor for safety and security of the general public, road users, workers and the wildlife.</p> <p>d) The contractor shall ensure proper maintenance of electrical supply lines/points.</p> <p>e) All such electrical operating units shall be switched off before operations are closed every day or night as the case may be.</p> <p>f) All electrical equipment/cables/wires to be used in the construction shall have to conform to the relevant BIS specifications/codes.</p> <p>g) The contractor will ensure that such equipment/cables/wires are free from patent defect, and maintained in good working order (as per the owner manual supplied by the manufacturer) through regular supervision, monitoring, maintenance and repair/ replacement from time to time.</p>
14.5	First Aid	<p>The Contractor shall arrange for -</p> <ul style="list-style-type: none"> ▪ A readily available life saving first aid kits including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone. ▪ Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital. ▪ Equipment and trained nursing /paramedical staff at construction camps. ▪ Periodic health checks for workers.




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Management Measures	
S. No.	Environmental Issue/Aspect
14.6	Risk Force Majeure
	<p>The Contractor shall take all reasonable precautions to prevent danger of destruction to life and property of the public as well as the workers on account of flood, fire, explosion, accidents involving vehicles carrying hazardous materials etc. in an around work sites, camps, maintenance units, burrow areas, quarries, haul roads and in any other place associated with the project activity.</p> <p>The Contractor will make the required arrangements so that in case of any mishap all necessary steps can be taken for prompt on-the-spot first aid treatment. Arrangements shall be made for quick rescue operation including shifting of the injured to the nearest hospital</p> <p>Fire extinguishers/fire-fighting equipment and salvaging equipment for the recovery of hazardous chemicals on account of accidents or spillage are to be kept ready at camping sites or major construction sites to attend to such eventualities.</p> <p>A Construction Safety Plan to be prepared by the Contractor during the Mobilization phase shall identify all necessary actions in the event of an emergency. The actions shall include description of stand-by arrangements, rescue of workers/people and salvage of hazardous chemicals/ materials in case of such eventualities. This plan shall be prepared in accordance with the standard practice adopted under labour welfare activities and Factories Act and will be approved by the Engineer.</p>
E.15	Accessibility
	<p>Construction activities that affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provision/s approved by the Engineer. The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from road sides and property accesses connecting the project road by providing safe temporary arrangements, including a connecting road, as necessary.</p>
E.16	Disruption to Other Users of Water
	<p>While working across or close to any perennial water bodies, the Contractor shall not obstruct/prevent the flow of water.</p> <p>Construction over and close to the non-perennial streams shall be undertaken in dry season and if such activity is likely to disrupt, constrain or impact the community use of the water body, adequate prior information (at least two weeks in advance) will be provided to such a community. Such water body may be ponds, water harvesting structures (WHS), feeder channels to pond, irrigation sources etc. If the supply of water or access to a source is being completely cut off, then the Contractor shall make necessary arrangements to provide water in the interim period. Water quality test shall be done prior to providing / supplying the water.</p>
E.17	Labour Requirements
	<p>The Contractor preferably will use labour drawn from local areas to provide maximum benefit to the local community especially to the vulnerable individuals/groups living in the project area.</p>

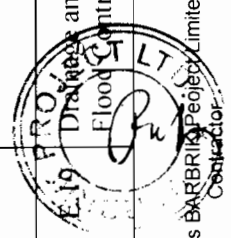

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Management Measures	
S. No.	Environmental Issue/Aspect
E.18	Pollution Management
18.1	Dust Pollution
<p>The Contractor will take every precaution to reduce the level of dust (SPM and RSPM) and make arrangements to minimize dust pollution through provision of wind screens/barriers, water sprinkling/mist spray units, and encapsulation of dust source shall be made at the plant sites.</p> <p>Specifications of crushers, hot mix plants and batching plants shall comply with the requirements of the relevant legislations and as laid out in the 'Consents' issued by the OSPCB. The Contractor will provide necessary certificates to confirm that all crushers used for the works under the Contract conform to relevant dust emission control legislation.</p> <p>Even if the Contractor chooses to use an existing crusher (already operating in the area), basic minimum standards stipulated under the Pollution Control Legislation will have to be met and dust control devices need to be installed and operated. Copies of the required certificates and 'consents' of such a plant shall be procured by the Contractor and submitted to Engineer prior to the procurement of material from a unit of this nature.</p>	
18.2	Siltation of Water Bodies and Degradation of Water Quality
<p>Release of wastes (non-toxic and toxic) by the Contractor into water bodies and drainage systems that may adversely impact the aquatic life both locally and in the downstream stretches shall be viewed as serious non-compliance of EMP since these may affect the eco-flow, aquatic life and livelihoods of people dependent on such resources.</p> <p>The Contractor will ensure that construction and excavated materials containing fine particles are stored in an enclosure, particularly during the rainy season, such that sediment-laden water does not drain into nearby water bodies..</p> <p>The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system by providing proper septic tanks and soak pits. Spills, dust fines, waste oil, wastes and debris shall be cleared and disposed off as per the guidelines provided in the EMP under the supervision of the Engineer.</p> <p>The Contractor will avoid continuation of construction activity close to the streams or water bodies during monsoon. Stream courses and drains will be kept free from dumping of solid wastes, excavated earth, sludge and discharge of waste water from construction camps and sites. Liquid wastes arising from construction sites are to be impounded into proper collection pits.</p>	
18.3	Water Pollution
<p>Garage, service stations, refueling stations and equipment maintenance yards shall be so located at least 100 mts. away from kitchen, mess and drinking water facilities within the camp site.</p> <p>The Contractor shall ensure that all vehicles, machinery and equipment are operated (including re-fuelling) and maintained in such a manner as to prevent spillage of oil, fuel, lubricants and other pollutants into the water bodies.</p>	


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Management Measures	
S. No.	Environmental Issue/Aspect
	Chemicals
	<p>a fashion that any spillage (while working or accidental) of fuel and lubricants does not contaminate the land and water resources. There shall be lined drains and service ramps with oil and grease traps/oil interceptors in such areas to prevent liquid wastes from entering into soil, any aquifer, local water source, bore well, pond and other water bodies. Storage of drums (both filled and empty) and refueling shall be done on concrete platforms (impervious surface). Additionally, roofing (of any type other than asbestos) shall be provided to prevent contamination of land and water due to run-off from such sites during rains. Oil interceptors are also to be provided at vehicle parking areas.</p> <p>The contractor will arrange for collection, storage, reuse/disposal of spent oil, lubricants, grease, sludge, slurry, bitumen, chemicals and paints or other such material. Covered bins/drums (marked specifically regarding the contents) shall be kept separately at maintenance and refueling areas. Disposal shall be at pre-identified sites (as listed in the Waste Management Plan) as approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with the prevailing MoEF and SPCB guidelines issued for such purpose. The Engineer will certify that all arrangements comply with the guidelines of SPCB/ MoEF.</p>
18.4	Noise Pollution
	<p>The Contractor shall ensure the following:</p> <ul style="list-style-type: none"> a) All plants and equipment used in construction (including those of sub-Contractors and/or suppliers such as aggregate crushing plants) shall strictly conform to the MoEF/CPCB noise standards and shall have latest noise suppression mountings. b) All vehicles and equipment used in construction will be fitted with exhaust silencers. c) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective, these shall be replaced. d) Maintenance of equipment, machinery and vehicles (including proper lubrication, tuning, checks for muffler effectiveness) shall be regular and up to the satisfaction of the Engineer to keep noise levels under control. e) Construction activity at sites within 100m habitations and hospitals shall not be carried out during night (10:00 pm to 06:00 am). f) Construction activity at sites within 500m from wildlife movement zones, reserved and protected forest areas shall not be carried out between 06:00 pm to 06:00 am. g) Blasting operations, if any shall be carried out with full safety precautions and in compliance with measures as specified in the legal provisions. <p>Monitoring shall be carried out by the Contractor in presence of the Engineer at the construction sites as per the Noise Monitoring Plan provided in this EMP and results shall be shared with the Engineer.</p> <p>The contractor will also ensure that no material (such as earth, stone, or other construction material or wastes) blocks the natural flow of water in any water course or cross drainage channel. All cross drainage and structure construction sites shall be</p>




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Management Measures	
S. No.	
Environmental Issue/Aspect	
E.20	<p>cleared/cleaned-up prior to the rainy season. Also, prior to the monsoon season, the Contractor will provide either permanent or temporary drains to prevent water accumulation in residential, commercial and agricultural areas adjoining the under-construction zones of the road. Besides this, drainage shall be cleared to avoid accumulation of water within the construction sites, camp and plant sites and storage yard well in advance of the rainy season.</p> <p>The Contractor will provide slope protection works as per design, or as directed by the Engineer to control soil erosion and sedimentation through use of dykes, sedimentation chambers, basins, fiber mats, mulches, grasses, slope drains and other devices as required under specific local conditions. All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earth work or other items of work and as such no separate payment will be made for them.</p> <p>The Contractor shall ensure the following:</p> <ol style="list-style-type: none"> After construction of road embankment, the side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub, as per design specifications. Turfing works will be taken up as soon as possible provided the season is favorable for the establishment of grass sods. Other measures of slope stabilization may include mulching/netting with sowing of grass seeds and sprinkling of water on such slopes after the completion of the earth work. Along sections abutting water bodies, stone pitching, as laid out in the design, will be provided to protect slopes.
E.21	Waste Management
21.1	<p>The Contractor will ensure that any spoils/materials unsuitable for embankment fill are not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests and pastures. All proposed disposal sites for waste material shall be identified by the Contractor and a Rehabilitation Plan (including details about pollution prevention and safety measures) for each such site shall be submitted to the Engineer for approval.</p>
21.2	<p>Debris generated due to the dismantling of the existing road will be suitably re-used in the proposed construction as follows:</p> <ul style="list-style-type: none"> ▪ The dismantled scraps of bitumen will be disposed off through utilization for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the corridor or in any other manner approved by the Engineer.



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Management Measures	
S. No.	Environmental Issue/Aspect
	<p>Structures and Road Surface</p> <ul style="list-style-type: none"> ▪ At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water. ▪ The Contractor will suitably dispose off unutilized non-toxic debris either through filling up of burrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of the Engineer. ▪ Debris generated from pile driving or other construction activities along the rivers and streams drainage channels shall be carefully disposed in such a manner that it does not flow into the water body. ▪ Non-bituminous wastes may be dumped in burrow pits (preferably located in barren lands) where such burrow pits are not suitable to develop as a economic source like pisci-culture or a source of irrigation. Such burrow pits can be filled up with non-bitumen wastes and then covered with a minimum 30cm layer of the soil, where plantation of trees and shrubs can be taken-up. <p>The Contractor at his own cost shall resolve any claim, arising out of waste disposal or any non-compliance that may arise on account of lack of action on his part.</p>
21.3	<p>Waste Disposal from Construction Camp/s and Plant Site/s</p> <p>The Contractor will provide garbage bins in the construction camp/s and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Contractor. The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site.</p> <p>Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tyres, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold/given out for recycling.</p>
E.22	<p>Chance Found Archaeological Property</p> <p>All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.</p>
E.23	<p>Demobilization and Decommissioning</p> <p>The Contractor shall clear all temporary structures and dispose all garbage, night soils and POL waste as per the approved Waste Management Plan. All construction zones including river-beds, drainage channels, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be rehabilitated as per the approved plans. The Engineer shall ensure that all clean-up and restoration operations are completed satisfactorily and written approval is given to the contractor before the 'works completion certificate' is issued/recommended to the Client.</p> <p>All clean-up and restoration operations, including road-side and structure construction site clean-up; burrow area rehabilitation</p>


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S. No.	Environmental Issue/Aspect	Management Measures
		<p>provision of drainage and slope protection measures and; restoration of top-soil shall be completed. All disposal pits or trenches will be filled in disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly at plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW.</p> <p>The Engineer shall ensure through site inspection that the Contractor and Engineer have complied with all these provisions prior to 'taking-over' the milestone stretch in question.</p>



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Contractor

[Signature]
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IDENTIFICATION OF DISPOSAL SITE LOCATIONS

[One Time Format, to be filled by the Contractor before dumping in each location]

Link : _____
[Give chainages and nearest settlements from both ends]

Sl. No.	Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3
1	Existing Land Use			
2	Area covered (m ²)			
3	Total Material that can be dumped within the site (m ²)			
4	Depth to which dumping is feasible (m)			
5	Distance of nearest watercourse (m)			
6	Nearest Settlement (m)			
7	Date/s of Community Consultation/s			
8	Whether the community is agreeable to sitting of dumping site (Y/N)			
9	Date of Permission from Villager/local community			
10	Proposed future use of the Site			
11	Selected Site (tick any one column only)			

Enclosures: [Tick as appropriate]

1. Map of each location (Totalno.s) : Attached / Not Attached
2. Photographs of
 - a. Each disposal location : Attached/ Not Attached
 - b. Each community consultation : Attached/ Not Attached
3. Photo copy of Agreement with individual owners
 - a. Mr. : Attached/ Not Attached
 - b. Mr. : Attached/ Not Attached

Remarks

Submitted

Signature.....

Name.....

Designation.....

Contractor

Checked

Signature.....

Name.....


Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer


Chief Engineer
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O/o the E.I.C.(Civil), Odisha
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World Bank Projects, Odisha




SETTING-UP CONSTRUCTION CAMP AND STORAGE AREA

[One Time Format, to be filled by the Contractor & submitted before target date of establishing camps or each time before change of layout]

Location of Camp : _____

Date _____

Sl. No.	Item	Unit	Details
1.	Detail of item camp		
a.	Size of Camp	m x m	
b.	Area of Camp	Sq.m	
c.	Distance from Nearest Settlement		
d.	Distance from Nearest Water Source [Type/Size/Capacity/present Use/Ownership]		
e.	Date of camp being operational dd/mm/yy		
f.	Present land use		
g.	No of trees with girth > 0.3m.		
h.	Details of Storage area (Availability of impervious surface)	Mxm	
i.	Availability of separate waste disposal from storage area	Cum	
2.	Details of topsoil stacking		
a.	Quantity of top soil removed	Sq.m	
b.	Details of storage of topsoil [Describe stacking arrangement]		
3.	Details of workforce		
a.	Total No of Laborers	Nos	
b.	Total no of Male Workers	Nos	
c.	No of Male Workers below 18 years	Nos	
d.	Total No of Female Workers	Nos	
e.	No of Female workers below 18 years	Nos	
f.	No of children	Nos	
4.	Details of dwelling units		
a.	No of dwellings/huts		
b.	Minimum Size of Dwelling	m x m	
c.	No. of openings per dwelling	Nos	
d.	Minimum size of opening	m x m	
e.	Walls	Specifications	
f.	Roofing	Specifications	
g.	Flooring	Specifications	
h.	Drinking Water Tank	Specifications	


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i.	Capacity of Drinking Water Tank	Cum	
j.	Size of Drinking Water Tank	Mxm	
k.	Total no of WC	Nos	
l.	No of Wcs for female workers	Nos	
m.	Minimum Size of WC	Mxm	
n.	Total No of Bathrooms for female workers	Nos	
o.	Size of septic tank for WC/Baths	Mxm	
p.	Capacity of Water Tank for WCs /Bathrooms and general purpose	cum	
q.	Fencing around camp	Y/N	
5.	Details of facilities		
a.	Availability of security 24 hrs a day	Yes/No	
b.	Details of First Aid Facility	Yes/No	
c.	Availability of Dav Care Centre	Yes/No	
d.	Availability of dust bins (capacity 60 ltr)	Nos	

Encl:

- Site Layout of Construction camp
- Drawings of dwelling units with allied facilities

Attached/ Not Attached

Attached/ Not Attached

Remarks

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

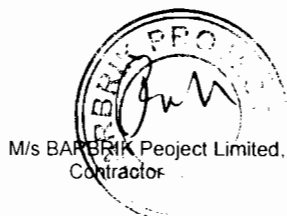
Environmental Engineer.
Construction Supervision Consultant

Approved


Signature.....

Name.....

Resident Engineer



M/s BARAK Project Limited,
Contractor


Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Shubaneswar.

Chief Engineer,
World Bank Projects, Odisha

ESTABLISHMENT OF BURROW AREAS PRIOR TO OPENING

[One time Format, to be submitted by the Contractor for taking consent for opening of EACH Burrow area]

Link No. _____
Material _____

[Give chainages and nearest settlements from both ends]

Sl. No.	Location			Area m x m	Quantity of Available Material (cum)	Distance from nearest Water Course (m)	Distance from nearest Settlement(m)	Land Use		No. of Trees Affected	Rehabilitation Measures Proposed
	Name of Village	Chainage of Project Road (km)	Side (LHS /RHS)					Haul road length (km)	Before		

- Photograph of Proposed Site Attached/ Not Attached
- Location Map Attached/ Not Attached
- Agreement with Land Owner Attached/ Not Attached

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



[Signature]
Chief Engineer
World Bank Project
C/o the E.I.C.(Civil), Odisha
Bhubaneswar

M/s BARBRIK Peoject Limited,
Contractor

ESTABLISHMENT OF HOT MIX PLANT /BATCH MIX PLANT

[To be submitted by Contractor for taking permission from PMU]

Link _____

Sl. No.	Location			Area (m ²)	Distance from nearest Water Course (m)	Distance from nearest Settlement	Existing Land Use	Prevalent Wind Direction	Weather in Down Wind Direction (Y/N)	Approved by EO (Y/N)	Remark
	Name of Village	Chainage (km)	Side (LHS /RHS)								

1. Photograph of Proposed Site Attached/ Not attached
2. Site Plan Attached/ Not attached
3. Permission from OSPCB Attached/ Not attached (Valid upto _____)

Submitted	Checked	Approved
Signature.....	Signature.....	Signature.....
Name.....	Name.....	Name.....
Designation.....	Environmental Engineer.	Resident Engineer
Contractor	Construction Supervision Consultant	



M/s BARBRAK Projects Limited,
Contractor

Chief Engineer,
World Bank Project
On the E.I.C.I Civil, Odisha
Bhubaneswar.

ROAD SAFETY REPORTING FORMATS

[Reporting by Contractor to PMU before commencement of construction in the Working Zone]

Link _____

DIVERSION at location : km _____

Report-Date.....

Sl. No.	Item	Unit	Remarks
Details of Construction Zone			
1.	Length of Working Zone	m	
2.	Distance between this and adjacent construction zone	m	
3.	Length of approach transition zone (should be min 50 for a speed of 50 km/ hr)	m	
4.	Length of terminal transition zone	m	
5.	Length of Longitudinal Buffer Zones	m	
6.	Length of Lateral Buffer Zone	m	
Signage's in advance warning zone			
1.	Sign 'Men at Work' before 200m	Y/N	
2.	Sign 'Men at Work' before working zone	Y/N	
3.	Signage saying 'Compulsory Keep Right /Left' provided	Y/N	
4.	Signage saying 'Narrow Road on left/ right' provided	Y/N	
Signage in Approach Transition Zone			
1.	Signage saying 'Compulsory Keep Right /Left' provided	Y/N	
2.	Delineators placed along length of transition	Y/N	
Signage in work zone			
1.	Hazard Marker placed where railing for CD structure on diversion starts	Y/N	
2.	Barricade on either side of work sub zone	Y/N	
Signage in Terminal transition zone			
1.	Sign for Restriction Ends	Y/N	
Road Delineator			
1.	Delineator posts provided	Y/N	
2.	Sand bag delineators with Retroreflective stickers provided	Y/N	
3.	Object Makers Provided	Y/N	

1. Sketch of construction zone showing all sub zones and location of signs
2. Format on Acquisition of Temporary diversions

Attached/ Not Attached
Attached/ Not Attached

Submitted

Signature.....

Name.....

Designation.....

Contractor

Checked

Signature.....

Name.....

Environmental Engineer.

Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer

[Signature]
Chief Engineer
World Bank Project
on the E.I.C.(Civil), Odisha
Bhubaneswar.

ARRANGEMENT FOR TEMPORARY LAND

[Quarterly Reporting by Contractor to PMU, Site Layout of all locations to be attached with this format]

Link _____ Report – Date: _____

Sl. No.	Item	Target date for Establishment	Date of Establishment	Location			Present Land use	Size (m x m)	Existing Trees >30 cm girth	Dist. From nearest settlement	Dist. From nearest water source	Site approved or not (Y/N)	Remarks by CMU (PRBDB) if any
				Name of Village	Chainage (km)	Side (LHS /RHS)							
1	Burrow Areas BA 1												
2	Workers Camps WC 1												
3	Site for Batching Plant BP 1												
4	Site for Hot Mix Plant HMP 1												
5	Stock Yard SY 1												

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Designation.....
Construction Supervision Consultant

Approved

Signature.....

Name.....

Designation.....
Resident Engineer



*Chief Engineer,
World Bank Project,
On the E.C.(Civil), Odisha,
Bhubaneswar.*

M/s BARBERK Projects Limited,
Contractor

IDENTIFICATION OF SOURCE OF WATER FOR CONSTRUCTION

[Monthly Reporting by the Contractor]

Link _____

Report – Date: _____

Sl. No.	Source (Name)	Location /Ch.	Distance from Road	Permission Required	Remarks

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



M/s BARAK Project Limited,
Contractor

Handwritten signature
Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar

Chief Engineer,
World Bank Projects, Odisha

DETAILS OF EARTHWORK

[Monthly Report to be filled by the Contractor for Each Burrow Area under use]

Link _____

Month.....

Date of Submission.....

Location of Burrow Area under use

	Name of Village	Chainage (km)	Side (LHS / RHS)	Haul road length (m)
I				
II				

2. Details of Burrow Areas

2.1	Capacity of the Burrow Area	
2.2	Percentage of the capacity exhausted	
2.3	Total quantity of the Earth Excavated (in cum)	
2.4	Quantity of Top Soil removed from the Burrow Areas	
2.5	Location of Top Soil stored removed	
2.6	Quantity of Top Soil stored at the beginning of the month	
2.7	Quantity of Top Soil utilized at the end of the month	
2.8	Location (s) where Top Soil has been utilized (Specify on a location plan)	
2.9	Quantity of earthwork excavation from existing road	
2.10	Total quantity of earthwork reused in cum. (5%)	
2.11	Location disposal (if other than sites) (Specify clearly on a location plan)	
2.12	Quantity of earthwork re-used in fill operation	
2.13	Location of burrow areas in disuse / exhausted	
2.14	Outline a rehabilitation plan for each of the exhausted burrow areas with special reference to Erosion Protection Measures. Also, submit at separate detailed rehabilitation plan for exhausted burrow areas for approval supported adequately with layouts, plans and drawings.	

Remarks

Submitted

Signature.....

Name.....

Designation.....

Contractor

M/s BARAK Project Limited,
Contractor

Checked

Signature.....

Name.....

Environmental Engineer,
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer


Chief Engineer
World Bank Project
O-o the E.I.C.(Civil), Odisha
Shubaneswar,
Chief Engineer,
World Bank Projects, Odisha

DETAILS OF HOT MIX PLANT

[Monthly Report for Each Hot Mix Plant , to be filled by the Contractor]

Reporting Month.....

Date of Submission.....

1. Environment Features of the surrounding area

1.1	Name and location of Hot Mix Plant (w.r.t. PWD km ch.)	
1.2	Wind direction	
1.3	Name (s), distance population and type of settlements in a 1.5 km radius of site.	

2. Draw/ Attach Sketch Plan of HMP clearly indicating distance and approach roads.

3. Details of HMP and Mitigation Measures taken

3.1	Installed Capacity	
3.2	Average Utilization	
3.3	Make	
3.4	Model	
3.5	Last Serviced	

4. Explain Air Pollution Control Measures taken at the HMP site

5. Explain Noise Pollution Control Measures taken at the HMP site

Remarks

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



DETAILS OF LAND FILL OPERATIONS

[Monthly Report for Each Land Fill site, to be filled by the Contractor]

Reporting Month.....

Reporting Date

1. Environment Features of the surrounding area

1.1	Location of each land fill site (Provide sketch Map below)	Name of Village	Chainage (km)	Side (LHS/RHS)	Haul road length (m)
	I				
	II				
1.2	Capacity of each land fill site				
1.3	Safety measure taken at land fill site (s)				
		1.			
		2.			
		3.			

1. Sketch maps

Attached/ Not attached

2.

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



M/s BARBRIK Project Limited,
Contractor


 Chief Engineer
 World Bank Project
 O/o the E.I.C.(Civil), Orissa
 Bhubaneswar
 Chief Engineer,
 World Bank Projects, Odisha

DETAILS OF MACHINERY IN OPERATION

[Monthly Report , to be filled by the Contractor]

Link _____

Reporting Month.....

Date of Submission.....

1. Details of Machinery Operation

Sr. no.	Machinery in operation	Registration No./ Mark	Make	Validity date of Pollution Control Certificate
1	Pavers	1.		
		2.		
2	Rollers	1.		
		2.		
3	Number of excavators	1.		
		2.		
4	Number of graders	1.		
		2.		
5	Number of dumpers	1.		
		2.		
		3.		
6	Others (Give details)			

1. Copy of OSPCB emission control certificates (To be attached Quarterly) Attached/ Not Attached

Remarks

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



M/s BARARIK Project Limited,
Contractor

[Signature]
Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar
Chief Engineer.
World Bank Projects, Odisha

DETAILS OF WORKSHOPS IN OPERATION

[Quarterly Report , to be filled by the Contractor]

Reporting Month.....

Date of Reporting.....

Sr. No.	Details	Location 1	Location 2	Location 3
1	No. of workshops with repairs facility (furnish location and type of facility provided)			
2	Number of vehicles in repair at each location			
3	Number of oil interceptor provided in each repair / fuelling site			
4	Total quantity of oil and wastes recovered in each interceptor during last month. (kg / lit)			
5	Details of waste disposal. (Whether Sold/ Disposed)			

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), District
Bhubaneswar

Chief Engineer.
World Bank Projects, Odisha



M/S PARBRICK Projects Limited,
Contractor

REDEVELOPMENT OF BURROW AREAS

[Monthly Reporting Format to be filled by the Contractor]

Link _____ Report-Date _____

Sl. No.	Burrow Area No.	Rehabilitation Measures	Date of approval of Rehabilitation	Date of Handing Over back to the Owner	Remarks

1. Drawing for Redevelopment for each Burrow Area Attached/ Not Attached
2. Photographs of sites before use Attached/ Not Attached
3. Photographs of sites after rehabilitation Attached/ Not Attached

Submitted	Checked	Approved
Signature.....	Signature.....	Signature.....
Name.....	Name.....	Name.....
Designation.....	Environmental Engineer.	Resident Engineer
Contractor	Construction Supervision Consultant	



[Signature]
 Chief Engineer,
 World Bank Project
 On the E.I.C.(Civil), Odisha
 Bhubaneswar.

Chief Engineer,
 World Bank Projects, Odisha

SAFETY CHECK LIST

[Monthly Reporting Format to be filled by the Contractor for each location]

Name of Safety Officer _____
 Date of Inspection _____
 Location

Description	Category		
	A	B	C
General			
House Keeping			
Stacking of Material			
Passageway			
Lighting			
Ventilation			
Others			
Electrical			
Switches			
Wirings			
Fixed Installation			
Portable Lighting			
Portable Tool			
Welding Machine			
Others			
Fire Prevention			
Fire Fighting Appliance			
Dangerous Goods Store			
Gas Welding Cylinders			
Others			
Others			
Dust Control			
Noise Control			
First Aid Equipment			
Washing Facility			
Latrine			
Canteen			
Provision of Personal Protective			
Helmet			
Eye Protector			
Ear Protector			
Respirator			
Safety Shoes			
Safety Belts			
Others			

A: Adequate at time of Inspection ; B: Needs Improvement ; C: Needs Immediate Attention

Remarks

Submitted

Signature.....
 Name.....
 Designation.....



Checked

Signature.....
 Name.....
 Environmental Engineer.
 Construction Supervision Consultant

Approved

Signature.....
 Name.....
 Resident Engineer

[Signature]
 Chief Engineer,
 World Bank Project
 O/o the E.I.C.(Civil), Odisha
 Bhubaneswar.

Chief Engineer,
 World Bank Projects, Odisha

ACCIDENT REPORT

[To be completed **ON OCCURRENCE** of injury by the Safety Officer]

Location : _____
 Time : _____ Day/ Night Weather : _____

Part I

Type of Accident

D01 ()	Fall of person from a height	D11 ()	Explosion
D02 ()	Slip, trip or fall on same level	D12 ()	Fire
D03 ()	Struck against fixed objects	D13 ()	Contact with hot or corrosive substance
D04 ()	Struck by flying or falling objects	D14 ()	Contact with poisonous gas or toxic substances.
D05 ()	Struck by moving objects	D15 ()	Contact with poisonous gas or toxic substances
D06 ()	Struck / caught by cable	D16 ()	Hand tool accident
D07 ()	Stepping on nail etc.	D17 ()	Vehicle / Mobile plant accident
D08 ()	Handling without machinery	D18 ()	Machinery operation accident
D09 ()	Crushing / burying	D19 ()	Other (please specify)
D10 ()	Drowning or asphyxiation		

Agent Involved in Accident

E01 ()	Machinery	E11 ()	Excavation / underground working
E02 ()	Portable power appliance	E12 ()	
E03 ()	Vehicle or associated equipment / machinery	E13 ()	Ladder
E04 ()	Material being handled, used or stored	E14 ()	Scaffolding /gondola
E05 ()	Gas, vapor, dust, fume or oxygen	E15 ()	Construction formwork, shuttering and false work.
E06 ()	Hand tools	E16 ()	Electricity supply cable, wiring switchboard and associated equipment
E07 ()	Floor edge	E17 ()	Nail, sllnter or chipping
E08 ()	Floor opening	E18 ()	Other (Please specify)
E09 ()	Left shaft	E19 ()	
E10 ()	Stair edge		

Unsafe Action Relevant to the Accident

F01 ()	Operating without authority	F11 ()	Failure to use eye protector
F02 ()	Failure to secure objects	F12 ()	Failure to use respirator
F03 ()	Making safety devices inoperative	F13 ()	Failure to use proper clothing
F04 ()	Working on moving or dangerous equipment	F14 ()	Failure to use warn others or given proper signals
F05 ()	Using un-safety equipment	F15 ()	Horseplay
F06 ()	Adopting unsafe position or posture	F16 ()	No unsafe action
F07 ()	Operating or working at unsafe speed	F17 ()	Others (please specify)
F08 ()	Unsafe loading, Placing, mixing etc.	F18 ()	
F09 ()	Failure to use helmet	F19 ()	
F10 ()	Failure to use proper footwear		

G01 ()	No protective gear	G08 ()	Unsafe layout of job, traffic etc.
G02 ()	Defective protective gear	G09 ()	Unsafe process of job methods
G03 ()	Improper dress / footwear	G10 ()	Poor housekeeping
G04 ()	Improper guarding	G11 ()	Lack of warning system
G05 ()	Improper ventilation	G12 ()	Defective tool, machinery or materials
G06 ()	Improper illumination	G13 ()	No unsafe condition

(Signature)
 Chief Engineer
 World Bank Project
 (150 the E.T.C.) (Civil, Char)
 Bhubaneswar

M/s BAPRIK Project Limited,
 Contractor
(Signature)

G07 ()	Improper procedure	G14 ()	Others (please specify)
---------	--------------------	---------	-------------------------

Human Factors Relevant to the Accident

H01 ()	Incorrect attitude /motive	H06 ()	Disobeyance of Rules
H02 ()	Alcohol/ Drug Usage	H07 ()	More Risk taking issue
H03 ()	Poor perception issue	H08 ()	Lack of Comprehension
H04 ()	Unsafe act by other persons	H09 ()	No unsafe personal factor
H05 ()	Fatigue Related Issues	H10 ()	Other (please specify)

Remarks

Submitted	Checked	Approved
Signature.....	Signature.....	Signature.....
Name.....	Name.....	Name.....
Designation..... Contractor	Environmental Engineer. Construction Supervision Consultant	Resident Engineer


Part-II

[To be completed Upon Finalization of Employee's compensation Claim]

- 101 () No permanent incapacity
- 102 () Less than 5% incapacity
- 103 () More than 5% incapacity
- 104 () Final

Submitted	Checked	Approved
Signature.....	Signature.....	Signature.....
Name.....	Name.....	Name.....
Designation..... Contractor	Environmental Engineer. Construction Supervision Consultant	Resident Engineer




 Chief Engineer
 World Bank Project
 Odisha E. & C. Civils, Odisha
 Bhubaneswar
 Chief Engineer.
 World Bank Projects, Odisha

POLLUTION MONITORING

(Periodically To be submitted by Contractor for locations at which monitoring to be conducted as per EMP)

Report – Date: _____

Compliance to Mitigation measures suggested in last report

If not reasons thereof.....

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Completion	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial /Commercial)	Remarks
1. Air Monitoring											
						SPM RSPM HC Sox NOx	SPM RSPM HC Sox NOx				
2. Water Monitoring											
						pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease	pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease				



Chief Engineer
World Bank Project
On the E.I.C.(Civil), Odisha
Bhubaneswar.

M/s BARBRIK Project Limited.
Contractor

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Completion	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial /Commercial)	Remarks
3. Soil Monitoring											
						pH Organic Matter Alkalinity Conductivity Water holding Capacity Pb	pH Organic Matter Alkalinity Conductivity Water holding Capacity Pb				
4.Noise Monitoring											
						L day equivalent L night equivalent L equivalent	L day equivalent L night equivalent L equivalent				

Remark

Submitted Signature.....
Name.....
Designation.....
Contractor

Checked Signature.....
Name.....
Environmental Engineer.
Construction Supervision Consultant

Approved Signature.....
Name.....
Resident Engineer



Chief Engineer
World Bank Project
Engg the E.C.(Civil), Odisha
Bhubaneswar

Chief Engineer,
World Bank Projects, Odisha

RESTORATION OF CONSTRUCTION SITES

(Monthly To be submitted by Contractor for locations at which monitoring to be conducted as per EMP)

Link _____

Report-Date.....

Sl. No.	Contract Package	Labour Camp		Construction Camp		Plant Site		Burrow areas		Disposal Locations		Top Soil	
		O	R	O	R	O	R	O	R	O	R	Preserved	Restored

Remarks

Submitted

Signature.....

Name.....

Designation.....
Contractor

Checked

Signature.....

Name.....

Environmental Engineer.
Construction Supervision Consultant

Approved

Signature.....

Name.....

Resident Engineer



M/s BARBANK Project Limited
Contractor

*Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar.*

Chief Engineer,
World Bank Projects.Odisha

FORMAT FOR KEEPING RECORDS OF CONSENT OBTAINED BY CONTRACTOR
 [Monthly Format]

Report-Date: _____

Sl. No.	Clearance	Applicable Acts	Agencies	Obtained on	Valid upto	Remarks
1						
2						
3						
4						
5						
6						

Remarks

Verified

Signature.....

Name.....

Resident Engineer
 Construction Supervision Consultant

Countersigned

Signature.....

Name.....

Executive Engineer (PMU)



M/s BARBRIK Project Limited,
 Contractor

[Handwritten Signature]
 Chief Engineer
 World Bank Project
 Oro the E.I.C.(Civil), Odisha
 Bhubaneswar

Chief Engineer,
 World Bank Projects, Odisha

CHECK LIST FOR ENVIRONMENT INSPECTION

[Monthly Format]

Date of Inspection _____

Sl. No.	ESMP Measures	Remarks
1	Provision of a personnel accountable for implementation of ESMP /Safety Measures with Contractor	
2	Consent of PCB to Establish HMP	
3	Consent of PCB to operate HMP	
4	Compliance of PCB Conditions for HMP installation and operation	
5	Whether compliance reported through monthly Progress report to Divisional Office of Executive Engineer	
6	PUC taken for all Construction vehicles	
7	Concrete platform with trap under bitumen boiler, Fuel Tank for HMP and generator set provided or not	
8	Precautions to prevent contamination of soil by emulsion, Bitumen, oil and lubricant taken while storing	
9	Providing cover to fine construction material & bituminous mix during transportation	
10	Burrow areas:	
	a) Burrow areas approved by Department	
	b) Existing land was used	
	c) Nos Opened	
	d) Available Quantity	
	e) Utilized Quality	
	f) Balance Quantity	
11	Spoil and debris disposal:	
	a) Present status of land	
	b) Closure and completion plan	
12	Site specific traffic Safety management Plan:	
	a) Contractor installed the warning /regulatory Traffic signs at the construction site	
	c) The arrangement adequate	
	Safety equipment i.e. helmet, gloves, gumboot, mask, earplugs etc. provided to workers	

14	Health Facility at camp and work site i.e. First Aid kit & suitable vehicle for conveyance in case of emergency / accident	
15	Permit for Procuring River sand	
16	License from Department of mines for quarrying	
17	Consent to establish / operation of crusher	
18	Provision of labour camp with sanitation & potable water	
19	Fire precautions at Hot Mix Plant and site Office	
20	Air and noise monitoring done in camp site	
21	Whether any cultural property is being impacted	
22	Status of drainage provision in camp area	
23	General House Keeping	

Remarks

Verified

Signature.....

Name.....

Resident Engineer
Construction Supervision Consultant

Countersigned

Signature.....

Name.....

Executive Engineer (PMU)





 Chief Engineer,
 World Bank Project
 On the E.I.C.(Civil), Odisha
 Bhubaneswar
 Chief Engineer,
 World Bank Projects, Odisha

SUMMARY SHEET
[To be filled MONTHLY by PMU]

Month _____ Date _____

Sl. No.	Description	Remarks
1	No Objection Certificate	
A	Hot mix Plant	
	Location 1	
	Location 2	
	Location 3	
B	Cement batching Plant	
	Location 1	
	Location 2	
	Location 3	
2	Pollution Under Certificate	
	Vehicles	
	Machineries	
3	No objection Certificate for Diesel Gen set	
	Location 1	
	Location 2	
4	Labour Camps	
	No. of sites Identified	
	Approved	
	Opened	
	Conforms to conditions imposed at the time of opening of sites	
	Closed	
5	Workers	
	No of workers employed	
	No of male workers	
	No of female workers	
	No of day workers	
6	Burrow Area	
	No. of sites identified	
	Approved	
	Opened	
	Quantity of available material	
	Quantity of material Utilized	
	Quantity of Topsoil preserved	
	Quantity to top soil used	
	No of sites closed	
	No. of sites Rehabilitated	
7.	Quarry	
	No. of sites identified	
	Approved	
	Opened	
	Material available	
	Material obtained	
	No. of sites Rehabilitated	
8	Disposal Locations	
	No. of sites identified	
	Approved	
	Opened	


Chief Engineer
World Bank Project
O/o the E.I.C. (Civil), Odisha
Bhubaneswar.

Sl. No.	Description	Remarks
	Amount of Waste disposed	
	Type of waste disposed	
	No. of sites Rehabilitated	
9	Road Safety	
	Road Safety norms followed as per guidelines, SP-55 and approved Traffic plan	
10	Cleaning of Culvert/ drains	
	No. of culverts/ drains	
	Nos. Cleaned	
11	Trees	
	No of trees marked for cutting in field	
	No of trees cut	
	No of trees to be Planted	
	Trees Planted	
12	Haul Roads	
	Adequacy of maintenance of Haul Road Network	

Remarks

Verified

Signature.....

Name.....

Resident Engineer
Construction Supervision Consultant

Countersigned

Signature.....

Name.....

Executive Engineer (PMU)



M/s BARBRIK Project Limited,
Contractor



Chief Engineer
World Bank Project
On the E.J.C.(Civil), Odisha
Bhubaneswar
Chief Engineer,
World Bank Projects, Odisha

SECTION 7: BILL OF QUANTITIES



M/s BARBRIK Project Limited,
Contractor


Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
SHUBANSHU
Chief Engineer,
World Bank Projects, Odisha

Grand Summary of Price Schedule

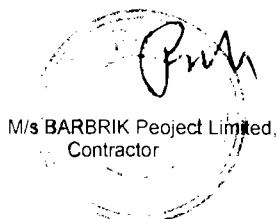
Contract Name: Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work) - **NCB Package OSRP-Bal-01A**

Contract No.: Agreement No. 4 of 2013 - 14


General Summary	Page	Amount
BILL NO.1 : SITE CLEARANCE		3,782,845.00
BILL NO.2 : EARTH WORKS		78,265,860.00
BILL NO.3 : SUB-BASE AND BASE COURSES		181,479,800.00
BILL NO.4 : BITUMINOUS COURSES		300,031,762.00
BILL NO.5 : CULVERTS AND UNDERPASSES		107,631,900.00
BILL NO.6 : BRIDGES		75,984,980.00
BILL NO.7 : RETAINING WALL, DRAINAGE AND PROTECTIVE WORKS		67,574,738.00
BILL NO.8 : ROAD SAFETY AND AMENITIES		36,337,750.00
BILL NO.9 : MAINTENANCE, REPAIR AND REHABILITATION		5,902,595.00
BILL NO.10 : ENVIRONMENTAL MITIGATION MEASURES		12,478,725.00
Subtotal of Bills	(A)	869,470,955.00
Total for Daywork (Provisional Sum)	(B)	1,719,352.92
Total of Bills Plus Provisional Sums (A + B)	(C)	871,190,307.92
Discount @3% over all the BOQ Items	(D)	26,135,709.24
Final Bid Price (C-D)	(E)	845,054,598.68
	Say	845,054,599.00

Rupees Eighty Four Crores Fifty Lakhs Fifty Four Thousand Five Hundred Ninety Nine

Only



M/s BARBRIK Project Limited,
Contractor


 Chief Engineer
 World Bank Project
 On the E.I.S.I.Civil, Orissa
 Suburban Road
 Chief Engineer,
 World Bank Projects, Odisha

Daywork Summary

Contract Name: Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16)
(Balance Work) - NCB Package OSRP-Bal-01A

Contract No.: Agreement No. 4 of 2013 - 14

	<i>Amount (Rs.)</i>	<i>% Foreign</i>
1. Total for Daywork: Labour	284,010.00	NIL
2. Total for Daywork: Materials	1,040,425.32	NIL
3. Total for Daywork: Contractor's Equipment	394,917.60	NIL

Total for Daywork (Provisional Sum) 1,719,352.92

(carried forward to Bid Summary, p.1)



Contract Name: Widening of Strengthening of Existing Carriage way to 2 lane road from Bhawanipatna to Khariar (2/000 km to 27/200 km & 30/000 km to 70/000 of SH-16) (Balance Work) (Package No- OSRP-Bal-P01A)
P R I C E S C H E D U L E (Works Items & Dayworks)

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO.1 : SITE CLEARANCE				
1.01	Cleaning and Grubbing for road land complete as per Technical Specification Clause 201 and as per the direction of Engineer.	Hectare	75.00	25000.00 Rupees Twenty Five Thousand Only	1,875,000.00 Rupees Eighteen Lakhs Seventy Five Thousand Only
1.02	Dismantling structures and pavement including disposal of resulting material complete as per Technical Specification Clause 202, 2809 and as per the direction of Engineer.				
	a) Brick/ Stone Structures	Cum	1864.00	150.00 Rupees One Hundred Fifty Only	279,600.00 Rupees Two Lakhs Seventy Nine Thousand Six Hundred Only
	b) Concrete/Reinforced concrete/ Prestressed concrete structures including cleaning straghtening & cutting of bars and separating them out from RCC/PSC. For Slab Culverts & Box Culverts and Bridges				
	i) P.C.C.	Cum	495.00	275.00 Rupees Two Hundred Seventy Five Only	136,125.00 Rupees One Lakh Thirty Six Thousand One Hundred Twenty Five Only
	ii) R.C.C.	Cum	517.00	350.00 Rupees Three Hundred Fifty Only	180,950.00 Rupees One Lakh Eighty Thousand Nine Hundred Fifty Only
	c) Dismantling of Pavement course	Cum	19792.00	60.00 Rupees Sixty Only	1,187,520.00 Rupees Eleven Lakhs Eighty Seven Thousand Five Hundred Twenty Only
	d) Hume pipe	Lm	623.00	100.00 Rupees One Hundred Only	62,300.00 Rupees Sixty Two Thousand Three Hundred Only
	e) Kerb	Lm	10.00	25.00 Rupees Twenty Five Only	250.00 Rupees Two Hundred Fifty Only



M/s BARBRIK Peolct Limited,
Contractor

Chief Engineer
 World Bank Project
 O/o the E.I.C.(Civil), Odisha
 Bhubaneswar.
 Chief Engineer,
 World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	f) Dry stone pitching	Cum	37.00	100.00 Rupees One Hundred Only	3,700.00 Rupees Three Thousand Seven Hundred Only
	g) RCC railing	Lm	6.00	50.00 Rupees Fifty Only	300.00 Rupees Three Hundred Only
	h) Expansion joint	Lm	208.00	75.00 Rupees Seventy Five Only	15,600.00 Rupees Fifteen Thousand Six Hundred Only
	i) Wearing Course				
	(a) Bituminous Concrete	Sqm	265.00	50.00 Rupees Fifty Only	13,250.00 Rupees Thirteen Thousand Two Hundred Fifty Only
	(b) Cement Concrete	Sqm	565.00	50.00 Rupees Fifty Only	28,250.00 Rupees Twenty Eight Thousand Two Hundred Fifty Only
	Total for Bill No. 1 Carried forward to Summary				3,782,845.00 Rupees Thirty Seven Lakhs Eighty Two Thousand Eight Hundred Forty Five Only



Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO.2 : EARTH WORKS				
2.01	Roadway and Drainage excavation necessary for construction of roadway complete as per Technical Specification Clause 301 and as per the direction of Engineer.				
	a) All kinds of soil	Cum	274509.00	50.00 Rupees Fifty Only	13,725,450.00 Rupees One Crore Thirty Seven Lakhs Twenty Five Thousand Four Hundred Fifty Only
	b) Soft Rock (Blasting not required) (LS)	Cum	500.00	60.00 Rupees Sixty Only	30,000.00 Rupees Thirty Thousand Only
	c) Hard Rock (Blasting required) (LS)	Cum	600.00	125.00 Rupees One Hundred Twenty Five Only	75,000.00 Rupees Seventy Five Thousand Only
	d) Hard rock (Blasting not required) (LS)	Cum	400.00	225.00 Rupees Two Hundred Twenty Five Only	90,000.00 Rupees Ninety Thousand Only
2.02	Construction of embankment with approved material from approved borrow areas with all leads and lifts complete as per Drawing and Technical Specification Clause 305 and as per the direction of the Engineer.	Cum	149647.00	160.00 Rupees One Hundred Sixty Only	23,943,520.00 Rupees Two Crores Thirty Nine Lakhs Forty Three Thousand Five Hundred Twenty Only
2.03	Construction of sub grade and earthen shoulder with approved material as per Drawing complete and Technical Specification Clause 305 and as per the direction of the Engineer.	Cum	214827.00	175.00 Rupees One Hundred Seventy Five Only	37,594,725.00 Rupees Three Crores Seventy Five Lakhs Ninety Four Thousand Seven Hundred Twenty Five Only
2.04	Construction of embankment and sub grade with suitable material deposited at site from roadway and drainage excavation all complete as per Drawing and Technical Specification Clause 305 and as per the direction of the Engineer.	Cum	9938.00	80.00 Rupees Eighty Only	795,040.00 Rupees Seven Lakhs Ninety Five Thousand Forty Only



M/s BARBANK Project Limited.

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Bhawanipatna-Kharlar
(Balance Work)

Chief Engineer
World Bank Project
On the E.I.C.(Civil), Orisha
Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
2.05	Loosening and re-compacting the existing sub grade in all kinds of soil up to required depth to meet the requirement of table 300-2 complete as per Technical Specification Clause 305 and as per the direction of the Engineer.	Cum	5675.00	25.00 Rupees Twenty Five Only	141,875.00 Rupees One Lakh Forty One Thousand Eight Hundred Seventy Five Only
2.06	Earthwork with agriculture soil for filling of median/island complete as per Technical Specification Clause 407 and as per the direction of the Engineer.	Cum	2700.00	170.00 Rupees One Hundred Seventy Only	459,000.00 Rupees Four Lakhs Fifty Nine Thousand Only
2.07	Scarifying the existing bituminous surface layers without disturbing the base including carrying, processing, laying and disposal of waste material complete as per Technical Specification Clause 501 and as per the direction of the Engineer.	Sqm	72500.00	10.00 Rupees Ten Only	725,000.00 Rupees Seven Lakhs Twenty Five Thousand Only
2.08	Stripping, storing of top soil by road side at 15 m internal and re-application on embankment slopes, cut slopes and other areas in localities where the available embankment material is not conducive to plant growth as directed by the Engineer and as per technical specification-301.	Cum	13725.00	50.00 Rupees Fifty Only	686,250.00 Rupees Six Lakhs Eighty Six Thousand Two Hundred Fifty Only
Total for Bill No. 2 Carried forward to Summary					78,265,860.00 Rupees Seven Crores Eighty Two Lakhs Sixty Five Thousand Eight Hundred Sixty Only



M/s BARBER Project Limited,
Contractor

[Signature]
Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
3.01	BILL NO.3 : SUB-BASE AND BASE COURSES Construction of Granular Sub-base course using crushed stone aggregates conforming to Gr-I of Table 400-2 complete as per Technical Specification Clause 401 and as per the direction of the Engineer.	Cum	92899.00	1100.00 Rupees One Thousand One Hundred Only	102,188,900.00 Rupees Ten Crores Twenty One Lakhs Eighty Eight Thousand Nine Hundred Only
3.02	Construction of Wet Mix Macadam Grading-I complete as per Technical Specification Clause 406 and as per the direction of the Engineer.	Cum	60993.00	1300.00 Rupees One Thousand Three Hundred Only	79,290,900.00 Rupees Seven Crores Ninety Two Lakhs Ninety Thousand Nine Hundred Only
	Total for Bill No. 3 Carried forward to Summary				181,479,800.00 Rupees Eighteen Crores Fourteen Lakhs Seventy Nine Thousand Eight Hundred Only

M/s BARBRIK Project Limited,
Contractor

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Bhawani-patha-Khariar
(Balance Work)


Chief Engineer
World Bank Project
Orissa E.C.C. (Civil), C.S.S. No.
Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
4.01	BILL NO.4 : BITUMINOUS COURSES Providing bituminous primer coat over granular surface complete all as per Technical Specification Clause 502 and as per the direction of the Engineer.	Sqm	239942.00	35.00 Rupees Thirty Five Only	8,397,970.00 Rupees Eighty Three Lakhs Ninety Seven Thousand Nine Hundred Seventy Only
4.02	Providing Tack coat complete as per Technical Specification Clause 503 and as per the direction of the Engineer. a) Granular surface treated with primer	Sqm	253544.00	15.00 Rupees Fifteen Only	3,803,160.00 Rupees Thirty Eight Lakhs Three Thousand One Hundred Sixty Only
	b) over normal bituminous surface	Sqm	446061.00	12.00 Rupees Twelve Only	5,352,732.00 Rupees Fifty Three Lakhs Fifty Two Thousand Seven Hundred Thirty Two Only
4.03	Providing Dense Bituminous Macadam course using Bitumen Grade-60/70 (VG-30) complete as per Technical Specification Clause 507 and as per the direction of Engineer.	Cum	18428.00	7500.00 Rupees Seven Thousand Five Hundred Only	138,210,000.00 Rupees Thirteen Crores Eighty Two Lakhs Ten Thousand Only
4.04	Providing Bituminous Concrete wearing course with modified bitumen confirming of grade CRMB 55 complete as per Technical Specification Clause 509 & 521 and as per the direction of the Engineer.	Cum	18011.00	8000.00 Rupees Eight Thousand Only	144,088,000.00 Rupees Fourteen Crores Forty Lakhs Eighty Eight Thousand Only
4.05	Providing, laying mixed seal surfacing in spur roads complete as per technical specification clause 512 and as per the direction of Engineer.	Sqm	1028.00	175.00 Rupees One Hundred Seventy Five Only	179,900.00 Rupees One Lakh Seventy Nine Thousand Nine Hundred Only
	Total for Bill No.4 Carried forward to Summary				300,031,762.00 Rupees Thirty Crores Lakh Thirty One Thousand Seven Hundred Sixty Two Only



M/s BARBRIK Project Limited,
Contractor

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BhawaniPatna-Khanjar
(Balance Work)

027
Chief Engineer
World Bank Project
Oro the E.I.C.(Civil), Odisha
Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO.5 : CULVERTS AND UNDERPASSES				
5.01	Earthwork in excavation of foundation for structures in all types of soils complete as per Drawing and Technical Specifications Clause 304 and 2903 including all leads and lifts and as per the direction of the Engineer.	Cum	12214.00	100.00 Rupees One Hundred Only	1,221,400.00 Rupees Twelve Lakhs Twenty One Thousand Four Hundred Only
5.02	Earth fill below pitching in quadrant portion with approved material complete as per Drawing and Technical Specification Clause 305 with all leads and lifts and as per the direction of the Engineer.	Cum	4729.00	160.00 Rupees One Hundred Sixty Only	756,640.00 Rupees Seven Lakhs Fifty Six Thousand Six Hundred Forty Only
5.03	Providing and filling behind abutment, wing wall and return wall with granular material etc. and below pipe bed in layers not exceeding 150mm thick including all leads and lifts complete as per Drawing, direction of the Engineer and Technical Specification Clause 304 and as per the direction of the Engineer.	Cum	7187.00	350.00 Rupees Three Hundred Fifty Only	2,515,450.00 Rupees Twenty Five Lakhs Fifteen Thousand Four Hundred Fifty Only
5.04	Providing filter media behind abutment, wing wall and return wall complete as per Drawing and Technical Specification Clause 2504, 2509, 2510 and as per the direction of the Engineer.	Cum	2834.00	1200.00 Rupees One Thousand Two Hundred Only	3,400,800.00 Rupees Thirty Four Lakhs Thousand Eight Hundred Only
5.05	Cement Concrete M-15 grade in levelling course etc. including centering and shuttering all complete as per Drawing and Technical Specification Sections 1500, 1700 and 2100 and as per the direction of the Engineer.	Cum	1755.00	3900.00 Rupees Three Thousand Nine Hundred Only	6,844,500.00 Rupees Sixty Eight Lakhs Forty Four Thousand Five Hundred Only


M/s BARBRIK Projects Limited.
Contractor

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.06	Cement Concrete M-15 grade in Sub-structure & Headwall including centering and shuttering all complete as per Drawing and Technical Specification Sections 1500, 1700, 2100 and 2200 and as per the direction of the Engineer.	Cum	3717.00	4200.00 Rupees Four Thousand Two Hundred Only	15,611,400.00 Rupees One Crore Fifty Six Lakhs Eleven Thousand Four Hundred Only
5.07	Reinforced Cement Concrete M-20 grade in all types of culverts as per Drawing and Technical Specification Section 1500, 1700 & 2200 and as per the direction of the Engineer.	Cum	4304.00	5000.00 Rupees Five Thousand Only	21,520,000.00 Rupees Two Crores Fifteen Lakhs Twenty Thousand Only
5.08	Reinforced cement concrete M-30 grade in approach slabs including cost of reinforcement all complete as per Drawing and Technical Specification Clause 1500, 1700 and 2704 and as per the direction of the Engineer.	Cum	1410.00	8500.00 Rupees Eight Thousand Five Hundred Only	11,985,000.00 Rupees One Crore Nineteen Lakhs Eighty Five Thousand Only
5.09	HYSD (TMT) bar reinforcement complete as per Drawing and Technical Specifications Clause 1600 and as per the direction of the Engineer.	MT	198.00	67000.00 Rupees Sixty Seven Thousand Only	13,266,000.00 Rupees One Crore Thirty Two Lakhs Sixty Six Thousand Only
5.10	Providing laying and joining NP-4(I.S 458) Hume Pipes for culverts complete as per Drawing Tech. Specification section/2900 and IRC special publication No.13 and as per the direction of the Engineer.				
	a) 1m dia. in Single Row	Lm	324.00	6500.00 Rupees Six Thousand Five Hundred Only	2,106,000.00 Rupees Twenty One Lakhs Six Thousand Only
	b) 1m dia. in Double Rows	Double Row-Lm	963.00	13000.00 Rupees Thirteen Thousand Only	12,519,000.00 Rupees One Crore Twenty Five Lakhs Nineteen Thousand Only

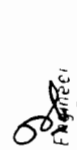

 M/s BARBRIK Project Limited,
 Contractor

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.11	Providing and laying filter material underneath stone pitching in slopes complete as per Drawing and Technical Specification section 2504, 2509, 2510 and as per the direction of the Engineer.	Cum	1338.00	1000.00 Rupees One Thousand Only	1,338,000.00 Rupees Thirteen Lakhs Thirty Eight Thousand Only
5.12	Providing and laying stone Pitching on embankment slopes complete as per Drawing and Technical Specification Clause 2504 and as per the direction of the Engineer	Cum	2624.00	950.00 Rupees Nine Hundred Fifty Only	2,492,800.00 Rupees Twenty Four Lakhs Ninety Two Thousand Eight Hundred Only
5.13	Providing Rubble Stone flooring in Cement Mortar (1 Cement: 3 Sand) and joints complete as per Drawing and Technical Specification Section 1400, 2505 and as per the direction of the Engineer.	Cum	1746.00	2000.00 Rupees Two Thousand Only	3,492,000.00 Rupees Thirty Four Lakhs Ninety Two Thousand Only
5.14	Providing weep holes in box portion, return wall, wing wall etc. all complete as per Drawing and Technical Specification Clause. 2706 and as per the direction of the Engineer.	No	8616	110.00 Rupees One Hundred Ten Only	947,760.00 Rupees Nine Lakhs Forty Seven Thousand Seven Hundred Sixty Only
5.15	Supplying and fixing Asphaltic Plug expansion joint complete as per Drawing and as per IRC: SP-69-2005 and as per the direction of the Engineer.	Lm	1584.00	1200.00 Rupees One Thousand Two Hundred Only	1,900,800.00 Rupees Nineteen Lakhs Thousand Eight Hundred Only
5.16	Reinforced cement concrete railing complete as per Drawing and Technical Specification Section 2700 (Including cost of Reinforcement) and as per the direction of Engineer.	Lm	1381.00	1800.00 Rupees One Thousand Eight Hundred Only	2,485,800.00 Rupees Twenty Four Lakhs Eighty Five Thousand Eight Hundred Only
5.17	Bituminous wearing course 56mm thick comprising 50mm thick asphaltic concrete with modified bitumen confirming of grade CRMB 55 in a single layer over Bituminous mastic course 6mm thick with a prime coat complete as per Drawing and Technical Specification Section 503, 509, 515 and 2700 and as per the direction of the Engineer.	Sqm	7874.00	400.00 Rupees Four Hundred Only	3,149,600.00 Rupees Thirty One Lakhs Forty Nine Thousand Six Hundred Only



M/s BARBRIK Projects Limited,
Contractor


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Bhawanipatna-Kharlar
(Balance Work)


Chief Engineer
World Bank Project
C/o the E.I.C.(Civil), Orissa
Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.18	Synthetic enamel painting of culvert No. and span arrangement as per IRC - 7 - 1971 and as per the direction of the Engineer.	No.	264	75.00 Rupees Seventy Five Only	19,800.00 Rupees Nineteen Thousand Eight Hundred Only
5.19	Providing and applying 2 coats of water based cement paint to un-plastered concrete surface after cleaning the surface etc. complete as per the direction of Engineer	Sqm	1690.00	35.00 Rupees Thirty Five Only	59,150.00 Rupees Fifty Nine Thousand One Hundred Fifty Only
	Total for Bill No.5 Carried forward to Summary				107,631,900.00 Rupees Ten Crores Seventy Six Lakhs Thirty One Thousand Nine Hundred Only


 M/s **BASU & SONS** Project Limited,
 Contractor


 Chief Engineer,
 World Bank Project
 O/o the E.C.Civil, Odisha
Chief Engineer,
 World Bank Projects, Odisha

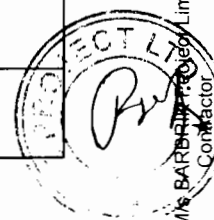
SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO.6 : BRIDGES				
6.01	Earthwork in excavation of foundation for structures in all types of soils complete as per Drawing and Technical Specification Clause 304 including all leads & lift and as per the direction of the Engineer.	Cum	7624.00	100.00 Rupees One Hundred Only	762,400.00 Rupees Seven Lakhs Sixty Two Thousand Four Hundred Only
6.02	Providing and filling foundation and at the back of abutment, wing wall and return wall etc. and below pipe bed in layers not exceeding 150mm thick with granular material including all leads & lifts as per Technical Specification Clause 304 and as per the direction of the Engineer.	Cum	8594.00	400.00 Rupees Four Hundred Only	3,437,600.00 Rupees Thirty Four Lakhs Thirty Seven Thousand Six Hundred Only
6.03	Providing Filter media behind abutment, wing wall and return wall complete as per Drawing and Technical Specification Clause 2504 and as per the direction of the Engineer.	Cum	555.00	1000.00 Rupees One Thousand Only	555,000.00 Rupees Five Lakhs Fifty Five Thousand Only
6.04	Cement concrete M-15 grade in levelling course etc including centering and shuttering all complete as per Drawing and Technical Specification Section 1500, 1700 and 2100 and as per the direction of the Engineer.	Cum	483.00	3900.00 Rupees Three Thousand Nine Hundred Only	1,883,700.00 Rupees Eighteen Lakhs Eighty Three Thousand Seven Hundred Only
6.05	Cement Concrete of following grades in foundation and substructure etc including centering and shuttering all complete as per Drawing and Technical Specification Section 1500, 1700, 2100, 2200 and as per the direction of the Engineer. a) M-15 Grade	Cum	621.00	4100.00 Rupees Four Thousand One Hundred Only	2,546,100.00 Rupees Twenty Five Lakhs Forty Six Thousand One Hundred Only
	b) M-20 Grade	Cum	1764.00	4200.00 Rupees Four Thousand Two Hundred Only	7,408,800.00 Rupees Seventy Four Lakhs Eight Thousand Eight Hundred Only
6.06	Reinforced Cement Concrete M25 grade in foundation complete as per Drawing & Technical Specification sections 1500, 1700, 2100, 2200 and as per the direction of the Engineer.	Cum	754.00	4300.00 Rupees Four Thousand Three Hundred Only	3,242,200.00 Rupees Thirty Two Lakhs Forty Two Thousand Two Hundred Only



M/s BARRAK Projects Limited,
Contractor

Chief Engineer
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar.
Chief Engineer,
World Bank Projects, Odisha

SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.07	Reinforced Cement Concrete of following grades in substructure complete as per Drawing & Technical Specification sections 1500, 1700, 2200 and as per the direction of the Engineer.				
	a) M-20 grade	Cum	428.00	4200.00 Rupees Four Thousand Two Hundred Only	1,797,600.00 Rupees Seventeen Lakhs Ninety Seven Thousand Six Hundred Only
	b) M-25 grade	Cum	2174.00	5000.00 Rupees Five Thousand Only	10,870,000.00 Rupees One Crore Eight Lakhs Seventy Thousand Only
	c) M-30 grade	Cum	310.00	5100.00 Rupees Five Thousand One Hundred Only	1,581,000.00 Rupees Fifteen Lakhs Eighty One Thousand Only
6.08	Reinforced Cement Concrete of following grades in super structure complete as per Drawing and Technical Specification section 1500, 1700, 2300 and as per the direction of the Engineer.				
	a) M-25 grade	Cum	71.00	6000.00 Rupees Six Thousand Only	426,000.00 Rupees Four Lakhs Twenty Six Thousand Only
	b) M-30 grade	Cum	797.00	6100.00 Rupees Six Thousand One Hundred Only	4,861,700.00 Rupees Forty Eight Lakhs Sixty One Thousand Seven Hundred Only
	c) M-35 grade	Cum	3.00	7000.00 Rupees Seven Thousand Only	21,000.00 Rupees Twenty One Thousand Only
6.09	Providing HYSD (TMT) bar reinforcement complete as per Drawing and Technical Specifications Clause 1600 and as per the direction of the Engineer.				
	a) in Foundation	MT	69.00	67000.00 Rupees Sixty Seven Thousand Only	4,623,000.00 Rupees Forty Six Lakhs Twenty Three Thousand Only



M/s BARISHA PROJECTS Limited,
Contractor

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	b) in Substructure	MT	216.00	67000.00 Rupees Sixty Seven Thousand Only	14,472,000.00 Rupees One Crore Forty Four Lakhs Seventy Two Thousand Only
	c) in Superstructure	MT	83.00	67000.00 Rupees Sixty Seven Thousand Only	5,561,000.00 Rupees Fifty Five Lakhs Sixty One Thousand Only
6.10	Providing and fixing specified bearings complete as per Drawing and Technical Specification 2000 and as per the direction of the Engineer.				
	a) Elastomeric Bearing	Cuqm	150000.00	3.10 Rupees Three And Ten Paise Only	465,000.00 Rupees Four Lakhs Sixty Five Thousand Only
	b) Tar paper bearing	Sqm	25.00	60.00 Rupees Sixty Only	1,500.00 Rupees One Thousand Five Hundred Only
6.11	Providing Reinforced Cement Concrete M-30 grade for in approach slabs complete as per Drawing and Technical Specification section 1500, 1600, 1700, 2700 and as per the direction of the Engineer.	Cum	250.00	8500.00 Rupees Eight Thousand Five Hundred Only	2,125,000.00 Rupees Twenty One Lakhs Twenty Five Thousand Only
6.12	Providing Bituminous wearing course 56mm thick comprising 50mm thick asphaltic Concrete with modified bitumen confirming of grade CRMB 55 in a single layer over Bituminous mastic course 6 mm thick with a prime Coat Complete as per Drawing and Technical Specification Section 503, 509, 515 & 2700 and as per the direction of the Engineer.	Sqm	2844.00	400.00 Rupees Four Hundred Only	1,137,600.00 Rupees Eleven Lakhs Thirty Seven Thousand Six Hundred Only
6.13	Cement concrete wearing course 75mm thick Complete as per drawing and Technical Specification Section 2700 and as per the direction of Engineer.	Sqm	290.00	750.00 Rupees Seven Hundred Fifty Only	217,500.00 Rupees Two Lakhs Seventeen Thousand Five Hundred Only
6.14	Providing and fixing Drainage Spouts Complete as per Drawing and Technical Specification Clause 2705 and as per the direction of the Engineer.	No	49	900.00 Rupees Nine Hundred Only	44,100.00 Rupees Forty Four Thousand One Hundred Only





 Chief Engineer,
 World Bank Project
 Civil (C), Odisha
 Bhubaneswar.
 Chief Engineer,
 World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.15	Providing and laying Stone pitching in slopes complete as per Drawing and Technical Specification Section 2504 and as per the direction of the Engineer.	Cum	757.00	1000.00 Rupees One Thousand Only	757,000.00 Rupees Seven Lakhs Fifty Seven Thousand Only
6.16	Providing as laying filter material underneath Stone pitching in slopes Complete as per Drawing and Technical Specification Clause 2504 and as per the direction of the Engineer.	Cum	378.00	1000.00 Rupees One Thousand Only	378,000.00 Rupees Three Lakhs Seventy Eight Thousand Only
6.17	Providing Weep Holes in abutments, wing walls and return walls etc. as per Drawing and Technical Specification Clause 2706 and as per the direction of the Engineer.	No	1806	110.00 Rupees One Hundred Ten Only	198,660.00 Rupees One Lakh Ninety Eight Thousand Six Hundred Sixty Only
6.18	Providing rubble Stone flooring in Cement mortar (1Cement:3 sand) and joints Complete as per Drawing and Technical Specification Section 1400 and 2505 and as per the direction of the Engineer.	Cum	1010.00	2000.00 Rupees Two Thousand Only	2,020,000.00 Rupees Twenty Lakhs Twenty Thousand Only
6.19	Supplying and fixing the Asphaltic plug Expansion Joints Complete as per Drawing and as per the direction of the Engineer.	Lm	384.00	1200.00 Rupees One Thousand Two Hundred Only	460,800.00 Rupees Four Lakhs Sixty Thousand Eight Hundred Only
6.20	Synthetic enamel painting of Bridge No. and span arrangement as per IRC - 7 - 1971 and as per the direction of the Engineer.	No	40	70.00 Rupees Seventy Only	2,800.00 Rupees Two Thousand Eight Hundred Only
6.21	Carrying and Confirmatory bores up to required depth at locations of bridges as directed by the Engineer complete in all respects, conducting all the tests required as directed by the Engineer and as per Technical Specification Section 2400 and interpretation of the bore data and presentation of the results and as per the direction of the Engineer.				
	a) In all types of soil (except hard rock)				
	i) i) depth from 0m to 10m	Lm	140.00	400.00 Rupees Four Hundred Only	56,000.00 Rupees Fifty Six Thousand Only



M/s BARBHAR PROJECT Limited,
Contractor

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BhawaniPatna-Kharair
(Balance Work)


Chief Engineer,
World Bank Project
O-10 the E.I.C.(Civil), Odisha
Bhubaneswar,
Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.22	Providing and painting of flood gauge on substructure is fall height and 500mm width and as per the direction of the Engineer.	Lm	60.00	500.00 Rupees Five Hundred Only	30,000.00 Rupees Thirty Thousand Only
6.23	Providing and laying 150mm dia. HDPE Service pipe as per Drawing and as per the direction of the Engineer.	Lm	884.00	400.00 Rupees Four Hundred Only	353,600.00 Rupees Three Lakhs Fifty Three Thousand Six Hundred Only
6.24	Providing and filling below pitching in quadrant portion with approved material complete as per Drawing and Technical Specification Clause 305 with all leads and lifts and as per the direction of the Engineer	Cum	1496.00	170.00 Rupees One Hundred Seventy Only	254,320.00 Rupees Two Lakhs Fifty Four Thousand Three Hundred Twenty Only
6.25	Providing and laying PCC of following grades in flooring as per Drawing & Technical Specification section 1700, 2500 and as per the direction of Engineer.				
	a) M-15	Cum	352.00	3800.00 Rupees Three Thousand Eight Hundred Only	1,337,600.00 Rupees Thirteen Lakhs Thirty Seven Thousand Six Hundred Only
	b) M-20	Cum	117.00	3900.00 Rupees Three Thousand Nine Hundred Only	456,300.00 Rupees Four Lakhs Fifty Six Thousand Three Hundred Only



M/s BARBRIK Project Limited,
Contractor

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Bhawani Patna-Kharriar
(Balance Work)

Chief Engineer
World Bank Project
On the E.T.C.(Civil), Odisha
Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha


Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.26	Providing Reinforced cement concrete crash barrier constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21, with MS vertical plate & base plate, 50mm dia pipe and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design and as per dimensions in the approved drawing and at locations directed by the Engineer and Technical Specification Clause 809, and section 1500, 1600, 1700. The item includes the cost of reinforcement and its fabrication.	Lm	497.00	3300.00 Rupees Three Thousand Three Hundred Only	1,640,100.00 Rupees Sixteen Lakhs Forty Thousand One Hundred Only
	Total for Bill No.6 Carried forward to Summary				75,984,980.00 Rupees Seven Crores Fifty Nine Lakhs Eighty Four Thousand Nine Hundred Eighty Only



M/s BARBRIK People Limited,
Contractor

[Signature]
Chief Engineer
World Bank Project
Civil Engineering Division
Bhubaneswar,
Odisha
Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
BILL NO.7 : RETAINING WALL, DRAINAGE AND PROTECTIVE WORKS					
7.01	Retaining Wall				
(a)	Earthwork in excavation for foundation complete as per Drawing and Technical Specification Clause 304 in Retaining wall for high embankment stretches as per the direction of the Engineer.	Cum	3468.00	100.00	346,800.00
(b)	Filter media behind wall complete as per drawing and Technical Specification Clauses 2504 and as per the direction of Engineer.	Cum	2700.00	800.00	Rupees One Hundred Only
(c)	Providing Plain cement concrete M -15 in foundation levelling course etc. including centering and shuttering all complete as per Drawing and Technical Clauses 1500, 1700 and as per the direction of the Engineer.	Cum	323.00	3900.00	2,160,000.00
(d)	Providing Cement concrete M-25 for reinforced concrete in foundation and substructure including centering and shuttering all complete as per Drawing and Technical Clauses 1500, 1700, 2100 & 2200 and as per the direction of the Engineer.	Cum	4785.00	4100.00	Rupees Twenty One Lakhs Sixty Thousand Only
(e)	Providing steel reinforcement HYSD (TMT) for retaining wall complete as per Drawing and Technical Specification Clause 1600 and as per the direction of the Engineer.	MT	383.00	67000.00	1,259,700.00
(f)	Providing guard post complete as per drawings and Technical specifications section 806 and as per the direction of Engineer.	No	1000	600.00	Rupees Three Lakhs Fifty Nine Thousand Seven Hundred Only
(g)	Providing Weep Holes in retaining wall complete as per Drawing and Technical Specification Clause 2706 and as per the direction of the Engineer.	No	3000	110.00	19,618,500.00
7.02	Providing and laying stone pitching on embankment slopes as per Drawing and Technical Specification Clause 2504 and as per the direction of the Engineer.	Cum	1409.00	900.00	Rupees One Crore Ninety Six Lakhs Eighteen Thousand Five Hundred Only
7.03	Providing and laying filter material underneath stone pitching on embankment slopes as per Drawing and Technical Specification Clause 2504 and as per the direction of the Engineer.	Cum	705.00	1000.00	25,661,000.00
					Rupees Two Crores Fifty Six Lakhs Sixty One Thousand Only
					600,000.00
					Rupees Six Lakhs Only
					330,000.00
					Rupees Three Lakhs Thirty Thousand Only
					1,268,100.00
					Rupees Twelve Lakhs Sixty Eight Thousand One Hundred Only
					705,000.00
					Rupees Seven Lakhs Five Thousand Only


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 O/o the E.I.C.(Civil), Odisha
 Bhubaneswar
 Chief Engineer,
 World Bank Projects, Odisha



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 (Balance Work)

SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
7.04	Turfing side slopes of main road and service road with grass sods complete as per Technical Specification Clause 307 and as per the direction of the Engineer.	Sqm	318546.00	3.00 Rupees Three Only	955,638.00 Rupees Nine Lakhs Fifty Five Thousand Six Hundred Thirty Eight Only
7.05	Constructing saucer drain with pre-cast units with M-30 grade Cement Concrete to the required lines and grades as per Drawing and Technical Specification and as per the direction of the Engineer.	Lm	8820.00	1500.00 Rupees One Thousand Five Hundred Only	13,230,000.00 Rupees One Crore Thirty Two Lakhs Thirty Thousand Only
7.06	Constructing RCC box type drains to the required lines and grades in built up areas including cost of steel and its fabrication as per Drawing and technical specification section 1500, 1600, 1700, 2100 and as per the direction of the Engineer. The rate shall be inclusive of cost for earth work excavation, PCC and RCC of required grade, and necessary steel reinforcement, shuttering and centering etc. complete for the complete item of work	Lm	120.00	12000.00 Rupees Twelve Thousand Only	1,440,000.00 Rupees Fourteen Lakhs Forty Thousand Only
	Total for Bill No.7 Carried forward to Summary				67,574,738.00 Rupees Six Crores Seventy Five Lakhs Seventy Four Thousand Seven Hundred Thirty Eight Only



M/s BARBANK Project Limited,
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(Balance Work)


Chief Engineer
World Bank Project
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Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO-8 : ROAD SAFETY AND AMENITIES				
8.01	Providing and laying plain cement concrete kerb as per Drawing and Technical Specifications Clauses 408, section 1500, 1700 and as per the direction of the Engineer.	Lm	480.00	600.00 Rupees Six Hundred Only	288,000.00 Rupees Two Lakhs Eighty Eight Thousand Only
8.02	Providing and fixing precast RCC boundary posts complete as per drawing and Technical Specification Clause 806 and as per the direction of Engineer.	No	743	600.00 Rupees Six Hundred Only	445,800.00 Rupees Four Lakhs Forty Five Thousand Eight Hundred Only
8.03	Providing and fixing precast RCC/PCC hectometer, Kilometer and 5th kilometer stones complete as per Technical Specification Clause 804 and as per the direction of Engineer.				
	a) No of (200) Hectometer Stone	No	271	600.00 Rupees Six Hundred Only	162,600.00 Rupees One Lakh Sixty Two Thousand Six Hundred Only
	b) No of Kilometer stone	No	54	2500.00 Rupees Two Thousand Five Hundred Only	135,000.00 Rupees One Lakh Thirty Five Thousand Only
	c) No. of 5th Kilometer Stone	No	14	4000.00 Rupees Four Thousand Only	56,000.00 Rupees Fifty Six Thousand Only
8.04	Constructing footpath/ paved separator at toll plaza/ passenger platform / paved part of medians and islands with 50mm thick Chequered tile flooring using 25mm thick pre-cast machine pressed cement concrete chequered tiles over 25mm thick cement mortar bed in CM(1:1) over 100mm thick PCC in CC M-15 over sand filling including cost of all materials, labour, transportation, taxes, royalties, watering, curing, sundries, T&P etc.complete as per Drawing and Technical Specifications and as per the direction of the Engineer.	Sqm	863.00	1000.00 Rupees One Thousand Only	863,000.00 Rupees Eight Lakhs Sixty Three Thousand Only
8.05	Providing passenger shelters for Bus Bays as per Drawing and Technical Specifications Section 1300, 1500, 1600, 1700, 2100, 2200, 2300 and as per the direction of the Engineer	No	31	85000.00 Rupees Eighty Five Thousand Only	2,635,000.00 Rupees Twenty Six Lakhs Thirty Five Thousand Only

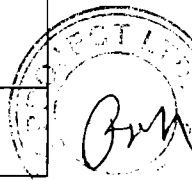


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Bhubaneswar.*

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.06	Construction of temporary diversion including temporary cross drainage works for plying of traffic in both directions, wherever necessary and maintenance thereof including traffic control and safety complete till the operation of the original road/ structure as per Technical Specification Clause 112.3 and as per the direction of the Engineer	Lm	3785.00	1500.00 Rupees One Thousand Five Hundred Only	5,677,500.00 Rupees Fifty Six Lakhs Seventy Seven Thousand Five Hundred Only
8.07(a)	Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35. The finished surface to be level, uniform and free from streaks and holes, as per Technical Specification section 800 and as per direction of Engineer. Lane line / Edge marking and other markings along the strips	Sqm	17394.00	600.00 Rupees Six Hundred Only	10,436,400.00 Rupees One Crore Four Lakhs Thirty Six Thousand Four Hundred Only
8.07(b)	Painting lines, dashes, arrows etc on roads in two coats on new work with ready mixed road marking paint conforming to IS:164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control				
	Directional arrows and lettering etc. as per drawing and specifications.	Sqm	192.00	600.00 Rupees Six Hundred Only	115,200.00 Rupees One Lakh Fifteen Thousand Two Hundred Only
8.08	Supplying and fixing sign boards complete as per Technical Specifications Clause 801. Including the cost of Posts, Fitting & fixing. Sheeting will be retro reflective type of high intensively grade and messages / boarders as per drawing and as per the direction of the Engineer.				
(a)	Informatory Signs				
	(i) Facility Information (800 x 600)mm	No	2	5000.00 Rupees Five Thousand Only	10,000.00 Rupees Ten Thousand Only
	(ii) Direction Signs (1200 x 700 mm)	No	4	8000.00 Rupees Eight Thousand Only	32,000.00 Rupees Thirty Two Thousand Only

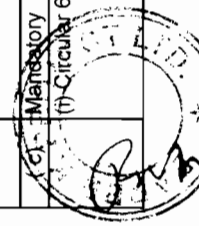


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Chief Engineer,
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Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	(iii) Advance Direction (size 1800 x 1200mm) ,	No	1	20000.00 Rupees Twenty Thousand Only	20,000.00 Rupees Twenty Thousand Only
	(iv) Re-Assurance Sign (1800 X 1200 mm) ,	No	1	20000.00 Rupees Twenty Thousand Only	20,000.00 Rupees Twenty Thousand Only
	(v) Destination Sign (1500 X 900 mm) ,	No	2	12000.00 Rupees Twelve Thousand Only	24,000.00 Rupees Twenty Four Thousand Only
	(vi) Place Identification (1500 X 900 mm) ,	No	1	12000.00 Rupees Twelve Thousand Only	12,000.00 Rupees Twelve Thousand Only
	(vii) Bus Lane Sign (450mm x 600mm)	No	34	4000.00 Rupees Four Thousand Only	136,000.00 Rupees One Lakh Thirty Six Thousand Only
	(viii) Toll Booth (1500 X 900 mm)	No	4	12000.00 Rupees Twelve Thousand Only	48,000.00 Rupees Forty Eight Thousand Only
	(ix) Route Marker Sign (450mm x 600mm)	No	4	4000.00 Rupees Four Thousand Only	16,000.00 Rupees Sixteen Thousand Only
	(x) Other Informatory Signs (2100 x 1500mm)	No	4	25000.00 Rupees Twenty Five Thousand Only	100,000.00 Rupees One Lakh Only
(b)	Cautionary Signs triangular 900mm side	No	130	4000.00 Rupees Four Thousand Only	520,000.00 Rupees Five Lakhs Twenty Thousand Only
	(c) Mandatory Signs (i) Circular 600mm dia	No	30	4000.00 Rupees Four Thousand Only	120,000.00 Rupees One Lakh Twenty Thousand Only




M/s BARBRI Engineers Limited,
Contractor

[Signature]
Chief Engineer,
World Bank Project
O/o the E.I.C.(Civil), Odisha,
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World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	(ii) Octagon 900 mm height	No	20	6000.00 Rupees Six Thousand Only	120,000.00 Rupees One Lakh Twenty Thousand Only
	(iii) Triangular 900 mm side	No	30	5000.00 Rupees Five Thousand Only	150,000.00 Rupees One Lakh Fifty Thousand Only
8.09	Providing & fixing retro - reflectorised road delineators complete as per drawing , Technical specifications clause 805 and as per the direction of Engineer. (i) Roadway delineator	No	452	800.00 Rupees Eight Hundred Only	361,600.00 Rupees Three Lakhs Sixty One Thousand Six Hundred Only
	(ii) Hazard Marker	No	168	800.00 Rupees Eight Hundred Only	134,400.00 Rupees One Lakh Thirty Four Thousand Four Hundred Only
	(iii) Object Marker	No	52	800.00 Rupees Eight Hundred Only	41,600.00 Rupees Forty One Thousand Six Hundred Only
8.10	Providing and fixing precast RCC Guard post complete including end anchorage as per drawing and Technical Specifications Clause 806 and as per the direction of Engineer.	No	3357	600.00 Rupees Six Hundred Only	2,014,200.00 Rupees Twenty Lakhs Fourteen Thousand Two Hundred Only
8.11	Supply of colour video coverage in digital format during construction as per Technical Specifications Clause 126 As per requirement and as per the direction of the Engineer.	Set	25	5000.00 Rupees Five Thousand Only	125,000.00 Rupees One Lakh Twenty Five Thousand Only




 Chief Engineer
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 O/o the E.I.C.(Civil), Odisha
 Bhubaneswar.

Chief Engineer,
 World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.12	Providing and making rumble strips comprising of ten rumbles in each set for complete carriageway width etc. complete at required places as per Drawing and as per the direction of the Engineer.	No	26	7000.00 Rupees Seven Thousand Only	182,000.00 Rupees One Lakh Eighty Two Thousand Only
8.13	Providing road hump complete at required places as per Drawing and as per the direction of the Engineer.	Lm	42	15000.00 Rupees Fifteen Thousand Only	630,000.00 Rupees Six Lakhs Thirty Thousand Only
8.14	Providing toll plaza building complex as per Drawings and Technical Specification and as per the direction of the Engineer.	No	1	1400000.00 Rupees Fourteen Lakhs Only	1,400,000.00 Rupees Fourteen Lakhs Only
8.15	Providing utility duct across the road in specified locations as per the schedule mentioned in drawing and as per the direction of Engineer.	No	18	50000.00 Rupees Fifty Thousand Only	900,000.00 Rupees Nine Lakhs Only
8.16	Providing and fixing of metal beam crash barrier made out of cold rolled steel strip W profile of 3 mm thick having a minimum yield strength of 2400 kg/sqcm, width of 313 mm and depth of corrugation as 83 mm hot dip galvanized of zinc coating @ 550 gm/sq.m. The post and spacer channel is made out of cold rolled channel 150x75x5 mm having minimum yield strength of 2400 kg/sqcm and hot dip galvanized of zinc coating @ 550 gm/sq.m. The total length of post shall be 1900 mm and minimum height of post above concrete foundation shall be 800 mm. The length of spacer channel shall be 330 mm. Job includes neatly fixing new post in cement concrete of M-20 grade complete (cost included) as directed by the Engineer including fasteners and fixing etc. complete. The spacing of the Steel posts shall be about 2 m. The guard rail reflectors of 100 mm dia circular made out of 2 mm thick GI sheet duly fixed with micro-prismatic type sheeting with Type 9 ASTM D 4956-01 standards @ every 5 meters. The rate also includes the cost for supplying & fixing of terminal anchorages at both ends of barrier. The work is to be executed as per drawing. Specifications and as directed by the Engineer.	Lm	800.00	2450.00 Rupees Two Thousand Four Hundred Fifty Only	1,960,000.00 Rupees Nineteen Lakhs Sixty Thousand Only



M/s BARBRIK Project Limited,
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Chief Engineer
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O/o the E.I.C.(Civil), Odisha
Bhubaneswar.


Chief Engineer,
World Bank Projects, Odisha

SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.17	Providing and fixing of bi-directional retro reflective raised pavement markers of approved colour, quality & make conforming to ASTM D-4280 as per approved drawing and locations provided in the schedule made from injection moulded high impact polymer including cleaning, preparation of surface and fixing at position with approved quality adhesives including cost of all materials, labour, transportation, taxes, duties, sundries, T&P etc. complete as per the technical specifications and direction of Engineer.	No	17930	165.00 Rupees One Hundred Sixty Five Only	2,958,450.00 Rupees Twenty Nine Lakhs Fifty Eight Thousand Four Hundred Fifty Only
8.18	Supplying, erecting and commissioning 100kVA diesel powered generator of approved make for Toll Plaza at required place as per the direction of Engineer including cost of all labour, transportation, taxes, duties etc. complete.	No	1	1200000.00 Rupees Twelve Lakhs Only	1,200,000.00 Rupees Twelve Lakhs Only
8.19	Providing and fixing Pedestrian guard rails in modules including painting with approved paint complete as per drawing and Technical Specification Clause 803.1008, 1300 & 1700 and direction of the Engineer.	Lm	3520.00	650.00 Rupees Six Hundred Fifty Only	2,288,000.00 Rupees Twenty Two Lakhs Eighty Eight Thousand Only
	Total for Bill No.8 Carried forward to Summary				36,337,750.00 Rupees Three Crores Sixty Three Lakhs Thirty Seven Thousand Seven Hundred Fifty Only



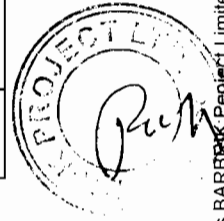
M/s BARBRIK Project Limited,
Contractor

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Bhawanipatna-Kharar
(Balance Work)


Chief Engineer
World Bank Project
On the E.T.C.(Civil), Odisha
Shubaneswar.

Chief Engineer,
World Bank Projects, Odisha

SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
9.01	BILL NO.9 MAINTENANCE, REPAIR AND REHABILITATION Restoration of Rain Cuts (Restoration of rain cuts with soil, moorum, gravel or a mixture of these, clearing the loose soil, benching for 300 mm width, laying fresh material in layers not exceeding 250 mm and compacting with plate compactor or power rammers to restore the original alignment, levels and slopes) as per the direction of Engineer.	Cum	267.00	75.00 Rupees Seventy Five Only	20,025.00 Rupees Twenty Thousand Twenty Five Only
9.02	Maintenance of Earthen Shoulder (filling with fresh soil) (Making up loss of material/ irregularities on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipment.) as per direction of the Engineer.	Sqm	23760.00	20.00 Rupees Twenty Only	475,200.00 Rupees Four Lakhs Seventy Five Thousand Two Hundred Only
9.03	Maintenance of Earth Shoulder (stripping excess soil) (Stripping excess soil from the shoulder surface to achieve the approved level and compacting with plate compactor) as per direction of the Engineer.	Sqm	59400.00	7.00 Rupees Seven Only	415,800.00 Rupees Four Lakhs Fifteen Thousand Eight Hundred Only
9.04	Filling Pot- holes and Patch Repairs with open - graded Premix surfacing, 20mm. (Removal of all failed material, trimming of completed excavation to provide firm vertical faces, cleaning of surface, painting of tack coat on the sides and base of excavation as per clause 503, back filling the pot holes with hot bituminous material as per clause 511, compacting, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2) and as directed by the Engineer.	Sqm	24503.00	90.00 Rupees Ninety Only	2,205,270.00 Rupees Twenty Two Lakhs Five Thousand Two Hundred Seventy Only
9.05	Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per drawing, Technical Specification clause 2807 and as per direction of the Engineer.	Sqm	134.00	700.00 Rupees Seven Hundred Only	93,800.00 Rupees Ninety Three Thousand Eight Hundred Only
9.06	Patching of damaged concrete surface with polymer concrete and curing compounds, initiator and promoter, available in present formulations, to be applied as per instructions of manufacturer, Technical specification clause 2806 and as per direction of the Engineer.	Sqm	495.00	5000.00 Rupees Five Thousand Only	2,475,000.00 Rupees Twenty Four Lakhs Seventy Five Thousand Only



M/s BARBANK Project Limited,
Contractor

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(Balance Work)

[Signature]
Chief Engineer,
World Bank Project
On the E.C.(Civil), Oaistrā
Bhabaneswar


Chief Engineer,
World Bank Projects-Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
9.07	Providing and laying 75mm thick Cement concrete wearing coat M-30 grade complete as per technical specification section 2700 and as per direction of the Engineer.	Sqm	290.00	750.00 Rupees Seven Hundred Fifty Only	217,500.00 Rupees Two Lakhs Seventeen Thousand Five Hundred Only
	Total for Bill No.9 Carried forward to Summary				5,902,595.00 Rupees Fifty Nine Lakhs Two Thousand Five Hundred Ninety Five Only




M/s BAPTIK Project Limited,
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Bhawanipta-Kharriar
(Balance Work)


Chief Engineer
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Bhubaneswar.

Chief Engineer,
World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	BILL NO.10 ENVIRONMENTAL MITIGATION MEASURES				
10.01	Earthwork in excavation of foundation for structures complete as per Drawing No. OSRP/CEG/SH/ENV/1 - A, B, C, D, 03, 04 - A, B, 05, 05 - A, 07, 09, 10, 12 and Technical Specifications Clause 304 including all leads and lifts and as per the direction of the Engineer.	Cum	1717.00	25.00 Rupees Twenty Five Only	42,925.00 Rupees Forty Two Thousand Nine Hundred Twenty Five Only
10.02	Sand filling below foundation of wing wall and return wall, pipe bed in layers not exceeding 150mm thick including All leads and lifts complete as per Drawing No. OSRP/CEG/SH/ENV/1-A, B, C, D, 03, 04 - A, B, 05 - A, 07, 09, 10, 12 direction of the Engineer and Technical Specification Clause 304 and as per the direction of the Engineer.	Cum	371.00	400.00 Rupees Four Hundred Only	148,400.00 Rupees One Lakh Forty Eight Thousand Four Hundred Only
10.03	Providing & laying in position Cement Concrete M-15 grade in foundation, levelling course etc. including centering and shuttering all complete as per Drawing No. OSRP/CEG/SH/ENV/1-A,B,C,D,03,04-A,05-A,07,09,10,12 and Technical Specification Sections 1500 and 1700 and as per the direction of the Engineer.	Cum	1300.00	3900.00 Rupees Three Thousand Nine Hundred Only	5,070,000.00 Rupees Fifty Lakhs Seventy Thousand Only
10.04	Providing weep holes in PCC toe wall with 100mm dia AC pipe at 1mtrs horizontal interval all complete as per Drawing No. OSRP/CEG/SH/ENV/03 and Technical Specification section. 2700& 2200 and as per the direction of the Engineer.	No	1900	110.00 Rupees One Hundred Ten Only	209,000.00 Rupees Two Lakhs Nine Thousand Only
10.05	Providing & laying in position Reinforced cement concrete of M-20 Grade in foundation complete as per Drawing No. OSRP/CEG/SH/ENV/04 - A, B, C, 05 -A, 06, 07, 10 & Technical Specification sections 1700, 2100 & 2200 and as per the direction of the Engineer.	Cum	176.00	4200.00 Rupees Four Thousand Two Hundred Only	739,200.00 Rupees Seven Lakhs Thirty Nine Thousand Two Hundred Only
10.06	Providing HYSD (TMT) bar reinforcement with anti-corrosive treatment coating complete as per Drawing No. OSRP/CEG/SH/ENV/04 - A, B, C, D, 05, 06, 07, 10 and Technical Specifications Clause 1600 and as per the direction of the Engineer.	MT	9.00	67000.00 Rupees Sixty Seven Thousand Only	603,000.00 Rupees Six Lakhs Three Thousand Only
10.07	Providing and laying filter material underneath pitching in slopes at water bodies and ponds as per Technical Specification Section 2500 and as per Drawing No.OSRP/CEG/SH/ENV/03 and as per the direction of the Engineer.	Cum	741.00	1000.00 Rupees One Thousand Only	741,000.00 Rupees Seven Lakhs Forty One Thousand Only



 Chief Engineer
 Bhubaneswar
 World Bank Project
 Odisha
 Chief Engineer,
 World Bank Projects, Odisha

Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.08	Providing and laying stone pitching on slopes over filter media as per Technical Specification Section 2500 and as per Drawing No. OSRP/CEG/SH/ENV/03 and as per the direction of the Engineer.	Cum	988.00	900.00 Rupees Nine Hundred Only	889,200.00 Rupees Eight Lakhs Eighty Nine Thousand Two Hundred Only
10.09	Providing cement paint two coats to the walls as per drawing no. OSRP/CEG/SH/ENV/03, 04-A, B, 05, 05A, 10 as per direction of Engineer.	Sqm	1995.00	20.00 Rupees Twenty Only	39,900.00 Rupees Thirty Nine Thousand Nine Hundred Only
10.10	Construction of approach road with GSB and moorum topping well mixed and compacted as hard shoulder as per technical specification clause 400.2 drawing no OSRP/CEG/SH/ENV/05 and as per direction of Engineer.	Lm	1140.00	300.00 Rupees Three Hundred Only	342,000.00 Rupees Three Lakhs Forty Two Thousand Only
10.11	Maintenance of haulage road for 4 occurrences as directed by the Engineer-in-chief through out the construction period as per technical specification cl.no.3002	Cum	22500.00	50.00 Rupees Fifty Only	1,125,000.00 Rupees Eleven Lakhs Twenty Five Thousand Only
10.12	Stripping of top soil from borrow areas located in agriculture fields, storing at a suitable place, spreading and re-laying after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer and as per the direction of Engineer.	Cum	10000.00	50.00 Rupees Fifty Only	500,000.00 Rupees Five Lakhs Only
10.13	Providing and making masonry Oil & Grease trap chamber of required size including excavation of foundation in all kinds of soil, 100mm thick bed concrete in CC M15 over 100mm thick sand filling, 1st class KB brick masonry in (1:3) for walls up to required height, covered with 100mm thick RCC slab with man hole covers and reinforcement bars as per design, including 12mm thick cement plaster in CM(1:3) with a neat coat of cement punning to the inside wall surfaces including cost of all materials, labour, transportation, taxes, sundries, curing, T&P etc. all complete as per approved drawing No OSRP/CEG/ENV/06, technical specifications and as per the direction of the Engineer.	No	1	125000.00 Rupees One Lakh Twenty Five Thousand Only	125,000.00 Rupees One Lakh Twenty Five Thousand Only



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(Balance Work)


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SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.14	Providing silt fence and sediment arrester in the construction zones and stock piles of top soil by fixing wooden posts of 100mm dia firmly to the ground at required intervals and placing closely woven fabric of coconut fibre reinforced with HDPE materials etc. complete as per drawing No OSRP/CE/PW, technical specifications including cost of all materials, labour, transportation, taxes, sundries, curing, T&P etc. and as per the direction of the Engineer.	Lm	3500.00	195.00 Rupees One Hundred Ninety Five Only	682,500.00 Rupees Six Lakhs Eighty Two Thousand Five Hundred Only
10.15	Grouting stone pitching on embankments of reptile passes for making trap drain 23cm deep with Cement Concrete M15 grade using 20mm down stone aggregates as per drawing no-OSRP/CEG/ENV/14, technical specifications including cost of all materials, labour, transportation, taxes, sundries, curing, T&P etc. and as per the direction of the Engineer.	Sqm	108.00	200.00 Rupees Two Hundred Only	21,600.00 Rupees Twenty One Thousand Six Hundred Only
10.16	Providing erosion control blanket made from coconut fibre reinforced with closely woven HDPE nets on both sides with aperture size less than 5mm of weight not less than 600 gm/sqm, over embankment slopes including preparation of bed, dressing the slopes, removing boulders, pebbles, vegetations and fixed firmly to the slopes using "U" shape galvanized iron hooks of 4mm diameter having dimension 300x75mm and covered with 100mm thick top soil brought from the stock piles/ approved area , spreading manure and spreading of native seeds or planting of shrubs/ grass and maintaining the same for one month by sprinkling water at regular interval as per drawing no-OSRP/PMU/ENV/02 technical specifications including cost of all materials, labour, transportation, taxes, sundries, watering, T&P etc. and as per the direction of the Engineer.	Sqm	6000.00	200.00 Rupees Two Hundred Only	1,200,000.00 Rupees Twelve Lakhs Only
			Sub-Total Bill No. 10		12,478,725.00 Rupees One Crore Twenty Four Lakhs Seventy Eight Thousand Seven Hundred Twenty Five Only



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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
Schedule of Daywork Rates: 1. Labour					
D101	Labour (Un-skilled)	Day	300	150.00 Rupees One Hundred Fifty Only	45,000.00 Rupees Forty Five Thousand Only
D102	Mason (Special)	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D103	Carpenter (Special)	Day	20	205.00 Rupees Two Hundred Five Only	4,100.00 Rupees Four Thousand One Hundred Only
D104	Mason (Second Class)	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D105	Carpenter (Second Class)	Day	20	205.00 Rupees Two Hundred Five Only	4,100.00 Rupees Four Thousand One Hundred Only
D106	Steelworker Erector	Day	70	205.00 Rupees Two Hundred Five Only	14,350.00 Rupees Fourteen Thousand Three Hundred Fifty Only
D107	Driver for vehicle up to 10 tons	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D108	Operator for excavator, dragline, shovel or crane	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D109	Operator for tractor with dozer blade or ripper	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D110	Operator grader	Day	50	205.00 Rupees Two Hundred Five Only	10,250.00 Rupees Ten Thousand Two Hundred Fifty Only
D111	Operator in other construction equipment	Day	25	205.00 Rupees Two Hundred Five Only	5,125.00 Rupees Five Thousand One Hundred Twenty Five Only



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SI. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D112	Chowkidars for watch & ward	Day	500	205.00 Rupees Two Hundred Five Only	102,500.00 Rupees One Lakh Two Thousand Five Hundred Only
Total					236,675.00
D113	Allow 20(Twenty) percent of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			20.00%	Rupees Two Lakhs Thirty Six Thousand Six Hundred Seventy Five Only 47,335.00 Rupees Forty Seven Thousand Three Hundred Thirty Five Only 284,010.00 Rupees Two Lakhs Eighty Four Thousand Ten Only



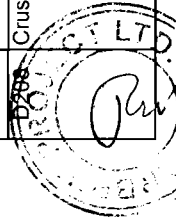
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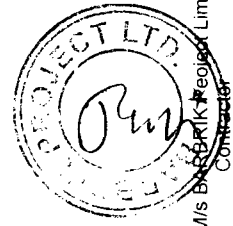
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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
Schedule of Daywork Rates: 2. Materials					
D201	Cement, ordinary Portland or equivalent in bags conforming to IS:269:1989 and IS 455:1989	Per Mt	20.00	6101.00 Rupees Six Thousand One Hundred One Only	122,020.00 Rupees One Lakh Twenty Two Thousand Twenty Only
D202	HYSD reinforcing bars upto 25 mm dia conforming to IS:1786:1989	Per MT	5.00	55000.00 Rupees Fifty Five Thousand Only	275,000.00 Rupees Two Lakhs Seventy Five Thousand Only
D203	Bricks of class designation 75 as per IS:1077:1992	Per 1000 Nos	50000	4053.50 Rupees Four Thousand Fifty Three And Fifty Paise Only	202,675.00 Rupees Two Lakhs Two Thousand Six Hundred Seventy Five Only
D204	Anti Corrosive Bituminous paint	Per Lit	10.00	160.16 Rupees One Hundred Sixty And Sixteen Paise Only	1,601.60 Rupees One Thousand Six Hundred One And Sixty Paise Only
D205	Enamel Paint of any shade & colour (IS 2932-1964 & IS 137-1975)	Per Lit	10.00	160.16 Rupees One Hundred Sixty And Sixteen Paise Only	1,601.60 Rupees One Thousand Six Hundred One And Sixty Paise Only
D206	Coarse Sand as per IS 1542	Per Cum	50.00	228.10 Rupees Two Hundred Twenty Eight And Ten Paise Only	11,405.00 Rupees Eleven Thousand Four Hundred Five Only
D207	R.R. Stone for masonry	Per Cum	50.00	405.76 Rupees Four Hundred Five And Seventy Six Paise Only	20,288.00 Rupees Twenty Thousand Two Hundred Eighty Eight Only
D208	Crusher broken stone aggregates up to 25 mm nominal size	Per Cum	50.00	587.50 Rupees Five Hundred Eighty Seven And Fifty Paise Only	29,375.00 Rupees Twenty Nine Thousand Three Hundred Seventy Five Only



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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D209	Crusher broken stone aggregates Above 25 mm nominal size	Per Cum	50.00	587.50 Rupees Five Hundred Eighty Seven And Fifty Paise Only	29,375.00 Rupees Twenty Nine Thousand Three Hundred Seventy Five Only
D210	Portable water at site	Per KL	5000.00	10.00 Rupees Ten Only	50,000.00 Rupees Fifty Thousand Only
D211	Gravel/ Moorum for Road Work	Per Cum	50.00	50.00 Rupees Fifty Only	2,500.00 Rupees Two Thousand Five Hundred Only
D212	Bitumen-VG-30	Per MT	5.00	40000.00 Rupees Forty Thousand Only	200,000.00 Rupees Two Lakhs Only
					945,841.20
					Rupees Nine Lakhs Forty Five Thousand Eight Hundred Forty One And Twenty Paise Only
D213	Allow <u>10(Ten)</u> percent of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			10.00%	94,584.12 Rupees Ninety Four Thousand Five Hundred Eighty Four And Twelve Paise Only
					1,040,425.32
					Rupees Ten Lakhs Forty Thousand Four Hundred Twenty Five And Thirty Two Paise Only



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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
Schedule of Daywork Rates: 3. Contractor's Equipment					
D301	Excavator, face shovel, or dragging including the cost of operator::				
D301.1	Up to and including 1 m3	Hour	15.00	840.00 Rupees Eight Hundred Forty Only	12,600.00 Rupees Twelve Thousand Six Hundred Only
D301.2	Over 1 m 3 to 2 m 3	Hour	30.00	840.00 Rupees Eight Hundred Forty Only	25,200.00 Rupees Twenty Five Thousand Two Hundred Only
D301.3	Over 2 m 3	Hour	10.00	840.00 Rupees Eight Hundred Forty Only	8,400.00 Rupees Eight Thousand Four Hundred Only
D302	Tractor, including bull or angle dozer including the cost of operator::				
D302.1	Up to and including 150 kW	Hour	4.00	231.00 Rupees Two Hundred Thirty One Only	924.00 Rupees Nine Hundred Twenty Four Only
D302.2	Over 150 kW to 200 kW	Hour	2.00	231.00 Rupees Two Hundred Thirty One Only	462.00 Rupees Four Hundred Sixty Two Only
D302.3	Over 200 kW to 250 kW	Hour	2.00	231.00 Rupees Two Hundred Thirty One Only	462.00 Rupees Four Hundred Sixty Two Only
D303	Tractor with ripper including the cost of operator::				
D303.1	Up to and including 200 kW	Hour	30.00	249.00 Rupees Two Hundred Forty Nine Only	7,470.00 Rupees Seven Thousand Four Hundred Seventy Only
D303.2	Over 200 kW to 250 kW	Hour	10.00	249.00 Rupees Two Hundred Forty Nine Only	2,490.00 Rupees Two Thousand Four Hundred Ninety Only
D304	Motor grader including the cost of operator:	Hour	40.00	1545.00 Rupees One Thousand Five Hundred Forty Five Only	61,800.00 Rupees Sixty One Thousand Eight Hundred Only
D305	Crane- 5 tonne including the cost of operator:	Hour	40.00	230.00 Rupees Two Hundred Thirty Only	9,200.00 Rupees Nine Thousand Two Hundred Only
D306	Diesel Road Roller, or Vibratory Compactor upto 10 t including the cost of operator:	Hour	15.00	738.00 Rupees Seven Hundred Thirty Eight Only	11,070.00 Rupees Eleven Thousand Seventy Only

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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D307	Trucks, or Truck tipper, or Truck with mounted water tank or truck with crane for removal of accidental vehicles including the cost of operator..	Hour	100.00	582.00 Rupees Five Hundred Eighty Two Only	58,200.00 Rupees Fifty Eight Thousand Two Hundred Only
D308	Tractor with trolley, or tractor with water tanker trailer, tractor with ripper	Tractor with hydraulic scraper including the cost of operator:			
	(a) upto 25 HP	Hour	40.00	242.00 Rupees Two Hundred Forty Two Only	9,680.00 Rupees Nine Thousand Six Hundred Eighty Only
	(b) For 25-40 HP	Hour	30.00	249.00 Rupees Two Hundred Forty Nine Only	7,470.00 Rupees Seven Thousand Four Hundred Seventy Only
D309	Bitumen mixture (10-14 Cft) C C including the cost of operator:	Hour	20.00	128.00 Rupees One Hundred Twenty Eight Only	2,560.00 Rupees Two Thousand Five Hundred Sixty Only
D310	Water pumping sets mounted on trolley (diesel driven)with inlet & outlet pipes including the cost of operator..				
	a) Sets up to 10 HP	Hour	10.00	100.00 Rupees One Hundred Only	1,000.00 Rupees One Thousand Only
	b) Sets 11 to 20 HP	Hour	10.00	100.00 Rupees One Hundred Only	1,000.00 Rupees One Thousand Only
	c) Sets above 20 HP	Hour	10.00	100.00 Rupees One Hundred Only	1,000.00 Rupees One Thousand Only
D311	Generator sets mounted on trolley including the cost of operator:				
	a) Sets upto 5 Kva	Hour	10.00	240.00 Rupees Two Hundred Forty Only	2,400.00 Rupees Two Thousand Four Hundred Only
	b) Sets 5-15 Kva	Hour	10.00	240.00 Rupees Two Hundred Forty Only	2,400.00 Rupees Two Thousand Four Hundred Only
D312	Mobile Crane / Power winch including the cost of operator:	Hour	10.00	150.00 Rupees One Hundred Fifty Only	1,500.00 Rupees One Thousand Five Hundred Only
D313	Bull Dozer 100/110 Hp including the cost of operator:	Hour	10.00	2519.00 Rupees Two Thousand Five Hundred Nineteen Only	25,190.00 Rupees Twenty Five Thousand One Hundred Ninety Only

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Sl. No.	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D314	Plate compactors including the cost of operator:	Hour	10.00	100.00 Rupees One Hundred Only	1,000.00 Rupees One Thousand Only
D315	Jack hammers for dismantling including the cost of operator:	Hour	10.00	206.00 Rupees Two Hundred Six Only	2,060.00 Rupees Two Thousand Sixty Only
D316	Utility Vehicles including the cost of driver:	Hour	10.00	206.00 Rupees Two Hundred Six Only	2,060.00 Rupees Two Thousand Sixty Only
D317	Mini Hot Mix Plant (5TPH) including the cost of operator:	Hour	10.00	7150.00 Rupees Seven Thousand One Hundred Fifty Only	71,500.00 Rupees Seventy One Thousand Five Hundred Only
329,098.00					
D318	Allow 20(Twenty) percent of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			20.00%	Rupees Three Lakhs Twenty Nine Thousand Ninety Eight Only 65,819.60
					Rupees Sixty Five Thousand Eight Hundred Nineteen And Sixty Paise Only 394,917.60
					Rupees Three Lakhs Ninety Four Thousand Nine Hundred Seventeen And




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Work Programme



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WORK METHODOLOGY

Objective: To establish the construction procedure, equipment required, and ensures that the work carried out is as per specification & Drawings. The methodology proposed under this section shall be read along with the Technical Specifications provided in this document described under relevant corresponding clauses.

ACTIVITIES OF PROJECT:

Survey and Setting out

Site Clearance

Stripping of Top Soil

Earthwork in Excavation

Earth Work in Embankment

Excavation for Unsuitable soil

Granular Sub-base

Wet Mix Macadam

Bituminous Work

Concrete Work

Note: This section gives methodology of major activities and all the activities not listed here will be documented as and when activity is taken up for work.

SURVEYING & INSTRUMENTS

EQUIPMENT REQUIRED

Electronic Total stations with target sets and all required accessories, Auto levels, Walky Talkies

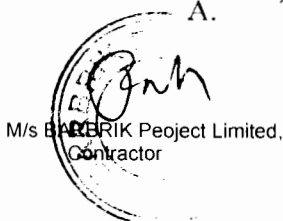
MATERIALS


Enamel Paint (White & Yellow), survey nails with round head, Punch Rod, Hammer, plumb bob steel tapes (3m, 5m, 30m and 50m lengths) safety cover, Red glass, Umbrella and reference pillars.

EXECUTION PROCEDURE

The work shall be carried out by a team of surveyors and the main surveyor shall be responsible for the job. However the work shall be cross checked by senior engineer. The procedure followed for several types of work shall be:

A. Traversing:




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- a. Traversing will start from two known and undisturbed coordinated pillars i.e., G.P.S or reference pillars.
 - b. Traversing will be followed by fixing intermediate temporary or permanent points along the path taking clock wise included angle and distance of each successive station.
 - c. Traverse should be closed on two known and undisturbed pillars i.e GPS or reference pillars
 - d. If closing error is permissible it will be adjusted in whole traverse otherwise traversing will be repeated
- After adjusting the traverse all adjusted Co-ordinates for all stations are listed

B. Establishment of Centre Line:

- a. From established traverse stations center line will be fixed at every 20m intervals by using Electronic Total Stations and Target sets.
- b. On existing road nails will be driven into road with punch mark over it, on virgin land wooden pegs/steel rods will be embedded on ground.

a. Fixing of reference and chainage pillars:

For center line alignment permanent reference nails will be driven in existing road and where center line passing open lands the reference pillars will be fixed at 20m interval each side of proposed road

b. Establishment of Temporary bench marks:

- a. T.B.M will be fixed every 100m at sufficient distance from edge of runway. The pillar will be of 150 X 150 X 900mm size with a M.S plate 100mm X 100mm embedded on it. The pillar will be established on hard ground and concreted with M15 Concrete.
- b. TBM will be established with respect to G.P.S benchmark.

Fly leveling will be carried out from G.P.S and closed to another G.P.S simultaneously transferring the R.L to the reference Pillars and permanent structures available along the alignment.

c. Taking O.G.L.'S and cross section data:

OGI will be recorded at 10 mtrs. Interval along the roadway at 2mts interval across the roadway and addition of required points as per site conditions on existing roadway additional levels will be taken to arrive at the quantities.

OGI will be taken at approved grid intervals for structures.

d. Safety Measures:

Umbrella will be used to protect the Instrument from rain, wind and sun light


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SITE CLEARANCE

GENERAL

Site clearing generally consists of the cutting and / or taking down, removal and disposal of everything above ground level, including objects overhanging the area to be cleared such as tree branches, except such trees, vegetation, structures or parts of structures and other things which are designated in the contract to remain, or be removed by others or which the Engineer (consultant) directed to be left undisturbed.

The material to be cleared usually includes but not necessarily is limited to trees, stumps, logs brush, undergrowth, long grasses, crops, loose vegetable matter and structures.

The entire road area shall be cleared as described above, unless otherwise shown on the Drawings and / or directed by the Engineer (consultant).

SETTING OUT

The roadway shall be surveyed and set out before any site clearance is carried out. Wooden pegs usually indicate the surveyed roadway.

PLANTS AND EQUIPMENT

Site clearing of vegetation, undergrowth, bushes and minor structures such as manholes are carried out by dozers and or hydraulic excavators.

Major structures that cannot practicably be cleared by hydraulic excavators and / or dozers, demolitions of these will be carried out using pneumatic tools, explosives and / or other specialised equipment depending on the size and type of structures.


Before commencing explosive demolition all necessary permits and licenses will be obtained and a blasting plan detailing the size of charges, locations of holes, system of detonation and safety precaution will be forwarded to the Engineer together with the Request/Approval sheets.

SEQUENCE OF WORKS

- i. Prior to the commencement of site clearance, the followings shall be carried out either independently or jointly with the Engineer's Representative.

- ii. The roadway alignment shall be surveyed and set out according to the data stated in the drawings. "Request/Approval will be submitted".


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- iii. Photographs shall be taken of structures, landscaping trees and shrubs, fences, telephone and electrical poles and other if they are payable under individual measured item apart from the general site clearance in the bill of quantities. "Request/Approval will be submitted".
- iv. The above site clearance items (ii) shall be measured according to the method of measurement jointly with the Engineer's Representatives. The locations of these items shall be identified according to the survey data or offsets from the centreline of the proposed alignments in runway construction. "Request/Approval will be submitted".
- v. Prior to demolition of existing buildings, liaison with the respective authorities terminates the utilities supply to the buildings.
- vi. Removal of landscaping trees and shrubs shall be carried out with the prior approval of the concerned authority.
- vii. Fencing or others that are to be relocated or salvaged shall be carried out according to the drawings or as per instructions given by the Engineer (consultant). "Request/ Approval will be submitted".
- viii. Obtain confirmation that the Employer or relevant authorities have acquired the right of way lands
- ix. Access roads to the site shall be constructed if required to enable vehicles, equipment and plants to be brought into the site. "Request/Approval will be submitted".
- x. Solid waste dumps sites shall be predetermined within or outside the site for the dumping of the site clearing materials.
- xi. The site clearance shall then proceed to clear the trees, vegetation, undergrowth, bushes and minor structures by hydraulic excavators and or dozers, or manually.
- xii. All unwanted materials shall be piled up and disposed off in a safe tidy manner at the designated dumping areas.
- xiii. Material designated in the Contract or directed by the Engineer to be salvaged, shall be removed and stored within the Right of way and shall be the property of the Employer or the Government whichever is specified in the contract.

SITE RECORDS

The Site Engineers in charge of the works shall ensure that the supervisors continuously supervise and observe the site clearance activities and maintain the daily site diary sheets each day.

The daily site diary sheets shall record the following information`s:-

- a. Location of site clearing
- b. Type of works and operations
- c. Plant and equipment used on site
- d. Material delivered and used on site if applicable
- e. Report of accidents, theft and others
- f. Sub-contractor personnel and operators at site
- g. Weather and site condition

The site engineers shall ensure that all items payable under measured items shall be measured and recorded.

STRIPPING OF TOP SOIL

EQUIPMENT REQUIRED

Dozer, Grader, Soil Compactor and Water Tanker

EXECUTION PROCEDURE

After fixing of centerline, the required toe width will be marked on the ground with lime. The formation width will be made clear of vegetation if present. The rut formation and roughly grade the road surface will dozed with Dozer. After stretch is roughly graded it is further graded with grader and is prepared, graded, watered and rolled giving determined no. of passes of roller.

EARLY WORKS IN CIVIL WORKS

CONSTRUCTION METHOD

The excavation of cutting shall be carried out in accordance with the drawings and to the slopes, levels, depths, widths and heights shown in the drawings.

Prior to commencement of the works, surveyor will use the survey data of roadway alignment and TBM provided by the Engineer for setting out the extent of cutting in accordance with the cross sections and put in such pegs, bars, sight rails and reference markers necessary to control the works.

A survey team shall monitor and control each stage of work. All the major setting out works will be carried out jointly with the Engineer's Surveyor. At the same time, the cut material below the top soil level shall be sampled and tested for laboratory compaction.



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MACHINERY

Excavator	for Bulk excavation. loading on trucks and slope trimming
Dump truck	for transporting cut materials from the cut area
Bulldozer	for ripping & loosening of earth and rock mixed soil etc
Grader	for trimming to final level and maintaining the surface parallel to the finished grade line

SITE RECORDS

The site engineers in charge of the works shall ensure that the supervisors continuously supervise and observe the site clearance activities and maintain the daily site diary sheets each day.

The daily site diary sheets shall record the following information's:-

- a) Location of site clearing
- b) Stage of works and operations
- c) Plant and equipments used on site
- d) Sub Contractor labour on site if any
- e) Total Length and levels of operations
- f) Details of obstructions and delays

EARTHWORK IN EMBANKMENT

CONSTRUCTION METHOD

The embankment shall be constructed to the levels, heights, widths and slopes shown on the drawings and in accordance with parameters establish in Trial Stretch, with following procedure:

TRIAL STRETCH METHODOLOGY

To establish parameters for loose thickness, number of roller passes and to train staff, a trial stretch will be laid prior to start of sub grade. Trial stretch shall be laid 200m in length in supervision of project engineer.

Filling shall be started at designated place for trial stretch, loose soil shall be spread by the motor grader in a fashion so that compacted thickness do not exceed 200mm, over entire width of embankment.

Moisture content of material shall be checked prior to work commencement, to achieve optimum moisture content, water tankers should sprinkle water uniformly. Quantity of water sprinkled on per unit area shall be recorded. Sprinkled water shall be thoroughly mixed to the spreader soil by the means of harrowing/blending until moisture content is uniform throughout the layer.



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If water content is more than optimum moisture content then material should be exposed to sun or aeration until acceptable water content achieved.

After spreading of soil, Vibratory roller shall be used to achieve desired compaction. Roller shall be move with a uniform speed of 5Km/Hr parallel to center line of road and number of passes shall be recorded over the length of trial stretch.

After compaction Modified Proctor Density Test shall be carried out to check the extent of compaction and surface levels should be recorded & conform as specified.


Information to be recorded during execution of Trial Stretch (Earth Work):

Date:	Location:
Length of Stretch:	Width of Stretch:
Source of Material:	Weather:
Machinery Used:	Manpower Used:
Loose thickness of Layer:	Compacted Thickness of Layer:
Type of Roller:	Number of Passes of Roller:
Frequency of Vibration:	Amplitude of Vibration:
Field Density & Moisture Content after Compaction:	

TYPE OF PLANT & MACHINERY TO BE USED: -

- | | |
|--|--|
| i) Excavator | For Slope trimming, bulk excavation and loading to dump truck. |
| ii) Dump truck | For transporting the material from the cut area or borrows pits to form the embankment |
| iii) Bulldozer | Ripping and loosening of rock/ earth. The bulldozer is used for pushing and spreading the earth in layer for compaction. |
| iv) Motor Grader | The motor grader can be used for spreading of sub Grades, shoulders, ditch and back slopes, Maintenance of hauls Road. |
| v) Compactor | 1) Vibrating roller for compacting soil
2) Smooth wheeled roller for compacting soil |
| vi) Water Tanker with approved spray bar | |




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Chief Engineer,
World Bank Projects, Odisha

GENERAL

The area to receive fill shall be sampled and tested below topsoil in accordance with the specification. If the test results indicate that the material is suitable to receive fill then a request of Approval starting compaction of existing ground will be submitted. Before starting the compaction of the existing ground the topsoil will be stripped from the area, either to a thickness agreed from the soil sampling holes or as directed on site by the Engineer or his designated staff and afterwards measured by leveling. After compaction the existing ground to specified standard density tests will be carried out and a Request for Inspection to start filling will be submitted. Where it is the intention to commence filling will be commence by cutting to firm material, for cross fill.

Fill materials for use in forming embankments shall be suitable material obtained from excavation in cuttings or borrow pits.

Prior to commencement of the works, the selected sample from the source of cutting or borrow pits shall be sent for laboratory test for the tests mentioned in Annexure –II.

Trial compaction shall be carried out at the designated area of the site to determine the pattern of compaction for type of material to be used. This shall include the use of compaction plant and the number of passes in relation to the loose depth of material to achieve desired compaction. The approximate quantity of water required per unit area to bring the fill close enough to the Optimum Moisture Content to achieve the specified compaction standard economically shall be computed and thereafter uniformly mixed throughout the material depth and width to be compacted.

After the required passes for compaction has been accepted, the embankment and subgrade material shall be spread in layers of uniform thickness not exceeding **200mm compacted thickness** over the entire width of embankment by mechanical means, finished by a motor grader and compacted. The motor grader blades shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the specific slope and grade. Successive layers shall not be placed until the layer under construction has been thoroughly compacted to the specified requirement and got approved by the engineer.

The density test shall be carried out in every compacted layer of approx.200mm depth and the Nos. of test shall be done in accordance with the Specification.

The Engineer's Site representative will witness the test and the result sent to the Engineer for approval to proceed further with next layer.

On the fill slope, the filling shall be in layer and with extended extra width for cut back to form the compacted slope.

Prior to the commencement of massive cut/fill, the haul roads shall be constructed with sufficient width for to and fro traffic and to ensure smooth movement of the plant



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Excavators shall be deployed for excavation and loading the cut material on the dump trucks for filling. At the filling area, the dump trucks transport the material to the spread spot and tip from one end. One bulldozer or grader shall be used for spreading the material into loose layers to the thickness indicated by the compacted thickness or less. Water shall be spread and mixed in as required until the whole layer is of uniform moisture content and the vibrating roller shall be used for compacting the layer. Field Density tests shall carry out, and if the results indicate compliance with the specification then a Request for Inspection to place the next layer will be submitted.

The slope trimming shall be completed after the pavement and shoulders are completed.

The trimmed slope is to be turfed, if specified.

EXCAVATION FOR UNSUITABLE MATERIAL

GENERAL

The Engineer has to determine the extent and the depth of soft material to be replaced before the commencement of the works. This shall normally be revealed by tests carried out on samples taken from the existing ground as preparation for cutting and filling operations and described in those method statements. However in the case of suspected deep deposits of unsuitable material the Engineer shall be informed and the Engineer then to indicate what extra testing and investigation shall be required. After completion of this investigation the removal of the unsuitable material will commence to the depth and extent indicated by the Engineer.

After removal of unsuitable material the bottom of the excavation will be compacted in the specified manner and submit a Request for Inspection for commencement of filling. Filling has to proceed in compacted layers to specification as per **Earthwork in Embankment**.

The approved suitable soil filling is kept close behind the excavation in order to reduce the possibility of the sides of the excavation slipping in again. Unsuitable material to be taken to areas designated by the Engineer.

Low-pressure track bulldozer or manual labour will be deployed to push or tip granular material in the required layer for compaction.


The compaction of all sub grade and embankment material shall be in accordance with the requirements. All fill material, which is within 500mm below formation level, shall be compacted to minimum of 95% of the maximum dry density.

Where deep deposits of compressible soil are encountered when embankments greater than 6m high are to be constructed, a site investigation boring, undisturbed sampling and testing as directed by the Engineer shall be carried out, in order to examine the feasibility of allowing the compressible soil to remain in place.

TYPE OF PLANT & MACHINERY TO BE USED: -



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World Bank Projects, Odisha

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As mentioned above (Trial Stretch)

SITE RECORDS

The site engineers in charge of the works shall ensure that the supervisors continuously supervise and observe the site clearance activities and maintain the daily site diary sheets each day.

The daily site diary sheets shall record the following information's: -

- (a) Location of site clearing
- (b) Stage of works and operations
- (c) Plant and equipment used on site
- (d) Sub Contractor labour on site if any
- (e) Total Length and levels of operations.
- (f) Details of obstructions and delays.

GRANULAR SUB-BASE

GENERAL

Sub-base is the lowest of all the pavement layers consisting of natural sand, moorum, gravel, crushed stone or combination thereof necessary to comply with the specified grading requirements;

The Materials to be used for the work shall be **crushed stone aggregate** only. The materials shall be free from organic or other deleterious constituent and confirm to **Grading I** of Table 400-2.

TRIAL STRETCH METHODOLOGY

The trial will be carried out in a length and width as directed by Engineer.

The mix from the plant shall be laid upon prepared base in required quantity; mix shall be spread by grader.

Levels of surface shall be checked regularly during spreading and all high & low areas rectified by adding/removing material.

If segregation of fine/Coarse particles is observed, mix shall be removed from that stretch & will be re-laid.

After spreading of mix Vibratory roller shall be used at uniform speed of 5Km/Hr. in parallel lanes. Each pass shall connect up to the previous pass to give the full coverage to the area.

Rolling shall be continued until desired density of minimum 98% of the maximum dry density for the mix is achieved.



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After compaction Modified Proctor Density Test shall be carried out to check the extent of compaction and surface levels should be recorded & conform as specified.

Information to be Recorded during execution of Trial Stretch (GSB):

Date:	Location:
Length of Stretch:	Width of Stretch:
Source of Material & its composition:	Weather:
Machinery Used:	Manpower Used:
Loose thickness of Layer:	Compacted Thickness of Layer:
Type of Roller:	Number of Passes of Roller: (tyre, size & tyre pressure)
Frequency of Vibration:	Amplitude of Vibration:
Field Density & Moisture Content after Compaction:	

Type of Plant & MACHINERY TO be used: -

- i) WMM Mixing Plant For mixing of graded material in Plant.
- ii) Dump truck For transporting the material from the mixing yard/ plant site to the work area
- iii) Motor Grader The motor grader shall be used for spreading.
- iv) Compactor
 - 1) Vibrating roller for compacting soil
 - 2) Smooth wheeled roller for compacting soil
- vi) Water Tanker with approved spray bar

MATERIALS

The material to be used for the work shall be crushed stone only depending upon the grading required. The material shall be free from organic or other deleterious constituents and conform to grading -I given in Table 400-1.

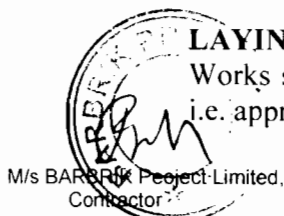
Prior to the laying of sub-base, a Request for Inspection of material shall be submitted which will indicate compliance with the specified properties of sub-base material.

LAYING EQUIPMENT

As Mentioned Above (Trial Stretch Methodology)

LAYING PROCEDURES

Works shall commence upon the approval and acceptance of sub grade formation layer i.e. approval on the line, levels and density of sub grade by the Engineer.



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Field Density test by sand replacement method (or other approved by the Engineer) shall be carried out at the specified intervals or greater as directed.

Request for Inspection to commence the next layer will be submitted, accompanied with appropriate test result sheets and leveling details.

SITE RECORDS

Competent personnel will supervise the overall work and maintain the following records:-

- (i) Date of laying
- (ii) Weather
- (iii) Location and length of operations
- (iv) Compaction results

TESTS REQUIRED

As specified in the contract specifications.

WET MIX MECHANICAL PAVEMENT

GENERAL

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared subgrade/sub-base/base or existing pavement as the case may be in accordance with the requirements of these Specifications.

TRIAL STRETCH METHODOLOGY

The trial will be carried out in a length and width as directed by Engineer.

The mix from the plant shall be laid upon prepared base in required quantity; mix shall be spread by WMM Mechanical Paver.

Levels of surface shall be checked regularly during spreading and all high & low areas rectified by adding/removing material.

If segregation of fine/Coarse particles is observed, mix shall be removed from that stretch & will be re-laid.

After spreading of mix Vibratory roller shall be used at uniform speed of 5Km/Hr. in parallel lanes. Each pass shall connect up to the previous pass to give the full coverage to the area.

Rolling shall be continued until desired density of minimum 98% of the maximum dry density for the mix is achieved.

After compaction Modified Proctor Density Test shall be carried out to check the extent of compaction and surface levels should be recorded & conform as specified.

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Information to be Recorded during execution of Trial Stretch (WMM):

Date:	Location:
Length of Stretch:	Width of Stretch:
Source of Material & its composition:	Weather:
Machinery Used:	Manpower Used:
Loose thickness of Layer:	Compacted Thickness of Layer:
Type of Roller:	Number of Passes of Roller: (tyre, size & tyre pressure)
Frequency of Vibration:	Amplitude of Vibration:
Field Density & Moisture Content after Compaction:	

Type of Plant & MACHINERY TO be used: -

- i) WMM Plant For mixing of graded material of WMM.
- ii) Dump truck For transporting the material from the mixing yard/ plant site to the work area
- iii) Paver Finisher The mix shall be spread by a mechanical Paver finisher
- iv) Compactor
 - 1) Vibrating roller for compacting soil
 - 2) Smooth wheeled roller for compacting soil
- v) Water Tanker with approved spray bar

MATERIALS

Prior to the laying of base course, a Request for Inspection of material shall be submitted which will indicate compliance with the specified properties of base course material.

The material shall conform to the specifications.

LAYING EQUIPMENT

As Mentioned Above (Trial Stretch Methodology)

LAYING PROCEDURES

Works shall commence upon the approval and acceptance of sub grade formation layer i.e. approval on the line, levels and density of sub grade by the Engineer.

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Field Density test by sand replacement method (or other approved by the Engineer) shall be carried out at the specified intervals or greater as directed.

Request for Inspection to commence the next layer will be submitted, accompanied with appropriate test result sheets and leveling details.

SITE RECORDS

Competent personnel will supervise the overall work and maintain the following records:-

- (i) Date of laying
- (ii) Weather
- (iii) Location and length of operations
- (iv) Compaction results

TESTS REQUIRED

As specified in the contract specifications.

BITUMINOUS WORK

GENERAL

The material quality shall meet the requirements of Specifications provided.

The bitumen for Dense Graded Bituminous Macadam work shall be paving bitumen of penetration grade 60/70 (VG-30) & Bituminous Concrete work shall be carried out with the modified bitumen (CRMB-55) which **shall be a product from the refinery.**

The aggregate shall be surface dry and shall be mixed at 155⁰c - 163⁰c temperature.

The mix material temperature as delivered to the laying site shall be between 120⁰C to 160⁰C.

EQUIPMENTS

Plant required to produce Bituminous Mixes shall be:

- (i) Batch Mix Type Hot Mix Plant
- (ii) Wheel loader

Machineries required for laying Bituminous Mixes

- (i) Tipper Trucks
- (ii) Sensor Paver



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- (iii) Tandem Roller
- (iv) Bitumen Sprayer

PROCEDURES

Trial mix and Trial lay shall be carried out to assess the suitability of the mixing, laying and compacting plant and to establish the sequence of the laying operation.

Works shall commence on site upon approval and acceptance of the Bituminous Mixes and layers.

The trial area shall be at least 50m long and 3 m wide.

The sampling of the mixture shall be carried out at the plant to conduct different tests as specified as approved by the Engineer.

The surface to receive the DBM layer / Bituminous Concrete wearing course shall be freed of all dirt, loose materials and standing water, and keep dry.

Tack coat of approved bitumen emulsion shall be applied as per Specifications on the prepared surface prior to laying of the bituminous concrete wearing course.

The DBM / Bituminous Concrete shall be plant-mixed with bitumen content as established in the design mix.

The approved bituminous mixture shall be delivered to site by tipper trucks. To prevent the loss of heat, the mixture shall be covered, if necessary.

The DBM layer / Bituminous Concrete shall be laid in single layer.

If the said surface is open-textured, back casting shall be carried out and the bigger size aggregates removed before rolling.

At the end of the paving operation, the transverse joint shall be feathered down. Vertical joint shall be provided for the next operation of paving.

Compaction shall be carried out using the specified/equivalent type of compactors and the rolling pattern shall be as agreed with the Engineer.

Rolling shall always commence from the lower end to the higher side of the carriageway. The minimum rolling temperature shall be at the specified temperature.

The surface of the DBM layer / Bituminous Concrete shall be finished to the grade and line as required by the Drawings, within the tolerance limits.


On completion of laying and compaction, checks shall be carried out to verify compliance with the specified requirement.

SITE RECORDS

Date, location and length (chainage) of B.C. laid

Temperature of mix at site on arrival and while rolling




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Weather

Machinery used and working time

Field test results

Compacted thickness of the layer

Pavement riding quality

Pavement level tolerances as per provisions of the contract

Reasons for delay or obstructions, if any

TESTS REQUIRED

The control tests on material and work shall be performed as per Contract specifications.

CONCRETE WORKS

GENERAL

Concrete in the grades of M-15, M-25, M-30 and M-35 is used in various R.C.C. components. The mixes will be designed and tested for approval of Engineer before the work is commenced. The manufacture, transporting, placing and compaction are stated hereunder.

EQUIPMENTS:

Concrete batching/mixing plant

Concrete Mixers with integral weigh batching facility Electrical or petrol driven

Vibrators with shaft dia. 25mm, 40mm and 60mm

Electrical form vibrators (12000 rpm)

Dewatering pumps (Diesel or electrical)

Shoring & strutting materials

TESTS TO BE CARRIED OUT:

All tests shall be carried out as per the specifications

Cement from each lot shall be tested.

Temperature of concrete at the time of laying

Slump test for workability determination

Concrete cube tests for compressive strength.

Periodical tests on fresh concrete shall be performed to verify the mix gradation values.



PROCEDURES

Before commencing with the project work, samples of all materials going into the concrete shall be tested in the field laboratory for approval. Test certificates will be furnished to the Engineer, as required in the specifications.

Design mixes for various grades of concrete and for various sources of materials will be determined by tests to be carried out by Material Engineer.

Advance planning will be done for every activity connected with concreting, and the Engineer will be notified of the Programme in advance as stipulated in the contract.

When the reinforcement and formwork for any concrete lift or component is ready, the central batching plant will be notified the date, timings, quantity and grade of concrete to be delivered at site. On receipt of Engineers approval, the concrete will be produced to design mix and dispatched to site from batching/mixing plant in transit mixers or dumper. The rate of dispatch will be controlled from site by wireless communication, or other means. For smaller works tilting drum concrete mixers may be used at site to produce concrete duly observing all the contract stipulations, with the permission of the Engineer.

The concrete brought to site will be tested for slump, and if found not workable for the component being concreted super plasticisers may be used to make the mix workable. If the lead-time for the transit truck mixer is more than an hour, retarders may be added to the mix. Six test cubes shall be taken for each component, out of which 3 cubes each will be tested at 7 days and 28 days respectively.

It will also be ensured that bar binders and shuttering jointers remain present during the placement of the concrete.

The vertical shuttering will be removed after 24 to 48 hours of completing the concrete. Curing will be commenced 24 hours after concreting ends, but in hot weather it will be started after 12 hours. If there are any minor surface deficiencies in the finish, these will be attended to and set right. Curing will be done with cover of wet sand below ground level, wet gunny bag/ straw above ground level and ponding of water on horizontal surfaces. In difficult positions, manually operated stirrup pumps etc will do continuous wetting.

The bottom support and shuttering of concreted elements will be removed after the period specified in the contract. Any surface deficiencies will be made good and duly cured.

PRECAUTIONS

A spare set of vibrators shall be kept as stand by.

In case the concreting is likely to continue beyond daylight with the approval of the Engineer, the generator set and floodlights shall be checked and kept available at site.

Rebar, formwork, levels and setting out should be checked and got approved by the Engineer's representative.



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The horizontal layers in concrete should not exceed 450 mm. Concrete normally will not be dropped freely from a height of more than 1.5 m.

The temperature of concrete while placing in formwork should be between 7⁰C and 40⁰ C.

SITE RECORDS

All concrete delivery notes indicating the slump test results and the structure component/location where placed.

Records of cube test results.

Weather condition (Temp. & Rainfall)


Components or lifts concreted during the day and their quantities.



ENVIRONMENT MANAGEMENT PLAN

The EMP provided in the Technical Specification shall be followed over all.
The exact details shall be rolled out periodically as the work progresses, keeping these activities as per schedule.




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Bhubaneswar.

Issue of Notice to proceed with the work

(letterhead of the Employer)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 34.1 and signing of the contract agreement for the construction of _____ @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of signatory authorized to sign on behalf of Employer)



M/s BARBRIK Project Limited,
Contractor.


Chief Engineer,
World Bank Project
O/o the E.I.C.(Civil), Odisha
Bhubaneswar

Chief Engineer,
World Bank Projects, Odisha

BANK GUARANTEE FOR ADVANCE PAYMENT

To: _____ [name of Employer]

_____ [address of Employer]

_____ [name of Contract]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, subclause 51.1 ("Advance Payment") of the above-mentioned Contract, _____ [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with _____ [name of Employer] a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ [amount of guarantee] / _____ [in words].

We, the _____ [bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ [name of Employer] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ [amount of guarantee]¹ _____ [in words].

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between _____ [name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal: _____

Name of Bank/Financial Institution: _____

Address: _____

Date: _____

1 An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.




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